IBM Personal Software Products

IBM® PSP's Rebuttal to the Microsoft® Document:

"Windows NT™ and OS/2® 2.1:
The Advantages of Windows NT for
Today's Client Server Computing"
(May, June, & July 1993 Versions)

July 16th, 1993

Introduction:

The purpose of this document is to rebut any inaccurate and/or misleading information that Microsoft published in a document called *"Windows NT and OS/2 2.1: The advantages of Windows NT for Today's Client-Server Computing".* Although it is not IBM's normal practice to produce such a rebuttal, we believe our customers should make their decisions based on facts, and therefore, felt it was worth communicating our viewpoint relative to Microsoft's claims and statements made in this document.

IBM is extremely proud of OS/2 and welcomes the opportunity to compare OS/2 to any version of Windows™ from Microsoft. We are confident that OS/2 provides a far better operating environment than Windows 3.1 and Windows NT, and that we will continue to provide superior technology and client/server solutions in the years to come. We therefore encourage our customers to get the facts when comparing OS/2 to Windows and Windows NT.

There are currently 3 versions of the Microsoft document dated May, June, and July 1993. The June version, in our opinion, did not correct any of the problems contained in the previous version. The July version corrected a few of the problems, due in part to our direct contact with Microsoft, but still included the vast majority of the problems. Although we have contacted Microsoft regarding this document, we do not endorse the July version as approved in any way by IBM. Our rebuttal is intended for customers who received the May, June, or July version of the referenced Microsoft document.

To ensure we are direct and to the point in our rebuttal, we have organized our response as a series of claims from Microsoft's document, in the order of occurrence, followed by our viewpoint. The sections are divided by page numbers (from the original May version of the Microsoft document) for easy reference.

Prior to the item by item discussion, it is worth discussing some overall themes that Microsoft consistently uses to distort requirements and features truly important to you, our customers, who are considering or are implementing a mission critical client/server application.

The most prominent theme Microsoft stresses throughout the document is that the client/server functions needed for most customers are "built-in" to Windows NT and Windows NT Advanced Server and therefore, are integrated. Most of the functions, however, were actually previously separate or are still separate Microsoft products that are bundled with Windows NT (e.g. the LAN server function in Windows NT Advanced Server was a port of the Microsoft OS/2 LAN Manager product plus enhancements).

Our customers have told us they want the flexibility to install and pay for the right function on the right machine and to be able to choose that function from the vendor who is best-of-breed (e.g. the ability to choose IBM LAN Server, NetWare® from IBM, a 3rd party solution, or all of the above based on their specific requirements and long term strategies). To assist with this customization, we provide solutions such as LAN NetView™ to help customers centrally or remotely automate individual and LAN software configuration, installation, and distribution.

'Built-in' does not mean products are more tightly integrated. Both IBM LAN Server 3.0 and NetWare from IBM for OS/2 products, for instance, are integrated down to 'ring 0' (privileged kernel areas) of the OS/2 operating system. The fact that Microsoft uses the word 'built-in' is much more of a marketing and packaging statement than it is an integration statement.

Another key requirement that Microsoft focuses on is reliability. We agree that this is a major requirement for client/server environments. We disagree with Microsoft's definition of reliability, which is summarized on Microsoft's chart on page 3 as 'Tightly integrated security', 'Built-in fault tolerance', 'Integrated systems and network management services', and 'Application and system integrity'. Removing

the words "tightly", "integrated", and "built-in", per the discussion above, OS/2 and its family of flexible extensions is delivering virtually all of what Microsoft is referring to plus many more important IBM exclusives, and IBM PSP has demonstrated or announced products that extend our lead as the premier provider of client/server solutions.

Most important, however, is that customers will view Windows NT as reliable when and if it establishes a track record of proven reliable operation in production client/server environments. Microsoft is claiming that Windows NT, on its first release, with over 4 million lines of new code (not including its client/server extensions of SQL Server/NT, SNA Server/NT, and Hermes systems management) will be more reliable than our 32-bit OS/2 and its family of extensions that have been shipping and in production use by well over a million customers for over a year. In addition, we just shipped the second generation, OS/2 2.1, which has met higher quality standards than all previous releases. Although Microsoft has done extensive beta testing with a proclaimed 75,000 users, it is difficult to see how it can compare to the over 4 years that OS/2 1.X and 2.0 and its client/server extensions have been in actual production use. Reliability to us is what you tell us it is - products that work. Reliability is a function of proven quality and maturity. Windows NT has yet to prove how reliable it is.

The Microsoft document also has distorted Windows 3.0 and Windows 3.1 volumes to emphasize Windows market acceptance. There is no dispute that Microsoft has achieved market success with the Windows 3.X family, but what is misleading about the document is that it uses Windows 3.X volumes when comparing to OS/2's market presence but uses Windows NT's features when comparing product lines. We have therefore added Windows 3.1 to several of the comparison charts Microsoft uses to compare client/server features to show that Windows 3.1 fails to meet most of Microsoft's own criteria.

Given these overall observations we would like to address the statements one by one.

Page 1 (of May version of Microsoft's Document):

***Microsoft Claim*: "It [OS/2 2.1] does not run Windows applications as well as Windows does."**

***IBM Response*:** OS/2 2.1 includes actual Windows 3.1 code to provide Microsoft Windows 3.1 functionality and compatibility. OS/2 can also provide Windows applications with key client/server features such as crash-protection and preemptive multitasking by running them in separate Virtual DOS Machines (VDMs). (These are features that Microsoft presentations concede will not be supported in Windows NT for 16-bit Windows 3.1 applications.)

Others agree. According to John Ruley, an editor for *Windows Magazine*... "OS/2 2.1 is a better DOS than DOS and probably a better Windows than (pause for effect) Windows..." (June 1993 issue)

***Microsoft Claim*: "Today, OS/2 does not support key Windows features [such] as dynamic data exchange (DDE), object linking and embedding (OLE) and even cut and paste between separate Windows virtual device machines (VDMs)."**

***IBM Response*:** Not true. OS/2's public clipboard enables DDE and cut and paste to work correctly between Windows applications in separate Windows VDMs (OLE works correctly between applications in the same Windows VDM which is equivalent to Windows NT OLE support).

***Microsoft Claim*: "Windows NT is a more powerful, reliable, and open solution for client-server computing."**

***IBM Response*:** Windows NT is not yet generally available. While it is certainly designed to be powerful (with a 32-bit data model, multithreading and preemptive multitasking like OS/2 has available today), NT's reliability and openness have yet to be proven.

Microsoft's justification for this statement references symmetric multiprocessing, portability, openness, integrated security and built-in networking as key high-end OS features.

- Multi-processor computers may be an option for customers with very high capacity server needs and there are different kinds of multiprocessing architectures to consider. IBM provides asymmetric multiprocessor support for OS/2 on the PS/2 model 295 and 195 today. Recently, IBM also demonstrated symmetric multiprocessing on OS/2 on a variety of multi-processor systems at Spring '93 Comdex in Atlanta and at PC Expo 1993 in New York.

- Operating system portability is one alternative for customers who are integrating and supporting different hardware architectures. A more important requirement for this environment is for vendors to support open industry standards. IBM is supporting both of these requirements by supporting OSF's Distributed Computing Environment (DCE) and by providing an OS/2 environment on a portable (to RISC architectures) and open microkernel, via the IBM Microkernel based OS technology which was also demonstrated at Spring Comdex.

- Microsoft's commitment to Open Systems, especially DCE and CORBA, has been incomplete. We are not alone in this viewpoint. From an article in *PC Week*, March, 1993, titled "Microsoft goes it alone: standards stance leaves users concerned"**:** "Users and observers say that Microsoft Corp. is taking advantage of its dominant position as a leader in the microcomputer software market to set its own standards and ignore those set by other industry groups.....Buyers are concerned about interoperability, according to analysts critical of Microsoft's often-proprietary approach.....Microsoft claims that it will support standards that have clear industry-wide support, such as POSIX, TCP/IP, and remote procedure call but has stopped short of endorsing the full Distributed Computing Environment (DCE) standard and some other widely supported standards."

- Of course, security and networking are necessary requirements for distributed computing. Including these features in the operating system is a packaging and marketing consideration. It may be a convenience for some customers but it can also limit their options and unnecessarily increase the system requirements.

The following table is a corrected version of the table in the Microsoft document and includes a column for Windows 3.1:

Windows NT vs. OS/2 2.1 and Windows 3.1 Summary

	Windows NT[1]	*OS/2 2.1*	*Windows 3.1*
Leverages Windows family benefits	Yes	Yes	Yes
Meets high-end operating systems requirements	Most	Most	No

[1] When generally available

Microsoft Claim: "IBM Has No Single Strategy....Long term IBM is working on eight different operating systems"

IBM Response: IBM recognizes that there is no "one size fits all" strategy when it comes to customer computing environments. The number of operating systems offered by IBM is a result of our long term leadership in helping customers develop mission critical systems to meet their needs on a *wide variety of hardware platforms*. The breadth of IBM offerings is underscored by a singular commitment to serve our customers. On the Intel compatible platform *alone*, Microsoft has at least eight operating systems supporting their strategy: Windows 3.1, Windows for Workgroups, Windows NT, Windows NT Advanced Server, Chicago, Cairo, Modular Windows and Winpad, all of which have differences in their application programming interfaces (APIs).

For a complete discussion of IBM's microcomputer based operating systems strategy, see the related document called *"Why OS/2?"* (updated version available August 1993).

Microsoft Claim: "IBM Embraces Windows"

IBM Response: It is true that the IBM PC Company resells Windows and may also pre-load Windows NT when customers request it. IBM recommends OS/2 and its client/server extensions over Windows and Windows NT because it is a superior platform for client-server computing.

Microsoft Claim: "Key ISVs, such as Micrografx, are halting their OS/2 development efforts...."

IBM Response: This statement is incorrect. *OS/2 Professional* magazine published the following in the May 1993 issue: "*PC Week* recently published an article saying Micrografx was not behind OS/2. On the contrary, J. Paul Grayson, Micrografx CEO, says the company has more people working on OS/2 than ever before, Grayson says Mirrors is doing very well, and they are evaluating new directions for OS/2 products. Among Micrografx's OS/2 offerings are Designer and Windows Draw. Grayson also reportedly attempted to get the *PC Week* article corrected prior to publication, but was unsuccessful."

Microsoft Claim: "...25 Million customers are using Windows already..."

IBM Response: While the shipment volumes of Windows is granted, there are several reasons to question the number of actual Windows users. First, the 25 Million number is the number of shipments since Windows 3.0. Most users of Windows 3.0 have upgraded to OS/2 or Windows 3.1. Second, 60% of all PCs ship with Windows pre-installed whether the user intends to use it or not. Last October, *Windows Magazine* estimated that only 1/3 of all Windows shipments were actually being used.

Microsoft Claim: "Windows 3.1 leverages existing hardware and software better."

IBM Response: It is a pretty safe assumption that most of the PCs that are running Windows 3.1 are 386 or above class machines with 32-bit architectures. While Windows 3.1 runs on more existing machines configurations, it doesn't fully exploit the capabilities of those machines like OS/2 2.X can since Windows 3.1 is a 16-bit DOS extender running on 32-bit hardware. In addition, there are more software packages that run on OS/2 2.1 since it runs DOS, Windows 3.1, *and* advanced 32-bit OS/2 applications.

***Microsoft Claim*: "...Usage of OS/2 has dwindled. This is because Windows NT best addresses customer requirements for high-end operating systems."**

***IBM Response*:** Contrary to Microsoft's claims, usage of OS/2 has not "dwindled". Shipments of OS/2 2.0 exceed all previous releases of OS/2 combined, and OS/2 2.1 has had a very positive reception in the market and is currently shipping in high volumes. [Phrase "Usage of OS/2 has dwindled" was removed from the July version of Microsoft document].

The assertion that Windows NT best addresses requirements for high-end operating systems is subjective and unsupported. A phone survey done by *Communications week* for their April 19th issue asked the question: "Which operating system is more strategic to your enterprise network: IBM's OS/2 or Microsoft's forthcoming Windows NT?". Over 1,400 votes were cast for OS/2 with only 75 cast for NT (95% to 5%).

Page 3:

The following table is a corrected version of the table in the Microsoft document and includes a column for Windows 3.1:

How Windows NT, OS/2 and Windows 3.1 address these customer requirements

	Windows NT[1]	***OS/2***	***Windows 3.1***
Powerful			
Capacity	High	High	Low
Symmetric Multiprocessing	Yes	Yes[2]	No
Supports RISC architectures	Yes	No[3]	No
Built-in networking/workgroup services	Yes	Available Option[4]	Available Option
Powerful development platform for client-server solutions	TBD	Yes	No
32-bit preemptive multitasking	Yes[5]	Yes	No
Reliable			
Tightly integrated security	Yes	Available Option	No
Built-in fault tolerance services	Yes	Available Option	No
Integrated system and network management services	Yes	Available Option	No
Application and system integrity	Some[5]	Yes	No
Open:			
Broad hardware and peripheral support	Yes	Yes	Yes
Applications compatibility and availability	Some[6]	Yes	Yes
Built-in support for standard protocols	Some[7]	Available Option	Available Option
Built-in support for industry standard network management environments	Yes	Available Option	Available Option

The primary correction (besides the inaccuracies about OS/2) is to include Windows 3.1, Microsoft's high volume client OS. As you can see, it fails Microsoft's own criteria as a client for client-server computing. By these criteria, Microsoft's strategy might be looked at as a server-server strategy.

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[1] When generally available

[2] IBM demonstrated SMP on OS/2 2.X on a variety of hardware configurations at Spring '93 Comdex

[3] IBM plans to support RISC via our IBM Microkernel based OS family (which includes support for DOS, Windows, and OS/2 applications). Also, IBM offers AIX/6000, a UNIX® based operating system for our RISC System/6000 RISC workstations.

[4] IBM chooses to offer options on selected features which enables our customers to configure options most appropriate to their needs.

[5] Windows NT runs all Windows 16-bit applications in a single address space and does not provide protection or preemptive multitasking between these applications (per the Microsoft presentation "A Technical Overview of Microsoft Windows NT 3.1").

[6] DOS and Windows applications that ship with and use a DOS device driver will not run under NT without modification unless a new device driver is supplied (per the same Microsoft presentation.).

[7] Microsoft has made no commitment that we know of to support the full DCE standard, except for RPC. IBM has in beta for OS/2 support for DCE's RPC and DCE's network time management, security, and distributed directory services.

***Microsoft Claim*: "Windows NT is the most powerful, reliable and open operating system for client-server computing"**

***IBM Response*:** This statement is subjective and unsupported. See introduction.

***Microsoft Claim*: "NT runs on all Intel 386/486 and compatible CPU's and will take full advantage of Intel's Pentium processor."**

***IBM Response*:** This is not correct. The recommended minimum environment for NT is either a very fast (25Mz+) 386 or 486 processor with 12 to 16Mb of memory. International Data Corp. (IDC) estimates this to be only about 20% of the installed base of PCs. OS/2, on the other hand, runs on 386sx or above processors and requires less memory (6-8Mb recommended).

***Microsoft Claim:* "OS/2 2.X only runs on the Intel x86 platform. IBM claims they are porting OS/2 to the Mach kernel, but this means creating an entirely new OS, which is a long and difficult project. For example, Windows NT took over four and one-half years to develop and spent over a year and one-half in large scale external testing."**

***IBM Response*:** To compare the development of an OS/2 personality to work on top of the IBM microkernel (Mach based) to the development of Windows NT is very misleading. Windows NT was developed from scratch to provide complex, high-end operating systems functions that are not available in the DOS/Windows environment, such as multitasking, multithreading, 32 bit memory model, high performance file system, etc. OS/2 already has all these high end features, and we do not have to 'create' an entirely new operating system to move them to a microkernel environment. We also don't need to 'create' the Mach microkernel which is an established code-base developed by Carnegie Melon University, and is adopted, approved and licensed by the Open Software Foundation. Microsoft, on the other hand, decided to build the kernel for NT from scratch (which they admit is a long and difficult project). In doing so, they have also decided to keep their operating system proprietary, not truly open to the industry. IBM, on the other hand, is in the process of licensing our microkernel technology to various industry players.

Page 4:

***Microsoft Claim*: "OS/2 2.X does not support multiprocessor systems"**

***IBM Response*:** As mentioned earlier, OS/2 currently supports the multiprocessing (asymmetric) PS/2 195 and 295 (available today), and OS/2 2.X was demonstrated on a variety of symmetric multiprocessing machines at Spring Comdex 1993 and PC Expo 1993.

***Microsoft Claim*: "[Windows NT] RPC facility is interoperable with other OSF/DCE compatible RPC implementations."**

***IBM Response*:** While Microsoft claims Windows NT's RPC will be interoperable with DCE there are at least 13 known incompatibilities between it and the DCE RPC as documented in Microsoft's RPC developers guide available with the March 1993 Windows NT beta program. Microsoft's decision to develop their own proprietary code base, instead of licensing it from the Open Software Foundation (OSF), introduces the potential for additional incompatibilities. IBM's implementation of DCE is based on software licensed directly from the OSF. In addition, IBM is enhancing the RPC software with plans to license it back to the OSF, meaning Microsoft will always be playing 'catch-up' with the latest OSF RPC specifications. IBM is also licensing software for the other OSF DCE standards which are network time management, security, and distributed directory services (we know of no Microsoft commitment to support these other DCE standards).

***Microsoft Claim*: "OS/2 does not have integration between 16-bit Windows and 32-bit OS/2 applications. In addition, integration features such as OLE and DDE do not work between separate 16-bit Windows VDMs. In many cases, simple cuts and pastes between VDMs do not work properly."**

***IBM Response*:** As stated earlier, OS/2's public clipboard enables DDE and cut and paste to work correctly between applications in separate Windows VDMs (OLE works correctly between applications in the same Windows VDM which is equivalent to Windows NT OLE support). We also support cut and paste and DDE between Windows and OS/2 applications. [In the July version of the Microsoft document the phrase "OS/2 does not have integration" was changed to "OS/2 has limited integration" with claims that Microsoft internal testing shows complicated cut and pastes and DDEs are not reliable between separate VDM's. Our internal testing and customer feedback indicates that we met our design goal which was to support all cut and pastes and DDEs between Windows applications in separate VDM's that perform correctly under DOS with Windows 3.1].

Page 5:

***Microsoft Claim*: "OS/2 2.x offers no integrated security. IBM promises security add-ons for future releases of OS/2, but to have truly integrated security, it must be designed into the system from the ground up."**

***IBM Response*:** The requirements for PC security varies from "none at all" for most end-users to "government certified" for military and international banking institutions. Microsoft is correct that some high-security features should be included in the base operating system. However, Microsoft's implication that OS/2 needs to be redesigned from the ground up is subjective and unsupported by facts. We have made design changes in OS/2 to enhance security over the years, specifically in support for OS/2 LAN Server which is the current method of providing fundamental security on an OS/2 system. We have plans in place to improve OS/2's security further and demonstrated a technology enhancing OS/2's security at Fall 1992 Comdex .

***Microsoft Claim*: "This [NT's] complete memory protection prevents errant applications from corrupting data, interfering with other applications, or damaging the system."**

IBM Response: This is not correct. Because NT runs all 16-bit Windows applications in a single address space, it is possible for one of these applications to interfere with one of the others running in that same space. This can happen between 16-bit Windows applications under Windows 3.0 and 3.1 in the form of UAEs and GPFs, respectively, and can continue to happen under Windows NT.

***Microsoft Claim*: "IBM claims that Windows 3.x applications are better protected in OS/2, but this is not the default configuration and can't be enabled without sacrificing application integration."**

IBM Response: By "sacrificing integration" Microsoft is again implying that cut and paste and DDE don't work across VDMs. Again, OS/2's public clipboard enables DDE and cut and paste to work correctly between applications in separate Windows VDMs (OLE works correctly between applications in the same Windows VDM which is equivalent to Windows NT OLE support).

***Microsoft Claim*: "LAN Server does not support RAID 5."**

IBM Response: This is misleading. LAN Server does not provide RAID 5 natively, but IBM offers an add-on product called OASAS that provides RAID 5 with or without LAN Server installed.

Page 6:

The following table is a corrected version of the table in the Microsoft document.

Windows NT has broad hardware and peripheral coverage

	Windows NT[1]	OS/2 2.X
Intel-based uniprocessor systems	1000+	760+
Symmetric multiprocessor systems	21	2[2]
RISC Systems	6 MIPS, 2 DEC Alpha	0[3]
Printers	649	329
SCSI adapters	49	67
Network adapters	26	87
Display adapters (with 10 chip sets)	26	30

1 When generally available

2 IBM demonstrated OS/2 2.X base running on 2 different symmetrical multiprocessor configurations at Spring Comdex '93 and PC Expo '93. Internally IBM has tested 6 configurations and plans to support many more when SMP support for OS/2 becomes generally available.

3 IBM plans to support RISC machines via our IBM Microkernel based OS family with an OS/2 personality

The format of this chart can be very misleading. For example, even though Windows NT may have more PC models and printers listed as "certified", Microsoft has not tested all configurations of those machines, per their compatibility document dated March 1993. Likewise, the number of PCs and printers tested by IBM is a subset of the machines that we support, given that we support all 386sx machines and above. Due to the system disk and memory requirements, it is likely that OS/2 can run on more installed PCs than Windows NT will be able to run on when it is generally available.

***Microsoft Claim*: "25% of [NT] applications are being ported from UNIX, VMS and MVS, including IBM's own DB2 database."**

IBM Response: This is a very misleading statement. IBM's MVS DB2 database is not being ported to Windows NT. In an effort to support a wide variety of server platforms, the DB2/2 product (currently available for the OS/2 environment) is being considered for porting to additional operating environments.

***Microsoft Claim*: "IBM currently lists only 500 unique OS/2 applications."**

IBM Response: This statement is incorrect. IBM currently lists 1196 unique OS/2 32-bit exploitive applications in our OS/2 Applications Guide. In addition, OS/2 2.1 runs existing DOS and Windows 3.X applications.

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***Microsoft Claim*: "IBM's Strategy...[is to] .. Show that Windows NT is broken"**

IBM Response: This is not correct. IBM does not believe that Windows NT is broken. It is late, still unavailable and definitely unproven. We do, however, believe that Microsoft's client/server strategy and products are not as good as ours, as we offer a more reliable, comprehensive and available set of client/server solutions.

***Microsoft Claim*: "OS/2 does not have the mission-critical features of Windows NT today."**

IBM Response: Today, OS/2 has more mission critical features available than Windows 3.1 and NT. When NT does become generally available, it is planned to have some additional features that are specific to niche needs. These features are either available on OS/2 via add-ons (such as fault tolerance and RAID 5) or are planned for OS/2 or a future add-on. On the other hand, even after NT is generally available, Windows 3.1 will still have inadequate mission critical features for the client, such as pre-emptive multitasking and crash protection, which OS/2 has today.

***Microsoft Claim*: "Today, OS/2 is missing key mission-critical features customers require, including true preemptive multitasking (with asynchronous input queues...)."**

IBM Response: This is a very misleading statement. OS/2 has true preemptive multitasking (i.e. the system can interrupt, or preempt, a running task and give control to another task). Asynchronous input queues address a different aspect of the system. An asynchronous input queue gives a separate keyboard and mouse channel for each application running on the screen. This feature does make the system feel more responsive to the end user, but has no value on an unattended server, which is Windows NT's main targeted market. IBM has publicly stated that asynchronous input queue support for OS/2 is in development. Also, note that 16-bit Windows applications running under Windows 3.1 *or under Windows NT* are lacking both features (preemptive multitasking and asynchronous input queues).

***Microsoft Claim*: "IBM has promised these features and others that Windows NT has today for the future, but equivalent functionality is still one to three years out"**

IBM Response: Windows NT is not generally available today, and Microsoft 's statements do not reflect IBM's priorities or product plans. OS/2 has a 15 month lead as an available 32-bit operating system and has features Microsoft does not plan to ship in Windows NT 3.1 such as an object-oriented Workplace Shell user interface and our System Object Model (SOM) which incorporates object technology directly into the operating system to allow object reuse between different object languages. In addition, we have announced for 3rd quarter '93 delivery and are beta testing Distributed SOM (DSOM) which allows object communication and reuse over networks, between different languages, and potentially, even different operating systems (e.g. AIX and OS/2). In addition, IBM has recently stated its intent to use OpenDoc technology from Apple for compound document integration that will support SOM and DSOM providing application integration across multiple operating systems, including UNIX, and across networks (both of which are features that are lacking in OLE 2.0 from Microsoft). OpenDoc is vendor independent and has growing industry support from major players including IBM, Apple, Novell, WordPerfect and Borland.

[In the July version of the Microsoft document the phrase "but equivalent functionality is still one to three years out" was changed to "but can't deliver them today". The 'functionality' Microsoft refers to includes 'built-in systems management tools' (Hermes) which is not available from Microsoft today. IBM's LAN NetView family of systems management products all entered beta testing with customers in June, 1993 and LAN NetView Start is generally available].

Page 8:

***Microsoft Claim*: "Windows NT is compatible with Windows 16-bit and MS-DOS applications."**

IBM Response: We believe NT will be compatible with the high volume applications but Microsoft will not focus on compatibility for lower volume or home grown applications. Also, DOS and Windows applications that ship with and use a DOS device driver, will not run under NT without modification unless a new device driver is supplied (per a presentation from Microsoft called "A Technical Overview of Microsoft Window NT 3.1.").

***Microsoft Claim*: "Windows NT's 16-bit application protection model provides error trapping between applications and more importantly provides full integration between applications. OS/2's model breaks application integration."**

IBM Response: The error trapping mechanism in Windows 3.1 (and NT) for 16-bit applications is not the same thing as the true protection that OS/2 provides for all applications by running them under separate processes. Error trapping just notifies the user once the damage has been done and recommends the user reboots (Windows 3.1) or restarts the Windows subsystem (Windows NT). Also, as stated earlier, Microsoft is incorrect about OS/2's ability to support DDE and cut and paste between Windows applications in separate VDMs, and OLE works correctly between applications in the same Windows VDM, which is equivalent to Windows NT OLE support. Also, IBM has announced our intention to support OpenDoc, which will provide compound document integration across multiple operating system types, including UNIX, and over networks which are features that OLE 2.0 does not support.

***Microsoft Claim*: "Neither OS/2 or Windows NT run on [Intel 386 systems with 4 Mb of RAM]. "**

IBM Response: This is incorrect. OS/2 does run on 4Mb Intel 386 systems (although 6 to 8Mb are recommended). Windows NT does not.

***Microsoft Claim*: "OS/2's model forces customers to choose between integration or task switching with protection."**

IBM Response: Microsoft is again implying that cut and paste and DDE do not work between separate Windows VDMs in OS/2. With the public clipboard enabled, DDE and cut and paste work correctly between applications in separate Windows VDMs (OLE works correctly between applications in the same Windows VDM which is equivalent to Windows NT OLE support).

***Microsoft Claim*: "IBM Asserts: OS/2 2.1 runs Windows applications faster than Windows NT on identical hardware....Windows NT performance is equivalent to OS/2 2.1"**

IBM Response: Some independent performance tests on Windows NT and OS/2 have been described on public bulletin boards that have drawn the conclusion that DOS and Windows applications run faster on OS/2 than on Windows NT, however IBM hasn't and won't "assert" anything officially until the Windows NT code is made generally available. [July version of the Microsoft document changes this claim to "Windows NT performance, given a certain level of hardware (e.g. Windows NT does not support 6 MB RAM configurations) is equivalent to OS/2 2.1"].

***Microsoft Claim*: "Windows NT is better optimized for performance-critical applications."**

IBM Response: The three reasons listed are the implementation of asynchronous input queues, use of asynchronous I/O, and the ability to preempt a running time slice. OS/2 supports the last two features today and we have publicly stated we intend to support asynchronous input queues in a future release. Asynchronous input queues affect only the responsiveness of the client and not of an unattended server. Also, as stated above, some independent performance tests have indicated that OS/2 is probably a better choice if performance is a concern, although we plan to wait for NT to ship to draw that conclusion.

Page 9 (start of sentence on page 8) :

***Microsoft Claim:* ".... in IBM's OS/2 applications catalog, only 500 are unique, of which only 15 are general desktop applications."**

IBM Response: This statement is incorrect. IBM currently lists 1196 unique OS/2 32-bit exploitive applications in our OS/2 Applications Guide. They break down into the following categories:

Category	Number of Shipping Apps
Productivity/Business	509
Communications	139
Development Tools	219
Multimedia	102
Utilities	98
Other	130
TOTAL	**1196**

In addition OS/2 2.1 runs existing DOS and Windows applications.

***Microsoft Claim*: "Microsoft has met every development milestone with Windows NT and plans to deliver it as promised in Q2 1993."**

***IBM Response*:** The following would seem to suggest otherwise:

MacWeek, July 13th 1992: "NT (New Technology) is on track to ship by the end of the year [1992] and is expected to cost less than $500, Gates said"

Computer Reseller News, September 28th, 1992: "Walker says that Windows NT will ship during the first few months of 1993."

Newsbytes, September 28th, 1992: "The new date is now 'early 1993,' with Microsoft officials saying that it 'needs more time to respond to customer suggestions for improvements in the Windows NT system'."

Software Magazine, December 1992: "At the ITAA conference...Mike Maples, Microsoft's executive vice president, said NT would ship in April."

InfoWorld, March 15th, 1993: "NT could ship to customers later than the promised date of June 30, but no more than 30 days late, Walker said."

Windows World, Spring 1993: Gates said in his keynote address that Windows NT would ship within 60 days [by July 22nd] and that Windows NT Advanced Server would ship within 30 days of Windows NT [by August 21st].

PCWeek, July 5th, 1993: "Gates also said Microsoft will ship Windows NT by the end of the month [July]...".

[In the July version of the Microsoft document, this claim was removed].

Page 10:

***Microsoft Claim*: "OS/2 requires add-on products (costly products) ... and they are not well integrated with OS/2."**

***IBM Response*:** Maintaining only the necessary functions on desktop machines is a significant benefit of Client/Server systems and it is what "Rightsizing" is all about. Unnecessarily upgrading hardware and forcing unused functionality into every machine is what can be costly. Our customers have told us that they need flexibility... so we are providing a robust and stable base for both client and server systems with optionally available features to customize each system as necessary. We also provide LAN mechanisms to manage this process centrally via remote electronic software configuration, installation and distribution.

Microsoft's assertion that networking features need to be built-in to be well integrated is simply not true.

[In the July version of the Microsoft document, the "(costly products)" phrase was removed].

Page 11 (Appendix 1):

***Microsoft Claim*: "By using the Windows NT microkernel architecture model, IBM claims OS/2 will..."**

***IBM Response*:** The IBM Microkernel is based on the Mach 3.0 architecture, not the Windows NT architecture model. IBM has since made significant enhancements to this microkernel and is now in the process of licensing this technology to other vendors, making it an open architecture. Windows NT's kernel technology is not considered a true microkernel since device driver and file system functions were allowed to reside in the kernel itself. The Windows NT kernel is also proprietary.

[In the July version of the Microsoft document the phase "By using the Windows NT microkernel architecture model" was changed to "By using the Mach microkernel architecture model"].

***Microsoft Claim*: "IBM's development cycle is one to three years behind Microsoft's. Windows NT will have been on the market for several years before IBM ships its first microkernel based version of OS/2."**

***IBM Response*:** In the paragraph preceding this statement, Microsoft also states that IBM plans to have microkernel based version of OS/2 available by mid-1994. Putting these two statements together implies that Windows NT has been "on the market" for several years before mid-1994. Obviously, IBM is not behind Microsoft in any sense. OS/2 is at least 15 months ahead of Windows NT in making mission-critical features available to customers. IBM is also years ahead of Microsoft in object technology - we shipped an object-oriented operating system shell called Workplace Shell with OS/2 2.0 in March of 1992 and have delivered beta versions of our Distributed Systems Object Model in February, 1993. On June 15th, 1993, IBM announced the SOMobjects™ Developer Toolkit Version 2.0, the first professional programming toolkit to incorporate IBM's System Object Model (SOM) and Distributed System Object Model (DSOM) technologies and announced a scheduled availability data of 3Q '93. Microsoft doesn't plan to deliver an object oriented interface or support distributed objects on Windows NT until release 2 (Cairo) . Microsoft has made no formal commitment for these object features on Windows 4.0 (Chicago) that IBM is aware of.

[In the July version of the Microsoft document, the claim above was changed to "IBM PSP group plans to ship a full beta release of its first microkernel-based version of OS/2 by the end of the 1993...].

For more information on the competitive advantages of OS/2 2.1 in a client server environment, please read *Why OS/2?* (updated version available August, 1993) and the article titled "IBM Personal Software Products: Product Line Update" from the April, 1993 edition of the *IBM Personal Systems Technical Solutions* magazine. Both documents can be obtained from your IBM marketing representative or systems engineer.

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