EXHIBIT 4

TO THE COMMENTS

OF RELPROMAX ANTITRUST INC.

EXHIBIT

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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF COLUMBIA

UNITED STATES

Plain

vs.

MICROSOFT CORI

Defenc

n No. 94-1564 (SS)

FILED

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Clerk, U.S. District Court
District of Columbia

MEMORAI TION TO

The economic arguments in t ...emorandum were prepared in extensive consultation with the following economists. However, because of the shortness of time, counsel retained complete responsibility for the contents of this document.

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The Department of Justice has determined that from 1988 through July 1994, a period during which the number of personal computers in the United States virtually exploded. Microsoft Corporation successfully used a variety of unlawful and "anticompetitive" practices to maintain its monopoly position in the market for "operating systems" for use with personal computers. As a result of these unlawful practices, Microsoft has been able to preclude any meaningful competition in the market while increasing the installed base of Microsoft operating systems from well under 20 million in 1988 to approximately 120 million in 1994.

This memorandum[1] will show that under established economic theory, this now-massive installed base will enable Microsoft, if unchecked, both to maintain its monopoly in the operating systems market, and to leverage its installed base to dominate and monopolize the markets for applications and other software products. This brief also will show that the Department's proposed decree completely fails to address the consequences of the huge increase in installed base that Microsoft has procured through illegal practices. Instead, the Department simply proposes to shut the barn door now that the horse has already gone.

Under established economic theory, it is clear that the proposed decree will neither result in an increase in competition in the operating systems market, nor prevent Microsoft from monopolizing the remainder of the software industry. These amici accordingly urge the Court to require further submissions from the Department, both by way of expert affidavits and the production of documents, to explain how permitting Microsoft to profit from

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[1] This memorandum amici curiae is submitted by Wilson, Sonsini, Goodrich & Rosati on behalf of certain clients that prefer to retain their confidentiality. Hence, they are not identified in this submission.

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its illegal conduct not just by continuing, but by expanding, its monopolization of the software industry can be argued to be in the "public interest."

I

INTRODUCTION AND SUMMARY

This Court has been asked to endorse the proposed Consent Decree between the Department of Justice and Microsoft without being provided with any of the information upon which a meaningful determination under the Tunney Act could be based. Thus, for example, the Department's investigation ostensibly inquired regarding "alleged false product preannouncements" by Microsoft. 59 Fed. Reg. 59,426, 59,427 (Nov. 17, 1994). At the September 29, 1994 hearing on this matter, the Court referred to this issue, noting that in the book Hard Drive,[2] Microsoft was said "time after time" to predatorially preannounce products "with the intent [to] freeze other people from coming out with their product." Tr. of Status Call, Sept. 29, 1994, at 16:21-22. The following colloquy then took place between Microsoft's counsel and the Court:

The Court:	[H]ow do you answer those charges?
Mr. Urowsky:	Those charges we believe are entirely false.
The Court:	In other words, the vaporware charge is false?
Mr. Urowsky:	That's correct.

Id. at 15:7-12, 16:18-17:1.

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[2] James Wallace & Jim Erickson, Hard Drive: Bill Gates and the Making of the Microsoft Empire (1992).

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Microsoft's representations, however, are belied by Microsoft's own documents, produced to the Government during the course of its investigation. (Examples of such documents are attached hereto at Appendix Exs. 21 and 22.)[3] Thus, for example, a Microsoft manager was involved in spearheading two product preannouncements during one six-month period. In one instance, the manager wrote that in response to "Borland's announce[ment of] TurboBASIC at the November Comdex," he simultaneously worked "to develop a [Microsoft] spec[ification] that could beat TurboB," while also formulating a promotional campaign "that could hold our position until [QB3, the Microsoft product] hit the market."[4] He stated that he "reviewed [this] promotion plan with Bill G. before implementation." Id. The Microsoft documents state that Steve Ballmer, one of Microsoft's top executives, favorably commented on this strategy, saying that the "best way to stick it" to Borland was such a "QB3 preannounce to hold off Turbo buyers."[5]

In the same document, the Microsoft manager wrote that Microsoft was "not as far along on the response to [Borland's] Turbo C," a second product, because Microsoft was "further from product announcement." According to the Microsoft document, the Microsoft manager:

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[3] Exhibit numbers refer to selected supporting documents which have been included in the Appendix to this Memorandum of Amici, filed herewith. For the Court's convenience, documents in the Appendix have been organized alphabetically by publication title.

[4] Microsoft Corp. Employee Performance Review, dated May 4, 1987, at 3 (Ex. 21). (Although this review has become a public document, these amici have redacted the review to safeguard the employee's privacy interests.)

[5] Microsoft Corp. Employee Performance Review, dated Nov. 2, 1987, at 8 (Ex. 21). (Although this review has become a public document, these amici have redacted the review to safeguard the employee's privacy interests.)

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> developed a rollout plan for [Microsoft's products] QuickC and CS that focused on minimizing Borland's first mover advantage by preannouncing with an aggressive communication campaign.[6]

The manager was given the highest possible rating on his performance review (a "5-") for his "public relations" handling of this "C preannouncement."[7]

Perhaps even more striking than the incongruence between Microsoft's representations and its own documents is the silence by the Department, both in its written submissions and in its oral presentation to the Court, regarding its findings on this and other matters. The Department has not taken the position (nor, presumably, could it, without some explanation of the documents that have been submitted to it) that Microsoft has not engaged in practices such as predatory preannouncements, or the seeding of what are referred to as "undocumented calls" (secret elements in an operating system that make a competitor's applications program operate less well than a rival Microsoft program).[8] Instead, the Department simply has asserted that it had determined that "no further action was warranted" on these matters -- presumably a conclusion that it asks this Court to take completely on faith, since it has provided the Court with literally no explanation for its decision.

Most remarkable of all, however, is the absence of any information in any of the Department's submissions regarding the adequacy of its proposed remedy for Microsoft's illegal monopolistic conduct. Based on the Department's own allegations, from 1988 to 1994 Microsoft used a variety of illegal tactics to maintain its monopolistic share in the rapidly growing

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[6] Id. at 6.

[7] Microsoft Corp. Employee Performance Review, dated May 4, 1987, supra, at 3 (Ex. 21).

[8] Examples of such "undocumented calls" will be described in Section IV, infra.

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operating systems market -- and thus increased the size of its installed base through the use of illegal tactics from no more than 18 million[9] to approximately 120 million users.[10] Having acknowledged that Microsoft thus illegally acquired its massive installed base, the Department nonetheless has failed to proffer any basis for concluding that simply prohibiting these practices in the future will remedy the unassailable position that Microsoft has gained as a result of its unfair and illegal practices.

Certainly no one in the industry believes that the Department's proposed remedies will have the slightest effect in unseating Microsoft from the position that it now illegally occupies. As one competitor observed after the consent decree was announced, "[t]he consent decree seems to have set [Microsoft] free. . . . Now, they are running rampant over

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[9] According to industry consultant Jerry Schneider, Microsoft's installed base in March 1988 was only nine to twelve million. Dump DOS? No Way, Not Yet, Computer Decisions, March 1988 at 50 ("between nine and twelve million DOS machines"). Indeed, according to Business Week, no more than twelve million PCs had been sold by April 1988. Will Sun Melt the Software Barrier, Business Week, April 18, 1988, at 72 ("Sun aims to coax a portion of the 12 million owners of PCs and clones into the UNIX camp.") The more expansive measure taken by industry analysts at International Data Corp. indicated there were "approximately 18 million IBM PCs and compatibles worldwide," in March 1988. Alan Radding, IBM PC Orphans Hang On To A Good Thing, Computerworld, March 7, 1988, at 81. Therefore, even under the assumption that Microsoft's operating system software had been installed in every IBM PC or compatible sold by 1988, Microsoft's installed base at that time was no larger than eighteen million. Cf. Christopher O'Malley, The New Operating Systems, Personal Computing, October 1986, at 181 ("better than 95 percent [of then-existing] PC's and compatibles use] Microsoft's disk operating system.").

[10] Amy Cortese, Next Stop, Chicago, Business Week, Aug. 1, 1994, at 24 ("120 million MS-DOS customers (including 55 million Windows users)"). See also OS Overview, Computer Reseller News, Aug. 22, 1994, at 223 (International Data Corporation table) (DOS and Windows installed base of 110.1 million).

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everything."[11] Microsoft entirely agrees. As Bill Gates observed in his response to the proposed decree:

> None of the people who run [Microsoft's seven] divisions are going to change what they do or think or forecast. Nothing. There's one guy in charge of [hardware company] licenses. He'll read the agreement.

Elizabeth Corcoran, Microsoft Deal Came Down to a Phone Call, Washington Post, July 18, 1994, at A1 (Ex. 42).

Nor have events since the decree was proposed provided the slightest basis for believing that the Department's proposed remedy will have any effect. In a nationally televised press conference on July 16, 1994, Attorney General Janet Reno predicted that the Department's settlement with Microsoft would have two results: it "will save consumers money [and] enable them to have a choice when selecting operating systems."[12] In fact, however, in the six months since the proposed settlement was announced, press reports indicate that Microsoft has literally doubled the price of its operating system to computer manufacturers.[13]

Moreover, far from the decree leading to an increase in competition in the operating systems market, a key competitor in that market, the maker of DR DOS, has subsequently withdrawn from the market. The competitor observed in withdrawing from the

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[11] Amy Cortese, No Slack for Microsoft Rivals, Business Week, Dec. 19, 1994, at 35 (Ex. 5).

[12] Attorney General Janet Reno, Department of Justice Press Conference Transcript Microsoft Settlement (July 16, 1994) at 2 (Ex. 12).

[13] Amy Cortese, Business Week, Dec. 19, 1994, supra, at 35 (Ex. 5) ("Computer makers have been startled to learn that they will be asked to swallow a huge price hike for their use of Windows 95 -- to as much as $70 per PC, vs. roughly $35 today.").

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market that "the battle for the desktop is over and MS DOS and Windows have won."[14] The withdrawal of DR DOS from the market is of particular note since it was DR DOS that the authors of Hard Drive pointed to as providing the most likely source of meaningful competition to Microsoft in the operating systems market. See Hard Drive, supra, at 398.[15]

Having failed to explain how its proposal will remedy Microsoft's illegal acquisition of its massive installed base in the operating systems market, the Department's submission does not even touch on Microsoft's use of that illegally acquired installed base to leverage into -- and acquire market power in -- other software markets. In analyzing the strength of the Department's case against Microsoft, Hard Drive identified Microsoft's weakness in application programs as the principal reason (apart from the competition provided by products such as DR DOS) why Microsoft's dominant position arguably would not hurt consumers. With respect to application programs, the authors in 1992 argued that

> Microsoft does not come close to dominating the Big Three of applications--word processing, databases and spreadsheets. WordPerfect is far ahead of Microsoft Word, Lotus 1-2-3 is still ahead of Excel, and Microsoft has nothing to compete against Ashton-Tate's dBASE.

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[14] Larry Campbell, Novell to Introduce SuperNOS Strategy, South China Morning Post, Sept. 20, 1994, at 1 (Ex. 37) (quoting Robert Frankenburg speech to Networld + InterOp '94 conference). See also Bob Lewis, Ten Troublesome Trends in Computing That Are Sure to Spook You, InfoWorld, Oct. 31, 1994, at 82 ("Let's all admit that NextStep and QNX should have all of the market if there was any justice," but Microsoft's "Windows and DOS have more than 80 percent market share, so the war is over!").

[15] Nor has the irony of this withdrawal been lost on the computer industry. As one observer noted: "July [of 1994] saw Microsoft in full agreement with the Justice Department. Microsoft agreed to withdraw the 'per processor' option that most PC suppliers found the cheapest way to buy DOS [in order to] encourage firms to offer alternatives to Microsoft's operating systems. Shortly afterward, Novell announced that it was stopping development of DR-DOS." Jack Schofield, Computing 94: Processor Wars and Rumors of Delays, Guardian, Dec. 29, 1994, at T14.

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Hard Drive, supra, at 398.

What a difference three years can make -- at least when, like Microsoft, a company can leverage its installed base in operating systems, and finance early losses in applications with monopoly profits from operating systems. Under the headline "MICROSOFT'S DOMINATION," Dataquest Inc. has reported the 1994 market revenue and share figures for the applications market:

> "Lotus 1-2-3, WordPerfect, dBASE, Paradox and Harvard Graphics once dominated their respective categories," said Dataquest analyst Karl Wong. "Today, Microsoft products have replaced each of these one-time product category leaders."

Microsoft's Domination, San Jose Mercury News, December 21, 1994, at 1F (Ex. 35).[16]

Microsoft did not achieve its dominant position in operating systems and applications through free and open competition on a level playing field. Rather, it used the illegal tactics challenged in the Government's complaint to create a huge installed base in operating systems. Then, it took unfair advantage of its installed base to give its own applications group a head start and its programs a performance advantage over applications competitors -- precisely the concern voiced in Hard Drive[17] and echoed by this Court.[18]

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[16] Indeed, in 1990 Microsoft began to bundle its application products together into so-called "suites." These suites are the fastest growing segment of the applications market, and Microsoft commands more than 85% of the suite market. See Personal Computing Software Worldwide, Dataquest, June 27, 1994, at 20 (selected pages at Ex. 11) (unit shipments of suites grew more than 350% in 1993); id. at 27 (Microsoft's 1993 market share for suites is 85.4%); Doug VanKirk, Integrated Office Suites, InfoWorld, Feb. 7, 1994, at 51 ("Microsoft owns a 90 percent share of the suite market. . . .").

[17] Hard Drive, supra, at 398-99.

[18] Tr. of Status Call, Sept. 29, 1994, at 25-28.

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"Microsoft has never had a hit among its MS-DOS applications programs."[19] Yet, in the past few years, Microsoft has come from nowhere to provide the lion's share of business application programs.[20]

As explained in this brief, Microsoft achieved that result by the illegal tactics charged by the Government, and by illegal tying techniques, monopoly leveraging, and otherwise predatorially exploiting its monopoly position in one market to achieve market power in other markets. Because of the type of economic forces that prevail in these markets, rigorous economic analysis predicts that, unless restrained by Government action, Microsoft will succeed in using its dominance in operating systems to monopolize all other aspects of transaction software, from desktop applications to online systems. Microsoft's goal is to identify and control every "strategic component," "choke point" or "leverage point" in the information economy.[21] And Microsoft is already close to achieving a complete lock-in in desktop applications.

This Memorandum of Amici argues that the Proposed Final Judgment is not in the public interest and should not be entered by this Court. Indeed [illegible] economically impossible to achieve the stated goals of greater choices and lower prices for operating systems without (1) addressing the increase in installed base that Microsoft has procured through illegal practices and (2) restraining Microsoft's use of that installed base to dominate the markets for applications and other software products.

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19 Ron White, Microsoft Gives the New Word, PC Week, Oct. 20, 1987, at 95.

20 See, e.g., Brent Schlender, Bill Gates: What Doesn't He Want, Fortune, Jan. 16, 1995, at 36.

21 Id. at 47.

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This Memorandum of Amici is divided into seven sections. This first section provides a summary and overview of the brief. The second section addresses the scope of investigation and power of this Court under the Tunney Act. In particular, the second section argues that, under 15 U.S.C. § 16(e), the Court not only can but should consider the effect of the proposed decree beyond the operating systems market. The section further argues that the Department's submission falls far short of providing the Court with an adequate record upon which to act, and provides no factual predicate for concluding that the decree's remedy is even arguably within the "public interest" under Section 16(e).

The remainder of the brief explains that the Government cannot effectively restore and maintain competition -- even in the operating systems market -- without addressing both the consequences of the "installed base" that Microsoft increased through illegal means, and the use of Microsoft's resulting market power more broadly. Section III describes the markets and technologies in which Microsoft operates and lays a foundation for an understanding of Microsoft's conduct and strategic direction. The section begins by describing the interrelationships among complicated software technologies and demonstrates that the various markets in which Microsoft competes are parts of a large network that can be entered by a competitor's product through a few key gateways, the principal gateway being the desktop operating system. Using economic analysis, the section then argues that the economic characteristics of the technologies and markets at issue differ markedly from other, more conventional industries, in that these products (software products) and markets (networks) exhibit "increasing returns," also sometimes called "network effects." The section discusses the underlying characteristics of the technology that gave rise to these conditions and the likely consequences that these circumstances will produce.

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Section IV of the brief explains Microsoft's strategy and evaluates Microsoft's prospects for complete domination of all of the interconnected software markets. The section begins by explaining that Microsoft increased its "installed base" in operating systems through the illegal practices charged in the Government's complaint. The section then explains and documents the fact that Microsoft pursues a strategy of leverage from "gateway" markets, like the desktop operating system in which it is dominant, to strategic markets in which its competitive position is weak (as was the case in applications). Microsoft targets such strategic markets, establishes marketing and technological links to those markets from established monopolies in gateway markets, and leverages its power to monopolize the target markets. In other words, it transfers the installed base of a gateway market it dominates to create an installed base in the strategic target market. The section focuses primarily on the desktop market, describing in some detail the method by which Microsoft (according to the Government's Tunney Act filing) used illegal activities to increase its installed base in operating systems and then leveraged its monopoly over the operating system to dominate applications. In particular, the section describes Microsoft's tactics of bundling and unbundling functions into and out of its operating system to disadvantage its competitors in the applications market.

Section V of the Memorandum of Amici applies "increasing returns" economics to suggest that Microsoft likely will achieve a monopoly position for its products throughout the entire personal computer network unless restrained by Government action. The section rejects various arguments that could be put forward to justify such monopolization, including the arguments (1) that alternative networks created by alliances of competitors will provide competition, and (2) that the benefits derived from integration of a single product line are worth the cost in loss of free competition throughout the network. The section concludes by suggesting

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that absent meaningful governmental intervention, the American software industry will be monopolized by Microsoft, with the only competition coming from protected markets and competition abroad.

Section VI evaluates the possibilities and prospects for governmental intervention from the legal perspective. The section begins with an evaluation of the proposed Final Judgment, observing that the Government's Tunney Act filing concedes that Microsoft, through the use of illegal practices, has acquired an enormous installed base that constitutes an overwhelming barrier to entry. The only sanction proposed by the Government, requiring Microsoft to cease the behavior that permitted it to acquire this entrenched installed base, will have no effect in diminishing the installed base, easing barriers to entry, or otherwise precluding Microsoft from using the illegally acquired installed base to monopolize the operating system market or other markets. The section considers specific strategies for relief adopted by previous Administrations in comparable situations and analyzes legal precedents supporting such strategies.

Finally, Section VII of the brief proposes procedures this Court may wish to adopt in order to exercise its appropriate role in Tunney Act proceedings. The section urges the Court to order the production of key Microsoft documents and to require the Government to produce detailed and predictive economic models of the type previously employed to support consent decrees adopted through Tunney Act procedures.

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II

THE PERMISSIBLE SCOPE OF THIS COURT'S REVIEW

In 1974 Congress enacted the Antitrust Procedures and Penalties Act ("APPA"), also known as the "Tunney Act," 15 U.S.C. §§ 16(b)-(h) (1994), out of concern with "prior practice, which gave the [Justice] Department almost total control of the consent decree process, with only minimal judicial oversight." United States v. American Tel. & Tel., 552 F.Supp. 131, 148 (D.D.C. 1982) ("AT&T"), aff'd sub nom. Maryland v. United States, 460 U.S. 1001 (1983). To remedy this practice, Congress sought to eliminate "judicial rubber stamping" of such consent decrees,[22] providing that "[b]efore entering any consent judgment ... the court shall determine that the entry of such judgment is in the public interest." 15 U.S.C. § 16(e). Circuit Judge Aldrich, sitting by designation in United States v. Gillette Co., 406 F.Supp. 713 (D. Mass. 1975) (cited by both the Department and Microsoft), observed upon reviewing the legislative history of the Act:

> The legislative history shows clearly that Congress did not intend the court's action to be merely pro forma, or to be limited to what appears on the surface. Nor can one overlook the circumstances under which the act was passed, indicating Congress' desire to impose a check not only on the government's expertise -- or at the least, its exercise of it -- but even on its good faith.

Id. at 715.[23]

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[22] As the sponsor of the Act, Senator Tunney, declared: "Specifically, our legislation will . . . make our courts an independent force rather than a rubber stamp in reviewing consent decrees, and it will assure that the courtroom rather than the backroom becomes the final arbiter in antitrust enforcement." The Antitrust Procedures and Penalties Act: Hearings on S. 782 and S. 1088 before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary, 93rd Cong., 1st Sess. (1973).

[23] Accord AT&T, 552 F. Supp. at 148 (Congress had "found that consent decrees often (continued...)

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Despite this clear statutory intent, the oral and written submissions in the present case have suggested that the Court's review should be circumscribed in ways not supported either by the statute or by existing case law. First, the submissions may be taken as suggesting that the Court should look only to the impact of the proposed decree on the operating system market in determining whether the decree is in the public interest. See, e.g., 59 Fed. Reg., at 59,429. The law, however, plainly is otherwise. For example, in United States v. BNS Inc., 858 F.2d 456 (9th Cir. 1988), -- a case relied upon by the Department -- the Court observed that "the statute suggests that a court may, and perhaps should, look beyond the strict relationship between complaint and remedy in evaluating the public interest." 858 F.2d at 462 (quoting United States v. Bechtel Corp., 648 F.2d 660, 666 (9th Cir.), cert. denied, 454 U.S. 1083 (1981)). While the court's public interest determination may not be based on a different market from the one identified in the complaint, the Ninth Circuit emphasized that this did not mean that only effects on that market can or should be considered:

> [T]he statute clearly indicates that the court may consider the impact of the consent judgment on the public interest, even though that effect may be on an unrelated sphere of economic activity. For example, the government's complaint might allege a substantial lessening of competition in the marketing of grain in a specified area. It would be permissible for the court to consider the resulting increase in the price of bread in related areas.

Id. at 463 (emphasis added).

Under the Department's own authority, therefore, the Court's inquiry is not limited to the effect of the proposed judgment on the operating system market. To the contrary,

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[23](...continued)
failed to provide appropriate relief, either because of miscalculations by the Justice Department or because of the 'great influence and economic power' wielded by antitrust violators").

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the Court can (and, it is submitted, should) determine the effect of the proposed judgment on other areas impacted by Microsoft's monopolistic conduct. As will be discussed in more detail in Section IV, infra, for example, Microsoft has used its illegally acquired market position to leverage into and acquire a monopoly in other related markets. The failure of the decree to "break up or render impotent [this] monopoly power found to be in violation of the Act." AT&T, 552 F. Supp. at 150 -- indeed, its tacit decision to leave Microsoft free to profit from its unlawful market power by leveraging into other software markets -- is something that the Court should consider in evaluating the public interest served (or disserved) by the proposed decree.

A second limitation implied in the submissions to the Court also is without authority in the case law, namely, that the Court is limited to considering those matters that the Department has identified in its complaint. That is not the law. See, e.g., BNS, 858 F.2d at 462 ("a court may consider matters not discussed in the complaint"); Gillette, 406 F.Supp. at 715 ("Congress did not intend the court's action to be . . . limited to what appears on the surface"). Indeed, simply accepting at face value the Department's analysis -- and even its good faith -- amounts to precisely the kind of "rubber stamping" that the APPA expressly rejects. The Court is required, in evaluating the Department's proposed decree, to determine whether it "meets the requirements for an antitrust remedy -- that is, if it effectively opens the relevant markets to competition and prevents the recurrence of anticompetitive activity." AT&T, 552 F. Supp. at 153. If the Department has determined not to address a practice -- for example, Microsoft's "bundling" of operating and applications programs, discussed in more detail in Section IV, infra -- which forecloses any meaningful chance of competition in the operating systems market, that fact must be considered by the Court in assessing the adequacy of the decree as a remedy for the charged violations. That is so regardless of whether the Department

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has chosen to turn a blind eye to the consequences of such bundling on the effectiveness of its proposed decree.

Finally, prior submissions to the Court have emphasized that in assessing whether the decree is in the "public interest" under Section 16(e), the Court should not "determine whether the resulting array of rights and liabilities is the one that will best serve society, but only to confirm that the resulting settlement is within the reaches of the public interest." United States v. Western Electric Co., 900 F.2d 283, 309 (D.C. Cir. 1990), cert. denied, 498 U.S. 911 (1990) (citations and quotations omitted; emphasis in original). This standard clearly is correct, but the parties' further assertion -- that the submissions already made by the Department are sufficient to satisfy this standard -- equally clearly is not.

A comparison of the information provided in those cases relied upon by the Department, with that provided here, highlights just how far short the Department has fallen in providing this Court with an adequate record upon which to act. For example, the Department relies heavily upon the Court of Appeals' decision affirming a modification of the consent decree in United States v. Western Electric Co., Inc., 993 F.2d at 1572. See 59 Fed. Reg. at 59,429.[24] However, in finding that there was a sufficient "factual foundation for the judgment call made by the Department of Justice and to make its conclusion reasonable," 993 F.2d at 1582, the Court of Appeals in that case expressly pointed to the "array of prominent economists (including two Nobel laureates, Stigler and Arrow)," who had submitted affidavits in the record that supported the Department's position. These affidavits provided detailed support for the

[24] An initial difference between that case and the present one, of course, is that the initial decree in that case was entered after the District Court had already heard approximately 11 months of trial testimony from roughly 350 witnesses. See AT&T, 552 F. Supp. at 140.

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factual predicates underlying the Department's proposal, including the view that the Bell operating companies would not be able to discriminate or engage in cross-subsidization; that government oversight would be effective in regulating their behavior; and that the proposal would enhance competition in the relevant markets. See id. at 1578-82.

This Court, by contrast, has not been provided with the affidavit of any economist, or for that matter of anyone else, that would provide a factual predicate for any of the matters that it must decide in reviewing the adequacy of the proposed decree. The Department has provided no factual basis (other than its say-so) for believing that the remedies proposed in the decree would be sufficient to "pry open to competition" the operating systems market, AT&T, 552 F. Supp. at 150; that Microsoft's other anticompetitive practices (undocumented calls, predatory preannouncements, anticompetitive bundling and unbundling, early disclosure to Microsoft applications programmers) will not undermine the effectiveness of the decree; and so forth. Although this case involves an industry of unquestioned significance to the future of the American economy -- one of comparable importance to AT&T itself -- the Department has in fact given this Court nothing to go on other than the purest ipse dixit. Indeed, it is hard to imagine how the Department could claim that its request for approval of the decree amounts to anything but a request for a "rubber stamp" when it has so notably failed to say anything other than "trust us."

Nor does the Department's submission compare favorably with the information available to other courts in cases cited by the Department. In Gillette, for example, which first formulated the "reaches of the public interest" standard, see 406 F. Supp. at 716, Judge Aldrich concluded that he was able to make an independent determination regarding the adequacy of the proposed decree because "the record [in the case] is both open and extensive." Id. at 715.

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Here, the record is neither. Indeed, the transcripts of the hearings on September 29, 1994 and November 2, 1994 are replete with inquiries by the Court regarding matters inextricably tied to the adequacy of the proposed remedy -- inquiries that repeatedly failed to yield any information at all, or (even worse) information that is at odds with the record.

The example of preannouncements already has been discussed above: despite Microsoft's unequivocal denial, and the Department's silence, the documentary record shows that such predatory preannouncements in fact are used by Microsoft. Nor is this the only example highlighted by the transcript. Equally striking is the Court's effort to ascertain whether the Department had concluded that a "Chinese Wall" exists between Microsoft's operating system and applications divisions. Noting the discussion of this point in Hard Drive, the Court may have been left with the impression during the hearing that such a "Chinese Wall" in fact exists. See Tr. of Status Call, Sept. 29, 1994, at 27:11-28:1. Certainly that is the impression that Microsoft previously has sought to convey, dating all the way back to 1983.[25] Indeed, throughout the spring and summer of 1991, after the FTC announced its investigation of Microsoft in March 1991, Microsoft persisted in its claim that the company's applications and systems development groups were separated.[26]

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[25] See, e.g., A Fierce Battle Brews Over the Simplest Software Yet, Business Week, November 21, 1983, at 114 (Ex. 2) (quoting Microsoft executive Steve Ballmer) ("There is a very clean separation between our operating system business and our applications business . . . It's like the separation of church and state").

[26] See, e.g., Paul Andrews, Can Microsoft Just Do It?, Seattle Times, March 18, 1991, at B1 (Microsoft "repeatedly" asserted "that a 'Chinese Wall' exists between its applications and systems divisions"); Microsoft and IBM Under Investigation by FTC, Technical Computing, Apr. 1, 1991 ("Microsoft maintains that it does not take unfair advantage of advance knowledge of operating systems in designing its consumer products. It says there is a 'Chinese Wall' between systems and applications"); Michael Stroud, FTC Widens Probe of Microsoft

(continued...)

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Now, however, at the end of a long footnote in its written submission, Microsoft disavows that any such "Chinese Wall" exists -- and, indeed, derides the idea as "irrational." See Microsoft Mem. at 7 n.12. The Department, again, has been silent. Was its determination that "no further action [is] warranted" on this issue, 59 Fed. Reg. at 59,427, based on Microsoft's earlier representation that a "Chinese Wall" in fact exists? Was it based on the conclusion that there is no "Chinese Wall," but it does not matter? If not, why not?

The answers to these and other questions may remain unanswered because no satisfactory answer is available. As shown in Sections III through VI, infra, the Government cannot effectively restore competition in the operating systems market without addressing the consequences of Microsoft's illegally-acquired "installed base," and its broader use of its acquired market power. The Government's proposed consent decree, however, fails to do either.

III

THE ECONOMIC CHARACTERISTICS OF THE SOFTWARE INDUSTRY

Section III is divided into two parts. Subsection A provides background by describing the structure of the software industry and how it has changed over time in response to

[26](...continued)
Dominence, Investor's Daily, Apr. 15, 1991, at 1 ("Microsoft maintains that it keeps a 'Chinese Wall' between its operating system and applications divisions to prevent such an unfair advantage from occurring"); Sean Silverthorne, AMD Files $2 Billion Antitrust Suit Against Intel, Investor's Daily, August 30, 1991, at 1 (Microsoft responds to charges that its application developers receive "inside knowledge" about the company's operating systems by claiming that Microsoft "has erected a 'Chinese Wall' between the two operations.").

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Microsoft's prior conduct in the market. Subsection B describes the economic characteristics of the technologies and markets at issue here.

A. Market And Technology Background

The relevance of much of the material in this section, particularly the schematic diagrams, is fleshed out and explained to a great extent in the subsequent sections. If the Court is unfamiliar with these markets, the Court may find it useful at this point to read The Economist[27] article, and the Harvard Business Review[28] article, both found in the Appendix.

At the outset, two characteristics of these markets and technologies should be emphasized. First, the products at issue are software products, composed almost entirely of intellectual property content. Because of the nature of software, there can be greater flexibility in the formation of vertical relationships than often is present with respect to more conventional products. Unlike a pipeline, for example, many competitors can vertically link their software, through software compatibility, to products in the markets above and below them. So, for example, a number of different companies can make word processing application programs that work equally well with Microsoft's operating system so long as they all have the same technical information on a timely basis. It is not necessary for Microsoft to bundle -- or literally tie together -- its operating system and word processing program in order to ensure that the two programs work well together. With software, the efficiency benefits of vertical integration can be achieved without foreclosing access to competitors.

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[27] The Computer Industry Survey: Reboot System and Start Again, The Economist, Feb. 27-Mar. 5, 1993, at 3 (Ex. 14).

[28] Charles R. Morris and Charles H. Ferguson, How Architecture Wins Technology Wars, Harv. Bus. Rev., Mar. 1993, at 86 (Ex. 16).

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Second, the Stipulated Complaint and Final Judgment in this case focus on the personal computer operating system and the applications that run on top of it. Together, the personal computer operating system and the applications that run on it are sometimes known as the "business desktop." But the desktop is really only an interrelated component of a network that contains desktops (or "clients") and "servers." These software networks bear many of the characteristics that economists have associated with networks in other industries, including "increasing returns" or "network effects," as described in Subsection B. Indeed, software networks manifest increasing returns, or demand-side economies of scale, more strongly than networks in more conventional industries.

The network at issue here has four components, two on the "business" side and two on the "home" side. On both the home and business sides, there is a desktop, or "client," component, and a "server" component that links the desktop into a broader network. The network as a whole can be diagramed as follows:

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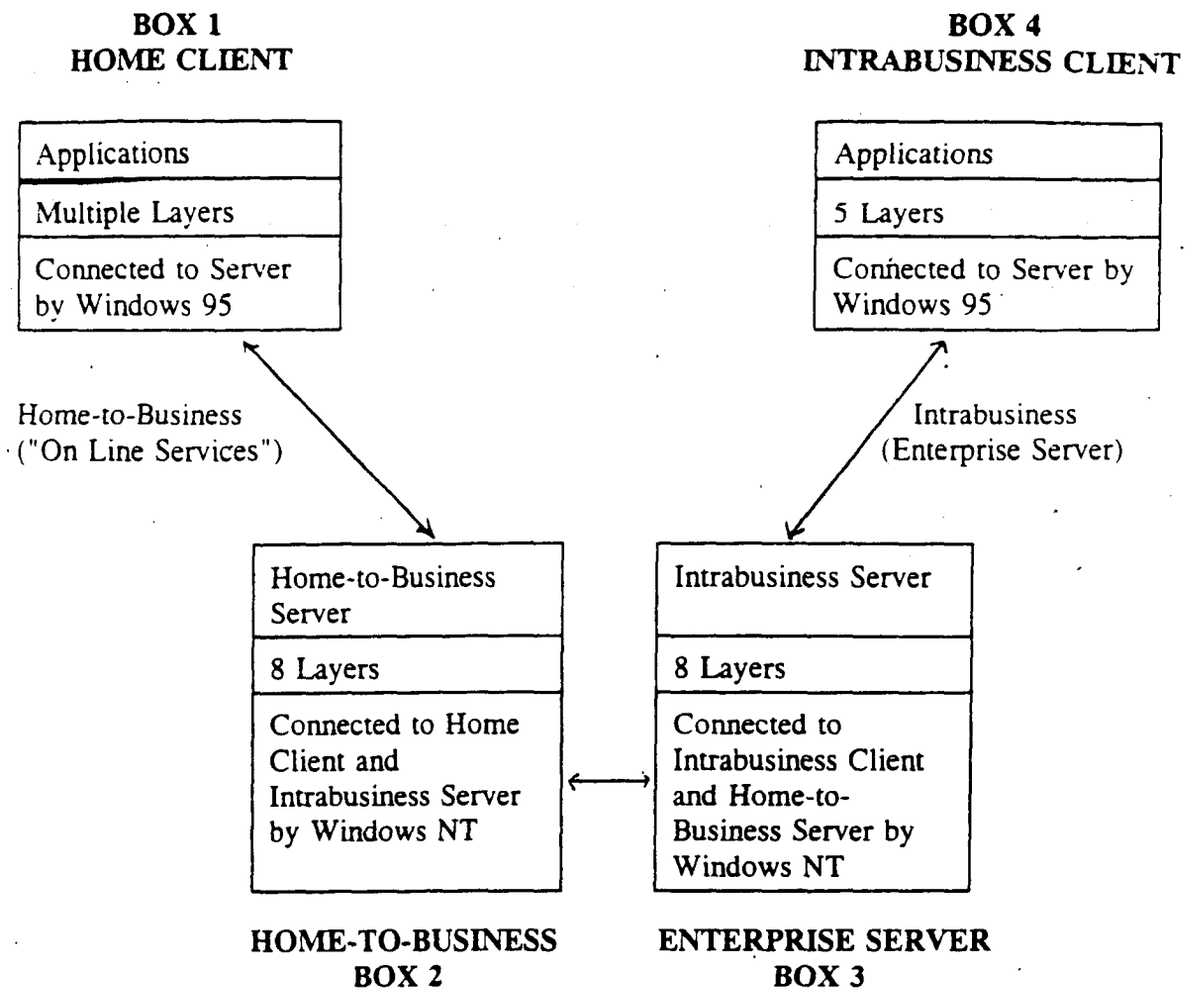

Figure 1

The following description attempts to provide some explanation for each of these boxes: the intrabusiness client, which runs on the "desktop"; the enterprise "server," meaning the hardware and software applications that run on a more centralized computer and that link the clients together; the home "client;" and the home-to-business server, that similarly links home personal computers ("PCs") into a larger network. This brief then discusses two particular technologies that play a critical role in understanding Microsoft's strategy: OLE and Windows.

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1. The Business Desktop

The personal computer or "PC" was initially devised as a stand-alone device, but today it is usually used as part of a network. This is certainly the case in business, and will increasingly be the case in the home.[29] The PC, both stand-alone and as part of a network, is often referred to as "the desktop." The FTC Investigation and the DOJ investigation of Microsoft have focussed on the desktop.

Prior to Microsoft Windows, the intrabusiness "client side" or desktop could have been thought of as having four layers.

Level	Name	Examples
4	Applications	Lotus 1-2-3, dBASE, WordPerfect, Harvard Graphics
3	Development Tools	Basic, Pascal, C
2	OS	Apple, CPM, MS DOS, DR DOS
1	Hardware	IBM, Apple, Kaypro

Figure 2

[29] See, e.g., All Things Considered (NPR broadcast, Nov. 17, 1994) ("if there's a sub-theme to this whole [Comdex] conference, it's networking, and Microsoft is the company that wants to connect all those different boxes that are going to be in your house."); Elizabeth Corcoran, Microsoft Heads Home: Software Giant Targets Huge Consumer Market With a Host of High-Tech Innovations, Washington Post, Nov. 13, 1994, at H1 (Ex. 44).

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Today, the market looks more like Figure 3 below. It reflects two principal changes, each of which will be explained in Section IV, infra. First, Microsoft succeeded in forcing the market to migrate to a new operating system or "OS" (Windows), thereby inserting a new layer, the "graphical user interface" (GUI) layer (layer 3), between the operating system and the applications. Second, using its leverage in layers 2 and 3, it has become dominant as well in development tools (layer 4) and business applications (layer 5).[30]

Level	Name	Examples
5	Applications	(a) Desktop applications (e.g., Lotus 1-2-3, dBASE, MS Word, MS Excel, WordPerfect) The Microsoft Office is a bundle of these applications made exclusively by Microsoft. (b) Client applications as part of a network (e.g., Oracle Financials, SAP, Peoplesoft, D&B Software, etc.)
4	Development Tools	Basic, Pascal, C, Borland C++, Powersoft
3	GUI and/or OS Services	MS Windows
2	Operating System	DOS, Apple, OS2/WARP, UNIX
1	Hardware	IBM, Apple, Compaq, Dell

Figure 3

[30] Layer 5 has been broken out into two parts to reflect the development of what are known in the industry as "client-server" applications: applications that run partially on the desktop, and partially on server hardware connected to the desktop by a computer network.

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The Justice Department investigation of Microsoft has focussed primarily on operating systems (Levels 2 and 3 in Figure 3), -- but the Government's Tunney Act submission also considers the applications layers (Levels 4 and 5) insofar as they impact competition in operating systems. In order to evaluate the proposed Final Judgment, a slightly more detailed understanding of the operating system layer is necessary.

The Government's complaint defines the market as operating systems that run on the Intel chip set (known as "X86" chips). 59 Fed. Reg. at 42,847 (Complaint ¶ 13). There were formerly three principal operating system vendors for this market -- Microsoft (MS DOS and Windows), Novell (DR DOS) and IBM (PC-DOS and OS/2). Novell, as indicated above, has withdrawn from this market, and Microsoft is unquestionably a monopolist, currently enjoying a greater than 90% market share.[31] Software written for the current version of Windows (v. 3.1) and prior versions will also run on the IBM OS/2 operating system. However, software written expressly for Microsoft's next release of Windows (Windows 95), due out in August of 1995, will not run on the IBM OS/2 operating system. Don Clark and Laurie Hays, Microsoft's New Marketing Tactics Draw Complaints, Wall St. J., Dec. 12, 1994, at B6 (Ex. 41).

There are a few other competing desktop operating systems that run on different chip sets. For example, Apple's Macintosh operating system runs on a Motorola chip set. And the UNIX operating system generally runs on a specially designed chip, such as the "RISC" (reduced instruction set) chip designed by Sun Microsystems.

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[31] PC Week, Feb. 21, 1994, at 39 (Paine Webber, Inc. Table) (excluding sales of Macintosh -- which does not use X86 chips -- Microsoft's 1994 market share was 92.4%). See also Computerworld, Dec. 6, 1993, at 99 (International Data Corp. Table) (Microsoft 1992 market share is 92.5%).

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Even including these other operating systems in the same market as those that run on the Intel chip, Microsoft has an overwhelming market share, with well over 85%. As the Government's Complaint correctly points out, applications software written for an Intel chip operating system will not run on the Apple Macintosh or Sun RISC workstation without significant modification -- known as "porting." Frequently, porting application software to a new chip set and operating system entails a significant re-engineering of the software. Hence, the Government does not include operating systems for the different chip sets within the same antitrust market.

However, the Government fails to point out that the only companies in the market for developing business application software for the operating systems sold by Apple and Sun, for example, are also the business application vendors on the Windows platform -- e.g., Novell/WordPerfect, Lotus, Borland, etc., and Microsoft, itself, of course. The significance of this fact is discussed in greater detail infra. The point here, however, is that if Microsoft were able to monopolize the market for business applications software, it would severely inhibit competition from vendors of operating systems that run on other chips but nevertheless compete with the Microsoft operating system (e.g., Apple and Sun).[32] .

Figure 4 shows what the intrabusiness client side probably will look like once Microsoft's strategy of vertical integration of markets within the client is completely executed.

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[32] The situation with respect to UNIX is slightly more complex, but in the final analysis, the situation is the same. UNIX has a strong following among technical engineering (as opposed to business) users of computers. There are companies that have written technical engineering application programs (such as "computer aided design" programs) to run on UNIX. But, as with Apple, the business applications vendors for the UNIX platform are the same companies that write applications for Windows. Hence, by controlling business desktop application programs, Microsoft can keep UNIX from penetrating the business desktop market.

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It shows the completion of Microsoft's leverage from layers 2 and 3 to further its domination of all aspects of layers 4 and 5.

Level	Name	Examples
5	Applications	Desktop Applications, e.g., Microsoft Word, Microsoft Excel, Microsoft Access, and Client Server Applications
4	Development Tools	MS Basic, MS C, MS C++, Microsoft Visual Basic, Microsoft Visual C++, OLE
3	Graphical User Interface	MS Windows
2	Operating System	MS DOS
1	Hardware	X86 PC Hardware and Other Hardware in Figure 3

Figure 4

2. The Intrabusiness Server

The "server" is the direct lineal descendant of the mainframe computer. Prior to the advent of the personal computer, companies operated using a mainframe, to which "dumb" terminals were connected. Personal computer technologies now allow many computing functions to be performed on the desktop by an individual worker, but workers within a business still need to share information with each other and access a body of data simultaneously. The "server," a dedicated hardware platform with its own server operating system, allows this to happen. Indeed, increasingly, workers within a business will want simultaneous access to several bodies of data and several different application programs, so that, for example, textual documents containing spreadsheets can be prepared by a number of employees working at the same time.

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There are two basic components of the server markets. The intrabusiness server is the backbone of business. Microsoft has projected that there will be 300 million servers in the business community, running everything from phone systems, to copying systems, to cash registers. J. William Semich, The Long View From Microsoft: Component DBMSs, Datamation, Aug. 1, 1994, at 40 (Ex. 10). If a single company controls all business server markets and applications, that company has far greater market power in various sections of the economy than, say, mere control of the desktop would bestow. The second server component, home-to-business, will be described in a subsequent section.

Today, the "server" side of the intrabusiness environment has approximately eight layers. It would unnecessarily complicate this brief of amici to describe the intrabusiness server markets in great detail. There are, however, three important points about the intrabusiness server markets that are relevant for this Court's consideration. First, the most important layer in the server market is the operating system level. The two leading competitors in this market at present are Novell's "Netware" product and Microsoft's NT product.[33] The operating system is important because the other products in the server market run on top of the server operating system in much the same way as desktop applications run on top of Windows. The operating system level is also important because it is the level through which the server is connected to the business desktop and (through on-line services) to the home client.

Second, as was the case on the desktop four years ago, competition is vigorous at all levels of the server market. At each of the eight levels, there are a number of competitors,

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[33] Laura DiDio, NetWare, NT Server to Divide Lion's Share, Dec. 26, 1994, at 77 ("The network operating system arena looks like a two-horse race in 1995, with Novell, Inc.'s NetWare 4.1 and Microsoft Corp.'s Windows NT Server 3.5 locked in a battle for first place.").

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each striving to make better products at cheaper prices. This condition represents a significant (and welcome) departure from the state of the computer industry prior to the advent of personal computer and server technology. In an earlier period, there were only a few vertically integrated companies in the computer industry, such as IBM, DEC and Wang. These companies attempted to supply all aspects of computer technology -- from the underlying chips and operating systems, to applications, to distribution, and even including service and support of previously sold computers. Generally speaking, consumers have benefitted enormously by the fragmentation of the industry into horizontal layers characterized by vigorous competition. Consumers have been able to choose the technologically superior and most cost effective product at each level and combine those products into a system that addresses the consumers' needs. The pro-competitive benefits of the industries' current horizontal alignment is discussed in some detail in the Economist article (Ex. 14).

Finally, Microsoft is pursuing a vertical integration strategy on the intrabusiness server side similar to that pursued on the business desktop side. This strategy is only briefly discussed elsewhere in this paper. The Court can get further information concerning Microsoft's strategy, goals and prospects for success from the following articles found in the Appendix: Stuart J. Johnston and Ed Scannell, Server Suite Could Squeeze Market, Computerworld, Oct. 10, 1994, at 4 (Ex. 7); How Microsoft's Server Strategy Will Change The Industry - Parts I & II, Report by Summit Strategies Inc.; J. William Semich, Datamation, Aug. 1, 1994, supra, at 40 (Ex. 10). Obviously, after complete execution of this strategy, Microsoft products would be dominant or exclusive on each of the server layers.

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3. The Home-to-Business Server

The second aspect of server technology is the home-to-business server market, sometimes known as "online services." Today, most online services run off mainframe computers the way LEXIS and NEXIS do. Businesses will increasingly need to sell directly into the home through online services in order to remain competitive. Control by a single company of the home-to-business server market would have significant economic ramifications.

Although there is a vigorous online services market in place, the home-to-business server does not yet exist, except in Microsoft's plans. It can be readily assumed that the home-to-business server would look much like the intrabusiness server, with only Microsoft products being vertically integrated.

Level	Name	Examples
8	Vertical Applications	Home banking, home shopping, news, product support, portfolio management, plus other "Marvel" (the Microsoft online service) applications
7	Horizontal Applications	
6	Development Tools	Same as Intrabusiness Server, plus Blackbird (OLE-based development tools; see InfoWorld 10/24/94)
5	Server Applications	Microsoft EMS E-mail; Microsoft Tiger Video Distribution
4	Database Services	Microsoft SQL Server (bundled with Marvel)
3	OS Services	Windows NT (bundling MS Services)
2	OS Networking	Windows NT (with Marvel Server Code)
1	Hardware	Intel or Alpha (DEC) chip

Figure 5

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4. Home Computer Market

The home computer market is in its incipiency. The most important applications programs on the home client are "home banking" (also sometimes known as "personal finance") and tax preparation.[34] The most successful company in this market, Intuit, Inc., makes the largest selling home banking ("Quicken") and tax preparation ("TurboTax") programs. The only substantial competition to Intuit's products comes from Microsoft. Yet, despite a very substantial commitment in marketing staff and resources, Microsoft has gained only a 10% share. Microsoft has therefore elected to take over the home finance market by purchasing the leading software developer, Intuit, rather than by making better products to compete against it. The Microsoft acquisition of Intuit was announced on October 13, 1994 and is still under review by the Department of Justice. It is the largest acquisition in the history of the industry with Microsoft paying twice as much for Intuit as that company was worth in the stock market.[35]

The Microsoft acquisition of Intuit is highly strategic. It is a key element in Microsoft's plans to dominate all of information processing and will be discussed in a subsequent section. If the Microsoft-Intuit deal is consummated, it is not difficult to project what the home client will look like given Microsoft's recent announcement concerning "Marvel" (described in a subsequent section).

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[34] See, e.g., Michelle Flores, Probe of Microsoft is Extended -- Justice Dept. Asks For More Information, Seattle Times, Nov. 22, 1994, at B11 (electronic banking is the "killer app. of the '90s").

[35] Prior to rumors of the acquisition, Intuit's stock traded at 40 3/4. John Eckhouse, Giant Microsoft Buys Intuit for $1.5 Billion, San Francisco Chronicle, Oct. 14, 1994, at A1, A19. Each Intuit share is to receive 1.336 Microsoft shares at the closing. Id. Based on Microsoft's January 3, 1995 closing price of 60 3/16, each Intuit share receives over $80.

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Level	Name	Examples
5	Applications	Microsoft Works, Quicken (Intuit), TurboTax, Encarta, etc.
4	Development Tools	For example, language features of Microsoft Excel
2-3	GUI/OS/Networking	Windows 95 with Marvel Client Code
1	Hardware	PC Hardware

Figure 6

In summary, in each of the four components of the software industry, Microsoft's overall business approach and strategy is based on the creation of technological linkages between layers within the same market (e.g., DOS to Windows on the desktop) and between layers in one market and corresponding layers in another market (e.g., Windows NT to the Microsoft Network to Windows 95 on the home client). To fully understand Microsoft's strategy and its economic implications, however, it is necessary to understand two additional strategic Microsoft technologies: OLE and Windows. This Memorandum of Amici will address each in turn.

5. OLE

OLE (object linking and embedding) is a strategic technology for Microsoft on both the client and server side. It is the Microsoft-imposed standard for sharing information both among applications, and between applications and the operating system. During the Justice Department investigation, desktop application companies complained that Microsoft seeded OLE to its own application developers before giving it to ISV's (independent software vendors),

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thereby giving its own applications a lengthy head start over the competition.[36] As set forth in a subsequent section, these charges are supported by ample evidence and constitute the clearest examples of Microsoft's use of operating system information and specifications to achieve an unfair head start in the application markets. This is precisely the issue raised by this Court.[37]

Even more striking is the fact that Microsoft continues to exercise the very same strategy on the server side. See, e.g., J. William Semich, Datamation, Aug. 1, 1994, supra, at 40, 41-44 (Ex. 10) ("If you think OLE is everywhere in the future, the answer is yes"). Microsoft has made it clear that OLE will be strategic technology for the home-to-business server market, but Microsoft has not provided sufficient specifications to independent database server providers to enable them to release equally well-behaved products on the same time schedule as Microsoft's own products.[38]

6. Windows

The business desktop connects to the server through the Windows operating system ("OS") and the home-to-business server ("online services") also connect to the home computer through the Windows operating system. Microsoft has several different Windows

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[36] See Brian Livingston, Undocumented Windows Calls, InfoWorld, Nov. 16, 1992, at 98 (Ex. 19); Doug Barney and Ilan Greenberg, ISVs Dampen Microsoft Furor for OLE, InfoWorld, July 18, 1994, at 1.

[37] Tr. of Status Call, Sept. 29, 1994, at 25-28.

[38] Microsoft has made numerous presentations around the country that specifically make this point and written documentation from these presentations has been provided to the Justice Department.

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products that provide OS, GUI and networking capabilities. A brief (and superficial) description of these products is included at this point to avoid confusion.[39]

a. Desktop

Microsoft's first Windows products were targeted for the desktop and were built on top of Microsoft's dominant desktop operating system MS-DOS. Because of their DOS legacy, these products are unable to take full advantage of the capabilities of the 32-bit microprocessors they run on. Microsoft's current product in this area is Windows 3.1, which, due in part to the illegal per-processor licensing challenged by the Government, is pre-installed on most desktop systems presently sold.

Microsoft plans to proliferate Windows 95 (also known in the press as "Chicago" or "Windows 4.0") widely next year as the successor to Windows 3.1. Windows 95 is a true 32-bit operating system, but it is being targeted to the mainstream personal computer market. It also includes advanced networking features.

Windows NT was Microsoft's first true operating system for 32-bit microprocessors. NT's principal use is in the server market (discussed below) but Microsoft has also targeted its NT marketing to power users running high-end personal computers or workstations.

b. Server

Windows NT can also be used as an operating system for a network server. Microsoft markets a version of NT with advanced server capabilities, called Windows NT

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[39] For a more thorough discussion, see Miles B. Keyhoe, The Winds of Change, HP Professional, Aug. 1994, at 40 (Ex. 17). See also Microsoft Corporation, Microsoft Windows NT and Client-Server Computing, May 1993.

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Advanced Server, as an enterprise-wide computing solution. Microsoft offers a suite of applications for Advanced Server called "BackOffice" that includes database services, electronic mail, systems management, and connectivity to mainframe and minicomputers.

Microsoft's vision for enterprise computing is being marketed through its plans for a replacement for Windows NT currently code-named "Cairo." Cairo brings object-oriented technology into the file server and operating system. Microsoft already controls object standards through it OLE specification, discussed in the next subsection. See J. William Semich, Datamation, Aug. 1, 1994, supra, at 41-44 (Ex. 10).

B. Free Market Forces in Increasing Return Industries

In some industries, companies generally compete on a "level playing field." In such industries, diminishing returns to scale ensure that the forces of the free market will naturally gravitate toward an equilibrium point which maximizes the production of goods and services and results in the most efficient allocation of resources. Under such conditions, antitrust enforcers as well as business executives can count on the fact that superior products will necessarily prevail in free and open competition.[40]

Free market forces in other industries -- including those at issue here -- do not exhibit such qualities. Rather, they exhibit "increasing returns." In such industries, there is more than one equilibrium point and there is no reason to expect the free market to reach equilibrium at a point that most efficiently allocates resources.[41] The markets in such industries

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[40] W. Brian Arthur, Positive Feedback in the Economy, Scientific American, Feb. 1990, at 92, 93 (Ex. 36).

[41] Id. at 92 (Ex. 36).

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can easily be manipulated by a company with a large "installed base,"[42] with the result that superior products of competitors are not likely to prevail in the free market.[43] Indeed, in "increasing returns" industries, there is every reason to believe that consumers will get "locked into" the first product that appears on a new platform, even if the product is technologically inferior.[44] Similarly, a company with a large installed base in one market can give its inferior product in a second market an insurmountable advantage over competitors in the second market by integrating the products from the two markets together technologically.[45]

Some of the early economic research in the area focused on perceived anomalies -- particular standards that became locked in, notwithstanding their obvious inferiority. Stanford economist Paul David identified several such examples, the most famous of which is the layout of the common typewriter keyboard, known as the "QWERTY" configuration because of the order of the keys in the second row of the keyboard.[46] Primitive typewriters were unreliable mechanical devices and the QWERTY keyboard, at least according to the folklore, was therefore

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[42] "Installed base" in the economic literature "means the number of owners of a good who may be dependent on the manufacturer of the good for the provision of complementary goods." Joseph Katten, Market Power in the Presence of an Installed Base, 62 Antitrust L.J. 1, 4 (1993).

[43] Joseph Farrell and Garth Saloner, Installed Base and Compatibility: Innovation, Product Pre-Announcements, and Predation, Amer. Econ. Rev., Dec. 1986, at 940; Janusz A. Ordover and Garth Saloner, Predation, Monopolization, and Antitrust, in Handbook of Industrial Organization 537, 565 (R. C. Schmalensee and R. Willis eds., 1989).

[44] W. Brian Arthur, Scientific American, Feb. 1990, supra, at 92-93 (Ex. 36).

[45] See, e.g., Garth Saloner, Economic Issues in Computer Interface Standardization, Econ. Innov. New Tech., 1990, at 140-142.

[46] See, e.g., Paul A. David, Clio and the Economics of QWERTY, Amer. Econ. Rev., May 1985, at 332; David A. Harvey, Ergonomic Issues Have Taken a Backseat to Performance, Resulting in a Growing Tide of Computer-Related Injuries. Change is Needed - Now!, Byte, Oct. 1, 1991, at 119.

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deliberately designed to be dysfunctional so that typists would not strike the keys so rapidly that the device would jam. Obviously, modern software and computers can process keystrokes far more quickly, yet consumers are locked into the QWERTY standard. There are even allegations "that the combination of constant repetitive motion and inefficient finger movements that QWERTY requires is the ticket to the most well-known [repetitive stress injury] RSI, carpel tunnel syndrome," yet we go right on teaching it in elementary schools.[47] Superior keyboard layouts were developed years ago but were unsuccessful in dislodging the clearly inferior design that established itself as an early standard.[48]

By the late 1980's, economic analysis was finally able to explain such situations more clearly. Economists at Stanford and the University of California at Berkeley published leading articles demonstrating that market characteristics long viewed as anomalous were, in fact, widespread in high technology industries.[49] By the mid-1990's, increasing returns economics has become widely accepted as mainstream economic analysis.[50] There is now extensive theoretical literature with direct empirical application to many leading industries, including telecommunications, broadcasting, computers, and ATMs.[51]

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[47] See David A. Harvey, Byte, Oct. 1, 1991, supra, at 120.

[48] Joseph Farrell & Garth Saloner, Amer. Econ. Rev., Dec. 1986, supra, at 942; Jean Tirole, The Theory of Industrial Organization at 405, n.40 (1988)

[49] W. Brian Arthur, Scientific American, Feb. 1990, supra, at 93.

[50] See W. Brian Arthur, Increasing Returns & Path Dependence in the Economy, 1994, at ix (forward Kenneth J. Arrow).

[51] For the theoretical literature see, for example, the recent Symposium on Network Externalities in the Journal of Economic Perspectives, Spring 1994, the Symposium on Compatibility, edited by Richard Gilbert in the Journal of Industrial Economics, March 1992, and the survey by Paul David and Shane Greenstein in the Economics of Innovation and New

(continued...)

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Increasing returns are present in industries throughout the economy, but two high technology market situations, in particular, give rise to increasing returns. First, users of high technology products are frequently electronically connected in a network. Networks exhibit and produce certain important economic results. Because the purpose of a network is to enable communication with others, the value of the network increases with the total number of users who join the network.[52] Consequently, once a network such as a telephone network is in place, a competing network would have to enter the market with at least as large a number of nodes in order to displace (or even compete meaningfully with) the first network.[53]

A second factor that gives rise to increasing returns is referred to as "compatibility" in the economic literature. Unlike more conventional industries, the value of the technology to end users in increasing returns industries increases with the number of users who

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[51](...continued)
Technology, 1990. For an application to telecommunications, see Stanley Besen and Garth Saloner, The Economics of Telecommunications Standards, in Changing the Rules: Technological Change, International Competition, and Regulation in Communications 177 (1989); for applications to broadcasting, see Stanley Besen and Leland Johnson, Compatibility Standards, Competition, and Innovation in the Broadcasting Industry (1986); for applications to ATMs, see Garth Saloner and Andrea Shepard, forthcoming in the Rand Journal of Economics, and Steven Salop, Deregulating Self-Regulated Shared ATM Networks, Econ. of Innov. and New Tech., 1990; and for computers, see Garth Saloner, Econ. Innov. New Tech., 1990, supra.

[52] This "network effect" has been described by numerous authors. In a recent Symposium in the Journal of Economic Perspectives, Michael Katz and Carl Shapiro write, "Consequently, as has long been recognized, the demand for a network good is a function of both its price, and the expected size of the network." See also Jeffrey Rohlfs, A Theory of Interdependent Demand for a Communications Service, Bell J. of Econ., Spring 1974, for an early reference, as well as Michael Katz and Carl Shapiro, Network Externalities, Competition, and Compatibility, Amer. Econ. Rev., June 1985; Joseph Farrell and Garth Saloner, Amer. Econ. Rev., Dec. 1986, supra; and other papers cited in Michael Katz and Carl Shapiro, Systems Competition and Network Effects, J. of Econ. Perspectives, Spring 1994.

[53] See Julio J. Rotemberg and Garth Saloner, Interfirm Competition and Collaboration, Strategic Options, 1991, for an example of the power of network size.

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use compatible technology. While the "network" feature draws its force from physical interconnection, the "compatibility" factor arises from a dependency of mutual use by consumers without regard to actual physical interconnection.[54] For example, although manual typewriters were not connected in a physical network, new users adopted the QWERTY keyboard because it was in wide use by others.[55]

Economic analysis demonstrates that superior products do not necessarily prevail in markets and technologies that exhibit increasing returns. Rather, these markets are easily susceptible to "tipping" -- once moved off of equilibrium by an event, the market tends quickly toward a single standard that dominates the market:

> [N]etwork markets are 'tippy': the coexistence of incompatible products may be unstable, with a single winning standard dominating the market. The dominance of the VHS videocassette recorder technology and the virtual elimination of its Betamax rival is a classic case.

See Stanley M. Besen and Joseph Farrell, Choosing How to Compete, J. of Econ. Perspectives, Spring 1994, at 118; see also Michael Katz and Carl Shapiro, J. of Econ. Perspectives, Spring 1994, supra, at 106. Once a market is "tipped" in favor of a particular competitor, it would take truly massive forces to return the market to a state of equilibrium (i.e., competition). See, e.g., W. Brian Arthur, Increasing Returns and Path Dependence in the Economy, supra, at 2, 10-11.

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[54] For early examples in the economics literature, see Joseph Farrell and Garth Saloner, Standardization, Compatibility, and Innovation, Rand J. of Economics, Spring 1985 and Michael Katz and Carl Shapiro, Amer. Econ. Rev., supra; Jean Tirole, supra, at 405.

[55] Jean Tirole, supra, at 404-406.

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Creating a large installed base is the key to dominating such an increasing returns market.

> Because of the compatibility and network benefits, all else equal, a new user prefers a vendor with a larger total installed base of users. Thus installed bases have a tendency to be self-perpetuating: they provide the incentive for the provision of products (software and hardware) that is compatible with the installed base which in turn attracts new users to the installed base further swelling its ranks. . . .

Garth Saloner, Econ. Innov. New Tech., 1990, supra, at 140. Indeed, "de novo entry into a market occupied by vendors with large installed bases is exceedingly difficult." Id. at 140.

The self-perpetuating nature of an installed base in an increasing returns industry causes particular products to become "locked-in." W. Brian Arthur, Scientific American, Feb. 1990, supra, at 99 (Ex. 36). The costs to a consumer of using or switching to a different system are so high that the vendor with the installed base has a substantial advantage over competitors and can, once the base is established, charge consumers supracompetitive prices.[56]

Because increasing returns markets are particularly susceptible to "tipping," a company with a monopoly in one market that faces competition in a second market can use the locked-in installed base of the first market to wipe out competition in the second market by "tipping" the second market. The monopolist might achieve this result by releasing a "predatory preannouncement" with regard to a product in the second market. In markets that feature increasing returns, users will want to be on the same standard as other users, so expectations

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[56] Garth Saloner, Econ. Innov. New Tech., 1990, supra, at 137-138; Joseph Farrell and Carl Shapiro, Dynamic Competition with Switching Costs, Rand J. of Econ., Spring 1988, at 123-137.

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(what users believe will happen) dominate user choice in the second market -- as opposed, for example, to the inherent technological quality of competing product offerings.[57]

> [A] preannouncement can sometimes secure the success of a new technology that is socially not worth adopting, and that would not have been adopted absent the preannouncement.

Joseph Farrell and Garth Saloner, Amer. Econ. Rev., Dec. 1986, supra, at 942.

Similarly, a monopolist that is cash rich from monopoly profits in the first market might also "buy off" early adopters to create a "band wagon effect" in favor of its product in the second competitive market.[58] This technique of predation is known in the economic literature as "penetration pricing."

> An installed base advantage might also be achieved by "penetration pricing," the technique of offering low prices to early customers so as to build up an installed base and influence the choice of later adopters. Penetration pricing seems a natural strategy in network industries, and appears prominently in the theory.

See Stanley M. Besen and Joseph Farrell, J. of Econ. Perspectives, Spring 1994, supra, at 122; see also Janusz A. Ordover and Garth Saloner, Predation, Monopolization, and Antitrust, supra.

Finally, a monopolist with a large installed base in one market might "tip" a second competitive market in favor of his product in that market by technologically linking the two products, or by outright bundling of the functionality of the second product into the first product, thereby eliminating the need for the competitor's product in the second market. For example, by subtly altering the tying product so that rival products in the tied market become

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[57] Stanley M. Besen and Joseph Farrell, J. of Econ. Perspectives, Spring 1994, supra, at 118; Joseph Farrell and Garth Saloner, Amer. Econ. Rev., Dec. 1986, supra, at 946.

[58] Joseph Farrell and Garth Saloner, Rand J. of Econ., Spring 1985, supra; Joseph Farrell and Garth Saloner, Amer. Econ. Rev., Dec. 1986, supra.

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incompatible with the monopolist's "standard," the monopolist can quickly dominate the second market.[59]

The Justice Department's complaint in this case recognizes the critical importance of an "installed base." The complaint alleges that the "lack of a sizable installed base of users" constitutes a "substantial barrier to entry" for Microsoft's operating system competitors. 59 Fed Reg. at 42,847 (Complaint ¶ 15). The complaint also alleges that Microsoft used "anticompetitive contracting practices" including "per processor licenses" starting as early as 1988 to "significantly increase the already high barriers to entry." Id. at 42,847, 42,848 (Complaint ¶¶ 18, 20, 26). The complaint appears to assume that Microsoft's monopoly was lawfully acquired. Id. at 42,847 (Complaint ¶ 19). But since Microsoft's installed base of operating system users has increased six-fold since 1988, it must follow that the "anticompetitive licensing practices" with which Microsoft is charged had the result of increasing its own installed base at the same time it impeded the development of competitors' installed bases. As set forth in the next section, Microsoft has used its installed base both to preclude competitive entry into the operating system market, and to stifle competition in related markets.

IV

MICROSOFT'S TACTICS AND PROSPECTS FOR SUCCESS

This section of the Memorandum of Amici will examine Microsoft's overall strategy, the tactics that Microsoft has used in pursuing that strategy, and the likelihood that

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[59] See Garth Saloner, Econ. Innov. New Tech., 1990, supra, at 141-142.

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Microsoft will accomplish its aims. Microsoft, by the admission of its own Chief Executive Officer, intends to dominate all of data and information processing.

> There's no level of performance or specific application of corporate information systems that we don't intend to go after . . . [and] there won't be anything we won't say to people to try and convince them that our way is the way to go. That's because this new, electronic world of the information highway will generate a higher volume of transactions than anything to date, and we're proposing that Windows be at the center, servicing those transactions.

Brent Schlender, Fortune, Jan. 16, 1995, supra, at 40 (emphasis in original).

To accomplish these aims, Microsoft has pursued licensing practices that the Government has denominated as "anticompetitive," and has engaged in classic predatory behavior by using its monopoly in one market to achieve monopolies in other markets. This section applies increasing returns economic analyses to Microsoft's behavior and concludes that, unless restrained by Governmental intervention, it is highly likely that Microsoft will achieve its goal of dominating the entire national information infrastructure.

A. Microsoft's Strategy

Even if Microsoft's initial monopoly was lawfully obtained, its enormous market power (and particularly the power to leverage into related markets) comes from its installed base in operating systems. That installed base, according to the Complaint, was procured as a result of anticompetitive practices. Indeed, Microsoft's installed base of operating system users has increased more than six-fold (from 18 to 120 million) since 1988, when the company began its anticompetitive practices. Microsoft has used its monopoly and its installed base in a classically predatory manner. It has used its monopoly revenues in one market to drive competitors out of other markets. It has also used its operating system installed base in a predatory manner to "tip"

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adjacent competitive markets in the direction of its own product in those markets, to the detriment of competitors.

Microsoft's strategy at any particular point on the network (for example, at the home client or at the business desktop) can only be understood and evaluated in the context of Microsoft's overall strategy. Microsoft pursues a strategy of leverage from product markets in which it is dominant, to markets in which its competitive position is weak. It targets particular markets, establishes marketing and, in particular, technological links to those markets from established monopolies, and then leverages its power to monopolize the target markets.

As used in this brief, "leverage" means that Microsoft uses the installed base in a market it dominates (for example, the operating system) to create an installed base in a new market (for example, desktop applications). It uses predatory subsidization, and both marketing and technological linkages, to accomplish leverage, as explained in greater detail in the succeeding pages. For the sake of easy example, Microsoft's horizontal tie-ins within a single layer represent the most trivial example of its marketing strategy. Thus, Microsoft has bundled for sale a number of desktop applications (under the name, the "Microsoft Office"), putting companies like Lotus, WordPerfect and Borland at a competitive disadvantage. Carole Patton, Bundles Are Bad News, Computerworld, Nov. 14, 1994, at 57 (Ex. 8). Microsoft is executing the same tactic on the server side by bundling its "BackOffice" products to foreclose meaningful competition at the "server applications" layer. See Stuart J. Johnston and Ed Scannell, Computerworld, Oct. 10, 1994, supra, at 4 (Ex. 7).

Microsoft also pursues other tactics. In particular, Microsoft derives leverage from its control of Windows products and logo; from its use of a consistent graphical user interface; and from its tight technical integration between interconnected machines through the

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control of standards such as OLE. After establishing market power on one level, Microsoft will target an adjacent layer, subsidize the creation and sale of products at that layer from the monopoly it derived on the first level, establish proprietary technological linkages to the target layer, and then leverage its market power to establish market power in the next layer. Two examples of this within the desktop side are DOS to Windows, and Windows to desktop applications. In addition, Microsoft uses its market power from one side of the network (server or client) to leverage to the other side, again by establishing linkages. Microsoft is already attempting to leverage its control of the desktop into a control of servers. It will also use its market power in the PC-based financial and text software market, through the acquisition of Intuit, to leverage into the server.[60]

Obviously, control of certain layers in the various markets of the network create greater potential for leverage than control of other layers. In particular, there are a few "gateway" layers into the network. Control of these layers represents the most effective platform for leverage (i.e., moving the installed base). Generally speaking, the operating system layers in each box represent the most powerful platforms for both horizontal and vertical leverage.[61] For example, Microsoft has already leveraged control of operating systems to desktop applications. It can also leverage control of the desktop operating system (Windows 95) to the server operating system (Windows NT).

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[60] For a detailed review of Microsoft's server strategy, see How Microsoft's Server Strategy Will Change The Industry, supra, (Ex. 38).

[61] There was clearly the potential for at least some leverage from the chip or hardware level, when the OS level was more fragmented. This possibility is not treated in this brief for a number of reasons, including the widely publicized alliance between Microsoft and Intel that makes separate treatment of the hardware layer irrelevant.

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Control of the "gateway" layers provides greater possibilities for leverage because control of the architecture at those levels effectively controls all higher vertical levels, and also provides significant power at the horizontal interface between the client operating system and the server operating system. This brief uses the term "architecture" in the same way as that term is used in the Morris and Ferguson Harvard Business Review article -- namely, the complex of standards and rules that define how programs and commands will work and how data will move around the system. Charles R. Morris and Charles H. Ferguson, Harv. Bus. Rev., Mar. 1993. supra, at 88 (Ex. 16).

By owning the installed base at a gateway, Microsoft can control not only the architecture at that level but also at all higher vertical levels. For example, by controlling the desktop operating system architecture, Microsoft can easily obsolete or render inoperable Lotus 1-2-3, merely by making a minor change to the architecture. Microsoft can pretextually or otherwise claim the change to be an "upgrade" or a "bug fix," but it is the effect of the power to control architecture that is more important than Microsoft's subjective intent.

If Microsoft controls the architecture at a "gateway," it can loudly proclaim its system to be "open" while in truth its architecture remains closed. Thus, for example, Microsoft can claim that its desktop operating system will continue to work with Lotus 1-2-3 or that its server operating system will continue to work with the database products offered by Microsoft competitors (and, to that extent, its system is "open"). Because Microsoft can easily obtain competitive advantage over (or outright displacement of) vertically related competitors by

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upgrades to the architecture, however, its nominally "open" system does not provide for effective competition on higher vertically related levels.[62]

All companies try to use leverage to some extent,[63] but Microsoft has a powerful advantage over its competitors. It has used "anticompetitive" licensing practices to acquire a huge installed base and it uses the power of this installed base against competitors in adjacent markets. Microsoft employs multiple linkages and leverage from the different markets (and, in particular, from the gateways) it controls into a single target market, so as to completely outflank and overrun existing competitors in that market.

In the beginning (for our purposes), IBM had a monopoly in computers and the market for computer products was, generally speaking, vertically integrated. (This necessary background is explained in The Economist, supra, at 3-18 (Ex. 14).) How IBM got this monopoly was the subject of much conjecture and years of litigation, but is irrelevant for our purposes. What is relevant is the fact that IBM, in its rush to get out a personal computer, did not leverage its own power from mainframes. Rather, it procured chips from Intel and an operating system from Microsoft ("DOS"), thereby transferring its market power to them as the

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[62] The operating system gateways are the most effective layers for leverage. But the system can also be leveraged from other access points as to which strong network externalities attach. For example, on the home client, Intuit has leverageable power from the strong network externalities that have attached to that product at the computer-human interface. (This is described in greater detail elsewhere in this brief.)

[63] In many respects Microsoft's strategy of targeting, linking and leverage is little different from that employed by MITI and Japanese keiretsus to target and capture American markets. Microsoft's leverage comes from technical ties in markets it dominates, while Japanese companies' leverage comes from the installed base of buyers it creates in Japan. In both cases, the leverage can be applied by forward-pricing into the target market to damage competition in that market. Cf., L. D. Tyson, Who's Bashing Whom? Trade Conflict in High-Technology Industries, at 55-57, 99-101 (1992).

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market for personal computers expanded to displace mainframes and IBM's imprimatur established a standard. In short, IBM empowered Microsoft and Intel to control the architecture for the next generation of computers, and has been playing catch-up ever since. See Charles R. Morris and Charles H. Ferguson, Harv. Bus. Rev., Mar. 1993, supra, at 86, 92 (Ex. 16). See also Elizabeth Corcoran, Washington Post, Nov. 13, 1994, supra, at H6 (Ex. 44).

Bill Gates, the founder of Microsoft, secured control of the personal computer market by riding IBM's coattails. The success of the IBM PC opened a lucrative market for compatible computers, or "clones." At the time, Microsoft was the sole source for a compatible operating system. Accordingly, Microsoft was able to license the operating system ("DOS") to compatible makers at significantly higher rates than those charged to IBM. Hence, as the Government's Complaint (¶ 19) explains, "Microsoft quickly dominated and gained a monopoly in the market for PC operating systems." 59 Fed. Reg. at 42,847. More precisely,

> DOS would have been worth relatively little had Gates not retained the right to license its use to IBM's rivals. This arrangement -- the source of Gates' wealth and power -- became clearer as IBM set the standard for the burgeoning PC market. By the mid 1980's every rival except Apple computer felt that the only way to compete against IBM was to sell a clone of IBM's PC. Making a clone required, among other things, licensing DOS from Microsoft. Over time DOS became a kind of annuity for Microsoft: buying DOS was the price of admission for entering the PC business.

See G. Pasquel Zachary, Showstopper: Breakneck Race To Create Windows NT and the Next Generation at Microsoft, 27 (1994).

As new technologies overcame the old mainframe market, the market for computer products formed into a number of horizontal markets that are vertically related to each other. Charles R. Morris and Charles H. Ferguson, Harv. Bus. Rev., Mar. 1993, supra, at 8 (Ex. 16). There are many competitors at each level that aggressively compete with each other to

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develop more powerful products at lower prices. Generally speaking, consumers have benefitted from the formation of horizontal markets. Consumers can put a system together using the best and most cost effective products at each level, even if the products are made by different manufacturers. But by using its installed base in operating systems to "tip" each of these markets in favor of its own products, Microsoft undermines the competitive process. From the initial monopoly bestowed on it by IBM and the huge installed base secured by anticompetitive practices, Microsoft has leveraged and linked a series of powerful monopolies with the intent of forming a new verticality on the market. After establishing several monopolies with enormous leverage potential, the positive feedback from the verticality imposed by Microsoft will in short order eliminate competition on all horizontal layers within the server and online markets, just as it is eliminating competition in the horizontal layers on the desktop.

1. The Business Desktop

The Justice Department's Tunney Act filing alleges that Microsoft has monopolized "the market for PC operating systems worldwide" for "almost a decade." 59 Fed. Reg. at 42,850. As noted previously, in 1988 Microsoft had an installed base of approximately 18 million operating system users.[64] In 1988, Novell (formerly Digital Research, Inc.) entered the X86 operating system market with a competitive product, DR DOS, and it was in response that Microsoft began the "anticompetitive licensing practices" identified by the Government. Microsoft continued these practices through mid-1994, and, as noted previously, it was during this period that Microsoft was able to increase its installed base by more than 100 million

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[64] See supra note 9.

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users.[65] As the preceding section explains, it is the size of Microsoft's installed base, rather than merely its market share, that determines the company's true market power. Accordingly, through practices that the Government has identified as "anticompetitive," Microsoft has increased its market power many fold.

Having gained this market power, Microsoft has used it both to maintain its monopoly in operating systems (described in subsection (a) immediately below) and to obtain a monopoly in desktop applications (subsection (b)). The remainder of this section (subsections (c) through (f)) describe how Microsoft has used its market power to engage in other predatory conduct in the desktop markets.

a. Effect of the Monopoly on Operating Systems

Microsoft's strategy, which was based at the outset on an installed base created in part through anticompetitive licensing practices, succeeded in monopolizing the desktop OS and threatening desktop applications. Once Microsoft had control of the operating system, which is the key architectural technology for desktop computing, it was able to maintain its share, even with an inferior product. The introduction of DR DOS from Novell showed that Microsoft had failed to keep MS DOS abreast of leading technology.[66] Yet Novell's compatible offering in the DOS market (DR DOS) stopped selling when Microsoft made it clear that Microsoft would create versions of Windows that were incompatible with DR DOS. It is common for "better" products to fail if a competitor controls the architecture in which the product operates. See

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[65] Amy Cortese, Next Stop, Chicago, Business Week, Aug. 1, 1994, at 24 ("120 million MS-DOS customers (including 55 million Windows users)"). See also OS Overview, Computer Reseller News, at 223 (DOS installed base of 110.1 million).

[66] See Stan Miastkowski, Digital Research Creates a Better DOS, Byte, Nov. 1991, supra, at 68.

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Charles R. Morris and Charles H. Ferguson, Harv. Bus. Rev., Mar. 1993, supra, at 89-91 (Ex. 16).

Microsoft was also able to raise prices for its operating system, as its monopoly position continued to solidify and its installed base increased. In the early 1980's, Microsoft licensed MS DOS for $2 - $5 per copy. By 1988, the price was up to $25 to $28. Once Microsoft drove DR DOS out of the operating system market, it was able to double the price it charged, with recent press reports indicating that it is demanding as much as $70 per copy of the forthcoming version of its operating system.[67]

Overall, Microsoft's strategy has been enormously successful in maintaining its monopoly in operating systems while expanding its installed base. Microsoft's share of all desktop operating systems is a staggering 85%. See supra note 32. Microsoft's share of the operating system market that runs on X86 chips is even larger -- more than 90%. See id.

b. Effect of the Monopoly on Applications

Having entrenched its operating systems monopoly, Microsoft has aggressively leveraged this monopoly to gain a monopoly in business applications. In 1991, Microsoft's senior vice-president Mike Maples expressly stated the company's intention to monopolize the software applications market:

> If someone thinks we're not after Lotus, and after WordPerfect and after Borland, they're confused... My job is to get a fair share of the software applications market, and to me that's 100 percent.

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[67] See Amy Cortese, Business Week, Dec. 19, 1994, supra, at 35 (Ex. __) ("Computer makers . . . have been startled to learn that they will be asked to swallow a huge price hike for their use of Windows 95 -- to as much as $70 per PC vs. roughly $35 today.").

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See Jane Morrissey, Microsoft's Application Unit Seeks Market Dominance, PC Week, Nov. 18, 1991, at 1.

Microsoft used the monopoly revenues from licensing the operating system to fund the development of applications to run on DOS, in competition with software vendors which had no operating system control (for example, Lotus, Borland, and WordPerfect). But because of the relatively open nature of DOS, competitors like Novell could make "compatible" operating systems -- operating systems that would run applications written for Microsoft's MS DOS without modification. Therefore, Microsoft could not exercise sufficient control to give its own applications a strong competitive advantage over the application programs of competitors. The competitors' products were the first developed on DOS and had therefore acquired significant installed bases, as to which powerful network externalities had attached. In order to displace these competitors, Microsoft needed to create a new operating system platform so that its own applications would reach the market on the new platform before its competitors' products.

Microsoft "solved" this problem by (1) developing a new operating environment (Windows) that it totally controlled, (2) targeting a function performed in the application layer that it could either embed in the operating system (for example, the "graphical user interface" or "GUI" feature) or link with the operating system, and (3) using its power over DOS to migrate users to Windows. Microsoft thereby got more control over the OS, added value to the OS it controlled, and forced independent application publishers to rewrite all of their applications twice (once for Windows and a second time for OLE, as described below). The forced migration that Microsoft effected with the GUI and Windows may be depicted as follows:

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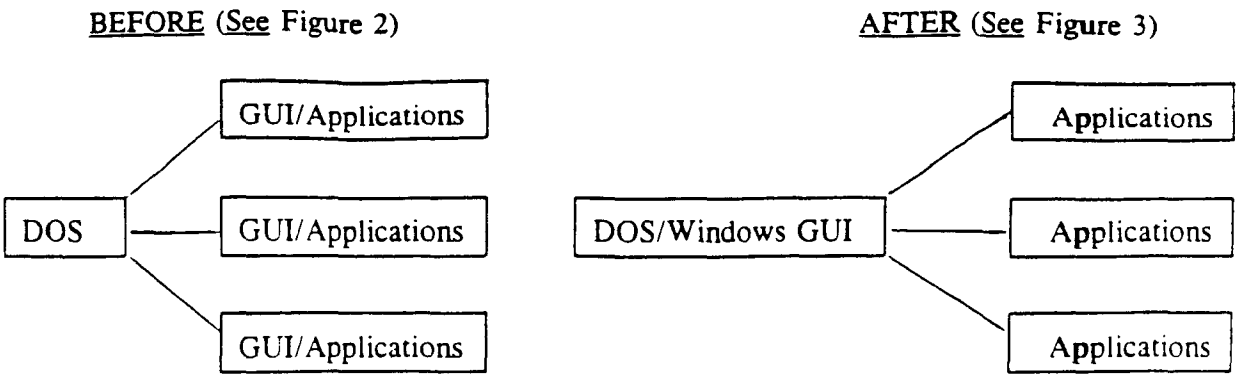

Figure 7

Microsoft, in effect, added a new layer to the architecture of the desktop, moving the industry from Figure 2 to Figure 3 above. Controlling architectures is the key to dominating competition. See Charles R. Morris and Charles H. Ferguson, Harv. Bus. Rev., Mar. 1993, supra (Ex. 16).

Microsoft leveraged its control over the operating system to control desktop applications, following a carefully crafted plan that utilized the market power of its installed base. First, Microsoft emulated the application program of the market leader in that application (e.g., Lotus, WordPerfect or Borland), breaking the network externality of the installed base by providing file and keystroke compatibility. Microsoft funded the development, marketing, and below-market pricing of its applications from the profits it reaped on the six-fold increase in the installed base of its operating system. Microsoft's

> stronghold in operating system software . . . financed Microsoft's push into applications software.

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Victor F. Zonana, $14-Million Deal Microsoft Buys Software Competitor, L.A. Times, July 31, 1987, at 4.[68] For years, Microsoft funded "many versions" of applications programs before they "were good enough to grab substantial market share."[69] But

> [b]ecause Windows gives Microsoft a "pervasive presence on any desktop that matters, Microsoft can subsidize its loss leaders [in applications] and leverage its desktop heritage".

Barbara Darrow, Developers Brace for Shakeout, Computer Reseller News, Feb. 1, 1993 at 28 (quoting Don DePalma, senior industry analyst for Forrester Research). ACCESS, Microsoft's database program, is a case in point. It

> cost a staggering $60 million to develop . . . . By contrast, the [entire 1992 development] budget at Borland was $50 million. At Lotus, it was $35 million. That's not all. Microsoft also had the money to offer an introductory price of $99 for ACCESS -- less than one-third the retail price for similar packages. Result: Microsoft sold 700,000 copies in just three months. The entire market in 1992 was only 1.2 million units.

Kathy Rebello, et al., Business Week, March 1, 1993, supra, at 88.

c. **Unfair Early Access**

Moreover, because of Microsoft's installed base in operating systems, it was able to provide an unfair advantage to its applications in a variety of other ways, as well. For

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[68] See also O. Casey Corr, IBM vs. Microsoft -- Software Superbowl -- IBM to Kick Off New Version of OS/2, but will Microsoft Make Winning Goal, Seattle Times, March 29, 1992, at C1 (system sales are "the cash cow that has fueled Microsoft's aggressive entry into nearly every field of personal computing"); id. ("DOS, which comes installed on computers at the factory, has provided profits to finance Microsoft's development of applications such as the Excel spreadsheet and Word, a writing program."); Laurie Flynn & Rachel Parker, Extending its Reach, InfoWorld, August 7, 1989, at 43 ("the Microsoft strategy has been to fund expensive applications development and marketing with its profits from the recurring DOS royalties it receives.").

[69] Kathy Rebello, et al., Is Microsoft Too Powerful, Business Week, March 1, 1993 at 88 (Ex. 4).

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example, Microsoft based its own application programs on components in the operating system that it had unique or early access to. Microsoft claimed it was "open," but actually used hidden features and functions to gain a competitive advantage. Brian Livingston, InfoWorld, Nov. 16, 1992, supra, at 98 (Ex. 19). That is, Microsoft provided a proprietary architecture with a supposedly "open" system. See Charles R. Morris and Charles H. Ferguson, Harv. Bus. Rev., Mar. 1993, supra. The most well-known such example involves Microsoft's "OLE" (object linking and embedding) standard.

Microsoft created interoperability among its own applications, and between its applications and its operating system, by creating a new standard, OLE, which copied functionality from Hewlett-Packard's product New Wave. Stuart J. Johnston, Dangerous Liasons, InfoWorld, April 8, 1991, at 44. With market power on both sides of the interface (i.e., in both the applications and the operating system), Microsoft easily displaced the existing standard in favor of OLE. It embedded OLE functionality into both its operating system and applications, and it heavily marketed this new functionality using profits from its market position in operating systems.[70]

During the very same time period that the Government contends Microsoft was using "anticompetitive licensing tactics" to harm OS competitors, applications competitors repeatedly complained that Microsoft was using its knowledge of new operating system features to give its own applications programs a head start and performance advantage over applications competitors. As stated in Section II of this memorandum, throughout the 1980's and early

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[70] See Cara A. Cunningham, IBM and Microsoft Wage Open Doc vs. OLE Find, InfoWorld, Aug. 15, 1994, at 25 (Microsoft has an "army of evangelists . . . that goes out and sells the [OLE] technology and swarms over developers").

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1990's Microsoft responded to this criticism by asserting that it had erected a "Chinese Wall" between its operating system developers and applications developers. According to Steve Ballmer, the senior vice-president for Microsoft's system divisions:

> [T]here is a very clean separation between our operating system business and our applications business . . . . It's like the separation of church and state.

Business Week, Nov. 21, 1983, supra, at 114 (Ex. 2).

In the face of mounting criticism, Microsoft executives adhered to the party line. For example, in 1989, Steve Ballmer again disputed "the charge that his people gave their counterparts in applications previews of their upcoming systems products."[71] Microsoft executives repeatedly told the press that a "Chinese Wall" was in place. See, e.g., Laurie Flynn and Rachel Parker, Infoworld, Aug. 7, 1989, supra, at 43. Indeed,

> Gates insisted that Microsoft kept the playing field level by erecting an imaginary barrier between the company's operating systems group and its applications division.

Hard Drive, supra, at 308. Even into early 1991, Microsoft executives were claiming that the company had an "ISV-independent program" that treated Microsoft applications "the same as any other ISV [independent software vendor]."[72] Although the FTC began investigating Microsoft in 1990, Microsoft continued to maintain that it had a "Chinese Wall" well into 1991.[73]

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[71] Richard Brandt, Microsoft Is Like an Elephant Rolling Around, Squashing Ants, Business Week, Oct. 30, 1989, at 148 (Ex. 3).

[72] Ray Weiss, Windows Stars at SD 91, Electronic Engineering Times, Feb. 18, 1991 (Ex. 15).

[73] See supra note 27.

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But Microsoft's head start in using OLE in 1991 to the detriment of applications competitors put the lie to such claims. Microsoft incorporated OLE into its Windows operating system and shipped its first completed application incorporating OLE, Excel 3.0, in February of 1991, at the very same time it was releasing a "beta version" of OLE -- not suitable for commercial distribution -- to ISV's. Indeed, the February 1, 1991, issue of Byte Magazine reports the two events in the same issue.[74] Microsoft's applications competitors suffered delays of many months as they were forced to rewrite their own applications to make them perform under Windows as well as Microsoft's Excel, which had a head start in using OLE. It was not until many months later that the first third-party implementation of OLE appeared on the market.[75]

Microsoft's unfair advantage obtained from prior knowledge of operating system functionality created a significant head start for its own applications on the new Windows platform. As the prior economic analysis demonstrates, the advantage of being first to market in an "increasing returns industry" is enormous -- it permits a competitor to begin to generate an installed base, reap the benefits of "positive feedback," and otherwise drive its own products to "lock in" before competitors even reach the market. Microsoft used its operating systems information to secure these unfair benefits for its applications.

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[74] Compare Andrew Reinhardt, First Impressions: New Extras for Excel, Byte, Feb. 1, 1991, at 136 with Microbytes, Byte, Feb. 1, 1991, at 20.

[75] See, e.g., Stan Levine, Lotus Embraces 'Competition As It Aims for Identity, LAN Times, June 17, 1991.

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Confronted with their obvious untruths, Microsoft executives did an abrupt corporate-wide about-face at the end of 1991. Microsoft senior executive Mike Maples stated in December of 1991:

> There is no Chinese Wall. We don't want there to be a Chinese Wall, and I don't think we've ever claimed that there is a Chinese Wall. Microsoft is a single company. . . . We don't try to pretend that there is a Chinese Wall. . . .

Stuart J. Johnston, 'No Chinese Wall' at Microsoft, Infoworld, Dec. 30, 1991, at 107 (Ex. 18).

And since early 1992, Microsoft has freely and openly given its applications developers an advantage over ISVs. In November of 1992:

> at least half a dozen cases in which Microsoft allegedly withheld information on its DOS or Windows functions from outside developers, for periods ranging from six months to several years. During these periods, Microsoft's own developers appear to have used these functions in applications or utilities that competed with those eventually developed by independent software vendors, according to programmers who have examined the code.
>
> * * *
>
> [I]n each case, the lack of documentation of the functions may have given Microsoft applications a time-to-market lead of six months or more before similar features could be incorporated into competing developers' applications . . . .

Brian Livingston, InfoWorld, Nov. 16, 1992, supra, at 98 (Ex. 19).

d. Predatory Bundling

Since dropping all pretense of a "level playing field," Microsoft has increasingly used the power of its operating system installed base to gain advantages over applications competitors. It has attempted to monopolize the market for the development tools (also known as programming languages) used to create applications by predatorially preannouncing its products (as documented in the introduction to this brief) and by bundling versions of its own

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programming language products into its operating systems so that users will have a powerful disincentive to purchase a competitor's programming language separately.[76]

Microsoft has also conducted a lengthy "campaign" to bundle business software applications into the operating system so that it can "mop up competitors that sell stand-alone applications, resulting in more limited user choice down the road."[77] Microsoft has steadily increased the price of its operating system to cover its own loss of revenue from the diminished sales of free-standing applications that it bundles into the operating system. Although free-standing applications generally cost more than Microsoft's increases in operating system licensing fees, the unit sales of each application are far fewer than the number of users that upgrade to each new release of the OS -- because of the huge installed base that Microsoft has procured by "anticompetitive practices." Hence, even a modest increase in operating system fees more than offsets Microsoft's loss of revenue from diminished applications sales.

Applications competitors, of course, do not fare as well -- when Microsoft bundles the functionality of their products into the operating system, they lose their only source of revenue. After the competitors go out of business, Microsoft is free to unbundle the applications from the operating system and charge, in the absence of competition, whatever price the market will bear. Microsoft initiated this strategy with the introduction of Windows, by bundling word

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[76] Ethan Winer, BASIC, Yes; Feeble, No, PC Magazine, Oct. 30, 1989, at 187 (Because "the BASIC [programming language] interpreter [is] bundled with DOS . . . at no extra cost, [it] is known and used by more people than any other programming language for personal computers.").

[77] Michael Csenger & Adam Griffin, Microsoft Free At Last?, Ruling Still Lets Firm Incorporate Apps Into Its OS'es, Network World, July 25, 1994, at 4 (Ex. 23); see also John Markoff, Microsoft's Future Barely Limited, N.Y. Times, July 18, 1994, at D1 (Ex. 24) (describing Microsoft's 14 year "campaign[] to expand the definition of what computing functions belong inside the computer operating system.").

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processing, calculations, communications and "paint" business applications software directly into the operating system.[78]

Microsoft has even bundled technology into its operating system that it misappropriated from its competitors. When Microsoft wanted to add data compression capabilities to DOS, for example, it approached Stac Electronics, developer of the industry's leading data compression software. Microsoft demanded a worldwide license to use Stac's software as part of DOS, but "steadfastly refused . . . to pay Stac any royalty for [its] patented data-compression technology."[79] When Stac refused Microsoft's demand, Microsoft simply incorporated Stac's intellectual property directly into DOS. Id. Stac brought suit and a federal jury found Microsoft guilty of infringing Stac's data compression patents and awarded Stac $120 million in damages.[80] Microsoft thereafter settled the case by acquiring a 15% interest in Stac, and obtained a license to Stac's vital data compression technology for a fraction of the jury's verdict.[81] Because Microsoft's conduct in the Stac case "underscore[s] the sort of allegations that have kept the [Government's antitrust investigation] alive for years," some observers have

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[78] Paul Andrews, Windows Is No JFK, But Its Visual Appeal Is Outstanding, Seattle Times, May 22, 1990, at C2 ("Windows 3.0 comes with a suite of mini-applications including Write, Paintbrush, Clock, Recorder (a macro utility), and Terminal (telecommunications).").

[79] O. Casey Corr, A Look Behind Stac Deal, Seattle Times, June 26, 1994, at F1 (quoting Stac's complaint).

[80] Id.; Charles McCoy, Microsoft to Pay Stac Judgment of $120 Million, Wall St. J., Feb. 24, 1994, at A4.

[81] Stuart J. Johnston, Microsoft Settles for Piece of Stac, Computerworld, June 27, 1994, at 30 (Microsoft paid $39.9 million for 15% of Stac, and an additional $43 million over 43 months for a license to Stac's data compression technology); Doug Barney, Microsoft, Stac Resolve Dispute; Microsoft Finally Pays Up, InfoWorld, June 27, 1994, at 14.

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suggested that the timing of Microsoft's settlement with Stac in late June 1994 was calculated to "remove [Stac president Gary] Clow as a hostile witness in the Justice investigation."[82]

e. Predatory Unbundling

Microsoft has also unbundled technology from its operating system in order to render other companies' products uncompetitive. For example, the DOS operating system contained, in version after version, a portion of code known as the "debug kernel." Both Microsoft and competitors like Borland created development tools that used the functionality of the debug kernel in order to run.

With the introduction of Windows 3.1 in April, 1992, Microsoft removed the debug kernel from the operating system and bundled it with its own language application program. If a user wanted to run the competitive Borland program, it had to buy the debug kernel separately from Microsoft, at a price Microsoft set to make the Borland product less competitive. Microsoft even conspicuously advertised the fact that its own product was cheaper than the Borland product because the user had to buy the debug kernel separately from Microsoft. Byte, May 1992, at 159 (Ex. 6). Whatever pro-competitive benefits Microsoft might advance to justify its bundling of new functionality into the operating system, it is difficult to imagine any justification for unbundling operating system technology, other than harming competition.

f. Other Uses of Leverage

Microsoft further exploited its leverage, both vertically and horizontally. Horizontally, within the desktop applications layer, Microsoft introduced additional applications,

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82 O. Casey Corr, A Look Behind Stac Deal, supra, at F1.

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touting and exploiting the benefits and advantages of its vertical linkage (to the operating system): for example, word processing ("Word"), database ("Fox Pro" and "Access"), and presentations ("Power Point"). Microsoft also employed horizontal leverage in the applications layer through its marketing practice of bundling a group of applications into a "suite," which is sold at low price points. And, all the while, Microsoft used its profits from its monopoly position in OS for (1) massive marketing to promote the linkage features of the OS, and (2) sustaining a protracted battle with independent applications vendors in a new market that, without the profits from the leveraged market, could not be sustained.[83]

As noted in the introduction to this brief, Microsoft has been spectacularly successful in leveraging its installed base in the operating system market to dominate the business applications market. In four years, Microsoft "went from an also ran in the business applications market to the industry leader." Inside Telecom, Sept. 26, 1994. Although Microsoft has not yet fulfilled Mike Maples' goal of "100 percent" market share, it is by far the leading supplier in each individual applications product category. Microsoft Domination, San Jose Mercury News, Dec. 21, 1994, supra, at 1F (Ex. 35). Moreover, suites are the fastest growing category of business applications software and Microsoft accounts for an astounding 85% of all suites sold. See supra note 16.

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Microsoft's success in monopolizing business applications is, absent effective Government intervention, only a taste of things to come. Having succeeded in dominating the

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[83] As explained in Section V.C., infra, the superficially irrational behavior of undermining the application vendors that produce programs that run on Microsoft's operating system is logical specifically because Microsoft has an independent economic incentive to monopolize the market for business application programs.

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desktop operating system and applications markets, Microsoft has begun to leverage its installed base to monopolize both the intrabusiness server and on-line systems, as set forth in subsequent sections.

2. The Intrabusiness Server

Microsoft intends to displace all of the competition on the enterprise server, just as it did on the desktop, by employing multiple linkages and leverage. Its leverage will come from the large installed base of the PC operating system monopoly. Using this base, Microsoft will employ three strategies: (a) vertical linkages similar to those that worked in the desktop markets, (b) horizontal linkages from desktop to intrabusiness server, and (c) horizontal linkages from home-to-business server to intrabusiness server.

Microsoft began the implementation of its strategy by creating a new server OS ("Windows NT") that horizontally leverages from the monopoly position of DOS/Windows in the client market. Microsoft has increasingly placed server functionality into Windows and Windows applications (for example, with the Microsoft products, Access, Fox Pro, and Excel).

> With NT, Gates seeks to extend his software dominion from desktop software, which he monopolizes, to the network. In the 1980's, Microsoft's DOS and Windows systems software defined the way most people worked with computers. In the 1990's, the company aims to define the software that electronically ties together workers and businesses, customers and homes.

Zachary, Showstopper, supra, at 3.

In addition, Microsoft is nakedly leveraging its market power in the desktop operating system market to the enterprise server by requiring software developers who want to use the logo for "Windows 95," the forthcoming version of Microsoft's desktop operating system, to make their desktop application products also run on "Windows NT" (Microsoft's

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server operating system). See William Brandel, Developing for Next Generation of Windows May Mean Running on NT, Computerworld, November 18, 1994, at 4. There is no technical reason to require an application to run on both Microsoft's desktop and server: indeed, a user would not even expect (nor perhaps even want) a "Windows 95" application program to run on the server. Microsoft's requirement is simply another way of leveraging:

> The NT requirement seems like nothing more than an attempt to leverage Microsoft's control over the upcoming Windows 95 market to assist its lackluster Windows NT product.

Brian Livingston, Will 'Windows' Compatible Really Mean What It Says?, InfoWorld, November 14, 1994, at 40 (Ex. 20) (quoting Andrew Schulman, Unauthorized Windows 95). Microsoft is using its operating system power to force independent application vendors to establish the linkage between the desktop and the server that Microsoft has been trying to establish through its own products. In affect, Microsoft is using independent software vendors to establish Microsoft's power in servers.

Microsoft also enhances its power in the server applications layer by horizontally bundling these products into a suite (the "BackOffice") in the same way Microsoft bundled desktop applications into a suite. Just as with the desktop applications, there is also vertical leverage to enforce the horizontal bundle by making all server applications OLE-enabled. See Stuart J. Johnston and Ed Scannell, Computerworld, supra, Oct. 10, 1994, at 4 (Ex. 7); J. William Semich, Datamation, Aug. 1, 1994, supra, at 41-44 (Ex. 10).

3. The Home-to-Business Market (Server and Client)

Increasingly, business will need to communicate with personal computers in homes in order to sell products or services and in order to provide information, for work or other purposes. Obviously, businesses that exploit this channel will have a strong advantage

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over competitors that do not, with the result that all businesses will seek entry. This market is currently known as "online services." There are three principal competitors in this market -- America Online, CompuServe and Prodigy.

Control of the home-to-business market by a single company would produce an enormous windfall. First, of course, the monopoly would be able to extract a toll for a large percentage of consumer financial and product transactions. More strategically, a company that controlled the home-to-business market could leverage that control back to the intrabusiness, or enterprise, server market. Control of both sides of the server market, intrabusiness (enterprise) and home-to-business, would place enormous power (financial services, information, education, etc.) in the hands of a single company. Microsoft has this power within its grasp. Microsoft is pursuing its policy of targeting, linking and leverage from the operating system installed base to seize control of the architecture of the home-to-business market, just as Microsoft gained domination of the desktop.

On November 14, 1994, Microsoft announced its own online service known as "Marvel" or the "Microsoft Network." Microsoft will use Windows NT as the home-to-business server for the Network. Adam Gaffin & Peggy Watt, Microsoft, Lotus Battle Shifting to On-Line Services, Network World, Nov. 21, 1994, at 1. More importantly, Microsoft will use the market power from its installed base in operating systems in a number of ways to displace existing on-line competitors and dominate the home-to-business market.

a. Predatory Bundling

First, Microsoft intends to leverage its installed base in operating systems to give its own on-line service an unfair advantage over existing competitors. Microsoft has already announced that the next upgrade of its PC operating system, Windows 95 (due out later this

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year), will have a connection to the Microsoft Network already bundled in. According to Bill Gates, "We'll give you access to [the Microsoft Network] with Windows 95... If (the software notices you have a modem, it will ask you if you want to register."[84]

This tactic will instantly displace existing on-line competition. Windows 95 will be pre-installed on virtually every PC sold in the United States in the coming year[85] and approximately 20 million copies will be in use within a year of its release. Amy Bernstein, Microsoft Goes Online, U.S. News & World Report, Nov. 21, 1994, at 84. This "potent plan for spreading Marvel" will dwarf the competition. Id. America On-Line, by comparison, has an installed base of 1.25 million subscribers. Elizabeth Corcoran, Washington Post, Nov. 12, 1994, supra, at H6 .

Industry analysts and commentators have repeatedly raised concerns that Microsoft's bundling of its own on-line service "tilts the playing field in its direction," likening Microsoft's bundling practice to the utility company selling appliances or the local phone company automatically connecting the user up with AT&T's long distance services[86]:

> In essence, OEMs will be forced to distribute MSN [The Microsoft Network] if they want to access Windows 95 -- even if that distribution is to the OEM's detriment.

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[84] Elizabeth Corcoran, Washington Post, Nov. 12, 1994, supra, at H6.

[85] Amy Cortese, Business Week, Dec. 19, 1994, supra, at 35 (HP, Compaq and other big U.S. PC makers plan to bundle Windows 95 into their machines).

[86] See Lawrence J. Magid, Microsoft: Not So Marvelous, Bay Area Computer Currents, Dec. 1, 1994, at 98, 101 (Ex. 1); Carole Patton, Computerworld, Nov. 14, 1994, supra, at 57 (Ex. 8).

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Jesse Berst, Microsoft's On-Line Rivals Could End Up In 'Cyberia', PC Week, Dec. 12, 1994, at 120 (Ex. 30). Microsoft's conduct is a textbook example of an attempt to use market power in one market (operating systems) to "tip" a competitive adjacent market (online systems).

b. Unfair Use of Information

Microsoft is also using its power over the operating system installed base to dominate the content of the home market -- CD ROMs -- the same way it used leverage from the operating system installed base to dominate business applications. For example, as a condition to obtaining information about how to run on the multimedia portions of Microsoft's operating system, independent CD ROM developers were required to fill out a form, designated "Microsoft Confidential." In other words, in order to obtain necessary operating system information, the form required Microsoft's CD ROM competitors to disclose to Microsoft confidential business information necessary to make successful CD ROM products. This form is a remarkably glaring example of the open exercise of market power. It required, inter alia, the following disclosures:

> Please describe your company's important business relationships (distribution, venture capitalists, etc.)
>
> Provide proposed product areas.
>
> Current key software products (in order of market share and importance to your company).
>
> Who is the target audience for your products?
>
> What is the price of your products?
>
> What is your supply date for retail distribution?
> What competition do you perceive for this product?
>
> How will you differentiate this product from its competition?

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How is this project funded?

(The "Microsoft Confidential" form is found in the Appendix as Ex. 22.) Armed with all of this confidential information about its competitors plans and products, Microsoft has successfully entered the CD ROM business itself, and is "churning out about one new CD ROM title per week." Washington Post, Nov. 13, 1994, supra, at H6 (Ex. 44).

c. **Unfair Head Start**

Microsoft will also ensure domination of the content of on-line services by using OLE-based tools as the standard for business developers and users to create object-oriented documents that can be transmitted over the Microsoft Network. Mary Jo Foley, Microsoft Lays Foundation For On-Line Network, PC Week, Nov. 14, 1994, at 1; Doug Barney, Microsoft to Announce New On-Line Service at Comdex, InfoWorld, Oct. 24, 1994, at 1,140. According to a PC Week article, the Microsoft network employs OLE technology and uses the "standard Microsoft Exchange E-mail client included with Windows 95 . . . ." In short, "Microsoft Network's on-line services are well-integrated into the Windows 95 user interface." Eamonn Sullivan & Matt Kramer, Microsoft Marvel Beta Leverages WIN 95 Desktop, PC Week, Nov. 7, 1994, at 169 (Ex. 28).

And, as if Microsoft's use of leverage to dominate the home and on-line markets is not sufficient, Microsoft announced on October 13, 1994[87] its intention to buy Intuit, Inc., paying a 100% premium to market. See supra note 36. Intuit publishes the personal finance

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[87] Lee Gomes, Microsoft to Acquire Intuit, San Jose Mercury News, Oct. 14, 1994, at 1D.

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and tax planning software programs that dominate their respective markets. Intuit's product controls 80-85% of the personal finance markets.[88]

Personal financial software is generally regarded as the "killer app[lication] of the 90's" for the home computing market.[89] Personal financial software has broad consumer appeal in that everyone has a bank account. It requires the integration of several sources of data including bank accounts, brokerage accounts, and credit information. Because of Intuit's commercial success, there is a strong network externality ("lock in") attached to a user's viewing his personal financial information through the Intuit user interface. Accordingly, Intuit provides tremendous leverage into the home banking market.

The Intuit acquisition is currently under Justice Department scrutiny. If the deal is consummated, Microsoft can be expected to leverage Intuit's installed base to further lock in its own products. For example, Microsoft will bundle Intuit's products with its next release of the operating system to increase the number of users who will upgrade to Windows 95.[90] Microsoft can also provide an enormous market edge to its own on-line service by making Intuit available exclusively (as among on-line services) on the Microsoft Network. See Michael J. Miller, The World According to Microsoft, PC Magazine, Jan. 24, 1995, at 80 (Ex. 25).

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88 Don Clark, Microsoft to Buy Intuit In Stock Pact, Wall St. J., Oct. 14, 1994, at A3 (86% of retail store sales); Karen Epper, Software Deal Shakes Up Home Banking, Amer. Banker, Oct. 17, 1994, at 1, 25 (80-85%).

89 Michelle Flores, Probe of Microsoft is Extended - Justice Dept. Asks For More Information, Seattle Times, Nov. 22, 1994, at B11; Michael Schrage, Microsoft Can Make Lots of Money; Can It Shape the Management of It?, Washington Post, Oct. 21, 1994, at B3; Brent Schlender, Fortune, Jan. 16, 1995, supra, at 36.

90 Gina Smith, Merger Misgivings: Will Intuit Go 'Soft?, S.F. Chronicle, Dec. 4, 1994, at B5, B14.

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Domination of home banking and personal finance provides the optimum platform from which to dominate other on-line services, including, for example, shop-at-home. Businesses that want to provide financial information to Intuit users, or who want to provide other on-line services. will want to choose server software for interacting with the Microsoft Network. Microsoft will be able to use all of its vertical integration skills developed in the desktop and enterprise server marketplace to ensure that businesses choose Microsoft home-to-business server software.

Based on the leverage potential from its operating system installed base, Microsoft has been able to consummate deals that will ensure that Microsoft Network dominates the market. For example, on November 8, 1994, Microsoft and VISA (the credit card company) announced the provision of a standard and secure method "for executing electronic bankcard transactions across global public and private networks." Visa News Release, Nov. 8, 1994 (Ex. 39). In the question and answer session following the press release, the VISA spokesperson said that the driving force in VISA's decision to do the deal with Microsoft was the fact that Microsoft had an installed base of 60 million copies of Windows. The significance of Visa's agreement with Microsoft is not lost on industry observers. See, e.g., Elizabeth Corcoran, Washington Post, Nov. 12, 1994, supra, at H6. Nor is it likely to be the last such agreement: the Post reported, for example, that "four telecommunications companies are expected to announce on Monday [November 14, 1994] that they are working with Microsoft to make dialing into Marvel a local call for many subscribers." Id. And, on December 21, 1994, Microsoft announced that Tele-Communications, Inc. purchased a 20% stake in the Microsoft Network for $125 million. The deal "implies a value of $625 million for an on-line service that doesn't exist yet . . . ." Jim Carlton & G. Pascal Zachary, Microsoft Sells A 20% Interest In

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Planned Unit, Wall St. J., Dec. 22, 1994. Once again, Microsoft is controlling the architecture and using a nominally open standard.

If Microsoft is successful in establishing the standard for the home-to-business market, it will be able to leverage into the enterprise server market both from the desktop, which it already controls, and the home market. Once a business decides that it should use the Microsoft server to communicate with customers, there is no point in having a different, probably incompatible, server for intrabusiness needs. After all, the operating system for the server side of Microsoft's home-to-business server is Windows NT. Why have a different business server operating system? This connection between the home server and the business server is clearly in Microsoft's contemplation because Microsoft has already announced that Marvel (the Microsoft network) will connect directly to a company's server. Doug Barney, Microsoft to Announce New On-Line Service at Comdex, InfoWorld, Oct. 24, 1994, supra, at 1.

The inevitable result of Microsoft's monopoly leverage will be to transform Microsoft into a "middleman" or rent collector for every transaction processed in an all-encompassing information economy. Whether writing a letter, placing an order, or paying a bill, every consumer and business connected to the information highway will pay Microsoft's toll. As noted in Fortune, "[t]his isn't just a gleam in Bill Gates' eye -- [by purchasing Intuit, entering a joint venture with Visa, and bundling the Microsoft Network] -- its already starting to come together, and in Microsoft's typically orchestrated fashion.[91]

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[91] Brent Schendler, Fortune, Jan. 16, 1995, supra, at 47-48; see also, Michael J. Miller, PC Magazine, Jan. 24, 1995, supra, at 80 (Ex. 25) ("Microsoft could require just a small service charge on each transaction. Or it could make money on the float -- the interest in the few seconds it takes to move money from one place to another. Or both.").

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V

MICROSOFT'S NETWORK-WIDE MONOPOLY

It is readily apparent that Microsoft's strategy of targeting, linking and leveraging from the desktop operating system has been successful in seizing control of the business desktop. It is also apparent that Microsoft is leveraging from the business desktop to the business server and is vertically integrating within the business server so as to seize control of the critical server operating system gateway. The Intuit acquisition is intended to control the gateway on the home computer and leverage toward the home-to-business market.

Application of "increasing returns" economic analysis would reasonably predict that, given the present situation, Microsoft will succeed in monopolizing the entire information infrastructure (just as it has monopolized the desktop) and that the monopoly will remain in place for a very long period of time.[92] Indeed, the monopoly on the enterprise and home-to-business server markets is likely to be so vast that Microsoft will be able to extract monopoly rents on not only financial transactions, but also the transmission of information and data.

> Some fear that as the digital future of the information superhighway emerges, an unchallenged Microsoft and Intel will wind up in total, undisputed control of the technology upon which the country's citizens and economy will depend . . . "Increasingly, I'm believing it's all over, and we're going to be locked into Microsoft and Intel forever," said Dataquest analyst Kimball Brown.

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[92] For example, leading industry analyst Rick Sherlund of Goldman Sachs predicted that with the settlement, Microsoft "should dominate the market for desktop software for the next 10 years." And another leading analyst, Richard Shaffer concluded that "[t]he operating system wars are over -- Microsoft is the winner . . . . Microsoft is the Standard Oil of its day." Andrew Schulman, Microsoft's Grip On Software Tightened By Antitrust Deal, Dr. Dobb's Journal of Software Tools, Oct. 1994, at 143 (Ex. 13).

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Rory J. O'Connor, Microsoft, Intel Set to Define Technology, San Jose Mercury News, Nov. 13, 1994, at 1-A. (Ex. 34).

Notwithstanding the Government's conclusion that Microsoft has increased its installed base in operating systems six-fold using "anticompetitive practices," and ample evidence that Microsoft has leveraged that installed base to attempt to monopolize business applications (as well as other markets), the Government's Tunney Act filing does not require divestiture of any part of its operating system installed base, nor does it prevent Microsoft from using that installed base to monopolize other markets, including business applications. The Government has articulated no economic rationale to justify its failure to act in the face of such clear evidence of anti-competitive intent and effect. These Amici can identify four possible economic justifications for the Government's inaction, but none of the four is persuasive.

A. Leverage of the Installed Base by Competitors

Although the Government has not articulated an economic rationale for its position, the Justice Department may have concluded that a monopoly of the X86 operating system market by Microsoft is inevitable -- either because MS DOS is already locked-in or because an "increasing returns" market will cohere around a standard in any case. Following this approach, the Government may have concluded that the best hope for competition in the operating system market is through an operating system program compatible with MS DOS, but made by a Microsoft competitor. Arguably, a vendor of such a program could tap into Microsoft's huge installed base and attempt to displace Microsoft by "migrating" users to subsequent versions of the competitor's operating system.

If such was ever in the Government's contemplation, events since the announcement of the settlement between the Justice Department and Microsoft have shown that

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such a scenario is unrealistic. Novell has withdrawn its MS DOS compatible operating system from the market entirely. See, supra note 14. And Microsoft's market is so strong that IBM selected Microsoft's MS DOS program for pre-installation on a new line of IBM personal computers, instead of IBM's own PC-DOS (compatible) program -- notwithstanding the fact that IBM's product is technologically superior to MS DOS and is less expensive.[93]

IBM's technologically advanced OS/2 is faring no better. OS/2 is capable of executing both DOS and Windows 3.1 applications, and according to Microsoft executive Steve Ballmer, IBM is "offering computer makers OS/2 for free and may be even paying some to take it."[94] However, Microsoft's market power has resulted in IBM getting few if any takers, even on these terms. As one potential customer, a computer manufacturer, stated:

> Microsoft can kill us, ... I worry more about my dealings with Microsoft than I do about my competitors.[95]

B. Alliances

Alternatively, the Government may have concluded that other operating system competitors might combine with application developers in alliance-type combinations to prevent Microsoft from extracting monopoly rents from the business desktop. But alliances among companies rarely work in the best of circumstances -- i.e., in more conventional markets. Here,

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[93] See John M. Goodman, The DOS Heavyweights Go Another Round, InfoWorld, Aug. 29, 1994, at 87 (rating PC-DOS version 6.3 above MS-DOS version 6.22) and Earle Robinson, DOS-version Madness? Integration Coping with DOS, Windows Sources, Oct. 1994, at 163 ("my choice would be the IBM . . . it's cheaper") and Yael Li-Ron, PC DOS 6.3: DOS and DOS: Separated At Birth, PC-Computing, July 1994, at 94 (IBM's Ambra computers ship with MS-DOS).

[94] Don Clark & Laurie Hays, Microsoft's New Marketing Tactics Draw Complaints, Wall St. J., Dec. 12, 1994, at B6 (Ex. 41).

[95] Id.

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the alliances would have to produce or blend complex software technologies in order to make a competitive offering equally useful and reliable to that marketed by a single vertically integrated competitor, which is better able to guarantee seamless integration.[96] Similarly, from the economic perspective, the possibilities of real competition from an alliance-based product line are highly remote, at best. Microsoft's installed base and share of the applications market is so large that its products are "locked-in" and true competition can be restored only through truly massive forces or structural relief. See, e.g., W. Brian Arthur, Increasing Returns and Path Dependence in the Economy 2, 10-11 (1994).

Most importantly, although there are companies that make operating systems that run on different chips, no Microsoft competitor or group of competitors controls the operating system gateway to the network in the way that Microsoft does. Control of the "human interface" gateway on the home computer through the acquisition of Intuit will only heighten Microsoft's control throughout the market. In short, the prospects of an alliance to compete effectively with Microsoft, in the current market where the gateways are controlled by Microsoft, are extremely remote. Competitors would have to produce a competing information infrastructure through a different paradigm (e.g., cable television), something that is years, if not decades, away. Microsoft is, moreover, already committing substantial resources -- reportedly 500 employees by next June -- in anticipation of this paradigm shift. See Elizabeth Corcoran, Washington Post, Nov. 13, 1994, supra, at H6 (Ex. 44). It therefore is clearly preparing now to be in a position to control this new paradigm as well.

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[96] All of these problems are discussed in Rory O'Connor, San Jose Mercury News, Nov. 13, 1994, supra, at 1A, 28A (Ex. 34).

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C. "Tiered" Monopoly

Third, the Justice Department might have concluded that, although Microsoft has achieved a monopoly in the operating system market, there is no need for governmental intervention because Microsoft would prefer competition in business and home applications software. In other words, the Government might argue that Microsoft has no economic incentive to monopolize the applications market intentionally and has acquired its dominant position in the market only because of superior products. According to this approach, although Microsoft has a monopoly on X86 operating systems, it would actually prefer that the applications (and development tools) market be fully competitive in order to maximize monopoly profits from the operating system market. A schematic representative of the "desktop," Figure 3, is reproduced below for reference:

Level	Name	Examples
5	Applications	(a) Desktop applications (e.g., Lotus 1-2-3, dBASE, MS Word, MS Excel, WordPerfect) The Microsoft Office is a bundle of these applications. (b) Client applications as part of a network (e.g., Oracle Financials, SAP, Peoplesoft, D&B Software, etc.)
4	Development Tools	Basic, Pascal, C, Borland C++, Powersoft
3	GUI and/or OS Services	MS Windows
2	OS	Apple, DOS
1	Hardware	IBM, Apple, Compaq, Dell

Figure 8

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This type of economic thinking would suggest that if Microsoft truly had a monopoly at the second level (operating systems), it would prefer competition at all higher levels so as to maximize its ability to extract monopoly profits through the operating system level. And, according to this economic argument, there would be no point in Microsoft expending the resources to monopolize applications (level 5), since it would derive the same benefit by monopolizing the operating system (level 2).

Indeed, according to this approach, because of the presence of demand side economies of scale, there would be a need for Microsoft to control the X86 operating system (level 2). There is a network externality that must be solved by a single firm with control of both level 2 and all of the levels above it (3-5). All other factors being equal, according to this argument, consumers would be better off with the greatest possible variety of level 5 competition and the greatest possible adoption of one operating system standard.[97] Hence, if Microsoft controls the operating system, it would have an incentive to price it low because it could extract the profits through the applications (level 5). (Or, alternatively, Microsoft might price the applications low and take the profits out through the operating system.) Indeed, Microsoft might be willing to price below cost.

On the other hand, according to this economic approach, if a Microsoft competitor gained control of applications, Microsoft and the competitor would fight over the division of profits. This would be wasteful, would lead to higher total costs for the system because of "double marginalization" and would not lead to as great adoption of the overall system. Given that Microsoft controls the X86 operating system, so the argument would go, its profits would

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[97] See Michael Katz and Carl Shapiro, Systems Competition, supra.

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be maximized if the market for applications were made as large as possible. Hence, it would follow that Microsoft would want to control applications to make this market as large as possible and would do this by pricing applications at a low level, and by making the inter-connection between its applications and operating system as efficient as possible.

This economic approach is unpersuasive for three reasons. First, although Microsoft monopolizes the market for operating systems that run on the X86 chip, there are competitive operating systems that run on other chips -- Apple and UNIX, for example. These competitive operating systems, like the Microsoft operating system, run business applications. Hence, so long as these competitive operating systems exist, Microsoft can extract "monopoly rents" by monopolizing a layer above operating systems -- business applications.

Second, as the Government's complaint in this case points out, there must be "a variety of high quality applications" that run on an operating system if that operating system is to be successful. 59 Fed. Reg. at 42,847 (Complaint ¶¶ 16-18). Accordingly, control of applications enables Microsoft to maintain and increase barriers to entry in the operating system market, thereby solidifying and maintaining Microsoft's operating system monopoly.

Finally, control of the application layer enables Microsoft to price discriminate more effectively, thereby maximizing its monopoly returns. For example, because Microsoft also monopolizes business applications, it has the ability to selectively bundle some word processing functionality into operating systems, while at the same time offering a higher priced, more fully functional word processing program to users who need greater functionality. This enables Microsoft to extract greater revenues than would be possible merely by uniform operating system prices -- i.e., if Microsoft only monopolized operating systems, but not applications.

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In short, Microsoft has ample economic incentive to monopolize business applications. To the extent Microsoft is concerned at all about actual or potential competition for operating systems, gaining control of applications will ensure overall control of the desktop, regardless of what might transpire in the future with respect to operating systems.

A complete comparison of consumer welfare in a world with uniform dominant-firm pricing in operating systems and competition in applications on the one hand, with monopoly price discrimination on the desktop (operating system and application together), on the other hand, is beyond the scope of this Memorandum. However, economic theory would strongly suggest that with respect to pricing, competition in applications, coupled with imperfect competition in operating systems -- or at least the presence of potential competition in operating systems -- is preferable to monopoly of the entire desktop. Moreover, in terms of technology, it is considerably more likely that the best technology will emerge in applications if there is open competition for the technology, rather than if it is dominated by the firm that monopolizes operating systems. That is especially true if the reason that Microsoft is able to monopolize applications is because it can leverage its operating systems monopoly and not because of any superiority of its technology.

D. Efficiencies of Integration

Finally, the Government might justify its failure to act on the belief that the benefits Microsoft is providing by vertical and horizontal integration outweigh any anti-competitive effects. Microsoft will point out that it seamlessly integrates new technologies into new markets, and it will argue that unless it is permitted to link and leverage, these markets will not be opened in a way meaningful for consumers. It will further argue that if markets are opened by less efficient alliances, the services are bound to cost more because Microsoft

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competitors will not enjoy the efficiency benefits of integration. Indeed, according to this argument, allowing Microsoft to leverage Windows from one market to the other amortizes the research and development costs over a broader base of potential customers, with the result that Microsoft can charge less for the product in the first instance.

Furthermore, Microsoft presumably will argue that because these markets and technologies exhibit increasing returns, they will gravitate toward a standard (i.e., a monopoly) anyway. According to this argument, it would be economically wasteful to require two networks that do the same thing. And, if there is only going to be one standard, that standard should be chosen by the market, as opposed to by Government intervention.

There are two important responses to this argument. First, software is not similar to many conventional products in an important way. With software it is possible to achieve virtually all of the benefits of integration without excluding competitors. There is no reason why an application developed by an ISV cannot work just as well with the operating system as a Microsoft application, provided Microsoft provides necessary information to application competitors on a timely and complete basis.

Second, while there are benefits to vertical and horizontal integration that Microsoft will point out, there are also very substantial costs. The enterprise server market, for example, is currently organized into a number of horizontal layers, each of which is characterized by strong competition. Generally speaking, consumers prefer this horizontal competition. See, e.g., The Economist, Feb. 27-Mar. 5, 1993, supra, at 11 (Ex. 14). Microsoft is attempting to impose a verticality on the enterprise market so that it can extract monopoly rents.

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Benefits of vertical integration, as opposed to horizontal competition at each layer, both on the desktop and the server, should be evaluated on the basis of product quality and incentive to innovate, as well as product cost. It is clear that vertical integration will allow Microsoft to displace even superior technologies. As PC Magazine recently observed:

> Since Microsoft is in a position where its operating system is dominant . . . [i]n order to be successful, Microsoft Network doesn't even have to be the best on-line service; it just needs to be good enough and the most convenient.

Michael J. Miller, PC Magazine, Jan. 24, 1995, supra, at 79-80 (Ex. 25). Similarly, if Microsoft controls the operating system gateway layer, its vertical integration will permit the displacement of superior products at the applications (and development tools) layer merely because of the vertical integration. The displacement of superior products is clearly a cost that should be evaluated, offsetting Microsoft's claim that its products would be lower-priced to the consumer.[98]

Moreover, once Microsoft achieves dominance in a market, it has little incentive to innovate.[99] So the negative effects of vertical integration include both the displacement of superior products, as well as the diminution of the incentive to advance technology that has become a standard. The latter cost should be evaluated as well.

Nor is it altogether clear that vertical integration will necessarily produce efficiencies (that translate into lower prices) over, say, horizontal competition at each layer.

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[98] Joseph Farrell and Garth Saloner, Installed Base, supra; Paul David, Amer. Econ. Rev., May 1985, supra.

[99] Indeed, Microsoft's operating system "lock-in" has permitted it to bring demonstrably inferior products to market (products that did not enjoy any appreciable consumer acceptance) without negative consequences to the company. See Michael Morris, Microsoft Deal: Too Little, Too Late, S.F. Examiner, July 24, 1994, at C-5. (Ex. 33)

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There is not yet empirical research on point, but there is certainly theoretical research suggesting that there are benefits to horizontal competition in the vertical layers.[100] Hence, while there is theoretical literature that documents the efficiency of the horizontal competition model, the real challenge is maintaining the horizontal model in the world. Increasing return economics indicates that there is no reason to believe that the market, as currently structured, will choose the "best" product at a particular level. Rather, there is every reason to believe that Microsoft, through leverage from control of the operating system, will be able to impose verticality, with its associated costs -- notwithstanding the fact that users appear to desire the benefits of horizontal competition. See, e.g., The Economist, Feb. 27-Mar. 5, 1993, supra (Ex. 14). In short, Government intervention is necessary merely to provide a sufficiently level playing field for the horizontal model to have a reasonable chance of succeeding.

VI

ANTITRUST ENFORCEMENT

This section of the brief identifies the deficiencies of the proposed Final Judgment and compares the relief sought by the Government in this case to the relief sought by the Government in comparable situations involving pharmaceutical, computer and telecommunications monopolies. Finally, the section analyzes the relevant case law that would support similar relief in this case, particularly a preclusion on the use of leverage from an installed base that was procured by "anticompetitive practices."

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[100] Joseph Farrell, Hunter K. Monroe and Garth Saloner, The Vertical Organization of Industry and Systems Competition Versus Component Competition, October 1994 (working paper).

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A. Deficiencies of the Proposed Judgment

Manifestly, the proposed judgment has failed to achieve its stated purposes. Instead of saving consumers money and providing them with greater operating system choices as the Attorney General promised, the settlement has permitted Microsoft to run yet another competitor out of the operating systems market (Novell) and raise its own prices to resellers. From an economic perspective, this was to be expected. The relief proposed by the Government will neither maintain nor restore competition in the operating systems market. More ominously, the settlement clears the way for Microsoft to use its unfairly acquired installed base to run competitors out of other software and networking markets, as well.

According to the Government's complaint, Microsoft used anticompetitive licensing practices from at least 1988 to 1994. As noted earlier, during that period, Microsoft maintained its greater than 90% share of the X86 operating system market,[101] thereby increasing its installed base six-fold.[102] Contrary to the assertions of the Assistant Attorney General, the relief proposed by the Government, a cessation of further anticompetitive practices, will not restore competition to the X86 operating system market because of the "network effects" present in the market.

Because Microsoft now has a huge installed base and an overwhelming market share of X86 chip operating systems, thousands of applications have been written for the

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[101] See, e.g., supra, note 32. (Microsoft presently holds greater than 90% of the X86 operating system market share); Christopher O'Malley, Personal Computing, October 1986, supra, at 181, 183 ("Microsoft's operating system" has "better than 95 percent" share of the X86 systems.)

[102] Department of Justice Press Conference (July 16, 1994), at 3-11 (by Asst. Attorney General Anne Bingaman).

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Microsoft operating system. Microsoft products, in economic jargon, are "locked in." New purchasers of computers with X86 chips have every incentive to demand Microsoft operating systems -- and no incentive to demand the operating systems of its competitors. Given the huge installed base, OEM's will therefore preinstall the Microsoft operating system in order to meet consumer demand -- whether Microsoft continues to pursue "per processor" licenses or not.

This conclusion is demonstrable from the economic literature cited in earlier sections. It is also obvious to the journalists, analysts and commentators who follow the computer industry. For example, following announcement of the settlement, PC Week wrote:

> According to computer manufacturers, industry analysts and end users, the outlook is grim for Novell's DOS and IBM's PC-DOS and OS/2. They say there is not much motivation for PC manufacturers to pre-install a competing product, since Windows has millions of users and thousands of software applications.

See Jeff Bertolucci, Microsoft Settles: Business As Usual, PC World, Oct. 1994, at 72 (Ex. 31).[103] Furthermore, Microsoft has adopted new marketing incentives that violate the

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[103] See also Stuart J. Johnston, Decree: Deal or Dodge?, Computerworld, July 25, 1994 ("Interviews with PC hardware vendors last week indicated few are likely to switch to a competing system any time soon. 'Customers have already voted with their dollars in a very strong way for DOS and Windows. I don't see that changing,' said Howard Elias, a vice president at AST Research, [a leading OEM].") Jane Morrissey, DOJ Accord Fosters 'Too Little, Too Late' Perception, PC Week, July 25, 1994, at 1 ("[O]bservers doubt the consent decree agreed on will have much effect on the company or its competitors," because it is "too little, too late."); Jesse Berst, Behind The Smoke: Microsoft Wins Again, PC Week, July 25, 1994, at 106 ("Does the agreement really change anything? No. . . . If the decree had come five years ago, when there were viable MS-DOS clones, it might have had some immediate impact. Now, in a world where MS-DOS is on the way out and Windows has no real clones, it will have no short-term impact") (Ex. 27); Andrew Schulman, Dr. Dobb's Journal of Software Tools, Oct. 1994, supra, at 143 ("the change from per-processor to per-copy licensing probably comes about four years too late"); Claudia Maclachlan, Software Makers Mull Over Microsoft Legal Challenge, National Law Journal, Aug. 1, 1994, at B1 ("They can't do [original equipment manufacturer] pricing, but they don't need it anymore.")

(continued...)

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spirit if not the letter of the consent decree by rewarding OEMs for activities designed to prevent them from doing business with competing operating system vendors. Don Clark & Laurie Hays, Wall St. J., Dec. 12, 1994, supra, at B6. In short, Microsoft's new practices achieve substantially the same effect as those banned by the Judgment.

More importantly, Microsoft remains free to leverage its installed base -- apparently with the Government's blessing -- to put competition out of business in scores of new markets: business applications, entertainment software, personal finance software, on-line systems, server technologies, etc. This key issue is simply not mentioned in the Government's Tunney Act filings, but, as with "lock-in," the significance of the issue is not lost on the industry:

> The settlement did not specifically address what many competing companies consider the antitrust issue. Microsoft, they say, has used its control of DOS and Windows to extend its hold on the software sector.

See David Einstein, Microsoft Unscathed by Settlement, S.F. Chronicle, July 18, 1994, at A1 (Ex. 32).[104] As explained in Section V.C., supra, Microsoft's use of leverage against

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[103](...continued)

Indeed, even Microsoft's supporters concede that, "[a] year from now, [the proposed decree] will be" no more than "a blip on the radar screen of computing history." William Casey, Let's Stop Beating On Microsoft, Washington Post, July 25, 1994, at F15. "Issued five years ago, the ruling would have had an effect . . . users were open to alternative environments, even if it meant migrating from [Microsoft's products]." Id. "Those choices, and the years in which they could have been made freely, are ancient history. . . . It's a fact that [today] the operating environment of choice on Intel-based processors is DOS and Windows." Id.

[104] See also John Markoff, N.Y. Times, July 18, 1994, supra, at D1 (Ex. 24) ("The agreement leaves untouched what many computer industry executives say is Microsoft's principal advantage -- that it develops both the basic operating system software that makes personal computers run . . . and applications software . . . that performs specific tasks."); id. ("The other (continued...)

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application competitors damages competition in the operating systems market, the very market the Government purports to address.

The pernicious use of leverage is well known to the Justice Department. Decrees sought by the Antitrust Division in comparable circumstances over the past forty years have prohibited leveraging of monopoly power to dominate related markets.

B. Comparable Consent Decrees

It is hardly aberrational for the Department of Justice to settle monopolization cases in high technology industries by securing consent judgments that prohibit the use of leverage from a monopolized market to a market in which competition is present. Some of the largest monopolization cases in history were settled on such a basis.

1. Parke, Davis Decree (Pharmaceuticals)

The decree entered in United States v. Parke, Davis and Co. and Eli Lilly and Co., 1951 Trade Cas. (CCH) ¶ 62,914 (E.D. Mich. 1951), prevented Parke, Davis and Eli Lilly from using their market power in the primary market for pharmaceuticals to exert leverage into the secondary market for gelatin capsules (used to contain individual doses of particular drugs). The decree did not foreclose the defendants from competing in the capsule market, but it imposed severe restrictions designed to ensure competition:

> No Acquisitions of Stock in Companies in the Secondary Market: Defendants were prohibited for ten years from acquiring any

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[104](...continued)
important issue not specifically addressed in the consent decree is whether Microsoft has been able to leverage its virtual monopoly in operating systems into domination of applications software -- a far bigger and more lucrative market"); Claudia Maclachlan, National Law Journal, Aug. 1, 1994, supra, at B1 ("As long as [Microsoft has] a dominant position in operating systems . . . it allows them to leverage that into applications. This agreement does nothing to the status quo.") (internal quotation omitted).

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interest in any business engaging in the manufacture or sale of capsules, capsule manufacturing equipment, or capsule filling equipment unless they applied to the court and made an affirmative showing that such acquisition would not substantially reduce competition. (An equivalent Microsoft decree would prohibit Microsoft from acquiring any interest in any company making or selling application programs (e.g., Intuit).)

Mandatory Licensing of Patents Pertaining to Secondary Market: Defendants were required to grant to "any applicant" (except the other defendant) royalty-free, unrestricted licenses under all Defendants' existing capsule-related patents. Defendants also were required to grant licenses to all of their future capsule-related patents in return for a "reasonable and non-discriminatory royalty." (An equivalent Microsoft decree would require, at minimum, that Microsoft grant royalty-free licenses on all its existing application and server software patents.)

Publication of Documentation to Enable Competition in Secondary Market: Defendants were required for five years to provide to all applicants "a written manual . . . describing the methods, processes, materials and equipment used by [Defendants]" in the commercial manufacture of capsules. (A provision that would have the same effect in the Microsoft decree would require, at minimum, that Microsoft immediately provide all competitors or potential competitors all operating systems documentation and specifications necessary to create a well-behaved application program. Going forward, Microsoft would have to provide the information necessary to place each of its competitors in the applications program market on an equal footing with Microsoft itself.)

This decree remained in effect until 1987. See United States v. Parke, Davis and Co. and Eli Lilly and Co., 1987-2 Trade Cas. (CCH) ¶ 67,834 (E.D. Mich. 1987).

2. International Business Machines Corp. (Computers)

In 1956, the Justice Department settled its monopolization case against IBM with the entry of a comprehensive decree, United States v. International Business Machines Corp., 1956 Trade Cas. (CCH) ¶ 68,245 (S.D.N.Y. 1956). That decree still remains in effect.

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The IBM decree prevents IBM from utilizing its power in a primary market (the market for "tabulating systems" and "electronic data processing systems") to create a monopoly in secondary markets (the markets for service on IBM machines). Unlike the Microsoft settlement, however, the IBM decree makes a comprehensive effort to prevent leveraging of the primary market monopoly. Rather than prohibiting a small number of specific practices (e.g., per-processor licensing), the IBM decree fundamentally restructured IBM's method of operation in the primary market to eliminate leverage opportunities.

A similar decree against Microsoft would have included (at minimum) provisions requiring that Microsoft: (1) train its customers and competitors in the use and structure of Windows, (2) disclose to all developers, customers and competitors the same details about Windows that it discloses to its own employees and at the same time, (3) make public Microsoft technical documentation and tools used in Windows development, and (4) create a separate corporation for developing application programs, with a true "Chinese Wall" between the applications and operating system development personnel.

3. American Telephone and Telegraph (Telecommunications)

In January of 1982, the Department of Justice filed a Final Judgment breaking up the AT&T monopoly. In its response to comments on the proposed final judgment, the Government explained that it sought broad relief to prevent the type of leverage that Microsoft is currently employing:

> The theory of both the Western Electric and AT&T cases was that, as a rate base/rate of return regulated monopolist, AT&T has had both the incentive and the ability, through cross-subsidization and discriminatory actions, to leverage the power it enjoys in its regulated monopoly markets to foreclose or impede competition in related, potentially competitive markets.

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47 Fed. Reg. 23,320, 23,335 (1982). Microsoft is not a regulated monopolist, but its monopoly in operating systems is no less thorough and its use of leverage to dominate related markets no less pervasive. Yet according to newspaper interviews given by the Assistant Attorney General following announcement of the settlement with Microsoft, the Justice Department "never considered" breaking up Microsoft. Viveca Novak, Antitrust's Bingaman Talks Tough in Microsoft Case, Wall St. J., July 19, 1994, at B5.

C. Case Law

Had the Justice Department sought to prevent Microsoft from leveraging its installed base of "locked-in" operating system users, its position would have found support in the case law. Cases in which leveraging claims have been denied involve factual situations in which the plaintiff conceded that monopolization of the target market was impossible, even with the leveraging. See, e.g., Alaska Airlines, Inc. v. United Airlines, Inc., 948 F.2d 536, 546 (9th Cir. 1991), cert. denied, 112 S. Ct. 1603 (1992).

This is not such a case. Here, both Microsoft and the Government concede that Microsoft has a monopoly in the operating system market and that Microsoft used "anticompetitive practices" to increase its installed base in operating systems six-fold. Microsoft then clearly expressed its intention to monopolize the business application market and thereafter succeeded by leveraging. Now, Microsoft's executives have clearly expressed their intention to monopolize every "specific application of corporate information systems." Brent Schendler, Fortune, Jan. 16, 1995, supra, at 40. Microsoft's tactics, coupled with the economics of the markets at issue, would lead inexorably to the conclusion that Microsoft will succeed.

A number of courts, including the Supreme Court, have evaluated conduct in one market based upon conditions in an adjacent, related market. Relevant decisions have reflected

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increasing returns-type analyses. For example, in Eastman Kodak Co. v. Image Technical Services, Inc., 112 S. Ct. 2072 (1992), the Supreme Court held that factual issues regarding consumer "lock-in" in the after-market for replacement parts constituted a proper basis on which to deny motions for summary judgment in a tie-in case. Similarly, a plaintiff's use of leverage in lock-in situations has frequently been cited in the lower courts as a principal basis for the denial of summary judgment motions in both tie-in and monopolization situations.[105]

One good example of such thinking is Grappone, Inc. v. Subaru of New England, Inc., 858 F.2d 792 (1st Cir. 1988). There the First Circuit (Breyer, C. J.) provided what it referred to as a more "refined analysis" for tie-in situations. This analysis begins to consider the anti-competitive consequences of actions that require competitors to enter the market on two levels (rather than a single level) of business. Id. at 795-96.

VII

PROPOSED PROCEDURES UNDER SECTION 16(f)

Reflecting its emphasis on the importance of court review of decrees agreed to by the Justice Department, Congress in 15 U.S.C. § 16(f) has expressly authorized a wide variety of procedures that the Court may use in making its determination regarding the public interest. These procedures include, inter alia, taking the testimony of Government officials or experts, or other expert witnesses (§ 16(f)(1)); appointing a special master or court expert (§ 16(f)(2));

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[105] See, e.g., Digidyne Corp. v. Data General Corp., 734 F.2d 1336, 1340-43 (9th Cir. 1984), cert. denied, 473 U.S. 908 (1985); (software); Ortho Diagnostic Systems, Inc. v. Abbott Laboratories, Inc., 822 F. Supp. 145, 155-56 (S.D.N.Y. 1993) (blood screening technology); Viacom International, Inc. v. Time Inc.,, 785 F. Supp. 371, 377 (S.D.N.Y 1992). See also Lee v. Life Ins. Co., 829 F. Supp. 529, 537-39 (D.R.I. 1993), aff'd, 23 F.3d 14 (1st Cir.), cert. denied, 1994 U.S. LEXIS 7596 (1994).

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examining documentary materials (§ 16(f)(3)); or "taking such other action in the public interest as the court may deem appropriate" (§ 16(f)(5)).

In this action, some information is relatively well-documented in the public record, and hence is less pressing significance to the Court's ability to engage in a meaningful public interest analysis. By way of comparison, in United States v. Yoder, 1989-2 Trade Cas. (CCH) ¶ 68,723, at 61,797 (N.D. Ohio 1986), the Department provided the court with an affidavit identifying the number of competitors, distributors and customers in the industry whom it had contacted about a proposed modification to a consent decree, and described the responses and concerns of those contacted. See id. at 61,797 n.10. Here, the Department has simply asserted orally that "by and large I think we got positive feedback" from competitors and customers, then adding (in response to a comment by the Court) "there were clearly some people who wished that we had done more." Tr. of Status Call, Sept. 29, 1994, at 13:16-22. These observations certainly do not give the Court the full flavor of industry concerns, but critical reports in the media amply document the true reaction in the industry to the proposed

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decree.[106] It is, therefore unnecessary to further burden the Court with affidavits or the testimony from those in the industry regarding these concerns.

Similarly, the nature of the allegations regarding Microsoft's conduct are well-established. Media reports, publications such as Hard Drive, this brief, and the Government's own submissions all document what the alleged illegal conduct is claimed to be: undocumented calls; early disclosure of operating systems information to Microsoft's own applications engineers; predatory preannouncements; predatory bundling and unbundling of operations and applications functionality; restrictive licensing practices; and the use of subsidized pricing to leverage into the applications market using monopoly profits from operating systems. See supra text at notes 69-70. It would therefore appear unnecessary to hold hearings in which various independent software vendors, OEM manufacturers, and other industry participants recount particular instances of such alleged conduct.

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[106] See, e.g., David Einstein, S.F. Chronicle, July 18, 1994, supra, at A1 (Ex. 32) (Ernie Simpson, president of a software company which develops programs for use with Windows, called the decree "a waste of time"); Quote of the Week, InformationWeek, Aug. 1, 1994, at 10 (Reacting to the proposed decree, Gordon Eubanks, CEO of software firm Symantec Corp., said simply, "That's it?"); John Markoff, N.Y. Times, July 18, 1994, supra, at D1 (Ex. 24) (quoting Martin Goetz, cofounder of Applied Data Research, the nation's first software company, as saying of the decree, "The Justice Department hasn't listened to the cries of the software companies"); Jane Morrissey, PC Week, July 25, 1994, supra, at 1 (Ex. 26) (quoting Mitchell Kertzman, chairman of Powersoft Corp., as saying the proposed decree will have "close to zero impact," and that "to the extent that Microsoft's behavior prevented other operating systems from succeeding, the war is over . . . DOS is it and Windows is it"); Andrew Schulman, Dr. Dobb's Journal of Software Tools, Oct. 1994, supra, at 143 (Ex. 13) (quoting spokesman for Compaq as saying "Windows is the standard--not much will change"). See also David Einstein, S.F. Chronicle, July 18, 1994, supra, at A1 (Ex. 32) (quoting a leading industry analyst as concluding that "[t]he operating system wars are over -- Microsoft is the winner . . . Microsoft is the Standard Oil of its day"); Claudia Maclachlan, National Law Journal, Aug. 1, 1994, supra, at B1 ("As long as [Microsoft has] a dominant position in operating systems . . . it allows them to leverage that into applications. This agreement does nothing to the status quo") (internal quotations omitted).

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Instead, these amici submit that what is missing from the record before the Court are two categories of information, neither of which should require unduly protracted hearings, but which together should provide the Court with a sufficient record to make a determination under Section 16(e). First, in the course of its investigation, the Government has reviewed large quantities of documents from Microsoft, and these amici believe that a very small group of these documents have been identified by the Government as "key" documents. These documents largely should answer questions regarding Microsoft's intent and use of various illegal practices. They should be turned over to the Court for its review.

Second, the Government should be required to submit affidavits from its economic experts that set forth in detail what those experts anticipate the operating systems and applications software markets will look like in five years, assuming that the present proposed decree were implemented. Such a submission should indicate whether, under the present decree, the Government's experts anticipate that competition will have been restored in the operating systems market by that time. If the Government's experts believe that competition is not likely to have returned to the market by that time, they should be required to indicate what effect different alternative proposals might have on restoring competition to the market. And, if they believe under "increasing returns" theory that it is simply too late to restore competition -- that the operating systems market "runs to scale," and having been permitted to establish dominance through its illegal practices, that Microsoft cannot now practically be unseated -- the Government should be required to indicate what alternatives it has considered to minimize adverse consumer consequences resulting from this monopoly.

These amici submit that the affidavits from the Government's economists also should address the extent to which they anticipate that Microsoft will have been able to leverage

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its operating systems monopoly into secondary software markets. Because Microsoft's installed base monopoly (and the resulting monopoly profits) were illegally acquired, the Government's economists should explain why it is unnecessary from an economic point of view to implement provisions such as those present in the IBM and Eli Lilly consent decrees. This analysis would include, for example, the effect of alternatives such as prohibiting Microsoft from acquiring stock in companies that make or sell application programs (Eli Lilly); spinning off its applications division into a separate subsidiary, and enjoining it from giving any benefit to the subsidiary that is not also provided to third-party applications providers (IBM); and making public Windows technical documentation and tools used in Windows development (IBM). In the event that such alternatives were not viewed as sufficient to ensure a "level playing field" in the applications markets, given Microsoft's now-dominant installed base, the economists should address whether divestiture (such as in AT&T) is the appropriate remedy.

Based upon the information made available to the Court as a result of this analysis, these amici believe that the Court would be in a position to accept or reject the Government's current proposed decree, or to identify those modifications that would be necessary to bring the decree within the public interest standard. Cf. AT&T, 552 F. Supp. at 153 & n.95, 212-13. At a minimum, such submissions would provide a factual record which the Court's own economist expert could review in considering the economic issues raised by the proposed decree, or to which economists could respond on behalf of other interested parties.

Given the extreme importance of these proceedings to the future of the American software industry, and hence to the economy as a whole, the Government should be permitted to do no less. As documented in previous Sections, economic theory predicts that, even without resort to its ongoing (and unchecked) illegal practices, Microsoft would very likely be able to

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leverage its unlawfully acquired installed base in operating systems to monopolize the entire business and home software network in the United States. The Government's decision to do nothing to restrain Microsoft's ability to engage in such monopoly leveraging, or even to curtail Microsoft's use of blatantly predatory and unlawful practices in furtherance of that end, requires explanation. Absent such explanation, these amici submit that the Court has no choice but to reject the proposed consent decree as plainly outside the bounds of the public interest.

Dated: January 10, 1995

Respectfully submitted,

WILSON, SONSINI, GOODRICH & ROSATI

By_____

Gary L. Reback

MTC-00030631_0364

PROOF OF SERVICE BY OVERNIGHT COURIER

I, Sharon S. Kelly, declare:

I am employed in the City of Palo Alto, County of Santa Clara, State of California. I am over the age of 18 years and not a party to the within entitled cause. I am readily familiar with Wilson, Sonsini, Goodrich & Rosati's practice for collection and processing of correspondence for overnight delivery by courier. In the ordinary course of business, correspondence would be consigned to a messenger service on this date.

On January 9, 1995, I served the attached **NOTICE OF MOTION, MOTION, AND MEMORANDUM IN SUPPORT OF MOTION TO FILE MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT** and **MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT** as well as the **APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT** on the parties listed below by placing the documents described above in an envelope addressed as indicated below, which I sealed. I consigned the envelopes to an overnight courier service by placing it/them for collection and processing this day following ordinary business practices at Wilson, Sonsini, Goodrich & Rosati, 650 Page Mill Road, Palo Alto, California 94304-1050, to be personally served on the following:

Honorable Stanley Sporkin
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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA, Plaintiff, vs. MICROSOFT CORPORATION, Defendant.	Civil Action No. 94-1564 (SS)

FILED
FEB 14 1995
Clerk, U.S. District Court
District of Columbia

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT

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TAB 1

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

USER OUTLOOK

Microsoft: Not So Marvelous

BY LAWRENCE J. MAGID

Microsoft Chairman Bill Gates didn't get to be the richest person in America by being modest or by playing patsy with his competitors. So it came as no surprise to hear Gates belittle his competition and exaggerate the value of his offerings at the recent Comdex trade show.

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District of Columbia

Gates was introducing the Microsoft Network. Preliminary reports on this online service, code-named "Marvel," have been circulating for months.

Like everything Gates announces, The Microsoft Network is purported to be the greatest thing since individually wrapped cheese slices. In introducing the service, Gates made some not-so-subtle digs at current online providers. "There is an opportunity to bring innovation into this market," said Gates, adding that existing services "take print material and move it over."

GOOD, NOT REVOLUTIONARY

But that's not entirely true. While the three big online services (CompuServe, Prodigy, and America Online) each offer online magazines, newspapers, and other print material, they also offer interactive forums, live chat rooms, shareware libraries, online technical support, and other information and interactive services that you can't get from your local newspaper. All three services are also experimenting with sound and graphics, and all plan to introduce animation and full motion video when communications technology (i.e., ISDN) lets them get around the limits of today's phone system. Bill Gates and his team of developers may be smart, but they have an exaggerated opinion of themselves when compared to the rest of the world.

Besides, what did Gates show when he demonstrated the service? An icon pointing to an online edition of *USA Today*. This is creative? To be fair, Gates also demonstrated some interesting new technology, including an online prototype of Microsoft Bookshelf, the company's multimedia reference guide. Most commercial online services offer online encyclopedias and other reference works, but none currently include graphics as a routine part of the deal.

Gates also showed how the Microsoft Network will be integrated with Windows 95. Users will be able to drag icons directly from the service to their Windows desktop. In theory at least, information that's online will be as easy to locate as information on your computer's hard disk. Of course, your modem will have to dial into the network to retrieve the information, at least until we're all hard wired into cyberspace.

I was also impressed by the way the Microsoft Network will display complex graphics like color photos. When you enter an area that uses images, graphics will quickly reveal themselves in low-resolution form, then become sharper and more vivid as data streams over the modem. This gradual display of graphics is necessa because the Microsoft Network will initially suffer the same phone-line and modem limitations that other online services do.

As interesting as Microsoft's service may be, it's hardly revolutionary. Prodigy, CompuServe, America Online, and Interchange (Ziff-Davis's forthcoming service) are all capable of offering similar features. The Microsoft Network won't be available to the public for at least eight months; its

See USER OUTLOOK, *page 101*

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USER OUTLOOK, *from page 98*

competitors will have plenty of time to catch up, if not move beyond Microsoft's plans.

Three basic issues affect the popularity of online services – interface, price, and content. Prodigy, CompuServe, and America Online can compete quite successfully on all three fronts. All three have plenty of time to tweak their interfaces, all can adjust their prices, and they all have a head start when it comes to content. Prodigy will announce a major interface overhaul in early 1995, and has had several years to build up its online content. CompuServe is reportedly working on easier-to-use software and, after nearly 15 years, is a leader in online databases, shareware, and more. America Online, though lacking the content of its two major competitors, leads the way with online editorial offerings and is generally regarded as being easy and pleasant to use.

Ziff-Davis's Interchange is every bit as up-to-date as Microsoft's Network. The only advantage Microsoft has is its ability to build its online software into Windows 95. And therein lies my biggest concern.

A RIGGED PLAYING FIELD

By making its network part of the operating system, Microsoft tilts the playing field in its direction. Microsoft clearly has the right to enter the online business, but I question whether it's fair to the other players if the Microsoft Network – and only the Microsoft Network – is part of Windows 95.

Imagine that utility companies sold appliances. You've just moved into an empty house and after turning on the power, the power person says she has a great refrigerator in the truck that she'd be happy to install for you. "It's as cheap as any you'll get in town and you don't have to make any payments until after you've used it for a while. Besides, our refrigerator is optimized to work best with our electricity." That utility company would sell a lot of refrigerators – and every other appliance vendor would rightly cry foul. This would never happen in real life, because utilities are regulated monopolies. Microsoft, despite the Justice Department's recently rulings, is a virtual monopoly, controlling nearly 80 percent of the personal computer operating system business.

Gates claims that his bundling the Network with Windows 95 is no different than IBM's bundling Prodigy software with some of its machines. And IBM does own half of Prodigy. But IBM also offers America Online on some of its machines. More germane, IBM controls only a fraction of the personal computing market. Nobody, except Microsoft, has a grip on more than about 10 percent of the market.

Microsoft's bundling scheme has caused America Online president Steve Case to cry foul, accusing Microsoft of creating an "unlevel playing field." Others in the online industry agree. Robert D. Mainor, vice president of Product Marketing for CompuServe, didn't go as far as Case in criticizing the Microsoft announcement, but he did say that "Microsoft enjoys a distribution model that no one else has access to." He added that his service, in business for about 15 years, is in a good position to compete with Microsoft. If CompuServe's claim of 2.4 million members is accurate, it is currently the largest online service.

Prodigy's president, Ross Glatzer, said that Microsoft's entry will help expand the total online market. However, he agrees that Microsoft has its thumb on the scale. Glatzer would welcome the opportunity to include Prodigy and other online service software with Windows 95 so that users would have free choice of services.

I think Microsoft is a great company. It produces some excellent programs and it improves America's trade imbalance. But it doesn't have the right to run roughshod over the entire computer industry. Microsoft's practices affect its competitors and, ultimately, its customers. The computer industry needs competition and a balance of power. Right now, that power is tilting toward Redmond, WA. It's time for the folks in the other Washington – the one between Maryland and Virginia – to wake up and start taking a hard look at Microsoft's anti-competitive behavior. ★

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Larry Magid is the author of ***Cruising Online: Larry Magid's Guide to the New Digital Highways*** *(Random House, 1994) and* ***The Little PC Book: A Gentle Introduction to Personal Computers*** *(Peachpit Press, 1993). He is also an internationally syndicated columnist for the* **L.A. Times**. *You can reach Larry on the Internet at magid@latimes.com, via CompuServe at 75300,2105, via Prodigy at KPVN58A, via America Online as LarryMagid, or care of* ***Computer Currents.***

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TAB 2

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Exh. 2

1ST STORY of Level 1 printed in FULL format.

94-1564 SS

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HEADLINE: A FIERCE BATTLE BREWS OVER THE SIMPLEST SOFTWARE YET

BODY:

The all-out fight for supremacy among the hardware makers -- Apple, Digital Equipment, IBM, and 150 others -- has been getting the headlines recently in the mushrooming personal computer market. But while it may never attract as much attention, an equally important battle is about to explode among the leading companies that write software for the small machines. Prompting this latest free-for-all is the emergence of an entirely new class of product called "environment" software Environment software has no specific application such as word processing or financial analysis. It is designed to make such jobs easier for users who are not technically trained -- a group that is rapidly becoming the majority of personal computer users. The new generation of software, which was pioneered with such machines as Xerox Corp.'s Star and Apple Computer Inc.'s Lisa, splits the computer screen into sections, or "windows." Users can run different applications software simultaneously in each window. Normally, a computer displays only one program at a time.

The new software more or less replicates tne desktop on the computer screen. In effect, a business executive or professional can put the equivalent of a letter, financial spreadsheet, or Rolodex file in the different windows on the computer display, or electronic desk.

The software battle pits three leading developers -- Microsoft, Digital Research, and VisiCorp -- against one another. Each wants its product to become the industry standard. The competition is especially fierce, because windowing programs are expected to be standard on every personal computer -- a market potential of as many as 5 million units in 1984 alone. "Environments used to feature, but now they have become a fundamental part of the [personal comter] system," says Esther Dyson, president of Rosen Research Inc.

In the fight to get their new software running on the largest variety of computer brands, the competitors are wooing the hardware makers for endorsements. The outcome will shape not only the future of the current $1.5 billion annual market for personal computer programs but also sales of the equipment itself, since the machines tnat run the most popular software will be among the best sellers. As a result, leading hardware makers -- most notably Apple and International Business Machines Corp. -- are being drawn into the fray.

The battle lines are forming rapidly. On Nov. 10, Microsoft Corp. was expected to announce that 23 computer makers -- including Apple, Digital Equipment Honeywell, Tandy, and Texas Instruments -- have signed up to use its

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version of the new software, which it says will be ready by April. Meanwhile, VisiCorp, the first software company to offer this next-generation product to the industry, is racing to get its VisiOn program out the door (page 115). Not to be left out, Digital Research Inc., which has not yet demonstrated its product, is leaking word that it will begin delivering its version of environment software to as many as 10 computer makers before the end of the year. "It's a real battle of the software developers," says Steven A. Ballmer, a vice-president at Microsoft.

Competition will be fierce because there is not enough room in the personal computer marketplace to support several versions of environment software. Applications programs for specific tasks such as word processing and financial analysis will have to be rewritten to work with each environment package.

"The battle is to establish whose [environment software] is going to win, because software developers don't want to write programs for 18 different systems," says Rosen Research's Dyson. Adds Moize Adney, manager of internal software development at Texas Instruments Inc.: "The pressure to standardize will be there."

INDUSTRY STANDARD. Companies racing to market environment software are placed in something of a catch-22 situation. They must convince computer makers that many writers of applications software will develop useful programs to operate with their environment packages. But they must convince the software writers at the same time that their environment programs will be used on the largest number of machines.

Microsoft hopes to parlay the popularity of its MS/DOS operating system -- the housekeeping software that controls the basic functions of a computer -- into a marketing edge. Its new environment program, Microsoft-Windows, is actually just an extension of its operating system. An impressive 40% of personal computers sold -- including the best-selling IBM PC -- are controlled by the Bellevue (Wash.) company's operating system software. This penetration, Microsoft maintains, provides a ready market for Windows. If every computer that runs Microsoft's operating system adds Windows, Microsoft is well on its way toward becoming an industry standard, says the company's Ballmer.

'CHURCH AND STATE.' On the other hand VisiCorp is stressing its success in appli cations programs. The San Jose (Califcompany, which was made famous by the VisiCalc financial modeling and spreadsheet program, has developed a set of applications for its VisiOn environment package. "What will make a windowing system successful is the quality of the applications under it," says Danie Fylstra, VisiCorp chairman.

While archrival Digital Research has not formally announced its environment package, the company is working hard to line up applications software companies to write programs for use with its new windowing software. Digital Re search says its environment package is the safest choice, because the company does not write applications software. "We're not in the applications business like VisiCorp or Microsoft," says Digital Research President John R. Rowley. "We do not present a threat."

Rowley contends that competitors can use their own environment software to bring out applications packages before anyone else can. Microsoft, for one, denies that offering an environment program gives its own applications programs an advantage. "We have shown in the past that there is a very clean separation

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between our operating system business and our applications software," says Ballmer. "It's like the separation between church and state. And if you don't play it straight, you can't expect to get the business." Microsoft is expected to hit sales of $70 million this year, double its figure for 1982.

Some applications software writers are concerned, however, that Rowley may be right. "VisiCorp is a competitor," says Fred M. Gibbons, president of Software Publishing Corp., which sells personal computer applications software. "Why should I trust them?" To cover their bets, some powerful independents could decide to go with more than one environment package. "There are many valid reasons to support more than one environment and let the marketplace decide," says Mitchell D. Kapor, president of Lotus Development Corp., which for now has gone with Microsoft for 1-2-3, its popular integrated spreadsheet and graphics package.

One variation on the environment theme is Quarterdeck Office Systems, a small Santa Monica (Calif.) startup. By the end of the year, Quarterdeck will begin shipping a $399 environment package called DESQ. But instead of persuading software writers to modify their programs, the company has designed DESQ for use with several existing applications programs. "With DESQ you just buy it and run it totally without having anything modified," says Therese E. Myers, president and founder.

PREEMINENT POSITION. As the battle begins to heat up, no company has produced the supporter that could carry the day: IBM. "IBM has established such a preeminent position in the marketplace that the supplier that has its environment on IBM will have the greatest success," says John R. Keifer, senior analyst at InfoCorp. Since the IBM PC was introduced in 1981, the computer giant has won more than 26% of the market. As many as 75% of personal computers, industry observers agree, are expected to follow the IBM PC design by 1985 (BW -- Oct. 3).

Few are willing to predict IBM's strategies in this key software market. "I don't expect IBM to endorse one environment in the near term," says Rosen Research's Dyson. "It will probably make them all available." But some observers say IBM will bring out its own environment software, and it is not clear where such a move would leave the independent software companies. IBM already has shown some of its own windowing software on an enhanced version of the PC, and there are reports of another IBM environment program, called Glass, that is being considered as a product. "With IBM's announcement of its own windowing capability, it looks to us that the big guy is starting his own standard," says Dennis V. Vohs, executive vice-president of Management Science America Inc., which owns Peachtree Software Inc., a personal computer software company.

The victors in the battle over environment software may not be obvious for a year or more. Despite an impressive array of endorsements, Microsoft will not begin shipping Windows until April. At that time, VisiCorp and Digital Research will have had their products on the market for only a few months. "There will be a lot of bandstanding and claiming victory," says Digital research's Row- ley. "But you won't really know what will happen for at least 6 to 12 months."

GRAPHIC: Picture, MICROSOFT'S BALLMER AND A DISPLAY DIVIDED INTO "WINDOWS"

LANGUAGE: ENGLISH

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TAB 3

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Exh. 3

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'MICROSOFT IS LIKE AN ELEPHANT ROLLING AROUND, SQUASHING ANTS'

As the company's dominance grows, so have the complaints of other suppliers of software

There's no doubt about it. Microsoft Corp. wants to dominate the world—the personal computer software world, that is. And it isn't very far from doing so: It already supplies the core software for just about all of the world's 25 million-plus IBM PCs and their clones. It has done well, too, in many sectors of the huge market for PC applications programs—spreadsheets, word processors, and the like. All in all, it's the leader in total PC software sales—Wall Street expects revenues of $1.1 billion for the year ending next June, up 40% from the year before.

Now, Microsoft is beginning to suffer the slings and arrows that often come with such fortune. Other suppliers of PC software are downright angry over its dominance. The company, they say, is just too powerful and its products too pervasive. Its virtual monopoly in PC operating systems—the software life-support systems that all other programs call upon for access to the PC's memory, disk drives, and display screen—means that Microsoft's every technical change, strategy shift, or mistake can adversely affect producers of applications software. They argue, moreover, that Microsoft is abusing its systems software edge to put them at a disadvantage—and win greater control of the market.

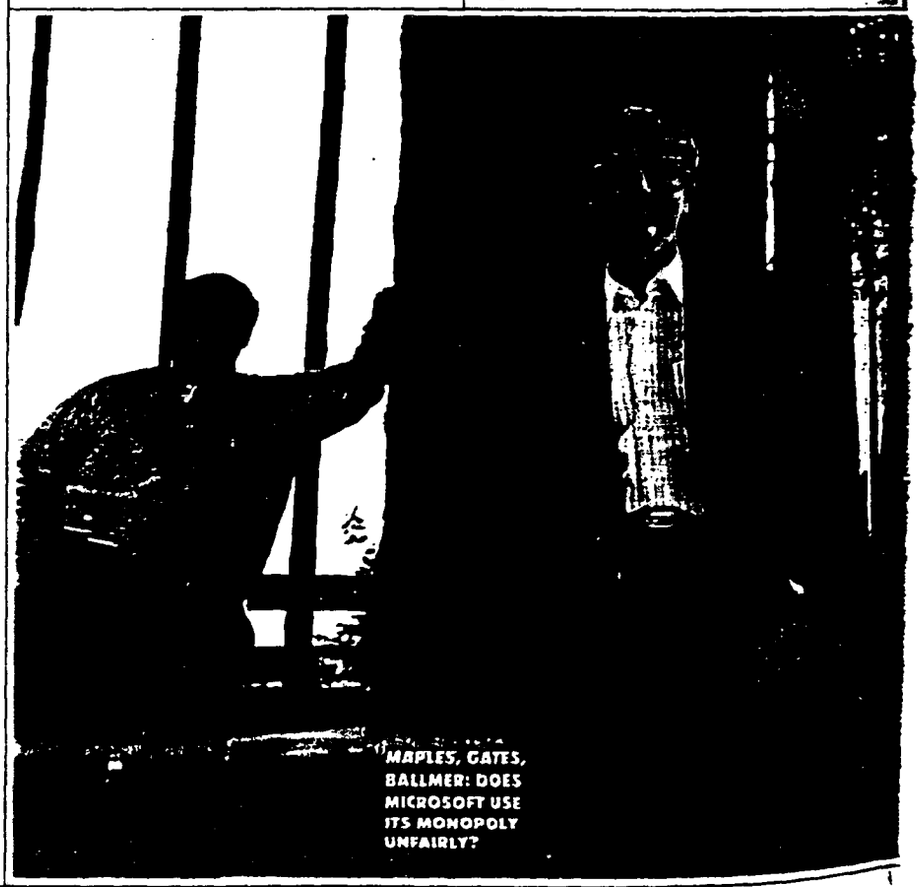
INTIMATE TIES. This, critics say, will make it harder for Microsoft's small competitors to prosper. And that hints at less innovation in software, the one part of the world computer market in which U.S. companies still hold an unassailable edge. Says Fred M. Gibbons, president of $100 million-plus Software Publishing Corp.: "Microsoft is like an elephant rolling around, squashing ants."

William H. Gates III, Microsoft's CEO, argues that such fears are misplaced. He contends that his company is so influential simply because it knows more than any other about how the pieces of a PC fit together, from chips to other components to software. Microsoft's intimate ties with leading companies such as IBM, Compaq, and Intel bode well for the U.S. computer industry, he argues. By virtue of those relationships, Microsoft can establish coherent technical standards—in graphics, communications, or computer languages, for instance—that if followed by everyone would speed up the process of writing new programs. Those would help sell machines, fulfilling Gates's vision of a PC on every desk and in every home.

What worries other software makers is where they fit into this vision. While tightening its grip on the $1.4 billion systems software market, where its MS-DOS and OS/2 operating systems are king, Microsoft has pushed harder than ever into the $4.4 billion market for applications packages. Its Microsoft Word text-processing program, Excel spreadsheet, and other such products now account for 47% of total revenues—almost equal to its systems business. And competitors say they're getting squeezed.

Recently, for example, Microsoft stopped providing them with lists of customers that use Windows, its graphical extension to MS-DOS. Instead, it offered to place ads for their Windows-compatible software in a booklet shipped with each copy of Windows. Competitors suspected that Microsoft's own applications group was still getting the lists. So they complained—and got the lists back.

VOCAL CRITIC. More unsettling are suspicions that Microsoft doesn't keep its systems and applications groups as separate as it promises—that church and state tend to mingle. Competitors figure that if Microsoft's applications people get peeks at unannounced systems software, they should, too. Otherwise, they're at a disadvantage. Microsoft fuels suspicions by sometimes shifting workers between its groups. And at Agenda 90, a recent trade conference,



MAPLES, GATES, BALLMER: DOES MICROSOFT USE ITS MONOPOLY UNFAIRLY?

PHOTOGRAPH BY ... KUHN

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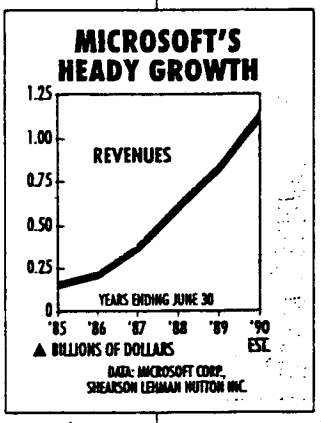
outsiders were angered to see an Excel specialist demonstrating new operating system features that they hadn't been briefed on. Apple Computer Inc. solved such conflicts in 1987 by spinning off its applications group into an independent company, called Claris Corp. Gates says that's not necessary at Microsoft.

Micrografx, a tiny graphics software company, might disagree. Recently, it approached Microsoft with a program it thought the larger company might want to use. But it showed it only to Microsoft's applications developers—not to its systems people, who it feared would copy its proprietary ideas. Micrografx President J. Paul Grayson says that one person who saw his program was soon transferred to Microsoft's systems division. Eventually, Gates placated Grayson with a cross-licensing deal, which Microsoft concedes was unusually generous. Still, Grayson says he was "manipulated by Microsoft," which insists it did nothing wrong.

PAINFUL P.S. Whatever the case, Microsoft's tactics have strained relations even with partners. This fall, John Warnock, chief executive of Adobe Systems Inc., had an emotional, public falling out with Gates. Adobe's top product, called Postscript, is a key program for desktop publishing. Earlier this year, Apple, Adobe's best customer, said it would replace Postscript in Apple computers. Microsoft continued to do business with Adobe. Then, in September, Apple and Microsoft surprised Warnock by announcing at an industry conference that they would collaborate in competing with Adobe. Says Warnock: "We used to be a strong ally of Microsoft." Now, "it's easier to help their competitors."



The biggest gripes have been with Microsoft's moves in operating systems. Like Microsoft, its competitors use those basic programs as "platforms" upon which to construct applications software. But if the platform is shaky, late to market, or just not selling well, writing software for it can be risky—as the tale of Windows shows.

Starting in early 1983, Microsoft tried to supplement MS-DOS with Windows, a program that makes PCs act much like Apple's Macintosh. But outside developers were wary of writing programs for Windows, which was 16 months late to market, because of its many early technical problems. They say Microsoft also gave them mixed signals: It positioned Windows as a program mainly for low-end PCs, while it worked on a more advanced—but incompatible—operating system called OS/2 for more powerful computers. And IBM threw its weight behind OS/2.

Much to the industry's surprise, however, OS/2 has caught on slowly. And Windows has taken off. Microsoft has shipped 2 million copies of it, compared with only 150,000 of OS/2. And next year, it will bring out a major revision of Windows that will be easier to program and more functional than the original—enough so, in fact, to do many of the same jobs that OS/2 was supposed to handle. Windows, says David G. Bayer, an analyst at Montgomery Securities, "has become the platform of choice."

DUPLICITOUS? Guess which company is poised to exploit that platform? While most competitors concentrated on writing for OS/2, Microsoft has been readying a slew of applications for Windows as well. They include a fancy new word processor, a project management program, and a long-rumored data-base program called Omega. That's leading companies such as Lotus Development and Software Publishing to call Microsoft duplicitous. They charge that Microsoft enhanced Windows just to help its own applications group. And, they claim, the more powerful Windows will further hurt OS/2. "It's irresponsible of Microsoft to do that," says Software Publishing's Gibbons.

Even discounting the effect of a revived Windows, Microsoft has disappointed those counting on OS/2. Introduced in 1987, that program still can't do all it promised, such as use all the power of Intel Corp.'s popular 80386 chip. Worse, perhaps, is that Microsoft still offers no aids for modifying Windows programs to work with OS/2. A recent poll shows that software executives don't expect OS/2 to really catch on until 1993—two years later than what they predicted last year. Gates's answer: Microsoft is devoting the maximum feasible engineering talent to OS/2 and Windows, favoring neither.

'SLIDEWARE.' On top of all this are wilder accusations—for instance, that Microsoft peddles nonexistent products to scare off competition. Michael J. Maples, the company's vice-president of applications software, shows slides at trade shows that list the software markets Microsoft intends to enter—programs for desktop presentations, for instance. One competitor calls that "slideware. They have slides saying they're going to be involved in every conceivable area of innovation five years from now," he says. "It slows the pace of innovation" by intimidating smaller competitors.

Gates laughs off the idea of software companies quaking in their boots. "So what are they doing instead, starting fast-food restaurants?" he quips. "I've never heard anyone say, 'we're chicken, we can't compete with you.'" WordPerfect Corp., for example, is beating Microsoft in word processing, with a 40% share of the market, up from 16% three years ago. And companies such as Micrografx and Atlanta-based Samna Corp. have drawn technical praise for their applications programs for Windows.

In fact, many of Microsoft's critics helped create their own problems when they ignored its pleas to develop applications for Windows. "Even when Gates makes a mistake, people turn it into a Machiavellian plot," says Gordon E. Eubanks Jr., president of software house Symantec Corp. And Steven A. Ballmer, senior vice-president for Microsoft's systems division, disputes the charge that his people give their counterparts in applications previews of their upcoming systems products.

Since Microsoft earns more from systems than from applications programs, Ballmer says, he would be foolish to jeopardize his market just to boost applications sales. Indeed, he recounts an occasion when Microsoft's developers of Excel accosted him in the company cafeteria for revealing their work to Lotus, which confers often with Microsoft on

CHART BY JOHN DECKERT/BW

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changes in its operating systems. "Telling me is as good as telling Lotus," he says, as if to prove his independence.

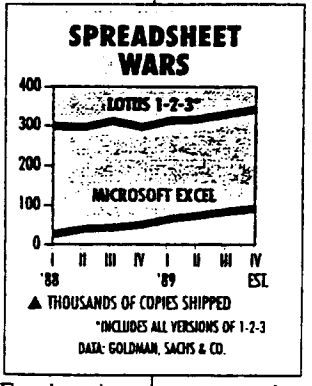
So, the tension mounts. But what can Microsoft's rivals do? Their dependence on its PC operating systems puts them at a disadvantage. But no company—not even IBM—has been able to avoid that. They might try to subvert Microsoft's efforts to win control over every critical software standard in the PC market. "If people are feeling mishandled, they're going to look for other [partners]," warns Lotus CEO Jim P. Manzi. A likely one would be the group of suppliers backing American Telephone & Telegraph Co.'s Unix operating system, which rivals OS/2 in scope and function.

But Unix' base of existing customers is minuscule compared with MS-DOS's. And Microsoft already has the best-selling version of Unix for personal computers, called Xenix. Perhaps, for competitors, there's just one choice: Learn to dance with the elephant.

By Richard Brandt in San Francisco

WHAT NOT DOING WINDOWS COSTS LOTUS

It's enough to drive Lotus Development Corp. to whining. Lotus spent three frustrating years and millions of dollars to bring out two versions of its 1-2-3 spreadsheet program that can work with Microsoft Corp.'s OS/2 Presentation Manager, the basic software, or operating system, that was supposed to turn every PC into a Macintosh. But OS/2 isn't selling well. And Microsoft, unexpectedly, is selling loads of an alternative called Windows, an earlier program that has lots of Presentation Manager's easy-to-use graphics.



Microsoft wins no matter which program takes off. Its own spreadsheet, called Excel, works with both. But Lotus isn't so lucky. Its advanced new 1-2-3, called Release 3.0, won't work with Windows. As Excel makes inroads, "Lotus has found that there's this large installed base of Windows users that it decided to ignore," says analyst David Readerman at Shearson Lehman Hutton Inc.

LATEST WOE. That has led to some public griping. For software companies, "choosing an operating system" to write programs for "should not be equivalent to betting on a horse race," Lotus CEO Jim P. Manzi told some of his peers in a recent speech. "Windows is like a horse that was about to be put to pasture but was then revitalized."

Indeed, corporate buyers such as Eastman Kodak Co. and BankAmerica Corp., which want to upgrade pro- [illegible] like 1-2-3 and use Windows as well, [illegible] used. Less powerful versions of 1-2-3 work with Windows, but they can't take advantage of many of its graphical features. Lotus probably will solve that problem: "We're not native," says Frank A. Ingari, vice-president of its PC spreadsheet division. But analysts say the revised program could take a year to produce.

The Windows flap is just the latest woe for seven-year-old Lotus. True, customers are buying more of 1-2-3 than competing products, giving Lotus 65% of the $600 million world market for PC spreadsheets. But so far, Release 3.0 may not be doing as well as its other new version, called Release 2.2, which runs on less powerful PCs. Some customers even are sticking with Release 2.01, now more than three years old. At Softsel Inc., a software distributor, Release 2.2 is outselling 3.0 by 3 to 2. Corporate Software Inc. says its ratio is more than 2 to 1. Lotus disputes such numbers, claiming that 2.2 and 3.0 are selling about the same.

The split means a lot to Lotus, which gets two-thirds of its profits from spreadsheets. Next year, it will lift 3.0's list price to $595, some $100 higher than other versions. That might add $20 million or more to Lotus' overall revenues in 1990. But it might not: "The question is, does Lotus see a fall-off after this initial upgrade bubble?" says Richard G. Sherlund, an analyst at Goldman Sachs & Co.

Profits dipped while Lotus struggled to get 3.0 out the door. But it now expects to finish this year with strong earnings. Its spreadsheet sales have returned to historical levels of about 110,000 units a month. And sales of 2.2 and 3.0 will boost revenues by $30 million this year. Now, all Lotus needs is one more product—so it can bet on two Microsoft horses at once.

By Keith H. Hammonds in Boston

JOHN DECKERT/BW

COMPUTERS

A HEAVYWEIGHT LIGHTWEIGHT

Compaq's new laptop may win big

Rod Canion keeps his word—eventually. For years, the president of Compaq Computer Corp. promised that his company would build a laptop computer as soon as it could do so without compromises such as eliminating floppy disks. Lately, with Zenith Data Systems Corp. and Japanese rivals selling laptops with all the customary PC features, Canion's pledge began sounding hollow. Even Compaq's first battery-powered PC, although a runaway success, had drawbacks: At a time when the Japanese were pushing down the size, weight, and price of laptops, the Compaq machine came in at a hulking 14 pounds—and with a $5,400 base price.

Now, Canion has kept his promise with a pair of laptops that weigh only 6 pounds, fit in a briefcase, and don't cost a lot more than competing PCs. These are the first "notebook" models (8½ by 11 by 1⅞ inches) to incorporate a full-size floppy disk. An optional hard disk, storing 20 million or 40 million characters of data, boosts the weight to only 6.7 pounds. Starting at $2,400, the basic LTE is aimed at NEC Corp.'s Ultralite and Zenith's Minisport, the leading notebook PCs. The competing models don't have a standard floppy disk drive and can't accommodate a built-in hard disk. A second Compaq LTE model, based on the faster Intel 80286 microprocessor, starts at $3,899. "These are breakthrough systems," says Peter J. Tiege, an analyst at market researcher InfoCorp.

INSTANT HIT. Some breakthroughs came from Japan's Citizen Watch Co., which will build LTEs for the European market. Citizen also worked on manufacturing problems. "We benefited from their miniaturization experience," says Canion.

On Wall Street, the laptops were an instant hit. Rumors of their debut sent Compaq's stock to a record 107 on Oct. 10. The Oct. 16 announcement pushed the stock back to 103¾ on Oct. 17, up from 98 after the market dove on Friday the 13th. Predicting that Compaq can sell 190,000 LTEs by the end of next year, Prudential-Bache Securities Inc. analyst Kimball H. Brown has boosted 1990 earnings estimates by 20¢, to $9.80 per share. That should make Compaq's lightweight laptops worth the wait.

By Geoff Lewis in New York

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TAB 4

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Exh. 4

94-1564

Special Report

IS MICROSOFT TOO

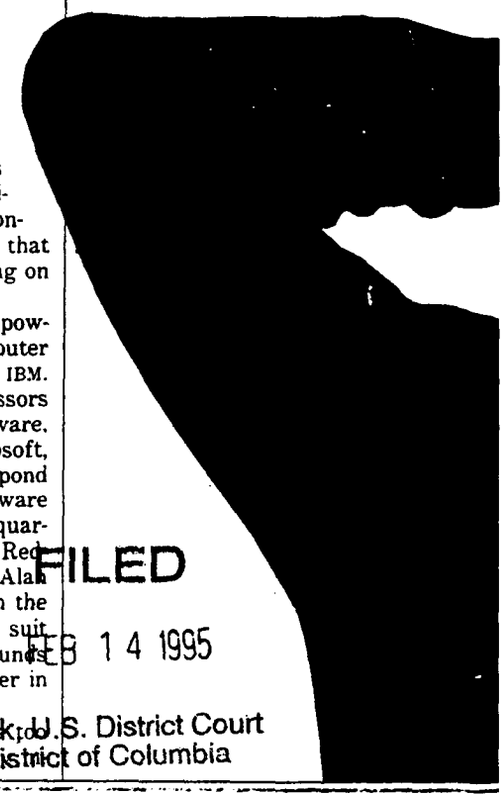
It's a chilly November night in Las Vegas, but 10,000 technoids are in full fever pitch. They're in town for 1992's Fall Comdex, the computer world's biggest convention cum celebration. Tonight is the annual Chili Cook Off, a charity event for the National Center for Missing & Exploited Children. Each year, the crowd pours in for kegs of beer, vats of chili, and live music. For one night, archrivals in the industry are expected to put aside their bitter feuds and just goof off.

But not this year. The Grayson brothers, Paul and George, founders of software house Micrografx Inc. and organizers of the event, are thanking companies that ponied up money. Each gets a round of applause. That is, until one of the hosts offers "a special thanks to Bill Gates and Microsoft," donors of $30,000. The crowd's reaction: scattered cheers, drowned out by a round of boos.

BIG GREEN. The fear and loathing on display in Las Vegas—as well as envy and a grudging respect—are the natural responses to Microsoft Corp. these days. Long a power in personal computer software, Microsoft has now emerged as clearly the most important single force in the entire computer industry. Where Microsoft leads, computer makers and customers follow. Where it stakes a claim, rivals steer clear. And as it springboards from its dominance in operating systems into a commanding position in applications programs, Microsoft leaves less and less territory for its software rivals. Many venture capitalists these days say they won't consider funding a software startup that looks like it might wind up competing on Microsoft's expanding turf.

Such a concentration of clout and power has not been seen in the computer industry since the glory days of IBM. Even Intel Corp., whose microprocessors are as pervasive as Microsoft's software, does not have the leverage of Microsoft, in part because Intel now must respond to chip clones (page 86). Some software executives refer to Microsoft, headquartered amid the evergreen trees of Redmond, Wash., as "Big Green." Says Alan K. McAdams, the chief economist in the Justice Dept.'s fruitless antitrust suit against IBM in the 1970s: "It sure sounds familiar. Microsoft is using its power in ways that are just like IBM's."

But does that mean Microsoft is powerful? Does its dominance re



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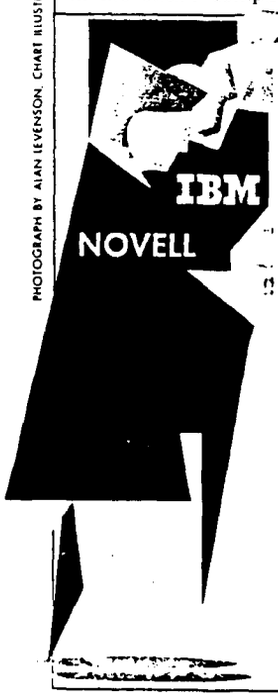

PHOTOGRAPH BY ALAN LEVENSON, CHART ILLUSTRATIONS BY RAY VELLA/BW

WHY ALL THE FUSS? THE POINTS OF CONTENTI

EARLY PRODUCT ANNOUNCEMENTS

CHARGE To preempt competing products, rivals say, Microsoft sometimes announces products years before they actually exist. Even if a rival's product already has the features that Microsoft promises, many customers are reluctant to buy it, preferring instead to wait for the "safe choice"—Microsoft

RESPONSE Microsoft says it is important to let outside software developers know Microsoft's directions in system software so they can develop application programs. In fact, software developers demand it. And, Microsoft says, it is important to let customers know where it's headed so they can plan accordingly

INSIDE KNOWLEDGE

CHARGE Makers of applications programs allege that Microsoft's applications programmers have advance details of its operating system software, and the company is slow to share vital information. They say Microsoft uses this edge to bring out better applications sooner. This, rivals complain, is a big reason Microsoft has more than 60% of the market for programs that work with Windows

RESPONSE Microsoft says it freely shares its knowledge with the industry and enjoys no substantial advantage in developing applications that work with its operating systems. The company says its software sells well because it's good

THE DOS TAX

CHARGE Rivals say that the way crosoft licenses MS-DOS and W dows to major PC manufacturers makes it nearly impossible for th to compete. Under some Micros censing contracts, PC makers pa fee to Microsoft for every PC th ship, even if they don't install the crosoft software on each machin Because of this, PC makers are u likely to substitute a competing c ating system

RESPONSE Microsoft says PC ma can, and do, choose several differ ways to license MS-DOS. The co versial "per processor" licensing rangement offers a lower price fo higher volume

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POWERFUL? HOW THE INDUSTRY'S LEADER IS WIELDING ITS CLOUT

hibit competition in the software market, and does it hamper advancement of the computer industry itself? And, perhaps most worrisome, will it ultimately lead to fewer competitors and less innovation in an industry founded on the latest, the greatest, and never-before-thought-of? Those questions are critical because computer software has become one of the driving forces in the economy. Not only is the software industry a key area for job creation, but it also produces the tools other industries need to boost productivity. Is such a vital industry best served by having a single dominant company?

FTC PROBE. Microsoft's competitors answer no. Software rivals insist that Microsoft's hyperaggressiveness—its use of every trick at its disposal to gain an edge, enter a new segment, or eke out one more iota of market share—has started to edge out innovation itself as the force that determines the shape of the industry. Microsoft Chairman William H. Gates III says such charges are ridiculous. "Our success is based on only one thing: good products. It's not very

BETWEEN MICROSOFT AND COMPETITORS

PRICING

CHARGE Microsoft can offer low-ball prices in two ways: by including extra programs with its operating systems and by using profits from operating system sales to support low pricing of applications programs. For instance, because it has not made much headway so far against Novell in sales of networking software, Microsoft is now building networking into Windows and MS-DOS

RESPONSE Microsoft says it is an industrywide trend that, as operating system software is improved, more features, such as networking, communications and graphics, are included to make computing more seamless for customers

THE F.U.D. FACTOR

CHARGE As the dominant force in PC software, Microsoft uses its unique position to spread "fear, uncertainty, and doubt" about its rivals to stop customers from buying rival products. Microsoft, competitors say, warns buyers that if they buy IBM's OS/2 or Novell's DR-DOS—both of which claim advantages over Microsoft's operating systems—they will be throwing away their money because those products may wind up incompatible with Windows or may not be around in a few years

RESPONSE Microsoft says customers ask for advice on many products, and, when it comments it is just responding to questions

BRAIN-PICKING

CHARGE Several companies charge that Microsoft has, in effect, stolen their ideas in the course of exploring collaborative agreements. Go Corp., for example, says that Microsoft expressed interest in writing applications for Go's operating system for pen-based computers. After Microsoft programmers examined Go's technology, however, Microsoft said it was no longer interested, Go says. Then, Microsoft announced plans for a competing system, developed, in part, by those who visited Go

RESPONSE Microsoft says it is upsetting that companies accuse it or imply it stole from them. Microsoft says it always honors nondisclosure pacts

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complicated," he says. "We're not powerful enough to cause products that are not excellent to sell well." Still, complaints from other software makers helped spur a 2½-year investigation by the Federal Trade Commission into Microsoft's tactics. FTC sources say the nonpublic probe was completed at the close of 1992 and focused on allegedly unfair tactics used to squelch competition (table). According to a confidential outline obtained by BUSINESS WEEK, the FTC investigated practices ranging from the way Microsoft prices software to the way it allegedly uses tying arrangements to force customers who want one Microsoft product to also buy others. Sources close to the investigation say that FTC staffers recommended a number of actions, including a preliminary court injunction, ordering Microsoft to cease the offending practices immediately, pending the outcome of the case.

NECESSARY EVIL? That they would even contemplate such an injunction—rather than wait for the outcome of a commission proceeding—is an indication of how serious the situation appears to the FTC staff, says Terry Calvani, a former FTC commissioner. "The reason the staff went into this uncharted area was the concern that there are companies in business today that may no longer be" by the time the FTC could finish trying a case against Microsoft, he says. But an injunction was only one staff recommendation among many and, so far, the FTC commissioners have not acted. On Feb. 5, they considered the recommendations and split 2-2 on what action, if any, to take. They are expected to meet again in a few weeks, but Calvani says the tie does not bode well for competitors who were hoping to see dramatic action.

Even if the FTC does nothing, the dominance of Microsoft will remain a maelstrom of controversy. Interviews with more than 60 industry executives and customers and a review of still secret FTC documents point to one overriding concern: Microsoft's methods and its growing control over the computer industry could choke the life out of any company that stands in its way. Steven P. Jobs, chairman of NeXT Computer Inc. and an outspoken critic of Microsoft, has publicly called for the breakup of Microsoft into two companies: one for operating systems and one for applications programs. That move—considered, then rejected by the FTC staff—would keep Microsoft from using its operating-systems business to give its applications business an extra edge, as now alleged.

For the most part, customers can't see what all the fuss is about: Most seem happy with what they're getting and with what they're paying for it. And even if computer makers grouse about how much influence Microsoft now exerts over their business plans, they concede that the standards Microsoft sets are helping to keep their industry vibrant. Says an executive with a top-tier PC maker: "Microsoft is not just a necessary evil at this point. It's necessary for the industry to proceed."

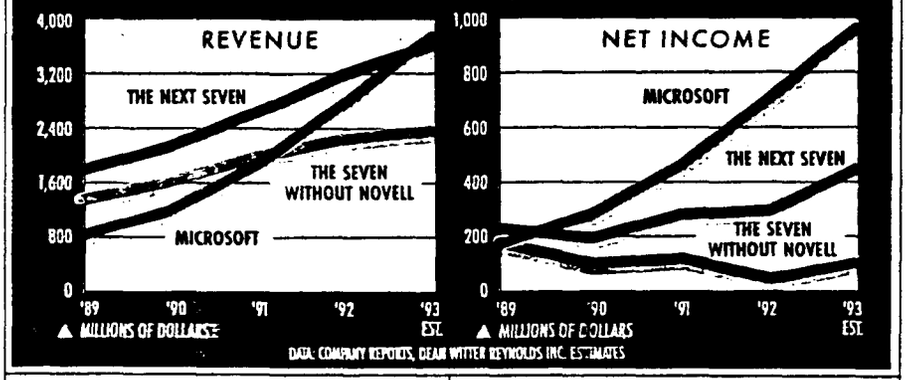
For many customers, Big Green has already taken on the role that had been Big Blue's. The saying among computer managers used to be: "Nobody ever got fired for buying IBM." Now, says the information-technology manager of a major French manufacturer: "If you put all your marbles in the Microsoft hat, you're safe—like the old IBM."

Even Gates, who pooh-poohs comparisons with the mighty IBM of the 1970s, agrees that his company has partially taken on the leadership role Big Blue has lost. "Who's there to fill that vacuum? Microsoft, more than anyone else," he says. Adds Roger McNamee, a partner in technology investors Integral Capital Partners: "Microsoft has been anointed the industry tsar. When that happens, people make it very, very rich."

WINDOWS AND ORPHANS. Rich indeed. Microsoft's MS-DOS operating system is used by 81% of the 22 million IBM-compatible PCs built every year, according to Sanford C. Bernstein & Co. Microsoft Windows, which gives MS-DOS a graphical "look and feel," is selling at the rate of 1 million copies a month. And because it has been first to market with top-notch applications packages for Windows, Microsoft is now the king of that white-hot growth segment. Lotus Development Corp., the king of spreadsheets in the MS-DOS world, has just 20% of the $756 million Windows spreadsheet market, while Microsoft's Excel now claims 73%, says market researcher Dataquest Inc. In word processing, the MS-DOS leader, Wordperfect, has 31% of the Win-

MICROSOFT AND THE SEVEN DWARFS

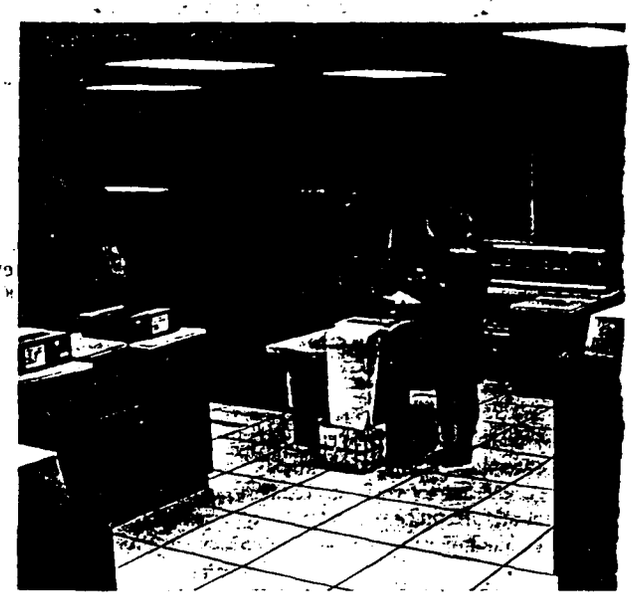
Microsoft's seven largest publicly traded competitors are: Novell, Lotus, Borland (with Ashton-Tate), Aldus, Adobe, Symantec, Software Publishing



DATA: COMPANY REPORTS, DEAN WITTER REYNOLDS INC. ESTIMATES

BIG BLUE MEETS BIG GREEN

As IBM ruled the 1970s with its mainframe hardware, Microsoft dominates today with its operating system software



Microsoft used IBM's own tactic against it: By "preannouncing" Windows NT, it stalled sales of Big Blue's OS/2, Version 2

CHART BY LISA KNOUSE BRAIMAN/BW

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ly, he adds: "I hope they don't kill us."

Novell can afford to joke. For now, it still holds 70% of its market. But the rest of the industry isn't laughing. Rival software companies give Microsoft credit for building good products and marketing them cleverly. But many software executives also are fuming about what they say are Microsoft's unnecessarily tough, sometimes downright mean-spirited tactics. Says the CEO of a rival software company: "If you were in my shoes, you would probably want to go and shoot them. It's not a level playing field. IBM was the most opportunistic and ruthless in the 1970s. And that's exactly what Microsoft is today."

VAPOR TIGERS. Indeed, industry veterans say there's a striking parallel between how Big Blue behaved back then and how Microsoft acts now. Computer executives say that just like the IBM of yore, Big Green bullies partners, withholds vital information, disparages competitors, and stalls the market by announcing products long before they're ready. Microsoft denies such charges. While such tactics are in the playbooks of many competitors, in the hands of the richest and most powerful player, they can be lethal.

Take IBM's classic move of announcing a product long before it was ready to ship—a tactic known as "preannouncing." In software, such products are called "vaporware" and no one pays much attention—unless the company promoting vapor holds a dominant position. In that case, the market freezes. Facing upstart Control Data Corp. in the 1960s, IBM paralyzed the market for scientific mainframes by announcing it was working on machines that would be far faster than CDC's. These paper tigers, as they came to be known in a subsequent antitrust trial, prevented CDC from winning a single order in 18 months.

Microsoft preannouncements now have a similar effect. Take the case of Adobe Systems Inc., maker of software that controls how computer printers produce typefaces. In September, 1989, Microsoft and Apple Computer Inc. said they would jointly develop a rival product. Adobe's stock fell 20% in one day, and for the next nine months the company spent 90% of its time answering customer's questions and "fighting vaporware," says Chairman John E. Warnock. As it turned out, Apple backed off and Microsoft did not ship its competing product, TrueImage, for two years.

Microsoft has turned this Big Blue weapon on IBM itself. Just as IBM was getting OS/2 Version 2.0 off the ground in mid-1991, Microsoft announced plans for Windows NT. Like the IBM product, NT would be a 32-bit operating system, meaning that it would tap all the powers of Intel's fastest chips. Customers could buy the 32-bit system from IBM then or wait at least 18 months for NT.

POWER PITCH. Guess what? Most of the market is waiting for the leader. An executive at a top PC company tells of one customer that felt the squeeze after committing to buy 36,000 copies of OS/2. The way the exec tells it, Microsoft came and pitched NT, and the buyer put the OS/2 order on hold. "It used to be IBM could put orders on hold," says the executive. "Now it happens with Microsoft."

And NT? It's the toast of the tech world even though it's still not ready. After a six-month delay, it's now scheduled for shipment by June—two years after it was announced. It could be a big

FOR INTEL, ONE GOOD FRIEND ISN'T ENOUGH

Microsoft isn't the only standard-bearer in the computer business. Software alone does not a computer make, and when it comes to standard PC hardware, the world looks to Intel Corp. Its microprocessors are at the heart of most IBM-compatible personal computers.

But Intel's power isn't rock-solid. For starters, unlike Microsoft, it has lost share in its core business. Clonemakers Advanced Micro Devices Inc. and Cyrix Corp. have already snagged 62% of the market for Intel's aging 386 chips and are getting ready to sell clones of the 486 as well. Their presence has forced Intel to adjust its marketing plans in the past two years, accelerating the shift from 386 to 486 chips.

'SIMPLICITY.' Intel could be in for more adjustments as Microsoft, its partner since the dawn of the IBM PC in 1981, spreads out. Windows NT, scheduled to appear this June, will be the first Microsoft operating system to run on chips other than those that are Intel-compatible. For starters, NT will also run on the Alpha AXP chip from Digital Equipment Corp. and the R4000 line from MIPS Computer Systems Inc., now owned by Silicon Graphics Inc. These are RISC (for reduced instruction-set computing) chips, the type of speedy design that since 1985 has been challenging Intel's dominance.

Microsoft says the RISC deals are to satisfy customer requests and don't indicate a change in the relationship with Intel. "Our cooperation with Intel is far more advanced than it is elsewhere,"

Microsoft's Gates and Intel's Grove: Intel needs Microsoft, but the reverse is becoming less and less true

AP/WIDE WORLD

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dows market, compared with 53% for Microsoft Word.

In short, Microsoft is cleaning up big time—at the expense of its smaller rivals. While other software makers were announcing shrinking market share, losses, or layoffs in 1992, Microsoft tacked on $975 million in calendar-year revenues—more than 90% of all the revenue growth in the PC software industry, according to preliminary Dataquest figures. Microsoft's share of the world desktop PC software industry reached 44% last year, Dataquest figures. And if, as analysts project, Microsoft sales rise 36%, to $3.75 billion, in the fiscal year ending June 30, Microsoft will have more revenues than its seven closest publicly held rivals combined. And at nearly $1 billion, it will have more than twice their net income (chart).

All that money, rivals fear, will soon translate into even greater power for Microsoft. Without healthy profits, other software makers may find it impossible to fund new development or finance upgrades of complex programs such as data bases, which comprise millions of lines of code. Borland International Inc. Chairman Philippe Kahn blamed pressure from Microsoft's foray into Borland's data-base turf when he laid off 15% of his 2,200 workers in December. Borland then reported a $61.3 million loss for the quarter and put on the back burner a word processing project that had been two years in development. Gates says Borland suffered mainly because its products were late to market.

Lotus, once No. 1 in PC applications programs, had its first-ever layoffs in 1992. Now, it's concentrating its resources where Microsoft isn't—yet: Programs such as Notes, which helps groups of workers collaborate.

'TOTAL UNDERDOG.' Such a sharp contrast between one have and many have-nots worries industry executives. They fear there will be few major players, more consolidation, and less money for everybody except Microsoft. They also warn of a chill on software startups. John M. Grillos, who manages technology investing for Robertson Stephens' venture-capital arm, says that there are still new opportunities for startups and scores are on the drawing boards—in promising new areas such as multimedia. But he has a long list of phone numbers at Microsoft and checks the behemoth's plans before going ahead with an investment. Does he call very often? "You bet," he says. "I'm not crazy."

'Microsoft is extremely aggressive in using everything they can to their advantage'

PIERLUIGI ZAPPACOSTA
Logitech

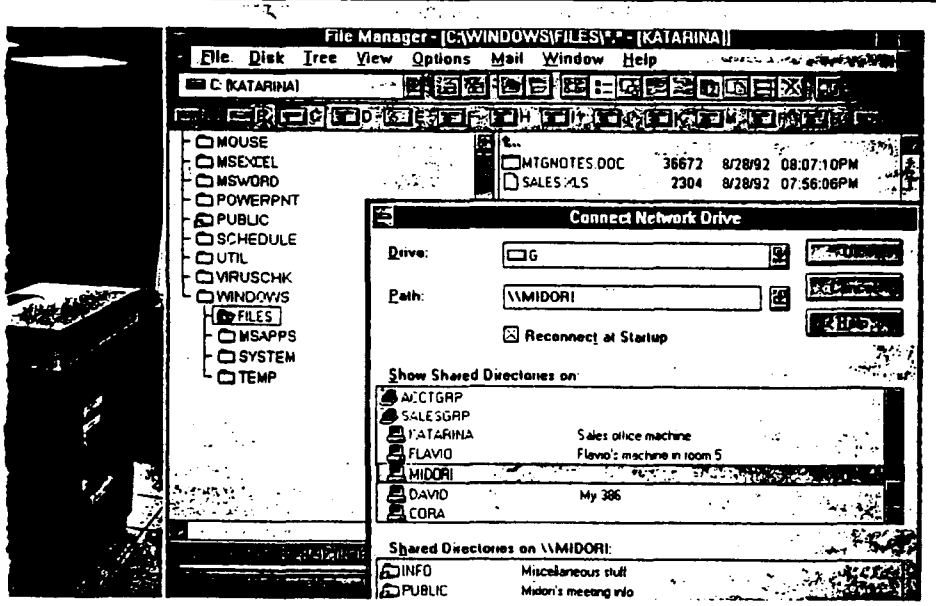
Gates, the billionaire mastermind of the Microsoft empire, says such worries are nonsense. Is Microsoft too powerful? "The answer is simply no," he says. He points out that Microsoft still lags in some important markets. "Take networking. We're the total underdog." And, he asserts, in markets such as spreadsheets and word processing, Microsoft's presence has prodded the competition to improve their wares.

Gates also points out that his commanding position does not guarantee him success in the next generation of software: operating systems that will let networks of personal computers take on the big computing jobs now done by mainframes, minicomputers, and workstations. Microsoft's entry, Windows NT, will square off with Novell's UnixWare, Sun Microsystems' Solaris, IBM's OS/2, and NeXT's NextStep.

Still, none of those competitors has the momentum that Microsoft gets from Windows. That should help Gates reach his stated goal of selling 1 million copies of NT the first year. But he insists that doesn't mean NT is already the winner. "This is a hypercompetitive market," Gates says. "Scale is not all positive in this business. Cleverness is the positive in this business."

To be sure, competitors such as Lotus and Borland have contributed to the myth of Microsoft's invincibility through their own less than clever moves. Equally true, there are examples of software companies that have kept well ahead of Microsoft. Many, such as Intuit Inc., a maker of personal finance software, are masters of lucrative niches (page 88).

The biggest player to successfully fend off Microsoft so far has been Novell Inc., the $933 million Provo (Utah) maker of networking software. But Microsoft is aiming for this key software market by building some features similar to Novell's NetWare into Windows NT. Says Kanwal S. Rekhi, a Novell executive vice-president: "Microsoft will keep us on our toes." Then, half-joking-



[TOP] PHOTOGRAPH BY ANDY FREEBERG

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hit. Even Borland is developing software for it. Says CEO Kahn: "There's no choice. The issue is not whether NT is good or bad. The issue is NT is being pushed by Microsoft."

And Microsoft is already talking about an operating system beyond NT. It's called Cairo, and it's due by 1995. The company says that package will match features of Novell's most advanced networking programs and the object-oriented programming features of NextStep and Pink, the operating system due by 1995 from Taligent, the joint venture between IBM and Apple.

F.U.D. MISSILES. Gates says Microsoft preannounces systems software because customers and outside developers need details to plan ahead. And once Microsoft tells developers, word spreads fast. "We tell 100 developers," Gates says. "And believe me, that is out in the press the next day."

Whatever the legitimate purpose, preannouncing is part of a larger strategy computer makers say IBM used effectively for years. It's called F. U. D.—for fear, uncertainty, and doubt—and it really works only for the big guy. It's essentially a whispering campaign suggesting it would be terribly unsafe to bet on a competitor. Gates snorts at the notion Microsoft uses F. U. D. as a weapon. "We have a whole department in charge of F. U. D.," he jokes. Seriously, he adds that Microsoft simply gives its opinions and expects customers to judge for themselves. "We're giving our honest view of how wise it is to buy these products," he says.

Where any discussion of Microsoft's power gets dead serious is when rivals—and the FTC—consider the power stemming from Microsoft's dominance in operating software. Like IBM, whose aggressive tactics for preserving its dominance in mainframes led to the Justice Dept.'s 1969 antitrust suit, Microsoft seems most bare-knuckled when perpetuating its position in operating sytems.

> 'Our success is based on only one thing: good products,' Gates says. 'We're not powerful enough to cause products that are not excellent to sell well'

Microsoft's most controversial tactic is a "per-processor" discount plan for MS-DOS, which it offers to the highest-volume PC makers. On average, PC makers pay $13 to $14 per copy. For the steepest discounts, the PC maker must agree to pay for a copy of MS-DOS for each PC it ships, whether or not the software is actually installed. That makes it "undesirable for a manufacturer to ship anything but MS-DOS," says a PC executive. Microsoft says that PC makers are offered a number of ways to buy MS-DOS. But with other plans the discounts are smaller, and PC makers locked in a bloody price war can ill afford to pass up the steepest discounts.

DOS & DON'TS. When pricing isn't inducement enough, Microsoft allegedly uses other means. One PC maker says it told Microsoft that it planned to ship DR-DOS, Novell's clone of MS-DOS, on about 10% of its machines. By shipping MS-DOS on 90% of its PCs, the company figured it would still get the best discount. Microsoft's response: It doubled that customer's price on MS-DOS, which quickly forced the PC maker to drop the idea of offering a choice to customers. Says a company executive: "In my opinion, any monopoly situation is not good for the customer." A senior Microsoft executive says he wasn't aware of this charge but says it would not be common practice.

Such alleged tactics may seem a tad over the top, but maintaining dominance in PC operating systems is critical. Like IBM's dominance in mainframes, it gives Microsoft an extremely reliable, enormously profitable revenue stream. "Microsoft's mainframe is its operating system," says one software executive.

Analysts estimate that between 1989 and 1992, MS-DOS and Windows generated revenues of $2.3 billion, with $998 million of that in 1992 alone. Net profits on those sales last year were $278 million, according to Sanford C. Bernstein & Co. Such profits have helped fund forays into almost every major software market. Microsoft's new data-base program, Access, cost a staggering $60 million to develop—and it was just one of a dozen products Microsoft brought to market last year. By contrast, last year's entire R&D budget at Borland was $50 million. At Lotus, it was $35 million.

That's not all. Microsoft also had the money to offer an introductory price of $99 for Access—less than one-third the retail price for similar packages. Result: Microsoft sold 700,000 copies in just three months. The entire market in 1992 was only 1.2 million units.

Gates shrugs off the notion that operating systems are his cash cow. "That's the biggest joke I ever heard," he snaps and points out that products such as

ys Carl Stork, the Microsoft manager works with hardware makers. For ance, Microsoft still designs its operating system fastest on Intel chips.

For his part, Chief Executive Officer ndrew S. Grove points out that Intel is ot completely dependent on Microsoft oftware, either. OS/2 and Unix are already available on Intel chips and NeXT omputer Inc.'s NextStep and Sun's Solaris soon will be. And, says Ronald J. Whittier, vice-president and general manager of Intel's software technology group, most customers aren't likely to switch to RISC hardware for NT because that would require buying all-new applications programs instead of keeping existing programs as owners of Intel-based NT systems will be able to do. "The thing Corporate America wants is simplicity," he says.

RISC FACTOR. Where Intel could be vulnerable, however, is in the market for network servers, a key objective for Windows NT. These machines, which feed centralized information to personal computers over a network, are replacing minicomputers and mainframes in corporations. And that means they're replacing large computer software, not desktop software. In that market, Intel has no advantage, and buyers can look for the best performance. That means RISC chips, which generally run about 50% faster than Pentium, Intel's most powerful chip yet, due out this March. "Would we look at other platforms in the future? Sure," says Edward F. Driscoll, an assistant vice-president at CIGNA Systems, which buys computers for the insurer. "The key is what happens at the server end."

If the RISC chips start to invade Intel's turf on servers running Windows NT, they could soon move toward desktops. And that could shake Intel's hold on the computer market. Microsoft, on the other hand, would still be selling software for all those machines.

By Richard Brandt in San Francisco

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Word and Excel are his most profitable. Yet in the next sentence, as he elaborates on the returns from operating systems, he says: "If you just took the cash cow business and did not factor in [the development costs of] NT and Cairo, yes, you'd get a huge profitability."

Gates is accurate when he points out that his applications business now generates more profits—about 50% of net income—than operating software. But it took years to reach that point—years during which Microsoft funded many versions of Word before it was good enough to grab substantial market share. Only when the Windows 3.0 version appeared, in 1990, did it take off.

The operating system business does more than spin profits. Competitors charge that because Microsoft writes operating systems, it also has an unfair edge in writing the applications programs that work with them. They say Microsoft's applications developers get a peek at the inner workings of new operating systems early so they can write programs to take advantage of new features first. In the FTC document, investigators referred to this as Microsoft's "fake Chinese Wall" and listed a dozen

'MICROSOFT IS GOOD, BUT IT'S NOT GOD'

Scott Cook was stunned by a phone call in late 1990. It was a senior Microsoft Corp. executive telling Cook, the co-founder and chief executive of tiny Intuit Inc., that the software goliath was about to enter Intuit's market—programs for check writing and household budgeting. Because the two companies had once talked about collaborating on a finance program for Windows, the executive said he felt obliged to let Cook know.

Small consolation. After their talks had broken off, Cook shelved plans for a Windows package, and he thought that Microsoft had abandoned its efforts. Now, Cook had little choice: He had to have a Windows version of Quicken in a hurry. In just 10 months, the Menlo Park (Calif.) company was done, just three weeks after Microsoft launched Money. "The advantage we were counting on was lost," says Bruce Jacobsen, general manager of the Microsoft unit that sells Money.

Then, the real battle began. Both products got good reviews, and both carried a list price of $70. Cook cut wholesale prices so dealers could undercut Microsoft's $45 retail price. He also began advertising on TV. All told, Intuit managed to hold on to its 60% market share. Jacobsen concedes that Microsoft was caught off guard.

The episode illustrates that Microsoft is not invincible. And although Microsoft loses only rarely, its performance with Money is not an isolated case. Says Robertson, Stephens & Co. analyst Peter J. Rogers: "Microsoft is good, but it's not God."

Some software makers have even taken back markets that Microsoft dominated. Until a year ago, Microsoft's Works program had close to 90% of the $50 million market for integrated software for Macintosh computers. Such packages combine basic word processing, spreadsheet, communications, and data-base functions. But Claris Corp., Apple's software subsidiary, figured it could build a better product. Its ClarisWorks arrived in late 1991 and within a year had 77% of the market, leaving Microsoft with 20%.

Sometimes, Microsoft's aggressiveness backfires. When it comes to creating multimedia CD-ROM disks, for instance, Microsoft often insists on buying rights to the content of the disks. That can scare off book publishers who worry about losing control in the new medium. Comptons NewMedia, a San Diego-based unit of Encyclopaedia Britannica Inc., on the other hand, helps publishers create and distribute new works for CD-ROM without buying content rights. Result: Comptons now distributes more than 40% of all retail CD-ROM titles in the U.S., while Microsoft only has five titles on the market. Says Link Resources Inc. analyst Steve Reynolds: "The Comptons approach will be more prevalent."

GERRY GROPP/SIPA

Cook pulled out the stops to market a Windows version of Quicken in time to spoil Microsoft's picnic

FOLLOWED HOME. If Microsoft has a consistent weakness, it may be in consumer products. Microsoft dominates the corporate market for PC software, which requires building relationships with computer managers and giving volume discounts. The home market, on the other hand, is based on catchy in-store promotions, direct marketing, and meticulous attention to making software easy to use.

That's where Intuit has excelled. A former Procter & Gamble Co. manager, Cook has built his company from about $6 million in 1988 to $84 million in 1992 by studying how ordinary people manage their finances. He has even had product developers follow customers from the store to their homes to see what difficulties they encounter when loading and using Quicken.

Of course, Microsoft isn't throwing in the towel. To finally win some market share from Intuit, Microsoft now has dealers selling Money for $15, compared to Quicken's typical retail price of $35. "Microsoft is relentless," says Cook. "It never gives up."

By Evan I. Schwartz in New York

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other ways Microsoft allegedly abuses its position. Microsoft denies any unfair crossover or inside knowledge.

Software developers also complain that Microsoft is slow or even reluctant to deliver needed information about operating systems. Perhaps the most ironic such charge comes from Claris Corp., Apple's software subsidiary. Executives there say they tried for a year to get information for writing Windows applications from Microsoft, to no avail. Claris says Microsoft was worried there were cracks in the Chinese Wall between Claris and Apple's operating system team—just what rivals say occurs at Microsoft. But after executive meetings and assurances of no cracks, the situation was resolved. Microsoft's head of developer relations says he wasn't aware of the Claris problem but does concede a general "concern about giving information to our operating system competitors."

> 'Microsoft is the IBM of the '90s and uses exactly the same marketing tactics IBM used to'
>
> PHILIPPE KAHN
> Borland International

ROBERT HOLMGREN

Microsoft says it's doing its best to get information out to thousands of companies and that it doesn't withhold information to favor itself. Says Pat Bellamah, a manager in Microsoft's developer group: "It's ironic to us that people feel they're having a hard time getting information when that's all we're putting out there." Gates estimates Microsoft spends $80 million a year disseminating information to developers.

One reason Microsoft draws so much criticism is simply that wherever it competes, it seems to play a particularly hard-core game of hardball. Take its dealings with Logitech Inc. Until last June, Logitech had a license to buy Microsoft Windows 3.0 at a discount, then sell it together with Logitech's mice. But Microsoft abruptly canceled the deal, saying that it was losing money on such "bundles" involving inexpensive hardware, according to Logitech President Pierluigi Zappacosta. Only Microsoft still continued to sell Windows bundled with its own mice—for about $10 more than Logitech had been charging.

After Zappacosta publicized his situation in September, Microsoft relented. But there was a catch: The new license fee would be 30% higher. Zappacosta says that priced him out of the market, depriving his company of about $20 million annually. Microsoft continues to sell its Windows-and-mouse bundle. Says Zappacosta: "Microsoft is extremely aggressive in using everything it can to its advantage." Microsoft denies that it forced Logitech out of the market but declines to discuss its pricing.

STAC ATTACK. Occasionally, Microsoft's hardball tactics have resulted in civil suits. The latest was filed in January by Stac Electronics, a maker of data-compression software. In its suit, Stac claims that Microsoft violated its patent by including Stac's technology in test versions of MS-DOS 6.0 without permission. Stac says it was negotiating with Microsoft to license the technology, but talks broke down when Microsoft did not offer a sufficient royalty. The suit claims that Microsoft executives then showed Stac a spreadsheet, detailing the "adverse impact on sales of Stacker" if Microsoft opted for another company's technology. Microsoft denies the claim, saying it bargained in good faith and offered "real money" for a license.

As the stories multiply, it also becomes clear that Microsoft long ago became everybody's favorite whipping boy. There's certainly resentment on the part of bright young software entrepreneurs who may never see millions, much less Gates's billions. And for all the companies that grouse about their dealings with the industry giant, there are dozens that are ardent admirers. Says Morton H. Rosenthal, CEO of software distributor Corporate Software: "We all live in a Microsoft-centric world. Working with Microsoft is like skiing behind the Queen Mary. It's a good ride. But getting up is a little rocky."

Indeed, with Big Blue's waning influence, there's a genuine need for a leader. Customers want good software and good prices. They also want a relationship with a software maker that's going to be around for the long run. They want a new IBM. "If I were a software company, I'd be complaining about Microsoft, too," says Greg Chetel, director of systems planning and research at Gillette Co. "But I don't care who wins. I just want quality products."

In the end, that may be the key to assessing whether Microsoft does indeed have too much power. Software makers are right to cry foul when they think Microsoft's practices have been anticompetitive. They have done so, and the FTC has listened. But as long as Microsoft's dominance stems from keeping customers like Gillette satisfied, it is hard to argue that its power, per se, is harmful.

The danger is that Microsoft will start to use the power of its position, rather than the appeal of its products and services, to stay on top. "If Microsoft runs out of bandwidth," says McNamee of Integral Partners, "then there will be a problem." That's when there will be reason to fear that competition will be stifled and innovation squelched.

If the history of Big Blue is a guide, Microsoft's dominance will be in danger of waning long before it can distort the market with nefarious practices. When the Justice Dept. began its antitrust suit in 1969, IBM's hold on the mainframe market made it seem invincible. By the time federal prosecutors withdrew their suit in 1982, however, the market had taken care of the problem: New technologies such as minicomputers and PCs had made IBM's near-monopoly in mainframes largely irrelevant.

History could repeat itself: Says Joe Guglielmi, a former IBM executive, now CEO of Taligent: "Today, everyone is in fear of Microsoft." "But in the end, everyone will compete. There are thousands of Bill Gateses out there who will find pieces of this market and win them." Just the way Microsoft won its place in the sun.

By Kathy Rebello in Redmond, Wash., with Evan I. Schwartz and John W. Verity in New York, Mark Lewyn in Washington, Jonathan Levine in Paris, and bureau reports

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TAB 5

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

Exh. 5

94-1564

SOFTWARE

NO SLACK FOR MICROSOFT'S RIVALS

FILED

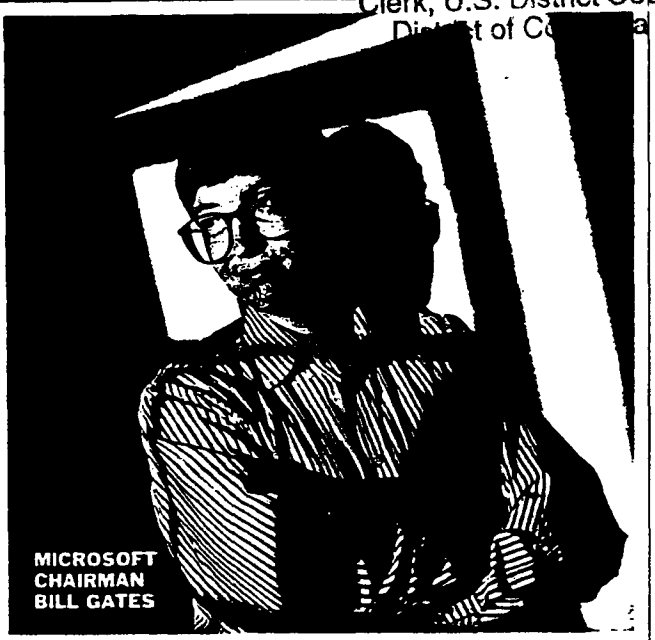
FEB 14 1995

Clerk, U.S. District Court
District of Columbia

They complain it hasn't been reined in at all by Justice

When Microsoft Corp. signed a consent decree in July with U.S. Justice Dept. trustbusters, it emerged virtually unscathed from the feds' five-year probe. Still, the investigation was a protracted—and expensive—headache for Chairman William H. Gates III. And the settlement banned some of Microsoft's most aggressive licensing practices. The experience, rival executives figured, surely would leave Microsoft chastened.

No such luck. "The consent decree seems to have set [Microsoft] free," gripes Robert J. Frankenberg, chief executive of Microsoft rival Novell Inc. "Now, they are running rampant over everything."



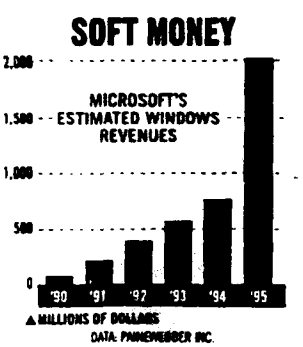
MICROSOFT CHAIRMAN BILL GATES

NO FAIR? Microsoft insists it hasn't strayed from the bounds of normal licensing practices

There is little doubt that Microsoft is competing aggressively: Even while the software giant presses its market-share advantages in operating systems and applications programs, it is bolting into new consumer markets with its own on-line service and a plan to buy Intuit Inc., the top maker of personal-finance software. The $1.5 billion deal requires approval of Justice, and rivals once again are regaling Justice staffers with tales of Microsoft's alleged anticompetitive behavior.

WINDOWS PAIN. What really stirs fresh fear and loathing in the computer business, however, is Windows 95. Microsoft plans to begin shipping the upgrade of Windows by mid-1995, and the industry already is complaining about the software giant's pricing and marketing plans for the software. Computer makers, for example, have been startled to learn that they will be asked to swallow a huge price hike for their use of Windows 95—to as much as $70 per PC, vs. roughly $35 today. At the same time, Microsoft has established more rigorous technical requirements for hardware and software makers who want to claim their products are compatible with Windows. "Prices are going up and terms are becoming more restrictive," says John B. Landry, senior vice-president at Lotus Development Corp.

There are ways PC makers can lower their costs—if they agree to shipment goals and marketing tactics designed to give Windows 95 an early boost. Indeed, a new "Market Development Agreement" that Microsoft has distributed to PC makers spells out a dozen ways to cut the Windows 95 license fee. For example, a company can save $3 per system by preloading Windows 95 on at least 50% of its personal computers in the first month Windows 95 is available. In a business with ever-shrinking margins, that's a deal many PC makers can't afford to pass up, ensuring Microsoft lots of promotional help.



In Europe, where Windows' grip on the market isn't as firm as it is in the U.S., Microsoft's pricing has prompted a minirebellion. Vobis Microcomputer, the No. 1 PC maker in Germany, announced in late November that it plans to bundle IBM's OS/2 operating system, rather than Windows, with its machines starting Jan. 1. Says Theo Lieven, Vobis' CEO: "Every penny counts."

CONTINENTAL DRIFT. Lieven contends his rebellion already is working. He says sales have jumped since mid-November, when Vobis began offering OS/2 in addition to Windows, and "we think OS/2 helped" contribute to the increase. Other European computer makers, including Peacock Computer, have also quietly begun shipping OS/2 on their machines.

U.S. PC makers aren't likely to follow the Vobis lead—partly because the American market is less receptive to OS/2. But that doesn't mean they're all happy about the Windows 95 pricing. Hewlett-Packard Co. executives, for example, say they are concerned that the higher cost of Windows 95 may cause a pricing differential between Windows PCs and those equipped with OS/2. Still, says a spokesman, HP expects to bundle Windows 95—and not OS/2—into its machines. And other big U.S. PC makers also remain loyal. "We plan to move to Windows 95 as quickly as we can," says Lorie L. Strong, a vice-president at Compaq Computer Corp.

Still, with Microsoft on the offensive again, some rival software companies believe the Justice Dept. should use the Intuit inquiry to look once again at broad questions about Microsoft's dominance of the software market. Indeed, rivals say Justice has been asking them probing questions about Microsoft's potential dominance of new distribution channels such as on-line services. But others call another move from Justice wishful thinking. "We're just going to need to slug it out in the marketplace," says a resigned Frankenberg at Novell. The way things are going, that's just going to get tougher and tougher.

By Amy Cortese in New York, with Richard Brandt in San Francisco, Gail Edmundson in Paris, and bureau reports

PHOTOGRAPH BY RICH FRISHMAN; CHART BY RAY VELLA/DW

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TAB 6

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

BYTE May 1992 Volume 17, Numbe

Introducing Microsoft C/C++.

Windows Class Libraries	Microsoft C/C++ 7.0	Borland* BC++ 3.0
Covers entire Windows API	Y	N
Menu support	Y	N
GDI support	Y	N
OLE 1.0 support	Y	N
Exception handling	Y	N
Diagnostics support	Y	N

Code Generation: DES Encryption Test	C/C++ 7.0	BC++ 3.0
EXE size	5K	7.3K
Execution time	820 sec	1500 sec

BYTE Build Test	C/C++ 7.0	BC++ 3.0
Using fast compile, pre-compiled headers	300 sec	420 sec
Optimized EXE size	162.4K	202.6K

Compiler Features	C/C++ 7.0	BC++ 3.0
Code in pre-compiled headers	Y	N
Inline any C/C++ code	Y	N
Auto-inlining	Y	N
P-code	Y	N

Windows Tools	C/C++ 7.0	BC++ 3.0
Windows resource editing tools	Y	Y
Profiler for Windows & MS-DOS	Y	Y
Windows Help compiler	Y	Y
Windows setup builder	Y	N
Total documentation	5408 pp	4038 pp
Windows 3.1 debug kernel	Y	$199 extra
Total Price*	$495	$948+

By almost any measure, new Microsoft® C/C++ Version 7.0 development system for Windows™ is the best way to create all your applications for the Windows and MS-DOS® operating systems.

With better code generation and pre-compiled headers, you'll have all the tools you need to write better code, faster.

And because the Microsoft Foundation Classes have the most complete framework for Windows, you'll use the same building blocks for your products that we use for ours.

C/C++ 7.0 also includes the Windows 3.1 debugging kernel which can help you find the bugs. Plus, all the tools you'll ever need to edit your resources, compile the help files and even build your very own graphical setup programs for Windows.

Judge for yourself. Try new Microsoft C/C++ 7.0 and, as a Microsoft, Borland or Zortech customer, you'll be able to upgrade for just $139* – and for a limited time, you'll get a free copy of Qualitas® 386MAX™ in the box!

So call your local reseller now, or call Microsoft at (800) 541-1261, Department Z71. Get your tools from the people who make Windows, because we've been building Windows tools longer.

Microsoft C/C++

Upgrade for just $139!

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The best C/C++ tools for Windows are from the company that makes Windows.

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94-1564 SS

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The Newspaper of Information Systems Management
October 10, 1994, Vol. 28, No. 41, 168 Pages, $6 Copy, $48/Year

COMPUTERWORLD

News

Server suite could squeeze market

Microsoft product linking plans point to another bid for dominance

By Stuart J. Johnston
and Ed Scannell

Microsoft Corp.'s recently announced BackOffice server suite is the first step in an evolution designed to accomplish much tighter integration during the next few years between the company's enterprise building blocks of servers and its operating systems.

In fact, by the time Microsoft's Cairo version of Windows NT arrives in late 1995, the fit may be so tight that a competitor's knife blade will not fit between the blocks.

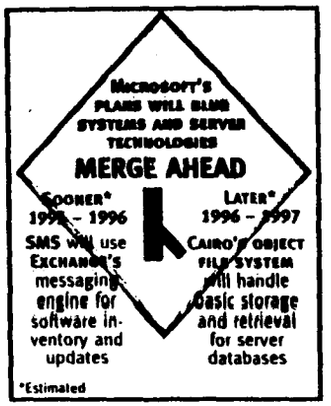
Problems could arise for competitors if Microsoft shares information only with its own developers on how to tightly integrate with the object-oriented Cairo file system, suggested Warren Smith, a certified public accountant and certified information systems auditor in Pacific Bell's auditing department.

If Microsoft puts shortcuts into Cairo that turn out to be better than the industry standard implementation of Cairo, Smith said the situation could be a return to the days when other third-party vendors complained about Microsoft using application programming interfaces "that no one else knew about in some of their applications."

At least one other observer agreed.

"All of this is an inevitability," predicted Jerry Schneider, president of Schneider Associates, Inc., a consultancy in Burke, Va., and former president of the Capitol PC User Group. "The [operating system] is always going to be getting more and more aggressive. No one is safe anymore."

The very thought may further unhinge competitors, some of which are still smarting from the recent Justice Department antitrust settlement with Microsoft. However, many large users do not appear concerned. In fact, some said they welcome a model along the lines of the old IBM that positions Microsoft as the new empire builder.



"Where Microsoft is at right now reminds me of where IBM was in the 1970s and 1980s, [and] if it continues to do things right, the users will benefit," said Scott Piper, a network analyst at Public Service Co. of Colorado in Denver.

"Generally, I don't find Microsoft's proprietary elements to be an impediment, [and] by making life simpler, it's going to be positive," said Colin Carpi, president and founder of Chartwell Advisory Services, Inc. in Penn Valley, Pa., which is developing a large on-line financial services system.

"Big is usually good [for users] because if you're going to have things work, then you [must] have standards, and that takes one [dominant] company," said Briscoe Stephens, coordinator for space sciences in the Advanced Scientific Information Systems Group at NASA in Huntsville, Ala.

Enhancing that vision of dominance are recent acknowledgments by Microsoft officials that over time, the line between server applications and systems software will begin to blur. The first step will be to provide tighter integration among the components in Microsoft's recently announced BackOffice server suite.

A major jumping-off point will come, however, when Microsoft ships the next major release of Windows NT, code-named Cairo, which will include a new file system that will store information as objects instead of files.

Total control

Cairo's Object File System will provide many core functions that users currently think of as database functions — functions that can become part of a standard computing architecture that Microsoft controls from top to bottom. Cairo is scheduled to ship late next year, but many analysts and industry observers said they do not believe it will be out until 1996, at the earliest.

By the time the entire strategy unfolds, users may depend on Microsoft for virtually all their computing needs, which Amy Wohl, editor of the "TrendsLetter" industry newsletter in Narberth, Pa., suggests may not be a good thing.

"Microsoft is becoming [like] IBM, [and] the downside [for users] is the more they do that, the less open they're going to be [so that] it becomes harder to swap in your favorite database," Wohl said.

Microsoft officials deny their plans will make their systems more closed. Many users agree, arguing that competitors will always be able to come up with innovative products to help keep the systems open.

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Commentary

Carole Patton

Bundles are bad news

Windows 95 is not just an operating system. When it arrives next spring, this tour de force from Microsoft will replace all those (formerly) separate utilities you probably have on your PC right now, such as fax software, E-mail and communications capabilities. Especially neat here is that all these built-in Windows applications will be tightly integrated into a single common interface and even a central database of names and addresses.

In fact, Windows 95, the next generation of Windows, is such a complete operating environment that you may never have to purchase another Windows utility again. Nice for you. Not so nice for software developers such as Lotus, Delrina or Symantec, whose Windows products are about to become "buggy whips" in the name of progress. Microsoft is even including a somewhat feature-limited version of its best-selling suite, Microsoft's Office, in Windows 95.

> The bundling strategy is a prescription for destroying the Windows service applications market.

This strategy is a prescription for destroying the Windows service applications market and damaging (if not terminating) the market for core business software. For example, what if you buy a laptop preloaded with Windows 95 and Microsoft's Office. Will you then go out and buy SmartSuite from Lotus or PerfectOffice from Novell? Probably not. Consumers aren't interested in replacing "good enough" with "great." Most new car buyers keep the standard radio their car came with. Only a handful are willing to shop around and pay a premium for better audio quality.

Bundle bandwagon

Microsoft is not alone in pursuing a bundling strategy. IBM's OS/2 Warp Version 3.0 ships with a Bonus Pak that includes a word processor and a spreadsheet (IBM Works), plus a host of third-party software.

These "free" goodies help sell the product and anoint those vendors whose software is bundled — "It's in there; it must be good," users think. But such a strategy also leaves out in the cold any vendor whose software was overlooked.

While bundling is arguably anticompetitive, the issue has expanded with Windows 95. IBM's Warp cannot claim the same high level of integration of Microsoft's standards, such as the internal communications process embodied in Object Linking and Embedding (OLE).

Take, for instance, Lotus' SmartSuite 3.0 for Windows, released in September. For all intents and purposes, SmartSuite is an office in a box. You get a word processor (Ami Pro), Lotus' famed 1-2-3 spreadsheet, a database (Approach), a calendar program called Organizer and Freelance Graphics presentation software. Lotus' SmartCenter tool for switching among these applications is nifty.

However, Lotus SmartSuite programmers were able to provide support for only part of the OLE 2.0 specification: the drag-and-drop among 1-2-3, Approach and SmartCenter. Microsoft's Office, on the other hand, supports OLE 2.0 across the board. (It *is* Microsoft's standard, after all.) It is so tightly integrated with Windows 95 that removing it to make room for SmartSuite may not be practical.

I've long thought that by selling both systems and applications, Microsoft would gain advantages that could eventually terminate competition among Windows vendors. This is especially evident now. With hardware prices dropping so fast, Windows (and Windows applications) could become "disposable" thanks to Windows 95. You won't ever have to replace or upgrade programs. Just buy a new PC that comes complete with all the software anyone is ever likely to need.

Sees their side

I can't blame Microsoft or IBM for trying to create a complete operating environment. We are leaving the era when users cared about software and took the time to learn a variety of different packages and understand the differences. Most computers today are being bought by novice PC users, and these newcomers require software that is easy to use. They want Windows point-and-click software, not arcane commands.

But I believe competition is, for all practical purposes, "locked out" when operating systems developers can integrate their own applications and so much "free" third-party software in a single, seamless package. If this doesn't raise a red flag in the offices of the U.S. Justice Department, then our regulators are asleep at the switch.

Here's the bottom line: Will you be better off five years from now without Lotus' SmartSuite for Windows? Without PerfectOffice? Without WinPlus? Without any choice?

Patton is chief analyst at the Mendham Technology Group in Mendham, N.J., and publisher of "Windows Letter," a newsletter for corporate decision-makers. Her book, *OS/2 Goldmine*, will be available from Van Nostrand Reinhold in March. Contact her through MCI Mail at 401-1868 or via CompuServe at 73700,2503.

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Developing for next generation of Windows may mean running on NT

By William Brandel and Ed Scannell

While software developers are enthusiastically preparing their wares for Microsoft Corp.'s rollout of Windows 95 next year, they are not thrilled about the strings attached to Windows NT.

A number of software developers last week expressed both reluctance and frustration over their efforts to codevelop Windows 95 applications that also run on Windows NT. Microsoft has required that software developers who want to use the Windows 95 logo meet a standard of seven different features, one of which is that the application also run on Windows NT [CW, Nov. 14].

A number of vendors said developing for the two operating systems is difficult, as each targets a different market. Windows 95 is the 32-bit version of Windows mostly likely to run on Intel Corp.-based desktops, while Windows NT targets applications that have typically run on Unix platforms, such as server and workstation applications.

"We are not going to delay our Windows 95 applications so that we can deliver Windows NT applications at the same time," said Peter Cohen, a spokesman for Lotus Development Corp.'s spreadsheet business. "We just don't see the demand for desktop applications on Windows NT."

In addition to the timing issue and a perceived lack of demand for Windows NT applications, Cohen cited the need to conduct extra rounds of quality assurance testing for applications that run on NT. Those resources could be better applied elsewhere, according to Lotus.

NT = no ties

The following vendors are writing applications for Windows 95, but they have different plans for Windows NT

VENDOR	WINDOWS NT DEVELOPMENT
Lotus	Yes, but effort is separate from that for Windows 95
WordPerfect	Yes, but having trouble
Symantec	No, little customer demand

This sentiment was echoed by a number of developers, including officials at WordPerfect, the Novell, Inc. Applications Group. WordPerfect is trying to meet the NT compatibility requirement.

"Windows NT has [more than a dozen] different APIs, a different shared memory space and different bugs to test for," said Gary Gibb, director of development for WordPerfect's PerfectOffice. "You have to go through your entire testing cycle on a number of different hardware configurations and then repeat these tests on NT. And none of this makes the Windows 95 applications run any better."

However, while Microsoft has listed running on NT as a Windows 95 compatibility standard, it has also left the door open for vendors to opt out. Microsoft will allow certain vendors to "degrade gracefully," or choose not to comply with some of the compatibility requirements, if the applications do not mislead the end user into believing certain functions are available when they are not, said Brad Struss, manager of Win32 developer relations at Microsoft.

"We'll let some vendors gray out an item menu if they don't support a feature," Struss said. He added that Microsoft's aim is to ensure that users do not run into application errors from trying to run a Windows 95 application on NT.

As for the alleged difficulty in developing to the Windows NT application programming interfaces (API), Struss blamed confusion over which API developers should be using.

Few choices for small vendors

While companies such as Lotus and Symantec Corp. have opted not to let the NT compatibility requirement bog down their Windows 95 application deliveries, smaller companies with limited resources are facing tougher choices.

"We have to measure the investment for Windows 95 development vs. our revenue streams for Windows 3.1," said Bruce Shafer, president of PC-Kwik Corp. For a smaller vendor, "it is a tightwire act," Shafer said.

Resources aside, other small vendors said their products are not conducive to the NT platform.

"The logo requirement is extreme," said Richard Smith, president of Phar Lap Software, Inc. "It makes no sense for us to have our Front Runner under NT." Front Runner is a shell that enables an end user to toggle between Windows and DOS applications.

However, it is risky to be a software developer rebelling against the mandates of Microsoft, cautioned industry watcher Jeffrey Tarter, editor of "Soft Letter" in Watertown, Mass.

"There is a long history of developers who thumbed their noses at Microsoft and later regretted it," Tarter said. "As an [independent software vendor], betting against Microsoft does not seem to be a high-payoff game."

Senior editor Michael Fitzgerald contributed to this report.

Correction

Due to a reporting error, "Replication falls short" [CW, Nov. 21] incorrectly identified the consulting firm where analyst Judy Davis works. Davis works at Patricia Seybold Group in Boston.

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TAB 10

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► Can Microsoft get SQL Server on everything from big iron to steam irons? If you think OLE everywhere is the future, the answer is yes. *By J. William Semich*

The LONG VIEW from Microsoft: Component DBMSs

THEY JUST DON'T GET IT. Informix, Oracle, Sybase—all the top database-system companies. They watch in a dither for a year while Microsoft messes up their space with its dirt-cheap SQL Server For NT database technologies, and they think that Microsoft is being random (as Bill Gates might put it) with pricing that just doesn't make sense. Dangerously random.

But the UNIX database oligopoly is only half right. They got the danger part right. Because it turns out Microsoft has a plan. When the company announced its future SQL Server 95 last June, the SQL Server crew had its three-year strategy all mapped out. 'Course, they didn't show that map at the announcement—only Microsoft's top management had seen and approved it. But we got an in-depth look after hours, and we'd like to share it with you.

Microsoft is taking a three-pronged strategy with its SQL Server technology. For symmetry's sake, we'll label the prongs "Three Hundred Million Servers," "Three Hundred Processors," and "Three Hundred Objects." If Microsoft succeeds on all three fronts, the face of computing will change, and so will the trajectories of the high-flying database vendors.

THREE HUNDRED MILLION SERVERS

First, there's the Three Hundred Million Servers strategy. That's basically a price strategy. Microsoft thinks it can push the price of the powerful database server software central to enterprisewide distributed computing so low that all your future computing systems will be based on database servers running on super powerful, cheap boxes. This is not a "servers attack the mainframe" strategy, though, cautions Microsoft's director of enterprise computing, David Vaskevitch. It's more of a "servers run the business" approach. "There are 11 million places of business in the U.S. alone. They're all doing things right now that servers could help them do better," Vaskevitch explains. "And there are other things they never dreamed of being able to do; servers can make those things happen, too." That blue-sky approach means, for example, that SQL servers could run your phone system, copying system, cash registers, all that stuff. Not hard to get to 300 million that way, eh?

This won't happen overnight, adds Vaskevitch, but he sees it as inevitable over the long term.

THREE HUNDRED PROCESSORS

Second, there's Microsoft's high-end corporate-computing strategy. By this time next year, when Microsoft ships the next upgrade of SQL Server For NT (code-named SQL Server 95, now officially named Microsoft SQL Server), its database server will be able to run on the most powerful mainframe-class multiprocessor computers and virtually match the pow-

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MS-SQL Server: Good Today, Better Tomorrow

er, features, and functions of the latest multiprocessor and parallel-processing products from the UNIX vendors.

You could call this the Three Hundred Processors Strategy and you'd not be half wrong. Well, maybe not 300 processors—at least not right away.

The Three Hundred Processors Strategy is actually one way Microsoft plans to become a major player in large-scale, mission-critical computing technologies. Microsoft recently restructured itself to better focus resources on making it happen. Last year, prior to restructuring, Microsoft sold just under $5 billion worth of PC software in a market that totals barely $10 billion. With its high-end corporate strategy, Microsoft intends to move into the $70 billion+ market for business software, so it can grow lickety split to something like $20 billion.

"We'll need to be selling into a $100 billion software market to get to that $20 billion," says Richard Tong, marketing director for Microsoft's new IS-focused Business Systems Division.

Of course, sitting squarely in the middle of that enterprise computing market are the likes of Computer Associates, Oracle, Sybase—you know the names. They won't let on that they're really concerned about the competition from Microsoft. They say Microsoft's big talk is just smoke. So how does Microsoft intend to prove them wrong?

Early progress toward the long-term Three Hundred Million Servers goal will help Microsoft achieve its aggressive revenue growth forecast, but performance improvements will help more.

By 1996, when Microsoft ships its even more advanced SQL Server For Cairo, it expects it to actually outperform Informix-Online Dynamic Server 6.0, Oracle7.1, and Sybase System 10 (see "MS-SQL Server: Good Today, Better Tomorrow").

Think you'll ever seriously consider swapping your mission-critical DB2-based financial management system, or Oracle7-based airline reservation system, or even your Sybase SQL Server 10-based loan approval system for a really complex Excel spreadsheet with a SQL Server engine? Hah!

But Bill Gates is betting the company that you will. Not exactly an Excel spreadsheet, of course—but a whole new kind of mission-critical, high-availability, heavy-duty, object-oriented, component-based enterprise system that includes the next generations of Microsoft's Windows NT operating system (dubbed Cairo), the new SQL Server 95 (and the unannounced SQL Server For Cairo), and its coming distributed OLE technology.

All this will happen in the next year or two, a not-so-distant future that Microsoft internally refers to as "the Cairo timeframe."

At right is the techno-time line Microsoft hopes will turn into reality:

THREE HUNDRED OBJECTS

Third, there's the Three Hundred Objects prong of Microsoft's strategy, the component-software-system piece. In order to build enterprise-computing systems from reusable mix-and-match software components, you need more than the object-oriented operating system Cairo, distributed OLE, and the Visual Basic enterprise development tool technologies. You need a technology that turns desktops and servers into peers when it comes to storing, sharing, and finding objects.

To help make this happen, Microsoft is moving SQL Server technology down-

The Metamorphosis of Micrsoft SQL Server

1994

SQL Server 4.21a

Symmetric multiprocessing
Graphical tools
Transact-SQL language
Two-phase commit
Database RPCs
Extended stored procedures
MAPI integration
Integrated security
Async I/O
Macintosh ODBC

NT AS

1995

SQL Server 95

Adds:
Data replication
Multiserver administration
Very large database support
OLE automation
Visual Basic For Applications extended procedures
Parallel operations: backup, restore, load
ANSI SQL support
Engine-based scrollable cursors
Extended MAPI
Parallel table scan

NT Server 3.5 (Daytona)

1996

SQL Server For Cairo

Adds:
Object repository
OLE data access
Parallel query/indexing
Distributed heterogeneous joins
Rich query semantics
Versioning, row locking
ANSI-92 conformance
Cairo security, directory
User-defined functions
Hierarchical data types
Object File System integration
Transaction coordination

NT Cairo

Source: Microsoft

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scale, onto the desktop. The plan is to use pieces of MS-SQL Server technology to rebuild desktop apps like Microsoft Access and Excel so desktops and server components can talk to each other.

"There's this huge mismatch, in terms of semantics, between the big server-based database systems and the tools that run on the desktop," says Gary Voth, group products manager, Business Systems division. "We want to build a common technology across the server—common data access semantics, common rich query technology—a unified engine architecture with the best of Access, Fox, and SQL Server itself. Then we'll move it into a single architecture, with shared technology between the server and desktop, and then componentize it all."

Come Cairo, that common architecture will be distributed OLE and the components will be distributed OLE objects.

The first implementation of this component strategy is in SQL Server 95's new suite of enterprise management tools, which are supposed to simplify the process of managing large, distributed

The SQL Server NT Decision: One Insider's Advice

By an anonymous Microsoft technology partner

You'd be crazy not to start looking seriously at Microsoft's SQL Server 95 technology. But you'd also be crazy—OK, not crazy, just adventuresome—to commit your company today to Microsoft's component enterprise-computing plan lock, stock, and barrel.

Even so, I've looked at SQL Server 95 and 96 up close and undressed, sort of, and it is something really slick. Microsoft recently demonstrated an early, early version to my company in the hopes that we would port our apps to SQL Server For NT. I can't tell you my company's name, but it's one of the leading midrange manufacturing packaged software application vendors.

First off, I was surprised and impressed at the level of the technology they're showing in SQL 95 and SQL 96. Microsoft looks like it's paying attention to the issues that are important to making SQL Server an enterprise-quality database management system.

They seem to be building in a scalability capability for symmetric multiprocessors, and they're leveraging the multithreaded capability of the NT operating system. That gives them a leg up on the other database products, which rely on different versions of UNIX. Some versions of UNIX don't support multithreading, so everything goes through a single queue. Microsoft isn't constrained by that.

SQL Server 95's new system administration toolsets (Starfighter) are very impressive. Microsoft is paying a lot of attention to things like ease of use and the kinds of data replication issues that are necessary to manage performance and backup, and necessary for hot-backup capabilities, performance monitoring, and job scheduling. The SQL 95 job scheduler is integrated into NT. That technology alone shows that Microsoft is trying to listen to enterprisewide needs. I don't see SQL 95 as a scaled-down version of Sybase System 10 at all. It appears to have the same robust capability that Sybase has.

> "Don't bet your job or your company on Microsoft SQL Server and NT Server today"

That said, I still chose Sybase System 10 for the next version of my company's packaged software. Why? Because my customers can buy it today, and I know it works and works well. And if I were a CIO or CTO at a large enterprise, I would do the same thing.

SQL Server 95 is an "NT only" solution—whatever advanced functionality Microsoft's building into it now is predicated on the success of NT. That's still an open question.

Besides, Microsoft's track record on delivering both functional and technical quality products out of the box isn't what I'd like it to be for the kinds of solutions I'm trying to sell. I'm not selling spreadsheets and word processors. Plus, Microsoft has no track record selling enterprise systems or applications. It's a gamble.

My recommendation is don't bet your job or your company on Microsoft SQL Server and NT Server today. Let Microsoft's existing dedicated NT users do that instead.

But you should look at SQL Server 95 and 96 very closely for the future. If you're an IS manager, assign staff to watch SQL Server and NT technology developments very closely. Do some background prototypes using SQL Server 4.21 (Microsoft's current version). Start building apps that include Microsoft's other enterprise server products like Hermes (Systems Management Server) and Information Exchange Server to see how the emerging Microsoft approach to enterprise computing fits your company's future needs. Then sign up as a beta site for SQL Server 95 later this year. (Microsoft is accepting beta requests as of this writing.)

That way, you'll at the least gain valuable experience in the operating system and client/server technologies that will begin to dominate the industry over the next two to three years, as Microsoft moves its user base to the Cairo component-computing environment.

If you're bringing up new mission-critical apps, go with the known players: IBM, Oracle, Sybase, CA, or Informix.

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systems across geographically dispersed servers with stuff like drag-and-drop replication, automated restore and restart. The tools, which Microsoft previously code-named Starfighter but has officially named Enterprise Administration Tools For SQL Server 95, are all OLE objects. Starfighter lets users build their own database management scripts using a new 32-bit version of Visual Basic. SQL Server 95 itself is, in effect, an OLE automation server for these OLE tools and scripts.

In other words, Microsoft is rebuilding SQL Server so that it can contain and manage software components. When SQL Server For Cairo is shipping, Microsoft's world of computing will become a world of OLE objects—components that a developer can link together using OLE's APIs into an application. Then SQL Server won't just store data—it will contain components.

"Under Cairo, you're either an OLE 2 object or you're nothing"

Explains Casey Kiernan, Microsoft's program manager for SQL Server tools: "Cairo is really an OLE 2 operating system—under Cairo, you're either an OLE 2 object or you're nothing. We'll wrap OLE 2 around the legacy stuff. The OLE SQL Server object [in SQL Server 95] is the first step to Cairo."

SQL Server will be just one of Cairo's server-based components, says Voth. "All of our server apps—SQL Server, Systems Management Server, Information Exchange Server, and SNA Server—will have this single integrated model in Cairo," he explains.

The company is serious about this, too, Vaskevitch says. No matter how long it takes, or how much work has to be done to make the technology compelling to commercial users, the company is committed to making its NT-based SQL Server the enterprise launching pad for its Cairo component-computing system.

"We've already invested three years in the planning process for SQL Server, and it doesn't bother us if it takes five, even eight years to get to where we want to be—we don't give up," says Vaskevitch. It probably doesn't hurt to have deep pockets, either.

THE FUTURE OF TECHNOLOGY & PRICING

So there it is—the future of enterprise computing according to Microsoft, the world's richest software company. And where will all the UNIX database companies be, come Cairo time? Today, at least, they still act like they don't have a clue.

They still think they can advance the technology by making their database systems into bigger, better, faster (and pricier) versions of what they've been selling for the past decade and a half—with, of course, the magic sobriquet "open" pasted onto it all.

They may think that. But according to Microsoft's plan, all these big, distributed UNIX megaliths will soon seem just as rigid, overpriced, oversized, and outdated

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as yesterday's mainframe and mid-range systems seem today. Microsoft's low-priced component based SQL Server 95 system and the low-cost hardware it runs on, conversely, will (so Microsoft thinks) form the basis of a whole new culture of computing–kind of like DEC with its avant-garde midrange computing technologies in the heady 1970s.

Fact is, the UNIX crowd is still stuck in the fast-receding bygone era when a system's power and size determined its price–the higher the price, the better the system. "Need to query a 5 million row, one gig table fast? Here, use this. That'll be $500,000, please. Need to run a departmental transaction record-keeping system? Okay, that's $117,000."

How do they set these prices? In what other industry could a marketing director describe product pricing strategy like this: "We look at what value our products bring to our customers' businesses and price according to that value." Translation: The more money your company earns, the more it should pay for its RDBMS.

They're extending that logic to conclude that Microsoft's SQL Server, at only $19,995 for an unlimited-user, multiprocessor RISC-based version, must be a low-power workgroup product. If high value equals high price, then low price must equal low value, right?

They just don't see what's going on.

It's like, they're watching Microsoft through a chink in a fence, right, and all they can see is a shiny piece of stainless steel here, a flash of glass there, maybe a lintel and a post somewhere else. So they think, "Hey, what are these guys making in there?" They figure it's a copycat version of what they've been building and selling for the past few years: a monolithic, UNIX-like, database-centric, big-business system that can pile information high to the sky without collapsing from its own weight.

'Tain't likely. Cause there really is a cultural revolution spinning out around how businesses do computing in the workplace–moving the power of computing down to the local level, onto your desktop, even down onto your lap.

Need to query a 5 million row, one-gig table fast? Here, use this. That'll be $500,000, please

Is Microsoft's 300 Million Servers, etc., vision the right one for this cultural shift? Hard to tell at this point. Maybe IBM will do a few quick flips and–presto–put together a better bunch o' buyables before Microsoft can. Or maybe NeXT's Steve Jobs and his UNIX bigots' object alliance, Sun, HP, DEC, and others, will get there first.

But one thing's for sure. Three, maybe five years from now, the UNIX database system vendors (the one or two who are still around to play) will be using a whole different set of rules–rules first sketched out up in Redmond by the likes of David Vaskevitch, Rich Tong, and Gary Voth.

TAB 11

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

Preface

The year 1993 was one of dramatic change in the PC software industry. This report will highlight the major events of 1993 in personal computing software. We analyze the positioning and directions of the top 10 vendors, dissect our data, and then analyze applications by category, operating system, and region. We conclude with our forecast of future trends in the industry.

Data included in this report is listed as needed for our discussion. For a comprehensive list of our historical data and forecasts, refer to the *Personal Computing Software Worldwide Market Statistics*, a series of three reports published in June 1994 (product codes: PCSW-WW-MS-9401, -9402, and -9403).

Dataquest's PC Software service tracks all major PC software business productivity applications running on the DOS, Windows, Macintosh, OS/2, and Windows NT operating systems and environments. Other services concentrate on other areas of the software market: our Multimedia service tracks entertainment and education software; our Client/Server service tracks development tools and server databases; and our Digital Documents and Operating Systems services complete the offerings.

In Appendix A, we define our market coverage boundaries. In Appendix B, we discuss the methodology used to arrive at our decisions.

We hope that you find this information useful. Please contact us if you have any questions regarding the data or analysis.

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District of Columbia

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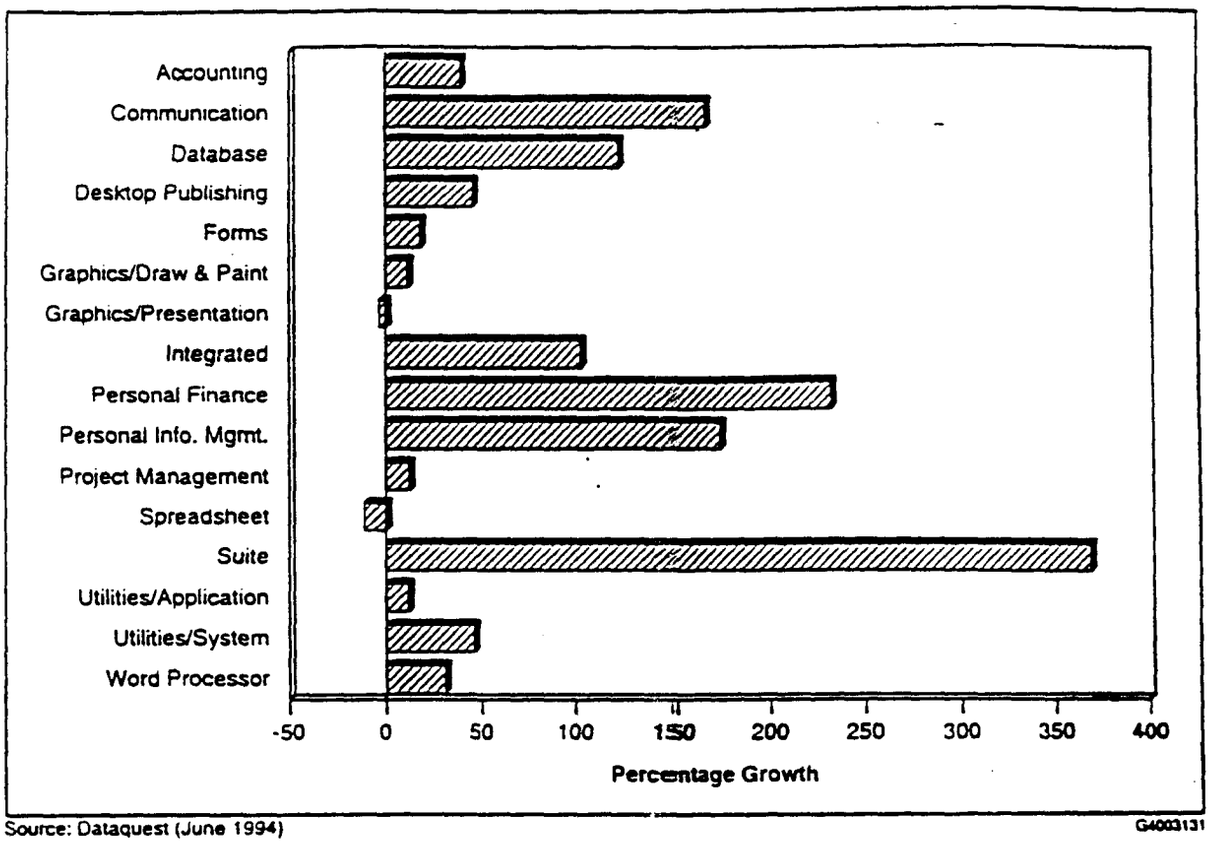
Figure 4-2
1993 Unit Shipments Growth by Category



Source: Dataquest (June 1994) G4003131

Analysis of Each Category

This section will analyze the 1993 results for each category. Future trends for each category will be discussed in Chapter 7. For a definition of each category, see Appendix C.

Accounting

Intuit, a new entry in the accounting market in 1992, jumped to the top spot in revenue in 1993 (see Table 4-1). Realworld, Peachtree, and Great Plains all ship products that have a higher ASP than Intuit; however, revenue for all four companies is very closely matched in the U.S.$20 million range. A slow transition to the Windows platform contributed to the revenue decline in 1993.

Communication

The communication market exploded in 1993. Bundling arrangements with modem OEMs contributed significantly to the 167 percent growth in unit shipments (see Table 4-2). Revenue increased by an impressive 47 percent. Delrina's WinFax Pro and Datastorm's Procomm Plus led the charge. The growth of the laptop market also spurred unit sales. There is still room for growth in this market, but 1993 will be remembered as the year this market really took off.

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Table 4-12
Top Vendors in the Spreadsheet Market
(Revenue in Millions of U.S. Dollars)

	1993 Revenue	1992 Revenue	1993 Market Share (%)	Revenue Change (%)
Lotus	445.9	502.2	46.1	-11.2
Microsoft	357.0	484.4	36.9	-26.3
Borland	69.5	121.4	7.2	-42.8
Total Spreadsheet Market	968.0	1,262.3	100.0	-23.3

Source: Dataquest (May 1994)

Table 4-13
Top Vendors in the Suites Market
(Revenue in Millions of U.S. Dollars)

	1993 Revenue	1992 Revenue	1993 Market Share (%)	Revenue Change (%)
Microsoft	821.2	213.0	85.4	285.5
Lotus	114.8	16.1	11.9	612.7
Borland	17.7	0	1.8	NA
Total Suite Market	961.5	229.1	100.0	319.7

NA = Not applicable
Source: Dataquest (May 1994)

Utilities/Application

WordPerfect's Grammatik for both DOS and Windows were the two leading applications in 1993. WordPerfect garnered a 36 percent market share based on revenue in 1993 (see Table 4-14). This is a small market that involves small companies able to find a niche market. This is not a market where we will likely see one or two vendors dominate.

Table 4-14
Top Vendors in the Application Utilities Market
(Revenue in Millions of U.S. Dollars)

	1993 Revenue	1992 Revenue	1993 Market Share (%)	Revenue Change (%) (1992-1993)
WordPerfect	24.1	0	36.2	NA
Wordstar	5.8	9.2	8.8	-36.5
Adobe	4.9	5.7	7.3	-14.0
T/Maker	4.0	3.7	6.0	8.8
Total Application Utilities Market	66.6	69.8	100.0	-4.6

NA = Not applicable
Source: Dataquest (May 1994)

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TAB 12

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Department of Justice

Ex. 12
94-1564 SS

FILED

FEB 14 1995

Clerk, U.S. District Court
District of Columbia AT

FOR IMMEDIATE RELEASE
SATURDAY, JULY 16, 1994

(202) 616-2771
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MICROSOFT AGREES TO END UNFAIR MONOPOLISTIC PRACTICES

WASHINGTON, D.C. -- Microsoft, the world's largest and dominant computer software company, agreed to end its illegal monopolistic practices after the Department of Justice charged that the company used unfair contracts that choked off competition and preserved its monopoly position.

The company agreed to settle the charges with a consent decree that will prohibit Microsoft from engaging in these monopolistic practices in the future.

Microsoft, which makes the MS-DOS and Windows operating systems used in more than 120 million personal computers, was accused of building a barricade of exclusionary and unreasonably restrictive licensing agreements to deny others an opportunity to develop and market competing products.

Attorney General Janet Reno said, "Microsoft's unfair contracting practices have denied other U.S. companies a fair chance to compete, deprived consumers of an effective choice among competing PC operating systems, and slowed innovation.

(MORE)

Today's settlement levels the playing field and opens the door for competition."

"Microsoft is an American success story but there is no excuse for any company to try to cement its success through unlawful means, as Microsoft has done with its contracting practices," said Anne K. Bingaman, Assistant Attorney General in charge of the Antitrust Division.

The settlement is the result of close coordination between the Department of Justice and the competition enforcement authorities of the European Commission, which has been investigating Microsoft since mid-1993, and which also initiated an undertaking containing essentially the same terms. This complaint and settlement marks the first coordinated effort of the two enforcement bodies in initiating and settling an antitrust enforcement action.

Bingaman, praised the Commission, noting that, "This unprecedented, historic cooperative action sends a powerful message to firms around the world that the antitrust authorities of the United States and the European Commission are prepared to move decisively and promptly to pool resources to attack conduct by multinational firms that violate the antitrust laws of the two jurisdictions."

The civil complaint and consent decree were filed last night, July 15, in U.S. District Court in Washington, D.C. The consent decree, if approved by the court, would settle the suit.

(MORE)

Until approved, Microsoft has agreed in a stipulation filed with the court to abide by the terms of the decree.

The Department alleged that Microsoft used the following unfair practices:

Exclusionary Per Processor Licenses--Microsoft makes its MS-DOS and Windows technology available on a "per processor" basis, which requires PC manufacturers to pay a fee to Microsoft for each computer shipped, whether or not the computer contains Microsoft operating system software. The complaint alleges that this arrangement gives Microsoft an unfair advantage by causing a manufacturer selling a non-Microsoft operating system to pay at least two royalties--one to Microsoft and one to its competitor--thereby making a non-Microsoft unit more expensive.

"Microsoft has used its monopoly power, in effect, to levy a "tax" on PC manufacturers who would otherwise like to offer an alternative system," said Bingaman. "As a result, the ability of rival operating systems to compete has been impeded, innovation has been slowed and consumer choices have been limited." She noted that Microsoft has maintained the price of its operating systems while the price of other components has fallen dramatically. Since 1988, Microsoft's share of the market has never dropped below 70 percent.

Unreasonably Long Licenses--The Department further alleged that Microsoft's contracts are unreasonably long. By binding manufacturers to the purchase of Microsoft products for an

(MORE)

excessive period of time, beyond the lifetime of most operating system products, the agreements foreclose new entrants from gaining a sufficient toe-hold in the market.

Restrictive Non-Disclosure Agreements--The Department also charged that Microsoft introduced overly restrictive non-disclosure agreements to unreasonably restrict the ability of independent software companies to work with developers of non-Microsoft operating systems. Microsoft sought the agreements from companies participating in trial testing of the new version of Windows, to be released later this year. The terms of these agreements preclude applications developers from working with Microsoft's competitors for an unreasonable amount of time.

The settlement ends these practices and will help to rectify the effects of Microsoft's past unlawful conduct. In particular, the settlement prohibits Microsoft from:

--Entering into per processor licenses.

--Obligating licensees (manufacturers of personal computers) to purchase any minimum number of Microsoft's operating systems;

--Entering into any licenses with terms longer than one year (although licensees may renew for another year on the same terms).

--Requiring licensees to pay Microsoft on a "lump sum" basis.

(MORE)

--Requiring licensees to purchase any other Microsoft product as a condition for licensing a particular Microsoft operating system.

--Requiring developers of applications software to sign unlawfully restrictive non-disclosure agreements.

The settlement is effective immediately and will be in effect for six and a half years.

Bingaman said "this settlement resolves the competitive problems created by Microsoft's unlawful conduct quickly and effectively."

Microsoft's main corporate office is in Redmond, Washington.

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94-387

ORIGINAL

1

2 DEPARTMENT OF JUSTICE

3 PRESS CONFERENCE

4 With Attorney General Janet Reno and

5 Assistant Attorney General Anne Bingaman

6 Regarding the Microsoft Settlement

7

8 Saturday, July 16, 1994

9

10

11

12

13 (Transcribed from a provided audiotape.)

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1 P R O C E E D I N G S

2 ATTORNEY GENERAL RENO: Good afternoon.

3 The Justice Department has charged Microsoft, the
4 world's largest software company, with using unfair
5 marketing and contracting practices to choke off competition
6 to preserve its monopoly position. Microsoft has agreed,
7 yesterday, to settle the charges with a consent decree that
8 will prohibit the company from continuing to engage in
9 monopolistic practices in the future.

10 While the company fairly and lawfully climbed to
11 the top of the industry ladder, it used unfair and illegal
12 practices to maintain its dominant position, and kept honest
13 competition from other U.S. companies.

14 The Justice Department has taken an action that
15 is critical to the personal computer industry and the
16 efforts to make it competitive. This settlement will save
17 consumers money, enable them to have a choice when selecting
18 PC operating systems, and it will stimulate innovation in
19 this critical market.

20 Today's settlement is the result of close
21 coordination between the Department of Justice and the
22 Competition Enforcement Authorities of the European
23 Commission, which, today, also has indicated an undertaking
24 containing essentially the same terms.

25 This complaint and settlement marks the first

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1 coordinated effort of the two enforcement bodies in
2 initiating and settling an antitrust enforcement action.
3 I want to thank and to recognize Anne Bingaman and
4 the fine staff of the Antitrust Division, who have worked
5 through long hours of negotiations to resolve quickly this
6 significant case, and achieve the best results for the
7 consumers of America.
8 And now I would like to ask Anne --
9 MS. BINGAMAN: Thank you.
10 We are proud of the achievement that the
11 settlement filed in Federal District Court in Washington,
12 the District of Columbia, at 9:30 last night represents.
13 It is a significant -- in fact, historic -- breakthrough for
14 the software industry, for innovation, for the
15 competitiveness of the American economy.
16 Let me describe for you briefly what the case we
17 filed is about and what the settlement achieves, because
18 they are significant.
19 Number one, the settlement will open the playing
20 field; it will level the playing field for Microsoft's
21 competitors in the operating system software market, to
22 enter this important market, to bring down prices to
23 consumers, to innovate, to produce better products.
24 Microsoft, for years, and has today, monopoly
25 power in the software -- operating system software market.

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1 As this chart shows, Microsoft has 79-plus percent of that
2 market. Its competitors are other American companies who
3 have been struggling for years to enter this market to
4 provide better, cheaper products to American consumers, and
5 Microsoft's contracting practices, which are challenged in
6 this lawsuit and which are ended by the settlement we
7 achieved, have prevented those competitors from entering the
8 market. They have deprived consumers of choice. And they
9 have stopped innovation -- slowed innovation in this
10 important market.
11 Let me describe to you the four major things that
12 Microsoft did and which this settlement ends.
13 Number one, the per-processor license, I'll
14 describe in a moment.
15 Number two, contracts of extraordinarily long
16 duration which blocks the market.
17 Number three, huge, 100 percent minimum
18 commitments for years, which amounted to take-or-pay
19 contracts, which blocked the market.
20 And, four, restrictive non-disclosure agreements
21 for software writers which prevented them from writing for
22 other software companies in some cases.
23 Let me turn first to the per-processor license,
24 what that is and what this settlement does to stop it.
25 Number one, the settlement bans it outright. That

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1 is first. What the per-processor license has done until
2 last night at 9:30 was to lock up 60 percent of this market
3 in the United States in per-processor contracts which
4 Microsoft began using in 1988. Per-processor contracts are
5 contracts which Microsoft imposed by virtue of its dominant
6 monopoly position on computer manufacturers, such as Dell,
7 Compaq, Gateway, you name it, the OEM's they are called in
8 the business, the computer makers, who have to license from
9 Microsoft because it has had this monopoly position and the
10 products are demanded in the marketplace.
11 Nothing wrong with that, but rather than simply
12 sell those products fair and square on the merits and on
13 price, in 1988, Microsoft invented a form of contracting
14 called the per-processor license, under which it required
15 the computer manufacturers -- induced them with extremely
16 low prices to pay for every processor they shipped of a
17 certain type not just to Microsoft, but to the competitors.
18 So it worked this way: Under a per-processor
19 license, which 60 percent of the industry has had until last
20 night, Microsoft got paid for every processor shipped by a
21 computer maker, whether or not that processor had a
22 Microsoft operating system loaded on it.
23 Now, if you are a competitor of Microsoft and you
24 wanted to sell your competing product to a consumer, you do
25 that through these computer manufacturers. But they had to

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1 pay Microsoft.

2 Now, if Microsoft -- take this hypothetical --
3 operating system was $15, and you came in with a better
4 operating system or cheaper, it worked just as well,
5 hypothetically $10 -- these numbers are lower than average,
6 but for ease -- under the per-processor license, the
7 computer manufacturer pays Microsoft 15 and the competitor
8 10 for a total of $25 on what really is a $10 item.

9 The result, computer manufacturer were reluctant
10 -- extremely reluctant -- to buy from competitors. And that
11 was the purpose and the effect of the per-processor license.
12 It's obvious what it does. It drives prices up to
13 consumers. It raises prices. It locks out competitors.
14 And it slows innovation.

15 So, this settlement stops the per-processor
16 license.

17 Two, Microsoft used contracts of three to five
18 years in an industry that was rapidly turning over. These
19 extraordinarily long contracts made it very difficult for
20 competitors to get in. The settlement we achieved today
21 reduces contract lengths to one year, with one, one-year
22 extension on the same terms and conditions which the
23 computer manufacturer, in its sole option, can elect.

24 So, we have gone to one-year contracts, banning
25 of per-processor.

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1 The third important feature of this settlement is
2 abolishing minimum commitments. Microsoft's third way to
3 lock up this market was to say to the computer makers who
4 had to deal with it, We will give you a lower price if you
5 estimate a large volume.
6 Nothing inherently wrong with that volume
7 discounting. The problem is Microsoft quoted these low
8 prices in conjunction with 100 percent minimum commitments
9 -- i.e., you get that price only if you sign on the dotted
10 line to pay us every cent regardless of whether you actually
11 ship our product or not -- a take-or-pay contract. You pay
12 no matter what.
13 Well, what does that mean?
14 Over a long-term contract, what that means is if
15 the computer manufacturer's business has not gone quite as
16 well as it thought, it is locked into Microsoft no matter
17 what because it owes them this minimum commitment, even if
18 it has not sold any machines. So, minimum commitments was
19 a third way that Microsoft locked up this market, locked out
20 competitors, and minimum commitments are abolished. They
21 are zero in the settlement we achieved yesterday.
22 Finally, NDA's, non-disclosure agreements, were
23 restrictive agreements which Microsoft, this winter, imposed
24 in a manner that had never been done before in the software
25 industry on certain applications writers. It would have --

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1 the NDA's challenged in this lawsuit and which Microsoft in
2 the consent decree agrees to stop would have prevented
3 applications writers from discussing Microsoft's operating
4 systems for as long as three years after public disclosure
5 of the operating system.
6 The effect could take those application writers,
7 the software writers, forever out of business, in effect,
8 except for Microsoft. It is another way to, in effect, lock
9 up the market -- this time by locking up the important
10 software applications writers.
11 Microsoft itself has said these NDA's were a
12 mistake. It has agreed in this consent decree to never
13 engage in such practices while this consent decree is in
14 effect. And that also is a significant achievement of this
15 settlement.
16 The last thing the settlement does is prohibit the
17 use of lump-sum contracts, which would have been another way
18 that Microsoft could have locked up this market. They had
19 not needed to use them in the past because they had these
20 other methods, but looking forward, our concern was that
21 they might. And so the settlement also bans lump-sum
22 contracts.
23 This settlement is everything we could have hoped
24 for in a fully litigated case and possibly more. It is an
25 historic achievement. I tell you, the charts we have

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1 prepared today were prepared for the lawsuit we planned to
2 file yesterday. The lawsuit was not filed because of the
3 settlement. We filed instead a complaint with a settlement.
4 We are extremely proud of this result.
5 And the last point that the Attorney General
6 noted, I think, deserves mention. This is the first time
7 in history that the Competition Authorities of the European
8 Commission and the Department of Justice have cooperated
9 closely in investigating a major worldwide company, whose
10 anti-competitive practices affected important markets both
11 in Europe and the United States.
12 We took this under a letter -- the EC and I and
13 the Department of Justice asked Microsoft last October to
14 waive any confidentiality restrictions under our respective
15 statutes so that we could work together and think about the
16 case we were jointly -- not jointly to them -- but that we
17 had each initiated. Microsoft agreed to that in writing.
18 We worked with the EC throughout the winter. We
19 shared documents. We worked closely with them. We settled
20 this together on terms that are substantially identical.
21 We negotiated in Brussels the week of July 4th with
22 Microsoft. We negotiated this week at the Department of
23 Justice with EC officials here. And this also is a truly
24 historic aspect of this settlement.
25 So, we are extremely proud of this. We are

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1 gratified that it concluded with a consent decree which
2 achieves the really 100 percent results that any lawsuit
3 could have achieved, and possibly more. And I want to
4 especially note that this was the ultimate team effort. We
5 had a group of lawyers, led by Sam Miller, who is here
6 today, and Don Russell, who is on his way back from Brussels
7 -- he has been in Brussels all week coordinating this hour
8 by hour with the EC over there -- we have had extraordinary
9 people on this case. We had a team of lawyers I would put
10 against anybody, and I would feel for the other side.
11 And I want to simply state the names on the
12 complaint we filed last night, because I am so proud to have
13 been part of this group. The complaint was signed by Sam
14 Miller, Don Russell, Joyce Bartu, Bob Zastrow, Dick Irvin,
15 Peter Gray, Justin Dempsey, Gil O'Hana, and Larry Frankel.
16 And there were more, and we had a paralegals. And this was
17 an effort of a remarkable, extraordinary, incredible group
18 of lawyers that I am so proud to have been part of. And I
19 am proud of our partnership with the EC.
20 So, with that, what can I tell you about any
21 questions you have?
22 QUESTION: What kind of room does this give
23 Microsoft's competitors -- (inaudible) -- civil actions?
24 MS. BINGAMAN: That is up to the competitors. I
25 do not actually believe this case changes the legal status

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1 of any competitor's suit, because, by settling, Microsoft
2 has admitted to no facts. It has consented to entry of the
3 decree that was filed with our complaint. But facts are not
4 established of record by a settlement, the way they are by
5 a litigated case to conclusion, with a jury trial.
6 So, my own horseback impression is that the
7 action, as such, does not change the legal status. But, as
8 far as private suits by competitors, it has enormous impact
9 for competitors in opening the market. This is exactly what
10 has been needed for years and years in the software
11 industry. And I think, in the market-opening respects and
12 for innovation, prices to consumers, it will have tremendous
13 impact.
14 QUESTION: Why has this taken so long, and why is
15 there no monetary penalty? And I notice it says that -- you
16 say in the press release that it bans these practices in the
17 future, but then says it only lasts six-and-a-half years.
18 MS. BINGAMAN: Okay. You have got several
19 questions there. Number one, we have had this case for a
20 little less than one year. The FTC had it for, I think,
21 two-and-a-half or three years before that. As everyone
22 knows, or a lot of people, the FTC deadlocked two to two.
23 We took the case acting as a fifth commissioner. We have
24 looked carefully at this case because it is an important
25 case, and we wanted to understand it fully ourselves.

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1 So, I have no concerns whatsoever about a one-year
2 action by the Justice Department that ends these practices.
3 There are no monetary penalties because they are
4 not provided by any law and never have been. When the
5 Justice Department settles a civil case, the Antitrust
6 Division -- the antitrust laws do not provide for civil
7 penalties, period.
8 We obtain adjunctive reliefs to open the market.
9 Under the American legal system, private actions obtain any
10 monetary damages, and that is just the way it is in all of
11 our cases. They are no different.
12 You had a third aspect.
13 QUESTION: The length of time, you say --
14 MS. BINGAMAN: Oh, the six-and-a-half years. Our
15 decrees normally last 10 years. We negotiated long and hard
16 with Microsoft over the length of the decree. The EC's
17 decrees last four-and-a-half years. We obtained immediate
18 effect of this decree. That was a crucial aspect of the
19 decree. And we believe we added, in effect, three to
20 three-and-a-half years on the front end of the decree
21 because the contract duration stops right now. The
22 per-processor stops as of last night.
23 The illegal practices that had locked up the
24 market are ended. And they do not have to wait for
25 contracts now in effect to run out. And it was our belief

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1 that based on all of those facts, plus the EC's practice of
2 four-and-a-half year decrees, that this was a fair balance
3 under the circumstances.
4 Let me mention something. I neglected to thank
5 -- and it was a major oversight on my part and I want to
6 correct it -- Henry Kawati is sitting here, who worked long
7 and hard on this case, he is an economist with our Economic
8 Section; Rich Gilbert, who is head of that section, was in
9 Brussels with me; and Mark Schecter, who killed himself on
10 the case, along with Bob Lighten, but I want to thank Henry
11 Kawati and Ken Hire and Rich Gilbert, because the economics
12 aspect of this case, as you can imagine, was critical. We
13 had outstanding outside economists who Henry worked with
14 tirelessly for many, many months. And he was a critical
15 part of it, as was Rich Gilbert and Ken. So, I wanted to
16 say that.
17 QUESTION: Can you estimate how much these
18 practices may have cost consumers over the years?
19 MS. BINGAMAN: We have not. Because we do not
20 bring damage actions, we do not put efforts into trying to
21 figure out monetary total impact. But I can, to illustrate,
22 tell you this. If you were a consumer and wanted to buy a
23 competing operating system, and despite Microsoft's
24 practices, there have been, in fact, four major competitors
25 in this market to Microsoft, who have clawed and grabbed and

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1 have managed to obtain some market share, if you bought one
2 of those competing companies, and 20 percent of the American
3 public does, and you were under a per-processor license, and
4 many of these licenses, as we saw, are per-processor, you
5 paid not just Microsoft anywhere from $15 to $50 for its
6 operating system, you paid the competing price on top of
7 that.
8 And so Microsoft, in effect, taxed every consumer
9 who bought a competing operating system and bought it from
10 a maker who had one of these per-processor contracts, or a
11 similar one. And so it's not insignificant. We have not,
12 as I said, made any effort to quantify it, but it is --
13 there are millions and tens of millions of PC's shipped
14 every year, and it is a major amount of money.
15 We can try to come up with some numbers after the
16 press conference. But with all the other things we have
17 done, that has not -- our focus has been opening the market,
18 truly, and obtaining the relief we needed.
19 QUESTION: To follow that up, do you have any
20 estimate of how many computers were shipped under these
21 agreements that would have been effected?
22 MS. BINGAMAN: I can come up with numbers on that.
23 We have not tried to. It is in the tens of millions. There
24 are 120 million total computers with Microsoft operating
25 systems on them. Many, many were shipped with this -- under

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1 these kinds of practices. And it has been a major market
2 problem for competitors, and has restricted choice for
3 consumers.
4 Let me tell you why else this is so important to
5 the American economy. We are about innovation and
6 competition in this economy. That is what we are for. And
7 Microsoft has its shot at the market. No problem. All we
8 are saying is others should have their shot at the market,
9 fair and square, a level playing field. That is the
10 American way.
11 And they may have a better mousetrap. They may
12 not. But what we are saying is people should get a chance
13 to judge it fairly on quality and price and the other
14 factors. And that is what this case is about. It levels
15 the playing field, opens the door.
16 And if a competitor has a better product that can
17 run computers faster, run them better, support better
18 applications, build a base, cut into Microsoft's market
19 share so that applications writers will write for it, that
20 could have profound consequences for the American economy.
21 What we are about is precisely that -- promoting
22 competition, innovation, better products at cheaper prices,
23 and letting the market take care of whatever happens.
24 We are not about driving the market; we are about
25 letting the market operate freely.

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1 QUESTION: Had this settlement not been reached,
2 what broader or further action could Microsoft have been
3 subjected to? And, a second question is, had there been any
4 serious consideration about splitting Microsoft into two?
5 MS. BINGAMAN: I cannot discuss our internal
6 considerations as such. I can tell you that we looked at
7 every possible legal theory and at all the facts throughout
8 the course of a long, tough winter, that the legal team I
9 mentioned went through. And it was our conclusion at the
10 end of that that the case to be filed was the case we did
11 file. We did not bargain off any case in exchange for a
12 settlement. This was the case that was there after
13 thousands of hours of work. And it needed to be brought,
14 and it was brought.
15 And that is really as much as I think
16 confidentiality permits me to talk about specifics.
17 QUESTION: Potentially, had this gone into
18 litigation, what could we have seen perhaps in terms of time
19 and cost?
20 MS. BINGAMAN: Had this been litigated, we hoped
21 to conclude it within a year. We planned to file it in a
22 district in which the dockets are not crowded and we could
23 have obtained a quick resolution, because the markets need
24 to be open. This needed to get done. But it would have
25 been a minimum of a year at the very best. It undoubtedly

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1 would have been appealed. And the key point is, after all
2 that, two to two-and-a-half years at best through appeal,
3 we could not have achieved one thing more than we got in
4 this settlement.
5 And, frankly, I am not sure we would have gotten
6 as much. I do not know, because I do not know what a judge
7 would have done. But this settlement is 100 percent of what
8 we would have gotten with a lawsuit.
9 QUESTION: Can you tell us more about the EC
10 cooperation, how and when was that initiated? And wasn't
11 there a British investigation as well?
12 MS. BINGAMAN: No, there was no British
13 investigation. It was the European Commission. It was a
14 result, actually -- last September, I went to Europe for
15 consultations, which are annual consultations with the EC
16 that we have done for years, the Antitrust Division -- it's
17 a mutual cooperative thing -- and Klaus Ailerman, the head
18 of the Competition Directorate said to me, What are you
19 doing about Microsoft, because we have a Microsoft case,
20 too, you know, and I am very interested to talk to you about
21 it?
22 And I looked at him and I said, Klaus, I do not
23 think I can say a word to you about Microsoft. Everything
24 I know is under confidential documents. I am forbidden from
25 talking about it. I can't speak to you.

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1 And he said, Well, what a great pity, because
2 we've got, as far as I can tell from press reports, the same
3 case.
4 And I said, Well, it is a great pity.
5 And I came back to the United States -- that was
6 the end of September -- and 10 days or two weeks later, it
7 just hit me out of the blue one day, we should ask Microsoft
8 to waive confidentiality so that we could cooperate and
9 decide whether in fact there is a case and coordinate
10 remedies.
11 And the coordination of remedies is really crucial
12 for a company in Microsoft's position, which operates
13 worldwide, literally, in -- I do not know -- tens of
14 countries in the world. They need, for their own business
15 reasons, to have the same contracting practices. It would
16 be terribly disruptive -- and I called the EC. We asked
17 Microsoft. Microsoft, for its own reasons, said that would
18 actually -- they didn't have a problem. They waived
19 confidentiality. And that is how it began last October, and
20 it has continued since then.
21 QUESTION: How is the Justice Department going to
22 monitor the new agreements, the new contracts that Microsoft
23 will sign with its OEM's? And what guarantees are there
24 that Microsoft isn't going to turn around and say, you know,
25 if we cannot do the kinds of volume deals that we have done

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1 in the past, we are going to charge 5, 10, 15 percent for
2 the operating system than we have in the past?
3 MS. BINGAMAN: If they charge more for their
4 operating system, the competitors are there, without
5 question, with comparable products. And the market should
6 take care of that. That is the whole idea of this
7 settlement. The market should take care of it.
8 We are allowed, in the monitoring provisions of
9 this decree, which you should have, to request documents
10 from Microsoft, to inspect their contracts, to talk to their
11 people. We are further -- the decree specifically provides
12 we can cooperate with the EC in this monitoring, so we will
13 continue our cooperation and close work with them.
14 And we are watching. We are very much on the
15 case.
16 QUESTION: A question about the per-processor
17 issue. From your presentation it wasn't entirely clear to
18 me, but it sounds as though Microsoft main pressure on
19 computer companies was that they got -- they would offer
20 huge, huge discounts to the companies that would accept a
21 per-processor kind of agreement. That being the case, it
22 seems to me that, on one level, the sin is that Microsoft
23 is simply charging too little for the operating system.
24 And, to follow up on that, to follow up on that,
25 it seems to me that the marketplace situation may not be a

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1 whole lot different, because Microsoft can continue, it
2 seems to me, to charge that same low, low price.
3 MS. BINGAMAN: Ed, you been talking to Microsoft?
4 That is their line. They are not telling you right. If
5 that was so easy, why did they have per-processor licenses?
6 They are the only company in the industry that did. Why did
7 they have three- to five-year contracts? They are the only
8 company that in the industry that did. Why did they have
9 100 percent minimum commitments? They are the only company
10 in the industry that enforced that.
11 If this was so simple, why were they locking up
12 the market with practices which every computer manufacturer
13 despised and which the competitors despised and which
14 Microsoft hung tough through four years of Government
15 investigation to hang on to? Do you think that is because
16 it did not matter to them? That is the story they are
17 putting out.
18 You are darned right they are trying to spin it
19 their way. That is not right. And let me tell you. Volume
20 discounts, of course they can volume discount. No question.
21 There is nothing wrong with volume discounting. It is done
22 in all kinds of industries, in all kinds of situations. And
23 the decree does not address volume discounts as such.
24 The problem with Microsoft's practices is that
25 they were using volume discounts to lock up the market with

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1 per-processor contracts and 100 percent minimum commitments,
2 which then were like iron. You could not get out of. You
3 could not escape.
4 To get those low prices, you had to sell your soul
5 and never leave Microsoft. And that is what this decree
6 changes.
7 Microsoft can compete on the basis of low price.
8 We have no problem with that. That is good. We want that.
9 What we do not want is competing on the basis of low price
10 and then using that to impose contract terms which exclude
11 every other competitor.
12 And, Ed, the reason they were able to do that is
13 because of their monopoly position in this market. I mean,
14 this is an important question you are asking, because they
15 are going to try to claim that this decree changes nothing.
16 That is wrong. That is a lie. And people need to
17 understand that.
18 Because volume discounting, in and of itself, is
19 not a problem. There are ways volume discounting can be
20 abused. I have discussed those ways with Microsoft and Bill
21 Gates. We are watching. We are watching closely what they
22 do with volume discounts. They know it. I know it. And
23 we are going to see what happens here.
24 But volume discounting, in and of itself, is not
25 a problem. There can be problems in how you structure them,

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1 whether you force -- it's a technical discussion. But, in
2 any event, believe me, they did not hang tough on this for
3 so long, right to the brink of a joint lawsuit by the U.S.
4 and the EC yesterday because these practices were so
5 harmless and meaningless and so forth. But I can see why
6 they say it.
7 (Laughter.)
8 QUESTION: Is there going to be an immediate
9 effect that we will notice for consumers?
10 MS. BINGAMAN: I hope consumers, within a short
11 period of time, will have more choice of operating systems,
12 genuine choice, more innovation in computers. Certainly,
13 the prices will lower for consumers who already buy
14 competing operating systems. Any of these companies in the
15 market right now can now sell just for their price, not for
16 this double tax that Microsoft has gotten.
17 So, I think prices will immediately lower, and I
18 think, over the medium to long range, this will, I hope and
19 believe, have profound market opening impacts. It will help
20 innovation, help the competition give us better products.
21 You may be using a different operating system three years
22 from now because of this -- maybe. And if you are, great.
23 If you still want whatever, great.
24 But the point is you should have a choice.
25 Everyone should have a choice. And the companies that

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1 compete with Microsoft should be able to offer you that
2 choice fairly and evenly.
3 VOICE: Thank you.
4 QUESTION: Microsoft's competitors in applications
5 have complained about the access that they have had to all
6 kinds of information about the operating system code. Did
7 the Justice Department not find that Microsoft had unfairly
8 restricted applications developers to various aspects of the
9 software?
10 MS. BINGAMAN: The nondisclosure agreement, the
11 so-called NDA part of the case, focused on nondisclosure
12 agreements required -- are you talking about something else?
13 QUESTION: I mean, certainly the NDA has been part
14 of it, but other companies --
15 MS. BINGAMAN: The so-called interoperability?
16 QUESTION: Yes, yes, hidden calls and all of the
17 charges that have been raised over the past few --
18 MS. BINGAMAN: I can tell you we have looked
19 closely at all aspects of this case. We have examined it
20 closely. And I think all that I can say, because of the
21 strictures of confidentiality and the law, is that we have
22 looked at it and this is the case we chose to bring because
23 this is the case that is there and needed to be brought.
24 And I think that is all I should say.
25 VOICE: Okay. Thank you.

1 VOICE: Thank you.

2 MS. BINGAMAN: Okay. Thank you.

3 VOICE: Thank you very much.

4 (End of proceedings.)

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TAB 13

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Microsoft's Grip on Software Tightened by Antitrust Deal

FILED
FEB 14 1995
Clerk, U.S. District Court
District of Columbia
Ex 13
94-1564SS

Andrew Schulman

On Friday, July 15, Microsoft signed a consent decree with the Antitrust Division of the U.S. Department of Justice (DoJ), ending a four-year investigation by U.S. antimonopoly agencies—first the Federal Trade Commission (FTC) and later the DoJ—into Microsoft's trade practices. At the same time, Microsoft signed a nearly identical settlement with the Directorate-General for Competition of the European Commission. The judgment lasts for six and a half years in the U.S., four and a half in Europe.

Microsoft agreed to immediately abandon several arrangements for licensing the MS-DOS and Windows operating systems to PC hardware vendors. It also agreed to halt some "unnecessarily restrictive" clauses in its nondisclosure agreements (NDAs) for the forthcoming "Chicago" version of Windows. The consent decree explicitly excludes Windows NT.

The consent decree is still subject to a 60-day public review. The full text of the DoJ's July 15 complaint against Microsoft for violations of sections 1 and 2 of the Sherman antitrust act, the U.S. District Court final judgment in *U.S. v. Microsoft*, and the "Stipulation" signed by the DoJ and Microsoft consenting to the final judgment, are available via Internet Gopher from the DoJ's Gopher server.

Who Won?

The consent decree was first viewed as a victory for the DoJ and Microsoft's competitors. The *New York Times* (July 17) carried the front-page headline, "Microsoft's Grip on Software Loosened by Antitrust Deal," and crowed that "the pact could reshape the world of computing.... The accord could undermine Microsoft's near total control of the market for operating systems." The *Boston Globe*'s headline was equally enthusiastic: "Microsoft Accord to Create Competition in US, Europe."

Indeed, the consent decree sounds at first as if it should cramp Microsoft's style, and lead to more competition in PC software. For years, Microsoft has provided PC hardware manufacturers (original equipment manufacturers, or OEMs) with per-processor licenses to MS-DOS and Windows, in which the vendor pays Microsoft based on the number of machines it think it will ship, rather than the number of copies of DOS or Windows it actually uses. In 1993, such per-processor agreements accounted for about 60 percent of MS-DOS OEM sales, and 43 percent of Windows OEM sales.

According to the DoJ, "Microsoft's per processor contracts penalize OEMs, during the life of the contract, for installing a non-Microsoft operating system. OEMs that have signed per processor contracts with Microsoft are deterred from using competitive alternatives to Microsoft operating systems." The consent decree put an immediate stop to this practice, leading to the hope that non-Microsoft operating systems would now have a shot at the desktop.

But the morning after, nearly everyone realized that, in fact, *U.S. v. Microsoft* is a victory for Microsoft. Directly contradicting the previous day's headline, a *New York Times* (July 18) news analysis by John Markoff spoke of "Microsoft's Barely Limited Future": "Rather than reining in the Microsoft Corporation, the consent decree... frees the company to define the computer industry's ground rules through the rest of the decade." The *Wall Street Journal* had a similar take: "A Winning Deal: Microsoft Will Remain Dominant Despite Pact In Antitrust Dispute." According to the *Journal*, Gates "has just won big again, this time by letting the Justice Department rake in a small pot while his company retains the power to dominate the nation's desktops."

In the first day of trading after the settlement, Wall Street made its statement on the consent decree: Microsoft stock rose $1.87, to $50.50. Rick Sherlund, an analyst for Goldman Sachs, stated that with the settlement, Microsoft "should dominate the market for desktop software for the next 10 years." Another frequently quoted analyst, Richard Shaffer, announced that "The operating system wars are over—Microsoft is the winner.... Microsoft is the Standard Oil of its day."

But how could a *ban* on an important Microsoft trade practice be viewed as cementing Microsoft's hold on the industry?

First, to achieve the DoJ's goals, the change from per-processor to per-copy licensing probably comes about four years too late. Despite some brave words from IBM and Novell after the consent decree, it seems unlikely that the change will lead to a larger presence for OS/2 or Novell DOS. As a spokesman for Compaq (which *already* offers OS/2 to its customers) noted, "Windows is the standard—not much will change."

Nor does the consent decree address the key questions about Microsoft's role in the PC software industry. Companies such as Lotus and Borland that compete with Microsoft in application areas such as word processors and spreadsheets have long asserted that Microsoft "leverages" its control of the operating system to benefit its applications—particularly the Microsoft Office "suite," which bundles together Microsoft Word, Excel, Access, Mail, and PowerPoint—at the expense of applications and suites from other vendors.

Grabbing the Whole Pie

More and more, Microsoft's applications seem like part of the operating system. Many PCs today come, not only with MS-DOS and Windows preinstalled on the hard disk, but also with Microsoft Office. The forthcoming "Chicago" release of Windows will include numerous features once considered the province of third-party applications developers. Microsoft not only has a near-monopoly on the operating system, but is constantly expanding the definition of what belongs in the operating system.

Some commentators see these increasing ties, and the DoJ's apparent refusal to touch them, as a *good* thing. For example, Steward Alsop was quoted in the *New York Times* (July 18) as saying, "If you really care about improving the personal computer, you want Microsoft to take over all the pieces of the pie."

There is a certain logic in this. For example, one reason the Apple Macintosh was for so long far easier to use than a PC was that Apple had a closed architecture and completely dominated the market, guaranteeing that almost everything came from a single vendor. Monopoly has some clear benefits. In certain situations, such as public utilities, monopoly may be the only viable industry structure, leading to a so-called "natural monopoly."

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Interestingly, the superb biography *Gates*, by Stephen Manes and Paul Andrews (Doubleday, 1993), quotes a 1981 statement by Microsoft chairman Bill Gates where he noted that volume and standards in PC software can lead to a "natural monopoly." But companies in such a favored position usually are forced to make an important trade-off: so-called natural monopolies are generally regulated, are prevented from expanding their monopoly into new areas, and so on.

Microsoft continues to deny that it monopolizes the PC software industry

Microsoft already has MS-DOS installed on about 120 million PCs in the world, and Windows on about 50 million. With the DoJ consent decree, Microsoft can move even more rapidly toward its goal of becoming an unregulated, nonpublic utility providing total, one-stop shopping for all your software needs.

Exposing Microsoft's Monopoly

Microsoft continues to deny that it monopolizes the PC software industry. Nor has it admitted to any guilt by consenting to the court's final judgment. The consent is explicitly "without trial or adjudication of any issue of fact or law; and without this Final Judgment constituting any evidence or admission by any party with respect to any issue of fact or law."

Nonetheless, the PC software industry has been treated to some puzzling denunciations of Microsoft trade practices from high government officials. After the signing of the consent decree, U.S. Attorney General Janet Reno said, "Microsoft's unfair contracting practices have denied other U.S. companies a fair chance to compete, deprived consumers of an effective choice among competing PC operating systems, and slowed innovation."

The Assistant Attorney General for Antitrust, Anne Bingaman, noted that "Microsoft is an American success story but there is no excuse for any company to try to cement its success through unlawful means, as Microsoft has done with its contracting practices."

"Microsoft has used its monopoly power, in effect, to levy a 'tax' on PC manufacturers who would otherwise like to offer an alternative system," said Bingaman. "As a result, the ability of rival operating systems to compete has been impeded, innovation has been slowed and consumer choices have been limited." According to a DoJ press release, Bingaman noted that Microsoft has maintained the price of its operating systems even while the price of other components has fallen dramatically, and that, since 1988, Microsoft's share of the market has never dropped below 70 percent.

The Road Not Taken

No matter what else it says, the fact remains that the consent decree addresses only a narrow issue: OEM sales represent less than 25 percent of Microsoft revenue.

The complaint notes that "At least 50,000 applications now run on MS-DOS and over 5000 have been written to run on Windows. Microsoft sells a variety of its own very successful and profitable applications." But that is all it has to say about applications!

The complaint also notes that "All versions of Windows released to date require the presence of an underlying operating system, either MS-DOS or a close substitute," but says nothing about alleged tying arrangements between Windows and MS-DOS (see "Examining the Windows AARD Detection Code" *DDJ*, September 1993).

Similarly, the complaint mentions "critical information about the interfaces in the operating system that connect with applications—information which the ISVs need to write applications that run on the operating system"—yet doesn't address the issue of whether or not Microsoft unfairly withholds some critical information, trying to give its developers exclusive use of undocumented interfaces.

Likewise, the DoJ was well aware of, and quite interested in, the issues surrounding Microsoft's ownership of the vastly important DOS and Windows standards. Yet none of this is addressed in the consent decree, which ends up looking quite similar to what Microsoft probably could have got from the FTC a year ago. Even Bill Gates, who was apparently in the habit of denouncing even the mildest FTC and DoJ questions as "communistic" and "socialistic," had to admit that the final settlement was no big deal saying, after years of investigation, that "this is what they came up with" (*Wall Street Journal*, July 18).

Why So Little?

Why did the DoJ settle for so little? How could they seemingly ignore the entreaties of so many PC software vendors?

One theory is that the Clinton administration views Microsoft as a "national treasure," and put pressure on DoJ to leave Microsoft alone. The press made much of a May 25 meeting between Bill Gates and Clinton's chief economic advisor, Robert Rubin. The date is significant because just one week later, Gates testified under oath

(continued from page 144)

before the DoJ. According to one anonymous source, Gates pointed out to Rubin that Microsoft is responsible for a substantial portion of U.S. software exports (*Information Week*, June 27).

Frankly, I don't buy Clinton administration pressure as an explanation for the DoJ's limited settlement. Microsoft may be highly visible, but it simply isn't that important to the U.S. economy, at least when compared to companies such as IBM or GM that make tangible goods. Microsoft, remember, produces software. While software is a crucial part of the modern world economy, consider that even "giant" Microsoft has only about 15,000 employees and that its quarterly sales are about $1.25 billion, compared to $13.3 billion for IBM, or even $2.5 billion for Apple.

What makes Microsoft different is its incredibly low costs. This is very nice for Microsoft, but it's hard to see what it does for the U.S. economy, especially when 45 percent of Microsoft's stock is owned by insiders. Had it wanted, the DoJ could have made a moderately plausible case to the American public that Microsoft, far from being a "national treasure," is simply a grossly profitable monopolist, with few employees and few stockholders, that gives back little to the public.

Another explanation is that DoJ feared a repeat of *U.S. v. IBM*, which dragged on for 13 years, only to be dropped as "without foundation." While you could easily imagine lawyers for the DoJ not wanting to stake their careers on a losing battle, you have to wonder whether *U.S. v. IBM* was such a complete washout, after all. Even though the case was eventually dropped, for years it had a serious effect on IBM. You could even argue that it was this supposedly unsuccessful case that caused IBM to unbundle software from hardware, thereby opening the way to an independent software market, making room for software upstarts, including a company called Microsoft. In many cases, Microsoft was a beneficiary of *U.S. v. IBM*, and "the next Microsoft" could have been a beneficiary of a *U.S. v. Microsoft* case.

Ultimately, I think that the DoJ didn't push for more against Microsoft for the very simple reason that they felt they couldn't win anything else. Responding to widespread criticism of the settlement as a DoJ sell-out, Anne Bingaman protests, "folks, we looked at every aspect of this. We brought the case that was there to bring." According to the DoJ, the Microsoft settlement was "everything we could have hoped for in a fully litigated case, and possibly more."

This is probably true. Law, like politics, is an "art of the possible." While the

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	Market Share (Percent)		
	Operating Systems	Word Processors	Spreadsheets
Microsoft	66	47	52
Novell/WordPerfect	14	35	—
Lotus	—	3	37
IBM	17	—	—
Apple	2	—	—
Borland	—	—	6

Table 1: *Application-software market shares.*

(continued from page 146)
settlement gives the Microsoft steamroller the green light, at the same time it's hard to see what the DoJ could have done differently. The DoJ's job is to enforce the antitrust laws, not to make industries more competitive — and the two are not the same.

What all this means is that those Microsoft practices studied by the DoJ, but not covered in the settlement, are either not illegal, or would be too difficult to prove illegal.

Where To Now?

While there might be some private antitrust action from Novell, Lotus, or Borland, and while the terms of the settlement are subject to public review, Microsoft must be feeling emboldened by the limited scope of the consent decree. Microsoft should be able to go full-steam ahead with its plans to greatly expand the operating system's dimensions in Chicago. Microsoft Office will increasingly seem like an essential part of Windows. With policies such as its new, heavy requirements for using the "Windows Compatible" logo (see "How to Adapt an App for Chicago: Requirements for the New Windows Logo," *Microsoft Developer Network News*, July 1994), Microsoft is raising the Windows development bar ever higher.

The PC-software industry is rapidly headed in the same direction as many other technology-based industries before it: rapid consolidation to a handful of vendors. There once were hundreds of U.S. car manufacturers; now there are just a few. With Novell's acquisition of WordPerfect and parts of the Borland product line, with Symantec's acquisition of Central Point, and Microsoft's purchasing a minority share in Stac Electronics, we are already seeing the same (probably inevitable) process occurring in software. As Table 1 shows, market shares reflect an already highly concentrated industry.

More and more, Microsoft's applications seem like part of the operating system

On most scales, Microsoft is about twice the size of its two nearest competitors combined. Lotus had 4450 employees and Novell also had 4450; Microsoft has 14,450. In 1993, Lotus sales were $981 million and Novell sales were $1.123 billion; Microsoft sales were $3.753 billion.

Given that the DoJ could apparently do very little about this increasing concentration in the software industry, what are software developers and vendors to do?

It is probably stating the obvious, but there is little point in trying to compete with Microsoft over productivity apps and office suites. These are rapidly becoming a quasi part of Windows itself, and even Novell and Lotus probably have little chance in this area. Microsoft Office is everywhere and everything. Perhaps there is still some room in databases, desktop publishing, and personal-finance software.

As always, another interesting area is plugging holes in Microsoft's own offerings: add-ins to Microsoft Office, remedying the inevitable temporary problems in Chicago, and so on.

The best bet is to find areas where Microsoft doesn't have a product, and where there is a chance of a several-year window of opportunity before it does have a product. On the other hand, the only market I've ever heard of that Microsoft *didn't* want to get into was pornographic screen savers and related multimedia titles. As one company employee told me, "We looked carefully at adult software, and decided to leave that money on the table."

DDJ

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12 ON READER SERVICE CARD

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TAB 14

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

The Economist

FEBRUARY 27TH–MARCH 5TH 1993

AIR DROP ON BOSNIA pages 16 and 51

FALLIBLE JAPANESE FIRMS pages 17 and 74

AFTER MULRONEY page 41

WITHIN THE WHIRLWIND after page 58
A survey of the computer industry

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District of Columbia

Exh. 14 94-1564 SS

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THE COMPUTER INDUSTRY

Reboot system and start again

Technological change is sweeping away the established computer industry. Firms are scrambling to find their place in the new industry that will replace the old. But even for those that survive, the turmoil will continue. David Manasian reports

FOR three decades the computer industry seemed to epitomise the marriage of technological wizardry and business acumen. Led by IBM, the industry masterfully exploited a pace of technological change that would have left managers in most other industries gasping. It grew through boom and bust, and revolutionised the way nearly all other businesses worked. Best of all, it consistently made enormous profits.

Computer executives saw themselves as both innovators and adventurers. Some pioneered new ways to manage armies of highly educated, independently minded employees. A few left the security and prestige of a corporate career, or went straight from the university classroom, to start companies from scratch. Naturally some computer firms failed. But the industry as a whole was largely immune to the travails that periodically beset more mundane businesses. For many people, computers were the quintessential industry of tomorrow.

Tomorrow has arrived and it is not a pretty sight. For the past two years the computer industry has been in turmoil: plummeting profits, flat sales, tens of thousands of jobs lost, vicious price wars. The industry's reversal of fortune has been so abrupt that it has left many of its leading companies floundering.

IBM, the biggest computer maker and long one of the most successful companies in the world, lost $4.9 billion in 1992, one of the biggest corporate losses in history. In January John Akers, its boss, resigned. Last year the company shed 40,000 of its 340,000 employees in an effort to control costs (which still look hopelessly bloated). Its stockmarket value is now about the same as Microsoft, a firm which employs only 12,000 people. And the once-mighty Big Blue is not alone. DEC, the world's second-biggest computer firm, ousted its founder and chairman in 1992 and lost a whopping $2.8 billion. Olivetti, Siemens-Nixdorf, Groupe Bull, Fujitsu, Hitachi and NEC have all seen profits collapse over the past two years. Wang, a high flier until the early 1980s, ended up in a bankruptcy court.

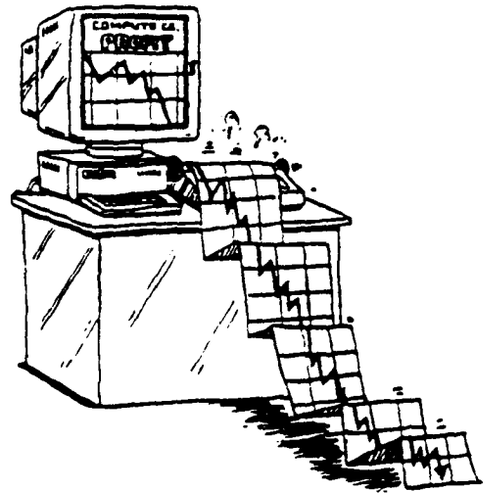
Clearly computers are no longer recession-proof. But global recession is not the only, or even the primary, cause for the industry's recent tribulations. Recession has simply accelerated changes that have been reshaping the industry anyway. Until the mid-1980s the computer business was dominated by a handful of large firms—foremost among them IBM—whose marketing and technological prowess let them educate, reassure and control the corporate customers who bought most computers. Smaller companies often introduced the latest technology to the market; but usually their innovations were not widely accepted until they got the imprimatur of Big Blue. These smaller firms seldom posed much of a threat.

The invention of the personal computer (PC) in the late 1970s brought in a motley collection of brash, new firms. At first the growing popularity of PCs had little effect on the fortunes of the industry's leading firms. Indeed, IBM itself became the world's biggest manufacturer of PCs, and its marketing clout helped their sales to soar. For 20 years IBM had skilfully coped with technological advances that appeared to be far more radical, or disruptive, than the personal computer. Few people inside or outside the company thought that these relatively tiny and rather simple machines were much of a threat to IBM's hegemony or to the stability of the industry as a whole.

Getting personal

They were spectacularly wrong. In the past few years, personal computers and the microprocessor chips on which they are based have upturned the economics of the business. This has happened so quickly that many computer executives are bewildered. Their industry has become one of confusing extremes. In any large industry the fortunes of different firms will vary. But in today's computer industry the differences are stark.

While many computer firms sacked thousands of workers and lost huge amounts of money last year, others thrived despite price wars and recession. On the day in August 1992 that Wang filed for chapter-11 bankruptcy, Dell, a personal-computer maker, reported quarterly sales up 129% and net profits up 77%. In 1992 some companies, such as Apple and Compaq, which looked doomed because of the price wars ravaging the PC market, staged stunning comebacks (though they too had to cut jobs and other costs). Price-cutting spread from hardware to software. And yet profits at Microsoft, the world's biggest personal-computer software company, leapt 53%. The computer business still boasts many of the world's fastest-growing and most profitable firms. But it now has some of the



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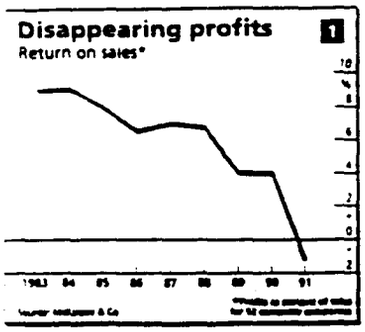
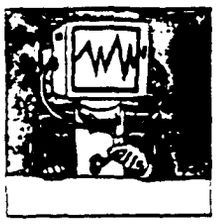


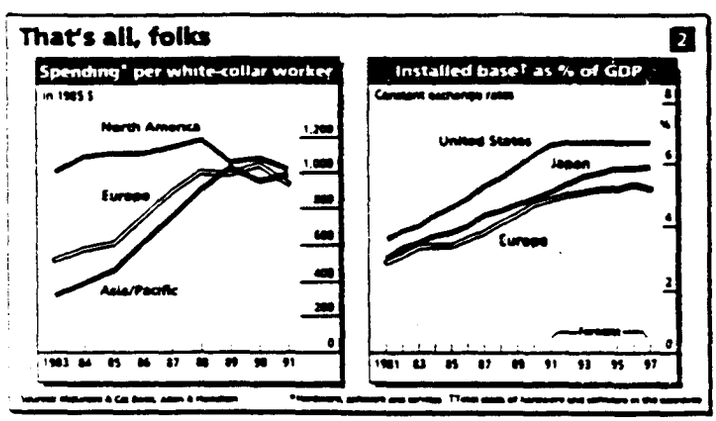


world's biggest loss-makers too.

Today's industry offers other remarkable contrasts. Despite the fact that its overall profitability has fallen so sharply (see chart 1), hordes of new competitors continue to enter almost every part of it. And far from slowing the pace of innovation, as might be expected, hard times seem to have quickened it. An unprecedented number of new products came to market last year. This stream is about to become a flood. With chip technology improving faster than ever, a plethora of new products will reach the market over the next few years: pen-based PCs, hand-held computing and communication devices, ever more powerful versions of today's desktop and notebook computers, sophisticated network and database software, cheaper and fancier supercomputers.

Moreover, a growing part of the computer market shows many of the classic characteristics of a commodity business: there are few discernible differences between products except price, low barriers to entry and razor-thin profit margins. This is a novelty for such a high-tech, inventive business. The large amount of intellectual property contained in computer products, and their complexity, ought to make it easy for companies to keep out new rivals, differentiate their products and command fat margins. Instead, even in many esoteric niches of the industry, growing competition is eroding margins.

Equally remarkable is the web of collaborative deals that spans the industry. As competition has become fiercer, the number of joint ventures, alliances and marketing agreements has multiplied rapidly, although this has done nothing to soothe the growing ferocity of competition. Nearly every firm, whether small or large, now has a variety of ties with dozens of others. Confusingly, many alliances seem designed to compete with other alliances containing some of the same firms, as companies place multiple bets on new technologies or market trends. Although these agreements are often between companies with complementary products, many are between once-bitter rivals, such as Apple and IBM, who stress that their collaboration does not rule out tough competition between them now or in the future.



Perhaps one of the most puzzling things about the computer industry is that, for all its vitality, its glory days of high growth and gushing profits are probably over. In a recent report on the industry, McKinsey, a management-consulting firm, predicts that the industry's sales will grow by 6% or less a year—scarcely more than the nominal growth rate for the world economy as a whole. "Just surviving will be a struggle and even many of today's healthy companies could become extinct," says Michael Nevens, one of the report's authors. Others agree with this gloomy assessment. IBM predicts that software and services will grow at some 11-13% a year between now and 1997; but sales of hardware will lag well behind economic growth.

Evangelical fervour

One reason is that the cost of computing power continues to drop by 30% or more a year, because of advances in chip technology that show no signs of slowing. This inexorable improvement has now begun to outstrip the demand for more computing power from customers. Another reason for slow growth is that, with more than $300 billion in sales, the computer industry is now so large that it probably cannot expect to capture a much bigger chunk of corporate or consumer spending. Most businesses, laboratories and classrooms already have some type of computer. Many are crammed with them. Because of the rocketing popularity of notebook and laptop computers, so are many briefcases.

A barrage of new products will be needed just to keep spending at current levels. In fact, the amount spent on computers per white-collar worker (the biggest users of computers) has been flat in America since 1983, and has recently levelled off in Europe and Asia as well (see chart 2). The total stock of hardware and software in developed economies is also set to level off in the next few years, according to many forecasters.

Even if the industry must learn to live with humdrum growth, there will be nothing dull about the computer business itself. This survey will spend little time on the myriad ways computers are used or how they are changing lives. Instead it will try to examine the peculiar economics of computers, and to make sense of the blizzard of news the industry generates every day. Why does it present so many conundrums? And why has no shakeout yet ended what, compared with most other large industries, looks like intolerable instability?

The growing number of competitors and the pace of technological change are raising the level of uncertainty, for both computer firms and their customers. As a result, the bosses of most computer companies are no longer the smug technologists or buttoned-down managers of a decade ago. They are preachers fervently trying to sway customers, suppliers, investors, employees—and often themselves—with their vision of the future. One of the industry's favourite verbs is to "evangelicise." This is an odd choice for sober-suited managers carefully investing billions of dollars. But it is all too appropriate to the opportunists or true believers now best equipped to survive in the computer business.

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Personal best

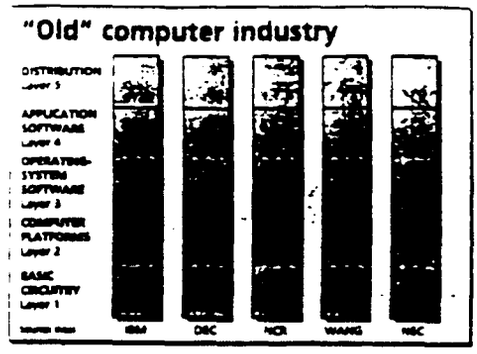
TO UNDERSTAND how drastically those little personal computers have changed the industry, and why they have suddenly left it in such a fragmented state, a little history is needed. Until the late 1970s, nearly all computers were large machines used to grind through mind-numbing calculations and routine book-keeping chores. Computers were especially useful in making the administration of large organisations more efficient. Outside laboratories, they were bought in the greatest numbers by large companies, which could afford to pay their hefty prices and to employ the professional programmers and technicians needed to keep the temperamental machines from breaking down.

Machines came in various sizes, the two broadest categories being mainframes and minicomputers. Both types could have several users at once, who sat at terminals to put data into the machines or to take it out. Mainframes soon stood at the heart of most of the world's biggest companies. Smaller and less expensive (though still quite pricey) minicomputers were often used by the divisions of the same firms, or by medium-sized firms which could not justify spending enough to buy a mainframe.

IBM bestrode the industry, accounting in 1980 for 38% of the industry's revenues and 60% of its profits. Even if IBM had not become such a dominant firm, a small group of large firms would probably have controlled the industry in any case. There are two reasons for believing this. First, computers were the most complicated machines ever made. In fact, they were so complicated that even individual machines were called "systems". And second, though the industry was large in revenue terms, relatively few machines were sold each year. As recently as 1980, fewer than 10,000 mainframes and 105,000 minicomputers were sold worldwide each year. Such volumes are significant for suppliers of capital equipment, but they are minuscule compared with those of the car or other consumer industries. Customers were reluctant to buy these cranky machines from anyone but large, established suppliers. So newcomers had a hard time breaking into the business.

The complexity of computers produced another crucial characteristic of the industry: it virtually ensured that computer makers would opt for vertical integration—that is, to make most of the parts of the machines themselves, with the software to run them, rather than buying parts from outside suppliers, and to do most of their own marketing, distribution, sales and service as well. A few of the smaller firms could not manage this. They either specialised in supplying pieces of equipment, such as terminals, tape drives or printers, which were attached to computers, or they bought what they could from outside suppliers. This put them at a huge disadvantage, for the simple reason that there were so few independent suppliers for the many components needed to build a computer. So the big computer firms built their own machines from the ground up.

The resulting structure of the industry looked



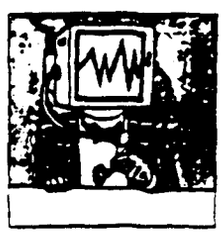
Days of yore, when IBM was king

something like the diagram above. Customers cared little about the various layers identified in this diagram, because they almost always bought all the layers in a single package from one supplier. It is useful to pause here to define these terms, because they will loom large later on.

Basic circuitry refers to the thousands of wires, transistors and other electronic bits which were in all computers. In the 1970s and 1980s most of these bits and bobs were gradually replaced with integrated circuits printed onto small pieces of silicon—ie, microchips. This allowed some specialised chip firms, such as Intel, Motorola and Texas Instruments, to become parts suppliers to computer makers. But many of the biggest computer makers, most notably IBM and Japan's Fujitsu, NEC and Hitachi, made their own chips.

Computer platforms refers to the assembled machines. These were useless without **operating-system software**, the programs needed to make the machines do anything but hum. Once the operating system enabled the machine to respond to various commands, **application software** told the machine what to do: compile the payroll, store data, solve abstruse equations, perform word-processing or whatever. Several applications usually ran on the same computer. As the diagram shows, firms did most of their own **distribution**, although some machines were sold through computer-leasing firms or "systems integrators".

One more point must be made: all computer makers used "proprietary" standards both to build their hardware and write their software. Except for a few firms which tried to mimic IBM's standards, no firm's software worked with any other firm's software, or ran on any other firm's machine. This locked customers into a single computer supplier. As a customer's investment in computers grew, the more dependent on his supplier he became. The cost of scrapping all of a firm's existing hardware or application software (which big firms sometimes wrote themselves) to switch to another supplier became prohibitive. Occasionally a customer became restless, especially if a supplier was charging too much, fell too far behind the rest of the industry technologically or failed to service his machines properly. A few small, specialised firms sprang up to engineer so-called "gateways", bits of hardware



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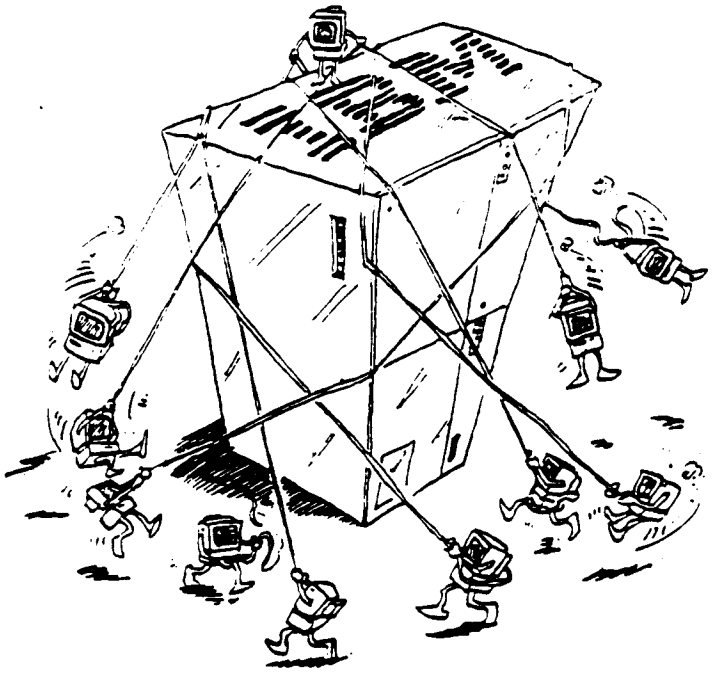


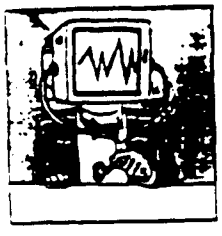
and software that would allow machines from different companies to work together.

For the most part, though, customers had to commit the bulk of their spending on computers to a single supplier. The safest thing to do for anyone who had to make this purchasing decision—in big companies usually the data-processing manager—was to buy from the biggest supplier, no matter what the cost. And that, by a long way, was IBM.

Chips with everything

From its inception, the personal-computer market assumed a different pattern from the established industry. PCs became possible only because chip manufacturers had managed to cram a simple version of a computer's central processing unit, the circuits that did most of the actual computing, on to a single chip. Appropriately, this was called a microprocessor. Around a single microprocessor, a small, cheap machine could be assembled from readily available parts used to supply the consumer-electronics industry. So most personal-computer makers were never vertically integrated. Separate groups of firms supplied parts, fully assembled machines (platforms), operating-system software and application software.

Personal computers were primitive compared with mainframes and minicomputers. But they could perform simple tasks such as word processing, keeping mailing lists or playing games, and they proved surprisingly popular. To grab some of the revenue from this small but burgeoning market, IBM launched its own PC in 1981. Because it wanted to do this quickly, it assembled its machine from off-the-shelf components made by firms which were also supplying other PC makers. It arranged to buy the two most important parts of the machine—the microprocessor and the operating-system software—from (respectively) Intel and a small Seattle-based company called Microsoft.

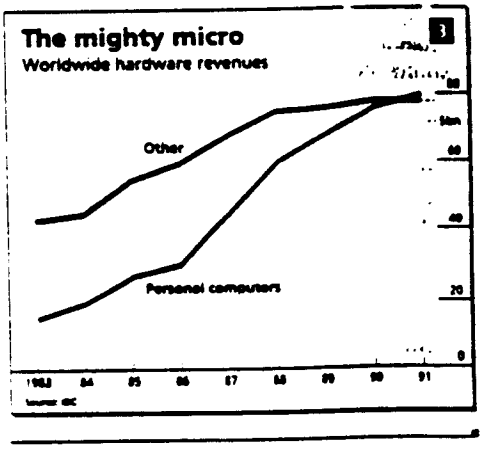


With IBM's backing, personal-computer sales skyrocketed. At first this was great news for IBM, which had the lion's share of sales and considered PC revenues simply a welcome supplement to its mainstream computer business. Thousands of small software companies began writing application programs for IBM's machines, boosting demand for them still further.

Still, from several points of view IBM had badly miscalculated. Buying the key parts of its machines from Intel and Microsoft, without demanding any kind of exclusive deal, effectively left control of the technical standards in these companies' hands. Scores of other firms, many of them new ones such as Compaq, quickly learnt to "clone" copies of IBM's machines using Intel chips and Microsoft's MS-DOS operating system. Their machines also ran all the software written for IBM's machines. To the user, therefore, there was no real difference between them. Users began buying the machines primarily on the basis of price. As demand for the machines took off (see chart 3), hundreds of small, low-cost producers jumped into the market. Prices began to collapse, even while the growing power of microprocessors rapidly boosted the capabilities of PCs.

Until the mid-1980s, many PCs were sold to customers—individuals, schools, small businesses, professional firms—who would never have been reached by IBM or other established computer makers. But when big corporate customers began tying the most powerful PCs together into networks as alternatives to minicomputers and mainframes, IBM became alarmed. In 1987 it belatedly tried to gain control of the personal-computer market with new models containing a patented technology called Microchannel, which rivals could not copy and which made IBM's machines incompatible with everyone else's. Competitors aptly dubbed these machines "clone killers". But by then it was too late. The PC market had slipped beyond IBM's grasp and the Microchannel machines flopped. Big Blue, like any other manufacturer, had to make its machines fit the industry's standards. Those were now set by millions of personal-computer users and owned by Intel and Microsoft.

In only a few years, before IBM or the other established computer makers had realised what was happening, an entirely new computer industry had grown up next to the old one.



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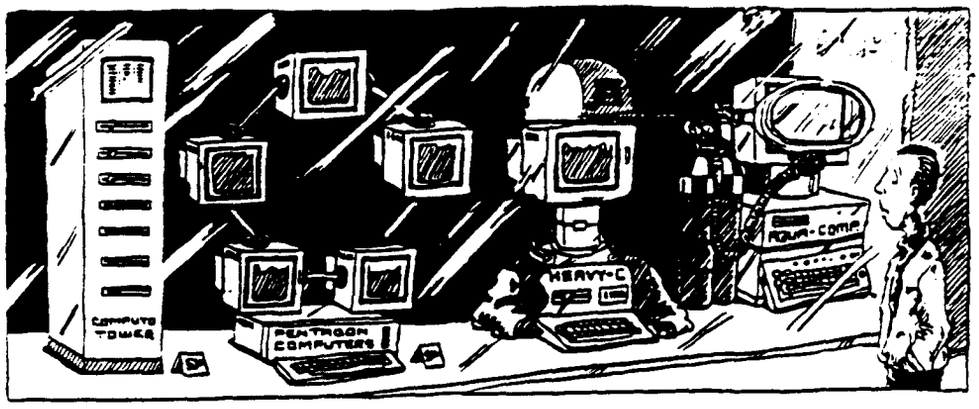
Harsh new world



Today all firms need a niche

THE companies which made a comfortable living for so long in the old computer industry face a challenge rather like switching from making battleships to rowing-boats in just a few years. Almost every defining feature of the old industry has been reversed in the new one. Instead of selling thousands of expensive machines to an easily identifiable set of corporate and institutional customers, the new industry sells tens of millions of cheap machines each year to individuals, businesses of any size and shape, and every type of organisation imaginable. Unlike mainframes or minicomputers, personal computers need little maintenance. And most of their software can be bought off-the-shelf, like a can of beans, rather than custom-designed for each user by teams of expert programmers. As a result, even in large corporations the computer-purchasing decisions are now made by hundreds of people with little technical knowledge, instead of just one or two computer nerds.

Instead of the proprietary hardware and operating-system software of the old industry, "open" standards now prevail. These permit the products of a growing number of computer firms to work together, which has opened the door to thousands of new firms that now compete at every link of the "value chain", from chips to distribution. Peter Shavoir, IBM's chief business strategist, estimates that 2,500 firms took some part in the computer industry of 1965, but that 50,000 jostle for business now. Most of the new ones entered the industry in the 1980s along with the personal computer.

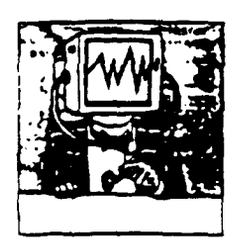
Despite this upheaval, the old computer industry will survive for some time yet. And mainframes, in particular, may never entirely disappear. Large organisations will need to process huge mountains of data quickly and store it securely in a single, central machine for a long time to come. "Some customers will always require robust, bullet-proof, bet-your-business kind of applications. These really do belong on a mainframe," argues Nick Donofrio, head of IBM's mainframe unit.

However, sales of such big machines are shrinking. Networking, the fastest-growing segment of the new computer industry, strikes at the heart of the old. At first PCs were strung together in networks to allow the users of individual machines to send information to one another. In the industry's jargon this is known as "peer-to-peer" computing. Some peer-to-peer users no longer needed to be connected to a larger computer to communicate.

More ominously for the makers of big machines, the hottest trend in the industry is now the much more sophisticated "client-server" network. In this type of network, a large number of personal computers ("clients") are connected to a central personal computer ("the server") which, at a fraction of the cost, does many of the things a minicomputer or mainframe once did, such as storing data, managing the flow of information between users and enabling them to work on the same documents. Many of these networks are built around a powerful type of personal computer called a workstation, based on a microprocessor called a RISC chip. Pioneered by Sun Microsystems, workstations were first used by engineers. Now they are being used by businesses for a variety of tasks and have become one of the fastest growing, and most fiercely contested, parts of the computer market.

The rapid growth of client-server networks is eliminating the need for big computers in many organisations. Companies like IBM and DEC, which sell big machines, reply that in many cases big machines themselves will function as the server for a host of "client" PCs. Nevertheless, with spending on hardware unlikely to grow, some class of machine must suffer, and higher-cost mainframes and minicomputers seem the most likely losers.

Even if demand for big machines holds up longer than expected, the creation of the new computer industry has wreaked havoc with the economics of the old. Spoilt by the convenience, choice and ever-falling prices offered by personal computers, buyers have demanded the same low maintenance, open standards and price reductions from large machines. The growing use of microprocessors in mainframes and minicomputers has enabled the old-style computer makers to provide some of what their customers want. But this has also left them adrift with armies of surplus salesmen, service staff and factory workers, which accounts for the thousands of layoffs in the past year.



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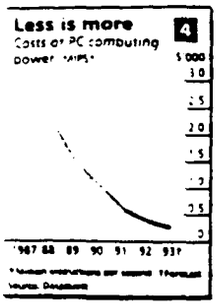
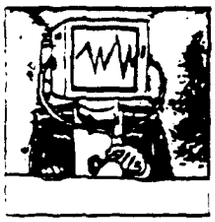




If microprocessor technology continues to advance as rapidly as it has done in the past (see chart 4)—and everyone in the industry expects it to do so—by the end of the 1990s even *mainframes* could be the size of PCs. They might be just as cheap too.

Well before that happens, it is likely that the new industry will have swallowed the old one. Because it represents the future, and is already where most of the action takes place, the rest of this survey will concentrate on the new computer industry and refer to the old only in passing.

Horizontal desires

Discerning a clear structure in the new industry is hard, but the diagram below is one attempt to do it. Like any such diagram, it is a simplification; technology and competition could soon change it. And yet it is a useful guide to the industry today, so will be used as the map for the rest of this survey.

Begin by comparing it with the much simpler diagram on page 9 of the old computer industry. The most striking thing is that the new industry is a series of horizontal layers, each containing many companies, rather than the vertical, single-company towers of the old industry. Each layer represents a distinct market. The barriers to entry for new firms vary from layer to layer; but in no layer are they as high as they were for the old computer industry as a whole, in which any new firm hoping to challenge the established computer companies head-on had to build an entire vertical tower of its own. As a result, competition in every layer of the new industry is much fiercer than it ever was in the old. This explains why profits for the entire industry have dropped since 1986.

The diagram is borrowed from Andy Grove, the boss of a successful American chip maker, Intel. It is easy to see why he is fond of it. "For us, who deal in the fundamental technology, it's wonderful," he says. Intel's dominance of the microprocessor level (layer 1) is matched only by Microsoft's hegemony in the client/stand-alone operating-system software level (layer 3) two steps above. Barriers to entry in both these layers are relatively high, because Intel and Microsoft have established *de facto* industry standards with their products. Supplanting them would be hard but (more on this shortly) neither Intel nor Microsoft is unassailable.

Layer 2, computer platforms, includes assembled personal computers of every size and shape—desktops, workstations, laptops and notebooks. Largely because Intel's dominance of microprocessors has established an industry standard in this layer, barriers to entry are minimal. Any technician who can buy Intel, or Intel-standard, chips (and Intel sells to anyone) can bolt together a respectable desktop PC from readily available components. So, predictably, this layer is where competition is fiercest. The continual newspaper and television advertising of computers which most people see, and the brutal price war which has captured so much attention in the business press over the past two years, come from firms competing in this layer.

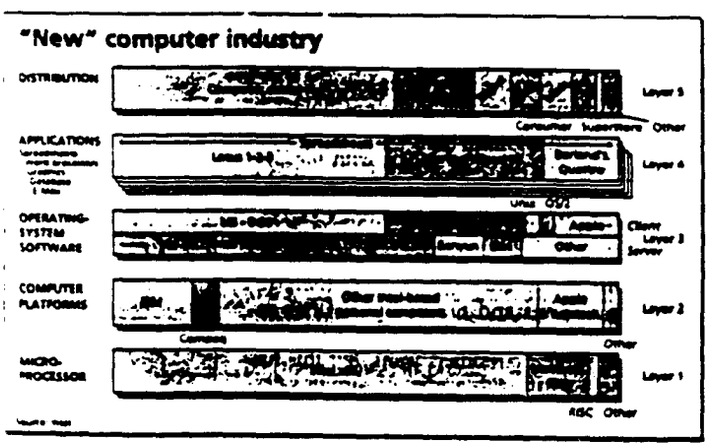
The next layer, operating-system software, is divided between the basic software needed to operate the central server of a network and the software needed to run client machines in the same network or stand-alone PCs. The top half of the layer is much bigger than the bottom half—some 90m machines run these operating systems compared with just a few million functioning as servers. But the bottom layer is growing fast and is highly profitable. For the purposes of this diagram, their relative sizes are not relevant and so they are shown as equivalent.

Layer 4, applications software, is the arena in which Microsoft, Lotus, WordPerfect, and Borland battle for market share. This layer projects into a third dimension because a few of the biggest application categories—spreadsheets, word processing, database management and graphics—are distinct markets in themselves, although all fit into the layer. Barriers to entry for any new firm hoping to grab business in one of these categories are somewhat higher than in computer platforms, because writing such complicated programs is time-consuming and expensive. The need for a strong brand name, and the ability to market and distribute such general-purpose software packages also act as barriers to newcomers. But tens of thousands of small firms compete in the application layer outside these areas with specialised software packages.

The layer above that is probably the most competitive of all, as firms scramble to find the most efficient way to reach customers with machines and software. In recent years, some of the industry's biggest winners and losers have been here. Dell grew from nothing in 1984 to just over $2 billion in sales in 1992 because it invented a new, lower-cost way to distribute personal computers: mail order sales backed by telephone hot-lines offering technical advice. The barriers to entry in this layer are low. Dell already has a host of imitators snapping at its heels, though this has yet to slow the firm.

Parts of the industry are left out of this map. They include memory chips, which work with microprocessors, and other components such as disk drives; peripherals such as printers and modems, and services, a fast-growing part of the industry. Services come in various forms: "outsourcing" (performing all the data-processing chores for a corporate or institutional customer); consulting (advising customers on how to reorganise their businesses to take advantage of computers); and systems integration (making a customer's computers work together).

One reason why such services are growing so quickly is that big corporate customers are confused by all the products being offered by the new



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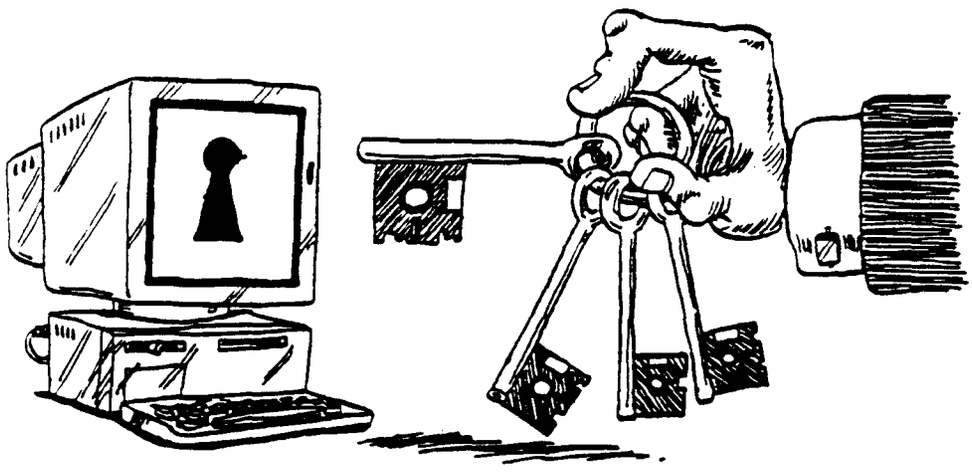
computer industry. Every large company from the old computer industry—IBM, DEC, Bull, Unisys and others—is now hoping to win much of the service business by exploiting the large marketing and service operations which they built to support the sale of their large machines.

Although memories, peripherals and services are sizable and growing segments of the computer industry, they are supplements to its core, represented in the diagram, where most of the strategic choices must be made and the technology is moving fastest. This is where the industry's crucial competitive battles are being fought, and where firms will emerge as either victors or victims.

Do it my way



THE noisiest of those competitive battles will be about standards. The eyes of most sane people tend to glaze over at the very mention of technical standards. But in the computer industry, new standards can be the source of enormous wealth, or the death of corporate empires. With so much at stake, standards arouse violent passions. Much of the propaganda pumped out by individual firms is aimed at convincing customers and other firms that their product has become a "standard".

It is for the customer's sake that standards matter. All industries need them, simply because so many things made by different companies must fit together to be of any use. Standards can either be a set of specifications and practices, or they can be embodied in a single product. Without some standards or other, no new industry can get off the ground. In its first two decades, the car industry fought fiercely over standards for everything from the size of nuts and bolts to whether vehicles would have steering wheels or boat-like tillers. Eventually, car makers managed to establish standards for enough key features and components to reach a mass market. But even in today's car industry, not everything is standardised, as anyone who has fumbled with the controls of an unfamiliar rental car will know.

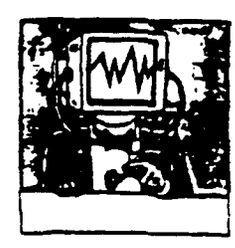
The world is full of standards that are entirely neutral, belong to nobody and simply make life easier (sliced bread fits most toasters). But standards, and who owns them, have always been a critical competitive issue in the computer industry.

In the old industry, standards were mostly set, and owned, by vertically integrated manufacturers and used to lock in customers and lock out competitors. By contrast, the new computer industry has rejected, at least rhetorically, such proprietary standards in favour of "open" standards to which all firms have access. Customers like open standards so much that they have insisted the old computer industry adopt them as well. Mainframe and minicomputer makers now declare themselves keen advocates of openness, although most of their products still do not connect easily to those of rivals.

Every firm wants a monopoly—and every firm wants to call it an open standard

Once established, open standards offer what economists call "network economies", which can entrench standards even when they are not the best available or abreast of the latest technology. In the case of personal computers, such network economies were enormous. Customers had strong reasons to buy machines built to the standard because they felt confident that large amounts of software would be available to run on them, and that most other machines would be compatible. Conversely, even tiny software firms suddenly had what promised to be a huge market at which to aim. Firms like Lotus, WordPerfect and Borland racked up hundreds of millions of dollars-worth of sales from a single hit product. A "virtuous cycle" had been created. As more software was written for IBM-compatible personal computers, more people wanted these machines. As more machines were sold, demand for software increased.

And yet open standards represent a trade-off for both computer firms and their customers. If the standard is embodied in a component that contains much of the value of the finished product—as it was in Intel's microprocessor—firms which use that component can find it difficult to differentiate their products without violating the standard. The



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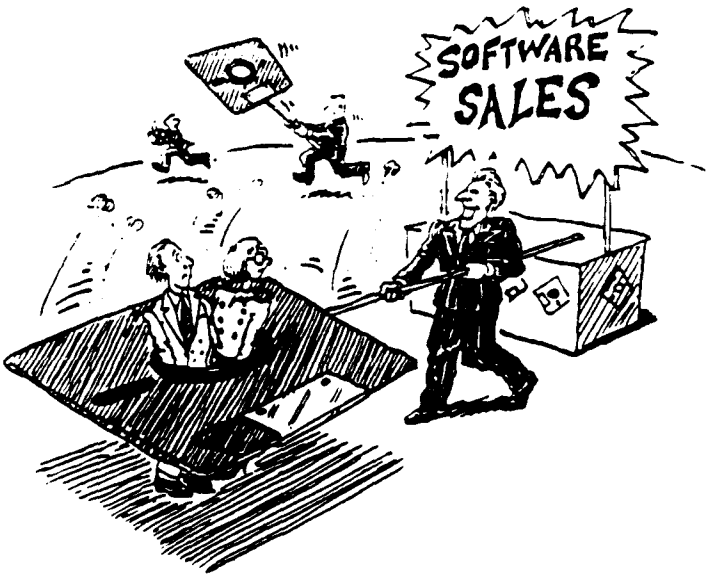
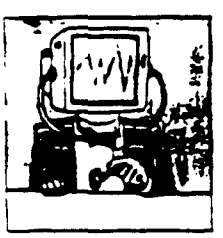


result in personal computers has been brutal price competition. And any standard, open or not, eventually becomes an obstacle to technological progress. With both microprocessor and software technology changing so rapidly, this conflict is especially acute in the computer industry. As a result, even agreed standards tend to be undermined by new technologies within a few years, compelling companies to pay the high costs of abandoning the old standard, and sparking a struggle among firms to establish a new one.

Open standards have become the religion of the new computer industry, to which everyone pays obeisance, so perhaps it is not surprising that schismatic wars have broken out over the meaning of the term. All firms now claim that their products are open, but that those of their competitors are not. "The eskimos have 21 words for snow. These guys need 21 words for 'open'," says Tim Bresnahan, an economist at Stanford University. Generally there are two ways to set open standards: through negotiations by several firms or by the adoption of a standard established by a single firm.

There have been repeated efforts to establish multi-firm standards, especially for operating-system software. Most of these have been based around an operating system first developed by AT&T called Unix, different versions of which can run on every size of machine from mainframes to personal computers. AT&T pledged to license the basic programming code of Unix to any other company at minimal cost. But most multi-firm efforts have failed for the simple reason that the participating firms cannot trust each other. There are now many rival versions of Unix sponsored by various firms from IBM to Sun Microsystems, all of which are, to a significant degree, incompatible with one another, although all are promoted as open.



Standard-bearers

In fact, widespread adoption of a single firm's product is the only way truly open standards have been established in the new computer industry. "The irony of open standards is that they have to be based on a monopoly, which then earns enormous amounts of money for whatever firm owns it," observes Todd Hixon, a technology analyst with the Boston Consulting Group. The most famous—some industry executives would say infamous—example is Microsoft's MS-DOS operating-system software, which now runs on 80m PCs.

Any firm in Microsoft's position has to make some difficult decisions. Owning a standard product is like possessing any monopoly: it is worthless unless a firm can derive income from it. But if a firm charges too much, other firms will rebel, and either try to copy the product or pay the cost of switching to another as a standard. Microsoft has played this delicate game with consummate skill. It has charged too little for MS-DOS to spark much rebellion, while assiduously encouraging other software firms to write application programmes which run on it. As the power of microprocessors grew, the company was also careful to develop new versions which took advantage of the new chips, but which were compatible with all earlier versions, so that users never had to scrap all their old software when they bought a new personal computer. Today nearly all PCs, except workstations and Apple's machines (which use Apple's proprietary operating system), come with MS-DOS already installed. Nevertheless, even MS-DOS's days are numbered, because of technological advances.

Every firm in the computer industry, no matter what layer it competes in, now dreams of repeating Microsoft's triumph. "Even as late as 1988 no one in the industry really understood how lucrative owning a standard could be," says David Yoffie, a professor at Harvard Business School and a board member at Intel. "Now everyone sees it. As a result no one is willing to let another company establish it. That is what makes the prospects for profitability so problematic in this industry."

A huge battle is shaping up in operating-system software. Microsoft has a big lead with a product called Windows, which runs on MS-DOS machines and mimics the easy point-and-click icons of Apple's computers. It has already sold more than 20m copies. But IBM is heavily promoting OS/2, its rival to Windows. In network operating-systems, which run on the machines at the centre of client-server networks, Novell has scored a success similar to Microsoft's. Its Netware has become the standard.

Netware's dominance is unlikely to last a decade, as Microsoft's MS-DOS has done. By the middle of next year, Microsoft has promised to launch a product called Windows NT (for "new technology") to compete with Netware. Meanwhile Taligent, a joint venture established by Apple and IBM, is also working on an operating system that will run both on networks and on stand-alone machines. And many people in the industry believe that some version of Unix will ultimately prevail. In December Novell bought Unix Systems Laboratories from AT&T and 11 minority shareholders, with the obvious intent of making Unix an alternative standard to whatever is offered by Microsoft.

The battle over operating systems will produce the most spectacular fireworks over the next few years. Nonetheless, scores of similar struggles to establish and control "open" standards are occurring in every corner of the computer industry.

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Decisions, decisions

MANAGING any business, from a fruit stall to an oil company, is a complicated task. Demand and price go up and down, competitors disrupt the most carefully laid plans, interest rates fluctuate, laws change, employees blunder. The list of possible calamities is long, that of opportunities lamentably short. And yet for most businesses the rules of the game, and so the types of calamities or opportunities to be faced, stay much the same for years, or even decades, at a time.

For computer companies, the rules of the game itself keep changing, which multiplies all the normal complexities and risks of running any firm. There are a number of reasons for this. First, the basic technologies of the computer business—microprocessors, memory chips, screens and software—continue to change quickly, creating new products and altering both the capabilities and pricing of existing products in every layer of the industry, which has knock-on effects in all the other layers.

Second, these technologies are so widely dispersed that predicting which firms will succeed with a new technology, or suddenly spring up as a new competitor, is far more difficult than in most other industries. A vast corps of electronics engineers and programmers have been trained over the past two decades. Their job mobility and willingness to take risks are legendary. Firms have little difficulty recruiting talent, and lots of new companies are formed every year. Even in microprocessors—a capital-intensive, specialised business—Intel now faces competition from a small, Texas-based firm called Cyrix, started by two engineers in 1988. In the late 1980s Toshiba, a distant also-ran in personal computers, shocked the industry when its laptop models, not those of the industry's established leaders, became a hit everywhere. Toshiba, in its turn, was shocked when its early lead was eroded by a wave of imitators, most of them American.

Third, far more often than most companies, computer firms are not selling their products to an established market, but trying to create demand for an entirely new product. This involves a lot of sheer guesswork. In 1991 many firms expected pen computers to take the industry by storm (these allow people to enter information by writing with a stylus on an electronic notepad rather than using a keyboard). Since then, sales have been disappointing. Pen computers are now seen as a niche product with limited potential.

Technological change is not unique to the computer industry. But its pace, and the fact that it is happening in so many areas at once, may be. So to succeed, or even to survive, computer firms now have to put an inordinate amount of effort into doing three things:

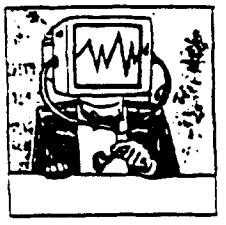
To compete, collaborate

• **Collaborating.** The multi-layered structure of the new computer industry and the large number of firms it now contains, mean that any single firm, no matter how powerful, must work closely with many others. Often this is in order to obtain access to technology or manufacturing expertise. A web of thousands of joint ventures, cross-equity holdings and marketing pacts now entangles every firm in the industry. Even firms with a revolutionary product need to create a "community" of other firms to exploit it, argues James More, of Geo Partners, a computer-industry consultant. "A firm has to attract help from all others in the value chain and deny it to competing communities of firms."

Successful alliances are notoriously tricky to achieve in any business. An added complication in most computer-industry deals is that few alliances are exclusive. Firms usually retain the right to do business, or strike a similar alliance, with other firms. And alliances are often between firms that compete fiercely in other areas. Apple and IBM are jointly developing new chips, operating systems and multi-media products, all critical to both firms' future. But Apple, like much of the rest of the new computer industry, also remains determined to steal business from IBM's corporate customers.

Given so many uncertainties, many of the grandest computer alliances predictably fail. The most spectacular break-up has been between Microsoft and IBM. The two spent years and hundreds of millions of dollars jointly developing OS/2, an operating system to replace MS-DOS. When an early version of OS/2 sold poorly in 1990, Microsoft threw most of its marketing efforts behind its own Windows operating system. IBM felt betrayed. It has since signed marketing pacts with Microsoft's rivals, Novell and Lotus.

• **Watching other firms.** Firms must keep a close eye on the actions of others, even those with whom they have no formal alliance or do not compete. Most firms depend on those in other layers of the industry to succeed. If a firm stumbles in one layer, it can deal a mortal blow to firms in other layers. In the 1980s Compaq owed much of its extraordinary success in the market for assembled PCs to Intel's willingness to provide it with early supplies of its latest microprocessor. But when new RISC microprocessors designed by Sun and others looked as if they would leave Intel's chips far behind, Compaq had no choice but to join Microsoft, and 19 other firms whose products depended on Intel's chips, in



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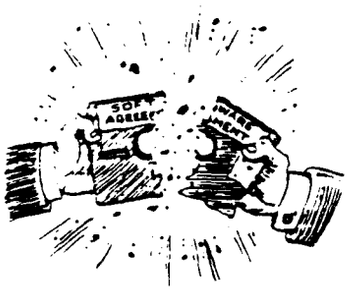
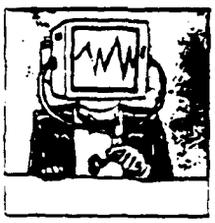


a consortium called ACE assembled to search for an alternative. Alarmed, Intel accelerated plans to bring out a new generation of microprocessors and eventually persuaded ACE's members that it could keep up with RISC technology. In late 1992 ACE was disbanded. Similarly, Lotus bet that IBM would succeed with OS/2 after its split with Microsoft. When sales of Windows took off and those of OS/2 sputtered, Lotus was not prepared with a Windows version of 1-2-3, its popular spreadsheet program. As a result, Lotus lost market share to the Windows version of Excel, Microsoft's own spreadsheet. Lotus is still scrambling to catch up.



• **Monitoring technology.** Like any type of company, computer firms must track their direct competitors to avoid being caught off guard by a technological breakthrough. However, technology is changing so fast in the computer industry that just watching competitors is not enough. Our map of the industry on page 18 will probably be completely redrawn in a few years. New technologies promise to blur the boundaries between today's layers, pitting supplier against customer and turning firms which now happily co-operate into competitors.

Chip makers are learning to put more and more of the electronic bits in complete machines on to a single piece of silicon along with the microprocessor. This is a direct threat to assemblers of personal computers, who are already struggling to find ways to add value to machines and so earn profits.

In the next few years, microprocessors themselves will become so powerful that they will incorporate many of the functions of current operating-system software, or run "emulations" which allow them to operate with software written for other types of microprocessors. There is disagreement about whether such emulations will be efficient enough to be invisible to the user, or whether they will slow computers down. If they prove efficient and invisible, the implications for the microprocessor and software markets are difficult to fathom.

It could prove a blow to Microsoft, Novell and others which sell operating systems. Or it could liberate them from specific chip makers. Microsoft has said that Windows NT will run on a variety of RISC microprocessors, as well as on Intel's chips. If all operating systems can run on all microprocessors, then the latter could become a commodity like memory chips, sold primarily on price. On the other hand, emulation may also allow operating systems to mimic each other, which would mean that software written for MS-DOS or Windows could run easily on Unix, Apple's operating system, and any others that come along. This, in turn, could make operating systems indistinguishable commodities.

Microsoft's boss, Bill Gates, dismisses any such idea as "really, really wrong. It ignores the idea that there is incredibly innovative work going on in operating systems." That is just the problem, complain many application-software firms. They worry that Microsoft will incorporate so many functions into its new operating systems that there will be little opportunity for them to innovate and add value. Though Microsoft is a big application-software firm itself, it is wary of alienating other application firms because it does not want them to devote their best efforts to writing software for rival operating systems. On the other hand, the intensely competitive Mr Gates finds it difficult not to seize an opportunity sitting right under his nose.

Meanwhile Lotus is attempting to appropriate some of the functions, and value, of the layer below the application-software layer where it normally competes with a product called Notes, which allows users on large networks of personal computers to communicate easily and share databases. Though ostensibly an applications program—it runs on various operating systems—Notes is also something of an operating system itself. Lotus is encouraging other firms to write applications which, in turn, exploit the capabilities of Notes. Already industry pundits are calling Notes "middleware", an entirely new industry layer between operating systems and applications. Microsoft plans to incorporate many of the same features offered by Notes into its new server operating-system, Windows NT, when it appears this year, which might promptly squeeze middleware out of existence.

Given all these risks, one question companies must continually ask themselves is whether or not they should be operating in the layer above or below their main business—in other words, how vertically integrated should they be? There is no single answer to this; and, because of technological changes, whatever answer looks right today may be wrong tomorrow. Apple and Sun Microsystems claim that being in both hardware and software is an advantage for making both work together, though they are now devoting the bulk of their R&D efforts to software. Mr Gates says being in both hardware and software is too risky, though he sees an advantage in being in both operating systems and application software. IBM, which is in every layer and every market, is floundering.

Four friends, four rivals

A tale of three winners and one big loser

MOST of the computer companies mentioned in this survey are American. That is no oversight. The industry's direction has been set in America, which is also where most of the innovation occurs. Although large, the European and Japanese computer industries are rooted in their home markets. During the past two difficult years, European companies have lost market share even at home to American rivals. Japanese companies have fared better. Their lead in memory-chip production and their skills at low-cost manufacturing have brought them modest gains in the share of world hardware sales. But at home they are facing an onslaught from American and other companies in the personal-

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computer market. And they have yet to make much of a dent in software.

Japanese firms could play a bigger role, especially if mobile, hand-held computers become as big a hit as many people predict. Until that happens, however, strategic choices made by American firms will determine the direction of the industry. This article examines the strategies of four of the most significant American firms.

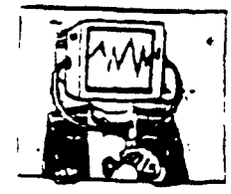
As the leader of the old computer industry, IBM faces enormous challenges finding its place in the new industry. Its efforts to do so will be one of the great dramas in modern corporate history. For IBM, 1992 was a disastrous year. Even worse, it capped a precipitous slide in the company's fortunes. Since 1985 its share of the total computer market, including hardware, software and services, has slid from 30% to less than 19%. Its market capitalisation has dropped like a stone, from a peak of $106 billion in 1987 to $27 billion.

IBM has already made wrenching changes, cutting its workforce by a quarter to 300,000 and reducing manufacturing capacity by 40% since 1986. This year it is cutting another 25,000 people. It has also reorganised its business five times over the same period. In December 1991 it announced the most drastic reorganisation of all, the division of the company into 13 autonomous businesses, each with its own balance sheet, profit and loss account and financial targets. These businesses are supposed to establish an internal market, with prices equivalent to those offered by outsiders, which should expose hidden subsidies and obvious laggards. Whether it will make IBM as a whole more competitive is debatable. "Markets and companies are very different things," says David Teece, a professor at Haas School of Business at the University of California's Berkeley campus. "IBM may not get the full benefits of either."

Despite its troubles, IBM remains huge. Its sales are more than three times the computer sales of Fujitsu, the world's second-biggest computer company. And amid the carnage of the past few years, it has scored some remarkable successes. Its minicomputers and workstations, two markets which it entered years too late, have sold well.

Today technology is coming out of IBM's vast R&D establishment much more quickly, producing a wave of new products in 1992. It has also launched a range of low-cost personal computers and copied the direct marketing and telephone technical support pioneered by Dell. The inadvertent creator of the new computer industry, IBM has now had to adopt the new industry's ethos, pledging to make all its products connect easily to those of other companies. It has collaborative deals with thousands of firms, including many of those whose success has done so much to destroy its hegemony. Lotus, Novell, Apple and others are all too happy to let IBM's huge salesforce flog their products to large corporate customers. Whether Big Blue gets much out of this is itself difficult to say. The company's top managers say they are now determined to give customers whatever they want, even if that means selling someone else's product, or helping a customer to scrap an expensive IBM mainframe in favour of a cheaper network of workstations and personal computers.

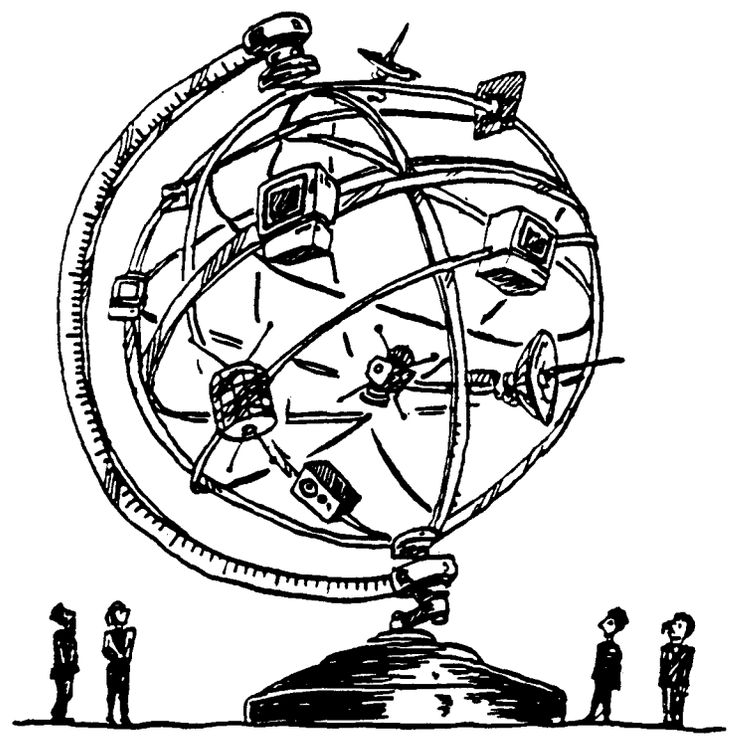
If it is to remain a single entity, IBM has no choice but to adopt this strategy of being all things to all customers. But IBM is competing against thousands of specialised firms aiming at every corner of its market and every layer of its value-added chain. Even if its mainframe patrimony, still its biggest business, survives longer than sceptics suggest, IBM may not be able to remain either so vertically integrated or so ubiquitous in an industry which is fragmenting quickly. IBM executives seem at a loss about what to do next. A new boss at the company may break it up.



Cool operator

Microsoft has replaced IBM as the industry's most feared and admired company. Its financial performance has been spectacular, largely because of its near-monopoly in PC operating systems, which account for 40% of its sales. Other firms in the industry are gunning for Microsoft. Complaints by rivals of anti-competitive behaviour have sparked an investigation of the firm by America's Federal Trade Commission, which could cause Microsoft big headaches in the future. IBM's alliances with Apple, Novell and Lotus are clearly designed to deny Microsoft dominance of the next generation of operating systems, whether on stand-alone machines or the servers at the heart of client-server networks. Sun Microsystems aims to do the same thing. Mr Gates shrugs off criticisms from other firms. "Customers don't care much about whether other companies in the industry are comfortable with us," he says. "Who gives a damn?" He rubbishes rival products. IBM's OS/2 operating system, he states flatly, will be dead in two years.

Behind the outward taunting, Mr Gates has displayed great skill and determination in building Microsoft into a powerhouse. Ironically, in the 1980s the firm's application programs for its own



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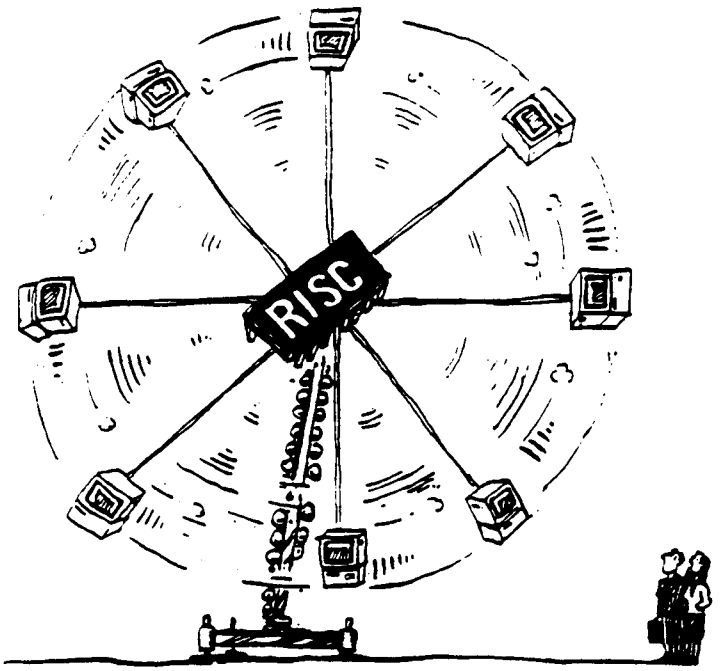
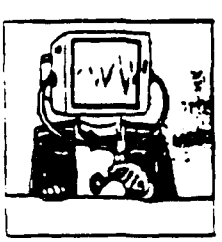


operating system sold poorly. Lotus, WordPerfect and Borland became the leading suppliers of (respectively) spreadsheets, word-processors and database software for IBM-compatible personal computers. So Mr Gates directed Microsoft's efforts to writing application programs for Apple's Macintosh computer, despite the fact that Apple's machines were rivals to those that ran its own MS-DOS operating system. The strategy worked brilliantly. Microsoft's applications helped make Apple's Macintosh computer succeed, although MS-DOS machines continued to account for 90% of PC sales. And then, when it abandoned its joint effort with IBM on OS/2 in favour of its own Windows software, Microsoft also threw its weight behind its Windows-compatible applications, catching Lotus, WordPerfect and Borland off balance and winning a big chunk of sales in the IBM-compatible market as well. It is waging a fierce price war to hold on to its new prize.

Though it is portrayed by rivals as the firm to beat, Microsoft will never dominate the new computer industry the way IBM did the old one. Mr Gates seems to recognise this when he admits that the company will not be able to maintain its phenomenal profitability indefinitely. But if Microsoft scores a success with Windows NT in network operating systems similar to what it has achieved with MS-DOS and Windows, it could enjoy another extraordinary decade. Its break with IBM will make that much harder to accomplish. Thousands of the corporate customers switching to client-server networks still have IBM machines. Many of them are bound to listen to IBM salesmen peddling network operating systems from Novell, IBM and others. If it fails, Microsoft will still be a formidable competitor in the application-software market. But that business, as even Microsoft has discovered, is more hit-or-miss than operating systems.



Intel, like Microsoft, has been one of the biggest beneficiaries of the brutal price wars in the PC market, which has boosted sales of machines, most of them containing an Intel microprocessor. For more than two decades, Intel has been one of the most innovative firms in electronics. But it has never been able to rest on its laurels for long, and that is truer today than ever before. Despite its supremacy in microprocessors, Intel faces competition from two types of companies: those making replicas of its microprocessors and those making alternatives using a different design.

Advanced Micro Devices (AMD), which Intel licensed as a second supplier at the behest of IBM a decade ago, has since managed to "clone" versions of Intel's most popular chip, the 386. This has driven prices down rapidly in the past year. So Intel has shifted its marketing efforts to the more powerful 486 chip. It has also invested heavily in both R&D and new production capacity to accelerate the launch of its next-generation chip, called the Pentium, which is expected in the next few months. Though Intel has dragged AMD in and out of court claiming patent infringement to slow it down, AMD says it will have a 486 chip ready this year. Cyrix, whose designs are not clones of Intel's but are meant to run all the same software, is already selling a 486 chip and promises a Pentium-compatible chip later this year.

RISCy business

A bigger threat could come from firms making incompatible RISC microprocessors, which have traditionally been faster than Intel's. These are made by a range of firms, from Texas Instruments to Fujitsu, working to the designs of Sun Microsystems. IBM, which invented RISC technology in the 1970s, is also working on a new RISC chip, called the PowerPC, with Apple and Motorola. Intel claims the Pentium will match the performance of any RISC chip, but also offer compatibility with all the software currently written for all earlier Intel chips—a big advantage. In any case, Intel has little choice but to keep running this particular race. The industry layer above, personal computers, is crowded with its own customers and an even harder market in which to make money.

Apple has always bucked the new computer industry's trends. It makes both hardware and software to its own proprietary designs (Motorola makes its microprocessors) and, until recently, charged a premium for its products in a price-conscious market. Its computers have been easier to use than those of rivals, and they have superb graphics. Apple has been the leading firm in American schools and the desk-top publishing market. Otherwise, most of its machines have been sold to individuals, not firms. Its customers are famously loyal.

The constant price-cutting by other PC makers eventually made Apple's strategy untenable. Alarmed by Apple's shrinking market share, John Sculley, its chief executive, reversed the company's direction in 1990, slashing prices, cutting costs and pushing new versions of its computers out of the door faster. "We realised that we didn't have a survivable company," he explains. Apple's market share has recovered. Mr Sculley claims that it is now the world's biggest manufacturer of personal computers. The company scored a hit with its elegantly

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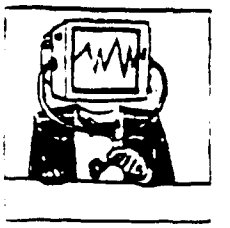
designed laptop computers, called Powerbooks, last year.

Mr Sculley also concluded that, however innovative or price competitive, Apple needed a partner. In 1991 he announced a wide-ranging alliance with IBM. During 1993 this is supposed to put Apple into the client-server market with a new Unix-based network operating-system and a RISC-based workstation powerful enough to act as a server. The alliance is also supposed to help Apple to crack the corporate market by making it easier to link Apples to IBM minicomputers and mainframes. In addition, the two firms have established joint ventures to develop multi-media software—mixing text, video, voice and graphics simultaneously on the same machine—and "object-oriented" software (chunks of standard software which users can assemble to make their own applications).

Mr Sculley is already looking far beyond any of these ventures. "In five years Apple will be heavily into services, software, and systems integration. The wars today are all about hardware prices. Microsoft's monopoly of the system software, Intel's control of microprocessor technology: that's all going to be ancient history," he says. The future, he predicts, will be one in which people will have access to all forms of information—news, television, business data—wherever and whenever they want, using hand-held "personal digital assistants", a kind of computerised mobile telephone. Apple announced the first family of these, called the Newton, last year, but has yet to bring any of them to market. By 2000, says Mr Sculley, the consumer-electronics, television, telecommunication, entertainment and news industries will have merged into a single market, with sales of $3.5 trillion a year. Apple will thrive in this market, he claims, because it knows better than most firms how to make complex technology easy for ordinary people to use.



Lost horizons

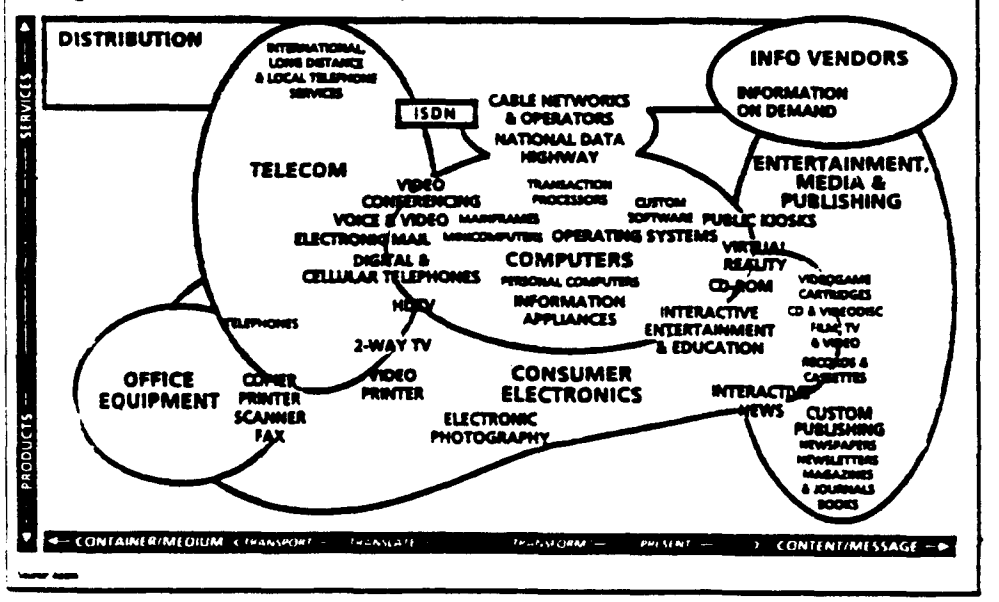
MANY of Mr Sculley's competitors accuse him of being glib. Yet most of them also share his vision of the future. Over the next decade, most information, including television, is expected to assume the same digital form as computer data. And the spread of mobile telephones is already bringing mobile computing in its wake. Some of the latest laptop computers can already communicate over the airwaves. More powerful chips seem certain to put enormous computing power into machines small enough to fit into the palm of the hand. More powerful software will make computers of any size and shape easier to use. The cost of storing, transmitting, manipulating and analysing data will drop sharply. Most big computer firms believe that this means the computer industry will overlap with a variety of others.

One way to portray Mr Sculley's vision is the product map below. It was drawn by Apple on the basis of work done at Harvard University's Centre for Information Resources Policy. The horizontal axis moves from (on the extreme left) products which act as containers or carriers of information, but have none themselves, to (on the extreme right) products whose value resides almost entirely in the information they contain, not their physical form. The vertical axis moves from tangible products at the bottom to intangible services at the top. The map plots where various industries will overlap or converge, so the area covered by each industry does not reflect its relative size in terms of sales.

Mr Sculley is not alone in seeing dazzling

The computer industry's possibilities are proliferating and its boundaries are dissolving

Merger mania The information industry in 2001



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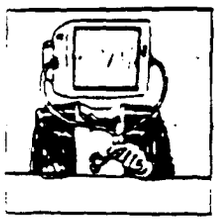


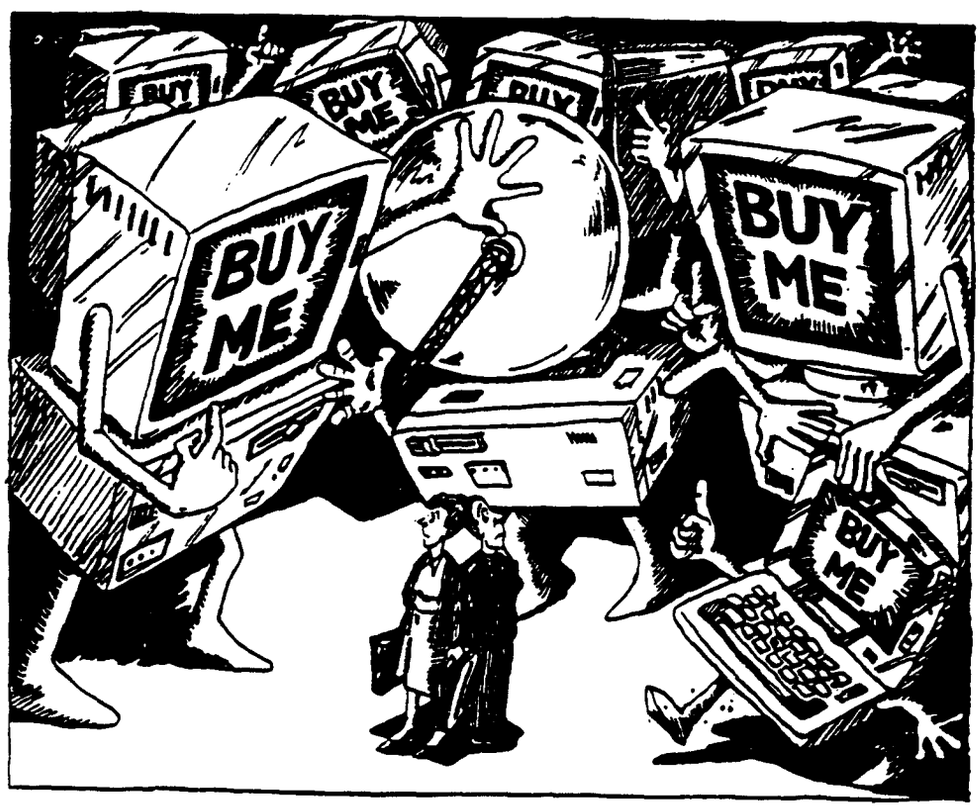
opportunities for computer firms in these spreading blobs. Motorola is already selling pagers which instantly alert a customer to any news item on his industry, or any other subject he specifies. IBM and Sears jointly operate Prodigy, a service which provides consumer and business information to PC users in America. Mr Gates also wants Microsoft to get into the business of providing time-sensitive information, and he has established a separate venture of his own to purchase reproduction rights to thousands of images.

But the product map of the future could just as easily mean a collection of tough new competitors for the computer industry. Particularly ominous is the vast area covered by consumer electronics. Japanese firms such as Sony, Matsushita and Sharp are veterans at miniaturisation, low-cost manufacturing and selling huge volumes of low-margin products to a global market. To manufacture its Newton products, Apple has already had to turn to Sharp. Publishers and news services such as Reuters, Dow Jones and Associated Press are unlikely to let computer firms into their business without a fight. And the biggest winners of all may be the telephone companies and cellular-phone operators. They already make more money transmitting faxes than the firms which make fax machines. In November AT&T bought a 33% stake in McCaw, America's biggest cellular operator, and it already owns stakes in EO, a start-up company making mobile, hand-held computers, and General Magic, an Apple spin-off developing software for such devices.

Mr Sculley argues that the winners in this vast new market will be whoever "owns customer relationships". With consumers needing guidance through the thicket of new technology, he may be right. But consumer-electronics companies, telephone firms and news services have just as much chance of forging such relationships as computer companies; and they are accustomed to talking in a language the average person understands, unlike most computer companies.

One thing seems certain: the new computer industry will never return to the stability, or high profits, of the old one. Too many companies now have access to the technology—and to the customer. The best strategy will still be to persuade other firms to use your product as a standard. As the industry collides with the telecommunications, publishing and consumer-electronics industries, there will be standards battles galore. The search for alliances will become more frantic. Launching new products will require even greater leaps of faith. Nobody really knows how many people will want so much information at their fingertips, what price they will pay for it or what they will want to do with it. When firms find the right combination of features, they will strike it rich. But scoring one-off successes will be easier than sustaining competitive advantage over the long term.

If the industry does not make enough profits to pay for R&D and earn a proper return on its invested capital, technological progress will eventually slow down. Even so, the future path of underlying technologies in both chips and software seems clear for some years to come. So if one firm drops the baton, another may well pick it up, make the R&D investment and try its luck. This heralds even tougher times ahead for the computer industry. For its customers, nothing could be better.



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TAB 15

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Electronic Engineering
TIMES
February 18, 1991

Windows stars at SD91

By Ray Weiss

Santa Clara, Calif. — The tenor of last week's System Development Conference was clear evidence that Microsoft Corp.'s Windows is well on its way to becoming the dominant operating-software platform for personal computers. SD91, here, was essentially a Windows show: More than one-third of the vendors in attendance had Windows-related products. Developers flocked to see Windows products, while software vendors launched the second wave of Windows 3.0 development software.

A typical reaction was that of Craig A. Snow, manager, software engineering, at Sophia Systems Inc. (Palo Alto, Calif.): "Everybody is going to Windows. It's inevitable. Everybody is looking for the right tool or vehicle to build Windows products."

Microsoft's dominance of Windows development tools was challenged by a number of tool vendors. Archrival Borland International debuted its next-generation Borland C++ product for Windows, which can build Windows programs without the heretofore required Microsoft System Development Kit (SDK). Jenson & Partners Inc. (JPI) announced its integrated set of Topspeed compiler/tools for Windows and DOS. JPI's tools, too, are complete Windows tool kits.

But Microsoft (Redmond, Wash.) is fighting back by preparing a new set of tools for release this year. To hold the fort in the meantime, Microsoft integrated its SDK and C6.0 C compiler, and dropped the combined price by 25 percent.

Breakthrough product

Borland's C++ is considered by many Windows programmers to be a breakthrough product—easier and faster to use than the older Microsoft C6.0 and SDK tools.

"This is the tool I've been looking for," said B.J. Safdie, a technology analyst with Sony Corp. (Woodcliff, N.J.).

Borland C++ has a fully integrated development environment, including the Turbo Debugger, which can run in a DOS window in Windows' standard protect mode. The package includes the interactive WhiteWater Group Resource Toolkit, with which to build Windows applications resources (bitmaps, fonts, dialog boxes, etc.)—a job normally handled by the Microsoft SDK resource editors. Many developers welcome Borland's offering.

The new C++ package supports Windows code. Users can build Windows programs, including DLLs (dynamic linked libraries). Additionally, Borland C++ minimizes compilation time by precompiling program header (.h) files. This saves time, for some .h files, like Windows.h (used in all Windows programs), have more than 20,000 lines of code.

Interestingly, as Borland Challenges Microsoft, Borland itself is being challenged by Jensen & Partners, a spinoff of Borland International. Its CEO, Niels Jensen, was one of the cofounders of Borland.

JPI's Topspeed Professional Techkit targets Borland's traditional strength: Turbo Pascal. "Unlike our competitors," said Jensen, "our Pascal compilers are ISO compatible, as is our C compiler."

Microsoft is fighting back by preparing a new set of tools for release.

The new compilers announced by JPI at SD91 brought a new tack to PC software tools. JPI debuted four compilers for Windows development: C, C++, Modula-2 and ISO Pascal. Unlike any other PC compilers, all of these run in a single environment (as DLLs) and share a common code generator. Users can buy and add as many compilers as they want. Additionally, they can compile mixed code concurrently, and the libraries are shared, i.e., C or Pascal programs can access Pascal or C library procedures/functions.

What's more, the JPI compilers feature some technical breakthroughs, including virtual pointers (typed pointers, which, when de-referenced, cause a function to

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be called) and DOS-based dynamic linking with DLLs (an overlay manager that uses the Windows DLL format). Also included with the languages is a pre-emptive, multitasking kernel that runs on top of DOS.

'We'll be there'

Microsoft is busily working on its own advanced tool sets. "You can bet that we will be there with next-generation tools," said Fred Gray, Languages general manager at Microsoft. The company is working at both better Windows development tools and a C++ compiler. Additionally, the company already has a 32-bit compiler as part of the new SDK for OS/2.

Many analysts expect Microsoft to field that 32-bit compiler for Windows, undercutting Borland and JPI, whose compilers are still 16-bit architectures, despite the fact that many developers are now running on 32-bit 386 and 496 machines.

Microsoft actually helped Borland in getting its Windows product out. "We have a tool-independent program," said Gray, "that treats our own languages group the same as any other ISV [independent software vendor]. Microsoft is out to get Windows accepted and will help competitors like Borland. In fact, we get Windows and other operating system releases the same time as do the ISVs."

Other vendors at SD91 presented products that support the emerging Windows development market. These include 32-bit compilers from Zortech (C++) and Watcom (C), as well as Windows GUI (graphical user interface) builders, such as Professional WindowsMaker from Blue Sky Software Corp. (Las Vegas, Nev.) and VZ Programmer for Windows.

Additionally, two key Windows products bowed that fill critical needs for Windows developers: PCsteam, a hardware ICE for Windows that monitors 386 systems out to 33 MHz with a fully compliant CodeView debugger, and Distinct, the first TCP/IP package for Windows—it includes Berkeley Sockets, RPC/XDR and NFS, linking Windows applications to the Unix networking world.

Getting attention

Windows is attracting a lot of attention. "Windows provides a full graphics environment," said Isadore Sobkowski, principal, Knowledge Associates Ltd. (Riverdale, N.Y.). "It's a perfect base for our new generalized expert system, ACE."

Another company, Expert-Ease Systems Inc., is moving its process-control software to Windows. "People want Windows—it's a rising market," said Dave Kuhlman, senior software engineer, Expert-Ease (Belmont, Calif.). "But I will continue to develop using OS/2—you can just do a lot more with OS/2 than with Windows."

Many programmers accept Windows as inevitable. "Windows has the market attention," said Sony's Safdie. "But it's a lot like those kits people used to buy and put on a Volkswagen, making it look like a Maserati or some luxury car. Under the hood is still a Volkswagen."

Ronald Surratt, principal, C Carp Designs (Laytonville, Calif.), plans to use Windows as a user-interface for software tools. "Windows is here and accepted. It takes care of the graphical user interface as well." Surratt will combine Windows with Smalltalk for development. "You can do an awful lot with a small amount of Smalltalk code; with Windows it minimizes development time," he said.

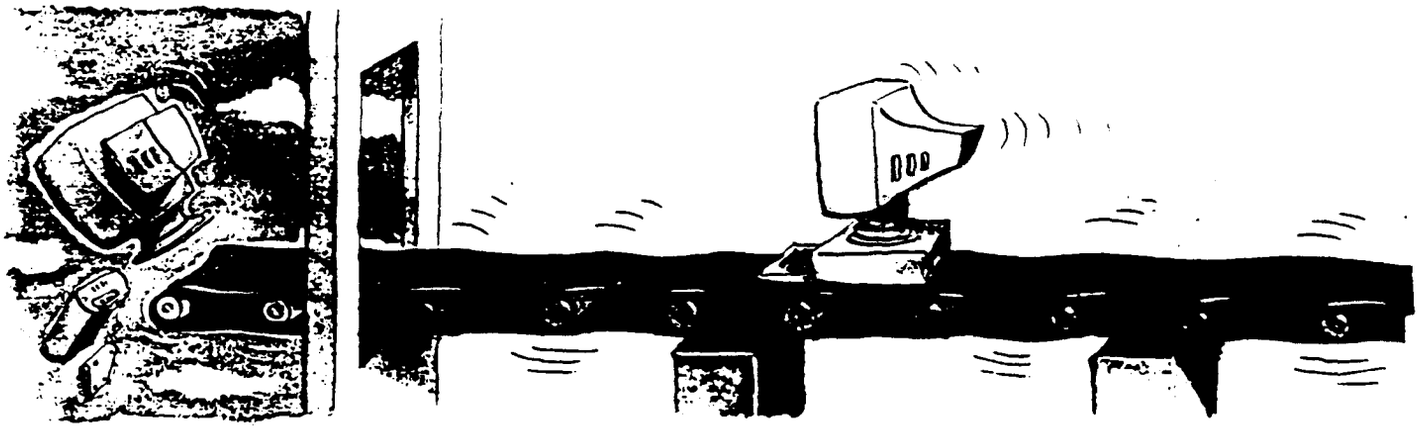
But there are others that cannot live with Windows' internals. "Windows is not deterministic," said Christopher Bajorek, president of Telephone Response Technologies Inc. "We do real-time voice systems and have built a pre-emptive multitasking operating system on top of DOS for our needs." Bruce Wallace, a development engineer at Quantum Institute, at the University of California at Santa Barbara, uses OS/2 for real-time control of a free electron laser.

TAB 16

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

Inventing – and reinventing – the proprietary architectures for open



How Architecture Wins Techn

by Charles R. Morris and Charles H. Ferguson

The global computer industry is undergoing radical transformation. IBM, the industry's flagship, is reeling from unaccustomed losses and is reducing staff by the tens of thousands. The very survival of DEC, the industry's number two company, is open to question. A roll call of the larger computer companies – Data General, Unisys, Bull, Olivetti, Siemens, Prime – reads like a waiting list in the emergency room.

What's more, the usual explanations for the industry's turmoil are at best inadequate. It is true, for example, that centralized computing is being replaced by desktop technology. But how to explain the recent troubles at Compaq, the desktop standard setter through much of the 1980s? Or the battering suffered by IBM's PC business and most of the rest of the desktop clone makers, Asian and Western alike?

And the Japanese, for once, are unconvincing as a culprit. The fear that Japanese manufacturing prowess would sweep away the Western computer industry has not materialized. True, Japanese companies dominate many commodity markets, but they have been losing share, even in products they were expected to control, like laptop computers. Earnings at their leading electronics and computer companies have been as inglorious as those of Western companies.

Explanations that look to the continuing shift in value added from hardware to software, while containing an important truth, are still too limited. Lotus has one of the largest installed customer bases in the industry. Nevertheless, the company has been suffering through some very rough times. Meanwhile, Borland continues to pile up losses.

Nor are innovation and design skills a surefire recipe for success. LSI Logic and Cypress Semiconductor are among the most innovative and well-managed companies in the industry, yet they still lose money. Design-based "fabless," "computerless" companies such as MIPS have fared very badly too. MIPS was saved from bankruptcy only by a friendly takeover. And Chips and Technologies is in dire straits.

Government protection and subsidies are no panacea either. The European computer industry is the most heavily subsidized in the world but still has no serious players in global computer markets.

Charles R. Morris is a partner in Devonshire Partners, a Cambridge, Massachusetts technology consulting and financial advisory firm. Charles H. Ferguson, an MIT Ph.D. and former MIT researcher, is an independent consultant, also in Cambridge. This article is based on their book Computer Wars: How the West Can Win in a Post IBM World, *which was just published by Times Books.*

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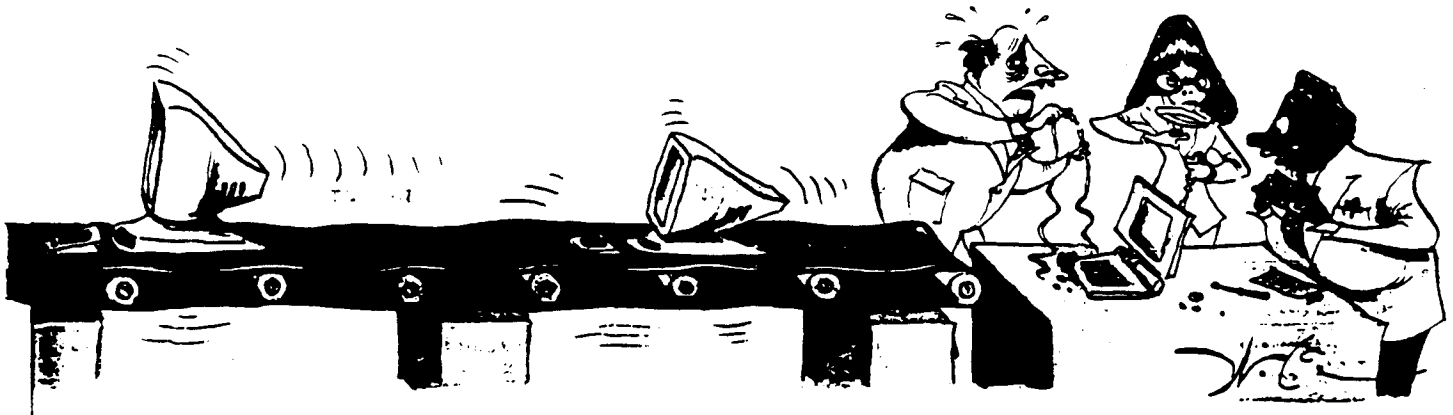
systems is critical to competitive success.



nology Wars

Scale, friendly government policies, world-class manufacturing prowess, a strong position in desktop markets, excellent software, top design and innovative skills – none of these, it seems, is sufficient, either by itself or in combination with each other, to ensure competitive success in this field.

A new paradigm is required to explain patterns of competitive success and failure in information technology. Simply stated, competitive success flows to the company that manages to establish proprietary architectural control over a broad, fast-moving, competitive space.

Architectural strategies have become of paramount importance in information technology because of the astonishing rate of improvement in microprocessors and other semiconductor components. The performance/price ratio of cheap processors is roughly doubling every eighteen months or so, sweeping greater and greater expanses of the information industry within the reach of ever-smaller and less expensive machines. Since no single vendor can keep pace with the deluge of cheap, powerful, mass-produced components, customers insist on stitching together their own local system solutions. Architectures impose order on the system and make the interconnections possible.

An architectural controller is a company that controls one or more of the standards by which the entire information package is assembled. Much current conventional wisdom argues that, in an "open-systems" era, proprietary architectural control is no longer possible, or even desirable. In fact, the exact opposite is true. In an open-systems era, architectural coherence becomes even more necessary. While any single product is apt to become quickly outdated, a well-designed and open-ended architecture can evolve along with critical technologies, providing a fixed point of stability for customers and serving as the platform for a radiating and long-lived product family.

Proprietary architectures in open systems are not only possible but also indispensable to competitive success – and are also in the best interest of the consumer. They will become increasingly critical as the worlds of computers, telecommunication, and consumer electronics continue to converge.

Architectures in Open Systems

In order to understand architecture as a tool for competitive success in information technology, consider first the many components that make up a typical information system and the types of companies that supply those components.

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Take the computer configuration in a typical Wall Street trading or brokerage operation. Powerful workstations with 50 MIPS (millions of instructions per second) – comparable to the power of standard mainframes – sit on every desk. The workstations are connected in a network so they can communicate with each other or with several

Proprietary architectures are not only possible but also indispensable to competitive success.

others at a time. Teams of workstations can be harnessed together to crunch away on a truly big problem. Powerful computers called servers support the network and manage the huge databases – bond pricing histories, for instance – from which the workstations draw.

Such a modern network will be almost entirely open, or externally accessible by other vendors; critical elements, from perhaps as many as a hundred vendors, plug interchangeably into the network. The workstations themselves are from companies like Sun Microsystems, Hewlett-Packard, and IBM, or they may be powerful personal computers from Apple or any of a number of IBM-compatible PC manufacturers. IBM and Hewlett-Packard make their own workstation microprocessors; most workstation or personal computer makers buy microprocessors from companies like Intel, Motorola, Texas Instruments, LSI Logic, AMD, and Cyrix. Almost all the display screens are made in Japan by Sony, NEC, and many other companies; the disk drives come from American companies like Seagate or Conner Peripherals. The memory chips are made in Japan or Korea. The network printers will typically have laser printing engines from Japan or, if they are high-performance printers, from Xerox or IBM; the powerful processors needed to control modern printers will come from AMD, Motorola, or Intel. The rest of the standardized hardware components on the network, like modems, accelerator boards, coprocessors, network interface boards, and the like, will be made by a wide variety of Asian and American companies.

The network will have many layers of software, most of it "shrink-wrapped" from American companies. The operating system – the software that controls the basic interaction of a computer's components – may be a version of AT&T's UNIX, specially tailored by the workstation vendor, as with Sun and IBM, or it may come from a third party, like Microsoft. Many vendors, like Lotus and Borland, will supply applications software. The complex software required to manage the interaction of the servers and workstations on the network will, in most cases, be supplied by Novell. The software that converts digital data into instructions for printer engines is sold by Hewlett-Packard, Adobe, or one of their many clones. Each smaller element in the system, like a modem or video accelerator, will have its own specialized software, often supplied by a vendor other than the manufacturer.

It is possible to construct open systems of this kind because for each layer of the network there are published standards and interface protocols that allow hardware and software products from many vendors to blend seamlessly into the network. The standards define how programs and commands will work and how data will move around the system – the communication protocols and formats that hardware components must adhere to, the rules for exchanging signals between applications software and the operating system, the processor's command structure, the allowable font descriptions for a printer, and so forth. We call this complex of standards and rules an "architecture."

A small handful of the companies supplying components to the network will define and control the system's critical architectures, each for a specific layer of the system. The architectural standard setters typically include the microprocessor designer (such as Sun or Intel); operating system vendors (possibly Sun or Microsoft); the network system (usually Novell); the printer page-description system (Adobe or Hewlett-Packard); and a small number of others, depending on the nature of the network. Each of these is a proprietary architecture; although the rules for transmitting signals to an Intel processor, for example, are published openly for all vendors, the underlying design of the processor

A small handful of innovative companies will define and control a network's critical architectures.

is owned by Intel, just as the design of Sun's operating system is owned by Sun, and so on for Microsoft's Windows/DOS, Novell's Netware, or Adobe's PostScript.

Companies that control proprietary architectural standards have an advantage over other vendors. Since they control the architecture, they are usually better positioned to develop products that maxi-

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mize its capabilities; by modifying the architecture, they can discipline competing product vendors. In an open-systems era, the most consistently successful information technology companies will be the ones who manage to establish a proprietary architectural standard over a substantial competitive space and defend it against the assaults of both clones and rival architectural sponsors.

It has been conventional wisdom to argue that users, and the cause of technological progress, are better served by *nonproprietary* systems architectures. This is emphatically untrue. There are many examples of nonproprietary architectures, like the CCITT fax standard or the NTSC television standard, most of them established by government bodies or industry groups. Because they are set by committees, they usually settle on lowest-common-denominator, compromise solutions. And they are hard to change. The NTSC has been upgraded only once (for color) in a half-century; committees have been squabbling over an improved fax standard for years. *Proprietary* architectures, by contrast, because they are such extremely valuable franchises, are under constant competitive attack and must be vigorously defended. It is this dynamic that compels a very rapid pace of technological improvement.

Architectural Competitions

The computer industry has been competing on architecture for years. Take the example of the product that established IBM's dominance in the mainframe computer business – the IBM System/360. The 360 was arguably the first pervasive, partially open, information technology architecture. In the late 1960s, once the System/360 became the dominant mainframe solution, IBM began to unbundle component pricing and selectively open the system, in part because of government pressure. Published standards permitted competitors and component suppliers to produce a wide range of IBM-compatible products and programs that were interchangeable with, and sometimes superior to, IBM's own. By licensing its MVS operating system to Amdahl, for example, IBM made it possible for Fujitsu, Amdahl's partner, to produce clones of the IBM mainframe. Much of what was not licensed away voluntarily was acquired anyway by the Japanese through massive intellectual property theft.

Hundreds of new companies selling IBM-compatible mainframe products and software placed intense competitive pressure on IBM. But they also assured that the IBM standard would always be pervasive throughout the mainframe computing world. As a result, even today IBM controls some two-thirds of the IBM-compatible mainframe market and an even higher share of its profits, not only for central processing units but also for disk drives, systems software, and aftermarket products like expanded memory. Because they have no choice but to maintain compatibility with the IBM standard, competitors must wait to reverse-engineer IBM products after they are introduced. Typically, by the time competitive products are on the market, IBM is well down the learning curve or already moving on to the next generation. And as the owner of the dominant architecture, IBM can subtly and precisely raise the hurdles whenever a particular competitor begins to pose a threat. For over 20 years, in generation after generation, IBM has played this game brilliantly and won every time.

> For over 20 years in the mainframe business, IBM has played this game brilliantly and won every time.

Ironically, IBM badly fumbled an equivalent opportunity in desktop computing, handing over the two most critical PC architectural control points – the systems software and the microprocessor – to Microsoft and Intel. Since any clone maker could acquire the operating system software from Microsoft and the microprocessor from Intel, making PCs became a brutal commodity business. As a high-cost manufacturer, IBM now holds only about 15% of the market it created.

In a related error, Compaq made the mistake of assuming that IBM would always control the PC architectural standard. On that premise, the company geared its cost structure and pricing policy to IBM's, only to find itself almost fatally vulnerable when the savage PC price wars of the early 1990s exposed the commoditized character of PC manufacturing. Tellingly, while IBM and Compaq struggle to eke out profits from their PC businesses, Microsoft and Intel are enjoying after-tax margins of about 20%, on sales of more than $4 billion and $6 billion respectively, and together they have more cash than IBM.

For a similar example, consider the case of Lotus. Lotus got its start in a market – spreadsheet software – where products are complex and feature-rich, hardly commodities. And over the years, the

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company acquired or developed a broad array of other products – Jazz, Manuscript, Improv, AmiPro, Notes, and Freelance – some of which are technically excellent. Lotus's competitive problem, however, is that these products lack any deep architectural commonality. Indeed, even the embedded spreadsheet software in the company's various offerings is incompatible from one to another.

Point product vendors like Lotus can be very profitable for a time. However, they are always at risk when an architectural leader changes the rules of the game. For example, while Lotus was accumulating a grab bag of point products, Microsoft was creating an architectural lock on the graphical user interface (GUI) for DOS-based computers. (See the insert "Scenarios for Architectural Competition: Graphical User Interfaces.") And Windows now defines the environment in which Lotus's software must compete. The great power of Windows is that it creates a relatively simple, intuitive, and reasonably uniform interface between a user and a very wide range of applications software. As users become accustomed to the greater ease of Windows, they insist on it, and point product vendors like Lotus are forced to adapt their software to run under the Windows architecture. But Microsoft also offers its own line of point products, like Excel and Word, and since they arguably better exploit the Windows architecture, they are steadily encroaching on Lotus's market share.

The irony is that for a time in the 1980s, Lotus had such a powerful market position that it almost certainly could have established a GUI standard itself. But the company neglected to do so. Such strategic errors spell the difference between an architectural winner and loser.

Principles and Phases of Architectural Competition

There are five basic imperatives that drive most architectural contests:

1. Good products are not enough. Products distribute architectures and can contribute to the success of an architectural strategy. However, as the case of Lotus suggests, good products alone are not enough. But if the sponsor invests heavily in continuous product improvement, products of only modest capabilities can become the basis for architectural leadership. For example, both Zilog and

Scenarios for Architectural Competition: Graphical User Interfaces

Graphical User Interfaces (GUIs) are the software that permits users to maneuver around applications visually – for example, issuing commands by pointing to icons – providing a simple, consistent method of working with many different programs. The evolution of the GUI market provides a dramatic example of the dynamics of architectural competition.

The original GUI was developed at Xerox's famed Palo Alto Research Center (PARC) and unveiled with the Xerox Star in the early 1980s. The Star was a brilliant achievement for its time – a high-performance, if very expensive, easy-to-use networked workstation. But it was a completely closed system; there was no published applications-program interface, so no one but Xerox could supply software to run on the Star. Its appeal was therefore far too limited ever to become a pervasive desktop standard.

Steve Jobs adapted the Star technology to Apple, but it took several tries before Apple began to make inroads in the GUI arena. Apple's first try was the Lisa, a substantially closed system that failed to attract any market share. The company got it more nearly right with the Macintosh. At least in later incarnations, the Mac has been hospitable to third-party software developers. It is considerably less expensive than the Lisa and has a superb operating system/GUI architecture. But Apple has still sharply limited its distribution potential by insisting on bundling its architecture with only its own, second-rate hardware. The Mac is hardly a failure, but had Apple licensed its systems software broadly, Apple and its microprocessor partner, Motorola, could have exercised the same architectural control over personal computing that Microsoft and Intel do now.

The operating system/GUI architectural struggle is far from over and will be one of the most heated competitive arenas of the 1990s. IBM OS/2 2.0 is technically excellent but suffers from a very late start; Microsoft's brand new NT system, which will run Windows applications, will raise the hurdles yet again. A variety of UNIX-based standards are alternatives to systems derived from the original DOS. And IBM and Apple have joined forces on a next-generation operating system/GUI in their Taligent partnership.

As the ongoing GUI contest suggests, architectural battles are fast-moving, hotly challenged, and rarely completely settled. The rewards to a winner, however, can be great.

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Scenarios for Architectural Competition: Video Games

The home video game industry, dominated by Nintendo and Sega, is a serious industry. Some 30 million American homes, or about 70% of all homes with a child between the ages of eight and twelve, own a video game. Both Nintendo and Sega sell video game consoles (basic, 16-bit, 286-level computers) with tightly bundled operating systems. Game software is developed by independent vendors under tightly controlled licenses but distributed only through the two companies' networks at hefty markups. Profits flow from game sales, not consoles.

Bundled architectures are ripe for attack by more open systems, just as the Apple II was overwhelmed by the IBM PC. In fact, a number of American companies have targeted the game market. Electronic Arts, for one, has won a copyright suit allowing it to reverse-engineer Sega's operating system. The availability of a Sega system clone would break that company's hold over game software and open up console manufacturing to cloners. Another company, 3DO (formerly the San Mateo Software Group), has plans to release a powerful consumer-oriented operating system that will be ideally suited for games. Specifications have been provided to a number of Asian manufacturers including Matsushita, a 3DO investor, for a CD-ROM-based console. Existing best-selling games, presumably, could readily be adapted to the new system. 3DO's objective is to own a Windows-like architectural franchise in the consumer world.

An interesting and potentially formidable dark-horse competitor is Silicon Graphics, a company that has built its industry-leading three-dimensional image manipulation technology into a billion-dollar business. From its original base in the engineering CAD industry, Silicon Graphics has found a new niche supplying the technology behind the spectacular special effects in Hollywood hits like "Terminator II." These systems could produce mind-boggling game effects; Silicon Graphics is known to have a consumer/game strategy underway.

All these companies have ambitions that extend well beyond toys. Games may be just the first of a series of image-oriented consumer platforms for everything from news services, home shopping, or endless entertainment services. On the principle that the low end always wins, such platforms eventually may supplant the current generation of personal computers. Microsoft and Intel beware.

AMD at various stages in the PC microprocessor contest made Intel-compatible chips that were superior to Intel's own; but neither company matched Intel's commitment to R&D, and both were left behind as Intel rolled out one generation of improved processor after another. Once an architecture is established, it in turn becomes a distribution channel for additional products, with the architectural controller's products holding the favored position.

2. Implementations matter. Manufacturing decisions are playing an increasingly important role in product strategy. But since successful architectures have a high design content and usually a high software content, manufacturing skills by themselves are not sufficient to prevail in architectural competition. Japanese and other Asian companies, for example, despite their great manufacturing prowess, have only rarely established architectural franchises. Generally, they have settled for positions as clone makers or commodity implementors. Perhaps the only area where Japanese companies have established proprietary control over an important architectural space is in video games. But even the leaders in this arena, Nintendo and Sega, are at risk. (See the insert "Scenarios for Architectural Competition: Video Games.")

While insufficient on their own, however, manufacturing skills may well be an essential competence for success in the architectural contests of the 1990s. The reason: implementation is increasingly becoming the key to winning architectural control. In microprocessors, for example, a good implementation can improve performance by a factor of two. That's why architectural leaders like Intel typically make their own chips. By contrast, Sun Microsystems has chosen to focus solely on the design of its SPARC microprocessor, a decision that has been a source of recent difficulty for the company because subpar supplier implementations have compromised SPARC performance. High-quality implementations are equally important in the new generations of hand-held computers. Indeed, the more advanced information technology makes inroads into consumer markets, the more manufacturing skills will prove invaluable.

> Manufacturing skills may well be essential for success in architectural contests.

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3. Successful architectures are proprietary, but open. Closed architectures do not win broad franchises. Choosing the right degree of openness is one of the most subtle and difficult decisions in architectural contests. IBM opened its PC architecture too broadly – it should have, and could have, retained control of either or both the operating system and microprocessor standard. Apple made the opposite mistake of bundling the Mac operating system too closely to its own hardware. Sun, in contrast to Apple, opened its SPARC RISC architecture very early, both to software developers and processor cloners; it has the lead position in workstations, and its broad base of third-party software support has helped maintain customer loyalty though a series of technical stumbles. Autodesk's computer-aided design (CAD) software for builders is open to add-on third-party packages, like kitchen design tools, and its broad base of supporting software has given it control of a small but very profitable franchise.

4. General-purpose architectures absorb special-purpose solutions. Architectures that cannot evolve to occupy an ever-broader competitive space are dead ends. Wang's lucrative word processor franchise was absorbed by general-purpose PCs. Special-purpose CAD workstations from Daisy, Applicon, and others were absorbed by more general-purpose desktop machines. Special-purpose game machines will, in all likelihood, be absorbed by more general-purpose consumer systems.

5. Low-end systems swallow high-end systems. Minicomputers poached away huge chunks of mainframe territory and were assaulted in turn by workstations and networks. Workstations are under pressure by increasingly high performance PCs. Traditional supercomputers and very high-end mainframes are vulnerable to parallel arrays of inexpensive microprocessors. High-end data-storage systems are similarly under attack from arrays of inexpensive, redundant disks. Although IBM helped create the personal computer revolution, it steadfastly refused to recognize its implications. Until relatively recently, it even called its desktop products division "Entry Systems," ignoring the fact that today's microprocessor-based machines are a replacement for traditional computers, not an entry point or way station to them.

However, managers must keep in mind that even those companies that best follow these principles are not necessarily guaranteed continued success in the marketplace. Architectural contests typically move through a number of different phases, and only those companies that successfully navigate them all, maintaining their pace and direction in the fluid environment of rapidly evolving technologies, emerge as winners over the long term. It's a delicate balancing act, and one that requires ever-increasing flexibility as the technologies mature.

> Architectures that cannot evolve to occupy an ever-broader competitive space are dead ends.

There are five principal phases to architectural competition:

Commitment. Architectural challenges usually emerge from the early-stage chaos of competing point products. Before the IBM PC, personal computers were rigid, closed systems that tended to bundle their own operating systems and applications software. Compaq had the insight that by purchasing a Microsoft operating system identical to that of the PC, it could ride the wave of the PC's success. Microsoft then insisted that all subsequent clone makers buy the same operating system and so seized the critical PC software architectural standard. Microsoft's insight was to realize that it was in an architectural contest and to take the appropriate steps, including steadily expanding the generality and scope of its systems to come out the winner.

Diffusion. Large profits come from broad franchises. Open architectures are successful because they can be broadly diffused. Xerox's Interpress page-description software, which converts digital data into printer instructions, is excellent but can be purchased only with Xerox high-end printers. Adobe, by contrast, has widely licensed its PostScript language and has become the industry standard setter. Intel widely licensed the early versions of its xx86 processors, then sharply restricted licensing of its 386 chip after the Intel standard had become firmly entrenched. IBM, on the other hand, has long resisted diffusing its mainframe and minicomputer software.

Of course, diffusion decisions are not without risk. Once again, balance and timing are essential. For example, Philips licensed its com-

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pact disc technology to Sony to increase market penetration. But Sony outperformed Philips and took half the market. Philips's standard was a static one that it never developed further.

Lock-in. A company has a "lock" on an architecture when competitors are trained to wait until the architectural leader introduces each new product generation. Intel and Microsoft, at least temporarily, seem to have achieved this position in PC markets. Sun was on the verge of a locked-in franchise in workstations but may have fallen short; the performance of its SPARC RISC processor design has been lagging behind the competition, and the company neglected to solidify its franchise by moving rapidly down to lower end platforms.

But lock-in is sustainable only when a company aggressively and continuously cannibalizes its own product line and continually and compatibly extends the architecture itself. This is a strategic choice that many companies find difficult to make. Often, managers become overprotective of the products that brought them their original success. IBM, for example, has frittered away a powerful lock on back-office transaction processing and operating systems. In a misguided effort to protect hardware sales, it has refused to release products, long since developed internally, that would adapt its best-selling AS400 minicomputer software to the RS6000 workstation. Such reflexive self-protection simply hands over a valuable franchise to the Microsofts and other vendors storming up from the low end.

Harvest. Of course, the ultimate objective of architectural competition is to win a market leader's share of the profits. Just to give one dramatic example, profit margins on Intel's xx86 family of chips are in the 40% to 50% range and account for well over 100% of the company's earnings. But no locked-in position is ever completely safe, and companies must be careful when they harvest not to rest on their previous successes. Indeed, Intel may have harvested too aggressively, drawing out spirited recent attacks by clone makers such as AMD and Cyrix.

Though painful, it is absolutely necessary to cannibalize old architectures.

Obsolescence and Regeneration. Just as products must be cannibalized, so must architectures themselves. The better the architecture, the longer its lifespan; but sooner or later every architecture, no matter how well designed, becomes obsolete. And before it does, the market leader must be prepared to move ahead, to do away with the old and introduce the new. Industry leaders often fail to cannibalize their old architectures, but although nothing is more painful, to do so is absolutely necessary. Otherwise, competitors quickly move to create and introduce rival franchises, and these eventually dominate the industry. IBM's failure to cannibalize its mainframe and minicomputer franchises provides a stark example of the catastrophic effects of waiting too long.

DEC provides another example. The company developed outstanding RISC products very early. But DEC declined to cannibalize its profitable VAX-VMS architecture because its VMS operating system, the source of its franchise, was tightly integrated with its aging VAX hardware. Predictably, DEC was beaten out by vendors such as Sun Microsystems and Microsoft, which didn't hesitate to move in with their newer, more powerful alternatives. (The main developer of DEC's advanced systems, Dave Cutler, is now in charge of developing NT for Microsoft.)

There are three lessons here. First, with better architecture DEC could have kept VMS alive longer. If VMS had been "portable," that is, not restricted to VAX hardware, DEC could have ported VMS to other vendors' hardware, making VMS an industry standard. Indeed, the company could have used RISC technology itself without losing its VMS franchise. Second, DEC would have been better off cannibalizing itself, rather than waiting to be cannibalized by others.

The third lesson, though, is the most important. As DEC's experiences with VMS and IBM's mistakes with the mainframe and minicomputer franchises show, the cultural and organizational structures useful for managing traditional, closed, integrated businesses will not work for companies that intend to compete with architectural strategy. In fact, we believe that architectural competition is stimulating the development of a new form of business organization.

This new structure, which we call the Silicon Valley Model, has major implications both for information technology and for many other indus-

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Scenarios for Architectural Competition: Page- and Image-Description Standards

Page- and image-description standards are rapidly evolving from their initial base in printers into a very large business that will transform the entire printing and publishing industry. Probably most published material is now captured in electronic format, and a major competition is shaping up for control of the standard for storage, transmission, and manipulation of complex text, images, and multimedia documents. The technology involved is extraordinarily sophisticated and processing-intensive. Data compression and decompression and image-manipulation algorithms tax all but the very fastest of available processors; data storage requirements are very large; and requirements for communications capacity outpace most conventional systems. All these hurdles are falling very rapidly before a wide range of technical advances.

At the moment, Adobe must be considered the front-runner in the standards contest. Its Acrobat product, due to be introduced this year, will provide the industry's most advanced storage, compression, and transmission capabilities. The first versions will permit users to annotate, but not edit, electronically stored texts. Later releases are expected to include editing options. Microsoft is mounting a major challenge, at least in the word processing of documents and fonts. The dark horse is Xerox, which traditionally has possessed a vast array of image- and text-oriented technologies that it somehow never manages to commercialize. A number of smaller companies have also planted their pennants, including, refreshingly, two from Europe, Harlequin and Hyphen. Hewlett-Packard and Microsoft have formed an alliance to stay in contention, but their solutions are, for the moment at least, quite limited.

An early inning in the contest will involve the possibility of creating a new proprietary fax standard. The combination of faxes with high-quality plain paper printers could induce a very substantial increase in fax usage, particularly if images are of sufficiently high quality to transmit pictures, working drawings, and the like. Two new products, PostScript for Fax from Adobe and Satisfaxion from Intel, provide much improved resolution and decrease the required data compression to allow existing low-capacity communication systems to handle complex images. Both interconnect with standard fax machines to send and receive low-resolution images.

tries. The model is still young and rapidly changing and although Microsoft probably comes closest, no company fits it perfectly.

Managing Architectural Competition: The Silicon Valley Model

The Silicon Valley Model arose a decade ago when early architectural competitors noticed that they faced the same problems in managing organizations that they faced with technologies and architectural strategies.

In retrospect, this is not surprising. Architecture responds to the same imperatives in both systems and organizations. It reduces complexity. It permits clean separation between centralized general-purpose functions and decentralized or specialized functions. It enables management of unpredictability and change; individual technologies, components, or products can be switched without the need to redo everything. For similar reasons, good architecture facilitates experimentation and competition: once the framework is specified, multiple approaches can compete without jeopardizing compatibility. And finally, a standard architecture permits many systems and organizations to be developed independently and still work together gracefully.

As an organizational paradigm, the Silicon Valley Model therefore has several characteristic features and advantages. Following are the most important:

1. Organizational architecture and decision making that mirror technical architecture. Any organization should develop and use good technical architectures. But Silicon Valley Model firms take an additional step: the structure of the firm itself mirrors the technical architectures it uses.

Thus, for example, Microsoft is structured so that its existing systems software and applications software are managed separately, as are new architectural efforts such as NT. In this manner, Microsoft can diffuse its applications across multiple operating systems (both its own and others, like the Apple Macintosh), while also marketing its operating systems by courting other vendors' applications. The two businesses can work largely independently, yet only Microsoft gains the benefits of their synergism. Most decisions can be made directly within the organization responsible for the relevant architectural domain; this minimizes complex vertical and horizontal debates.

2. Meritocracy and direct feedback. Silicon Valley Model firms enable and force direct performance

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feedback, at levels ranging from individuals to business units. At Microsoft, team members rate each other periodically in peer reviews. Outstanding performers are rewarded; laggards are warned, then fired. Technical expertise is required for a large fraction of senior management, and communication occurs directly between the relevant parties, unbuffered by hierarchy.

By contrast, performance ratings in traditional bureaucracies are determined by managers at higher levels, and compensation is rarely based on long-term corporate performance. The process is often heavily politicized; dissent is suppressed, and incompetence goes unpunished.

Architectural competition also exposes Silicon Valley Model firms to another form of peer review – product competition. To succeed as industry standard setters, firms must license their architectures to competitors, while also developing critical products themselves. As a result, each layer of the firm (and of the architecture) is exposed to direct competition and market feedback. Hence although Microsoft controls Windows, application groups still compete individually: Excel against Lotus and QuattroPro, Word against WordPerfect and AmiPro, and so forth. Architectural leadership provides an advantage, but prevents a cover-up. Silicon Valley Model firms are structured so that excellence is the only defense.

3. Clean boundaries, both internal and external. In architected corporate structures, organizations can create and dissolve alliances rapidly, both internally and externally. Organizations are very flat, and development groups have simple, clean interfaces to each other determined by architectural boundaries. Architecture and point products can be kept apart. Moreover, products can invisibly incorporate architected "engines" developed by other organizations, including competitors. For example, a start-up called InfoNow has organized alliances involving itself, Microsoft, publishers, computer vendors, and other software companies. InfoNow packages software products, together with reviews and samples of them, which are preloaded for free on computers; the software products, however, are encrypted. Users can sample them, read reviews, and then purchase them by telephone, which triggers electronic decryption. Adding new software packages is trivial.

> Silicon Valley Model firms take an additional step: the structure of the firm itself mirrors the technical architectures it uses.

4. Internal proprietary control of architecture and critical implementations, externalized commodities and niches. Silicon Valley Model firms seek to externalize the maximum possible fraction of their total system, while carefully controlling those areas required to establish and hold an architectural franchise. Thus core development of the general purpose architecture is always internally controlled. So usually are critical product implementations, which cover the broadest markets and are required either for early diffusion or later harvesting.

> Broad, cost-sensitive markets are the strategic high ground, if covered by proprietary architectures.

Silicon Valley firms also carefully manage their dependencies, so as not to become unilaterally dependent on architectural competitors.

On balance, however, Silicon Valley Model firms are much less autarkic than traditional large firms. Niche products, commodity components, and architectures controlled by others are outsourced, and/or relegated to licensees. In fact, Silicon Valley firms actively seek to commoditize regions not under their control.

This yields several benefits. For one, companies can focus on what they do best and on the efforts critical to architectural success. For another, broad outsourcing and licensing create competition among suppliers and licensees, which broadens the market and benefits the architectural leader. PC price wars delight Intel, Microsoft, and Novell; IBM and Compaq take the heat.

Interestingly, this contradicts the 1980s conventional wisdom that firms should avoid broad, cost-sensitive markets in favor of high-price niches. In fact, the broad market is the strategic high ground, if it is covered by a proprietary architecture. Niche product vendors can make profits, but they will remain minor players.

5. Migration and evolution over time. Just as architectures evolve and eventually become obsolete, so too with organizations. Thus the firm's internal structure and external alliances evolve along with its architecture and market position. As new layers are added to an existing architectural position (Windows on top of DOS, then NT underneath Win-

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dows), new organizations are created; a similar situation occurs when an architecture must be cannibalized. Some Silicon Valley Model firms will soon face cannibalization; it will be interesting to see how they do.

Broader Implications of the Silicon Valley Model

The Silicon Valley Model is very much a product of a few companies in the computer sector, just as mass production was invented by Ford and just-in-time production by Toyota. And as in those cases, we believe that the Silicon Valley Model will diffuse throughout the broader information technology sector as the computer, telecommunications, information services, and consumer electronics industries merge.

In addition, however, as industrial competition in all industries becomes more complex and technological change accelerates, the model may have important effects upon many other fields. We think that it provides a framework that allows proprietary leaders in general to have the greatest span of control and profitability with the least complexity and smallest size. In fact, we think that the model is appropriate for small and large companies alike; it does, however, penalize unnecessary size. (Microsoft, with fewer than 15,000 employees, has a market capitalization equal to IBM's.) We will therefore close with an example of how architectural strategy and the Silicon Valley Model could have been used more than a decade ago, by Xerox.

Xerox became a large, global company through a single proprietary technology – xerography. Xerographic "marking engines" are the core of photocopiers, printers, and facsimile machines, all of which Xerox invented. But Xerox chose to exploit its control of xerography using the traditional strategy of integrated companies.

Where Xerox felt it could not develop products profitably itself, it simply left the market vacant. As a result, when the company's patent position eroded, Japanese competitors took the bulk of the blossoming low-end markets for personal copiers, laser printers, and fax machines. Xerox's market share declined from nearly 100% to about 30%.

Instead, Xerox could have developed an architecture for a broad family of machines and control systems, including interfaces for scanners, document handlers, and "finishers" for collating, stapling, and binding. It could have licensed its technology to other firms, and/or sold them xerographic engines. It could have developed products for core markets, leaving others to niche companies.

Every few years, the company could have changed or enhanced its architectures to improve its products and competitive position. The result could have been a Microsoft-like position, with Xerox holding the lion's share of the profits in a highly competitive, dynamic market – yet one under its own effective control. We think that similar strategies are available to companies in other complex industries – aerospace and machine tools, among others. If so, the information sector's strategic and organizational innovations might prove as interesting as its technology.

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TAB 17

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

HP Professional

HP Professional August 1994 v8 n8 p40(2)

The winds of change.

(Microsoft readying three 32-bit operating systems) (PC Tips)

Author

Keyhoe, Miles B.

Abstract

Microsoft is readying three new 32-bit operating systems, each of which includes powerful new features and backward compatibility with prior operating systems. Windows NT 3.5, code-named Daytona, features powerful, flexible networking capabilities that will enable Win NT systems to fit anywhere in an organization. Version 3.5 is Windows-based, although MS-DOS can be used if necessary. Windows 4.0, code-named Chicago, will provide the desktop with full 32-bit computing. Version 4.0 does not depend on MS-DOS and the eight-character limit for file names has been eliminated. Files will be referred to as objects. Some of the 'power user' features, such as the Windows Recorder, will be missing in the first version of Chicago. Microsoft is also developing the replacement for Windows NT, code-named Cairo, but it is not expected to be available until 1996.

Full Text

Change looms on the horizon. By this time next year, most of us will have first-hand experience with at least two of three new major Microsoft operating system releases. Representing a bold leap in technology, all three releases - code named Daytona, Chicago and Cairo - feature full 32-bit implementation, backward compatibility and some powerful new enhancements.

WINDOWS NT COMES OF AGE

Windows NT, the first 32-bit operating environment from Microsoft, has been shipping for almost a year. Although it brings a powerful platform to the enterprise, it is severely limited because it relies on MS-DOS as its foundation. Consequently, it has inherited all of the limitations we've been frustrated with for years: eight character file names, relatively slow and inefficient file systems, and a 16-bit architecture.

The next release of Windows NT (version 3.5), aka Daytona, marks what I believe is Microsoft's first "professional quality" release of NT. It features powerful and flexible networking capabilities that let Win NT systems fit anywhere in a corporation. And, with its Advanced Server edition it's primed to serve as an engine for enterprise computing.

Like its predecessor, Daytona can use MS-DOS as its foundation; but unlike earlier versions, Daytona doesn't require MS-DOS - it is finally a Windows operating system. However, giving up MS-DOS doesn't mean giving up MS-DOS compatibility. An important feature of Daytona is its ability to emulate MS-DOS to execute existing applications.

While Microsoft continues to position Daytona as shared resource or file server for networked Windows systems, it offers a great opportunity for power users and programmers to begin experimenting with 32-bit or multithreaded applications right away.

NEW YEARS IN CHICAGO

After spending a New Year's holiday in Chicago, I know I'd rather be anyplace but on the Lake Michigan shoreline in winter. But by December the direction of the computer winds will be turned toward Chicago. Not the city, of course, but the new Windows client software. Although some people have called the Chicago release "Windows 4," I've heard rumors that the product will be marketed as "Windows 95."

FILED

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No matter what it's called, Chicago will finally bring full 32-bit computing to the desktop. Unlike Daytona and other Windows NT releases, Chicago is intended to replace Windows 3.1 and Windows for Workgroups 3.11 on everyone's desk. Those of you who have used New Wave will feel right at home with Chicago.

In fact, the first time I saw Chicago working, it had the same dark green desktop that I've known in New Wave for years. Documents and applications are represented by icons. You can drag-and-drop documents onto applications or just double-click the document icons.

Because Chicago does not depend on MS-DOS, file names are no longer limited to eight characters. However, using a scheme similar to New Wave, Chicago maps long file names into unique eight character file names when you use existing Windows and MS-DOS applications.

Speaking of file names, you're likely to hear what we now call files referred to as objects in Chicago - more shades of New Wave. However, Chicago will store file extensions, or file types, along with the visible document name and the operating system will use a scheme much like the existing Registration Database to map applications to document types.

In the first release of Chicago, Microsoft will be giving up some of the traditional "power user" features. The Windows Recorder is likely to be missing, as well as a variety of other applications. Help will be much improved, with hypertext links between the help screen and the system utilities. For example, help on setting the system time will include a link to the Date and Time module of the Control Panel to change the time directly. This should make things easier for novices as well as for those of us who support them.

LOOKING FORWARD

Even further away from Chicago is Cairo, the eventual replacement for Windows NT. Don't expect to see this release until 1996. Cairo is to Windows NT what Chicago is to Windows. Like Chicago, it will feature a brand new user interface (probably one like Chicago). But like Windows NT, it will be the workgroup system that most individuals don't use at their desks. Because its release is so distant, it's hard to know just what will be included. But one thing is for certain - we'll probably wonder how we got by with plain old Windows 3.1.

Type
Column

Company
Microsoft Corp.

Product
Microsoft Windows 95 (Operating system)
Microsoft Windows NT (Operating system)

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TAB 18

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

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LENGTH: 955 words

HEADLINE: Maples: No 'Chinese Wall' at Microsoft

BODY:

After spending nearly 20 years at IBM, Mike Maples several years ago became head of the applications division at Microsoft Corp. Then-Microsoft-president Jon Shirley said hiring the guy from Big Blue was the riskiest move of his Microsoft career. Well, the risk eventually paid off, because Maples is still guiding Microsoft's applications strategy and even had extra time recently to joust with InfoWorld Seattle bureau chief Stuart J. Johnston.

Johnston: How will modular applications work in the future using OLE?

Maples: First let me explain that our applications were just getting too big. Word 1.0 had about 37,000 lines of code, while Word for Windows 1.0 had 408,000 lines of code. I didn't want to be here when they built a 4-million-line word processor, so I talked to a number of people at universities about moving to object-oriented programming. "First fire all your programmers," they said. "Then throw away all your programs, because however you got started isn't good for object-oriented programming." That wasn't exactly what I had in mind.

So we came up with a way to break applications down into shared components. We developed an architecture, which we call OLE, that allowed these objects to be arbitrarily linked together. Then we took the drawing code from PowerPoint and the charting code from Excel out of the products and built these larger objects. That lets you use a charting function from one development effort across multiple products. It's good for the user because it allows them to have absolute consistency.

Johnston: I understand that the OLE spec is actually being driven by the systems side of the house, but a lot of the coding is done by applications.

Maples: The original code wad done only for apps as an internal development. Then we decided it was a generic thing that was valuable to give other vendors. We could have kept it proprietary but didn't. So we gave the responsibility for managing that to systems, which works with ISVs.

Johnston: But wasn't OLE codeveloped with Lotus, Aldus, and WordPerfect?

Maples: The No. 1 participant was Aldus. Aldus had another specification, so we decided to resolve a single spec. But that was just two app companies trying to make their lives easier.

Johnston: Other companies are saying privately, "These are systems issues but

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they are coming from the apps division, so there really isn't a Chinese Wall over there, and that's what scares us in competing with Microsoft."

Maples: There is no Chinese Wall. We don't want there to be a Chinese Wall, and I don't think we've ever claimed that there is a Chinese Wall. Microsoft is a single company. We have a single management executive in Bill. We don't try to pretend that there is a Chinese Wall, any more than there is at IBM or Apple or any other company.

Johnston: Yet I recall Steve Ballmer using the term Chinese Wall. He said the apps division got the information about beta code and new systems designs at the same time as the people outside and that they were, in fact, two separate companies.

Maples: I never heard that. I wouldn't argue that somebody said that, but I can tell you that I've never said that.

The bigger issue would be, if we were using secrets or undocumented things, and we very consciously avoid that. A long time ago, when Windows was barely being strapped together, there were cases where things were added to make [the applications division's] life easier, but they were added for other apps developers too. But right now, to my knowledge, there isn't a single undocumented thing in Windows that is used by a Microsoft application.

Johnston: Yet this issue was evidently in the Federal Trade Commission's mind after they did the first round of interviews with third parties then expanded their probe of Microsoft.

Maples: The only things that I've ever seen reported was that the FTC got a number of complaints that they were investigating. People can make up complaints about anything. I don't see that we are doing anything illegal, immoral or irrational, and it is certainly in our interest to have a lot of Windows ISVs. As soon as the ISVs believe the playing field's not level they'll pick another platform.

Johnston: At the Applications Horizon meeting last month there was a lot of hoopla attributed to you by The Wall Street Journal about how Microsoft, despite the FTC investigation, is trying to conquer the entire market.

Maples: That was very much out of context. The question was about market share on the Mac and how happy would you be if you had that share of Windows? It's fair to say that we want to compete vigorously, but we're doing that based on good products and good service. Every vendor would like world domincation and to have 100 percent market share, but to translate that as a goal is a real stretch of the imagination. Windows is on probably 30 to 40 percent of the machines being sold today. If you took the number of Windows sold as a percentage of the installed base, it's probably 8 percent, 10 percent. To dominate the market, Windows would have to triple its sales rate and you'd have to get every Windows app sale.

Johnston: But at that same conference, Steve Ballmer -- or maybe it was Bill Gates -- said by two years from now they expect most of the installed base to have migrated to Windows.

LEXIS·NEXIS LEXIS·NEXIS LEXIS·NEXIS
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Maples: I listened to every speech and I didn't hear that. To believe that Windows in the next year or two could penetrate the installed base would be a very difficult situation.
Mike Maples
Senior V.P. of Applications
Microsoft Corp.
Redmond, Washington
Age: 49

GRAPHIC: Picture, no caption

LANGUAGE: ENGLISH

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TAB 19

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

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66-MHz 486DX2 PCs

We score 17 of the newest, fastest systems. See page 114

/EMBER 16, 1992 THE VOICE OF PERSONAL COMPUTING IN THE ENTERPRISE VOLUME 14, ISSUE 46

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94-1564 SS

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U.S. District Court
of Columbia

PETER HOEY

Undocumented Windows calls

Deciphering the charges leveled at Microsoft

By Brian Livingston

We may never know the true status of the Federal Trade Commission's investigation of Microsoft Corp. unless the agency decides to go public with its case. But based on accounts by developers, a composite of the FTC's potential case against Microsoft can be drawn.

Research and interviews by *InfoWorld* have revealed at least half a dozen cases in which Microsoft allegedly withheld information on its DOS or Windows functions from outside developers, for periods ranging from six months to several years. During these periods, Microsoft's own developers appear to have used these functions in applications or utilities that competed with those eventually developed by independent software vendors, according to programmers who have examined the code.

In only one case (involving a version of Microsoft Excel) do the undocumented functions appear to have given a Microsoft application a performance advantage. But, in each case, the lack of documentation of the functions may have given Microsoft applications a time-to-market lead of six months or more before similar features could be incorporated into competing developers' applications, say critics of the Redmond, Wash., firm.

FTC INVESTIGATION. The FTC refuses to comment on pending cases (or even confirm that Microsoft is the subject of an investigation). Lacking hard facts, observers have assumed that the FTC is interested in possible anticompetitive behavior that Microsoft may have engaged in when marketing MS-DOS, OS/2, and Windows.

The tone of recent interviews sponsored by the FTC, however, suggests that the investigation has moved into a slightly different area: enforcing federal laws against unfair competition.

Microsoft enjoys at least a near-monopoly in the market for its two main products: DOS and Windows. Market analysts indicate that Microsoft controls more than 80 percent of the market worldwide for DOS-compatible operating systems, with most of the rest accounted for by Novell Inc.'s DR DOS (mainly in Europe and Asia). Microsoft's shipments of Windows amount to 100 percent of the market for Windows 3.1-compatible operating systems. Whether this market dominance has been taken advantage of by Microsoft is hotly disputed between Microsoft and its critics in the software industry.

Federal antitrust laws do not prohibit one company from "benignly achieving an overwhelming share of a market," according to Gerry Elman, CEO of Elman & Wilf, a Philadelphia law firm that represents software companies. The Federal Trade Commission Act, however, does prohibit "unfair methods of competition." This includes improper activities by companies that have a monopoly on a particular market, says Elman, who worked for six years in the antitrust division of the U.S. Department of Justice.

Because the relevant act is broad, the U.S. Supreme Court in 1972 clarified the definition of unfair competition. The Court upheld an FTC policy against practices that are: 1. prohibited by "common law, statutory, or other established concept of unfairness"; 2. "immoral, unethical, oppressive, or unscrupulous"; or 3. cause "substantial injury to consumers (or competitors or other businessmen)."

This definition is still quite broad.

"The court interpreted congressional intent as granting the FTC wide discretion in identifying unfair behavior in the marketplace," Elman says.

OPERATING SYSTEM DEFINITION. Software developers do not complain about Microsoft reserving functions of its operating systems solely for the internal use of those systems. An operating system must, in fact, keep a certain number of functions to itself. Otherwise, applications using these functions could make the system unstable. It is only when Microsoft's utilities and applications use those "undocumented" functions that competing vendors complain.

Software vendors often make substantial amounts of revenue by selling utilities that supplement Microsoft's. Products such as the Norton Utilities, Mace Utilities, and PC Tools have been tremendous financial successes. Vendors use these revenues to fund the development of other applications, which may compete with Microsoft more directly. If Microsoft uses undocumented functions, which outside vendors cannot easily obtain, it would cut off a vital flow of cash for software development.

Consider MS-DOS. The DOS operating system consists of two hidden files that are installed on a PC's hard disk. In DOS 5.0, these files are called IO.SYS and MSDOS.SYS. These files provide the core services needed for Disk Operating System functionality.

Microsoft also sells utilities, such as COMMAND.COM, which act as "shells" for DOS but are not the operating system itself. COMMAND.COM is replaceable and competes with 4DOS, by J.P. Software; NDOS, a part of the Norton Utilities (which is based on 4DOS); and several other DOS shells.

Similarly, other Microsoft utilities, such as FORMAT.COM, are not the operating system, but use services of the operating system. These "external" utilities compete with Novell's DR DOS and other vendors trying to sell operating systems compatible with MS-DOS.

Windows, which Microsoft markets as an operating system, also has operating-system components and utilities. The operating system consists of three components: USER.EXE, GDI.EXE, and KRNLX86.EXE. Shells, such as Program Manager and File Manager, are not part of the Windows operating system. These shells can be replaced by other shells, which are run by Windows' three essential components. Program Manager and File Manager compete with Norton Desktop for Windows, WinTools, and numerous other products.

The distinction between the kernel of an operating system and utilities that are bundled with that operating system is often unclear, even within Microsoft. "What are the areas that third parties can and should market?" asks Cameron Myhrvold, product manager for the Windows Software Development Kit (SDK). "The shell is not something we have encouraged a lot of people to replace, because of the importance of a consistent interface."

But DOS and Windows, like most computer operating systems, are clearly made up of an essential OS kernel and simple but useful utilities that use the functions of that kernel. "Every operating system works that way," says Steve Gibson, the developer of SpinRite and other utilities. "You have a core operating system, and utilities that can't function without that core."

On top of its two operating systems, and the utilities bundled with them, Microsoft develops and sells applications. These applications usually compete with those of other vendors, who would like to make money selling similar or superior products.

If Microsoft withholds information about important features of its operating systems, then uses these features in applications or utilities that compete with other vendors, is it practicing unfair competition or merely managing its business well?

Developers themselves are of different minds. "My attitude toward the undocumented functions is it's a sort of a witch hunt," says Paul Yao, who leads Power Programming workshops for International Systems Design of Bellevue, Wash. "Yes, there are undocumented calls. At the end of one chapter of my book [Chapter 5 of *Peter Norton's Windows 3.0 Power Programming Techniques*, by Peter Norton and Paul Yao, Bantam, 1990], there is a statement not to use these calls." Yao believes developers who use these functions run the risk of their applications not working under a later version of the operating system.

With all these legal and technical issues, what is the FTC looking for in its investigation of Microsoft? The following details could influence a possible FTC challenge to Microsoft, according to statements from Microsoft competitors.

DID MICROSOFT USE UNDOCUMENTED DOS FEATURES? To understand the roots of the current controversy, it is necessary to go back to the release of DOS 2.0.

To a programmer, the behavior of DOS 2.0's PRINT.COM utility was unusual. A user was able to type a command, such as "Print Bigfile.txt," and almost immediately return to the DOS prompt. Users could start and run another program, such as Lotus 1-2-3 or WordStar, while DOS sent Bigfile.txt to the printer in the background. PRINT.COM knew how to terminate, yet stay resident in DOS — it was the first TSR program.

The function calls that allowed PRINT.COM to multitask were not described in Microsoft's reference books on DOS. In fact, many other function calls were not documented either.

Since it is a highly desirable feature for a program to be able to work in the background, programmers outside Microsoft began to puzzle out how this magic was accomplished. One result was a TSR called SideKick, released in 1984 by a tiny company now known as Borland International Inc.

SideKick, a personal information manager, was a remarkable success and was soon imitated by other programmers. Unfortunately, because Microsoft had not documented several functions necessary to write a reliable terminate-and-stay-resident program, many of these TSRs left out important safeguards. They crashed when more than one was loaded, or worse, they interfered with normal, foreground applications.

Under fire from Borland and other companies, Microsoft representatives in 1986 began to discuss publicly some of the secret functions. But the effort was too late. Swamped with mysterious problems, many PC managers adopted policies forbidding the use of TSR programs. Other than SideKick, no TSR became a best-seller.

Yet Microsoft released its own utilities that depended on undocumented TSR function calls. For example, Microsoft's CD ROM Extension program, MSCDEX.EXE, released in 1987, allows files on a compact disc to appear in the standard DOS file system. Microsoft representative Tony Rizzo said in the September 1987 *Microsoft Systems Journal*, a programmers magazine currently published by M&T Publishing of San Mateo, Calif., that Mscdex used something called the DOS "network redirector." But this capability remained undocumented and unavailable to developers of competing file-system products. (Technically speaking, Mscdex used undocumented Function 11 of DOS Interrupt 2F.)

Undocumented functions were also used in Microsoft debuggers, including Debug and CodeView. These debuggers call Interrupt 21, Function 4B, Subfunction 01. Microsoft's technical documentation for DOS listed only Subfunctions 00 and 03 until recently. Knowing the missing subfunction is a requirement for any company trying to write a competing debugging environment for programmers.

DID MICROSOFT USE UNDOCUMENTED FEATURES IN EXCEL? Today, Microsoft Excel is by far the No. 1-selling graphical spreadsheet. Lotus 1-2-3 for Windows did not appear on the market until 18 months after Windows 3.0, and Quattro Pro for Windows shipped just last month.

With its now dominant place in the market, it's easy to forget that Excel originally did have stiff competition. Under Windows 2.x, Excel had to face well-financed spreadsheet rivals such as Wingz by Wingz Software, and Full Impact from Ashton-Tate.

The failure of these products was widely attributed to their slower performance compared with Excel. Numerous published reviews from that era show Wingz and Full Impact lagging behind Excel.

Tim Paterson, the author of DOS 1.0,

What's the beef?

Critics of Microsoft accuse the company of using undocumented features of DOS and Windows in applications and utilities like the ones that independent software vendors also want to sell. The following are some examples of the controversy:

Function	Use by Microsoft	Discussion
• INT 2F Function 11	Microsoft CD-ROM Extensions	Undocumented DOS "network redirector" function also used for drive remapping
• INT 21 Function 4B 01	Debug and CodeView	Undocumented but required to write debugging environments for compilers
• DefineHandleTable	Microsoft Excel	Windows 2.x function, undocumented until made obsolete by Windows 3.0
• GetTaskQueue and Directed Yield	Quick C for Windows	Windows 3.0 functions; DirectedYield was documented in Windows 3.1 SDK, but not GetTaskQueue, which Microsoft describes as useless
• InitApp, InitTask, and WaitEvent	Windows 3.0 SDK compiler (1989)	Functions necessary to compile Windows applications, released to independent compiler vendors in April 1991.
• OLE 1.0 specs	PowerPoint	Critics charge PowerPoint was released with OLE support six months before OLE specs were released to competing vendors
• Drag-and-Drop Server API	File Manager 3.1	Not available to outside developers until after Windows 3.1 shipped.
• NT DLL functions	Pview	Win32 developers claim Microsoft's processor-view utility uses functions they cannot access for their own utilities

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revealed an important reason for this difference in a two-part article, "Managing Multiple Data Segments Under Microsoft Windows," published in the February and March 1990 issues of *Dr. Dobb's Journal* (M&T Publishing). Paterson and fellow programmer Steve Flenniken described undocumented function calls in Windows 2.x that allowed Excel to access large amounts of extended memory rapidly.

Specifically, Excel used undocumented functions of Windows 2.x named *DefineHandleTable*. Without these functions, Paterson and Flenniken wrote, an application's data was limited to "not more than 300K under the best conditions." However, they wrote, "Microsoft's own Windows applications use all of the techniques discussed here ... to build Windows applications with virtually unlimited data capacity."

The *DefineHandleTable* functions in Windows 2.x were documented by Microsoft in the Windows 3.0 SDK. But developers charge that this was too late, as the functions are no longer needed in Windows 3.0's protected mode.

DID MICROSOFT USE UNDOCUMENTED FEATURES IN QUICK C? On August 31, 1992, Microsoft released an eight-page statement and a 10-page white paper on 16 undocumented Windows 3.0 functions used by Microsoft applications. These functions were revealed earlier that month in *Undocumented Windows* (Addison-Wesley, Reading, Mass.), a book by Andrew Schulman (a former software engineer at Phar Lap Systems), David Maxey (a former Lotus developer), and Matt Pietrek (a California developer).

In its statement, Microsoft says, "Microsoft applications derive no unfair advantage from the few undocumented APIs that they call." Additionally, "Microsoft has also provided at least 26 ISVs [independent software vendors] with the information on undocumented calls in Windows."

Regarding some of the undocumented functions used by Microsoft applications, the white paper describes four of these functions as "documented in the Windows Software Development Kit (SDK), Version 3.1," six as obsoleted by Windows 3.1, and six more as undocumented but "with documented equivalents" or "entirely useless."

For example, the white paper describes the Windows 3.0 function *GetTaskQueue* as "undocumented," with "no equivalent, but useless." Another Windows 3.0 function call, *DirectedYield*, is described as being documented in the Windows 3.1 SDK.

Undocumented Windows coauthor Schulman charges, "It's dishonest for Microsoft to tag as 'Documented in SDK' functions that have only recently been documented in the 3.1 SDK, but that Microsoft [and others] were using long before 3.1. Timing is everything in this industry."

Schulman says that the *GetTaskQueue* and *DirectedYield* functions are essential to the working of Microsoft's Quick C for Windows and are, in fact, "crucial to writing an integrated development environment or debugger for Windows."

By disassembling QCWIN.EXE, the main executable file in Quick C for Windows, Schulman says he found at least three instances of the following code:

```
if (GetTaskQueue(hTask != 0)
  PostAppMessage(hTask, ...);
DirectedYield(hTask);
```

The first line of code determines whether a C application running in Quick C's development environment has set up a "task queue" for messages. If so, the second line posts a message to that queue. Finally, Quick C yields control to the application so it can process the message. This routine is necessary because sending a message to an application before it's ready can cause strange system crashes.

"We needed five undocumented calls to write debugging devices for Windows 3.0," says one developer for a major software firm, who spoke to *InfoWorld* only on condition of anonymity. "Meanwhile, Microsoft came out with these devices, and it wasn't until six months after the release of their [Microsoft's] debuggers that Microsoft provided the information."

DID MICROSOFT WITHHOLD THE "SECRET SAUCE"? According to *Undocumented Windows*, several undocumented calls — known among developers as the "secret sauce" — were used to compile Windows programs using Microsoft's own Windows 3.0 SDK, which Microsoft began selling in 1989. Competitors such as Borland, Zortech/Symantec, and other C language vendors could not create their own stand-alone Windows compilers, which did not require Microsoft's SDK, without conducting a project to disassemble Windows and discover these secrets.

After much criticism by competitors, several of these crucial, undocumented functions — including *InitApp*, *InitTask*, and *WaitEvent* — were finally unveiled by Microsoft. Most of the information came out April 9, 1991, in Microsoft's "Open Tools" binder, as well as being documented in the Windows 3.1 SDK later that year.

Unfortunately for Microsoft's competitors in the heated C-language marketplace, Microsoft had already shipped more than 48,000 copies of its SDK compiler by the time the Open Tools release took place. Critics of Microsoft argue that this gave the Redmond company a tremendous lead with corporate and commercial programmers, who were actively purchasing tools to create Windows applications.

Microsoft's Cameron Myhrvold argues that, far from giving Microsoft an advantage, the extra effort that Zortech and Borland put into their compilers increased their market share, at Microsoft's expense. "Zortech C was the first [stand-alone] compiler to ship for Windows in August of 1990, then Borland," says Myhrvold. "The first Microsoft C compiler that didn't need the SDK didn't ship until around Windows 3.1." As a result, Myhrvold says, Borland and Zortech now outsell Microsoft in C language compilers.

DID MICROSOFT DEVELOPERS GET ADVANCE OLE CODE? A hot new feature of Windows 3.1 is Object Linking and Embedding (OLE), a feature that allows users to place text or a graphic from one application into another and have it dynamically updated. Microsoft's documentation of the OLE 1.0 specification was released to developers in December 1990.

But Microsoft PowerPoint 2.0, which was shipping to paying customers six months earlier, already had support for OLE between its graphing and display modules, developers point out. PowerPoint had OLE hard-coded into it, rather than relying on external OLE libraries, as became possible later.

"I don't know how to call that one," Myhrvold says. "PowerPoint [developers] went ahead and shipped something before it was final, probably Version 0.8 or something like that." He explained that Microsoft is trying to work more closely with independent software vendors on the upcoming OLE 2.0 specification, beta copies of which were shipped to several dozen vendors two weeks ago.

DID MICROSOFT WITHHOLD DETAILS OF DRAG-AND-DROP? Windows 3.1 allows users to drag file names from the File Manager window and "drop" them onto other applications. The applications then automatically open or print the dropped documents.

Microsoft documented how a "client" application should respond to a file being dropped on it. But, despite repeated requests from ISVs, Microsoft pointedly refused to distribute any information about how the Windows 3.1 File Manager acts as a "server" for file names dragged out of its window, preventing developers of competing file managers from releasing upgrades with the release of Windows 3.1 on April 6, 1992.

The information needed for competing vendors to develop their own drag-and-drop servers remained undocumented until an article by Jeffrey Richter — the author of *Windows 3.1: A Developer's Guide* (M&T Publishing, 1991) — appeared in the May-June 1992 issue of the *Microsoft Systems Journal*. Even then, the information appeared only after attempts by Microsoft officials to suppress the article and after another publication threatened to run it. "The *Microsoft Systems Journal* article by Jeffrey Richter was stalled by Microsoft for months because of resistance in the company to publishing this article," says *Undocumented Windows* coauthor Schulman. Richter confirmed this saying, "It was held up by a Windows 3.1 product manager," whom he declined to identify.

"There were a number of vendors who figured out drag-and-drop," Myhrvold says. "With certain issues, we aren't going to sue Norton [Desktop] or stop them, but we're not going to assist them in doing a shell." Server drag-and-drop "wasn't implemented robustly in Windows 3.1, and we wanted to improve it [in a later version]. It's important for consistency for the user."

WINDOWS NT AND THE FUTURE. Outside developers have found parts of Windows NT that are undocumented but are being used in Microsoft utilities that compete with utilities they would like to sell. Although NT is still in beta testing, several vendors are already selling NT development toolkits to numerous commercial and corporate sites.

Microsoft's Win32 Software Development Kit (required for developing NT applications) includes a utility called Pview. This tool lets developers look at the tasks assigned to one or more processors. The utility uses functions such as *NtQuerySystemInformation*, *NtQueryPerformanceCounter*, and *NtQueryInformationThread*, according to Schulman. These functions, although contained in NTDLL.DLL (which will be included in the shipping version of NT), are all undocumented.

"If NT is to be successful," Schulman says, "won't it need the same kind of active third party-utilities market that DOS and Windows have? So won't developers need to be able to write their own utilities, such as Pview?"

Microsoft intends to provide this information to developers, Myhrvold says. "We're going to document the NT API. Some of it is in the NT DDK [Device Driver Kit]," which shipped to developers last week. "We're also looking at producing a technical reference, or putting it in the MSDN [Microsoft Developer Network CD ROM]. That will be forthcoming near or just after NT ships."

GOOD FOR BUSINESS? Is Microsoft's use of undocumented functions in applications and utilities that compete with independent software vendors something that developers (or the FTC) should complain about? Or is it simply good business?

For whatever reasons, Microsoft has become by far the world's largest software company. In the last four quarters (ending September 30), it had sales of $3.0 billion and net income of $773 million.

Microsoft's sales represent 7 percent of all sales made by U.S. companies in the "computer software and data processing" category, according to Media General Financial Services, a market analysis firm. But Microsoft's net income represents 25 percent of all profits made by those same firms — a fact that causes resentment among other developers.

Whether its share of the operating systems market has given Microsoft an unfair advantage in marketing DOS and Windows applications is open to dispute. What is certain is that Microsoft is now selling more than 60 percent of all Windows applications, according to Jesse Berst, editor of the *Windows Watcher* newsletter in Redmond, Wash., which tracks software sales.

Because of this dominance, some vendors argue that Microsoft should be broken into separate companies responsible for systems, languages, and applications. These "Baby Bills," like the "Baby Bell" telecommunications companies that resulted from the 1984 breakup of AT&T, would presumably improve competition.

Only history will tell if this is what the FTC seeks. Since the present FTC investigation of Microsoft will wind slowly through the courts — if the agency takes any action at all — it may be years before anyone knows the final outcome.

Brian Livingston is a contributing editor at InfoWorld and the author of Windows 3.1 Secrets (IDG Books).

Jeanette Borzo, Jim Hammett, Doug Barney, David Coursey, and Stuart Johnston contributed to this report.

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TAB 20

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

SOFTWARE

WINDOW MANAGER · BRIAN LIVINGSTON

Will 'Windows compatible' really mean what it says?

A DEVELOPER WITH WIDE-RANGING experience in Windows programming will announce a new book on Nov. 15 that will reveal many of the undocumented features Microsoft's Windows 95 shell takes advantage of.

Along the way, Andrew Schulman (co-author of *Undocumented DOS* and *Undocumented Windows*, Addison-Wesley, [800] 822-6339 or [617] 944-3700) shows who will benefit from the release of Windows 95 and who will be hurt. In particular, Schulman points to those developers who will be handicapped by some of the new requirements that Microsoft Corp. has tacked onto its "Windows-compatible" logo, which it licenses to vendors of shrink-wrap software.

In his new book, *Unauthorized Windows 95* (IDG Books, [800] 762-2974 or [415] 312-0650), Schulman lists these new requirements. Aside from the features an application arguably needs to qualify as "Windows 95 compatible" — it must be a 32-bit application, it must handle filenames longer than eight characters, and so on — there are several requirements that have nothing to do with Windows 95 compatibility. Quoting from *Microsoft Developer Network News*, July 1994 issue:

- It must run on Windows NT 3.5.
- It must have OLE 2.0 container and/or object and OLE 2.0 drag-and-drop support.
- It must include a Send or Send Mail command on the File menu (and support the Common Messaging Call API).

Although Microsoft allows some exceptions to the last two rules for applications that don't deal with files (such as games), all three of these new requirements have raised eyebrows with developers.

In his forthcoming book, Schulman writes: "Microsoft is simply raising the cost of developing Windows applications, and not necessarily in ways that will benefit end-users."

As examples, he cites the requirements to support NT and OLE. "The NT requirement seems like nothing more than an attempt to leverage Microsoft's control over the upcoming Windows 95 market to assist its lackluster Windows NT product. The OLE 2.0 requirement is odd, given that Microsoft itself hasn't used OLE for the Windows 95 shell."

That new shell is an application called EXPLORER.EXE. In recent betas of Windows 95, the line SHELL=EXPLORER.EXE appears in the SYSTEM.INI file, rather than SHELL=PROGMAN.EXE as in Windows 3.x.

In *Unauthorized Windows 95*, Schulman reveals that this shell application uses several as-yet-undocumented features of the new operating system. These calls include such intriguing-sounding functions as RegisterShellHook, FSNotify_HandleEvents, and SHFindFiles. These functions (and how they work) might be of no significance, except that many developers have expressed interest in selling improved shells to Windows 95 users.

It's easy to switch shells. Simply change the SHELL= line in SYSTEM.INI (or in the new Registry database, which will likely be the repository of this kind of information by the time Windows 95 is released). But developers will need to get or create documentation on these functions in order for their products to emulate Microsoft's own shell.

The NT requirement particularly bothered several developers I spoke with. As it turns out, NT differs from Windows enough that supporting both environments can be a full-time job. Some API functions use different parameters, some things that work in one environment don't work in the other, and so on.

I'd say the "Windows 95" logo is going to be meaningless in determining the real compatibility of new programs. I'll have more on this next week.

Brian Livingston is the author of Windows 3.1 Secrets *and* More Windows Secrets *and co-author of* Windows Gizmos *(IDG Books). Send tips to brian_livingston@infoworld.com, or fax: (206) 282-1248*

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FEB 14 1995

Clerk, U.S. District Court
District of Columbia

TAB 21

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

ORIGINAL

MICROSOFT CORPORATION

PERFORMANCE REVIEW FORM FOR EXEMPT EMPLOYEES

NAME: REDACTED POSITION TITLE: Group Product Marketing Mana

GROUP: Languages Marketing REVIEW PERIOD: April 87 - Sept 87

Instructions to the Manager:

1. Give the review form to the employee for their evaluation of work performed since the review.
2. Once completed, determine your own evaluation and ratings of the employee's performa Discuss these with the employee.
3. Finally, fill out the final overall rating below and jointly establish objectives and pertir performance factors for the next review period.

Instructions to the Employee:

1. In one or two sentences, describe the overall function or purpose of your position.
2. Complete both sections entitled: Major Activity/Objectives and Performance Factors evalua your performance since the last review.
3. Return the review form to your manager for his/her rating, and once completed, discuss ratings and pertinent performance factors for you and your position, and future objectives.

RATING DEFINITIONS: Ratings should be given in 0.5 increments. For example, 3.5 is a valid rating, but 3.7 is not.

(5) EXCEPTIONAL PERFORMANCE: Consistently exceeds all position requirements; v consistently exceeds quantity, quality, cost,, and time standards. Consistently meets hig standards of excellence.

(4) EXCEEDS PERFORMANCE STANDARDS: Consistently exceeds most position requirements expectations. Work exceeds most standards often; meets high standards of excellence.

(3) MEETS PERFORMANCE STANDARDS: Consistently meets requirements and job standards; require assistance with complex or new assignments. Work regularly meets standards of f competent performance.

(2) NEEDS IMPROVEMENT: Does not meet standards of the job consistently; may need additi time-in-job, further training or more than normal supervision; may meet some posi requirements but possess one or more performance deficiencies in critical job areas.

(1) UNSATISFACTORY: Falls short of minimum requirements in critical aspects of job.

FINAL OVERALL NUMERICAL RATING (to be completed by manager): _____
This rating should be a composite of the Major Activity/Objective and Performance Factor sections. Remember that 5 is high and 1 is low.

FILED

EMPLOYEE: REDACTED DATE: 11-2-87
(Your signature does not necessarily mean that you agree, but affirms that this review has been discussed in detail with you.)

FEB 14 1995
Clerk, U.S. District Court
District of Columbia

MANAGER: REDACTED DATE: 11/2/87

APPROVING MANAGER: _____ DATE: _____

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International Executive
BRIEFINGS

As Steve said, we toyed with the idea of responding with just mktg activity. But they best way to stick it to Phillipe is with product.

- free 2.01 update for word of mouth
- QB3 preannounce to hold off Turbo buyers
- free 2.01 → QB3 so they won't wait to buy.

QB4 is a Turbo killer.

If we mobilize now we can take advantage of this opportunity.

QB3 compares well with TB, but we are still looking for creative product ideas. If you have one, let me know.

We just got a QBZ survey back and we DESPERATELY wanted to know which product BASIC pgmrs would use.

- What was considered at purchase time?
- % that answered "very important"
- QB3 wins in categories customers care about most.
- don't know how we compare on reliability, exe speed, document.
- Customers want our goals to be...

If we do things right w/ QB3 we can beat Borland.

- Our future plans match w/ customers desires.
- Exe speed will have minor improvements
- Borland cannot match Int/comp pair
- We may revisit macros & user defined keys.

When we look at customer desires and the QB4 spec, I think we have a Turbo killer. We need to work like mad to have a winning version of QB3 to keep Borland from getting

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MICROSOFT CORPORATION

PERFORMANCE REVIEW FORM FOR EXEMPT EMPLOYEES

REDACTED

NAME: _____ POSITION TITLE: Group Product Manager

GROUP: Languages _____ REVIEW PERIOD: 11/86 - 5/87

Instructions to the Manager:

1. Give the review form to the employee for their evaluation of work performed since the last review.
2. Once completed, determine your own evaluation and ratings of the employee's performance Discuss these with the employee.
3. Finally, fill out the final overall rating below and jointly establish objectives and pertinen performance factors for the next review period.

RATING DEFINITIONS: Ratings should be given in 0.5 increments. For example, 3.5 is a valid rating, but 3.7 is not.

---

(5) EXCEPTIONAL PERFORMANCE: Consistently exceeds all position requirements; wor consistently exceeds quantity, quality, cost, and time standards. Consistently meets highe standards of excellence.

(4) EXCEEDS PERFORMANCE STANDARDS: Consistently exceeds most position requirements an expectations. Work exceeds most standards often; meets high standards of excellence.

(3) MEETS PERFORMANCE STANDARDS: Consistently meets requirements and job standards; ma require assistance with complex or new assignments. Work regularly meets standards of ful competent performance.

(2) NEEDS IMPROVEMENT: Does not meet standards of the job consistently; may need addition time-in-job, further training or more than normal supervision; may meet some positi requirements but possess one or more performance deficiencies in critical job areas.

(1) UNSATISFACTORY: Falls short of minimum requirements in critical aspects of job.

FINAL OVERALL NUMERICAL RATING (to be completed by manager): _____
This rating should be a composite of the Major Activity/Objective and Performance Factor sections. Remember that 5 is high and 1 is low.

REDACTED

EMPLOYEE: _____ DATE: 5/4/87
(Your signature does not necessarily mean that you agree, but affirms that this review has been discus

MANAGER REDACTED _____ DATE: 5-4-87

APPROVING MANAGER: _____ DATE: _____

AJOR ACTIVITY/OBJECTIVE: *Compete with Borland*
y most important activity is to be sure that Microsoft competes effectively with Borland. This includes ollecting intelligence about Borland activities and products, making sure that our products are competitive, nd building awareness among end users and gateskeepers about how we compare with Borland products.

MPLOYEE EVALUATION:
verall, I did a very good job in the BASIC market and my work in C has been fair but not outstanding.

hen Borland announced TurboBASIC at the November Comdex, I collected information about his product nd moved quickly to formulate a response strategy. My strategy involved a rapid product response to urboB that could hold our position until QB4 (then called QB3) hit the market. I also proposed that we call QB3 instead of QB2.5 in order to make the release sound more significant. I worked with LenO and TomC o develop a QB3 spec that could beat TurboB. In addition to mobilizing development, I flew to Dallas to ttend a region manager's meeting where we formulated a retail promotion strategy intended to fill the hannels with QB before TurboB shipped. I reviewed the promotion plan with BillG before implementation egan. I also flew to LA to meet with KDP about the QB3 ad. In that meeting we decided that to compete ith Borland's inside-front-cover advertising, we would need to use a big media unit with heavy paper. I also ositioned QB against TurboB for the ad. RayKa and I met with CorpCom and came up with the idea of QB osters. I have also been working with the press to be sure that comparisons are not made against QB2 (see ress objective section). My rapid response strategy was correct; we would be in a very poor position today, f QB3 were not available (the Byte article bears that out). I was able to mobilize development, retail, and orpcom to respond to the TurboB threat. We have yet to see the ad, but I beleive that my decisions regarding he media unit and my positioning of QB3 are sound. The results of the spiff promotion have been spotty, few distributors have had success with it.

We are not as far along on the response to TurboC because we are further from product announcement. I eveloped a rollout plan for QuickC and CS that focused on minimizing Borland's first mover advantage by reannouncing with an aggressive communication campaign. I determined that we should preannounce in arly June because that is when editorial should be light and it is when BillG speaks at BCS. At SteveSn's uggestion, I worked with KathrynH to make the BCS announcement a real extravaganza. I also proposed a ew early beta program for QuickC that would help us to get press coverage sooner after shipment. I chaired a meeting with BillG, JonS, and SteveB to run through the plan. While we were well prepared to discuss QuickC they were more interested in discussing how we would protect our high end product. This meeting would have gone better if I had met with Bill first to determine an appropriate agenda. We still need to figure out how to protect the high end product from price cutters. We should be prepared to offer a stripped down high-end compiler (i.e., no CodeView, and no QuickC) at a lower price point if TurboC begins to cannibalize the high end.

MANAGER'S EVALUATION AND RATING: 4+

did a very good job shaping our product direction in response to the Turbo Basic product announcement. Alternative strategies were formulated, evaluated, and a decision was reached swiftly. role in this was highly analytical; in the future, should strive to play a more active role in driving the decision process.

The marketing response to Turbo Basic was mixed. did a good job working with the press - although, the final results remain to be seen. Also, the User Group program appears to be going well. wever, other promotional programs were haphazard at best - and our educational thrust is virtually none existant. More creativity is needing in developing marketing programs, and better follow-through is required to implement.

played an important role in Turbo C product response, although the contribution was not as significant as Quick Basic. We all missed the boat on the key marketing issue - a preliminary discussion with Jons would have prevented this. Again, needs to be more pro-active in driving

ACTIVITY/OBJECTIVE: *Public relations*

is my responsibility to get coverage for our language products, and to be sure that the coverage is fair and curate. My activities include press planning, tours, issueing press releases with followup, and working with viewers.

MPLOYEE EVALUATION:

have made some strides with the press in terms of getting them to use our benchmarks. I am working th PcMag to help them develop a set of benchmarks for testing BASIC and C compilers. They also ntacted us before printing their QB benchmarks. We identified problems in their tests and worked with em to correct the problems before the article was run.

y press trips for FORTRAN got us news coverage in InfoWorld, and PC Week. We will also see feature ticles in Computer Languages, PC Tech, Dr. Dobbs, and probably Byte. For this trip I put together a esentation and materials that emphasised the connection between FORTRAN and C, and defined our longer rm strategy for optimization. That approach was very well received by the press because C is hot and cause of the long term strategic implications of the optimization work.

have been working with PC Tech, PcMag, and Computer Languages on QB3. They have held off on their mparison articles until version three, but they have all said they would not wait for version four. My cision to release a QB3 has proven to be correct.

also formulated the PR strategy with Waggener for FORTRAN, QB3, QB4, and the C preannouncement. hese plans have all been approved and I think have some exciting elements.

ve. .l. I think that our relationships with the press have been very good with the notable exception of Byte. is my goal over the next six months to turn that relationship around.

ANAGER'S EVALUATION AND RATING: 5-

gree. The only thing I would add is to continue to improve your listening skills during visits with he press.

TAB 22

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

Exh 22
94-1564 SS

Multimedia Systems

Development Partner Program

FILED

FEB 14 1995

Clerk, U.S. District Court
District of Columbia

Program Application

Please return signed copy to:

Cornelius Willis
Microsoft Corporation
Multimedia Systems Group
One Microsoft Way
Redmond, WA 98052-6399

Submitted by:

_____
Company

_____
Signature

_____
Name

_____
Title (CEO, President or Key Manager with overall responsibility for this project)

Microsoft Confidential

The Multimedia Systems Development Partner program exists to provide developers with necessary and appropriate resources, education, and support to ensure the successful and timely implementation of their projects.

Microsoft views Development Partners as essential parts of our multimedia business plan. This application will help us understand your company's ideas and qualifications. It will also help us to assess your product's development and introduction schedule so that Microsoft may determine your level of interest and commitment. Qualifying for this development program may later entitle you to participate in a marketing support program. Please fill it out as completely as possible and return it, along with all requested materials, to the address indicated on the cover. Microsoft looks forward to your participation in what we expect to be an extremely successful multimedia marketplace.

Developer Information

_____
Company Name

_____
Address

_____
City *State* *Zip*

_____
Telephone *FAX* *Telex*

_____
Development Contact *Title* *Phone*

_____
Marketing Contact *Title* *Phone*

Please describe your company's important business relationships (distributors, venture capitalists, etc.) on a separate sheet.

Company Background

Type of company:

____ ***Publicly held***
____ ***Privately held***
____ ***Subsidiary***

If publicly held please include annual report

_____
Name of parent (if subsidiary)

_____ ***Number of employees*** _____ ~~Gross annual sales~~

Primary business activities:

_____ business software
_____ productivity software
_____ education software
_____ entertainment software
_____ personal productivity software
_____ development tools
_____ other software publisher
_____ consumer information
_____ business information
_____ CD-ROM publisher
_____ on-line information provider
_____ other electronic info publisher
_____ magazine, newspaper publisher
_____ broadcast media producer

Product Information

Proposed product areas (check all that apply):

Applications:

____ adult education
____ business productivity
____ business information
____ consumer information
____ entertainment / games
____ home business
____ home management
____ K-12 education
____ music
____ on-line services
____ personal creativity
____ personal development
____ publishing
____ reference
____ other applications
_____
_____

Tools:

____ animation editing
____ authoring / scripting tools
____ image processing
____ music editing
____ programming tools
____ search / retrieval engines
____ sound processing
____ storyboarding / prototyping
____ other data preparation
_____
_____
____ other programming tools
_____
_____
____ other tools
_____
_____

Current Products

Current key software products (in order of market share and importance to your company):

Product name	*Description*	*Supported Platforms*
Product name	*Description*	*Supported Platforms*
Product name	*Description*	*Supported Platforms*
Product name	*Description*	*Supported Platforms*

Please include any appropriate product descriptions or brochures with this application.

Developer Qualifications

What is the extent and nature of your group's relevant technical experience, particularly in the areas of multimedia production, Microsoft Windows or other windowing systems programming, or new technology implementation in general?

_____
_____
_____
_____
_____
_____

ncept Description

(Please respond to the following questions on separate sheets).

Please provide a short conceptual description of your product(s).

How will you enrich your application so that it is compelling, makes use of this machine, and helps to define multimedia personal computing?

Describe a typical user session with this product. What will a user experience?

List a "table of contents" for this product. If it consists of only one thing (such as "a game") then list its components as appropriate.

Is this product based on an existing application? If so:
On which product is it based ?
What is the history of this product?

Market Analysis

Who is the target audience for your product?

Explain why you think this is an important product for the machine introduction.

What is the proposed price of your product?

What competition do you perceive for this product? How will you differentiate this product from its competition?

Product Development

What is your expected shipping date for retail distribution? _____

When do you project that you will reach these project milestones?

Software Design Complete _____ *Date*

Alpha Level Code _____ *Date*

Beta Level Code _____ *Date*

Final product available for shipment _____ *Date*

Do you perceive any other critical milestones in your development schedule?

If any of the above milestones are contingent on external events, please indicate below:

How is this project funded ? (Please answer on a separate sheet).

Microsoft Corporation
16011 NE 36th Way
Box 97017
Redmond, WA 98073-9717

Tel [illegible] 8080
Te
Fax [illegible] 8101

Microsoft

August, 1990

Multimedia Windows Pre-Release Program

This paper will give you important information about Microsoft's plans for the Multimedia Windows Pre-Release Program and information on how to use it most efficiently.

Multimedia Windows Pre-Release Program Objectives

1. Distribute pre-release software and documentation to qualified developers.

2. Relay information and schedules to multimedia developers in a timely, efficient manner.

3. Educate hardware and software developers on the capabilities of Multimedia Windows.

4. Obtain valuable feedback about Multimedia Windows that will continue to enhance and improve it.

The success of Multimedia Windows system software and its applications depend upon effective communication between Microsoft and the hardware and software communities. Microsoft is committed to this mutually beneficial relationship.

Requirements for Participation

To participate in the Multimedia Windows Pre-Release Program, your company must meet all of the following requirements:

1. Sign the enclosed Pre-Release Program Non-Disclosure Agreements

Enclosed you will find a non-disclosure agreement for the Multimedia Windows Pre-Release Program. By signing this agreement, you agree to participate in the program under confidential restraints, meaning that you will not discuss any information that you receive from Microsoft about this Windows product with anyone outside of your company. This requirement will be in place until Multimedia Windows is publicly announced. Enclosed you will also find a master Non-Disclosure Agreement. A completed copy of this Agreement must be on file at Microsoft and covers additional confidential information you may receive as a participant in the Multimedia Windows Pre-Release Program.

2. Submit a program application to participate in future support programs and to include your company in the Multimedia Windows Hardware and Software Directory database.

By submitting the program application, you become eligible to participate in future technical seminars or marketing programs that Microsoft may offer to Multimedia Developers. Furthermore, this application allows our staff to build an accurate database of active developers and vendors involved in this program so that we can better track your interests and your needs. This tracking system will become even more important as the program grows.

When Microsoft announces its plans for Multimedia Windows, we may publish a directory of company names and product summaries derived from this database. Until that time, the list will only be available to developers in the Pre-Release program.

3. Include a check or P.O. for $495 to Microsoft

This fee enrolls you in the Pre-release program and covers the cost of technical support until product release. A majority of the support for the Pre-Release program will be conducted via Microsoft OnLine, our electronic technical support service. Microsoft will use this communication service to inform participants of plans, changes, and updates. We may also provide incremental software releases via OnLine, which you can download at your convenience. Any feedback or problems you encounter with the product must be reported through Microsoft OnLine.

This special OnLine account will allow your development staff to ask questions about Windows 3.0, the Windows 3.0 SDK, Multimedia Windows MDK and DDK, and the Microsoft languages and tools that support multimedia software development under Windows 3.0. It will also provide them access to all Microsoft product information in the OnLine Knowledge Base.

4. Sign the signature block at the end of this letter, and return the entire package.

By signing this letter, you indicate that you have read and understand this letter and agree to abide by the Pre-Release Program objectives and intentions.

What you can Expect from the Multimedia Windows Pre-Release Program

If you meet all of the above requirements, you will become an on-going member of the Multimedia Windows Pre-Release Program. After Microsoft receives the signed agreements, and application, your Microsoft OnLine account will be activated or modified and your company and product summary entered in the Multimedia Windows database.

Microsoft Online Account

When you return your signed OnLine Agreement, you will receive a Microsoft OnLine access ID number that can be used to access Multimedia Windows pre-release information. OnLine documentation and software will also be sent to all new subscribers.

If you already have an active OnLine Account, a special Multimedia Windows-specific OnLine account will be set up for you. The Multimedia Windows Pre-Release access number for Microsoft OnLine will be dissolved at the termination of the Pre-Release program. You may continue to use the existing account until your Microsoft OnLine subscription terminates. Renewal of your OnLine account will be at the standard price of $795.00.

If you would like to change the billing name and address for that account please fill out the information below:

_____ Yes, please change billing name/address for Windows Pre-Release OnLine access ID number

_____
Billing contact name

_____
Billing company name

_____
Billing address

_____

_____
City State/Country Postal Code

International Developers:

International developers are not required to obtain a Microsoft OnLine account. Instead, please contact your local Microsoft Subsidiary for information on their support programs.

_____ check here if you will be obtaining support from a Microsoft Subsidiary

2. *Review/Sign/Copy/Return the enclosed Non-Disclosure Agreement*

As stated earlier, these agreements allow us to disclose confidential information about our product development plans without compromising marketing plans that we have. If you have any questions about the agreement, please state them in a letter and send to Multimedia Windows Product Marketing address listed below. Since there is no signature block for Microsoft, your copy of each agreement is all that is needed for your records.

If there is a business reason for you to communicate information to another company, please outline your needs/reason and the contact information for that company and return this letter to the Multimedia Windows Product Marketing address given at the end of this letter. You will be notified of the outcome of your request.

3. *Complete and return the enclosed Development Program Application*

If you are currently working on a Multimedia Windows product but would prefer not to be listed in the distributed directory, your information will be kept confidential until you notify us otherwise. Please mark your preference on the application.

If your company is considered a Corporate Account and are using Multimedia Windows as an end-user product only, it is not necessary to complete this step.

TAB 23

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

2ND STORY of Level 1 printed in FULL format.

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Network World

July 25, 1994

Ex. 23
94-1564
FILED
FEB 14 1995
Clerk, U.S. District Court
District of Columbia

SECTION: TOP NEWS; Pg. 4

LENGTH: 724 words

HEADLINE: Microsoft free at last?;
Ruling still lets firm incorporate apps in its OSes.

BYLINE: Michael Csenger and adam Gaffin

BODY:

Washington, D.C.

The antitrust settlement Microsoft Corp. reached with the Justice Department skirted an issue central to network users, paving the way for the software giant to continue integrating applications with its desktop and network operating systems.

The consent decree, announced July 16, focused almost entirely on the way Microsoft sold operating systems to hardware vendors. But it does not prevent the company from integrating applications into the operating system itself.

Competing software vendors such as Lotus Development Corp. had long alleged that Microsoft's applications division received unfair information from its operating systems division that gave the company a leg up on the competition.

Some analysts and users said the decree, which also poses stricter controls on the royalties Microsoft can collect from personal computer vendors, leaves the path clear for Microsoft to mop up competitors that sell stand-alone applications, resulting in more limited user choice down the road.

SKEPTICISM

But others said Microsoft has yet to prove to the market that it has operating systems and networked applications worth betting a business on.

"A lot of its networking products are either futures or first-generation products," said Jamie Lewis, president of The Burton Group, a Salt Lake City consulting firm. The company faces entrenched and growing user bases for both Novell, Inc.'s NetWare operating systems and Lotus' Notes groupware applications, he said.

Users also expressed skepticism.

"Microsoft promises Chicago and Cairo and a whole lot of networking, but the question is, will it work before they run out of cities to name these things

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Services of Mead Data Central, Inc.

after?" quipped a network manager whose major brokerage house network runs on Unix.

Windows NT is not a truly open environment, he said, "Because if Gates doesn't have it then neither do you, and I'd rather not put myself in his hands. That's why we've standardized on Unix for our trading floor."

Frank Caro, technology transition team leader for Otis Elevator Co. in Farmington, Conn., cited interoperability problems with Microsoft's current Windows implementation of Transmission Control Protocol/Internet Protocol as an example of the company's network shortcomings.

"We've been trying to get into the networking capability of Microsoft's products and find there's one common theme: NETBIOS," Caro said. Microsoft does not yet support native TCP/IP, but uses NETBIOS or NETBEUI encapsulated within TCP/IP, he said.

"We're totally uninterested in any approach like this; it can't handle a network of more than 50 users and is terrible over the wide area," Caro said.

And Windows NT has proved unable to handle the applications that Otis wants to take off its mainframe system, because Windows NT is not a multiuser environment.

But Caro respects Mi-crosoft's ability to change course as necessary and awaits the promised native TCP/IP support in Chicago.

"That one feature alone is going to cause dramatic change in network connectivity," said Nick Lippis, principal at Strategic Networks Consulting, Inc. in Rockland, Mass., referring to Windows' TCP/IP.

Native TCP/IP support for Chicago could help Mi-crosoft cut into Novell's in-stalled NetWare client base by providing an alternative to Novell's Internetwork Packet Exchange (IPX) protocol. If the desktop operating systems supported TCP/IP directly, "why continue with IPX?" Lippis asked.

NOVELL NOT WORRIED

"I laugh when I hear people say it's all over for Novell now, we should pack up and go home," said David Bradford, vice president and general counsel for Novell.

"Microsoft has come against Novell [several] now with their networking products, and we've beat them every time," Bradford said.

Bradford also noted that this consent decree does not close Microsoft's books forever. "They will be monitored, perhaps even more so than before," he said. "The industry and consumers have an ally in the Justice Department."

Frank Dzubeck, president of Communications Network Architects, Inc., in Washington, D.C., agrees that the case may not yet be closed.

"If Microsoft gets very aggressive and starts burying things in their operating systems, then this whole issue will be revisited, he said. But it will

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require that another company first go bankrupt."

LANGUAGE: ENGLISH

LOAD-DATE-MDC: July 27, 1994

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MTC-00030631_0506

TAB 24

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

Business Day

C1

MONDAY, JULY 18, 1994

The New York Times

Microsoft's Barely Limited Future

By JOHN MARKOFF

Special to The New York Times

SAN FRANCISCO, June 17 — Rather than reining in the Microsoft Corporation, the consent decree that the Justice Department announced over the weekend with Microsoft, the world's largest software publisher, frees the company to define the computer industry's ground rules through the rest of the decade.

News Analysis

The agreement leaves untouched what many computer industry executives say is Microsoft's principal advantage — that it develops both the basic operating-system software that makes personal computers run, known as MS-DOS, and applications software, like word-processing programs or spreadsheets, that perform specific tasks.

"Microsoft's whole empire is based on the interlocking nature of their operating-system and application software," said William Joy, a founder of Sun Microsystems, and the author of one version of the Unix operating system.

Not a Central Issue

Microsoft officials said Saturday that issues related to the relationship of their operating software and their applications programs had not been a focus of their recent negotiations with Justice Department officials.

MS-DOS and the Windows program, which makes DOS easier to use, are installed in millions of computers worldwide. While the Justice Department has decided that Microsoft does have a monopoly in operating systems, it insists that the licensing changes the consent decree spells out provide a remedy.

Yet many Microsoft competitors see a broader problem, as well: the line between where the operating system ends and the applications programs start is increasingly being blurred by advances in technology.

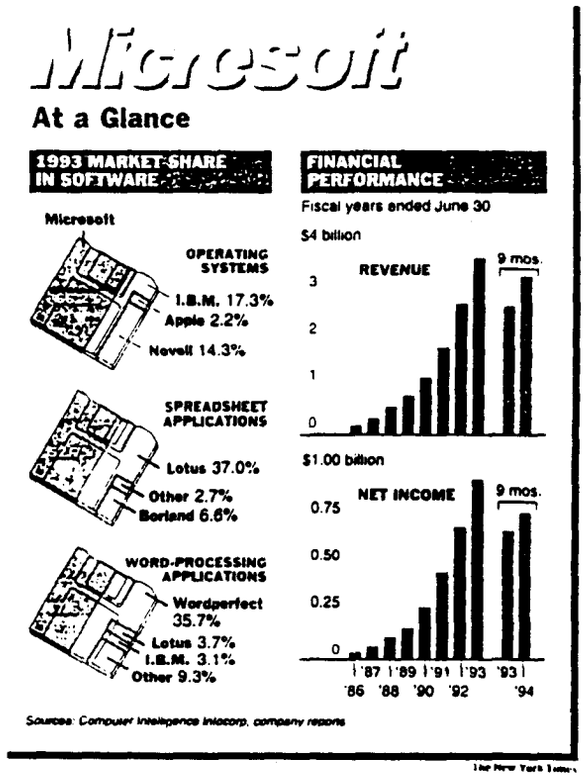
Smaller competitors with innovative ideas in businesses as diverse as electronic mail, file compression, which creates more storage space on a disk, and screen savers, which prevent damage to monitors, are finding that their business is evaporating because Microsoft keeps adding such programs to its operating system as it periodically brings out an updated version.

A Microsoft's operating system scheduled for release next year, called Chicago, will accelerate the process. The program will merge DOS and Windows and will include electronic mail, remote access, file-searching functions and screen savers.

Since introducing MS-DOS in 1981, Microsoft has continually campaigned to expand the definition of what computing functions belong inside the computer operating system. The early versions of DOS were small programs that did little more than control the storage and retrieval of data and start and stop applications programs. But in the 14 years that followed, Microsoft's operating systems have greatly expanded the services they provide to users and programmers.

The other important issue not specifically addressed in the consent decree is whether Microsoft has been able to leverage its virtual monopoly in operating systems into domination

Continued on Page C5



Ahead for Microsoft: Barely Limited Future

Continued From First Business Page

of applications software — a far bigger and more lucrative market.

This matter is of great concern to companies like Lotus Development, Borland International and Novell, and its recently acquired Wordperfect — which specialize in applications software. About half of the 50 million computers that run Windows, for example, use Microsoft's word processor, called Word, and its spreadsheet, Excel.

It was for that reason that lawyers at the Federal Trade Commission toyed two years ago with the idea of breaking Microsoft into two companies. More recently, Justice Department investigators are believed to have studied ways of creating some sort of "Chinese wall" that might limit the information traveling between the two sides of the business.

Anne K. Bingaman, Assistant Attorney General in charge of antitrust matters, refused to comment on the issue. But in response to a question whether the department had considered trying to split Microsoft, she said Saturday that her lawyers had looked at "every possible legal theory."

Linkage Is Soft-Pedaled

In an interview today, Ms. Bingaman acknowledged that the decree was silent about any linkage between Microsoft's power in operating systems and its growth in applications software. But she also said the Justice Department had decided against pursuing a "second range of issues" that had been raised by the F.T.C.'s earlier investigation.

"All I can tell you is we filed the complaint based on what we decided were the problems that needed to be corrected," she said.

What the consent decree announced on Saturday did achieve was this: Microsoft agreed to change the way it deals with the companies that make the hardware for personal computers, freeing them to offer customers a choice of operating systems. Microsoft will also alter its software-licensing policies and the way it gives information to software developers.

The expectation is that personal computer makers like Compaq, Dell and others will now be more receptive to the operating systems made by Novell, International Business Machines and Sun Microsystems.

Software companies will be able to develop versions of their programs for Microsoft's operating systems without making exclusive commitments to Microsoft, leaving them free to create applications for operating systems that other companies have designed.

Yet while the consensus is that Microsoft's influence will continue to increase, computer industry executives are divided over whether its power and influence will be good or bad for consumers.

"Microsoft has become the I.B.M. of the 1990's," said J. Paul Grayson, chairman and chief executive of Micrografix, a software publisher in Richardson, Tex. "There are issues for anyone who wants to participate in this market because of their size and scope. Anything the Government does to slow them down would be welcome."

Believes Bigger Is Better

But others in the industry believe that Microsoft's strategy is benefiting consumers.

"If you really care about improving the personal computer, you want Microsoft to take over all the pieces of the pie," said Stewart Alsop, editor of Infoworld, a weekly computer-industry newspaper.

Competitors like Novell, which were otherwise pleased by the agreement obtained by the Justice Department, said they were disappointed that the Government had not forced Microsoft to disclose information about new versions of its operating systems in ways that would level the playing field for developers who are competing with Microsoft applications.

A software giant's double identity is not addressed in its U.S. accord.

The company's competitors have argued that Microsoft has gained a special advantage for its applications programs by using hidden operating-system features and providing earlier access to technical information for its programmers.

Microsoft officials said the Government had found no evidence that such a special advantage existed. "We don't think this is market power in the traditional antitrust sense," said William H. Neukom, the company's vice president for law and corporate affairs. "Anyone can come in and upset you with better technology. We think it's a ferociously competitive business."

While the agreement may aid some companies like Novell, which makes a Microsoft-compatible operating system, it will not affect Microsoft's power with respect to smaller software developers.

"Microsoft will continue to be very powerful," said Martin Goetz, a co-founder of Applied Data Research, the nation's first software company. "The Justice Department hasn't listened to the cries of the software companies."

FILED

FEB 14 1995

Clerk, U.S. District Court
District of Columbia

Exh. 24 94-1564 SS

TAB 25

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

Ex. 35
94-1564 SS

Michael J. Miller

The World According to Microsoft

FILED
FEB 14 1995
Clerk, U.S. District Court
District of Columbia

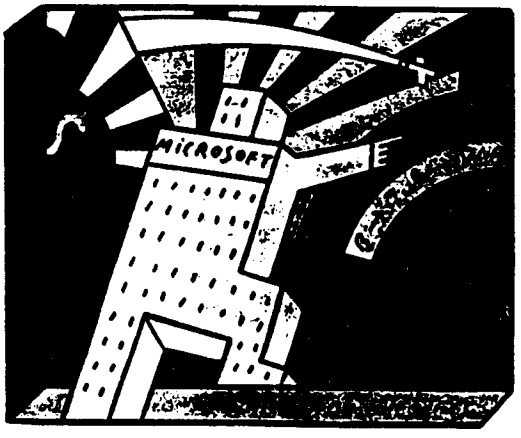
If you think Microsoft is too dominant in today's computer industry, a quick look at where the Bill Gates juggernaut is headed may prove disheartening. Already the leading provider of operating systems and office productivity applications, Microsoft wants to carry its success over to other areas, ranging from interactive television to financial services. With its recent announcements, acquisitions, and introductions, Microsoft is making its goal clear: It aims to become a ubiquitous part of tomorrow's information infrastructure.

THE RIGHT TOOLS

While Intel seems to face more competition than ever, Microsoft's position in the operating-system market has gotten stronger. The reason for this continued success is twofold. Confusion and a lack of focus from OS competitors—such as IBM and Apple—certainly helped, but Microsoft also gave itself quite a boost by developing tools like Visual Basic and Visual C++.

Not too long ago, Borland surpassed Microsoft in the quality of its tools. But more and more, the big firms I talk to are moving to Microsoft tools. This kind of support gives Microsoft the ability to decide which technologies to push and which platforms to support, as well as which technologies to license and which to keep for itself. For instance, Microsoft was first on the market with products that really supported OLE 2.0. Now that it wants OLE 2.0 to be widely supported, it has done a very nice job of making OLE support easier by providing Wizards in its Visual C++ package.

Microsoft wants OLE to be the object standard, and wants to establish it before OpenDoc or Taligent gets off the ground. Microsoft even wants to control object standards on other platforms, hence its introduction of tools that make it easier for developers to take Windows applications and move them to other platforms, such as Macintosh, with built-in support for OLE. Not only does this kind of accommodation push Microsoft's APIs, it also makes it easy for vendors to use Windows as their primary development platform, regardless of what their target system might be. This will, of course, lead to code that is optimized for Windows. (Okay, Microsoft is a bit confused here. This is because part of the company wants to protect the rights of its Word and Excel teams by insisting on special terms for using the cross-platform code for people who write word processors or spreadsheets.)



Microsoft plans to be the backbone of tomorrow's information infrastructure.

THE RIGHT NETWORK

The dominance in tools, applications, and operating systems may be just the beginning. Consider Microsoft's recent announcements, such as Microsoft Network, a new on-line service that will be bundled with Windows 95.

Microsoft Network, once code-named Marvel, may well be the first thing users see when they start the new operating system and it may be the best way to get Microsoft support. If users choose to subscribe to Microsoft Network, the company could wind up getting a steady stream of $4 to $5 a month from everyone on its operating system, and that could mean several hundred million dollars a year.

Microsoft isn't the only one with this idea. IBM is doing the same thing with OS/2 Warp by bundling in Internet access through its Advantis service, which then sets up a continuing monthly fee. In fact, you can almost view these two operating systems as loss leaders for their suppliers' on-line services. Since Microsoft is in a position where its operating system is dominant, however, users will be more likely to try its network service first. In order to be successful, Microsoft Network doesn't even have to be the best on-line service; it just

MTC-00030631_0510

Michael J. Miller

needs to be good enough and the most convenient. And including Microsoft Network with Windows 95 will certainly help.

Now take Microsoft's recent plans to acquire Intuit with its Quicken personal finance program (which links to a check-paying system), and add that to the likelihood of Microsoft Network's success. Because of its size, Microsoft is in a better position to work out relationships with large banks and other financial players. Imagine how Microsoft could extend electronic banking onto an online service such as Microsoft Network. Microsoft could require just a small service charge on each transaction. Or it could make money on the float—the interest in the few seconds it takes to move money from one place to another. Or both.

Microsoft's success in one area helps it extend its success in other areas. Because Windows is so successful, developers must develop for it. If Microsoft Network becomes successful, more developers and content publishers will support it. The same reasoning will apply to Microsoft's Tiger system for delivering video and other content to set-top boxes, or even to the far-off plan of developing wallet PCs with access to financial information.

UNCHARTED WATERS

All this may sound inevitable, but it isn't. First of all, no one—not even Bill Gates—is successful with every product he introduces. Just think about Microsoft Money. And does anyone out there remember the first Microsoft Access, the abortive Crosstalk competitor? Not too many folks, obviously, or Microsoft couldn't have recycled the name for use on its database.

Microsoft still has a lot of strong competitors who envision a different future. Novell, for instance, is still the clear leader in network operating systems and has recently announced plans with General Instruments, the leader in cable set-top boxes.

To date, Microsoft's track record in communications products is less than stellar. Lotus's cc:Mail and Notes have a larger market share than Microsoft Mail. Notes practically defines groupware and Lotus's plans to make Notes a wide-area product through its relationship with AT&T makes it a strong competitor in the world to come. Micro is getting into areas where it will face competition, in addition to its traditio software competitors, from banks to tele sion and cable companies. In many cas these firms have unique relationships w customers or content that Microsoft ca easily duplicate.

The more Microsoft focuses on push its existing platforms and operating syste the more likely it is that there will be so outside force, some new technology, th Microsoft either won't see or won't com to quickly enough. This would leave roo for new competitors. Remember, it was too long ago that IBM, Digital Equipme Corp., and Wang were the dominant info mation companies, and look what happene when the technology changed.

Still, if you're worried about Microsoft dominance today, you have good reason. may foreshadow a future where Microso has a hand in every area of your life—fro communications to entertainment to pay ing your bills. The road to this future won be easy, but Microsoft is very determine and is certainly in a better position tha almost anyone else to ride out th inevitable storms. □

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TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE IN OPPOSITION TO PROPOSED FINAL JUDGMENT IN CIVIL ACTION NO. 94-1564 (SS) SIGNED BY GARY REBACK

PCWEEK
THE NATIONAL NEWSPAPER OF CORPORATE COMPUTING • JULY 25, 1994 VOLUME 11, NUMBER 29 $3.95

DOJ accord fosters 'too little, too late' perception

NEWS ANALYSIS 'Chinese wall' sidestepped, but some see new opportunities

BY JANE MORRISSEY

The Justice Department and the European Commission won several concessions from Microsoft Corp., but observers doubt the consent decree they agreed on will have much effect on the company or its competitors.

The government got Microsoft to give up per-processor licensing and other business practices and will monitor its compliance for six and a half years, but left untouched its ability to preferentially share operating-system information with its application developers.

The consent decree will be open for public comment within the next 60 days, after which a federal judge will offer a final ruling. Legal experts expect the court to uphold the decree.

Although the government could take further action and Microsoft could face lawsuits from competitors, most observers said both are unlikely because of the time and expense involved. Microsoft competitors may have to live with the outcome, but many are not satisfied.

"Anyone who said this decision went far enough isn't in touch with the industry," said Ed Zander, president of SunSoft Inc., Sun Microsystems Inc. software unit. "Of the three or four issues [the DOJ] could have worked on, they picked the least contentious. The 'Chinese wall' is more substantive."

IS managers take sides; despite the agreement, the government's Anne Bingaman and Microsoft's William Neukom still don't see eye-to-eye; Microsoft financials, meanwhile, are strong. Page 110

But Microsoft officials, citing legal precedents to back them up, said they were able to convince the government that such exclusionary sharing is well with-

See Justice, Page 110

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Justice

from page 1

in their rights. "We encourage our systems people to talk with the apps people about potential new operating-systems features," said Chairman Bill Gates.

Operating-system makers such as IBM, Novell Inc., Taligent Inc., Geoworks, and SunSoft said they were were encouraged that Justice took the actions it did on per-processor licensing practices.

"We're going to jump all over this," said Lee Reiswig, president of IBM's Personal Software Products division, in Austin, Texas. "It means a level playing field for us for the first time. We have the opportunity to hit the OEMs."

"It will help us in the future in not disadvantaging us with a pricing mechanism," said Joseph Guglielmi, chairman and CEO of Taligent, in Santa Clara, Calif.

But some said it is too little, too late. "To the extent [Microsoft's behavior] prevented other operating systems from succeeding, that war is over," said Mitchell Kertzman, chairman of Powersoft Corp., in Concord, Mass. "DOS is it and Windows is it. The decision has close to zero impact."

Novell, one of the instigators of the government inquiry, said the decree is a good first step in addressing its concerns. The Provo, Utah, firm will discuss at an upcoming board meeting whether to submit objections or initiate litigation.

"Sure, I am somewhat disappointed," said Novell General Counsel David Bradford. "Nevertheless, I understand how the Justice Department and the EC got to where they did. . . . They did all in their power, given the political and legal environment."

Bradford expects the decree to help Novell fight the next-generation operating-system battle. "The 32-bit OS market has not been won by anybody," he argued. "This decree will allow for freer competition."

A major disincentive to bringing its own charges against Microsoft is Novell's recent desire to forge a better relationship with Microsoft. Novell CEO Bob Frankenberg met earlier this month with Gates to re-establish ties that had broken off under Novell Chairman Ray Noorda.

"Noorda called us Nazis and, so far, Frankenberg hasn't engaged in that type of thing," Gates said, declining to elaborate on any new accords. "We're not going to conduct this phase in a fishbowl." ■

Additional reporting by Mary Jo Foley, Norvin Leach, and Sam Whitmore

THE CONSENT DECREE

OEM licensing practices

- no per-processor licensing deals
- no minimum volume commitments required from OEMs
- no contracts longer than one year; no penalty for non-renewal
- no restrictions on OEM's licensing or sale of non-Microsoft operating systems
- no requirement that OEMs license DOS to gain a license for Windows

Non-disclosure agreements

- duration not to exceed the product's release, public disclosure by Microsoft, or one year, whichever comes first
- cannot restrict third parties from developing software that runs on competing operating systems

THE CONSENT DECREE DOES NOT ADDRESS:

- Microsoft benefiting from operating-system knowledge to develop applications, such as Microsoft applications group getting advance notice on operating-system advancements, and the use of undocumented APIs
- Microsoft acquiring technology from third parties under guise of making a deal

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TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Jesse Berst
Berst Mode

Behind the smoke, Microsoft wins again

I know you've all heard about the settlement between Microsoft and the Justice Department. But I thought I'd tell you some inside information that hasn't made it into the press releases and official statements.

WHY DID MICROSOFT REALLY DECIDE TO SETTLE? Because the Justice Department and the European Commission both said they would sue unless Microsoft agreed by July 14.

WHY DID THE JUSTICE DEPARTMENT REALLY DECIDE TO SETTLE? Because it got to wave the flag and talk in its most grown-up voice about protecting consumers without the risk of lengthy litigation—litigation it probably would have lost.

DOES THE AGREEMENT REALLY CHANGE ANYTHING? No. Microsoft has always let hardware manufacturers make other kinds of deals. But the price for those deals was so much higher that no one could afford to use them. Everybody ended up making per-processor arrangements whereby they ultimately paid Microsoft royalties for every machine shipped. There were always escape clauses. It's just that nobody could afford to take them. Now those escape clauses have been codified into the agreement. Because of the economics, however, few will use them, at least not in the short term. As for non-disclosure agreements, Microsoft was in the middle of creating a new standard agreement anyway.

How pathetic to see Janet Reno prattling on about "lower prices immediately."

WILL CONSUMERS REALLY SEE LOWER PRICES? How pathetic to see Attorney General Janet Reno prattling on about "lower prices immediately." If the decree had come five years ago, when there were viable MS-DOS clones, it might have had some *immediate* impact. Now, in a world where MS-DOS is on the way out and Windows has no real clones, it will have no short-term effect.

WHAT CHANGES WILL REALLY COME ABOUT BECAUSE OF THE SETTLEMENT? Very few. It will be *slightly* easier for computer firms to sell NetWare-ready servers without incurring financial penalties from Microsoft. In the long term, it may be *slightly* easier for a firm to introduce a new operating system.

WHO'S THE REAL WINNER? Microsoft. It gets two governmental bodies off its back. And it does so without admitting that it was wrong, without being forced to divest or break up, and without paying a cent in fines or restitution.

Best of all, it has the opportunity to restore its image just when it needs it most. Microsoft wants to be a dominant player in the enterprise market. To do that, it must convince global corporations that it is a trustworthy long-term partner. That job would have been much harder if governments on two continents were filing lawsuits. The company might as well have changed its slogan to "Microsoft—the most antitrusted name in the business."

HOW DO MICROSOFT'S COMPETITORS REALLY FEEL ABOUT THE SETTLEMENT? They feel like schoolboys who complained about a bully stealing their lunch money and the teacher let the bully keep taking money for four more years while "investigating"—and then let him off with a token promise to be a good boy from now on. And he even got to keep the money he had collected.

Still, I think the announcement will ultimately benefit the rest of the industry. It frees them from their silly fantasy that the government was going to come riding to their rescue. Now they can get back to competing on the basis of better products and features, not better lawyers and lobbyists. ■

JESSE BERST IS DIRECTOR OF THE WINDOWS SOLUTIONS CONFERENCE & EXPOSITION. IF YOU WANT HIM TO CONSENT TO YOUR DECREES, CONTACT HIM VIA E-MAIL (JBERST@MCIMAIL.COM) OR FAX (206-883-1452).

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Microsoft's Marvel beta leverages Win 95 desktop

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BY EAMONN SULLIVAN AND MATT KRAMER

The Microsoft Network, Microsoft Corp.'s new on-line service, is taking the first steps toward joining the ranks of more established services such as CompuServe and America Online by tying itself into Windows 95's navigational tools.

PCWEEK LABS BETA SIGHT

Also known by the code name Marvel, Microsoft Network will reach beta testers in large numbers as part of the second major beta version of Windows 95, due this week. PC Week Labs took a look at the on-line service on a late-release candidate of the second beta.

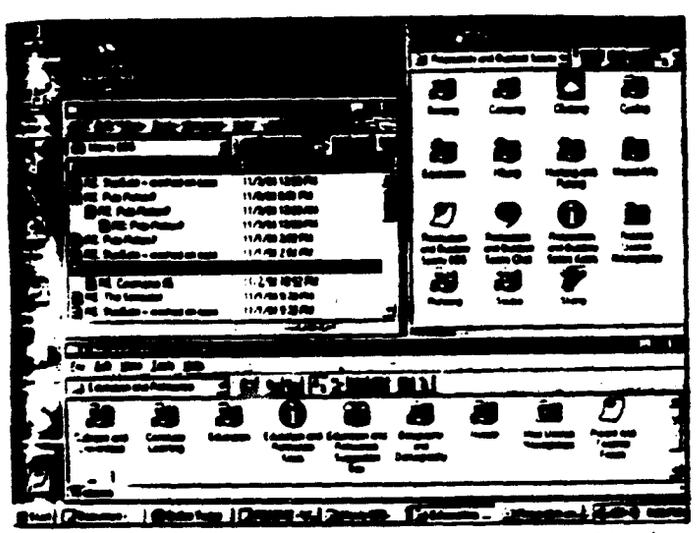
Microsoft Network's on-line services are well-integrated into the Windows 95 user interface. The content is very sparse at this stage, but once populated with information service providers, Microsoft Network may prove to be a valuable information source for Windows 95 users. The information that is available is well-organized into a hierarchy of folders and icons.

Navigating discussion groups and chat areas was similar to navigating local files and folders. Windows front ends to America Online and CompuServe, in contrast, are separate applications.

With Microsoft Network, we were able to create a link (called a Shortcut) to a discussion group and place the link on the Windows 95 desktop, where it appeared like any other folder. When we double-clicked on the discussion group, Windows 95 automatically re-established our connection before opening the icon.

Shortcut icons can be embedded as Object Linking and Embedding 2.0 objects, allowing users to distribute them.

Messaging services are just as well-integrated. We could use the standard Microsoft Exchange E-mail client included with Windows 95 to compose and send messages. ■



THE MICROSOFT NETWORK SERVICE acts as an extension to the Windows 95 interface.

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SIGNED BY GARY REBACK

PCWEEK

THE NATIONAL NEWSPAPER OF CORPORATE COMPUTING • NOVEMBER 21, 1994 VOLUME 11, NUMBER 45 $3.95

PC vendors allege undue pressure from Microsoft

BUNDLING IBM, OEMs contend strong-arm tactics

BY MARY JO FOLEY AND LISA DICARLO

LAS VEGAS—IBM and other major hardware OEMs are complaining that Microsoft Corp. is unfairly pressuring PC vendors to refrain from bundling OS/2 and PC-DOS with their PCs.

Also last week, Microsoft disclosed to hardware OEMs at Comdex here the Windows 95 MDA (Market Development Agreement), outlining proposed licensing fees, incentives, and compliance criteria.

Concerning OS/2, the hardware makers claimed that Microsoft officials threatened to delay, if not withhold entirely, delivery of Windows 95 code; reduce market-development funds; and withhold sales and support training for vendors that offer IBM's OS/2 or PC-DOS preloaded on their systems, sources said.

Sources said IBM and the hardware vendors have held periodic discussions with the Department of Justice about the alleged unfair Microsoft practices. IBM, the Justice Department, and the vendors declined official comment.

IBM VS.

"The [Justice Department] has turned into a Better Business Bureau for anyone who wants to shoot off a complaint against Microsoft," said David Williams, group manager of Microsoft's Personal Operating Systems Division, in Redmond, Wash. "We've got some salespeople who sometimes can go too far." Williams said he was unaware of any new filings regarding Microsoft with the Justice Department.

"The playing field is not level.

SEE BUNDLING, PAGE 138

NEWS

ning OS/2 Warp, said the source.

"There's about 15 things in there where you get $3, $2, or $1 off if you do things like put the Win 95 logo in national advertising," said another OEM.

"There are strong merchandising incentives [in the MDA]," said Steve Lair, Toshiba vice president of marketing, adding that he didn't see anything in the agreement that overtly demanded exclusivity to Microsoft's products.

In the weeks leading up to Comdex, Microsoft made it clear to OEMs that it could make the transition to Windows 95 a costly and bumpy move, according to one of the sources.

Hardware and operating-system vendors complained privately that despite the proposed Justice Department consent decree—which required Microsoft to alter its OEM licensing and non-disclosure agreement practices—Microsoft has done little to modify its behavior.

With the MDA, "we are not doing per-system incentives for OEMs. That would be in violation of the consent decree," said Microsoft's Williams. "Instead, we're offering incentives for OEMs who go that extra mile in marketing Windows 95," he said, specifying financial, training, and joint promotional incentives.

Additional reporting by Neal Boudette, Dan Farber, and John Dodge

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Bundling

from page

and we have a problem with that," said an executive with a hardware maker, who requested anonymity. Other hardware vendors, fearful of reprisals from Microsoft, also requested anonymity.

One Microsoft customer said further complaints to the Justice Department against the company would not affect any business dealings. "We've been through this DOJ stuff with the old IBM," said Pete Bavoso, vice president of information systems with The Darby Group Co., a medical supplier and PC Week Corporate Partner in Westbury, N.Y.

As for the MDA, several hardware makers complained about the high royalties that could hike PC prices as well as the stiff provisions for preloading.

However, they also said the licensing figure is a mere trial balloon floated by Microsoft, with Windows 95 not scheduled to ship until mid-1995.

Also at Comdex, several PC vendors claimed to have been discouraged by Microsoft from demonstrating IBM's OS/2 Warp at the show. Hewlett-Packard Co. and Packard Bell were among the companies that decided at the last minute against showing OS/2 as a result of implied and suggested retaliation from Microsoft, according to several sources close to the companies.

Officials with HP, of Palo Alto, Calif., and with Packard Bell, in Chatsworth, Calif., declined to comment. Dell Computer Corp. and Toshiba America Information Systems Inc. showed OS/2 Warp in their booths.

"Microsoft has been very aggressive about staving off the IBM assault," said another OEM source. "There were indications that the smoothness and flexibility of bundling Windows 95 would have been jeopardized" if the vendor showed systems run-

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SIGNED BY GARY REBACK

Microsoft's on-line rivals could end up in 'cyberia'

Jesse Berst
Berst Mode

Microsoft has promised to bundle an on-line service called The Microsoft Network into Windows 95 next summer or fall. If that occurs, I predict that competing on-line services will be sentenced to a long, cold winter of discontent. Microsoft's service will have an unbeatable edge over CompuServe, Prodigy, America Online, and other rivals.

I'm not an expert in antitrust law, so I *don't know whether this advantage is illegal.* But I do know it feels unfair. It feels like Microsoft is using a monopoly in one area to gain a monopoly in another. Microsoft may change its terms and conditions *before the final release.* But as I understand it right now, OEMs will be forced to include MSN. What's more, customers will not be informed they have alternatives.

Let's say XYZ Co. makes a deal to bundle a special Prodigy package with each computer. It even goes to the trouble of arranging for a Prodigy sign-on screen to appear the first time the customer boots up.

When XYZ ships its Win 95 PCs, it will have to include The Microsoft Network sign-on. XYZ may not want to promote MSN. It may have given money or other consideration to Prodigy in return for the bundle. Yet, as far as I know, XYZ won't be able to turn off the built-in MSN screen.

In essence, OEMs will be *forced to distribute* MSN if they want to access Windows 95—even if that distribution is to the OEMs' detriment.

I also worry that consumers won't realize they have options. It's as if your local phone company were to automatically sign you up for AT&T's long-distance service without letting you know that you have other choices. And I worry that Microsoft will use the MSN "registration" procedure to read information about customers' computer configurations and send that information to a Microsoft database. At least one other company (Delrina) has used on-line registration to scan and store configuration info.

Now, *that* would be a competitive advantage—if Microsoft knew the names of millions of Windows users and knew exactly what hardware and software they owned.

GULAG IMBROGLIO. I have no evidence that Microsoft intends to secretly capture and *store configuration info.* But the fact that I worry about it points up how Microsoft creates problems for itself.

These fears are feeding the mounting opposition to Microsoft's Intuit purchase and to The Microsoft Network. The Justice Department is being pressured to open another investigation—pressured by the same competitors that Microsoft cavalierly dismisses as "whiners" (to quote a Microsoft exec). Luckily for Microsoft, it has so much money it can afford to waste millions in legal fees. It looks like it will get a *chance to do just* that very soon.

RESPONSE OF THE WEEK: From system analyst Jim Gavnor of Columbus, Ohio: "The likelihood of a Big Crash on the Internet decreases daily. Links between one portion of the net and another may temporarily go down, but the Internet's genesis was in a Department of Defense project to create a data network capable of withstanding a nuclear attack. Truly crashing the Internet for an extended period would require a bankrolled effort on the level of the most professional modern terrorism. However, I agree that the tourists will start leaving. While Mosaic may be pretty, interaction requires both action and thought, foreign concepts to the passively entertained masses." ■

JESSE BERST IS THE EDITORIAL DIRECTOR OF WINDOWS WATCHER NEWSLETTER. CONTACT HIM VIA INTERNET (JBERST@MCIMAIL.COM), MCI (JBERST OR 914-8466), COMPUSERVE (71337,2052), OR FAX (206-883-1452).

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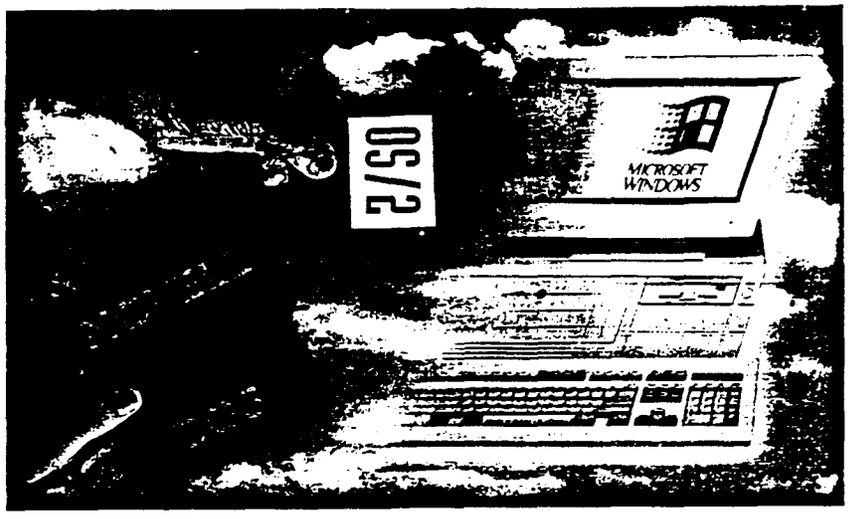
Microsoft Settles: Business as Usual



Now that Microsoft's licensing agreements for MS-DOS and Windows have been deemed "unfair" and "monopolistic" by the Department of Justice, will other operating systems have a fighting chance on the desktop?

According to computer manufacturers, industry analysts, and end users, the outlook is grim for Novell's DOS and IBM's PC-DOS and OS/2. They say there's not much motivation for PC manufacturers to preinstall a competing product, since Windows has millions of users and thousands of software applications. And since Microsoft's upcoming version of Windows (code-named Chicago) won't require DOS, the demand for all flavors of DOS is likely to plummet.

Has the train for Chicago already left the station? "I think the world of OS/2," says Jerry Williams, vice president of data operations for Eglin Federal Credit Union in Fort Walton Beach, Florida. "It's a good operating system. However, I think the momentum has swung in Windows' favor. If you go with OS/2, you're kind of stepping off the ladder."

"DOS is starting to go away, and Windows is taking over everything," says Gary Shurman, president of the New Orleans Personal Computer Club. "Unless somebody comes up with something earth-shattering, I don't think there's a serious challenger to Microsoft."

Despite the skepticism, Microsoft's competitors may have their best chance in years to challenge Bill Gates's desktop domination. After a lengthy investigation by the U.S. Department of Justice and the European Commission (the executive body that governs the European Community), Justice Department officials announced in July that Microsoft had agreed to end its "illegal monopolistic practices" and stop using "unfair contracts that choked off competition and preserved its monopoly" in the PC operating system market.

Terms of the Decree

Under the terms of the consent decree, Microsoft must change its licensing contracts with PC manufacturers (called OEMs). It can no longer make "per processor" agreements that require OEMs to pay a royalty to Microsoft for each PC shipped—regardless of whether the preinstalled operating system is from Microsoft or a competitor. The company also can't require OEMs to purchase a minimum number of Microsoft operating systems or sign a license with terms longer than one year (although the OEM can renew the license for an additional year).

Perhaps most optimistic about the Justice Department ruling is IBM, which has had little success in convincing OEMs to preinstall its OS/2 operating system. "This has really opened the door. We've gone out proactively, contacting hundreds of PC manufacturers already," says John Soyring, a director of IBM's Personal Software Products division in Austin, Texas. While Soyring expects some "major North American manufacturers" to preinstall OS/2, so far Big Blue's victories have been in Europe. Soyring says that German PC makers Vobis and Escom already preinstall OS/2—and Escom expects to ship 440,000 systems with OS/2 over the next 12 months.

Despite the ruling from Justice, Microsoft's influence over PC manufacturers remains immense. Most of the leading OEMs contacted for this article had little or no comment on the Justice Department ruling, other than to say that their relationship with Microsoft would stay the same (in other words, they'd still preinstall Windows). And many industry pundits see the consent decree as a weak slap on Microsoft's wrist. "I think Microsoft is thrilled with the settlement," says Tim Bajarin, president of Creative Strategies in San Jose, California. Of course, if Microsoft is too aggressive, it is likely to find itself in the sights of regulators once again. That's a position even Bill Gates wants to avoid.

—Jeff Bertolucci

New Orleans PC Club president Gary Shurman believes Windows is unstoppable.

RIGHT: DAVID SPEILMAN; ABOVE: JEFF BERLIN

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TAB 32

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

San Francisco Chronicle
THE LARGEST DAILY CIRCULATION IN NORTHERN CALIFORNIA
MONDAY, JULY 18, 1994 415-777-1111 50

Microsoft Unscathed By Settlement

Antitrust pact a slap on wrist for software giant

Exh. 32
94-1564 SS

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Clerk, U.S. District Court
District of Columbia

By David Einstein
Chronicle Staff Writer

Although the government claimed victory in its antitrust battle against Microsoft, it appears as if the world's largest software maker suffered little damage and in fact should continue to steamroller the rest of the industry.

NEWS ANALYSIS

By agreeing to halt some supposedly monopolistic practices, Bill Gates' giant company has left the door open ever so slightly for competitors to grab some piece of the market for operating systems that run most of today's personal computers. It is a market Microsoft dominates with its MS-DOS and Windows programs, currently installed on more than 120 million computers worldwide.

But sometime late this year or early next, Microsoft intends to brush away its rivals once again when it introduces Chicago, the next generation of Windows. If PC users flock to Chicago as expected, Gates actually could increase his hold on the industry he helped cre-

MICROSOFT: A13 Col. 3

MICROSOFT: Playing Field Uneven Despite Settlement

From Page 1

ate in the early 1980s.

There had been speculation that the Justice Department, which took over the investigation from the Federal Trade Commission last year, might have gone so far as to break up Microsoft just as AT&T was split up in 1984.

But as the government closed the case late Friday, however, it was with a mere slap on the wrist. Microsoft admitted no guilt over allegations of monopolistic practices, and faces no fines or financial penalties. Its revenues, now over $4 billion a year, probably will not suffer.

No wonder Microsoft officials were happy with the terms of the settlement. "It preserves our ability to do business in a way that is effective," said Bill Neukom, vice president of law and corporate affairs.

But Attorney General Janet Reno professed satisfaction with the outcome of the first major antitrust case of the Clinton administration, saying the settlement "levels the playing field and opens the door for competition" by curbing Microsoft's "monopolistic practices."

Reno talked tough, adding that "while the company fairly and lawfully climbed to the top of the industry ladder, it used unfair and illegal practices to maintain its dominant position."

But the settlement did not address what many competing companies consider the real antitrust issue. Microsoft, they say, has used its control of DOS and Windows to extend its hold on the software sector.

In fact, during the nearly four years the government investigated Microsoft, the Redmond, Wash.-based behemoth managed to be the major player in the market not only for operating systems, but also for major applications such as word processing and spreadsheet software. And even as the consent decree goes into effect, Microsoft is trying to tighten the screws on its major competitors by asking smaller software developers to adopt a standard that would make their programs dovetail with Microsoft's best-selling "Office" suite of applications.

Licensing

Friday's consent decree, which steers the company and the government clear of the courts, includes an agreement to change the way Microsoft licenses its operating system. That issue the government felt was its best chance to beat Microsoft had the antitrust case gone to court.

Microsoft no longer will offer PC makers steep discounts on volume purchases of DOS and Windows in return for royalties from every PC sold — whether or not the Microsoft system was actually installed on them. That "per-processor" licensing strategy had discouraged manufacturers from buying rival products such as Novell's version of DOS or IBM's OS/2 operating system, since they already were paying for Microsoft's version.

Novell's general counsel, David Bradford, saw the consent decree as a clear victory. "This has been a long effort by many companies for many years," he said, "and this decision will provide consumers with increased choices and more innovative products."

But the euphoria may wear off quickly. Microsoft's Chicago program reportedly will not require an underlying operating system, leading industry experts to predict the irrelevancy or death of DOS once Chicago catches on.

Industry Standard Pacts

Competitors may benefit more from Microsoft's agreement to loosen restrictions on its nondisclosure agreements — industry-standard pacts that software companies must sign to get advance copies of new products such as Chicago. Microsoft in the past has forced companies to agree not to work with other operating systems in return for access to its programs.

That may help large companies like Novell, which is updating its popular WordPerfect and Quattro Pro programs. But smaller companies still may find themselves tilting at windmills in trying to take on Microsoft.

Ernie Simpson, president of The Wizard Co. in Denton, Texas, called the settlement "a waste of time."

"Microsoft will continue to do as they have been doing, only they'll word their contracts a little differently," said Simpson, whose company develops software for some major Windows programs. "Microsoft is the de facto industry standard for operating systems, and they will continue to control the industry to the advantage of Microsoft and the detriment of everyone else."

Microsoft had insisted it would never settle antitrust charges out of court. Gates was positively adamant about it, complaining that the Justice Department was hounding him unreasonably. In the end, however, with antitrust charges looking more and more possible, the company decided to cut a deal. Judging from the first reviews, Gates appears to have done quite well by it.

Chronicle wire services contributed to this report.

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TAB 33

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

San Francisco Examiner

COMPUTERS & TECHNOLOGY

Microsoft deal: too little, too late

VIEW POINT

By Michael Morris
SPECIAL TO THE EXAMINER

A few days after the Department of Justice announced the settlement of its antitrust investigation of Microsoft, Bill Gates told the Wall Street Journal, "I intend to defy gravity."

Thanks to the nature of that settlement, it is likely that he will.

The Justice Department press release announcing the settlement quoted Attorney General Reno as saying, "Microsoft's unfair contracting policies have denied other U.S. companies a fair chance to compete, deprived consumers of an effective choice among competing PC operating systems, and slowed innovation." True enough.

She went on to state, "Today's settlement levels the playing field and opens the door for competition."

Unfortunately, it is unlikely to do either.

It is telling that in describing the harm caused to competition and innovation by Microsoft's practices, the attorney general used the past tense. The particular practices the settlement addressed were unquestionably key factors in Microsoft's rise to dominance in the 1980s.

Among other things, Microsoft required PC manufacturers to pay a license fee for its MS-DOS and Windows operating system software on every PC shipped with an Intel microprocessor under long-term agreements — whether or not those PCs actually contained that software — and unreasonably restricted independent software companies from working with Microsoft competitors. In so doing, Microsoft managed to insinuate its technology into the heart and soul of 85 percent of the world's PCs.

By 1985, these practices had already had their intended effect: making Microsoft's operating system the de facto PC standard. The present source of Microsoft's domination in the PC world derives from its status as the standard-holder, not the practices the Justice Department condemned and which will now be prohibited under the settlement.

Microsoft understands this perfectly well, which, of course, is why Bill Gates let the settlement happen. Nothing in the proposed settlement is likely to have anything other than the most marginal effect on Microsoft's future.

Inherent in the nature of software technology is the concept of dependence. Operating systems are useless without application programs and vice versa. Neither has discrete, stand-alone value.

But of the two, operating systems software must come first and clearly provides the most potential for leverage. To its credit, Microsoft understood this earlier than everyone else and exploited its insight relentlessly. So technically dependent is the PC industry on Microsoft operating system software, that Microsoft could afford the luxury of a five-year period in which to perfect Windows after its initial introduction in 1985.

When Apple introduced the Macintosh "graphical user interface," which replaced obscure and hard-to-remember keyboard commands with easy-to-learn and easy-to-use screen icons and a mouse, it marked a watershed in the development of consumer-friendly computing. In response, Microsoft introduced Windows, which was supposed to provide Macintosh-like ease-of-use.

[See VIEWPOINT, C-6]

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◆ *VIEWPOINT from C-1*

Too little, too late

But the first several versions of Windows were so poorly designed that very few people wanted them, preferring even the archaic DOS with its incredibly difficult keyboard commands. It wasn't until 1990, five years after its introduction, that Microsoft finally produced a version of Windows that was ready for prime time.

Now, one would think that if genuine competition existed in PC operating systems, this five-year gap would have been exploited by one or more competitors of Microsoft. Indeed, it's hard to conceive that any company could have taken as long as Microsoft did to get a basic technology right and still survive.

Yet, Microsoft not only survived during this period, it prospered. The reason is that it was virtually impossible to shake free of MS-DOS, even when clearly better alternatives were available. The consumer investment in application programs that could only run on the Microsoft system was too large and the cost of switching to an alternative technology — even a clearly better one — too great.

While this was obvious to everyone by 1985 or 1986, Bill Gates understood it in 1980.

Almost 10 years later, PC manufacturers, consumers and software developers are even more tightly bound to Microsoft operating system technologies. The ties that bind are not contractual, they are technical, which is why the Justice Department settlement will be ineffective.

And while controlling this standard, Microsoft is free to compete on applications based on the standard. Companies that develop competing spreadsheet, word processing and other such programs have complained for years that Microsoft programmers have the unfair advantage of knowing changes to the operating system specifications well before anyone else.

The fact is Microsoft owns — and closely guards — the de facto standard for desktop computers, a critical part of our information infrastructure. And at least three steps could be taken to ensure fair competition. Microsoft could be required to:

▶ Publicly disclose its operating system interface specifications so that designers of competing operating systems could have assurance that application programs written for MS-DOS or Windows would run efficiently with their operating systems. Microsoft should update its specifications in a periodic and timely manner.

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Microsoft, Intel set to define technology

■ **Duopoly:** Apple, IBM, Motorola mounting last-ditch attempt to make PC alternative.

BY RORY J. O'CONNOR
Mercury News Staff Writer

Tomorrow, when Silicon Valley's brain trust arrives in Las Vegas as part of a 200,000-strong crowd at the computer industry's largest trade show, conversation will almost certainly center on one topic: Can anything stop Microsoft and Intel from controlling everything?

Who will control
COMPUTING'S FUTURE?
First in an occasional series.

Some fear that as the digital future of the information superhighway emerges, an unchallenged Microsoft and Intel will wind up in total, undisputed control of the technology upon which the country's citizens and economy will depend. And few believe that a recently announced alliance between Apple and IBM will prove an effective roadblock.

See COMPUTING, Back Page

PC giants tighten grip on technology

■ COMPUTING

from Page 1A

Today, Microsoft Corp. makes the world's most popular software for personal computers, operating systems that control 85 percent of the machines in use. Intel Corp.'s microprocessor chips are the brains in 75 percent of all the computers made.

But the personal computer is rapidly becoming a home appliance, and the PC is poised to expand from word processing and spreadsheets to controlling a myriad of other jobs in our everyday work and personal lives. The companies that control personal-computer technology are in a position soon to dominate much, much more.

From video telephones to intelligent fax machines, from office to home, from providing digital information and entertainment to managing credit-card and other financial transactions, Microsoft and Intel are already extending their reach far beyond traditional personal computing.

Both companies have deep pockets to back the technology — and their unofficial partnership is an effective duopoly that could let the companies dictate the price of technology, minimize consumer choices and slow the pace of technical progress.

In short, many believe, little stands between the two companies and technical control of the future.

"Increasingly, I'm believing it's all over, and we're going to be locked into Microsoft and Intel forever," said Dataquest analyst Kimball Brown.

In the 13 years since IBM transformed the PC from hobbyist toy to business tool, control of the industry has shifted from IBM and Apple to their once-tiny competitors. Now, Apple and IBM, despite their combined annual revenues of nearly $75 billion, are the underdogs.

Except for Apple, whose research and development spending remains large despite a $100 million cutback in the past year, few PC companies invest significant sums in new technology research. The bulk of such money is spent by Intel to develop chips and Microsoft to further its lead in software.

Many people in the industry decry this state of affairs, but lack the money, the marketing or the technology to force meaningful competition. Even the federal government has declined to step in, punishing Microsoft with a slap on the wrist after a four-year investigation into what Attorney General Janet Reno called "illegal, monopolistic" practices.

Perhaps the only force large enough to change anything is an infant agreement announced last week by Apple, IBM and Motorola to build a new kind of personal computer, one that would neither use Intel microprocessors nor feature Microsoft operating systems.

The timing of their agreement, one week before the largest annual gathering of technology power brokers in the world, is no accident.

Even though the alliance will not produce a product until 1996, IBM and Apple need every ounce of momentum they can muster for what is probably the last-ditch attempt to topple Intel and Microsoft — or even to hope to play a role in defining the technical future.

But most analysts insist that Apple and IBM are waging the wrong war.

"The desktop operating system war is over," said venture capitalist Ann Winblad, whose Emeryville firm specializes in software companies. "Microsoft has won."

Instead, Apple and IBM should be looking to the information superhighway for opportunities to sell new technology, expand their business and regain the power to force technical competition, said Richard Shaffer, publisher of the Technologic Letter in New York.

That's because there is a potentially more lucrative market in the future, one that uses both the personal computer and its technology.

It goes by the catch-all term of information superhighway, but it encompasses a host of major changes in the role of personal computers at work and at home.

Some of the latest home computers are already touted as being able to replace nearly everything in a small office except the coffee pot.

Phones and fax machines are becoming smarter, thanks to more-powerful computer brains. And when people are away from their home or office in the future, they may well carry portable devices that combine today's cellular phone with ready information access, offering yet another umbilical cord to the PC.

Over the next decade, even television is poised to become interactive, offering far more choices, two-way video and fountains of information on demand — activities that require heavy use of computer chips and sophisticated operating systems and other software. Computers will manage nearly all financial transactions, and will even be a citizen's primary conduit to the government.

Some experts envision a single intelligent box in the home, one that would use the functions of a personal computer to connect the home to information and communications lines through phone-company wires or cable-television hookups.

There's little doubt that each of these areas will be the site of intense competition. In almost every case, Microsoft and Intel's dominance of the PC business would give them a crucial advantage.

If they succeed in controlling key technology in any or all of these areas, they will be able to determine much of how the devices work, and could even control how people receive information or make purchases. And the closer the digital world moves to merging control into just one or two boxes connected to monolithic networks, the better the chance Intel and Microsoft have to dominate them as they have PCs.

But Apple insists it is not blind to the digital future, despite initial failure in one new market — that for personal digital assistants — and a very slow start for its E•World on-line service.

"Clearly, there's a feeling at Apple that these other technologies are very exciting areas," said Rick LeFaivre, the head of the company's Advanced Technology Group. "But at the same time we're making sure not to take our eye off the PC and say it's dead. . . . The PC side of our business will be by far the dominant side for a long, long time."

At the same time, Apple's partner is struggling to regain power it has lost in nearly every area of its business. Internally, it is replacing top managers, revamping its structure, changing key technology, laying off workers and trying to figure out how it fits into a world it once controlled. Externally, critics say they can't fathom the company's strategy, especially in personal computing, where it is unclear what software and hardware technology IBM considers strategic — and, therefore, safe for customers to buy.

The problem for Apple and IBM, according to analysts, is that they probably have little hope of competing effectively in the digital future unless they can quickly establish their new computer as a viable alternative.

But to become a PC alternative, the companies must overcome a host of difficulties, from wrenching changes in their corporate cultures to damaged balance sheets to the improbability of the partnership they began with Motorola more than three years ago.

"The whole plan in 1991 was daring, kind of like chemotherapy," said Shaffer. "The therapy might kill the patient, but the alternative is certain death."

Few believe that Apple, IBM and Motorola can thrive against the Microsoft-Intel duopoly short of a move even more unlikely than the original IBM-Apple partnership.

"Without the merger of Apple and IBM into one corporate entity, they are executing separate strategies, no matter what they say," Winblad said. "So while some people have called this the David and Goliath story, with Microsoft as Goliath, there is no David — perhaps a Tom, Dick and Harry."

Not everyone believes that a world where two companies control most of the technology is a cause for alarm, however.

"What's wrong with there being just one operating system? It's supposed to be transparent to the user," said analyst Doug Kass of the Viewpoint Group in Aptos. "I don't think that will lead to huge increases in price. It's not competition among vendors, but what the market will bear in terms of price. Consumers look for what works, not the cutting edge. If some new (software) is priced beyond the glass ceiling of what consumers are comfortable paying, it won't sell."

Not surprisingly, Microsoft officials share that view.

"Things are very competitive now," said Brad Chase, general manager of Microsoft's personal operating systems division. "Apple is certainly not an uncompetitive company. IBM is a very aggressive company. And the thing about technology is you can't rest on your laurels. If you don't keep aggressive, your leadership will melt like butter."

Tomorrow in Business Monday: How far can Microsoft go?

TAB 35

TO

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IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

San Jose Mercury News, Wednesday, December 21, 1994

Ex. 55

94-156455

MICROSOFT'S DOMINATION

Microsoft's revenues in the world market for personal computer business grew more in 1994 than revenues in the market as a whole, according to preliminary estimates by Dataquest Inc. Total revenues grew by more than $550 million, while Microsoft's related revenue grew by more than $650 million. "Lotus 1-2-3, WordPerfect, dBase, Paradox and Harvard Graphics once dominated their respective categories," said Dataquest analyst Karl Wong. "Today, Microsoft products have replaced each of these one-time product category leaders." (Figures are in millions.)

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'94 Rank	Company	1993 Revenue	'93-'94 % chg.	'94 Revenue	'94 market share (%)
1	Microsoft	$2,221	+29.4	$2,873	34.7
2	Lotus	986	-1.8	968	11.7
3	Novell	698	-11.6	617	7.5
4	Adobe	197	+28.1	253	3.1
5	Symantec	207	+15.2	238	2.9
6	Claris	160	+9.3	175	2.1
7	Borland	360	-52.8	170	2.1
8	Intuit	104	+56.9	163	2.0
9	Corel	105	+41.6	148	1.8
10	Delrina	65	+43.1	94	1.1
	Others	2,617	-1.7	2,573	31.0
	Total	7,720	+7.2	8,272	100.0

Source: Dataquest Inc

MERCURY NEWS

TAB 36

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Positive Feedbacks in the Economy

94-1564

A new economic theory elucidates mechanisms whereby small chance events early in the history of an industry or technology can tilt the competitive balance

FILED
FEB 14 1995
U.S. District Court
District of Columbia

by W. Brian Arthur

Conventional economic theory is built on the assumption of diminishing returns. Economic actions engender a negative feedback that leads to a predictable equilibrium for prices and market shares. Such feedback tends to stabilize the economy because any major changes will be offset by the very reactions they generate. The high oil prices of the 1970's encouraged energy conservation and increased oil exploration, precipitating a predictable drop in prices by the early 1980's. According to conventional theory, the equilibrium marks the "best" outcome possible under the circumstances: the most efficient use and allocation of resources.

Such an agreeable picture often does violence to reality. In many parts of the economy, stabilizing forces appear not to operate. Instead positive feedback magnifies the effects of small economic shifts; the economic models that describe such effects differ vastly from the conventional ones. Diminishing returns imply a single equilibrium point for the economy, but positive feedback—increasing returns—makes for many possible equilibrium points. There is no guarantee that the particular economic outcome selected from among the many alternatives will be the "best" one. Furthermore, once random economic events select a particular path, the choice may become locked-in regardless of the advantages of the alternatives. If one product or nation in a competitive marketplace gets ahead by "chance," it tends to stay ahead and even increase its lead. Predictable, shared markets are no longer guaranteed.

W. BRIAN ARTHUR is Morrison Professor of Population Studies and Economics at Stanford University. He obtained his Ph.D from the University of California, Berkeley, in 1973 and holds graduate degrees in operations research, economics and mathematics. Until recently Arthur was on leave at the Santa Fe Institute, a research institute dedicated to the study of complex systems. There he directed a team of economists, physicists, biologists and others investigating behavior of the economy as an evolving, complex system.

During the past few years I and other economic theorists at Stanford University, the Santa Fe Institute in New Mexico and elsewhere have been developing a view of the economy based on positive feedback. Increasing-returns economics has roots that go back 70 years or more, but its application to the economy as a whole is largely new. The theory has strong parallels with modern nonlinear physics (instead of the pre-20th-century physical models that underlie conventional economics), it requires new and challenging mathematical techniques and it appears to be the appropriate theory for understanding modern high-technology economies.

The history of the videocassette recorder furnishes a simple example of positive feedback. The VCR market started out with two competing formats selling at about the same price: VHS and Beta. Each format could realize increasing returns as its market share increased: large numbers of VHS recorders would encourage video outlets to stock more prerecorded tapes in VHS format, thereby enhancing the value of owning a VHS recorder and leading more people to buy one. (The same would, of course, be true for Beta-format players.) In this way, a small gain in market share would improve the competitive position of one system and help it further increase its lead.

Such a market is initially unstable. Both systems were introduced at about the same time and so began with roughly equal market shares; those shares fluctuated early on because of external circumstance, "luck" and corporate maneuvering. Increasing returns on early gains eventually tilted the competition toward VHS: it accumulated enough of an advantage to take virtually the entire VCR market. Yet it would have been impossible at the outset of the competition to say which system would win, which of the two possible equilibria would be selected. Furthermore, if the claim that Beta was technically superior is true, then the market's choice did not represent the best economic outcome.

Conventional economic theory offers a different view of competition between two technologies or products performing the same function. An example is the competition between water and coal to generate electricity. As hydroelectric plants take more of the market, engineers must exploit more costly dam sites, thereby increasing the chance that a coal-fired plant will be cheaper. As coal plants take more of the market, they bid up the price of coal (or trigger the imposition of costly pollution controls) and so tip the balance toward hydropower. The two technologies end up sharing the market in a predictable proportion that best exploits the potentials of each, in contrast to what happened to the two video-recorder systems.

The evolution of the VCR market would not have surprised the great Victorian economist Alfred Marshall, one of the founders of today's conventional economics. In his 1890 *Principles of Economics*, he noted that if firms' production costs fall as their market shares increase, a firm that simply by good fortune gained a high

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proportion of the market early on would be able to best its rivals; "whatever firm first gets a good start" would corner the market. Marshall did not follow up this observation, however, and theoretical economics has until recently largely ignored it.

Marshall did not believe that increasing returns applied everywhere; agriculture and mining—the mainstays of the economies of his time—were subject to diminishing returns caused by limited amounts of fertile land or high-quality ore deposits. Manufacturing, on the other hand, enjoyed increasing returns because large plants allowed improved organization. Modern economists do not see economies of scale as a reliable source of increasing returns. Sometimes large plants have proved more economical; often they have not.

I would update Marshall's insight by observing that the parts of the economy that are resource-based (agriculture, bulk-goods production, mining) are still for the most part subject to diminishing returns. Here conventional economics rightly holds sway. The parts of the economy that are knowledge-based, on the other hand, are largely subject to increasing returns. Products such as computers, pharmaceuticals, missiles, aircraft, automobiles, software, telecommunications equipment or fiber optics are complicated to design and to manufacture. They require large initial investments in research, development and tooling, but once sales begin, incremental production is relatively cheap. A new airframe or aircraft engine, for example, typically costs between $2 and $3 billion to design, develop, certify and put into production. Each copy thereafter costs perhaps $50 to $100 million. As more units are built, unit costs continue to fall and profits increase.

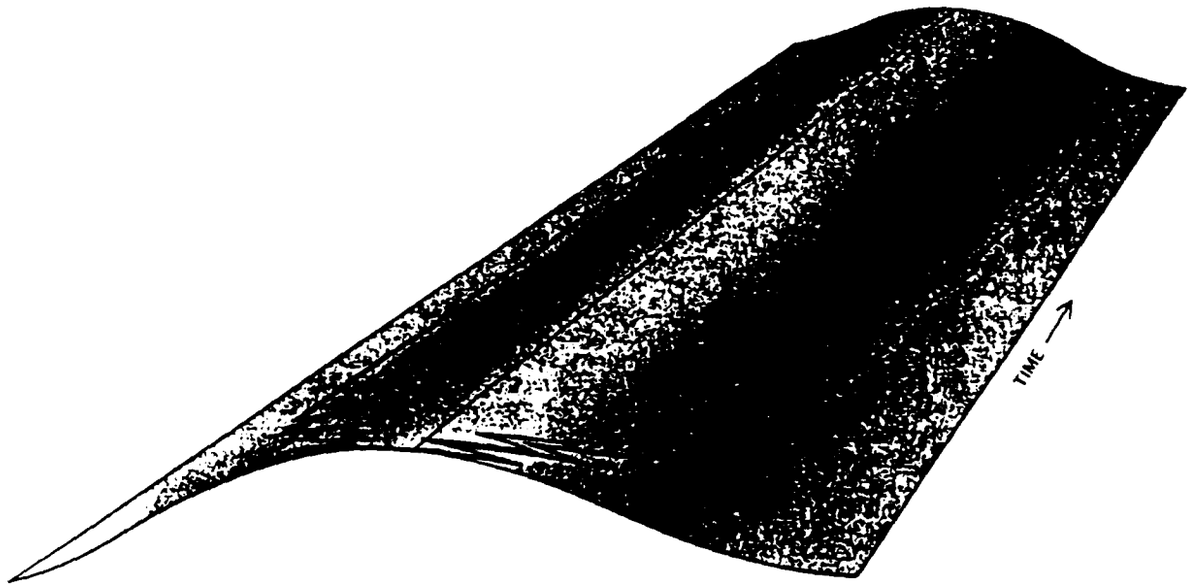
Increased production brings additional benefits: producing more units means gaining more experience in the manufacturing process and achieving greater understanding of how to produce additional units even more cheaply. Moreover, experience gained with one product or technology can make it easier to produce new products incorporating similar or related technologies. Japan, for example, leveraged an initial investment in building precision instruments into a capacity for building consumer electronics products and then the integrated circuits that went into them.

Not only do the costs of producing high-technology products fall as a company makes more of them, but the benefits of using them increase. Many items such as computers or telecommunications equipment work in networks that require compatibility; when one brand gains a significant market share, people have a strong incentive to buy more of the same product so as to be able to exchange information with those using it already.

If increasing returns are important, why were they largely ignored until recently? Some would say that complicated products—high technology—for which increasing returns are so important, are themselves a recent phenomenon. This is true, but is only part of the answer. After all, in the 1940's and 1950's, economists such as Gunnar K. Myrdal and Nicholas Kaldor identified positive-feedback mechanisms that did not involve technology. Orthodox economists avoided increasing returns for deeper reasons.

Some economists found the existence of more than one solution to the same problem distasteful—unscientific. "Multiple equilibria," wrote Joseph A. Schumpeter in 1954, "are not necessarily useless, but from the standpoint of *any* exact science the existence of a uniquely determined equilibrium is, of course, of the utmost importance, even if proof has to be purchased at the price of very restrictive assumptions; without any possibility of proving the existence of [a] uniquely determined equilibrium—or at all events, of a small number of possible equilibria—at however high a level of abstraction, a field of phenomena is really a chaos that is not under analytical control."

Other economists could see that



RANDOM WALK on a convex surface illustrates increasing-returns competition between two technologies. Chance determines early patterns of adoption and so influences how fast each competitor improves. As one technology gains more adherents (corresponding to motion downhill toward either edge of the surface), further adoption is increasingly likely.

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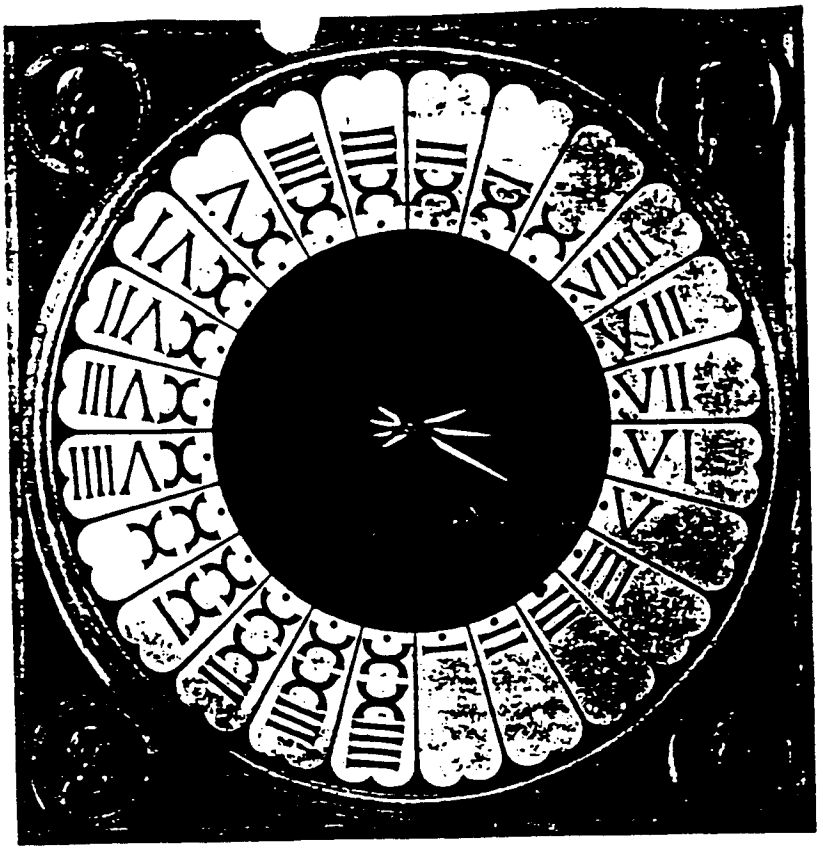

FLORENCE CATHEDRAL CLOCK has hands that move "counterclockwise" around its 24-hour dial. When Paolo Uccello designed the clock in 1443, a convention for clockfaces had not emerged. Competing designs were subject to increasing returns: the more clockfaces of one kind were built, the more people became used to reading them. Hence, it was more likely that future clockfaces would be of the same kind. After 1550, "clockwise" designs displaying only 12 hours had crowded out other designs. The author argues that chance events coupled with positive feedback, rather than technological superiority, will often determine economic developments.

theories incorporating increasing returns would destroy their familiar world of unique, predictable equilibria and the notion that the market's choice was always best. Moreover, if one or a few firms came to dominate a market, the assumption that no firm is large enough to affect market prices on its own (which makes economic problems easy to analyze) would also collapse. When John R. Hicks surveyed these possibilities in 1939 he drew back in alarm. "The threatened wreckage," he wrote, "is that of the greater part of economic theory." Economists restricted themselves to diminishing returns, which presented no anomalies and could be analyzed completely.

Still others were perplexed by the question of how a market could select one among several possible solutions. In Marshall's example, the firm that is the largest at the outset has the lowest production costs and must inevitably win in the market. In that case, why would smaller firms compete at all? On the other hand, if by some chance a market started with several identical firms, their market shares would remain poised in an unstable equilibrium forever.

Studying such problems in 1979, I believed I could see a way out of many of these difficulties. In the real world, if several similar-size firms entered a market at the same time, small fortuitous events—unexpected orders, chance meetings with buyers, managerial whims—would help determine which ones achieved early sales and, over time, which firm dominated. Economic activity is quantized by individual transactions that are too small to observe, and these small "random" events can accumulate and become magnified by positive feedbacks so as to determine the eventual outcome. These facts suggested that situations dominated by increasing returns should be modeled not as static, deterministic problems but as dynamic processes based on random events and natural positive feedbacks, or nonlinearities.

With this strategy an increasing-returns market could be re-created in a theoretical model and watched as its corresponding process unfolded again and again. Sometimes one solution would emerge, sometimes (under identical conditions) another. It would be impossible to know in advance which of the many solutions would emerge in any given run. Still, it would be possible to record the particular set of random events leading to each solution and to study the probability that a particular solution would emerge under a certain set of initial conditions. The idea was simple, and it may well have occurred to economists in the past. But making it work called for nonlinear random-process theory that did not exist in their day.

Every increasing-returns problem need not be studied in isolation; many turn out to fit a general nonlinear probability schema. It can be pictured by imagining a table to which balls are added one at a time; they can be of several possible colors—white, red, green or blue. The color of the ball to be added next is unknown, but the probability of a given color depends on the current proportions of colors on the table. If an increasing proportion of balls of a given color increases the probability of adding another ball of the same color, the system can demonstrate positive feedback. The question is, Given the function that maps current proportions to probabilities, what will be the proportions of each color on the table after many balls have been added?

In 1931 the mathematician George Polya solved a very particular version of this problem in which the probability of adding a color always equaled its current proportion. Three U.S. probability theorists, Bruce M. Hill of the University of Michigan at Ann Arbor and David A. Lane and William D. Sudderth of the University of Minnesota at Minneapolis, solved a more general, nonlinear version in 1980. In 1983 two Soviet probability theorists, Yuri M. Ermoliev and Yuri M. Kaniovski, both of the Glushkov Institute of Cybernetics in Kiev, and I found the solution to a very general version. As balls continue to be added, we proved, the proportions of each color must settle down to a "fixed point" of the probability function—a set of values where the probability of adding each color is equal to the proportion of that color on the table. Increasing returns allow several such sets of fixed points.

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This means that we can determ the possible patterns or solutio of an increasing-returns problem by solving the much easier challenge of finding the sets of fixed points of its probability function. With such tools economists can now define increasing-returns problems precisely, identify their possible solutions and study the process by which a solution is reached. Increasing returns are no longer "a chaos that is not under analytical control."

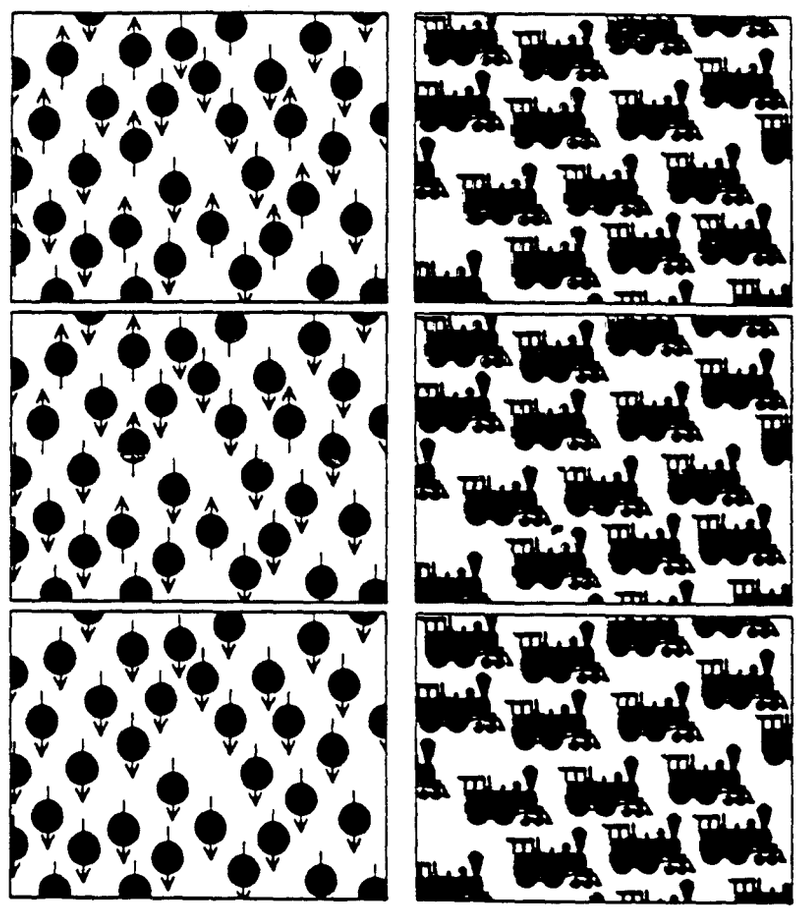
In the real world, the balls might be represented by companies and their colors by the regions where they decide to settle. Suppose that firms enter an industry one by one and choose their locations so as to maximize profit. The geographic preference of each firm (the intrinsic benefits it gains from being in a particular region) varies; chance determines the preference of the next firm to enter the industry. Also suppose, however, that firms' profits increase if they are near other firms (their suppliers or customers). The first firm to enter the industry picks a location based purely on geographic preference. The second firm decides based on preference modified by the benefits gained by locating near the first firm. The third firm is influenced by the positions of the first two firms, and so on. If some location by good fortune attracts more firms than the others in the early stages of this evolution, the probability that it will attract more firms increases. Industrial concentration becomes self-reinforcing.

The random historical sequence of firms entering the industry determines which pattern of regional settlement results, but the theory shows that not all patterns are possible. If the attractiveness exerted by the presence of other firms always rises as more firms are added, some region will always dominate and shut out all others. If the attractiveness levels off, other solutions, in which regions share the industry, become possible. Our new tools tell us which types of solutions can occur under which conditions.

Do some regions in fact amass a large proportion of an industry because of historical chance rather than geographic superiority? Santa Clara County in California (Silicon Valley) is a likely example. In the 1940's and early 1950's certain key people in the U.S. electronics industry—the Varian brothers, William Hewlett and David Packard, William Shockley—set up shop near Stanford University; the local availability of engineers, supplies and components that these early firms helped to create made Santa Clara County extremely attractive to the 900 or so firms that followed. If these early entrepreneurs had preferred other places, the densest concentration of electronics in the country might well be somewhere else.

On a grander scale, if small events in history had been different, would the location of cities themselves be different? I believe the answer is yes. To the degree that certain locations are natural harbors or junction points on rivers or lakes, the pattern of cities today reflects not chance but geography. To the degree that industry and people are attracted to places where such resources are already gathered, small, early chance concentrations may have been the seeds of today's configuration of urban centers. "Chance and necessity," to use Jacques Monod's phrase [illegible]ract. Both have played crucial ro[illegible] the development of urban centers [illegible] the U.S. and elsewhere.

Self-reinforcing mechanisms other than these regional ones work in international high-tech manufacturing and trade. Countries that gain high volume and experience in a high-technology industry can reap advantages of lower cost and higher quality that may make it possible for them to shut out other countries. For example, in the early 1970's, Japanese automobile makers began to sell significant numbers of small cars in the U.S. As Japan gained market volume without much opposition from Detroit, its engineers and production workers gained experience, its costs fell and its products improved. These factors, together with improved sales networks, allowed Japan to increase



FERROMAGNETS AND REGIONAL RAIL GAUGES become ordered in much the same way. As a disordered magnetic material is cooled (*left*), the atomic dipoles inside it exert forces on one another, causing neighboring dipoles to align. Eventually all the dipoles in a sample line up, but the direction they all take (up or down) cannot be predicted beforehand. Similarly, as Douglas Puffert of Swarthmore College has shown, neighboring private railroads (*right*) in the past century adopted the same gauge to extend their range more easily. Eventually all (or most) railroads used the same gauge. Similar equations describe the behavior of these two systems.

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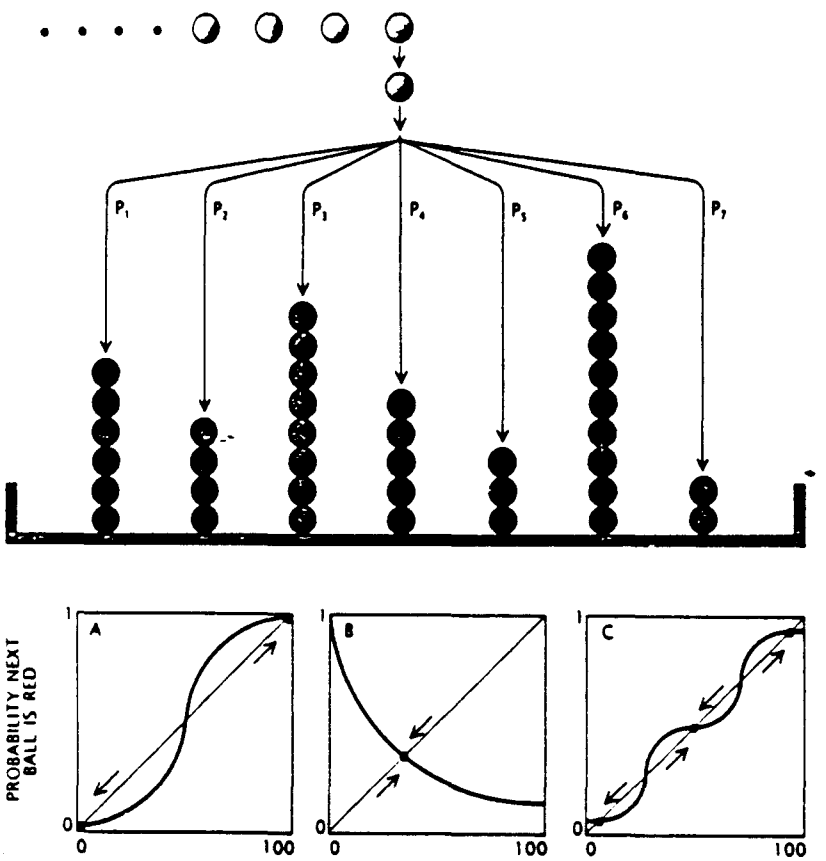
its share of the U.S. r. :: as a result, workers gained still more experience, costs fell further and quality improved again. Before Detroit responded seriously, this positive-feedback loop had helped Japanese companies to make serious inroads into the U.S. market for small cars. Similar sequences of events have taken place in the markets for television sets, integrated circuits and other products.

How should countries respond to a world economy where such rules apply? Conventional recommendations for trade policy based on constant or diminishing returns tend toward low-profile approaches. They rely on the open market, discourage monopolies and leave issues such as R&D spending to companies. Their underlying assumption is that there is a fixed world price at which producers load goods onto the market, and so interference with local costs and prices means of subsidies or tariffs is unproductive. These policies are appropriate for the diminishing-returns parts of the economy, not for the technology-based parts where increasing returns dominate.

Policies that are appropriate to success in high-tech production and international trade would encourage industries to be aggressive in seeking out product and process improvements. They would strengthen the national research base on which high-tech advantages are built. They would encourage firms in a single industry to pool their resources in joint ventures that share up-front costs, marketing networks, technical knowledge and standards. They might even foster strategic alliances, enabling companies in several countries to enter a complex industry that none could tackle alone. Increasing-returns theory also points to the importance of timing when undertaking research initiatives in new industries. There is little sense in entering a market that is already close to being locked-in or that otherwise offers little chance of success. Such policies are slowly being advocated and adopted in the U.S.

The value of other policies, such as subsidizing and protecting new industries—bioengineering, for example—to capture foreign markets, is debatable. Dubious feedback benefits have sometimes been cited to justify government-sponsored white elephants. Furthermore, as Paul R. Krugman of the Massachusetts Institute of Technology and several other economists have pointed out, if one country pursues such policies, others will retaliate by subsidizing their own high-technology industries. Nobody gains. The question of optimal industrial and trade policy based on increasing returns is currently being studied intensely. The policies countries choose will determine not only the shape of the global economy in the 1990's but also its winners and its losers.



NONLINEAR PROBABILITY THEORY can predict the behavior of systems subject to increasing returns. In this model, balls of different colors are added to a table; the probability that the next ball will have a specific color depends on the current proportions of colors (*top*). Increasing returns occur in *A* (the graph shows the two-color case; arrows indicate likely directions of motion): a red ball is more likely to be added when there is already a high proportion of red balls. This case has two equilibrium points: one at which almost all balls are red; the other at which very few are red. Diminishing returns occur in *B*: a higher proportion of red balls lowers the probability of adding another. There is a single equilibrium point. A combination of increasing and diminishing returns (*C*) yields many equilibrium points.

Increasing-returns mechanisms do not merely tilt competitive balances among nations; they can also cause economies—even such successful ones as those of the U.S. and Japan—to become locked into inferior paths of development. A technology that improves slowly at first but has enormous long-term potential could easily be shut out, locking an economy into a path that is both inferior and difficult to escape.

Technologies typically improve as more people adopt them and firms gain experience that guides further development. This link is a positive-feedback loop: the more people adopt a technology, the more it improves and the more attractive it is for further adoption. When two or more technologies (like two or more products) compete, positive feedbacks make the market for them unstable. If one pulls ahead in the market, perhaps by chance, its development may accelerate enough for it to corner the market. A technology that improves more rapidly as more people adopt it stands a better chance of surviving—it has a "selectional advantage." Early superiority, however, is no guarantee of long-term fitness.

In 1956, for example, when the U.S. embarked on its nuclear-power program, a number of designs were proposed: reactors cooled by gas, light water, heavy water, even liquid sodi-

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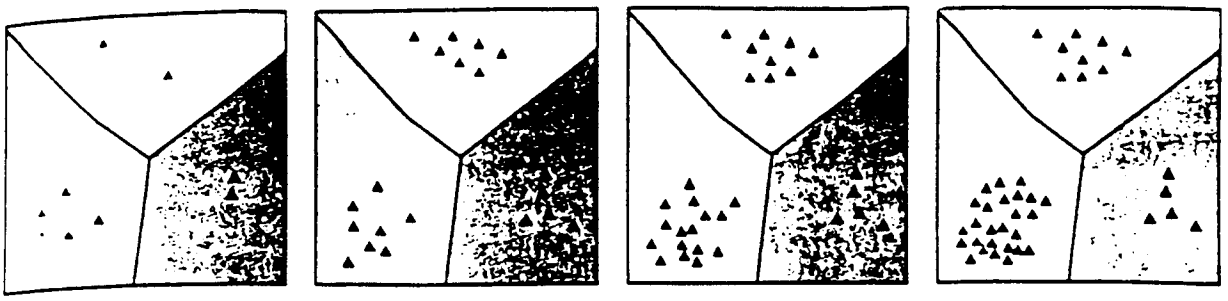

COMPANIES CHOOSE LOCATIONS to maximize profits, which are determined by intrinsic geographic preference (shown by color) and by the presence of other companies. In this computer-generated example, most of the first few companies settle in the green region, and so all new companies eventually settle there. Such clustering might appear to imply that the green region is somehow superior. In other runs of the program, however, the red and blue regions dominate instead.

um. Robin Cowan of New York University has shown that a series of trivial circumstances locked virtually the entire U.S. nuclear industry into light water. Light-water reactors were originally adapted from highly compact units designed to propel nuclear submarines. The role of the U.S. Navy in early reactor-construction contracts, efforts by the National Security Council to get a reactor—any reactor—working on land in the wake of the 1957 *Sputnik* launch as well as the predilections of some key officials all acted to favor the early development of light-water reactors. Construction experience led to improved light-water designs and, by the mid-1960's, fixed the industry's path. Whether other designs would, in fact, have been superior in the long run is open to question, but much of the engineering literature suggests that high-temperature, gas-cooled reactors would have been better.

Technological conventions or standards, as well as particular technologies, tend to become locked-in by positive feedback, as my colleague Paul A. David of Stanford has documented in several historical instances. Although a standard itself may not improve with time, widespread adoption makes it advantageous for newcomers to a field—who must exchange information or products with those already working there—to fall in with the standard, be it the English language, a high-definition television system, a screw thread or a typewriter keyboard. Standards that are established early (such as the 1950's-vintage computer language FORTRAN) can be hard for later ones to dislodge, no matter how superior would-be successors may be.

Until recently conventional economics texts have tended to portray the economy as something akin to a large Newtonian system, with a unique equilibrium solution preordained by patterns of mineral resources, geography, population, consumer tastes and technological possibilities. In this view, perturbations or temporary shifts—such as the oil shock of 1973 or the stock-market crash of 1987—are quickly negated by the opposing forces they elicit. Given future technological possibilities, one should in theory be able to forecast accurately the path of the economy as a smoothly shifting solution to the analytical equations governing prices and quantities of goods. History, in this view, is not terribly important; it merely delivers the economy to its inevitable equilibrium.

Positive-feedback economics, on the other hand, finds its parallels in modern nonlinear physics. Ferromagnetic materials, spin glasses, solid-state lasers and other physical systems that consist of mutually reinforcing elements show the same properties as the economic examples I have given. They "phase lock" into one of many possible configurations; small perturbations at critical times influence which outcome is selected, and the chosen outcome may have higher energy (that is, be less favorable) than other possible end states.

This kind of economics also finds parallels in the evolutionary theory of punctuated equilibrium. Small events (the mutations of history) are often averaged away, but once in a while they become all-important in tilting parts of the economy into new structures and patterns that are then preserved and built on in a fresh layer of development.

In this new view, initially identical economies with significant increasing-returns sectors do not necessarily select the same paths. Instead they eventually diverge. To the extent that small events determining the overall path always remain beneath the resolution of the economist's lens, accurate forecasting of an economy's future may be theoretically, not just practically, impossible. Steering an economy with positive feedbacks into the best of its many possible equilibrium states requires good fortune and good timing—a feel for the moments when beneficial change from one pattern to another is most possible. Theory can help identify these states and times, and it can guide policymakers in applying the right amount of effort (not too little but not too much) to dislodge locked-in structures.

The English philosopher of science Jacob Bronowski once remarked that economics has long suffered from a fatally simple structure imposed on it in the 18th century. I find it exciting that this is now changing. With the acceptance of positive feedbacks, economists' theories are beginning to portray the economy not as simple but as complex, not as deterministic, predictable and mechanistic but as process-dependent, organic and always evolving.

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TAB 37

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

4TH STORY of Level 1 printed in FULL format.

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LENGTH: 1774 words

HEADLINE: Novell to introduce SuperNOS strategy

BYLINE: From LARRY CAMPBELL in Atlanta

BODY:

NETWORK computing industry leader Novell is bailing out of a number of its existing markets and terminating several product lines - including Novell DOS 7 - to concentrate on new ''technology initiatives'' and usher in an era of ''pervasive computing''.

Novell is initially pulling out of the personal computer operating system business by stopping production of Novell DOS 7, a product it acquired as part of its take-over of Digital Research.

''The battle for the office desktop is over and MS-DOS and Windows have won,'' Novell chairman and chief executive Robert Frankenberg said at last week's Networld+Interop '94 conference in Atlanta, Georgia, in the United States.

''We will support Novell DOS, but we will not enhance it.''

''Novell has as much DOS marketshare as Microsoft has network marketshare,'' said Novell executive vice-president John Edwards.

''We are focusing on strong areas.''

Novell used Networld+Interop '94 to introduce these strong areas, which are part of its vision of the future of computing.

Novell sees networking as it is today evolving to encompass a much wider, global concept. It envisages everyone now owning a computer will use networking technology - through the global information superhighway, among other things.

It also expects a growing number of people using computers for the first time in future will also need to connect to information hubs to share and exchange information.

''Our goal is to take people one step at a time,'' Mr Edwards said.

''The future is pervasive computing: connecting people to allow them to work anytime they want - any way.''

The term ''Pervasive computing'' is one Novell has chosen to define its

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vision for the future. To usher it in, the company is turning its attention to a range of new products - encompassing operating systems and user interfaces - and services.

Top of the list is SuperNOS, a planned killer operating system that will see the best of Novell's existing NetWare network operating system being combined with the best of UnixWare - its UNIX counterpart.

There are an estimated 40 million NetWare users on four million local area networks (LANs) worldwide - more than double the number of users of all other network operating systems combined.

In addition, there are about 30 million users of UNIX applications around the world.

It is this formidable market that Novell aims to capture with SuperNOS, according to Mr Frankenberg.

''The time has come for NetWare NOS to provide all the services of an operating system,'' he said.

''This is why we are evolving a SuperNOS with NetWare and UNIXWare on a common Novell microkernel.

''We have left the world of the mainframe. Organisations have many servers. By ensuring that NetWare and UNIXWare work perfectly together, we allow our customers to chose which technology they need on which servers.''

Novell planned to make both products run on a single set of hardware, or ''as a single system image on multiple hardware sets'' on a network.

''You get the best of both and a progressive, evolutionary path from today's specialised, robust backend,'' he said.

''All applications, trained programmers, tools, interoperability, support, and network services continue on without change. Perhaps best of all, we build on success, adding functionality rather than simply re-writing the old.''

SuperNOS is still a ''concept'', according to Mr Edwards.

''(It is a) codename for a technology initiative to bring the best of UNIX and NetWare together in a common system''.

When complete, the system would be open to licensing and would be provided on a wide range of platforms, he said.

In addition to its focus on the network operating system market, Novell is also looking at the client side of the business.

Last week Mr Frankenberg unveiled plans for an ''advanced Novell client interface that will make it compelling to be connected networks''.

Featuring a graphical three-dimensional user interface with a ''world metaphor'', the system would make network navigation simple for the first time, he said.

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However, it would not be a new operating system in its own right, Mr Edwards said.

Instead, it would be built on existing systems such as Windows 95.

''We will see over four to six months of demonstrating and customer testing of this system (before it is brought to market),'' he said.

''It will browse the Internet, NetWare and NCS networks and live in MS Windows, Chicago, UNIXWare and other desktop operating systems,'' Mr Frankenberg said.

''It will bring not only these end user services, but also compelling consistent NAPIs (network application programmer interfaces) for Windows, UNIX and other developers to unlock the power of the network from client applications.''

These new areas of focus do not just see Novell pulling out of the desktop operating system market - which was itself a move the market ''welcomed'', Mr Frankenberg said.

In addition, Novell is pulling out of the database business, up to a point. Having sold off Btrieve, its database product, the company is now only working with partners in the database area.

It will steer clear of creating vertical applications and, while working with information service providers as part of its networking technology initiative, it will not become an information service provider itself, or attempt to provide communications infrastructure.

''This frees up a considerable number of people who are now making the network fulfil our vision,'' Mr Frankenberg said.

Hardware would also be an area that Novell would abstain from dabbling in, he said.

''(Former Novell chairman and chief executive) Ray Noorda got us off hardware in the '80s. I will keep us on the wagon in the '90s,'' he said.

LANGUAGE: ENGLISH

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TAB 38

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

SUMMIT STRATEGIES

How Microsoft's Server Strategy Will Change the Industry—*Part I: Microsoft's Operating System and Application Strategy for Servers*

94-1564

FILED

FEB 14 1995

District Court
Columbia

Fine-Tuning Microsoft's Server Strategy

Microsoft competitors have taken great pleasure in the slow acceptance of the much hyped NT. Some of this gloating is certainly well deserved. After a long period of anticipatory eulogies for competitive operating systems, NT barely shipped 400,000 units in its first full year of availability. This is one-sixth the number of OS/2 shipments and only marginally higher than Solaris' 1993 shipments (see Figure 1). Moreover, the majority of NT shipments are either free copies or are being used for development or evaluation.

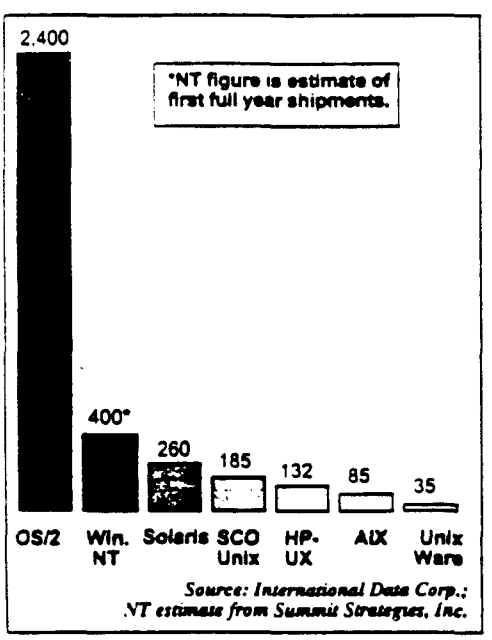

Figure 1: Licenses of 32-Bit Operating Systems Shipped in 1993 (thousands of units)

Are competitive OS vendors beginning their celebrations too soon? After all, consider how much solace Apple took in the slow acceptance of Windows.

Just as importantly, many NT cynics are finding their evidence in the wrong places. They are looking at the small number of total NT units, the minimal acceptance on the desktop and the technical deficiencies of the operating system. Many of those competitors who view NT as a server operating system are focusing on comparisons with and difficulties in displacing NetWare.

Those who want to objectively assess the prospects for NT should instead examine the positioning, capabilities and increasingly high-profile endorsements of NT as an application server operating system. While NT's acceptance as a desktop and file server OS has been slow, a growing number of large, leading-edge corporate customers see tremendous potential for NT as an application server in department-sized environments.

More importantly, Microsoft has optimized NT's server capabilities by segmenting its development focus between desktop and server versions and by introducing a broad range of complementary server offerings. Meanwhile, most of the leading server application vendors—including those introducing client/server versions of applications that had been available only

on minicomputers and mainframes—have selected NT as one of their first server operating systems, and the one offering the largest market potential.

What are NT's real prospects as a server operating system? How can one capitalize on its potential without making their company's future too dependent on Microsoft and NT?

Windows NT: The Rumors of its Death Are Premature

Make no mistake. *Windows NT and its successors are Microsoft's strategic operating system.* As Microsoft Executive Vice President Mike Maples states, "by the end of the 1990s there will be one Microsoft operating system—NT—but there will be three of them: NT Advanced Server, NT Advanced Workstation and Windows NT" (see Figure 2) Microsoft views the slow initial acceptance of NT as only a relatively minor delay in its quest for global software domination.

As discussed in Summit Strategies' report, *Profiting from the Transition from Personal Desktops to Enterprise Desktops*, initial NT **desktop** acceptance will be limited primarily to engineering, publishing, software development, trader workstation and a few other specialized applications with particular performance, security and reliability requirements. This will begin to change as developers write applications to Win32. Most of these applications will be optimized for Chicago, but they also will provide native performance on NT Workstation and, then, on Cairo.

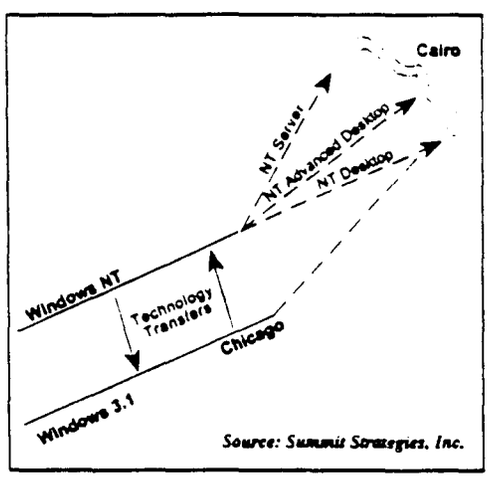

Figure 2: Future of the Windows Architecture

The story is very different for **NT Server**. NT Server is Microsoft's future. It is **THE FOUNDATION** of all of Microsoft's target growth markets—workgroup, department, enterprise, advanced consumer and information highway. Microsoft, however, has little or no experience or credibility in those markets. It must develop them essentially from scratch.

Microsoft recognizes these limitations and is dedicating extensive commitment and resources to its efforts to establish NT as a standard server operating system. It has carefully studied the factors that made other enterprise and server operating systems successful and has developed a strategy that combines some of the most important of these factors with Microsoft's own unique twists.

NT Server as the Foundation for Microsoft's Solution Platform

Microsoft's most obvious work on NT is in the form of Daytona, which will be more formally known as Windows NT 3.5. Daytona will deliver higher performance with smaller memory and will provide better reliability, robustness, SMP support and connectivity than version 3.1.

It will be divided into two optimized

versions—one for advanced desktop users (NT Workstation) and one for servers (NT Server). This division will mark the beginning of separate, but still binary compatible code bases that are targeted at separate markets. Daytona also will provide a migration path to Cairo (NT version 4.0), the scaleable, object-oriented OS that Microsoft plans to release by the end of 1995.

However, as important as all of these operating system enhancements may be, they are only the foundation of a much broader Microsoft server strategy. This strategy is based on a broad range of server applications that Microsoft is developing to run on top of NT Server and which will tailor the OS for use in specific functions.

Microsoft plans to ship five server applications that will run on top of NT Server, some of which are already shipping: SQL Server, SNA Server, Systems Management Server, Exchange Server, and "Tiger" Video Server.

These server applications will likely be joined by others, including a search and navigation engine, server versions of many of its client-based Microsoft Office applications and, possibly, some "diagonal" server-based business applications, such as accounting, human resources management and sales automation. Microsoft is also developing an online service (code-named Marvel) that will generally compete with Prodigy and America Online.

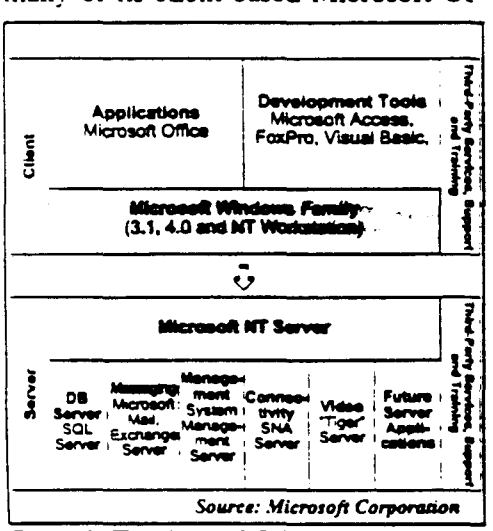

Figure 3: The Microsoft Solutions Platform

Although these server applications are very different from each other, all share at least two important factors: They are designed as general, extensible frameworks on which partners are encouraged to write their own specialized applications; and each is available on and optimized for use with NT Server and is designed to work seamlessly with all other Solution Platform tools and applications.

The combination of these factors will make NT Server a unique, very formidable server operating environment.

Creating a Consistent, Universal Server Environment

Each Microsoft server applications competes with some third-party offerings. SQL Server, for example, competes with Oracle7 and Sybase System 10. Exchange competes with Lotus Notes and Novell GroupWise.

Microsoft, however, is positioning each of these applications as generalized, extensible platforms on top of which smaller, more specialized and vertically-focused applications can be written.

Like Oracle and Sybase, Microsoft is attracting third-party developers to write specialized applications on top of its own generalized platforms. Unlike Oracle and Sybase, however, Microsoft will not develop these applications itself. It will leave this add-on market exclusively to

third-party partners and has developed a number of large, well-funded cooperative technical, marketing, distribution and consulting programs to help these partners enter and expand their markets.

Microsoft has already attracted more than 600 partners to write applications on top of SQL Server, more than 25 to write for Systems Management Server, and 70 partners to write for Exchange Server. SQL Server applications, for example, range from diagonal accounting and document management through vertical applications for insurance and health care.

This base of third-party applications will help make the generalized Microsoft Server Platform a viable foundation for a broad range of highly specialized applications. In and of itself, however, this is not different from what is provided by competitive OSs (i.e., NetWare and Unix), databases (such as Oracle7) and groupware environments (such as Notes).

Microsoft, though, takes a giant step beyond these competitive environments by:

- Optimizing its applications for, and integrating them closely into its OS to provide fast performance, permit the application to take full advantage of all operating system capabilities (without duplicating them) and provide the basis for integrating important application capabilities directly into future versions of the OS.
- Providing a common set of development tools and integration protocols that allow third-party applications to be easily integrated into and take full advantage of the operating system and all Microsoft server applications and to integrate closely with Microsoft desktop OSs and applications.

This integration is critical to Microsoft's entire server strategy. It provides developers with a single set of APIs and communications protocols with which they can develop to all Microsoft desktop and server OSs and integrate with all compliant Microsoft and third-party applications. It provides customers with a modular, comprehensive, "easy-to-own" server environment.

Microsoft also is laying out a road map under to make this integration closer and deeper. As a result, data semantics and query technology will be common across both desktop and server components and communications will be facilitated between them.

More importantly, the OLE object model—already supported by all Microsoft and a small, but growing number of third-party applications—will form the foundation of Microsoft's next-generation Cairo operating system. In addition, many new Microsoft products are based on a technology that will be used in Cairo. This will simplify the upgrade path to Cairo and will allow the new OS to take over many of the capabilities of previously distinct applications.

Since Cairo will be a pure object-based OS, it will be highly modular. Components will be easily added, deleted or replaced, making it relatively easy for resellers or customers to customize the operating system and incorporate traditionally distinct functions into it. In fact, since all Microsoft server applications will fit into a single, integrated Cairo model, it will be almost impossible to distinguish between the operating system and the applications.

Redefining Server Industry Rules to Match Microsoft Strengths

Microsoft's approach promises to make NT Server a much more comprehensive, integrated server environment than is available from any other client/server operating system, relational database or messaging backbone vendor. In fact, NT Server will approach the level of integration that previously had been available only in proprietary mainframe and minicomputer environments.

In and of itself, this integration will be attractive to large numbers of customers, application developers, OEMs and resellers, but Microsoft plans to go even further. It will offer these capabilities in a new way that no other competitor can directly match. It will combine capabilities that had traditionally been available only as high-priced, custom-developed solutions on expensive platforms with price levels and distribution channels that were available only for basic PC-level solutions.

In other words, *Microsoft plans to redefine the rules of competition in the server operating system and applications market.* It will rewrite these rules in a way that builds on its existing business model and makes it difficult, if not impossible, for other vendors to follow.

Summit Strategies believes that Microsoft will execute this strategy gradually and in a way that permits the incremental extension of its traditional low-overhead, product-oriented, virtual company business model. It will establish this presence in a niche in which there is very little entrenched competition—department-level, decision support application servers (see Figure 4). It will position the NT server environment as a more functional, scalable application platform than NetWare and a less expensive, easier-to-own alternative to Unix. While Microsoft plans to ultimately replace NetWare and Unix, initially it will coexist with them by emphasizing connectivity with Unix and its use as an application server within existing NetWare file server environments.

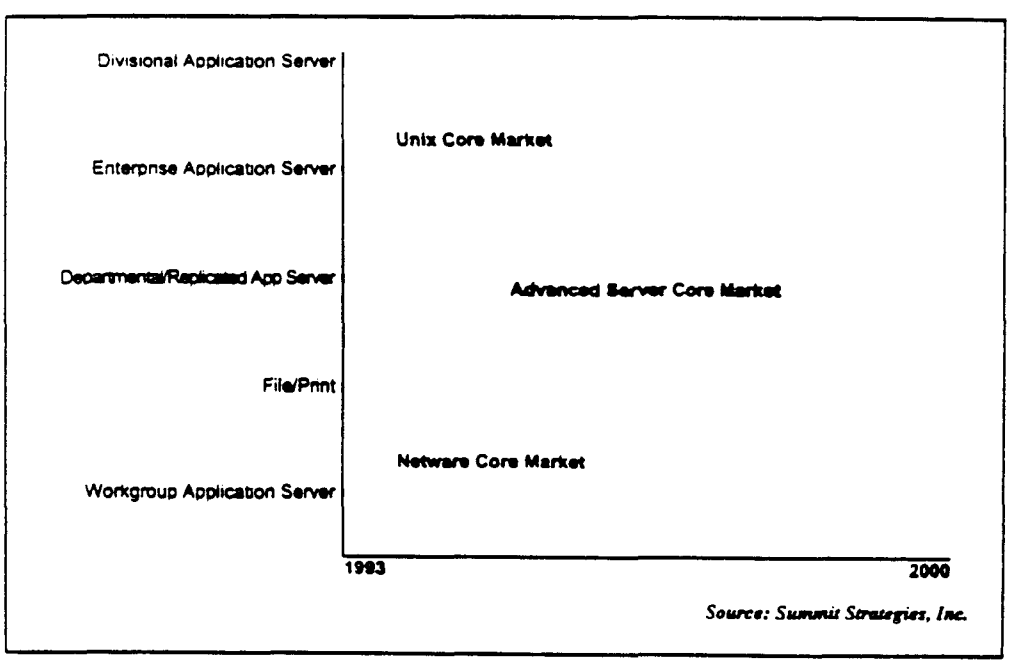

Figure 4 :Microsoft's Trojan Horse Strategy

Microsoft will use this market as a beachhead from which to expand gradually into complementary segments, such as department-level and branch transaction servers, workgroup application servers, file and print servers and eventually, into some division-level environments. Summit Strategies expects this strategy to allow Microsoft to grow NT's position in the network server operating system market from about 2.5 percent in 1993, to almost 15 percent by 1997. It will play much larger roles in the application server market and, especially, in the low-end to midrange of that market.

Obstacles to Microsoft's Dominating the Application Server—Part I

Microsoft is certainly well-positioned to establish a strong position in the application server market. Its success, however, is far from assured. The company still faces a number of strong competitors and must overcome a number of self-imposed obstacles. These obstacles fall into two primary categories: some are product-based while the others are a result of the company's business model. Microsoft's product-based obstacles are:

The perceived unreliability of Microsoft server solutions

Everybody recognizes the limitations inherent in the Windows desktop environment. Most customers are willing to put up with these limitations in return for the benefits of low cost, application availability and standardization. Customers, however, are much less willing to accept such limitations in application server environments, particularly when they are using the servers to run business-critical applications that had previously been entrusted only to mainframes and minicomputers.

On one hand, NT is relatively robust for a Version 1.0 operating system. However, it is still immature, unproven and lacks many of the complementary tools that will be required for acceptance in business-critical environments. Microsoft does promise more robust upgrades to its operating system, RDBMS and communications software, new versions of needed system management and messaging software, and improved fault tolerance and recoverability. However, its continual missed shipment deadlines do not instill great confidence.

The limited openness and scalability of the Microsoft solution

Although Microsoft operating systems may be standards, they are not open. This creates a risk, since customers who adopt them will have a difficult time migrating to another operating systems, should the need arise. This problem will be particularly acute for customers who buy into Microsoft's server applications, since these applications will be available exclusively on NT Server and will be integrally linked to it.

This lock-in could be particularly dangerous for customers who require that their applications be highly scaleable, up through enterprise environments. Microsoft solutions currently support symmetric multiprocessing and will support clustering and be portable to all major processors. However, NT Server is currently tuned for single and dual processing. Its next implementation is only likely to scale to four processors, which is far below the 16- to 30-CPU tuning of a number of versions of Unix.

There are, however, mitigating factors for

each of these concerns. Consider robustness. While Microsoft has missed deadlines in shipping virtually all of its key products, once they do ship, they are reasonably stable and deliver on most of the company's promises. When push comes to shove, most customers would prefer to receive a stable product late, than a buggy product on time. But, regardless of when Microsoft ships, computing environments with overwhelming needs for proven, reliable server environments are unlikely to select Microsoft products, at least for the next several years.

As for openness and portability, it is largely a question of target markets and tradeoffs. Generally speaking, large corporate MIS departments are most likely to demand that their server environments be open, flexible and scalable. Most of these MIS groups have the capabilities or the resources required to configure, develop for and administer these solutions. In contrast, many small businesses and department-level customers will be willing to trade off such benefits in return for solutions that are easier and less expensive to buy, configure and manage, and for which off-the-shelf applications are generally available.

The percentage of the market that will fall into each camp is certainly debatable. While everyone says that they want open, scalable and robust solutions, when it comes time to make a final decision, Summit Strategies believes that many more customers will choose easy, cheap and standard.

Obstacles to Microsoft's Dominating the Application Server—Part II

The other, and more difficult obstacles to Microsoft's success in the server market are more dependent on the company's business model and style of operation, than on its technology. Summit Strategies sees three primary obstacles in this category.

Microsoft's penchant for making enemies

Microsoft has always had a way of making enemies due to such factors as its sheer market power, position as industry upstart, cockiness, and the ruthless way in which it often deals with competitors and partners alike. On one hand, vendors have no choice but to cooperate with a company that is dominant in the market in which they wish to participate (as Microsoft is on the desktop). On the other hand, vendors can avoid, or actively help to defeat those companies which do not yet have market dominance.

Microsoft's lack of an enterprise marketing and support organization

Microsoft developed its business model around a product-focused, low-overhead, indirect sales and support model. This model was well-suited to the company's initial goal of selling high volumes of low-cost, non-mission-critical products into low levels of business organizations. However, Microsoft is now targeting with its server products towards the business solutions market, which developed around a totally different business model. Its customers, therefore, have very different requirements.

Microsoft does not have or plan to develop the type of direct sales,

implementation consulting or 7/24, heterogeneous, on-site support capabilities that many business customers expect from their key system software vendors. While Microsoft is enhancing its direct marketing, consulting and support capabilities, it will rely on third-party partners to provide most of these capabilities. There is no evidence to suggest that its new target market is ready for this type of "virtual company" model.

Microsoft's confusing market messages

Microsoft doesn't seem to know what it wants to be when it grows up. On one hand, it insists that it is preparing to become an enterprise solutions vendor. It claims that NT Server and its accompanying applications will provide the robustness, scaleability, reliability, capabilities and features of traditional enterprise solutions. On the other hand, its product releases, actions and distribution and support programs suggest that Microsoft is really targeting department-level markets. These mixed messages are extremely confusing to customers and partners, and damages Microsoft's credibility as a business systems provider.

Summit Strategies believes that Microsoft will ultimately recognize that its most natural and responsive customer base, its partner franchise, and its largest potential, most strategic market lies in department-level and branch environments. It will focus its product development, its marketing resources and its partnership programs at this segment. Once it captures a dominant and sustainable position in this core market, it will expand in both directions—downward into file server and workgroup markets and upward into enterprise-level markets.

Microsoft, however, must address a number of other issues before it can hope to effectively address even these department-level and branch application server markets. It must build the type of in-house infrastructure required to establish credibility in these markets and attract the type of application, distribution, integration and support partners that can address these customers' real needs.

As fully discussed in the next report in this series, *Microsoft's Market, Channel and Partner Development Strategy for Servers*, Microsoft recognizes many of these requirements and is making more progress in addressing them than is generally recognized.

In summary, Microsoft will certainly be a force to be reckoned with in the application server market. Anyone who hopes to play in this market must understand where Microsoft is going and how the company will change the rules of competition to its own advantage. Only by understanding these critical factors can a company decide whether they will partner or compete with Microsoft and what they must do to survive this competition or partnership.

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SUMMIT STRATEGIES

How Microsoft's Server Strategy Will Change the Industry—*Part II: Microsoft's Market, Channel and Partner Development Strategy for Servers*

Microsoft's goal is to establish NT Server as the AS/400 of the client/server world. It is developing a seamless, optimized, easy-to-use and administer environment that will provide access to a broad range of packaged, business-critical applications. The server platform will be sold to the same types of customers who have bought IBM's AS/400-based business solutions—a combination of small and midsized businesses and departments of larger corporations.

Similar to the AS/400 which comes standard with its own specially tuned and optimized operating system, database and management tools, Microsoft is developing a complete suite of base-level server applications that are available exclusively on and optimized for NT Server. Microsoft, however, cannot provide the type of bundled solution that IBM is offering. NT Server must run on multiple off-the-shelf servers and must accommodate databases, communications, management and other tools from a large number of competitive vendors.

Novell is another network operating system vendor who has successfully sold into small and midsized business and departments of larger corporations. As with Microsoft, Novell relied on partners and third-party partners for distribution and support and had to integrate NetWare into heterogeneous environments. However, Microsoft will face more difficult challenges than Novell did since NetWare is primarily a file server operating system. In general, file server LANs are easier to configure and manage and do not require the level of integration, tuning or solutions-oriented sales capabilities that client/server networks do.

Although Microsoft must provide the value of supporting a broad range of platforms and accessory software, it recognizes that too many options lead to the same type of confusion that has restrained the growth of Unix. Microsoft, therefore, is taking something of a middle path by providing customers with the choice to purchase its server operating system and applications either as:

- Separate, standalone products that can be integrated with any other vendors' NT Server products or as
- A single, integrated bundle (called Back Office), which includes the server operating system and Microsoft server applications as a preconfigured, integrated set of tools designed to work together. Pricing for this package is 40 percent less than if all packages were bought separately.

As discussed in the first report of this series, *Microsoft's Operating System and Application Strategy for Servers*, all Microsoft server products share a number of important factors. Each is:

- Available exclusively on, and optimized for use with NT Server;
- Designed for use with a common set of Microsoft development tools and integration protocols;
- Designed to work seamlessly with all other Solution Platform tools and applications;

- Positioned as a generalized, extensible framework on which partners are encouraged to write their own specialized applications.

This commonality and integration is critical to Microsoft's server strategy. The goal is to attract large numbers of developers, resellers and administrators to the broad Microsoft environment, facilitate the availability of hundreds of specialized, packaged server applications and to provide customers with a modular, comprehensive, easy-to-own server environment. Microsoft plans to offer capabilities that have traditionally been available only as high-priced, custom-developed solutions on expensive platforms, at price points and through channels that were previously associated with PCs. The company also will provide migration paths from PCs.

Thus, Microsoft will *redefine the rules of competition* in the server operating system and applications market. If it succeeds, many of Microsoft's competitors will find it difficult—if not impossible—to compete.

Building a Business-Critical Solutions Infrastructure

Microsoft faces a number of challenges in its bid to enter these new markets. Its corporate infrastructure was well-suited to the marketing and support needs and the economic mandates of the PC industry. It had a small direct marketing organization to promote desktop productivity products to storefront computer dealers and a small telephone-based support staff to answer questions. It did not have, however, a large customer direct sales force, a consulting or integration group, or comprehensive support capabilities to which MIS managers and CIOs are accustomed. It could not hope to compete with vendors such as IBM, Hewlett-Packard and Oracle in selling bet-your-business server products to large corporations.

Microsoft, therefore, has begun to build new marketing, integration and support infrastructures that are intended to improve its credibility and more effectively address the needs of new customers. The company built a:

- 3,000-person direct marketing organization, 40 percent of whom are dedicated to addressing the needs of large corporate customers;
- 500-person consulting and systems integration group to help large corporate customers plan, design and implement sophisticated client/server business solutions around Microsoft products;
- 3,000-person, around-the-clock support group, 400 of whom are trained specifically on the complexities of server operating systems and heterogeneous networking. Premier customers get access to higher-level support people, an accelerated escalation procedure, a dedicated manager who will help them with proactive planning and, in some instances, access to on-site support capabilities.

Microsoft also formed a new marketing group, the Organization Customer Unit, that is responsible for developing and managing ongoing relationships with business organizations. This unit is divided into two primary groups: one to manage large corporate customers, the other to build sales into small and midsized companies. The Organizations Unit is responsible for:

- Managing the company's Select volume licensing program, which is intended to make it easier for large corporations to buy from Microsoft and to build ongoing relationships with them;
- Recruiting and managing relationships with client/server application developers and systems integrators who will be most important to Microsoft's efforts to sell client/server solutions into large corporate accounts;

- Responsibility for the Microsoft's value-added Solution Providers programs. It recruits and manages resellers who will be capable of selling Microsoft server products and client/server solutions and other partners who are specially qualified to train customers on and support these new implementations.

The Organization Customer Unit also owns Microsoft's Industry Marketing group which targets vertical markets that can potentially generate large sales of Microsoft-based client/server solutions.

Defining a New Client/Server Business Model

Microsoft's direct work with corporate accounts, through its newly enlarged direct sales force, consulting services and support arm, is somewhat similar to that provided by traditional enterprise system and software vendors. But there are two major differences between Microsoft's approach and those of enterprise vendors. Under the Microsoft program:

- Third parties handle all product delivery and much of the implementation and actual support requirements. All Microsoft product sales, even those under the Select program, are fulfilled by third parties. Microsoft's consulting and support groups will typically refer customers to third-party partners or bring these partners into a project themselves, with the goal of having the partner handle the implementation and most of the follow-up work.
- The primary goal in working directly with customers is to transfer Microsoft's knowledge to its customers, not to actually do the work themselves. For example, the company generally confines consulting work to fast-in/fast-out projects where it defines architectural requirements, plans transitions and trains or supervises customer employees and third parties to provide the actual implementation work and to fully handle future projects themselves.

Virtually all aspects of these services have the ultimate goal of helping third-party partners address the needs of corporate customers without direct involvement by Microsoft. While all product fulfillment is handled exclusively through third parties, Microsoft is trying to involve appropriate partners directly in the demand creation process.

Microsoft's consulting and support organizations have even more formal structures for training and for bringing partners into accounts. MCS consultants, for example, dedicate approximately ten percent of their total billable hours to helping Microsoft Solution Providers (SP) and count on partners for providing more than half of all their billable hours in some of its practices.

This cooperation with SP partners also carries through Microsoft's support and training organizations. For example, Microsoft Education Services no longer deliver training directly to end users. The company has two new channels, Authorized Training Centers and Technical Education Centers, that it established specifically to deliver courses on Microsoft products and to certify partners who have completed specialized training.

The company's support group, meanwhile, provides only very limited support for Microsoft products' connections into heterogeneous environments. One class of partners, Authorized Service Centers, have been authorized to provide such capabilities. Furthermore, the company provides very little on-site work and will not even go on-site without a Solution Provider. If the customer does not have an SP, Microsoft will help it select one and then bring the Solutions Provider up-to-speed on the customer's environment.

Developing Partnerships to Enable Microsoft's Virtual Company Model: Phase One

Every vendor, irrespective of the degree of its horizontal integration, relies on partners to help sell its products. Microsoft's virtual company model will require much closer partnerships with many more types of partners than most other companies' models.

Various partners will play different roles in the Microsoft server business model, but these roles will change significantly as the market for client/server solutions matures. During the earliest stages of the market, Microsoft must work most closely with solutions-oriented systems vendors, systems integrators and software developers. After all:

- Systems vendor partners such AT&T GIS and Digital Equipment and systems integrators such as Andersen and Business Systems Group work directly with large corporate customers to help define the need for, develop, implement and support custom solutions;
- Infrastructure software developers will provide the capabilities required for more demanding and sophisticated applications such as enterprise transaction processing;
- Application vendors develop the solutions that will be required to attract customers who cannot or do not want to develop their own applications. Microsoft has already gained commitments from vendors of leading client/server accounting, MRP, groupware, document management, and customer management applications;
- Relational database vendors will play particularly important roles in the early stages of this market. RDBMSs are critical client/server infrastructure technologies and most of the vendors have their own solution-based sales, consulting, application development and support capabilities. Moreover, once an RDBMS is ported to an operating system, it is relatively easy for all of the applications written to these RDBMSs to be ported.

Microsoft will always want to play a role in the type of large, corporate, custom implementations that are handled by large system vendors SI, RDBMS and application partners. Therefore, it will have a continuing need to work with these first-generation client/server partners. However, Microsoft will be ready to shift its primary emphasis to a new group of partners once client/server computing (especially Microsoft's approach to it) becomes more widely understood and accepted and a critical mass of applications become available for NT Server.

Developing Partnerships to Enable Microsoft's Virtual Company Model: Phase Two

Microsoft's primary strength is in selling large quantities of standard products to smaller companies and individual customers through large numbers of third-party channels. It will attempt to apply this same business model to its server business. A number of Microsoft partners are already established in and committed to this type of business.

Microsoft is encouraging current server vendor partners (everyone from AST through Tricord) to bundle NT Server and the Back Office application suite with some of their servers. Some partners such as Compaq and Informix will play critical roles as "bridge vendor" partners, helping to "repackage" the capabilities developed and lessons learned from direct sales of client/server solutions into third-party channel programs. (Summit Strategies' report, *The New Age of Client/Server Applications*, contains a full examination

of the roles of bridge vendors.)

Microsoft already has signed up almost 6,000 third-party Solution Provider resellers, and plans to grow this number to about 15,000 resellers by mid-1995. The company is focusing SP recruiting efforts primarily at established, successful resellers of products including the AS/400, Novell NetWare, Sun workstations, Unix RDBMSs and vertical and diagonal applications. It is targeting resellers who are best situated to address Microsoft's targeted verticals in geographies that lack adequate coverage. Microsoft also is devoting extensive efforts to training and generating business for these partners. For example, it is:

- Establishing large, formal programs (e.g., DevCast, BusCast, TechNet and Microsoft Partner Network) to educate and train these channels;
- Passing large numbers of leads to these channels, and is developing vehicles (e.g., trade shows, road shows and seminars) to generate demand;
- Using Microsoft consultants and support engineers to train partners to perform functions currently provided by Microsoft personnel, and to actively bring these partners into accounts;
- Actively helping high-end, traditionally direct sales system vendors (e.g., AT&T GIS and Digital), database vendors (e.g., Oracle and Sybase) and application vendors (e.g., SAP and D&B Software) to develop and offer their own products through third-party channels;
- Encouraging distributors and aggregators to provide built-to-order, custom-configured server bundles (that combine Back Office back-end, Vertical Office front-end, and specialized third-party applications) to their resellers.

Microsoft plans to use its market position, vendor partnerships and aggressive channel development programs to build a broad, third-party, client/server distribution and support channel well before its competitors. It will then try to lock these channels into Microsoft solutions by ensuring that they are familiar and comfortable with Microsoft products. Microsoft will do this by providing the best technical and marketing support, by using its marketing muscle to generate more sales than competitors (with less effort and resources from SPs), and by promising never to directly compete with its partners (as proprietary and Unix vendors often do).

Microsoft's Prospects for Success in the Client/Server Server Market

Unix vendors will most likely offer client/server server solutions that are more open, robust, flexible and scalable than those offered by Microsoft. IBM will most likely offer AS/400 solutions that are more turnkey and easier to manage. Novell will most likely offer solutions that are lower priced. Microsoft, however, will combine some of the best of all of these capabilities with a number of its own unique advantages. For example, it will offer:

- The largest base of binary compatible servers and off-the-shelf applications of any server environment;
- Access through the broadest range of distribution channels in the industry;
- Probably, the lowest cost, best price/performance application servers in the industry (due to a combination of Microsoft's aggressive software pricing, availability on all hardware platforms and broad distribution);
- A turnkey solution (based on Back Office and Vertical Office) in which all of the components will integrate seamlessly with each other and support the same APIs (e.g., OLE, ODBC and MAPI);

- A strong development platform to which custom and packaged application developers can write using a broad range of Microsoft and third-party tools;
- Strong scalability ranging from uniprocessor 486-based PC servers to 30 CPU Sequent servers and a broad range of uni- and multiprocessor RISC servers; and
- Systems and software that provide reliability, availability, manageability, security and robustness that will be suitable for all but the most demanding applications and environments.

Given the strategic importance of the server market to Microsoft's future, the company can be expected to compete ferociously, and offer the largest, best-funded partner recruitment, training, advertising and marketing programs in the industry. However, as discussed in the first report of this series on Microsoft's NT Server strategy, *Microsoft's Operating System and Application Strategy for Servers*, the company will still be hampered by factors such as:

- Novell's strong established position in the channel and in the file server and low-end database server markets;
- Unix's perceived (and in many instances, real) advantages in areas such as reliability, scalability and openness;
- Microsoft's reputation for ruthlessness and for competing with its software partners in a segment of the market in which partnerships are critical; and
- Whether the market or channel is prepared for the virtual company model on which Microsoft is staking its future.

Summit Strategies views this last issue as the *single most important, most open question* in assessing Microsoft's prospects for success in this new market. Will customers who are accustomed to a single vendor solution really accept such a diffuse, nontraditional chain of responsibility for support of mission-critical, line-of-business solutions? Will Microsoft's partners be able to address the demands that this model will place on them?

As discussed in a number of our previous reports, Summit Strategies believes that this model *will* work and that Microsoft is building the type of infrastructure that is required to support it. But even *if* the virtual company model works, there is still a question as to *when* it will work.

While the virtual company model will almost certainly succeed when client/server technologies and markets become more mature, how suitable is it during the early stages of the market? After all, few people currently understand how to design, develop or maintain client/server solutions, the tools are immature and most configurations are still custom developed.

Microsoft's initial reliance on the virtual company model has the potential of effectively locking the company out of the market before its business model has a chance to prove itself. This, however, is not likely to occur. After all, Phase One partners such as AT&T GIS, Digital Equipment, Sequent, Andersen, EDS and SAP typically assume full responsibility for their solutions.

Ultimately, customers and partners must rely on Microsoft rather than on system vendors for the stability of the operating system and the foundation server applications. However, this should not be much of a problem since no systems integrator or vendor (including IBM) assumes full responsibility for every component of a solution. Although it may cause some consternation, everybody uses some type of third-party products. While the risk may still be greater for a Microsoft-based solution than for a vendor-specific Unix system, the level of risk will decline as Microsoft's server products mature (as with NT Server 3.5) and as implementations of leading reference accounts become proven.

Overall, Summit Strategies is quite optimistic about the prospects for NT Server. As fully discussed in the first report of this series, we expect NT Server to account for a rapidly growing share of the network operating system market, growing from about 2.4 percent in 1993 to 14 percent in 1997.

More important than the raw numbers, are the segments in which NT Server will experience its greatest acceptance. Penetration will be relatively low in file server and enterprise application server markets, yet NT Server is likely to dominate the large, highly strategic midrange (large workgroups, departments and branch office) application server markets. As shown in Figure 1, this entry will provide a perfect vehicle by which Microsoft will be able to extend its penetration downward into the file server and workgroup application server markets, and gradually upward into the division and enterprise application server markets.

Opportunities and Threats for Microsoft Partners and Competitors

Microsoft's likely success in the application server market presents some significant opportunities for partners. Each phase of the market will offer significant revenue and profit opportunities, but the opportunities will vary greatly by type of partner and over time.

During Phase One, turnkey solutions partners who can define, develop, implement and support custom applications will have a great advantage. In Phase Two, as NT Server and applications become more established in the market, and as client/server solutions become poised to enter broader markets and channels, Microsoft will shift its attentions to "bridge vendors" who can help translate the capabilities and lessons of Phase One-implementations into the type of "cookbook" approaches and solutions that will spur broad market, third-party sales. When the market enters Phase Three, the lowest cost producers with access to the broadest, most effective distribution channels will be best situated.

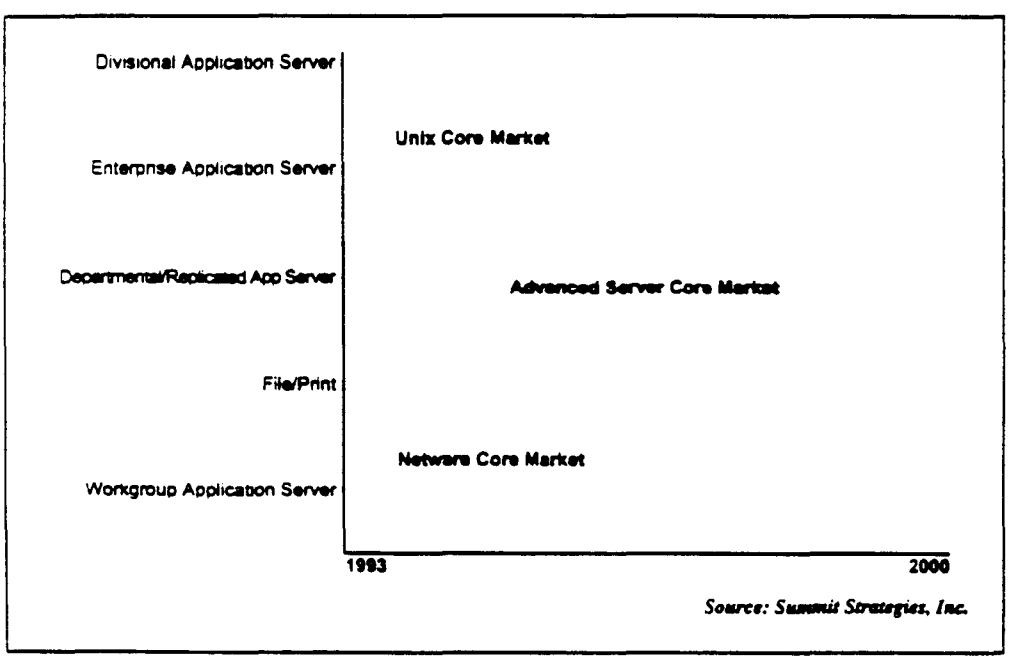

Figure 1: Microsoft's Server Market and Expansion Strategy

By this time, Phase One partners will have to either:

- Evolve their business models to play by Phase Three rules;
- Adapt their value-add to ever more specialized, demanding, and narrower segments of the market such as distributed, object-based transaction processing environments;
- Find another market such as global, enterprise Unix solutions; or
- Go out of business.

All types of partners—hardware vendors, software vendors and resellers—will be susceptible to this type of shake-out.

Microsoft is using its unique product line and market position to change the rules of competition in these markets. It is optimizing its applications for its NT Server operating system, providing the type of bundling incentives and using the type of pricing approaches that few, if any, competitors will be able to follow.

Even though Microsoft currently is competing only with vendors of the broadest server foundation applications, all partners need to beware. As the client/server market grows, previously specialized applications will become increasingly mainstream. As discussed in previous reports such as *Developing and Leveraging Client/Server into Broad Markets and Channels*, Summit Strategies believes that diagonal applications such as accounting and sales automation will become just as broad and strategic in the client/server age as database and presentation graphics were in the personal computer age. If Microsoft decides to enter these markets, some server application vendors may face the same types of options in competing with Microsoft that server operating system vendors will face over the next several years.

If Microsoft does succeed in changing the rules of competition, few will be able to go head-to-head with Microsoft products. They will be faced with a choice of one of two primary strategies: either focus their product and market development efforts on segments of the market in which they have a clear advantage and can establish a reasonably defensible position; or introduce highly focused products that are optimized for a market niche that is too narrow to attract the direct (or at least focused) attention of Microsoft.

In summary, partnering with Microsoft may be as dangerous as competing with it. Partners can protect themselves by continually adapting their value-add to provide capabilities that Microsoft will require during different stages of its server products' life cycle.

Vendors still have about a three-year window of opportunity before Microsoft establishes the level of market power that will make it difficult or impossible to compete head-to-head in its core market. Even after Microsoft attains this level of power, competitors will have many opportunities to "hit Microsoft where it isn't" by targeting segments where Microsoft and its solutions are weak or by focusing on niches that are too small or specialized to draw Microsoft's focus (future Summit Strategies' reports will address this and related issues in greater detail).

Although partners and competitors will always have plenty of opportunities, every vendor and reseller in the server market will have to learn to play by new rules. These rules will be generally defined by Microsoft, around the vendor's own capabilities, channel strengths and business model. For better or worse, the rules of the application server market will come to look increasingly like those that currently shape the personal computer market.

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TAB 39

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

NEWS RELEASE

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94-1564

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District of Columbia

MICROSOFT AND VISA TO PROVIDE SECURE TRANSACTION TECHNOLOGY FOR ELECTRONIC COMMERCE

Secure Transactions Across Networks Mean Lower Costs, Expanded Markets

PARIS, France, November 8, 1994 -- Microsoft Corporation and Visa International today announced that they have signed a letter of intent to jointly provide a standard, convenient and secure method for executing electronic bankcard transactions across global public and private networks. Their secure solution will help expand the market for electronic commerce by providing new opportunities for consumers, merchants and Visa member financial institutions.

The secure transaction technology will consist of software that supports both the cardholder and merchant sides of a transaction and works with the VisaNet payment system to authenticate buyers and sellers and to secure transactions for clearing and settlement. Microsoft and Visa will publish specifications that make secure transaction technology available to other software vendors and card systems to implement themselves or license from Microsoft.

The technology will be developed initially for the Microsoft® Windows ™ operating system family and is scheduled to be available in 1995. It will include extensive encryption capabilities based on technology from RSA® Data Security, Inc.

- more -

"The technological leadership of Microsoft, along with the global financial reach of Visa, allows the consumer to make payments over networks worldwide as easily and safely as payments made in person," said William L. Chenevich, group vice president, Visa International. "Our relationship with Microsoft will help to accelerate the growth of commerce over electronic networks and will open up new opportunities for our member institutions, merchants and cardholders worldwide. As the information highway becomes defined, we must look at a variety of alliances and a variety of ways to protect the financial relationships of our members and their cardholders." Chenevich also indicated that the two companies welcomed the interest and support of other parties.

"Right now, we're all street people on the information highway; we can't protect our privacy and information; we can't prove who we are; we can't buy anything," said Nathan Myrhvold, senior vice president of Advanced Technology at Microsoft. "The Microsoft-Visa technology solves these problems by using public-key technology to assure safety and privacy, and easy-to-use client software which allows consumers to use their existing bankcards to pay for goods and services across multiple applications and merchants."

Will F. Nicholson, Jr., chairman of the board of directors of Visa U.S.A. and president and CEO of Colorado National Bankshares, Inc., added that U.S. financial institutions were facing new challenges in a changing payments environment to provide their customers with service and support. "With Microsoft, we have an opportunity to bring together technology and banking, as consumers explore alternative methods of purchasing at new points of transactions," he said.

Founded in 1975, Microsoft is the worldwide leader in software for personal computers. The company offers a wide range of products and services for business and personal use, each designed with the mission of making it easier and more enjoyable for people to take advantage of the full power of

- more -

personal computing every day. Microsoft is headquartered in Redmond, Washington, U.S.A.

Visa, the world's largest consumer payment system, has more than 11 million acceptance locations. Visa member financial institutions have issued more than 357 million cards worldwide including more than 185 million in the U.S. Visa also has the leading global ATM network. Visa, headquarters in the U.S., has offices in London (Europe region), Tokyo (Asia Pacific region), Toronto, (Canada region) and Miami (Latin America region).

# # #

Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

RSA is a registered trademark of RSA Data Security, Inc.

TAB 40

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Trade Group's Board Cancels Hearing On Microsoft's Plan to Acquire Intuit

By VIVECA NOVAK
And DON CLARK
Staff Reporters of THE WALL STREET JOURNAL

WASHINGTON—An unusual trade-group hearing on Microsoft Corp.'s pending acquisition of Intuit Inc., scheduled to take place today, was canceled after Microsoft successfully pressed for an eleventh-hour meeting of the group's board.

Mike Maples, a Microsoft executive vice president, said the Information Technology Association of America board voted overwhelmingly Friday to cancel the hearing, after he invoked his right as a director to call a board meeting. "It wasn't a Microsoft-driven decision," he said.

But he complained in an interview that scheduled speakers at the hearing were all opponents of the Intuit deal who are believed to be talking to the Justice Department's antitrust division. That division is reviewing the transaction.

News of the cancellation reverberated. "It's pretty apparent that Microsoft squelched it," said Dan Schley, former head of a tax software firm who was scheduled to give his views at the session. "The industry is clearly up in arms about this." ITAA's 325 members include such giants as International Business Machines Corp. and General Motors Corp.'s Electronic Data Systems Corp., as well as Microsoft.

"I'm very disappointed," said Bernard Goldstein, a former chairman of ITAA. "It was very obvious Microsoft was unhappy with this process, but this really is, for the industry, a very large issue. It's worthy of venting . . ."

ITAA chairman Jim Mann, who formed the committee last month, said he believed the group's diverse membership would make for a range of opinions.

Instead of holding today's hearing, the committee will broaden its inquiry to evaluate Microsoft's overall impact on the information technology industry.

Rick Crandall, an ITAA board member and chairman of Comshare, a software company in Ann Arbor, Mich., said a larger look is needed. "The question is, where does the industry stand with regard to Microsoft, what are its competitive tactics, and are they illegal or unhealthy for the industry?"

The latest developments add to the intensity surrounding the review. Justice Department staff are being inundated with the views—mostly negative—of companies and individuals about the impact of the deal beyond the financial software market that it most directly affects.

Stephen Case, chief executive of America Online, was to speak at the ITAA event today. Two on-line service providers – Compuserve Inc., a unit of H & R Block Co.; and Prodigy Services Co., a joint venture of International Business Machines Corp. and Sears, Roebuck & Co. – have talked to the antitrust division about the Microsoft deal.

Mr. Schley has been a key source of information about the personal financial software industry for antitrust division staff. He said that in a conference call with seven lawyers and eight economists from the division a couple of weeks ago, he told the staff that he didn't believe that Microsoft's plan to sell its personal finance package, Money, to rival Novell Inc., will lead to real competition for Intuit's much more popular Quicken program. Microsoft hopes the divestiture will allay government concerns about any anticompetitive effects of its Intuit acquisition.

Exh. 40
94-1564 SS

FILED

FEB 14 1995

Clerk, U.S. District Court
District of Columbia

TAB 41

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Exh. 41

94-1 5 3 4 5 5

FILED

FEB 14 1995

Clerk, U.S. District Court
District of Columbia

Microsoft's New Marketing Tactics Draw Complaints

Hard Push to Get Commitments to Windows 95 May Hurt IBM's OS/2

By DON CLARK
And LAURIE HAYS
Staff Reporters of THE WALL STREET JOURNAL

Five months after a controversial settlement with the Justice Department, Microsoft Corp. is using aggressive new marketing tactics that have angered some key customers.

The software powerhouse is seeking more money and more marketing support from personal-computer companies for Windows 95, a fundamental rewrite of the operating system used on more than 100 million personal computers. Microsoft's proposed licensing terms have caused a chorus of complaints from PC makers, who are under severe pressure to lower their own prices.

Microsoft's terms include an extensive list of marketing incentives to get PC makers to quickly commit to the new program, which could bring more than $1 billion in sales in its first 12 months. Windows 95 also could help Microsoft further undermine International Business Machines Corp.'s OS/2 program, which has about 5% of the market compared with Microsoft's 80%.

Some computer makers contend the new terms raise an unfair barrier to their offering OS/2 and may violate the spirit of Microsoft's consent decree with the Justice Department. Vobis Microcomputer AG, Germany's biggest personal-computer maker, also has publicly complained about Microsoft's proposed licensing terms for its previous operating systems and announced plans to start loading machines with OS/2.

Microsoft insists it is operating strictly within the guidelines of the settlement. Several large computer makers, including Compaq Computer Corp. and Packard Bell Electronics Inc., also said they see no unfair anticompetitive bias in the marketing incentives.

Still, the harsh response to its biggest-ever selling job suggests that even mighty Microsoft has to tread carefully in prodding the industry toward a major modernization effort. A serious misstep could wind up boosting OS/2, which IBM is promoting heavily to take advantage of delays in shipping Windows 95. There are signs that Microsoft already has begun backing away from a major price increase for the product.

"Now is not a sane time to be unreasonable," said Steven Ballmer, Microsoft's executive vice president of sales and support. "IBM has never been thumping the drum harder for OS/2 than they are now. . . . I don't think they're going to be successful, but you don't gamble the company on it."

Microsoft doesn't disclose its terms for PC makers. Several PC makers said Microsoft representatives mentioned possible prices from $55 to $75 before discounts for Windows 95, an increase that could be more than 100% over the estimated $35 average for the combination of its existing DOS and Windows programs.

But Michael Culver, senior director of product management at Acer Inc.'s PC unit in San Jose, Calif., said Microsoft more recently dropped the proposed price sharply and reduced the size and number of marketing discounts offered.

"The ultimate goal is to have a similar price as what we are paying for DOS and Windows now," Mr. Culver said. "In the end, whether they've been forced to be more accommodating, or it's just negotiating strategy, I think in the end, it's going to work."

After the haggling, some analysts believe Microsoft will wind up settling for a price increase of 15% to 20% over earlier operating systems. Rick Sherlund, an analyst at Goldman, Sachs & Co., estimated that computer makers would wind up paying about $43 a machine for Windows 95.

> 'Microsoft can kill us,' the chairman of one PC maker said. 'I worry more about my dealings with Microsoft than I do about my competitors.'

The flap is just the latest reverberation from the advent of Windows 95, which replaces both DOS and Windows and is scheduled to be shipped in the second quarter of next year.

The stakes are equally high for IBM, which is battling to build acceptance for its latest version of OS/2, called Warp. IBM's operating system is based on DOS and Windows, and runs application programs written for them. But Warp won't run programs tailored for Windows 95 unless IBM makes some major changes to the program, a process that Microsoft expects could take years. The new software gap could remove a prop keeping IBM's software on the market, Microsoft believes.

Mr. Ballmer asserted that IBM is offering computer makers OS/2 for free and may be even paying some to take it. An IBM spokeswoman denied both contentions; she wouldn't disclose exact pricing, but conceded that IBM is "going for market share." IBM said it has sold 500,000 copies of Warp in five weeks, and the spokeswoman added that the company viewed the recent friction between Microsoft and computer makers as "an opportunity."

Complaints about Microsoft's latest tactics come as the Justice Department prepares for a final appearance before a federal judge on the consent decree this week. Robert Litan, deputy assistant attorney general in the department's antitrust division, declined to comment on specific allegations against the company but said he has continued to talk to rivals about Microsoft's actions.

The consent decree, signed in July, ended Microsoft's practice of "per-processor" licenses, which Justice contended excluded competitors by forcing computer makers to pay for every PC they shipped that contained particular microprocessor chips. It also prohibited "minimum commitments," under which computer makers were compelled to pay for a set number of copies of Microsoft's programs, regardless of whether they sold the estimated number of computers or not.

Mr. Ballmer said Microsoft's new marketing incentives for Windows 95 were designed to take the place of minimum commitments while accelerating the move to the new product. According to a draft of one of the "market development agreements," PC makers can choose among a series of "milestone" steps that can reduce their royalty payments as much as $20 a machine.

For example, PC makers can get a $3 discount a system if they agree to install Windows 95 on at least 50% of their desktop systems within 30 days of the time it appears on the market. They can earn another $2 if they sign a license agreement by March 1, another $3 by completing a certification program to earn a Windows 95 logo by next April 1, plus $2 more for putting that logo on PC cases and keyboards.

But some PC makers contend they have little choice but to sign the agreements. Executives at these companies, who requested anonymity because of potential retaliation from Microsoft, said they could face prices for Windows 95 that will put them at a disadvantage against competitors if they don't sign up.

"Microsoft can kill us," the chairman of one company added. "I worry more about my dealings with Microsoft than I do about my competitors."

Some exectives said promoting Windows 95 and designing systems to win certification for its logo program reduces the money they have to spend promoting other operating systems. An executive at one PC maker said it already has cut back on his OS/2 Warp support after agreeing to the Microsoft marketing steps. He said his understanding with Microsoft prohibits him from exhibiting Warp at a trade show booth alongside Windows, although that restriction isn't explicitly stated in the contract.

"We have to sit there and swallow it. What else do we do?" said the computer executive. He added in a reference to activities permitted under the consent decree, "Microsoft has just found a new way to skin the cat."

Microsoft's Mr. Ballmer rejected such assertions, stating that the incentives are entirely voluntary and don't discriminate against other operating systems. "The amount of work isn't a strenuous set of activities," he said. "If there isn't a payback, you just don't do them."

Vobis, the German PC maker, claims that Microsoft insisted on computing discounts for its existing operating systems based on Vobis's total PC shipments. In August, just after the consent decree was signed, Microsoft proposed a contract to Vobis that estimated its annual shipments of 88 models at around 475,000 and quoted a Windows price of $28 a copy based on that total.

Theo Lieven, chairman of Vobis, said he wanted a discount based on lower estimated sales, so that he could accommodate customers that may ask for OS/2. But Microsoft wouldn't quote him a price based on a smaller number of computer shipments, he said. Instead, in oral negotiations, Microsoft said Vobis would have to pay $63 for each machine under a so-called per-copy license, a more costly licensing scheme that doesn't use estimated sales.

The consent decree permits volume discounts and says they may be based on estimates of future sales. Microsoft's Mr. Ballmer said Mr. Lieven wasn't being required to put Windows on every machine he shipped in order to receive the $28 price. Vobis would pay that price only on copies it used; if the number wound up to be less than 475,000, the royalty rate would be renegotiated next year, he said.

But Mr. Lieven insisted that once he agreed to a price based on total shipments, he would be forced to use Windows on that many machines, regardless of what customers ended up wanting. Microsoft "is doing exactly the same as before" the consent decree, Mr. Lieven charged.

"I have everyday negotiations with Microsoft, but it's difficult for them to understand that this decade of monopolism has ended. We want a choice of operating systems," he said.

TAB 42

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

4TH STORY of Focus printed in FULL format.

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SECTION: FIRST SECTION; PAGE A1

LENGTH: 1472 words

HEADLINE: Microsoft Deal Came Down to a Phone Call;
With Bill Gates on the Line, Justice Dept. Ends a Lengthy Probe

SERIES: Occasional

BYLINE: Elizabeth Corcoran, Washington Post Staff Writer

BODY:

By last Friday afternoon, the dozen lawyers gathered in a conference room at the Justice Department were exhausted. They had spent the past day and a half wrangling over the terms of a settlement that -- if signed -- would close the most extensive antitrust investigation of a software company in history.

"Get Bill Gates on the phone," demanded Anne K. Bingaman, the department's assistant attorney general for antitrust.

After almost five years of investigation, the Justice Department was on the verge of settling its charges of monopolistic practices with software giant Microsoft Corp. But not near enough to sign an agreement. Two previous negotiating sessions had broken off each time in a stalemate.

Bingaman believed she had to talk to the man at the top, Gates, the 38-year-old co-founder and chairman of Microsoft. Over the course of 19 years Gates had turned a simple software program into a company with $ 4.5 billion in annual sales. For much of the industry, he didn't just run the company, he was the company.

Soon Gates came on the line. Bingaman recalled that after an hour's back-and-forth over details of Microsoft's licensing practices, Gates said the words she wanted to hear: "I can live with this."

Meeting with reporters on Saturday, Bingaman said the settlement would end a virtual monopoly by Microsoft with its MS-DOS and Windows "operating system" software, which controls the basic functions of personal computers. It would mean lower prices and greater choice for consumers, she said.

Microsoft, at its own press conference here an hour later, offered a different assessment: "I'm going to invite your attention back to the facts and cut the rhetoric," Microsoft general counsel William Neukom said. The company had settled a costly, bothersome suit; Microsoft's business would not be affected by the changes.

The following reconstruction was based on interviews with Bingaman, Gates and

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others involved in the negotiations.

After a long winter of studying evidence, Bingaman was convinced that Microsoft's licensing practices for its operating system were unfair. In mid-June, she informed her boss, Attorney General Janet Reno, that she thought there was enough evidence to sue. As as a matter of course, Bingaman's office then contacted the company.

Bingaman asked Microsoft if it was interested in settling. Neukom said the company was willing to listen.

Microsoft was fed up with the investigation, which had begun in 1989 with an inconclusive Federal Trade Commission inquiry. The Justice Department picked up the case last August.

Although Microsoft had provided what Gates described as "millions of documents and every piece of e-mail," or electronic mail, for more than four years, it never knew precisely what the government was trying to prove, he said. News reports floated ideas such as breaking up the company.

"In some ways, a lawsuit would have been a more just environment," Gates said yesterday, because Microsoft could have publicaly aired its side of the case. "Things were just so random."

Gates had once been proud about having virtually nothing to do with Washington politics. But in the past year he had become a more frequent visitor to the nation's capital, hiring a local public relations firm and calling on journalists and administration officials to discuss the software industry, the information highway, foreign trade -- and the investigation.

When Bingaman and Neukom finally met in late June, the assistant attorney general laid out a narrower case than many of the press reports had suggested.

The Justice Department wanted Microsoft to change licensing practices that the department contended unfairly discouraged computer makers from buying operating systems from Microsoft's competitors. She broached terms for a possible settlement.

A day or so later Neukom responded. Microsoft was willing to negotiate. He requested, however, that the European Commission, which was investigating similar charges against Microsoft in Europe, be part of the negotiations. According to Neukom, Microsoft did not want to finish one battle in the United States, only to face another overseas.

Bingaman and the European Commission agreed to negotiate jointly with Microsoft in Brussels.

Bingaman had a vacation coming up, the week of July 4, which she traditionally spent in Silver City, N.M, the hometown of her husband, Sen. Jeff Bingaman (D-N.M). But this year, she would miss it. She told only a handful of key staff members she and a team were heading across the Atlantic.

For a week, nine people -- three each from the Justice Department, Microsoft and the commission -- spent hours at a time discussing licensing minutia in

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conference rooms at the commission's headquarters in Brussels. "I'd say the discussions were very civilized," said Neukom, who headed the Microsoft team. "There was a lot of information to be exchanged."

For a week the negotiators met several times a day, often picking up again late in the evening so they could cover new information or terms that had been faxed from Microsoft headquarters in Redmond, Wash., which was nine hours behind Brussels. By Friday, they had reached an impasse -- the Americans flew home. In interviews, neither side would say what had caused the breakdown.

They had agreed to a telephone conference on July 11, but Bingaman was not betting on a happy ending. "I had to play out the hand," she said. "I figured, if it works, great; and if not, we gave it our best try."

In the conference call, the parties agreed to return to the bargaining table. This time the date was set by the Europeans, who could not arrive in the United States until late the next day. They agreed to convene again last Thursday morning. Although the European delegation was down to two, a few more Justice Department lawyers had joined the talks.

Bingaman had not officially threatened a suit, she said, but she was ready to file. On Thursday a Justice Department attorney had flown to a district where Bingaman wanted to file, a place, she later said, "where the dockets are thin ..." If the negotiations fell irreparably apart, all Bingaman needed was a final okay from her boss, Reno.

Neukom was uncertain if Bingaman would take Microsoft to court. "People negotiate in lots of different ways," he said. "But we were confident of our position and felt the courts would agree with us."

By about 4 a.m. Friday the talks had stalled. Bingaman suggested that a call to Gates to try to resolve some of the disputed terms. The conversation was brief -- and futile. The lawyers quit the offices, convinced that their differences were widespread.

Yet one more phone call from the Justice Department to the Microsoft people drew the negotiators back to the table later on Friday. By early afternoon, with only a few points unresolved, Bingaman again asked to speak to Gates. "He's the ultimate decision maker," she said. "I just wanted to get this settled with him."

For the next hour or so, Gates talked via speakerphone with Bingaman and a small team of Justice lawyers, along with representatives from the European Community and Microsoft. They gathered near the speakerphone in Bingaman's office, occasionally leaving in small groups to debate a point in private.

"I sat on the phone for a long time," Gates recalled. "People seemed to be coming in and out of the room" where Bingaman was talking.

Then came the breakthrough, according to Bingaman. "Bill finally said, 'I can live with this,' and I said the same thing." The representative from the European Commission also agreed.

"She asked me if Neukom had the authority to sign for me and I said, 'Yeah,'

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" Gates added.

The lawyers scrambled to turn dog-eared pages with scribbles in the margins into a single document. They finished the set for the European Commission first, so the representatives could make the last flight back to Brussels, which left at just before 8 p.m. Friday.

By 9:30 p.m. the signed settlement was filed in the U.S. District Court in the District of Columbia, which must now decide whether it will be implemented.

"I just went home," Bingaman said. "It was a weird feeling. Even after 4 o'clock [and the discussion with Gates] I wasn't clear it was going to happen."

Gates said: "It's over. I like to work on products. This could have been a distraction. We've settled it in a way that doesn't affect our business."

Gates pointed out that the company has seven divisions that work on a variety of products. "None of the people who run those divisions are going to change what they do or think or forecast. Nothing. There's one guy in charge of [hardware company] licenses. He'll read the agreement."

And when Microsoft signs future licensing agreements with hardware makers, Bingaman promised, "we'll be watching."

GRAPHIC: PHOTO, BILL GATES

LANGUAGE: ENGLISH

LOAD-DATE-MDC: July 18, 1994

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TAB 43

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

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Exh. 43

94-1564 SS

FILED

FEB 14 1995

Clerk, U.S. District Court
District of Columbia

SECTION: FINANCIAL; PAGE C1

LENGTH: 663 words

HEADLINE: Microsoft's Plan To Buy Intuit Raises Concern; Trade Group Calls 2 Hearings To Get Industry Opinion on Deal

SERIES: Occasional

BYLINE: Elizabeth Corcoran, Washington Post Staff Writer

BODY:

The reach of software giant Microsoft Corp. has so vexed some in the computer industry that a major trade association is convening two meetings to talk about it.

Yesterday, the Arlington-based Information Technology Association of America (ITAA) said it was asking companies throughout the industry to voice their opinions on Microsoft's latest proposed conquest -- Intuit Inc., the leading maker of personal finance software. Microsoft announced on Oct. 13 that it planned to buy Intuit for stock worth $ 1.5 billion.

"This is a dramatic acquisition by a very elite and powerful company," said Bernard Goldstein, who will chair a special ITAA committee to solicit industry comments on the deal. "We want to understand why many firms in the information technology industry are agitated by this proposed transaction."

The ITAA, which represents 325 software and hardware companies, plans to turn over relevant comments to the Justice Department, which is reviewing whether the proposed deal might squash competition. The agency must give approval before the deal can be consummated.

To gather comments, the ITAA plans to host two industry hearings, one in Washington and another in San Francisco, in early December. The ITAA also will accept written comments submitted by Dec. 2.

In hopes of skirting criticism that the deal might inhibit competition, Microsoft plans to transfer its own personal finance software package, called Microsoft Money, to Novell Inc. of Provo, Utah. As payment, Novell would give Microsoft royalties on every copy of Money it sells for a fixed period.

Microsoft is clearly trading up. Intuit's software, called Quicken, is estimated to have 6 million customers while Microsoft Money has only about 700,000. Among other points, observers suggest that the Justice Department will weigh the market strength that Money would have in Novell's hands and whether it would continue to offer real competition to Quicken.

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Sources said that about 10 days ago, Justice Department representatives met with Microsoft to request additional details on the proposed deal. Once the department receives that information, law requires that it spend only a few weeks finishing its analysis.

In the course of its review, the Justice Department would be likely to interview industry representatives. But some industry players have suggested that few are willing to criticize the software giant publicly because so many must work with Microsoft to ensure that their software applications will run smoothly on top of Microsoft's DOS or Windows operating systems, software that is used in most personal computers.

By offering to accept written comments and promising to keep some names confidential, the ITAA hopes to loosen a few tongues. "I guess we'll find out how inhibiting a factor that [concern] is," said Jim Mann, who chairs the ITAA. If no one offers criticism of the Microsoft-Intuit deal, he suggested, "it would be responsible to conclude that would be due to business relationships with Microsoft. We know there's concern."

Other software associations have chosen not to get involved in the issue. But the ITAA has not shirked such issues in the past. The association offered comments during the government's investigation of the business practices of International Business Machines Corp. during the 1970s. Within the past year, the association also voiced concerns about whether IBM was still honoring the conditions of a consent decree it had signed with the government. Both IBM -- and Microsoft -- belong to the ITAA.

In July Microsoft tentatively settled another Justice Department inquiry by agreeing to end certain licensing practices that the Justice Department alleged were anti-competitive. Last week, the department released the public comments it had received on the proposed settlement, along with its response. The department received only five letters, including one arguing that the government should leave the company alone.

LANGUAGE: ENGLISH

LOAD-DATE-MDC: November 8, 1994

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TAB 44

TO

APPENDIX TO MEMORANDUM OF AMICI CURIAE
IN OPPOSITION TO PROPOSED FINAL JUDGMENT
IN CIVIL ACTION NO. 94-1564 (SS)
SIGNED BY GARY REBACK

Virginia Routs Maryland, 46-21; Penn St. Holds On, 35-31—D1

Weather
Today: Mostly sunny, mild. High 66
Low 42. Wind southwest 5-10 mph
Monday: Partly sunny, breezy, warm
High 70. Low 51. Wind 8-16 mph
Yesterday: Temp. range 35-56
Wind chill 25. Details on Page B2

The Washington Post

Sections
A National News, World News
B Metro, Obituaries
C Outlook, Editorials
D Sports
D24 Classified
E Travel
F Sunday Style
G Sunday Arts
H Business
K Employment
Insider: Book World, TV Week, Washington Post Magazine, Comics
Today's Contents: Page A2

117TH YEAR · No 343 SUNDAY, NOVEMBER 13, 1994 Prices May Vary in Areas Outside Metropolitan Washington (See Box on A4) $1.50

Microsoft Heads Home

Software Giant Targets Huge Consumer Market With a Host of High-Tech Innovations

By Elizabeth Corcoran
Washington Post Staff Writer

REDMOND, Wash.

Behind tall, wooden doors, in a modest building on the grounds of software giant Microsoft Corp., visitors can take a peek at the company's vision of the future.

The doors swing open to a suite of subtly elegant rooms—a model home-of-the-future—dubbed "the Taj" by those at Microsoft. The Taj is filled with familiar icons of modern, upper-middle-class life: plush chairs in the living room, crayon drawings on the refrigerator, grungy sneakers kicked under a table.

Yet technology has seeped into every corner. In the living room, just to the left of the hearth, is a huge video screen. Another screen is above the kitchen counter. A children's corner has its own computer. The screen in the dining room glows with what could be modern art. The home office is ready for a video conference. Lights, temperature and music are controlled by an electronic central nervous system.

Microsoft—whose software runs in millions of offices—wants to come home. Not just to the homes of a few crazed tekkies, but to as many of the nation's 104 million homes as possible. It wants to offer us a rich choice of images and information that will fly across screens in every room. And it wants to build the invisible software web that will make such systems work.

See MICROSOFT, H6, Col. 1

MTC-00030631_0583

Microsoft Seeks to Pump Streams of Information Into Homes

MICROSOFT, From H1

Tomorrow in Las Vegas, at the industry's annual trade show known as Comdex, Microsoft will offer a glimpse of one part of this new consumer strategy—a future on-line service code-named "Marvel." As with existing on-line services such as America Online or CompuServe, Marvel customers will use their computers and modems to tap into a range of discussion groups, as well as products and services from Microsoft and others. But Microsoft promises its service will be a showstopper. To woo customers, Microsoft plans to include access to Marvel in every copy of its next operating system, Windows 95.

Gates's Vision

The new world according to Microsoft will be sketched tomorrow morning, when the company's chairman, Bill Gates, delivers a state-of-cyberspace keynote address at Comdex. He will describe life in a world where people work in "virtual offices," collaborating with colleagues around the world via portable computing and communications devices. They will use on-line services to get medical advice anywhere at anytime, tour the world's art galleries without leaving their sofas, and pay for goods and services with "electronic currency."

Yet when Gates describes the future, his images do not have the sci-fi fuzziness that eventually grounded that other high-flying visionary, former Apple Computer Inc. chairman John Sculley. The difference is that Gates's audience knows—sometimes from bitter experience—that he can turn it into a winning business plan.

"I'm taking a 10-year horizon, but everything will be within use [in] five years," Gates said in a telephone interview on Friday. "We want to be one of the companies that's going to make that happen."

Gates's hard-nosed pragmatism scares his competitors. They snipe that even though Microsoft now employs some of the country's brightest software engineers, its work lacks the originality and whimsy of Apple. Such comments irritate Gates. But he can take comfort in the belief that runs through the core of Microsoft: Business isn't about fomenting cultural revolutions. It's about selling products.

With the thoroughness of an engineering corps, Gates and his team of executives have mapped out a strategy that they hope will make Microsoft products as familiar to consumers as Ivory soap.

This is no tentative effort. Gates has said he is willing to invest more than a billion dollars over 10 years to develop consumer products. He has committed $100 million to an advertising campaign to bolster Microsoft's brand name so that consumers will remember its products. And Gates has just hired a chief operating officer—Richard J. Herbold, a former Procter & Gamble Co. senior vice president, who is credited with revising P&G's pricing strategy to keep it competitive.

Tapping the Market

For Microsoft, the consumer market is tantalizingly large. Microsoft is already the biggest computer software company in the world, with revenue of $4.6 billion in fiscal 1994. But that looks puny measured against such consumer products giants as Procter & Gamble, which had more than $30 billion in sales last year, or even video game maker Nintendo Co., whose estimated worldwide revenue will total about $9 billion this year.

To get into the consumer market, Microsoft is applying the lessons it learned in the computer software business. Gates got his start by honing the layer of software called the "operating system," which controls the basic functions of the machine and also shapes the look of the "applications," or programs such as spreadsheets and word processors, that run on top of it.

When International Business Machines Corp. decided to use Gates's disk operating system, or DOS, on its personal computers, his software became essential to millions of consumers. Over time, Microsoft tightened its hold on the market with the "Windows" operating system, which gave DOS a face that was easier to use.

Microsoft has used this base to vault into the lucrative business of building applications, such as Microsoft Word for word processing and Excel for spreadsheets. These and other applications now generate a big share of the company's revenue.

Microsoft's market lead bothers others. "It's like a greyhound race, and the CEOs are all greyhounds," said Scott McNealy, chairman of Sun Microsystems Inc., in Mountain View, Calif. "This guy [Gates] caught the bunny. He's driving the damn bunny cart. . . . No one's supposed to be driving that cart."

Microsoft executives shrug off such criticisms. "There are competitors of ours who don't like us, who are envious of our success, said Nathan Myrhvold, a senior vice president. "And they've gone to great lengths trying to claim that our success is not due to something fair."

But, he said, "In every forum that's been raised, it's been formally decided that no, that isn't the case."

He pointed to the Justice Department's decision in July to close its investigation of Microsoft's business

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Microsoft Seeks to Pump Streams of Information Into Homes

activities after the company agreed to change a few specific practices.

No Slowing Down

Even the tussle with the Justice Department hasn't slowed Microsoft's plans for growth. "We said, a computer on every desk and in every home," Gates said. And indeed, the company seems poised to make that slogan a reality.

Michael Maples, executive vice president for products, reels off a strategy for the company's future. Continue the current businesses and grow two other divisions, namely, the "consumer" division (which is now churning out about one new CD-ROM title per week) and the "business systems division," which is building software for corporate computers. When those businesses are maturing four or five years from now, Maples predicted, Microsoft's investments in future consumer products will begin to "hit their stride."

The company's forthcoming on-line service, Marvel, will be a key part of the strategy. What will be different about Marvel? "We think you have to create an economic model where it's worth creating content," Gates said.

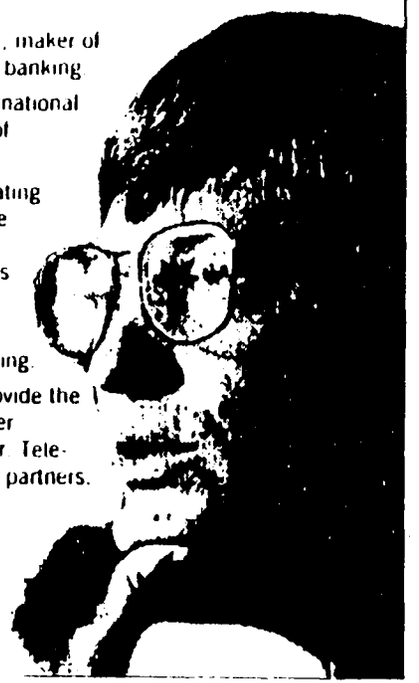
To do so, Microsoft plans to offer content providers, such as newspapers, the tools to build attractive displays for their on-line products and then, effectively price their wares as they please. Subscribing to Marvel

MICROSOFT'S WORLD

The software giant is developing a wide range of consumer products and services with many partners. Among the initiatives:

- **ON-LINE SERVICE:** Code-named "Marvel," details of Microsoft's plan to take on Prodigy, CompuServe and America Online are to be announced tomorrow. Four telecommunications companies are expected to be partners, along with "content providers" such as newspaper publishers.
- **FINANCIAL SERVICES:** Proposed acquisition of Intuit Inc., maker of Quicken personal finance software, would enable on-line banking
- **CREDIT CARD SERVICES:** Deal announced with Visa International seeks to refine the technology for ensuring the privacy of financial information transmitted over networks.
- **BOOKS ON-LINE:** Microsoft's consumer division is generating about one new CD-ROM book per week. Half of these are done with partners. Many are aimed at children, such as "Fine Artist" and "Creative Writer." Plans are in the works to put some of these on-line.
- **BROADBAND SERVICES:** To create the technologies for "broadband" interactive television and computer networking.

  Microsoft would write the software. Partners would provide the computer hardware for sending the information, consumer devices for receiving it and skills to make it work together. Tele-Communications Inc. and General Instruments are major partners.
- **UTILITY SERVICES:** Plans to develop technologies, with partners such as Pacific Gas & Electric, that would respond automatically to consumers' energy and other needs.



Microsoft Chairman Bill Gates

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may cost as little as $5 a month. Phone charges may also be low, as four telecommunications companies are expected to say on Monday that they are working with Microsoft to make dialing into Marvel a local call for many subscribers.

When subscribers peruse on-line magazines, they will be charged by those journals. Like the owner of a mall, Microsoft will exact a percentage from what content providers earn via the network. Microsoft is not yet saying who those content providers might be.

The company also has a potent plan for spreading Marvel. "We'll give you access to it with Windows 95," Gates said. "If [the software] notices you have a modem, it will ask you if you want to register electronically."

Rick Sherlund, an analyst at Goldman Sachs & Co. in New York, estimates that as many as 14 million people may upgrade their software to Windows 95 in the first year it ships them. In contrast, America On-line Inc. was boasting last month that it had 1.25 million subscribers. Even if Microsoft includes other on-line services in Windows 95, the Microsoft brand name could lure customers to Marvel.

A Wary Word

Steve Case, president of America Online in Vienna, is wary of Gates's plans. Computer operating systems are becoming the "dial tone of the computer age," he said. Just as the government regulates telecommunications, he suggested, the country may need new policies to ensure that consumers can easily reach any company's products or services through the dominant operating system.

"Ultimately, customers will prefer broad range of content, with an engaging presentation and offered at an affordable price," Case said. "There's not yet evidence that Microsoft will offer consumers something that they'll want," he added.

Meanwhile, Microsoft is fitting other elements of its on-line strategy into place. Last week, Microsoft and Visa International said they were working on ways to protect on-line information, such as credit card numbers. That security will prove handy as people begin to use Marvel to buy products on-line.

Microsoft has other plans for helping people check their bank accounts or pay bills remotely. In mid-October, Microsoft made a bid to buy Intuit Inc., the biggest maker of personal finance software, for $1.5 billion in stock. Microsoft's home-grown package, called Microsoft Money, has only won about 700,000 users since it went on sale three years ago. About 6 million people use Intuit's Quicken.

" 'Money' is really quite a good product," Maples said. But he explained that Quicken's broader customer base would accelerate Microsoft's entry into electronic commerce. One hurdle Microsoft must clear, though, is a Justice Department investigation into the possible anticompetitive effects of the merger.

Microsoft has other products it would like to see go live as well. Its 600-person consumer division, for example, hopes to deliver CD-ROMs via communications networks at some point. But to pump information-rich video into consumers' homes will take faster and more powerful networks than those Marvel will use.

Getting Organized

Microsoft is working to develop these superhighway-size, broad-band networks, through its Advanced Consumer Technology group, headed by Vice President Craig Mundie. By next June, the group will employ more than 500 people, working on the technologies that will turn Gates's Comdex address into reality: everything from interactive television and utilities that "know" when a house is too hot or cold, to personal gadgets such as a "wallet PC," which could automatically update a bank account, or show a video of the kids.

For two days in late October, Mundie's group convened about 65 companies from around the world for an information "summit." In effect, this was a meeting of construction crews. Behind closed doors, Microsoft executives laid out their plans for pumping streams of information into consumers' homes by way of their personal computers, in late 1996 or early 1997, and eventually through their television sets.

More than a dozen companies have pledged to work with Microsoft to develop—and commercialize—the technology. They include Alcatel Alsthom SA, Andersen Consulting, Deutsche Bundespost Telekom, General Instruments Corp., Hewlett-Packard Co., Nippon Telegraph & Telephone Corp. and US West Inc.

According to Mundie, the "rollout" of advanced networks will begin in the Seattle area late next year. By the end of 1996 or early 1997, Mundie hopes the technology will be ready to be "cloned" throughout the country. Ultimately, if consumers like what they see, every room in a home could have a connection to the information highway, much like Microsoft's Taj, he believes.

"Our view is that in the long run this is a very risky but potentially very rewarding business activity," Myrhvold said. He recalls that it took about five years before Microsoft's current operating system, Windows, became a hit.

"I assert it was a good idea to have done Windows," he said. "Today, that is a no-brainer."

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