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1285
Comes v. Microsoft

Depo. Ex. 1315

Work in progress...
This currently is relatively
random ramblings, but it
might be useful to you
anyway & I'd appreciate
any comments

Mack
Chicago

Thoughts on PS BU
Product Strategy with Emphasis on the
1993 Release of Windows on DOS

04/09/92 02:00 PM

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Introduction

The following is a collection of thoughts and information about the DOS and Windows/DOS projects currently under development and the directions they should be taking in 1993. It is focused primarily on gathering the information needed to reach the best decisions for the '93 DOS and Windows/DOS releases. Send comments to mackm, stevem, and bobem, or place them inline in

shadowed boxes with your name please.

Our comments are inline in unshadowed boxes.

Target Users

The 1993 DOS and Windows/DOS releases are targeted at the following broad user bases:

Enterprise MIS Supported Application Users

This is not clear. It will depend heavily on the decision as to the shell, network, security, and distributed capabilities we decide on. This area may be left largely to NT.

Desktop and Workgroup Productivity Application Users.

This group as a whole is growing more sophisticated in its demands from a system both in terms of power and usability. Hardware pricing and peripheral innovations are also bringing a whole new class of requirements for support of diverse new types of I/O, and exploitation of increasingly large and powerful systems. In 1993 however, a large portion of the user base will still be using systems purchased in CY 1991 and before which means that our design sweet spot cannot rise above 386Sx class machines with as little as 1 megabyte (Character [MS-DOS] application user) to 2 megabytes (GUI [Windows] application user).

Mobile Computer Users

The many new applications which are made possible by the advent of new lighter, powerful, durable computers which will begin to become available, at reasonable prices, with built in data-communications, and with sufficiently long battery life, are expected to make mobile computers the fastest growing segment in CY '93 and CY '94. The most interesting of these machines will be those focused on the continuance of the process of making data and compute power more accessible to people (i.e. programmable systems with data storage and data transfer capabilities.)

Imbedded Systems and Consumer Electronics

Computers are rapidly moving into the consumer electronics arena. Continued price reductions and the aforementioned Mobile computing capabilities will serve to further accelerate the blurring of the distinction between the traditional IS computer, home computers, and consumer electronics. Whereas MS-DOS has played an important role in the consumer electronics and embedded systems marketplace for some time now, it is only recently that hardware capabilities have reached the point where Windows becomes a viable alternative for a number of more advanced imbedded systems and consumer electronics applications. While not nearly as high a priority as the previous two categories (at least for the PS BU), the imbedded marketplace will be taken into consideration and certain features (such as execute from ROM) will be added to both MS-DOS and Windows for these applications.

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Distribution Channels

Both packaging and feature decisions must be made with a consideration of the distribution channels through which the 1993 DOS and Windows/DOS products will be delivered. The three distinct distribution channels are:

OEM

There are two major objectives for this channel: Preventing loss OEM share to competitive operating systems (primarily DR-DOS and OS/2, but also NeXT, Sun, SCO, etc.) and also increasing the penetration of MS-Windows pre-installation (both Win/DOS and Win/NT). In addition to caring about popularity with users, this market is very COGs sensitive, has significant internationalization requirements, and has a set of very unique setup requirements.

Retail

To date, this has primarily been an upgrade marketplace for DOS and new business for Windows. With Windows 3.1, both products are now involved in significant upgrade business. In the future we will be moving toward complete OS upgrades and away from having users upgrade just DOS or just Windows. Each new major release must have significant end-user benefit to insure a significant upgrade business. Also critically important is ease of learning the new version after using the previous one and applications bought for the previous version(s) continuing to run well. A new OS release can also generate upgrade business through enabling new classes of applications, but the chicken-and-egg problem tends to make this a much less compelling generator. Significant OEM penetration will help here.

Corporate Accounts and PC Resellers (VARs)

In addition to volume purchase discounts, reseller agreements and other marketing angles, this market has its own unique set of product requirements based around their software planning, testing, installation process, system management, and internal support. The fundamental difference lies in the facts that the one making the purchasing decision is not, in general, the end-user, but rather someone who will be responsible for installing some number of machines, configuring them, training the users, and providing support for them. There are at least three (product development related) angles to selling this person:

1. Providing significant tangeable end user benefit (measured in increased productivity and satisfaction.)
2. Providing a very easy to use, low maintenance, reliable product.
3. Providing tools to help in the installation of the product and support of those using it.

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Project Glossary and Schedules

The following outlines the major projects currently underway.

This list should also include NT, Cairo, Winball, and Slotum. Probably should say something about IPX/SPX/NCP also.

Janus

Janus is a single SKU which provides the user with a combined DOS 5.0a and Windows 3.1 install. There are actually two phases of the Janus project:

Non-Upgrade Janus(4/92¹)

Non-Upgrade (NU) Janus is a product that is intended for installation at or before the time a PC is originally purchased at retail. As we choose to not compete with our DOS/Windows hardware OEMs on first OS sales, NU Janus will only be released as a retail by Microsoft for machines of those OEMs who choose to not sell DOS with the machines (This will be enforced with a machine-type check at the start of setup). NU Janus does a particularly nice job of upgrading a machine which originally has OS/2 installed on it.

Upgrade Janus(6/92)

Upgrade Janus will upgrade a machine from essentially any operating system to MS-DOS 5.0a and Windows 3.1 with a single tightly integrated setup program.

Astro(9/92)

Astro is a feature upgrade to MS-DOS 5.0a. The base operating system features of MS-DOS are augmented with:

- Full featured backup program
- Disk Defragmenter
- Subscription to an anti-virus service
- Automated memory configuration utility (UMB optimizer)
- Improved disk error detection/correction utility
- Directory undelete
- Disk compression
- Online command reference
- Improved shared DOS/Win utilities (smartdrv, cmm386, etc.)

Many of these features will be acquired from third parties and will be based on currently shipping stable products.

Jaguar(6/93)

Jaguar is the next major release of real-mode MS-DOS to contain significant enhancements to the base product. Improvements will be made to provide more power and consistency at the command line for MS-DOS users and also to provide much of the function to Windows users in a more seamless manner. Major features of Jaguar include:

- More powerful and consistent command line options for commands
- MS-DOS utilities and command.com are callable as windows .DLLs
- Additional Fit and Finish on all utilities
- No compile translatable
- Multi-lingual install
- Astro utilities more tightly integrated
- Exploitation of Cougar environment
- Complete memory configuration support including aggressive options

¹Dates in this document are Golden dates. Actual product availability schedules are TBD.

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- Complete online documentation
- File-find performance improvements

Cougar(6/93)

Cougar is a small fast 32-bit protect-mode MS-DOS kernel. It provides 100% MS-DOS 5 compatible support for multiple concurrently executing MS-DOS applications. In addition to this, cougar will serve as the kernel for the next major windows release (Panther). Major features provided by Cougar include:

- 32-bit protect-mode pageable device driver model
- Installable filesystem driver support
- Protect mode filesystems
- Local named pipes
- Print spooling
- Layered plug-n-play I/O driver model
- Symmetric installable network support
- Protect-mode redirector, Netbus, DLC, and NDIS 3.0 drivers
- Protect-mode peer file and print server
- Dial-up and wireless network support
- Layered high-speed serial device support
- Dynamically (un)loadable device driver support
- Event-based configuration management

Panther(6/93)

Panther is the subsystem which provides API support for 16 and 32-bit Windows applications. It consists of the 16-bit memory management, imaging, messaging, windowing, and printing subsystems used by Windows applications (i.e. User, GDI, and Kernel 16, and the associated display and printer drivers. In addition to this, Panther provides memory management, scheduling, synchronization, file and network I/O, serial device, tape, etc. API support for 32-bit Windows applications. In general the 32-bit API are provided by mapping directly to the 32-bit capabilities of Cougar, the exceptions being that calls to USER and GDI are provided via 32->16-bit thunks a-la Win32s.

Panther will not support mixed-mode applications, an application must be either 32-bit flat model, or 16-bit segmented. 16-bit application support is 100% compatible with Win 3.1 as all the 16-bit API continue to be implemented by enhanced versions of the Win 3.1 base DLLs. The 32-bit API will be a proper subset of the Windows NT Win32 API and will be a significant superset of the Win32s API (Currently under development in Haifa.) In addition to the improved performance and capacity provided by running on, and exploiting the capabilities of Cougar, significant functional enhancements to Win32s provided by Panther include:

- Thread Support
- Preemption between 32-bit threads
- Separate Address Spaces
- Memory Mapped Files
- Sparse Memory
- The Console API

Additional enhancements to the 32-bit API will remain compatible with Windows NT. The decision as to which additional API to add will be made through working with Windows ISVs to determine what minimum set is needed for them to write 32-bit Windows applications.

Rover(6/93)

Rover (aka Windows for Mobile Computing) is a direct derivative of the Cougar and Panther projects outlined above and will support the Windows API. Rover is focused on the items which are unique to the hardware and applications that will be built specifically for mobile (portable) computers. Among these issues are:

- Very small secondary storage devices

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- Solid-state secondary storage
- No-available swap media
- Intermittant connections to networks
- Wireless network support
- Small Displays
- Rotation of Displays
- Visuals for Hand-Held Computing
- Pen as primary input device
- Power Management
- Suspend/Resume and Instant-On
- Execute from ROM or flash RAM
- Deferred I/O

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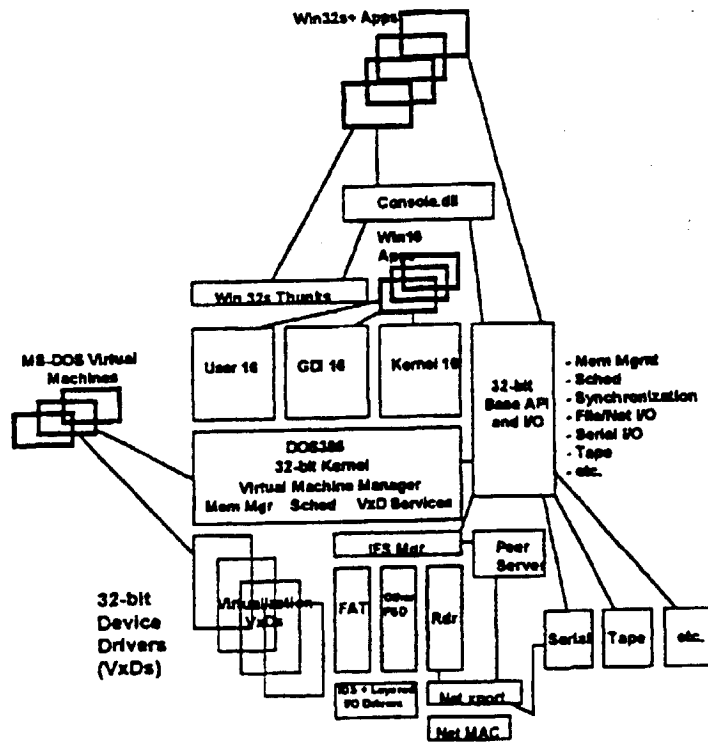
Jaguar/Cougar/Panther System Architecture

Cougar, Jaguar, and panther can best be described in terms of their evolution from DOS 5.0 and Windows.

Words to come... Mack

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1993 Product Objectives

The following is an initial pass. It will require significant refinement as our work progresses.

DOS

Current Situation

Pre-installation of MS operating systems on OEM hardware is fundamental to our business model and revenue stream. The overriding objective for MS-DOS is continued dominant share in OEM PC pre-installation. Also significant is MS-DOS upgrade revenue stream.

MS-DOS 5.0 continues to hold it's own, but it's grip is tenuous. Actual value in the form of new features, more available memory, and improved performance have sold nearly/over 2 million

verify with brad

copies of the MS-DOS 5.0 upgrade. xx% of PC OEMs currently sell MS-DOS with their new PCs. MS-DOS 5.0 has gained a reputation of being a safe reliable product and therefore has maintained a significant upgrade business over time.

Competition: DR/Novell

MS-DOS is currently under serious attack from DRI. They have made significant inroads in the retail marketplace and have had some minor successes in the OEM business. Their popularity appears to be based primarily on perceived value. DRI has bundled a number of utilities into their 6.0 release that an MS DOS user would have to purchase separately. By far the most significant of these is Disk Compression. Currently a number of MS-DOS OEMs are being forced to cut their own third-party deals with compression vendors in order to provide this feature to their users on systems which have small hard disks (primarily portables). Our OEM sales force is faced with questions about DRI and what we are doing to counter the perception that they provide a better value almost every day.

There are two paths which DR may take in the future to attempt to make further inroads into the desktop software business. They are not mutually exclusive:

Retail Treadmill

The approach here is to continue to come out with significant functional upgrades spaced closely together. This, if done correctly by DR, can give the perception of leadership, momentum, and value and could potentially put Microsoft in a catch-up position if we do not respond. Dangers of getting on such a treadmill are inflating COGs and support costs, hence reducing margins or forcing price increases to maintain margins - we are not yet sure how price sensitive the DOS upgrade market is. There is also a danger of confusing our customers with too many releases and getting them to start skipping releases. OEM and international channels may also suffer with the constant retooling/retranslating and inventory updates. That is not to say that we should not respond to DR, to ignore them would be to leave our flank undefended, only that our response must be well planned and well positioned to the various channels and customer bases.

Leverage the Network Stronghold of Novell

DRI is now wholly owned by Novell. This gives them a number of opportunities to leverage the install base, Value Added Reseller (VAR) network, and technologies of Novell to strengthen their product positioning. In the area of linking the two products, they are faced with a double-edged sword however. DR-DOS has thus far failed to gain general acceptance as a safe base for running Windows. Given that, any innovation which Novell makes which is only available to DR-DOS users, and as such is essentially unavailable to Windows users, it is unclear in a general sense, how far Novell will go to make enhancements which are only available when running DR DOS. There are some areas that seem obvious for them to enhance the DR-DOS/Netware combination:

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Network Install/Server Bundle

With their VAR and Corporate customer base, Novell can provide instant benefit, by providing operating system and network software updates which ship with the Server and install automatically across the network. Rumors of them including a00 DR-DOS licenses with each server are currently circulating.

Compression Across the Net

DR-DOS currently has (add-on) compression. Novell has talked about server-side compression. An obvious optimization would be to compress/decompress server-based files at the client side and effectively increase the communication bandwidth of the Server. The obvious optimizations for copy, xcopy, etc. to the server or between servers would also fall out of this.

Automated Backup

Client Software shipped with DR-DOS that can either backup locally or remotely to a Novell server. NLM at the server for centralized control of the backup process (setting workgroup backup policy etc.)

Security

Extending DR-DOS Security to include secure network logon.

Name Resolution

With the introduction of Netware 3.2 (supposedly this fall), Novell will have an enhanced distributed name service (directory). We should expect a version of DR-DOS in this timeframe that has enhancements to present access to the distributed namespace seamlessly. We were told about this some at their developers conference last month.

Network-Aware Graphical Shell

Provide information finding and browsing interfaces to the network, perhaps control of Multiple Virtual DOS Machines, integrated e-mail and scheduling are possibilities. It doesn't seem likely that they would try to establish a new GUI API, but the possibility cannot be ignored.

The difficult thing to divine in all of this, is exactly how much is Novell willing to buck the windows trend with enhancements that are specific to DR. Network revenues are their bread and butter, and to make features available to non-Windows users. The somewhat scary scenario this brings up, is that if I were in their shoes, I would build a complementary set of products:

- The Novell desktop for DR-DOS, and
- the Novell desktop for Windows (which would work on DR or MS-DOS.)

This would attempt to take the non-windows DOS market for all Novell users who do not want Windows applications, and to take control of the Windows user interface (Therefore the leverage towards establishing an object model and a distributed computing model) away from Microsoft. (I would do this in conjunction with Borland, to leverage Borland's object technologies and Novell's distributed systems technologies.)

Competition: IBM

IBM appears to be positioning OS/2 2.0 (among other things) as the successor to DOS, and the logical upgrade path for DOS users to follow. As most (non-Windows) DOS users do not have PCs that are well suited to running OS/2, this presents us with primarily an OEM challenge. It seems difficult to believe that many OEMs will be willing to bet their hardware strategy on an operating system which they are dependent on a competitor to deliver. The exception may be in the corporate MIS sales arena where special deals probably will be cut for selling non-IBM OEM systems with OS/2 2.0.

Strategy

Continue to Cement OEM Relations '92/'93

- Providedisk compression as soon as possible
- Further lower COGs
- Do not inflate support costs
- Continue to improve OEM and multilingual pre-installation

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- Maintain industry perception of quality leadership product
- Add network support?

Strengthen Retail Position '92, Leapfrog DRI

- Remove perception that DR DOS is better value
- Provide Disk Compression
- Anticipate and Pre-empt DR DOS 7.0
- Maintain MS-DOS 3 image of Safe and Reliable
- Leverage Sparta release

Strengthen Retail Position '93

- Provide significant end-user benefit in stand-alone upgrade
 - Usability
 - New Function
- Network ready
- Focus on hardware exploitation, ease of use, running Windows better

Leverage Tie to Windows

Advance Windows Shell

See below.

Windows

Current Situation

While it has yet to be seen, Windows 3.1 is expected to be a major success and to cement a leadership position for Microsoft in the movement away from the DOS command line to a GUI environment.

Need to get info on breakout of current user base (Home, Standalone business, workgroup, corporate, etc.)

Windows still suffers from a number of actual and perceived weaknesses which may inhibit its growth in a number of segments of the market:

- Difficult to install in a networked environment (esp. Novell)
- Unreliable and Unprotected (Still to be seen how 3.1 improves this perception.)
- DOS apps don't run well (3.1 improves this, Win app success makes it less of an issue.)
- User interface is non-intuitive (Better in 3.1, long way to go)
- Managing disks and data is difficult - still have to use DOS (true)
- Built on a crumbling 16-bit base (Essentially false architecturally, still major perception)

In addition to this, a number of windows applications threaten to establish Windows standards which are not in line with our strategic directions for User Interfaces, Object Technologies, and Workgroup/Enterprise computing:

With OS/2 2.0 claiming to have solved most of the problems listed above, we must move quickly to remove these perceptions.

Shell

- Norton Desktop for Windows
- Xerox Rooms

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Object Technologies

- Borland xxx
- OSF xxx
- Apple xxx

Need info from stevem

Workgroup/Enterprise Computing

- Lotus Notes
- Apple xxx
- OSF DCE
- Novell xxx

Strategy

Improve Networking Story

- Ship Sparta
- Ship integrated Netware client ASAP
- Ship NT LANMAN client with NT

Does NT have a peer-server story? How will the LANMAN server be shipped/priced?

Improve Robustness, Capacity, 32-bit Story

- Ship Win 3.1 (done)
- Ship Windows/NT product 1 in '92
- Ship Panther/Cougar and position as 32-bit Windows on 32-bit DOS in '93

Improve OO Story

Ship Cairo desktop on Panther/Cougar (OO interaction with shell)

- Ship Cairo/OLE2 OO API (I need to understand what this is better...Mack)

Improve Workgroup Story

- Bundle Bullert and Bandet with Sparta

- Need help from Stevem on what Cairo adds here

Windows/DOS 1993 and the 32-bit Question

Major issue here appears to be tradeoff between getting ISVs to write 32-bit applications (including MS apps.) which exploit new CPUs and help NT significantly vs. Size and schedule risk. We have a lot of work (Outlined in work list at end of DOC to quantify all of this.

Target Hardware

The following represents what we feel is a reasonable hardware platform to develop for for products released in CY 3Q '93. This is conservative vs. what we expect the standard volume retail machine to be at the time as it is important that we be able to achieve significant upgrade business as well as new machine sales.

The Windows Marketing guys have quite a bit of data about what kind of machines those who bought Windows 3.0 and who they expect to buy the 3.1 upgrade are using. This would be a good starting point from which to extrapolate.

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Standalone User

Boots the machine, runs applications, prints. May run serial communications, but as foreground application, and only app running.

Disk Space for System (System Files + SwapFile)

- Less than 20 Megabytes (Assumes 60 meg harddisk)

Boot and run 1 app acceptably

- 386 Sx 16
- 2 Meg F 4M
- VGA

Run Word and Excel Well (16-bit versions)

- 386 Sx 20
- 4 Meg RAM
- Super VGA or Equivalent

Power User Non-Networked

Expects Background I/O (printing, fax, disk, scanner, etc.) not affect what is being done in the foreground. Uses advanced peripherals such as fax, scanner, postscript printers, etc. Loads and runs multiple programs at once.

Workgroup User - Basic

Need current size of Winball components from Jofalu to estimate.

Workgroup User Advanced

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How big is Windows 3.1 ?

Everyone agrees that Windows 3.1 is a large and complicated operating environment yet no one seems to know exactly how large. This is partially due to the modularity of Windows which makes it difficult to come up with a meaningful 'size' estimate without a specific usage scenario.

The practical size of Windows depends on many factors including

- which modules need to be resident
- the resource requirement of the different modules
- the usage scenario

Component sizing

Thanks to Robwi and the rover team for much of the initial data here...

DOS

DOS occupies approximately 64 KB. An additional 20+ KB is required for device drivers, stacks etc.

WIN386

Win386 consists of the virtual machine manager (VMM) which includes the memory manager and scheduler and a set of installable virtual device drivers (VxDs) which help to virtualize the system. VxDs can provide services to other VxDs through a dynalink mechanism and to virtual machines through services provided by the VMM.

Usage : In Windows 3.1, all Win386 code is physically resident for the entire session. All Win386 code is 32-bit flat and runs at Ring 0. On a 4 MB machine, Win386 resident code and data requirements are approximately 225 KB and Win386 will dynamically allocate approximately 200 KB of fixed data structures for page tables, page management, translation buffers etc.

Static size :

This table shows the static size of some common WIN386 VxDs. Not all of these VxDs are required or loaded on all machines and some machines will have other VxDs loaded.

Component	Description	Resident Code	Resident Data
VMM	win386 core	48529	28800
BIOSXLAT	BIOS interrupt translation	960	107
BLOCKDEV	Block device driver support	1012	113
COMBUFF	Buffer COM I/O	858	168
DOSMGR	DOS translation and mgmt.	14082	3036
EBIOS	EBIOS support	101	77
INT13	Int 13 translation	668	724
PAGEFILE	paging file services	1600	464
PAGESWAP	demand paging support	2364	240
PARITY	parity NMI support	168	148
REBOOT	ctrl-alt-del support	1063	2024
SHELL	UI services for VxDs	13352	3931
V86MGR	V86 memory management	26176	4048
VCD	COM virtualization	2916	563
VDD\$14	display virtualization	25830	4216

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VDMAD	DMA virtualization	6676	996
VFD	floppy virtualization	336	105
VKD	keyboard virtualization	7609	940
VMCPD	math coprocessor support	398	92
VMD	mouse virtualization	2664	192
VMPOLL	idle detection	663	85
VNETBIOS	network BIOS support	2420	1312
VPICD	interrupt support	4805	2380
VPOWERD	power mgmt. support	323	77
VSD	PC speaker support	362	77
VTD	timer services	3080	280
WDCTRL	block device for WD controllers	1072	1021

USER

USER consists of several core components that allow a human user to interact with applications in a Windows graphical environment including the window manager, messaging system, mouse support, keyboard support and the standard UI controls.

Usage: USER is a 16 bit Dynamic Linked Library (DLL) which runs at Ring 3 in the system VM. Only 50 KBytes of USER is fixed (page locked) but applications generally utilize most of USER's features, so the memory impact of USER is normally significantly larger since USER has approximately 230 kbytes of code (but hardly any static data). USER allocates most objects from its own 64K heaps.

A good estimate of the size of USERs working set largely depends on system use and should be investigated under an acceptable scenario for portable machines.

Static size :

This table shows the static size of code and data for each part of USER. The table is loosely ordered by likely frequency of use and thus likelihood of residency.

Class	Description	Static Code	Static Data
Window Manager	Application/system window management	48340	20
Tasks and Applications	Task/application management and window association	6225	82
Messages	Message queue and message passing management	3908	0
System Parameters	System metrics, menu, and appearance management	13657	132
Input devices and display	Mice, keyboards, and displays management	3233	269
Menus	Menu bar, popup and pull-down menu management	21513	6
Dialog and Message boxes	Interactive communication with human users	15491	86
Clipboard	Graphical and text data transfer support	1939	0
Resources	Cursors, icons, and carets management	9183	0
Global data	USER private global data	23	1184
Helper	USER private utility functions	1437	0
Strings	US and foreign language string manipulation APIs	2237	0
Miscellaneous APIs	WinHelp and Drag/drop support and rectangle APIs	2917	0
Initialization	USER initialization functions	10505	87

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Controls	Buttons, Edit, Listboxes, and Scrollbars management	66444	37
Installable peripheral devices	Network, comm port, multimedia I/O device support	7511	241
Desktop	Desktop appearance management	4322	44
MDI	Multiple Document Interface support	8436	12

GDI

The Graphical Device Interface (GDI) is a Windows component that allows USER and Windows applications to perform output operations on displays and other graphical output devices, independently from the native format of the devices. The devices are represented by device contexts and their drawing surfaces. GDI co-operates with device drivers to produce graphical output by translating the output operations into device dependent forms so that the device drivers can perform the output operation and by simulating the operations which device drivers are incapable of. The behaviour of the operations and the appearance of the output is dictated by various GDI drawing tools and the configurable attributes of the device contexts.

Usage: GDI is a 16-bit Dynamic Linked Library (DLL) which runs at Ring 3 in the system VM. Approximately 30 KBytes of GDI is fixed however, practically, certain classes of fundamental objects (device contexts, bitmaps, fonts, brushes, rectangular regions) and operations (BitBlt, PatBlt, TextOut) which are constantly used by USER and applications should remain in physical memory at all times. The minimum code and fixed data size, then, is approximately 60kB.

GDI has approximately 200 kBytes of code and 60 kBytes of static data.

In addition to static memory, GDI allocates most objects from its own 64K heaps. Only large objects, such as large bitmaps, regions, palettes and fonts, are allocated from extra "global" memory. The estimate size of this portion largely depends on the system use and should be investigated under an acceptable scenario for portable machines but it is not uncommon to see 300 kBytes of global GDI objects on a system running the shell and no major applications.

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Static size :

This table shows the static size of code and data for each classes of GDI objects and graphical operations. The order of the classes also suggests the frequency of its usage, thus the likelihood of their residency.

Class	Description	Static Code	Static Data
Device Contexts	Output device representation	4058	30
Drawing surfaces and tools	Bitmaps, pen, brushes, and fonts management	7162	0
Fixed-size Fonts	Device, resource, and simulated bitmap fonts management	26553	560
Device Independent Bitmaps	Device Independent Bitmap (DIB) management	8646	0
Regions	Drawing surface's area management	4142	10
Transformation	Coordinate scaling and translation	2081	24
Graphical and Text Output	Graphical and Text output operations onto drawing surfaces	23339	194
Texts and Vector texts	Text attributes and vector text management	6989	2
Geometric drawing objects and output	Curves, lines, arcs, and polygons	12517	14
Helpers	GDI Private utility functions	3739	72
Miscellaneous APIs	LineDDA, MulDiv, ScanLR, etc.	1861	0
Initialization	GDI Initialization functions	3323	985
MetaFiles	GDI defer IO support	18186	62
Palettes	Drawing surface's color palettes management	4031	4
Scalable Fonts	TrueType fonts management and output operations	54587	5391
Printing/Spooling	Printing and spooler support	13658	262

KERNEL

The windows enhanced mode kernel is a 16 bit Ring 3 DLL which provides memory management and scheduling services for applications. The kernel has about 70 kBytes of static code and data about 50 kBytes of which is fixed.

Static size :

This table shows the static size of code and data for each part of Kernel. The table is not ordered.

Class	Description	Size
Global Mem Mgr	Heap mgr, allocation, compaction	9729
Local Mem Mgr.	heap mgr, allocation, compaction	6507
Handles, Atoms and other objects	handle mgr, atom mgr	923
Diagnostics, error handling	GP fault recovery, reboot, critical error support, validation	4372
DOS and IO	IO routines, Int 21 support, EMS support, DOS structures	5607
Scheduler, Module Mgmt	task scheduler, stacks, module mgr	4568
Static strings and data		3394
Loader	Module load, application load, load APIs, bootstrap, segment caching, openfile, fastboot, exe header loader, relocation code, segment allocation	22167

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Miscellaneous

useful string routines, interface to ini | 8154
files, winexec, DS fixup, resource mgr
support

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Current Windows/DOS in '93 Work Assignments

bobmu

List of features that will compel the apps group to move to 32 bits
(steven starting with patch/bobmu soon)

List of requirements that must be met before our apps group will
begin 32 bit work (may overlap with edward's tools stuff below)

EdwardJ/BobMu

OLE, DDE interop. Supposedly 16/32 bit interop of OLE and DDE are
being worked on, but I have not seen a complete design, running code,
dev and test plans yet - maybe they exist. Let's get a design
and program review together. and do we believe their plan.

edwardj

Tools. what do we need, what don't we have. for porting AND for
new development of 32 bit apps. for making an existing 16 bit app
32 bit and (then) win4 compat. for bringing our shell up on win32/s+.
(ScottC has started some of this work for win32s, touch base with
him)

Can we get macroman & object basic on this schedule, 32 bits

We need a plan for cbi for 32 bit apps

mackm/davidcol

win32s/s+ sizing, performance impact over 16 bit shell

what 16bit DLLs/subsystems does the 16 bit shell use in addition
to user and gdi.

what will performance, size, test impact be of using all of them
(incl user and gdi) under 32 bit shell; what should we do if they're
unacceptable.

we need more data on what our size constraint for the shell will be
such that it will run "well" in a 4MB system - working set and
linear space with say a 5 MB swap/page area (can restate this
as what's the case today, how much room will you give us,
how much should we rely on that if at all)

mack/steve

need to size (work, memory impact) of modifications to the DOS

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based (16 bit) USER to support enhanced visuals
old app evaluation (look, compatibility) testing setup

steve

so exactly how huge is the current cairo shell?

what should our international strategy be for 1993, Unicode is not a viable solution in this time frame...or is it?

What will we do for printing (touch base with lins when she gets back also of course davern)

What do we do about other 16 bit apis like mapi and odbc

applettes plan

what to do with:
ODBC
MAPI

all

(From Mack) We need to discuss productization. Is there a win4, win4 for work groups, win4 network extensions pack?

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