

Microsoft Evolution: The 3.1 Flavors of Windows 2000 and Windows XP Become the Microsoft Environment

INTRODUCTION

The Transition from DOS to Windows XP (eXPerience) (formerly Windows 2002)
<http://www.microsoft.com/windowsxp/>

Many software application packages, in areas such as records management, have recently made the transition from DOS to Windows. But . . . , not to Windows 95, Windows 98, Windows 98 Second Edition, Windows 2000, or Windows XP (formerly Windows 2002), but to Windows 3.1. Windows 95, Windows 98, and Windows 98 Second Edition are very different than Windows 3.1, from a programming perspective. Windows 2000 and the follow-on Windows XP (eXPerience) (Windows 2002), differ even more from Windows 3.1, and are also very different than Windows 95, Windows 98, and Windows ME (Millennium Edition). What are all these products? This paper is about the relationship between DOS, Windows 3.1, Windows 95, Windows 98, Windows 98 Second Edition, Windows ME, Windows NT, Windows 2000, Windows XP, and the other products in the Microsoft family.

This paper is intended to be representative of product concentrations within Microsoft product lines, but is not intended to be an all encompassing, comprehensive review of all Microsoft products.

[In 2001, Microsoft plans to replace Windows 2000 (and to replace Window 98, 98 Second Edition, and ME) with Windows XP (eXPerience) which was to have been Windows 2002, and may still be followed by Windows 2003]]

OPERATING SYSTEMS

DOS

DOS (Disk Operating System), as we know it, was born with the IBM PC in 1981. 'D' was for 'Disk' because the software was on disk rather than on tape or punch cards. 'O' was for 'Operating' because DOS ran the computer so that an application, such as a word processor, could run on the computer and create your documents when you typed. 'S' was for 'System'. Everything in the computer was run by DOS, and DOS ran the computer as a system.

Windows

In the mid 1980's a layer was added on top of DOS. This layer was called Windows, a GUI (Graphical User Interface). GUI's were born at Xerox PARC (Palo Alto Research Center), popularized by Apple, and made a wild commercial success by Microsoft. In the early 1990's Windows 3.0, the first successful Microsoft Windows product, gave DOS the point and click mouse look, but Windows did not improve the underlying DOS.

Release Numbers

New versions of DOS and Windows were released, each with a new number. An example of a release number is '3.1.1'. A change in the first digit represents a product life altering change, essentially a new product. A change in the second digit (called a point release, as in 3 point 1, 3.1) represents a significant upgrade. A change in the third digit represents a minor change, usually a bug fix.

Microsoft is hard at work changing release number into model year numbers, where a product is 'new' each year, changes are predictable, and changes are driven and timed by marketing, not technology. 'Windows 98' is an example of a model year number, just like the model year numbers used in the automotive industry.

Windows NT

DOS needed to be removed rather than tinkered with. In 1993, Windows NT (WNT) (now Windows 2000, and soon to be Windows XP) was introduced after five years of development. Windows NT has nothing to do with DOS or Windows (or with Windows 98). However, the Windows NT GUI was made to look like Windows to make Windows NT easier to sell. Windows NT is also incompatible with just about all DOS specialized hardware and a wide variety of DOS software.

Windows NT was, and is (now as Windows 2000 and Windows XP), designed to replace Mainframes, Unix servers, and Unix workstations. Windows 2000 (and XP) has not grown into these shoes yet, but it will someday. Windows NT, now Windows 2000 (and XP), is the current choice for all but the largest servers, used in areas such as document management, document imaging, and records management system. You will see, or hear about, Windows 2000 (and XP) (Windows NT) servers in most of the booths in the ARMA (Association of Records Managers and Administrators) and AIIM (Association of Information and Image Management) shows.

Windows 95 and Windows 98

Windows NT (now rebadged as Windows 2000 and Windows XP) was a radical departure from both DOS and Windows 3.1. Most DOS and Windows users could not easily adopt Windows NT, (alas), so a transition plan was created. The transition plan was Windows 95 (W95) followed by Windows 98 (W98). Two weeks before Windows 95 was introduced, Bill Gates, Chairman of Microsoft, said that transition plan would last only two releases before it was replaced by Windows NT. He said that Windows 98 would have no successor and that Windows 98 would be the end of the product line.

Windows 95 and Windows 98 removed DOS completely, but maintained compatibility with DOS hardware and software. Unfortunately, this compatibility with DOS also preserved many DOS problems and made it impossible for W95 and W98 to support many of the very desirable features of Windows NT, now renamed Windows 2000 (and XP). This is why W95, W98, and the various editions of W98, will be replaced by Windows XP (2002) in 2001.

Another reason for removing DOS completely from Windows 95 and 98 was that in 1981, at the time of the introduction of the IBM PC, IBM retained the rights to market DOS independently from Microsoft. Microsoft had also been restricted by the federal government from marketing DOS in a monopolistic manner. With the creation of W95 and W98, DOS no longer existed in the Microsoft product line, or in the part of the computer world influenced by Microsoft, which is most of it. The quarter billion US dollar hoopla around the introduction of Windows 95 was not to get people to buy Windows 95, but was to kill DOS.

The elimination of DOS is one entry on Microsoft's growing list of 'victories-by-definition'. (Microsoft defined DOS out of existence two weeks after the US federal government restricted Microsoft's DOS marketing practices.)

Windows 2000: The Name

By renaming Windows NT 5.0 as Windows 2000, Microsoft: (1) restarted the release numbering with '00' (Truly the bedrock of a fresh start.), (2) provided a clean slate for the new millennium, (3) transitions WNT to annual model year changes, (4) dropped the 'NT' from 'Windows NT' because there will be nothing left of 'Non-NT Windows' to distinguish 'NT' from, (5) unified the conceptual Windows

product line, (6) blurred the distinctions between the many completely different products that have constituted the Windows product line, (7) erased all memories of two decades of incompatibilities (8) convinced all the Windows 98, Windows 98 Second Edition, and Windows ME customers that Windows 2000 (and soon Windows XP), is merely the next step (even though in many ways Windows 2000 (and Windows XP) is ten times bigger and more complex than Windows 98), (9) linked Windows 2000 to the turning of the millennium, in the hope that any problems would be lost in the cacophony of the millennial celebration and the noise of Y2K millennium bug disasters, and (10), perhaps most important, gave the Windows product line an elusive name, making it impossible to take the product to task. For, who could focus on a product with position zero: '00' in the scheme of things?

Windows 2000: The Delay

Microsoft has become famous for delayed software. One of the reasons that Windows 2000 did not come after NT 5.0 and instead *became* NT 5.0 (in a name change), was that NT 5.0 was delayed so long that the desire to use model year names became stronger than the desire to keep the same name on a product (NT 5.0) throughout the product's development and release.

A second naming problem caused by the long gestation period of NT 5.0 was the need to keep NT 4.0 in the marketplace for far longer than its design life. This was compounded by the marketing requirement that NT 4.0 not have intermediate point releases. This was necessary to show that NT 4.0 had been a complete product when released. Eliminating point releases also prepared Microsoft customers for a conversion to model year changes, which do not have point releases. Taken together, these two requirements begat the several NT 4.0 service packs that were effectively the NT 4.n point releases. Because the earlier service packs were not officially releases, they were not tested as thoroughly as point releases usually are tested. To avoid the resulting problems, service packs are now tested as thoroughly as point releases (Service packs have now become point releases).

A third naming problem arose. As Windows 2000 slipped further, Windows 98 had to be refreshed with upgrades such as Internet Explorer 5.0. Because Windows 98 has been described as the end of the line, the name could not be changed. To solve this problem, Windows 98, Second Edition was released in the Fall of 1999.

Microsoft has many server-based features in Windows 2000 that could not be put in Windows NT 4.0 with service packs (patches),

so Windows 2000 could not be allowed to slip much further into the year 2000. To get Windows 2000 out sooner, some of the consumer features in Windows 2000 were not completely implemented. For this reason Windows 2000 does not have an easily marketed home version. This has led to Windows 98, Second Edition and a Windows 98 Third Edition (now known as Windows ME, Millennium Edition), released on September 14, 2000.

Windows ME tested some new consumer features for audio, video, and personal photography support. As the first truly non-office, home centered version of Windows, Windows ME also tested the water for dropping support for some third party networking. (In theory the third party networking could be installed after purchase.)

As Windows provides more and more drivers for networking and to operate a wide variety of peripheral devices such as joysticks, displays, printers, scanners, and disk drives (in the name of plug-and-play), not having software bundled with Windows could become the death-knell of software (and hardware) products, just at the time that the government is trying to get Microsoft to unbundle various software products.

The appearance of Windows 98, Second Edition, was a harbinger of the imminent arrival of Windows 2000, because, relieved of the need to support home users, Windows 2000 could be released sooner, with fewer changes from the previous release, known as Windows NT 4.0. With the elimination of a full consumer version, Windows 2000 made its scheduled street date (when it was to be available on store shelves) of February 17, 2000.

To explain the promises that Windows 2000 would be completed by the end of 1999, Microsoft referred to RTM (Release to Manufacturing), which is the Microsoft term for the date that the software is frozen so that the Microsoft suppliers can produce the tens of millions of copies required to make the software available at all stores, simultaneously, worldwide. RTM did occur in very late 1999.

Just as Windows 98 Second Edition presaged the appearance (without the consumer application interfaces) of Windows 2000, so the cancellation of Windows 98 fourth edition, in July of 2000 anointed Windows XP (Windows 2002) as the marriage that will achieve the elusive linking of the two royal lineages of operating systems (by killing off the older one (DOS), in the best tradition of royal interactive gaming), that will finally achieve the merger of the consumer (DOS) and business (NT) portions of the Windows product line. The merger previously planned for Windows 2000, and before that, for Windows NT.

Windows XP for You: More Reliability, Fewer Games, More Horsepower Required

Windows XP is much more reliable than any of the DOS based systems, even Windows 98 Second Edition and Windows ME. This is because there is a much better separation between the operating systems and the applications programs.

As a result of this separation, applications, which formerly could access computer peripherals directly, must now go through the operating system to access the peripherals. This is a particular problem for games, and for game peripherals such as joysticks and displays. This requirement for change has made it difficult to port many applications to XP, and as a result, some of the applications will never be ported. On the other hand, the migration (from DOS to NT) has been going on since Windows NT was introduced in 1993 (Windows NT was born in 1988), and many applications have now been ported. (All of the delays have had at least this one benefit.)

Because the operating system (Windows XP) is general purpose, it is not as efficient as custom application programs. As a result, for almost all applications, more memory and a faster processor is needed. One quarter GigaByte (256 MegaBytes) to One half GigaByte (512 MegaBytes) and possibly even a whole GigaByte (1,024 MegaBytes) of RAM (Random Access Memory) and at least a 1 GigaHertz (GHz) processor are necessary to assure smooth operation of Windows XP powered systems (and to avoid upgrade problems for the next two or three years).

Fortunately for Microsoft (and for us) computers are getting faster, more capacious (more memory), and cheaper at an alarming rate.

One of the reasons that more and more RAM and processor speed are necessary is that reducing the size of programs and increasing their efficiency makes the programs more expensive to develop. By reducing the emphasis on reducing the size of programs and increasing their efficiency, the cost of producing the programs can be reduced.

The cost of software development is reduced, but users then need more memory and speed, very often more memory and speed than is available on the users' existing computers. This need for new computers is also the cause of another phenomenon, the fact that most people and organizations wait to get a new computer before upgrading the operating system (such as Microsoft Windows) and the applications (such as Microsoft Office). This synchronization of hardware and software upgrades is another force behind the movement to annual model year changes of software (and someday hardware).

Windows XP is a 'real' operating system in that it fully separates applications and the operating system. One large benefit of this is that server features will now be available to home and office users. An example of this is the fault tolerant feature of mirrored disk drives. With a mirrored drive, all data on the drive is replicated on two disk drives so if one of the two disks crashes, the user is unaffected and can buy a replacement drive when it is convenient. In fact, with the sophisticated error checking features in advanced server operating systems (such as Windows XP), the operating system can detect that a disk drive is about to fail and can automatically order a replacement drive over the Internet for a free replacement (if the disk is still under warranty).

If a user has another Windows XP supported plug-and-play hardware feature, a removable hard drive, the user can slip (hot swap) the new drive (on its sled) into the slot (holster) in the user's computer while the computer is running, and Windows XP will make a new copy of the user's data on the new disk drive, restoring the fault tolerance of the mirrored disk drive configuration automatically. For even more fault tolerance, the user can have a third hot swap slot that holds a third drive that can be used as a hot spare, so that the fault tolerance of the mirrored configuration can be restored (by copying data to the hot spare drive) as soon as an imminent disk failure is detected.

Waiting for the First Service Pack (SP1)

An old adage in computing is 'Never buy the first release of anything'. Wait for the vendor to learn from the customers of the first release. Let the vendor learn from someone else.

A corollary is to always wait for the first Service Pack (SP1) (formerly the first point release). This requires waiting 3 to 6 months after the initial release (software upgrade), but it avoids many problems (particularly the problem of installing software changes which always seems to break something). In addition to fixing bugs, unforeseen software interactions (like undesirable drug interactions) are fixed by all affected vendors in the 3 to 6 months after a new operating system (or major application such as Microsoft Office) is released.

Waiting for SP1 will make it possible to 'fire-and-forget' (to buy a computer and software and then make no changes until it is again time to buy a new computer and new software).

The Three (or More) Faces of Windows 2000 (and the Five or more faces of Windows XP)

The Workstation, Server, Advanced Server, and Data Center Server versions of Windows 2000 were fully differentiated with the release of Windows 2000. These capabilities will be

undergo a (hoped for) process of continuous improvement in Windows XP (aka (also known as) WNT 6.0 and Windows 2002) and its successors in the NT lineage. Windows XP is planned for release this year (2001).

Three more possible XP faces for personal use are: Windows XP home and a Windows XP Professional Lite for lower-powered (to differentiate them from Windows XP Professional the high powered CAD (Computer Aided Design) and scientific workstations) office PCs. These personal XP versions may be derived from a version of the easy-to-maintain ZAW (Zero Administration Windows) Windows 2000 Workstation.

Four coming Windows XP server faces are based on the Windows 2000 server line. Windows 2000 (and Windows XP) Professional workstations are networkable and replaced WNT 4.0 Workstation. Released on February 21, 2001, Windows 2000 Small Business Server is able to support a small workgroup network with up to 50 workstations. Released September 26, 2000, Windows 2000 DataCenter Server, with support for up to 32 processors in a multiprocessor configuration, is advertised to be able to handle the largest networks. Released February 17, 2000, Windows 2000 Server, with up to 4 processors, will handle configuration for small workgroups. Also released February 17, 2000, Windows 2000 Advanced Server, with up to 8 processors, will support medium-sized businesses and department level networks. As with the segmenting of the Windows 2000 (and Windows XP) product line and market, all Microsoft products are increasingly being defined to match the marketplace rather than being defined by the underlying technology.

Windows CE

Windows CE is an operating system for handheld devices including cell phones, palm-top computers, and even smart cards, credit card sized computers. Microsoft's plan is for everyone with a telephone to turn to Microsoft for telephone software. Microsoft has announced (March 1999) it is working with Acer Inc., Daewoo Telecom Ltd., Panasonic, Philips and Vestel to develop Windows CE based, web-enabled telephones, which combine traditional telephone services such as voice messaging and caller ID with enhanced data capabilities such as Internet access and e-mail.

While the exact relationship between Windows CE and Windows 2000 (and XP) has not been determined, Windows CE and Windows XP are said to be in the same family: Windows. As memory gets cheaper and processors get faster, CE may grow into a full-fledged version of Windows XP (2002).

Windows Powered Pocket PC

To create a new market for Windows, in 2000 Microsoft began differentiating Pocket PCs from the smaller PDA (Personal Digital Assistants) which Windows CE can operate and the larger notebook PCs which can run Windows 98, 2000, and XP.

Windows NT (Windows 2000) (and Windows XP) is Unix

This was what the winning vendor said on a billion USD (US Dollar) US Coast Guard contract that specified the Unix operating system.

US Federal procurement procedures specify an appeals process, and the Unix vendors appealed. The Unix vendors claimed that Windows NT did not meet the contract specifications because it was not Unix. The Windows vendor asked the government to define Unix. The government definition of Unix is the POSIX standard [http://www-library.itsi.disa.mil/org/fips_std/fpb_151_2.htm] FIPS PUB 151-2 Portable Operating System Interface (POSIX) defines a C language source-code-level interface to an operating system environment. It adopts ISO/IEC 9945-1:1990 as modified by FIPS 151-2). Because Windows NT was written to the POSIX standard, by the government definition of Unix, Windows NT is Unix. Because the POSIX standard was written by the government, and not Unix developers, the Unix vendors did not see a reason to modify well designed Unix operating systems to comply strictly with the POSIX standard. As a result, Windows NT is more like Unix than any other Unix product. Windows NT (and Windows XP) is Unix.

Clearly, this is a victory by definition.

--- Editors' note: end of part 1 ---

SUITES

The Office Suite

Microsoft Office is the marriage of Word (word processor), Excel (spreadsheet), PowerPoint (slides), and other desktop applications, creating a suite of products. Office 97 added Outlook 97, a contact management program (enhanced telephone book). Office 2000, which was available June 10, 1999, improves many of the features and components that were new in Office 97 (supporting the axiom that everything is better in the second release).

On March 21, 2000, Microsoft released Office 2000, Service Release 1 (SR1), effectively a bug fix point release. Because SR1 changes the way in which Office 2000 document files are interpreted, SR1, operating beyond the control of users, has the potential to slightly modify the appearance of any archived Office 2000 document, or any document archived in a previous version of Office format.

On September 25, 1999, Microsoft announced the 1.3 Billion US Dollar acquisition of Visio, a Seattle, Washington based company that created the office quality drawing, diagramming, and flowcharting software market. Visio was founded in September 1990 and released version 1.0 of the Visio product in 1992. With Visio, Microsoft has acquired 3 million new customers (existing Visio users), but more importantly, has made the Microsoft product line even more complete, eliminating yet another reason for Microsoft customers to buy products from outside the Microsoft product space.

Like Xerox, Microsoft from time to time finds it necessary to acquire companies, that to some degree, had spun off from Microsoft and developed innovative products.

Because of Visio's huge market share and existing customer base, it was not necessary for Microsoft to make Visio part of Office to grow Visio's market and market share. However, just by making Microsoft's overall product line more complete, Visio makes the Office suite stronger.

Visio 2002 will be available in May 2001, continuing the model year nomenclature.

A component of Office 2000 Premium, the first release of PhotoDraw 2000, provides competition for CorelDRAW and Adobe Illustrator and Adobe Photoshop, and is likely to be continuously improved by Microsoft in the future. Microsoft also attempted to increase the penetration rate of Publisher 2000 by including it in Office 2000 Premium.

Microsoft is also working to tie Office more closely to Microsoft's independent software developers. The Office 2000 Developer edition includes Office 2000 Premium, the high-end edition of Office 2000, as well as professional productivity tools, documentation, and sample code for quickly building solutions with Microsoft Office. These tools and Visual Basic for Applications (VBA) enable developers to build business solutions that utilize Office as a powerful platform for application development.

Many Microsoft Office development tools are useful within Office, even if Office is running on a Mac platform. Office thereby brings the Microsoft environment into the Mac world. With some development effort, on the part of their computer support group, Mac users can participate in a Microsoft workspace

experience while using underlying Mac hardware and software.

Microsoft has even opened the Microsoft workspace experience to developers of other software products by creating a Microsoft Office compatibility certification. When certified, third party developers, such as Apple, can advertise their products as a part of the Microsoft workspace eXPerience.

Office XP (2002)

Bill Gates has become enamored of the concept of eXPerience the web, and eXPerience Microsoft products. This is why Windows and Office are XP (this year at least).

On March 5, 2001, Microsoft RTMed (Released to Manufacturing) Office XP (Office 2002). At the same time, Microsoft released the code to 500 thousand businesses, in more than 30 countries, in a preview edition. Carrying on the latent model year nomenclature, Office XP includes the Outlook 2002 messaging and collaboration client, Microsoft Excel 2002 spreadsheet application, Microsoft PowerPoint 2002 presentation graphics program, Microsoft Access 2002 database application, and the Microsoft FrontPage 2002 web site creation and management tool.

The comprehensive Microsoft Office XP (2002) offering, if Microsoft is successful in fulfilling Office XP's many promises, will be the start a trend of annual model year changes for the Office Suite. (XP is much less identifiable than 2002, and it is likely that Microsoft will opt for the less confusing model year designations, such as Office 2003, in the future.)

SharePoint 2002 Document Management System from Microsoft

Office XP (2002) also includes SharePoint (formerly codenamed Tahoe), Microsoft's document management product. SharePoint will be strategically integrated with all Office XP components. 200 million Office users will suddenly discover that they have a document product to use. And, true to the Microsoft suite marketing strategy, none of the 200 million SharePoint document management customers will remember having purchased SharePoint. [<http://www.microsoft.com/Servers/Sharepoint/>]

BackOffice 2000

Following the Office suite concept, several support programs have been combined into the BackOffice suite. Released February 28, 2001, Windows Back Office Server 2000, will support medium-sized businesses and

departments. The flagship support program is Windows 2000. Second is the SQL (Structured Query Language) Server database. SQL Server has just been completely rewritten as SQL Server 7.0 (now updated to SQL Server 2000 and perhaps named SQL Server 2002 in the next release) and is now offered as a back-end for the Microsoft Access database and as a replacement for the Microsoft Access database. The IIS (Internet Information Server) manages a Web interface and hosts an organization's Internet site. Exchange is a mail server that complements Outlook in the Office suite. It is likely that over the next few years Exchange, in conjunction with SharePoint will expand beyond e-mail documents and take over all document management functions in enterprises, including records management.

An Enterprise level version of Back Office, including the Windows 2000 Datacenter Server and SQL Server 2000 Enterprise Edition seems to be in the offing.

Because Exchange is included at no additional cost in BackOffice and SharePoint is included at no additional cost in Microsoft Office, every organization with BackOffice will view document management as a free service that came along with their server and their office suite. This no-additional-cost view has already been created with Windows XP (2002) networking, which is included free with Windows XP (2002). This is currently affecting networking vendors, such as Novell, that market their products as an additional cost add-on to Windows. Not only is Microsoft networking free with Windows XP (2002), Microsoft networking is invisible because it does not have a high profile name. In fact, Microsoft networking does not have a name. In a brilliant marketing move, Microsoft has left Microsoft networking nameless (and invisible). It appears that Novell may have already lost the 'war-by-definition' that Netscape has been fighting with the aid of the federal government.

The Microsoft 'SQL Server' name was also chosen with great (marketing) care (and acumen). SQL is the standard for the language of database queries. All database vendors, such as Oracle, describe their database servers as 'SQL (language based) servers' (with a lower case 's' on the word server. Potential customers, who do not have time to learn the intricacies of database interfaces and design, hear all database vendors say 'SQL Server', with a capital 'S' on server, which is a Microsoft product.

System Inventory and Management

In BackOffice, SMS (System Management Service) tracks an organization's hardware and software inventory and configuration. SMS was rushed into service by an eager Microsoft because SMS also manages software licenses

and reminds Microsoft customers that they should purchase more software licenses when new users are added. SMS also facilitates software audits both internally and by parties alleging software piracy.

Outlook

Outlook is a member of the Office suite, but it substitutes for a member of the BackOffice suite, Exchange Server, if a user's computer is not networked to an Exchange Server.

Outlook manages all of an individual's documents and connections, just as Exchange can manage all of the documents and connections of an organization.

Connections include email addresses, phone number, addresses, and organization charts. Outlook managed documents types start with email and include all types of documents that can be attached to email, which by definition is all document types because any type of document can be stored in a Microsoft file, and any Microsoft file can be attached to an email.

In the future Outlook can provide SMS like services in the home; tracking purchased DVD movies, music, books, games, and other software. Outlook will be able to create music play lists for personalized radio stations as efficiently as Outlook now schedules an individual's time in their day planner and calendar. Outlook will manage car maintenance and home content inventories done for insurance purposes. The home content inventory will be fed directly by Microsoft Money as product purchases are downloaded over the Internet as part of debit and credit card bills.

Outlook will also be able to paste the transaction numbers, from the list of credit card purchases on emailed credit card bills, into a personal or corporate tax form, if the tax collectors ever decide to require a traceable transaction code to substantiate every deduction listed on a tax return. This feature would decrease the size of the cash economy, with which Microsoft competes as an alternate use of available funds. Microsoft also competes with the cash economy because the cash economy is a vendor of Microsoft's own (pirated) products.

Outlook is great with details; a simple extension could link individual phone calls, initiated by Outlook using the PCs modem port, to the phone call line-items listed on a phone bill delivered via an electronic commerce billing service. All of this information could be instantly and permanently available from the PC, over a LAN (Local Area Network), or over the Internet.

BackOffice for Small Business

The BackOffice Suite market is being segmented for different size businesses in the same way that the Microsoft Office Suite market is segmented, by product, into Works, a low cost, introductory version of the Office, Office Standard, and Office Professional. Currently available are BackOffice for Small Business and the Standard BackOffice. An enterprise version of BackOffice will soon follow.

Sweetening the Suites, a Suite of Suites

Microsoft's great success with suites (Microsoft Office adopted the suite market and then took it over.) has created suites for everything. The Microsoft Encarta Reference Suite 98, includes the unabridged Encarta 98 Encyclopedia, Encarta Virtual Globe 98, and the Bookshelf 98 CD-ROM that includes: the American Heritage Dictionary, the Microsoft Internet Directory 98, the Encarta 98 Desk World Atlas, Roget's Thesaurus, the World Almanac and Book of Facts 1997, the Encarta 98 Desk Encyclopedia, the Columbia Dictionary of Quotations, the People's Chronology, the National Five-Digit ZIP and Post Office Directory, and the Microsoft Computer and Internet Dictionary. The Microsoft Home Essentials 98 Suite contains Word 97, the Encarta 98 Encyclopedia, Money 98, Works 4.5, Greetings Workshop, the Entertainment Pack Puzzle Collection, and Microsoft Internet Explorer. The Microsoft Money Financial Suite 98 includes Money 98, access to stockbrokers, and web-based financial advice.

Most people only want one or two of the products that make up a suite, so suites are priced at about the same price as two of the suites' many component products. If there is even a slight chance that there might be a need a second Microsoft product in the suite, most Microsoft customers decide to buy the entire suite rather than buying the individual product for which the customer made the initial purchase decision. Then, when the Microsoft customer finds a need for one of the other suite components, they discover they already have the Microsoft product for that need. They also discover that they acquired the product for free, as part of the Microsoft suite.

This is great marketing. It puts Microsoft first in line for each new product category as users expand their repertoire of software tools. It is also a good antitrust strategy. If the government requires Microsoft to release each of its products separately (as the Department of Justice is trying to do by forcing Microsoft to separate Internet Explorer from Windows 98), Microsoft can then combine the separate products into suites.

Ultimately, there can be suites of suites, providing an all-encompassing Microsoft

environment, available on one DVD. (A DVD looks just like a CD, but can hold over 25 times as much software. Officially DVD does not stand for Digital Video Disc, but that is what it is.) And, the DVD is supported by Windows 98 and Windows 2000. The DVD, Windows 98, and Windows 2000 seem like technology tours de force, but they will probably be most important as very effective tools for blurring the distinction between applications and the operating system, by providing suites of both on the same physical piece of media.

Upgrades: Why the Popularity with Users

When new versions of Microsoft software come out, one often sees articles by technical experts saying that there are too few new features to justify an upgrade. Conversely, business experts often say that new microprocessor designs have no advantage because their new features are not used in the software used in business.

Technical experts are tasked with adapting existing software to a specific user environment. Having succeeded with this, the experts often do not see much difference between the systems they have configured and debugged, using the current release of Microsoft software, and newly available software release.

Users, on the other hand, remember the struggle they had with their existing software, the effort it took to work with the technical experts to get most important features to function in the user's workspace, and the features that it was easier to live with than to change.

A new release fixes everything in one fell (and inexpensive) swoop. That is the power behind the annual software christenings, the synchronization of the hardware and software industries on a model year basis, and increased, predictable, sales volume for Microsoft.

Upgrades: the Annual Purchase Opportunity

Microsoft's long gestation period for software has made it difficult for users to determine the best time to purchase software. Users could not wait two or three years to make a purchase. Once a purchase decision is made, the purchase must be made within a few months, within a year if exact release timing can be assured.

Previously, with long release cycles, users had to guess which intermediate patch (e.g. service pack) to go with. Often it was difficult to even find some versions of patches. Each patch carried with it the possibility of issues (problems) and it was often not possible to uninstall the patches.

Windows 2000 and Office 2000 both fixed many internal issues in Microsoft software. Having swept aside major structural problems, it should be easier for Microsoft to make regular (annual) incremental changes in the future.

Microprocessor hardware vendors have recently tried to increase the frequency of new microprocessor introductions to the rate of one every few months. As Microsoft increases the percentage of its product line that is released annually, microprocessor vendor introductions will become synchronized with the annual software introductions.

Microsoft is in hot competition with standalone game manufacturers. By incorporating game-like graphics in commercial office products such as data imaging and modeling for data warehouses, Microsoft can build the sales volume of commodity microprocessors produced with these game-like instructions. This volume decreases the graphics-capable microprocessor prices and allows Microsoft to compete on a software basis with the dedicated hardware in the standalone games. This competition ensures that Microsoft will incorporate new microprocessor features in its software as quickly as possible. Each annual software release will include the latest software advances.

Given these factors, users will continue to set a budget and then buy whatever they can afford, making purchase about once every three year. Even though computers are kept about three years, users must have a purchase opportunity at least once per year so that the users can start or change their purchase cycle in a year of their choosing.

High-end home users and corporate users will continue to spend about US\$ 2.5 thousand for their hardware and software package. Most users will spend the newly viable US\$ 1 thousand. The remaining, first time users, who purchase their computers to get on the Internet, will spend the soon to be viable US\$ 250.

The US\$ 250 software and hardware price is projected based on Microsoft's continuing efforts to reduce the percentage of computing expenditures received by hardware vendors. Microsoft competes with hardware vendors on an alternate use of funds basis. Microsoft embraces all new microprocessor and system designs so that the hardware field will be open to intensive competition, driving down prices.

Upgrades: The Compatibility

With each release of new software, Microsoft attempts to bring more order to the chaos of PC standards. As Microsoft requires closer adherence to standard interfaces for applications, more applications interfaces break (are rendered incompatible with the new

release of Microsoft software). Independent software vendors (ISVs) are currently working to resolve these incompatibilities and ease the introduction of Microsoft Office XP (2002) and Microsoft Windows XP (2002), just as the ISVs did with Microsoft Office 2000 and Microsoft Windows 2000.

Granularity

Software products can be aggregated into suites, decreasing granularity, and, as the federal government may allege, decreasing competition.

Soon Microsoft will increase the granularity of its products by decomposing them into programmable objects, hundreds of thousands of programmable objects, one for each product feature, for all of the features of all of the Microsoft products. This was originally done to make each of the product features available to programmers and to make all Microsoft products scriptable. Scriptability means that any operation that can be carried out with mouse clicks and keyboard entries can be executed by a program.

Increasing granularity may also be Microsoft's response to the governments' anti-trust lawsuits. Instead of separating Windows 98 and Internet Explorer and creating two separate products, Microsoft will have the option of presenting the government with hundreds of thousands of products. Beyond this, millions of Microsoft developers will create millions of customized combined operating system and application packages using the programmable objects. These packages will then compete with each other. Underlying the whole competitive structure will be Microsoft products.

Microsoft plans to be the first company to take advantage of the freedoms afforded by this object-oriented architecture. Steve Ballmer, President of Microsoft, speaking in Long Beach, California, Microsoft TechNet Briefing, (Microsoft event number 25316, [<http://msevents.microsoft.com/isapi/events/usa/enu/searchglobal.asp>]), on August 12, 1999, said that in the release (both Windows and applications) after the 2000 release this year, Microsoft planned to merge the Windows 2000 file system, the Microsoft SQL Server database, and Exchange (the equivalent of Outlook on servers).

Xbox the Game Xbox the Paperclip

Microsoft plans to introduce its Xbox game console in the fall of 2001, going head-to-head with the Sony PlayStation 2 and the Nintendo Game Boy Advance. [<http://www.Xbox.com>]

Eventually Microsoft will bring gaming back to Windows XP and the animated paperclip (Microsoft Office Assistant) will become a fully animated person (from 3D (Dimensional) animated gaming display software) such as the personal assistant that appears in the 50 minute BBC documentary 'Hyperland' about what the Internet was to become. 'Hyperland', produced by Max Whitby, was broadcast September 21, 1990, on BBC2. 'Hyperland' was written by Douglas Adams who also wrote the 'Hitchhikers Guide to the Galaxy' [www.H2G2.com]. In 'Hyperland', Douglas Adams plays a user of the future Internet. Tom Baker of 'Dr. Who' plays the animated digital assistant who helps Douglas Adams navigate the Internet. Ted Nelson explains how his invention, hypertext can be used to operate the links of the future Internet [<http://www.Xanadu.net/>] (founded 1960).

--- Editors' note: end of part 2 ---

THE INTERNET

Microsoft Designs on the Internet

Microsoft first viewed the Internet as unimportant.

Then Microsoft viewed the Internet as important. For Microsoft, important is synonymous with being within Microsoft's sphere of influence.

The Windows 98 and Windows 2000 GUIs look like the Internet. The Windows XP GUI looks like Microsoft's .Net portal. Many Windows 98 users are not completely clear where Windows 98 stops and the Internet begins. Rather than trying to take control of the Internet, Microsoft has made it appear that Microsoft is the Internet.

With Windows XP, Microsoft is working on making all products available on the Internet appear to be Microsoft products (available through Microsoft).

Microsoft's Internet version of Encarta is billed as a child-safe window on the Internet, a virtual library, crafted by Microsoft. With this version of Encarta, Microsoft becomes the Internet, a child-safe virtual library containing all the information on the worldwide web (www). And Microsoft's Encarta is designed to be the first window on the world that children encounter after they leave the Microsoft published Magic School Bus mythical exploration product.

After Encarta, Microsoft presents the Microsoft Interactive Media products including: the

Microsoft Network; interactive service businesses including the Expedia.com, the Mungo Park online travel magazine, CarPoint, and the Sidewalk city guides and national yellow pages; news and commentary products including MSNBC on the Internet and the Slate interactive magazine; multimedia games such as the Internet Gaming Zone; consumer CD-ROM titles in the kids, reference, and mapping categories; and desktop finance products and services including Microsoft Investor.

Microsoft Web Portals

Microsoft is busy polishing its portals. A portal is a home page on the Internet that Internet users go to first when looking for information, services, or products to purchase. Microsoft has modified the Microsoft Network (MSN) to be a portal on the Internet, and the first products presented in the MSN portal are Microsoft products.

The Microsoft Web Events portal offers over 700 radio and television stations to Internet listeners and viewers. With Microsoft Internet Explorer 5.0, an Internet listener or viewer can turn on any one of the stations with a single mouse click. The user can then listen to or view the station on their PC while working or playing a game. To be sure that Internet Explorer is available with no effort, Microsoft has worked to have more than 200,000 PC makers ship Internet Explorer with the PCs they make.

Through another portal, Hotmail, Microsoft delivers the mail for over 40 million Internet users and is adding over 150 thousand new Hotmail customers per day (April 1999).

According to Microsoft, Hotmail has members in every country in the world, with international membership representing more than 50 percent of total membership (April 1999).

The Office Suite Portal(s) and the Coming Microsoft .Net User eXperience

It is no longer necessary for users to purchase and install the Microsoft Office Suite. Users can use all of the suite components on a pay-as-you-go basis on the Internet.

On November 9, 1999 Microsoft announced Microsoft Office Online, a new offering of its flagship Office product that will enable the delivery of Office 2000 over the Internet. Office Online will provide a choice for Office customers who prefer the benefits of centrally managed software and will be offered to small-business customers through Microsoft's bCentral Web services portal.

Also on November 9, 1999, as part of an Office Online pilot program, leading partners also

announced Office Online service offerings, including British Telecommunications PLC; CenterBeam Inc.; Concentric Network; Digex Inc.; Equant; FutureLink Corp.; Interland Inc.; Interliant Inc.; Micon Electronics; MTT Mpowered, a division of Aliant; Qwest Communications International Inc.; TeleComputing Inc.; USinternetworking Inc.; Verio Inc.; and Winstar Communications Inc. Several of these offerings were available on November 9, 1999, and others were to be introduced in the following months.

Office Online offers users a complete set of services including the ability to save Office settings and access their customized version of Office from a range of devices. With Office Online, it's also possible to provide users with other services, including document storage, Web hosting and Office Server Extensions, which enable users to streamline workgroup collaboration and save documents to the Web. Service providers will deliver highly customized Office-based solutions as well as enable customers to get instant updates and service releases, and provide customers with the opportunity to pay for services on a monthly basis.

Office Online will be offered by Microsoft bCentral Web services, a portal created specifically to meet the needs of small and growing companies. According to Microsoft, bCentral provides a comprehensive and integrated suite of services to help growing companies use the Internet to improve their business. The site delivers services in three areas: getting a business started online by connecting to the Web and building a Web site, promoting and marketing online to reach new customers, and managing a business more effectively. The bCentral Office Online offering is focused on small businesses that want the full functionality of Office but would like to outsource technology and utilize new service opportunities. The Office Online offering was to be available from Microsoft by the end of 1999 with broad availability in 2000.

As part of the pilot program, Microsoft and industry partners, including industry-leading Internet service providers, application service providers, telecommunications providers and original equipment manufacturers, are developing an expertise in the technology requirements and an understanding of the customer needs for this new service model. Partners will primarily target small to medium-sized businesses and build on existing services including Internet access, Web site hosting, data storage, networking management and customer hardware and support. Many of the Office Online partners will also offer Microsoft Exchange, in addition to Microsoft Office, as a foundation for their knowledge-worker solution.

Office Online is growing into the Microsoft .Net initiative where all Microsoft products and services appear via a single portal (a single web page) on the Internet. Potentially, the portal could include all products of all Microsoft partners as well. The current eCommerce activities on MSN.com may be the first steps in this direction.

Microsoft's plan is that Microsoft customers (a growing percentage of the world's population) will come to eXperience life (at least that part of life available through Microsoft and its partners) through the .Net portal.

Commercial Content

For commercial content, Microsoft now has CarPoint for car sales and ongoing management of car maintenance for individuals, the Microsoft Network to provide Internet connections and web content, MSNBC to provide news content, Microsoft HomeAdvisor which provides a national multiple listing service for real estate and which recently started providing assistance in arranging loans, and Expedia, Microsoft's travel services which is doing three million dollars per week (December 1998) in travel sales with the Microsoft Expedia.com travel service.

Recently (March 1999) Microsoft announced it has signed a memorandum of understanding to enter a joint venture with Softbank (Softbank is the Microsoft software distribution in Japan. Softbank is also the owner of the Comdex tradeshows, worldwide.) and Yahoo! Japan to create the Japanese version of the MSN CarPoint.

The Microsoft Yellow Pages: Sidewalks

To enhance its yellow pages product, Sidewalks, Microsoft Corp. acquired (March 1999) CompareNet Inc., one of the leading comparison-shopping services on the Internet with more than 1.5 million unique users per month. CompareNet will be incorporated into the MSN Sidewalk online guide.

When the MSN shopping portal is complete, a customer interested in purchasing a new television will be able to research the latest features and innovations as well as access product reviews and shopping tips to gain insight into the products available. The online customer can find and compare models that meet their personal preferences for brand, quality, price or other attributes, and view special offers and promotions from online and local retailers. In addition, the customer will have the ability to buy from an online merchant or search by ZIP code for a retail store nearby that meets customer defined specific criteria.

Microsoft Maps

Microsoft also offers products to help its customers find their destination in the physical world. These map products are tied in with the Microsoft travel service, Expedia.

Microsoft Expedia Streets & Trips 2000 allows users to quickly and easily calculate door-to-door driving directions throughout the United States, find and map street addresses, places or points of interest with pinpoint accuracy, and search a comprehensive guide of travel planning information for North America. With more than 6 million miles of local, city and state roads and highways throughout the United States, Canada and Mexico, customers can use Expedia Streets & Trips 2000 for planning a trip of any distance. Streets & Trips 2000 combine detailed U.S. street maps, North American highway maps, and high-quality turn-by-turn data, with extensive information on places and travel services. By combining what has generally been offered in two separate products, Microsoft provides consumers with one comprehensive and completely integrated mapping solution.

In Streets & Trips 2000, Microsoft has included: 1.) More than 6 million miles of local, city, state and highway road maps for North America from leading map data providers Geographic Data Technology Inc. (GDT) and Navigation Technologies Corp. (NavTech); 2.) Door-to-door driving directions to virtually any address in the United States; 3.) Information on turn restrictions, detours and road construction, with updates available online; 4.) Powerful Snap-Routing features for customizing routes and roads with a simple mouse-click and drag; 5.) Pocket Streets feature for the Windows® CE operating system so users can transfer their plans to a pocket PC; and 6.) Thousands of articles and listings from the world's leading authorities on travel, including the following: A.) More than 14,000 ZagatSurvey restaurant listings; B.) More than 300,000 business listings from infoUSA, including locations for ATM bank machines and car service centers; C.) More than 9,500 campground listings from Woodall's; D.) More than 7,000 listings from Interstate America of exits and rest areas; and E.) More than 2,500 beautiful photographs and travel images.

Streets & Trips 2000 also includes more than 10,000 Web links that provide in-depth information on points of interest and 24-hour access to local highlights, traffic, current road construction, detours, weather updates and other relevant travel information. An easy-to-use download feature updates construction information quickly and easily so users can avoid delays by rerouting around trouble spots.

Microsoft Hospitality

Microsoft has signed (March 1999) co-marketing and advertising deals with Starwood Hotels and Resorts Worldwide (including the Desert Inn in Las Vegas, Nevada, formerly owned by, and the home of, Howard Hughes), Hyatt Hotels and Resorts, and Travelscape.com to position MSN Expedia as a one-stop travel marketplace where consumers can access an increased selection of hotels' options and services. The deals also constitute both Starwood's and Hyatt's largest online advertising purchases and illustrate how MSN Expedia is working with the hotel industry to reshape the way in which travel suppliers connect with consumers on the Web.

Microsoft Gaming

MSN Gaming Zone now counts (November 1999) more than 10 million registered users with more than 50,000 gamers logging onto the site worldwide at peak times. The Zone (www.Zone.com) began in 1996 with 15,000 members and six card and board games. Today the Zone hosts more than 500,000 unique visitors per day (with an average usage of nearly 40 minutes per user per day) and offers more than 90 multiplayer games for players of all interests and skill levels. Players can choose from free classic card and board games like Hearts and Chess, free matchmaking for popular retail games like 'Age of Empires' and 'Rainbow Six', as well as four exclusive premium games: the 'Fighter Ace' and 'UltraCorps' online multiplayer games, and 'Tanarus' and 'CyberStrike2'.

Microsoft claims that the five hundred thousand Zone daily visitors are more than twice the total number of visitors per day at all of the Disney theme parks combined. The games generate more than 20 million minutes of usage per day on the Microsoft game Zone.

According to Microsoft, the recent growth is due in part to the Zone's thriving community, which now hosts more than 1 thousand user-run tournaments per week and several free Microsoft-sponsored tournaments with prizes. In addition, players can start clans (there are currently more than 4,000 clans on the Zone), strategize and collaborate with peers, lay down a challenge, share tips and tricks, or even attend a guest chat with a celebrity game developer.

With a diverse variety of over 118 games to entertain everyone from the hardcore PC gamer to the casual card- and board-game player, the MSN Gaming Zone has succeeded in becoming one of the most popular interactive entertainment destinations on the Internet according to Microsoft. The MSN Gaming Zone can also be found on the Internet at <http://msn.com>, under games.

"We believe the Zone's remarkable growth is an indicator that online gaming is the future of Internet entertainment," said Adam Waalkes, product unit manager for the MSN Gaming Zone. "By providing the best retail and premium games and supporting our community, the Zone will continue to attract people who want an interactive online entertainment experience, one that goes beyond the passive experience that most Web sites currently offer."

With this large, loyal, fun-loving audience, the Zone has attracted big-name promotional associates, including Toyota Motor Sales, U.S.A. Inc., First USA Bank NA, The Coca-Cola Co. and General Mills Inc., resulting in a surge in advertising revenue. In fact, earnings in the first quarter of the Zone's fiscal year 2000 have already surpassed earnings for the entire fiscal year 1999.

Protection of Intellectual Property Rights

Microsoft's foray into content has added textual and image based intellectual work products to Microsoft's traditional area of intellectual property protection: software.

Microsoft made (March 1999) an equity investment in Reciprocal, Inc. (formerly known as Rights Exchange Inc.). In addition, the two companies entered into a strategic technology and marketing alliance to accelerate the development and optimization of Reciprocal's Digital Rights Management (DRM) solution and services for the Microsoft Windows operating system. DRM encompasses a broad set of technologies and services that provide new ways of accessing, using and purchasing all kinds of digital content. Integration of Reciprocal's solution with the Microsoft Windows operating systems will help build the emerging digital content distribution and commerce industry.

Office XP (2002), XML, and the Internet (eXtensible Markup Language)

Microsoft Office XP will store all of its documents in XML format, an enhanced version of the HTML (HyperText Markup Language) format used on the Internet. In 1999, Office 2000 was the first version of Office to store all of its documents in XML format. With XML, all Office XP documents can be stored to an Internet server and made accessible to everyone on the Internet with no additional effort. Any Microsoft Office customer can now publish to the Internet merely by saving their Office documents exactly as the customers have already learned to save the Office documents, with no additional study or training.

Microsoft will also add extensions to XML to facilitate storing Office documents in the XML format. The documents that are published on the Internet using these Microsoft XML extensions will be most easily viewed using Microsoft's Internet Explorer browser. Tied in with other Microsoft products, this will increase Internet Explorer's domination. In marketing terms: as Internet Explorer becomes synonymous with browser, it will cease to be necessary to say 'Internet Explorer browser', 'Internet Explorer' will be all that is necessary. Unfettered by other vendors' browser release numbering, Internet Explorer can become Internet Explorer 2003.

Internet Explorer 5.0

Microsoft Internet Explorer 5 is the first commercially available browser software to support the Extensible Markup Language (XML) 1.0 recommendation developed by the World Wide Web Consortium (W3C). As a co-founder of the W3C XML working group (an industry standards group) and a provider of XML technologies to the computing industry, Microsoft views XML as the language of choice for building data-driven application.

Internet Explorer 5 is currently (April 1999) the only shipping browser, Microsoft claims, with complete support for XML 1.0. Further, Internet Explorer is the first, and currently the only, Microsoft claims, shipping browser to support a wide variety of other XML technologies, including a subset of the Extensible Stylesheet Language (XSL) W3C working draft, the XML Document Object Model (DOM), the XML Namespaces 1.0 Recommendation and a technology preview for advanced XML schemas (document descriptions).

Internet Explorer 5.0 is off to a rousing start. More than 1 million downloads of Internet Explorer 5 took place, from Microsoft's web site, in the opening week of availability, starting March 18, 1999. According to Microsoft, customer downloads of Internet Explorer 5 during the 'opening weekend' more than tripled those of the previous record-setting Internet Explorer 4.0 and were greater than the total number of people who attended the opening weekends of Best Picture nominees "Shakespeare in Love," "Elizabeth," "The Thin Red Line" and "Life is Beautiful" combined.

Microsoft also noted that more than 140 ISPs (Internet Service Providers) and PC manufacturers also made Microsoft Internet Explorer 5.0 available for download to their customers from their websites on the first weekend. Microsoft did not have figures for the number of downloads from these additional sites.

Microsoft NetMeeting: Internet TV

Microsoft NetMeeting is a Suite of products that expands into the area of teleconferences, multipoint dataconferencing, surveillance camera recording, traffic monitoring, traffic violation ticketing at monitored locations, videotelephony, and Internet telephony for all Microsoft customers worldwide. Microsoft NetMeeting is a core component of Microsoft Internet Explorer.

More Suites, and the Internet

As Microsoft continues to create more product suites and begins to merge the product suites with the Internet, the process may even be a preparation for the possibility that Microsoft, itself, may not be able to sell suites of its products directly. Third parties can be enlisted as suite creators. Infoseek has created an intelligent channel suite, on the Internet, with Microsoft's web content products. Products in the Infoseek Internet suite include: Microsoft Investor, tools and content from the Microsoft Money Insider interactive financial guide; Microsoft Expedia.com, Microsoft's travel service; Microsoft CarPoint, Microsoft's online automotive sales service; and MSNBC.

Internet Hardware

Microsoft is working on a myriad of fronts to make Internet hardware and communications links much faster and much lower cost, worldwide. For example, Microsoft is working with Hong Kong Telecom (March 1999) to develop a range of compelling multimedia applications to be delivered via Hong Kong Telecom's broadband network, the world's largest ATM (Asynchronous Transfer Mode) network that already reaches 70 percent of the homes in Honk Kong. Hong Kong Telecom is a subsidiary of Cable & Wireless, a communications company with 17 million customers in 70 countries.

Portugal Telecom SA and Microsoft will jointly develop (March 1999) interactive video and data services. The objective of the agreement is to accelerate the deployment of new broadband and wireless technology and services for delivery to customers in Portugal. In addition, Microsoft will invest US\$ 38.6 million for an equity stake of 2.5 percent in TV Cabo, Portugal Telecom's cable and satellite television services company, which plans to launch broadband Internet services to residential customers later this year.

Microsoft has made a US\$ 200 million investment in Qwest Communications who's fiber communications network will span more than 18,500 route miles in the United States when completed in 1999. Qwest will use

Microsoft software to deliver VPNs (Virtual Private Networks) (corporate intranets).

Microsoft has begun trials (March 1999) of its new high-speed DSL (Digital Subscriber Line) service in four U.S. cities. The MSN (Microsoft Network), the ISP (Internet Service Provider) owned by Microsoft, Internet Access DSL provides consumers with Web access at speeds of up to 8 Megabits per second - up to 275 times faster than today's 28.8 Kilobit per second modem standard and up to thirty times faster than competitors' DSL offerings. MSN Internet Access DSL works across existing telephone lines, eliminating the need for a second voice line so consumers can navigate the Web while they talk on the telephone. In addition, the service is always turned on so there is no wasted time in dialing up for access to the Internet.

Windows CE and Cell Phones

British Telecommunications plc. (BT) and Microsoft announced (February 1999) a global agreement to develop a new range of Internet, intranet and corporate data services for mobile customers around the world. These services will allow mobile users outside North America to access securely the broad range of Microsoft Internet and corporate applications, on which they rely in the office and at home. Customers could, for example, access applications such as e-mail, calendaring, personalized web content and online information services using their digital mobile phone, pager, or handheld or laptop computer.

Trials were scheduled to begin in the United Kingdom this spring, with services expected to become available in several countries by early 2000. The new services will be developed and marketed worldwide by BT and Microsoft, and offered by Concert Communications Services, BT's global communications company. BT will accelerate the development and deployment of Internet-standards-based wireless services by selecting Microsoft microbrowser technology and Windows CE for manufacturers' handsets.

The BT mobile networks currently serve more than 13 million customers in 10 countries. Through Concert Communications Services BT reaches more than 40 countries outside North America. BT's global partnership with Microsoft bridges the divide between computing and mobile communications, enabling customers to see what they want on the phone, meeting the needs of those who need to communicate on the move, and allowing them to be reachable and remain connected to vital information at all times.

Microsoft's partners are often encouraged by Microsoft investments, such as the 5 billion USD (US Dollar) investment Microsoft made in AT&T in May 1999.

-- Editors' note: end of part 3 --

THE FOUNDATION FOR THE FUTURE

Accessibility Features: Seniors

Microsoft has identified senior citizens and physically challenged persons as an important markets, markets that could potentially provide competitors with an entree to Microsoft's more conventional areas of operation. Microsoft has long worked to make its products accessible to senior citizens and physically challenged individuals. The new accessible features of Office 2000 continue this work and build Microsoft's presence in yet another two markets.

Microsoft sponsored research findings that show a 'digital divide', or the growing gap between computer users and nonusers, significantly affecting older Americans. While approximately 50 percent of Americans own and use computers, only 24 percent of seniors (ages 60 and older) do. These statistics show that computer use among senior citizens is less than half that of the general population. The research was conducted to better understand and quantify the sociological impact of the digital divide and was unveiled at the 45th annual conference of the American Society on Aging (ASA) in Orlando, Florida (March 1999).

Microsoft has created a Senior Initiative program aimed at bridging the digital divide and ensuring that seniors are not left on the side of the information highway. By providing access to information technology and PC literacy training, the Microsoft Senior Initiative is introducing the exciting possibilities of technology to senior citizens.

Microsoft launched the Seniors & Technology website, (<http://www.Microsoft.com/seniors/>), in October of 1997 to serve as a conduit for information on programs, partners and products for seniors, their families and their communities. This site includes resources and community based training programs, tips and tricks as well as profiles of how technology has impacted the lives of seniors.

Since August 1996, Microsoft has been holding information seminars designed to provide a basic understanding of computer and Internet usage for senior citizens. Based on the demand and excitement for these programs, and working with AARP and SeniorNet, Microsoft launched the Lifetime Connections Program in August 1997. Since then, Microsoft has completed over 800 informational seminars to 70,000 seniors throughout the country. Co-

sponsored by Sony, this program provides mature Americans an opportunity to explore and learn of the world of computers and the Internet in a friendly environment. Microsoft has been a supporter of SeniorNet for the past decade, providing a combination of software, training curriculum, cash, and equipment grants.

In October 1998, with the goal of reaching under-served communities and providing PC Literacy training, Microsoft announced a two-year grant worth over \$1 million, to upgrade and expand SeniorNet's 140 Learning Centers.

Microsoft works with Julia Alvarez, Ambassador, Alternate Permanent Representative of the Dominican Republic to the United Nations to better understand the needs of Seniors in third-world countries and how technology can provide exciting possibilities to them and develop their communities. In April 1998, Microsoft participated in a United Nations conference on worldwide aging, preparing delegates for the "UN Year of Older Persons" in 1999. Microsoft's presentations highlighted the convergence of aging and technology and the benefits of PC and Internet usage. Other programs include a computer usability and accessibility day at the United Nations (December 1998).

Accessibility Features:

Physically Challenged Persons

Microsoft has continued its commitment to develop assistive technology, creating and allowing ease of use by users of all ages including 'Active Accessibilities' or accessibility options. These features allow users to easily change system configurations allowing the user to use their personal computer with greater ease. Examples include the ability to change the background color and font size to ease reading and the ability to change the keyboard for easier use by selecting 'sticky keys' allowing a user to depress one key at a time in instances where two keys need to be depressed at once. Other examples include visual warnings and captions instead of audible warnings.

In an effort to make computers and the Internet easier to use for people with disabilities, Microsoft announced (March 1999) a series of grants to non-profit research and educational institutions for original research in the field of accessibility. Titled 'Exploring PC Accessibility: New Discoveries,' the international grant program was created in December, 1998 to complement and extend the work Microsoft and other software and hardware vendors are doing to make computers easier and more useful for people with a variety of disabilities.

The announced grants, ranging from \$10,000 to \$50,000 for concept exploration and technology development respectively, were presented at the annual California State University Northridge 'Technology and Persons with Disabilities' conference by the director of accessibility at Microsoft.

Bill Gates often talks about a computer on every desktop. For people with disabilities, the PC can be enabling technology in the workplace and education, and it can provide a vital connection to other people as a basic means of communication. In addition to making Microsoft products accessible, Microsoft has a goal of equipping and motivating the development community to produce the best accessibility solutions.

Microsoft's Exploring PC Accessibility: New Discoveries grant program is one of many initiatives Microsoft is undertaking to improve the features and usability of PC and Internet technology for people with disabilities. For example, new and improved accessibility features have been announced in a number of upcoming product releases, including the Microsoft Office business suite and the Windows 2000 operating system. In addition, Microsoft's Accessibility and Disabilities Group recently hosted the company's newly formed Accessibility Advisory Council, consisting of representatives from advocacy groups, user groups, and research organizations in the disability community.

Education

Microsoft is also moving into education.

Microsoft has an extensive philanthropy program. For example, Bill and Melinda Gates gave 200 million US dollars worth of computer hardware to libraries and Microsoft gave 200 million US dollars of software to libraries. This increases the likelihood that people, particularly children, visiting libraries will have the opportunity to use Microsoft software.

As part of a new and continuing program (October 1998), Microsoft assisted a third party in distributing 55 million US dollars to students planning to take Microsoft technical courses from February and September 1998. These loans will help expand the ranks of the 300 thousand persons already certified as trained to work with Microsoft products. Some of these certified persons will work for the 15,500 Microsoft certified solution providers who do systems integration using Microsoft products.

Apple is big in education and in August 1997 Microsoft invested 150 million USD dollars in Apple. Apple agreed to ship Microsoft's Internet Explorer as the default Apple browser and to drop patent claims and lawsuits.

Along the same lines, Microsoft invested 135 million USD dollars in Corel in October 2000. Corel agreed to support Microsoft initiatives on the Internet with WordPerfect and may provide some Linux assistance with the Microsoft .Net initiative.

What's Next?

Microsoft has spent over twenty years establishing a solid, unshakable foundation in information processing. Microsoft depends on no one for its core software products. Having established ownership in the domain of information processing, Microsoft is moving to assume its newly built heritage in information content, asserting its dominion in banking and finance, the stock market, car sales, travel, telephonic and Internet communications, and document management. From its unassailable position in information processing, Microsoft can gradually increase the expression of its long ago won hegemony in the world of information at the slow, decades-long, unstoppable pace it has become known for.

To put these initial information content forays into perspective, information can be seen as constituting fifty to ninety percent of the world economy when analyzed from an information management point of view.

Bill Gates moved beyond the content of Microsoft's Bookshelf by purchasing the Bettmann Archive of photographs and starting the Corbis Archive. A few of the premier photography collections featured in the seventeen million photograph Corbis Archive include the Bettmann Collection, the LGI Collection, the Turnley Collection, Ansel Adams, and Roger Ressmeyer. The prestigious group of museums currently working (1998) with Corbis includes the Barnes Foundation, The National Gallery in London, the Philadelphia Museum of Art, The State Hermitage Museum, the Kimbell Art Museum, and the Seattle Art Museum. Over one million of the images have been digitized, making the Corbis Archive the largest digital photographic archive in the world.

Microsoft Hardware Initiatives

With the release of Microsoft's annual specification for PC hardware, starting with PC 97, and testing by Microsoft's in-house hardware compatibility test lab, Microsoft now has more control over PC hardware than Apple has over Mac hardware, even though Microsoft makes almost no PC hardware. Microsoft achieved this by indicating that Microsoft software may not run on PC hardware that does not meet the Microsoft PC NN (e.g. PC 99) hardware specification.

Microsoft's hardware compatibility test labs are busy around the clock, testing the compatibility of hardware and software. The labs maintain computer systems from more than 300 different manufacturers. For the first beta release of Windows 2000, and for each Windows 20NN operating system build (the process of assembling the components of an operating system) thereafter, at the rate of one build per day, the labs test more than 400 video adapters, more than 1,400 printers, more than 350 net cards, and more than 2,600 modems against the current day's version (or build) of Windows 20NN. Every day more devices are tested and declared Microsoft compatible and are added to the test systems (test suite). These devices can then be sold with a Microsoft compatible logo on their packaging.

Microsoft Research

Microsoft Research is taking the reins of basic research from Bell Labs, IBM Research, and the major universities.

(Since 1991 Microsoft Research has hired hundreds of leading Computer Science scholars (420 by July 1999), <http://research.microsoft.com/people>, to do the fundamental research which underlies Microsoft contributions to the many industry standards groups, conference program committees, editorial boards, and advisory panels that Microsoft and its researchers belong to. Microsoft Research operates research facilities in Redmond Washington, San Francisco California, Beijing China, and Cambridge England.)

Building a Global Think Tank

To keep the pace of research in line with Microsoft's overall growth, in 1997, the company decided to expand the size of its research organization to 600 people (Adjusted to 700 according to Steve Ballmer, President of Microsoft, speaking in Long Beach, California, Microsoft TechNet Briefing, (Microsoft event number 25316, <http://events.microsoft.com>), on August 12, 1999) by July 2000. "It was Bill [(Gates)]' feeling and Nathan [Myhrvold]'s feeling that research needed to grow faster to keep pace with the company," Rick Rashid, President of Microsoft Research said. "The company (Microsoft) had been growing faster than Microsoft Research had, and there was a sense that increasing our efforts was one of the best investments the company could make toward its future."

People at Microsoft Research

But, while Microsoft Research is growing, Rashid said complaints that Microsoft is raiding the academic world for researchers are unfounded. Fewer than 50 of the 420 employees hired by Microsoft Research (June 1999) have been faculty members at universities, he said. And that's a small number compared to the more than 3,000 computer science faculty members that are out there. "Over the past eight years, we've probably hired on average six people from teaching positions in a year," Rick Rashid, (Who was hired from Carnegie Mellon University, CMU, where he had taught for the preceding dozen years. He was passionate about his research, he enjoyed the academic work environment there, and he was next in line to become dean of the university's computer science department.) said: "That's a blip. That's unnoticeable in statistics."

Profiles of the people who work at Microsoft Research are at:

<http://www.research.microsoft.com/people/>

Research Areas at Microsoft Research

Interactivity & Intelligence

- 3-D Graphics
- Artificial Intelligence
- Audio
- Character-Based Interaction
- Collaboration & Communications
- Computer Graphics
- Computer vision
- Data Mining & Exploration
- Distance Learning
- Electronic Commerce
- Gaming
- Human-Computer Interaction
- Knowledge Management
- Machine Learning
- Multimedia
- Natural Language Processing
- Speech technologies
- Statistics
- User Interfaces
- Video
- Virtual Reality

Mathematical Sciences

- Algorithms
- Mathematical Methods
- Theory

Programming Tools & Techniques

- Compiler Technology
- Development Tools
- Foundations
- Programming Languages
- Software Engineering

Systems & Architecture

- Cryptography
- Databases
- Devices
- Distributed Systems
- Networking
- Operating Systems
- Real-Time
- Security
- Sensors
- Signal Processing]
- Ubiquitous Computing

Other

- Adaptive Systems and Interaction
- Collaborative and Multimedia Systems
- Graphics
- Information Retrieval and Analysis
- Integrated Systems
- Internet Media
- Signal Processing
- Speech & Handwriting
- Multimodal User Interface
- Machine Learning and Applied Statistics
- Media Computing
- Natural Language Computing
- Natural Language Processing
- Next Media Research
- Telepresence
- Vision Technology
- Virtual Worlds
- Visual Computing

--- Editors' note: end of part 4 ---

THE ENVIRONMENT

The Microsoft Environment

The Microsoft environment is not just Microsoft's increasingly comprehensive product line. It is the mystique, the aura, the cachet (royal seal of quality), and the royal protection of Microsoft. Customers buy and learn Microsoft products because they know the Microsoft products will always be around; the customer's investment will never be lost. And if Microsoft drops a product, at least the Microsoft product was the least likely to disappear of all the similar products in the market place.

If a Microsoft product is not so good, at least it will have the most customers working (and paying) to make it better. If it takes a long time for a Microsoft product to get better, at least Microsoft has the most staying power to improve the product in the long run. If Microsoft does not have a feature or function yet, its customers are able to wait. They waited years for the features of the Mac GUI. If you are working with someone else, they are probably using the same Microsoft product you are using. If you are having problems with the Microsoft product, then your collaborator is

probably having the same problems, will understand your delays, and can help.

In the old days people said that you would never lose your job if you 'bought IBM', because if IBM could not do it, no one could do it. Today Microsoft is the safe bet because if you fail with Microsoft, no one will have done better than you, because they all used (and failed with) the same Microsoft products. And, if your peers did not fail with Microsoft products, you can use your peers' solution; and Microsoft Consulting Services will help you.

Whole industries have grown up in niches created when Microsoft products do not completely fill a need. Novell and third party networking is an example. The third parties complete the Microsoft solution package, enhancing Microsoft sales and establishing a market for the new product. After the third parties grow the niche into a market large enough to justify Microsoft's interest, Microsoft enters the market niche with a Microsoft product tailored to the niche. Everyone then buys the Microsoft product and Microsoft benefits again.

If a customer does not buy the Microsoft product, and instead buys a competitive product, or does not switch to Microsoft as soon as Microsoft produces a competitive product, the customer is left with a large investment in an obsolete (competitive) product when Microsoft takes over the product's market, as the conventional wisdom is wont to predict.

Paradigm Marketing

Once customers enter the Microsoft environment, all they see are Microsoft solutions. This could be called paradigm marketing, where the customer is first sold on the idea, or paradigm, that the place to buy software is Microsoft. Then, when the customer goes to buy software, they only see Microsoft products to select from. The premiere example of paradigm marketing is the product category of operating systems. (DOS, Windows 95, Windows 98, and Windows NT see Windows 2000 are operating systems.) Most people have never heard of operating systems as a product category, and have not considered spending time evaluating operating systems. People only know that you buy Windows (a Microsoft product) when you buy a computer.

In the old days, when an IBM salesperson said that no solution existed, they did not see the necessity of explaining that they meant that IBM did not have a solution. If a solution was not available from IBM, then it was unavailable to the salesperson. And, therefore, it was unavailable to the customer. Similarly, the best solution available was, by definition, the best

solution available from IBM. (The best solution within the IBM paradigm.)

One of the best things about being in a paradigm is that a paradigm does not need to be explained, it just is. Explanations are long and technical. No one wants to listen to, or discuss, or, heaven forbid, evaluate a long and technical explanation. People just want to do the best thing (for example, buy Windows) and get on with their jobs.

A Microsoft Shop

When a paradigm is set in stone, and becomes the rule of the land, it is given a hallowed name. Seeing the benefit of uniformity and long-lived products, many customers standardize on Microsoft products and refuse to use any other products; these customers' sites are known as 'Microsoft Shops'.

When the cachet was IBM's, the site were known as IBM shops or simply as 'Blue Shops', following the moniker of 'Big Blue' that IBM earned from being big and from having a standard 'IBM' blue equipment color.

Worldwide, Universal

The Microsoft environment is international, worldwide, universal. (The word 'Catholic' is an anglicized Greek word that means universal.) More than half of all Microsoft sales are outside the United States. Microsoft, itself, has offices in more than 48 countries. To reduce the costs of internationalization, and to pass on the benefits of universality to all Microsoft third party software developers and to all Microsoft end users, Microsoft is moving to a common code set for all languages.

From a marketing perspective, the Microsoft paradigm, like all paradigms, has to be universal, all encompassing. Therefore, Windows 2000 is designed to support all the languages of the world equally; including the large character set languages like Chinese. Windows 2000 is also timeless, in that it is able to support all the ancient languages as well.

To provide this universal language support, Windows XP (2002) text is based on the Unicode character set which uses 16 bit bytes, and can represent 65,536 characters. This replaces the older 8 bit bytes of ASCII (the ANSI (American National Standards Institute) Standard Code for Information Interchange), which could only represent 256 characters. With the Unicode character set, all characters, of all languages, are available simultaneously for use anywhere in the operating system, application, or content.

Windows XP (2002) will expand on this universal language support by making the user interface language independent. The same user

interface code can support all languages (when language modules for all languages have been written). With Windows XP (2002) as a foundation, all Microsoft products will eventually follow and become language independent.

With universal language support, Windows is envisioned to become the 'sine quo non', the indispensable communications tool, just as Latin was the indispensable communications tool of learning, science, and religion for over a thousand years.

Summary:

The 31 Flavors of Windows NT 2000

When Windows 2000 was released on February 17, 2000 (1) Windows 2000 Professional was the workstation version, replacing Windows NT 4.0 Workstation, (2) a Windows XP Professional - Lite (currently undifferentiated and un-named) did not replace Windows 98, successor to Windows 95 in the office, but may in 2001, or a little later, (Windows 2000 Professional is the current substitute), (3) Windows 2000 Home did not replace Windows 98, successor to Windows 95 in the home, but will (as Windows XP Home) in 2001, (4) Windows 2000 Server serves workgroups of under 50 systems, with up to 4 processor support for departmental servers, (5) Windows 2000 Advanced Server provided organization wide server support with up to 8 processors, (6) Windows 2000 DataCenter provided enterprise wide server support with up to 32 processors and up to 64 GigaBytes of RAM (Random Access Memory), (7) Portable Windows XP (currently un-named) may replace Windows CE for handheld computers and cell phones (the name change may precede the design change), and (8) Windows XP Super-Lite (currently un-named At Work version) may be used in embedded controls for television sets, DVD players, appliances, office equipment, automobiles, and industrial devices (may slip to Windows 2001 or later). With NT operating all (most, at least a large number of) known computer configurations as Windows 2000, now Windows XP (2002), the 'NT' of 'Windows NT' has faded away and the ubiquitous operating system, that operates everywhere, is now known as 'Windows' ('Windows 2000' and now 'Windows XP' in the current release).

The Big Picture:

Microsoft is now the World's Largest Company

The size of a company can be described as the price one would have to pay to purchase the company. To buy Microsoft, one would have to buy all the Microsoft stock. The total value

of all the Microsoft stock is now approximately 500 (250 - when the stock market is down) billion USD (US dollars) (approximately 100 (50) USD per share multiplied by approximately 5 billion shares). This makes Microsoft the largest company in the world. Microsoft is larger than General Motors, larger than General Electric, larger than AT&T, and larger than IBM.

(During Microsoft's troubled time in court, on charges of monopolistic marketing, Cisco Systems, the largest manufacturer of Internet switching hardware and software, from time to time, wrestled the mantle of 'worlds largest company' from Microsoft.)

The reason investors are willing to pay so much for a company with so little in annual sales is that investors can see that Microsoft has a very, very rosy future. That is, to varying degrees, investors believe that Microsoft is heir to the information economy.

As noted above, information can be seen as constituting fifty to ninety percent of the world economy when analyzed from an information management point of view. If the world economy is 30 trillion US dollars, and if the information economy is 50 percent of the world economy, then Microsoft's potential share is 15 trillion US dollars, about 1 thousand times more than the approximately 20 billion US dollars that Microsoft grosses today.

Microsoft Accounting

Microsoft accounts for its profits in an extremely conservative way, and still nets about 2 billion US dollars in profits per quarter: about 8 billion US dollars in profits per year.

Microsoft expenses almost all development costs, rather than capitalizing them, and still nets about 8 billion US dollars per year. Almost all of Microsoft's expenditures are for future products and future return from current marketing efforts, yet Microsoft consistently expenses its investment in its future against current earnings. Microsoft's current expenses to sell its current products are the cost of reproducing the DVD's and CD's that contain their software.

If Microsoft sold a new version of all of its products to each of its 100 million customers each month, this would cost less than 2 billion US dollars per year using DVD's that will soon cost less than one US dollar to reproduce all Microsoft products on a single media unit. This would leave a net profit of over 13 billion US dollars per year and capitalized development expenses of about 9 billion US dollars per year to be amortized over the lifetime of Microsoft's products. Viewing the 1 dollar US DVD as too expensive, Microsoft is planning to send customers frequent product updates for all Microsoft products over the

Internet at no cost to Microsoft except for the servers feeding the Internet.

And, in another stroke of naming acumen, which has fortuitously evolved into astute legerdemainship, the name 'Microsoft' literally means 'very small and soft'.

Is It Legal?

As litigations, to which Microsoft is party, drift toward settlement talks in the United States, the European Community, and perhaps some day the United Nations, it seems clear that a treaty would provide too much independence, and a merger, through direct and specific regulation, as was the case with IBM might be more appropriate. (IBM implemented its consent decree with a sales manual that specified what salespersons could and could not say, in great detail.) It may even be that Microsoft will enjoy the competitive advantages of being open-source as a result of a settlement.

Will It Happen Soon?

No. Even though Microsoft has been declared a monopoly, the case must move through multiple levels of appeal, if Microsoft decides to appeal the judge's decision. This can take more than a decade. And, Microsoft may yet win the case on appeal. Another possibility is a settlement. A settlement would be followed by an implementation period. If there were questions about the implementation, the case might then return to the courts and the multiple levels of appeal.

Given that Microsoft was able to establish a legally significant presence on the Internet in the time after the last consent decree, Microsoft has many options in the direction of its commercial activities before the current case is finally decided.

What Did Microsoft Do Today?

Microsoft's daily press releases are at <http://www.Microsoft.com/presspass/todaynews.htm>, which makes an excellent start page in a web browser (See also paper 22015, Microsoft Initiatives, Day by Day, 1996 to Present). Each press release represents years of work by a Microsoft team and often by teams in many cooperating companies in the computer world. It is not unusual to see five press releases in a day, and during a major tradeshow, Microsoft may have three or four times this many releases in a single day.

How Long?

The last operating system designed to operate all known computer configurations was IBM's OS/360, announced in 1965 and delivered in partial working order in 1968. Thirty years

later, renamed and updated versions of OS/360 still operated almost all mainframe computers. OS/360 created the paradigm that operating systems existed and that applications were separate from operating systems. Windows 2000, now Windows XP in 2001, may reverse OS/360's paradigm creation by creating a paradigm in which applications and operating systems are one-in-the-same, a continuum of features and function.

IBM was the creation of Tom Watson Sr., who learned his trade at NCR (the National Cash Register Company), starting in the 1890's. Tom Watson Sr. influenced IBM into his 80's, and even influenced the creation of OS/360, ten years after his death. Microsoft is the creation of Bill Gates. In 30 years, in the 2030's, Bill will be in his 70's and probably still having fun at Microsoft.

--- Editors' note: end of part 5 ---

Sidebar One

The Buccaneers

How did the buccaneers remember how many bits were in a byte? They called the bits pieces-of-eight. How did the buccaneers remember how many bits were in a quarter of a byte? They called them two bits.

Sidebar Two:

Why was it called Windows NT?

(Historical Eponymy in Computing)

In the movie 2001, now making an anti-anachronistic rendezvous with the year 2001, the villainous computer was named HAL. By adding 1 to each letter of HAL's name, one arrives at IBM. Dave Cutler, who developed Windows NT (now Windows 2000 and XP) for Microsoft, was hired from Digital Equipment Corporation (DEC) where he developed the Virtual Memory System (VMS) for the Virtual Address eXtension (VAX) computer. Adding 1 to each of the letters of 'VMS' one gets 'WNT'. Microsoft already had Windows for the 'W'. All that was necessary was to assign a meaning to the letters 'N' and 'T'. Being the King of generically anointed products such as Microsoft Word, Microsoft probably found 'New Technology' a wonderfully pastel choice.

Sidebar Three

W2K Wags

Windows NT 5.0, rechristened Windows 2000, changed Windows NT 4.0 very substantially, in very many ways, and also added very many

completely new features. All of these changes are intended to benefit Windows customers, but all changes carry with them the possibility of software bugs. For this reason wags were wont to call Windows 2000 'Windows 00'. 'Windows Oh Oh', or 'W2K'.

Note to Readers

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Please send your comments via email to SteveGilheany@ArchiveBuilders.com. Tel: +1 310-937-7000. Fax: +1 310-937-7001. Also, please let us know where you saw this article.

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Note to Editors

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Steve Gilheany
Archive Builders
1209 Manhattan Ave., C-14
Manhattan Beach, CA 90266
Tel: +1 310-937-7000 Fax: +1 310-937-7001
SteveGilheany@ArchiveBuilders.com

Dividing this Article into Parts for Serialization

If you decide to divide this article into parts please print at least the updates, comments, and

acknowledgements sections in each of the parts along with:

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Bio

Steve Gilheany, BA in Computer Science, MBA, MLS Specialization in Information Science, CDIA (Certified Document Imaging System Architect), AIIM Master (MIT), and AIIM Laureate (LIT), of Information Technologies, CRM (Certified Records Manager, ARMA) has eighteen years experience in document imaging and is a Sr. Systems Engineer at Archive Builders.

Author

Steve Gilheany is a Sr. Systems Engineer at Archive Builders. He has worked in digital document management and document imaging for twenty years.

His experience in the application of document management and document imaging in industry includes: aerospace, banking, manufacturing, natural resources, petroleum refining, transportation, energy, federal, state, and local government, civil engineering, utilities, entertainment, commercial records centers, archives, non-profit development, education, and administrative, engineering, production, legal, and medical records management. At the same time, he has worked in product management for hypertext, for windows based user interface systems, for computer displays, for engineering drawing, letter size, microform, and color scanning, and for xerographic, photographic, newspaper, engineering drawing, and color printing.

In addition, he has nine years of experience in data center operations and database and computer communications systems design, programming, testing, and software configuration management. He has an MLS Specialization in Information Science and an MBA with a concentration in Computer and Information Systems from UCLA, a California Adult Education teaching credential, and a BA in Computer Science from the University of Wisconsin at Madison. His industry certifications include: the CDIA (Certified Document Imaging System Architect) and the AIIM Master (MIT), and AIIM Laureate (LIT), of Information Technologies (from AIIM International, the Association of Information and Image Management, www.AIIM.org), and the CRM (Certified Records Manager) (from the ICRM, the Institute of Certified Records Managers, an affiliate of ARMA International, the Association of Records Managers and Administrators, www.ARMA.org).

Contact:

SteveGilheany@ArchiveBuilders.com
Tel: +1 310-937-7000 Fax: +1 310-937-7001

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<http://www.ArchiveBuilders.com>