We thought it would be "fun" to spend part of the summer talking about operating systems. You know, the software that actually makes it possible for your computer to do the sorts of things you expect of it. The Encyclopedia of Computer Science (1976, First Edition, pg. 1003) defines an operating system as follows:

Basically, an operating system is the software (programs and data) that initiates the interaction of the electronic and electro-mechanical components of a computer so that they constitute a useful system for carrying out calculations [or other tasks].

So ... without an operating system of some sort, you wouldn't be able to use your computer!

Operating environments are not operating systems, per se. They make requests of the underlying operating system software rather than issue commands directly to system hardware. Graphical User Interfaces (GUIs) like Windows 95 and Linux are operating environments. The terms operating system and operating environment are frequently interchanged these days, however.

It would be impossible to talk about all computer operating systems/environments, there are thousands. So, we picked a few that we thought would be of interest to the campus community. They are OS/2 Warp, Windows 95 (Preview Edition), MacOS System 7.5.1, Linux, and Solaris.

"Operating systems" is a topic that can generate a lot of controversy. People have their preferences, and OS loyalty can get ugly. The cartoon on page 5 illustrates just how biased some people are about their operating system/environment. It can get ugly, but with a little understanding, we should all be able to get along.
UNT COMPUTING CENTER ORGANIZATION AND FACILITIES

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CONNECTING TO UNT COMPUTERS

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<th>Host System (OS)</th>
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All dialup lines use 8 data bits, No Parity and 1 Stop Bit

Academic Mainframe (CMS) vms.acs.unt.edu
Choose a host from the menu. If the host is not in the menu, type: telnet internet.address (substituting the correct Internet address).

Jove (UNIX) jove.acs.unt.edu
Some software and/or file transfer methods require you to disable the terminal server escape sequence, to do this, type: stty cts=none

Sol (UNIX) sol.acs.unt.edu
*To avoid long distance charges, do not dial a 1 before the metro line phone number. When dialing from outside the metro service area, please consider using the Denton local lines.

Gopher gopher.unt.edu login: gopher (Do not use this if you have an ID on Jove, Sol, CMS or Ponder)
To go to the telnet command prompt, press <CTRL J> Typing quit will close your session.

WWW www.unt.edu login: www (Do not use this if you have an ID on Jove, Sol, CMS or Ponder)
Etiquette for dialing up the UNT Host Systems:
Please do not "camp off" the dialups. There are more users trying to use the dial-up lines than there are phone lines. Please hang up when you are finished.

Ponder (Computer Sciences Sequential) ponder.cs.unt.edu

UNT Libraries' on-line catalog
library.unt.edu

UNIVERSITY OF NORTH TEXAS COMPUTER ACCESS AREA HOURS: Summer 1995

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Operating Systems

... Warp 3
... Engage!

By Faisal Islam, Student Records Data Systems Programmer (Islam@ce1.umi.edu)

The following are my opinions only, so please treat them as such.

I remember the day I dialed the 800 number to order the Beta 2 copy of OS/2 Warp. It was offered on either CD-ROMs or diskettes. I was especially interested in the latter because it came in 28 high quality 1.44 MB diskettes. I figured, for $14.95 (shipped to my door) that was a pretty good deal for diskettes. Testing OS/2 was the last thing on my mind. The diskettes arrived and the package sat unopened by my computer for a few days. Gosh, the saying about the cat and its curiosity is so true. In time, I found myself trying to install that thing on my computer. The sparse instructions said to insert the disk marked “Installation” into drive A: and turn the computer on. I did that and it chugged along. It asked for the next disk, I inserted that and it chugged along. Then the next disk and the one after that and the one after that... and then... BAM!!! For the first time in my life, I was looking at the fangs of an OS/2 error message. Yuck, UGLY! It was a SYSXXXX (X=a number) and some Greek. What the heck does it mean? The enclosed few pages of documents said nothing about this SYSwhatever. Eighteen hours, hundreds of phone calls, gallons of coffee, pounds of aspirin and many healthy doses of nicotine later my computer was running OS/2 Warp. So now that I conquered the beast, I could deinstall it and reformat those diskettes in peace. Little did I know that I had just embarked on a journey into the guts of a 32 bit multisking, multithreading, multihooked operating system for the Intel platform. My mission? To boldly go where no moron has gone before (apologies to ST TNG).

I started playing with Warp and reading up on it. It had a really attractive and comprehensive online tutorial and I checked that out. Things were quite similar to the Windows environment I was so accustomed to but at the same time so (for the lack of a better term) different. The GUI was nice. I especially liked the default color scheme of the teal background with purple titlebars. The right mouse button had a purpose, it did things. And goodness, this thing was so customizable. If I didn’t like the way something worked, I could change it to the way I wanted it, easily. Didn’t like the default fonts? No problem. Open the Font Palette, drag a font to the place I wanted the new font to display and drop it. Didn’t like a color? Open either the Mixed or the Solid Color Palette, drag my color of choice and drop it. It was smart enough to configure itself to the new settings and remember it. OS/2 gives an icon to everything. You just bang on the icon and it works. They call it an “object.” You can drag an object anywhere you want it to be. In a folder, on the desktop (they call this the Workplace Shell, WPS in short), to the shredder, to the printer, to the fax, you name it.

Drag-n-Drop
The concept of “drag-and-drop” can really spoil you. For example, I configured the spell-checker of the word processor as an object. When I want to check the spelling on the document I am working on, I don’t select the function from the menu. Instead,

I just drag the icon of the document and drop it on the Spell-Checker. I am instantly back to the editing mode while the document is being checked for spelling mistakes, in a totally different thread. Every time it finds a misspelled word, it pops up a window in the foreground with the offending word and a list of possible correct words, waiting for my response. Compare this to DOS. I would be waiting for the computer to finish checking the document — twiddling my thumbs. The same thing applies to printing, saving to disk, importing/exporting, repaginating, checking grammar, search/replace, you name it. The focus returns to you — the master — almost immediately. Be aware, that I am talking about native OS/2 software here, the ones designed to take advantage of these features of the OS.

Long Filenames
I got really attached to the long file names. Now I can name my file “First, final and only draft of the article on OS/2 Warp for Benchmarks” which includes mixed cases and spaces in the name. Compare this to the 8.3 DOS convention I was living with from the day I started working on computers. (Of course, this naming convention is not new, UNIX and Apple/Macintosh users have used this from way back when.) When I do a DIR on my data subdirectory from a command prompt, I know which file is what. I don’t need to remember what is in the file OS2D1BNC.MW2. The file-names can be 255 characters long, long enough for a brief summary of the contents. If I open up the icon view of the subdirectory (represented by a folder on the WPS) I see my beloved long filename there too.

HPFS/FAT
Most of you are familiar with FAT - File Allocation Table. This is a scheme of formatting the hard and floppy disks. OS/2 will install and run quite nicely on a FAT formatted hard disk. You will, however, find that OS/2’s own HPFS (High Performance File System) to be far superior than FAT. HPFS allows the
Long Filenames, is much more resistant to fragmentation of files, stores files more efficiently, and is quite a bit faster than FAT. You can install and run all your DOS/Windows software on a HPFS partition. (The DOS/Win software will have to adhere to the 8.3 file naming convention, though). Note that only hard drives can be formatted HPFS (I hear that the new ZIP drive by Iomega can also use HPFS if you "lock" the disks). Floppy disks are, unfortunately, still FAT.

**Different Versions — Red/Blue/Connect**

OS/2 Warp 3 comes in different packages. (Note, this is version 3, not 3.0). With this release, IBM went to great lengths to avoid the stigma of n.x nomenclature of software distribution. The next version, I’m assuming, will be Warp 4.) The box with the red spine does not have the Windows code but the box with the blue spine does. The red uses your existing Windows code to provide support for Windows software. Since IBM has to pay Microsoft a royalty on each copy of the Windows code it sells with OS/2, the price is quite a bit more for the blue box (also known as the Full-Pack). There is also an upgrade version of the Full-Pack, which upgrades the OS/2 code from version 2.1.x to 3, but uses (migrates) the Windows code from OS/2 2.1.x. This version is sold at the same price as the red. The Windows code used in the Full-Packs (known as WinOS/2) is almost the same as the code found in MS Windows 3.1.x sold by Microsoft. The only difference is that IBM decided to compile the source using their own compiler, giving the resulting code a 10% performance boost. IBM, however, did not clean the Windows code of its shortcomings. By the time you read this, Warp Connect will be out. This will add support for all the networking features missing in the “red” and “blue” Warp (TCP/IP, LAN Server, LANtastic, Windows for Workgroups, Windows/NT, Novell Netware, etc.). The Warp Connect will primarily be aimed at organizations that operate in a networked environment. This too, I hear, will have two flavors, one with the Windows code and the other without. The one with the Win/OS2 code is supposed to come out first. (Warp for the PowerPC is in beta at the time I am writing this. Knowing IBM, they will release the PowerPC computers before they finish work on Warp PPC, giving Win/NT a clear head start. Sigh).

**Backward Compatible With Most DOS/VIN Software**

Warp is backward compatible with most DOS and Windows software. IBM decided on this backward compatibility with last decade’s software so that both ISV’s (Independent Software Vendors, the people that write and sell software) and users alike will have ample time to catch-up with native OS/2 software. I say, “compatible with most” software because you will find a small number of packages that don’t run under Warp at all or don’t run well. Some DOS games make direct calls to parts of the computer and Warp, a protected mode operating system, will simply not allow that. Some Windows software that make use of undocumented “hooks” to the Windows code will also not run or run well under Warp. If you absolutely have to run these games and software, you can always boot to DOS via Boot Manager or Dual Boot (see the next column) and run them there.

**Warp “Enhances” DOS/Windows ?**

There is a misconception that you need DOS and Windows already installed in your computer to install OS/2 Warp, in other words, Warp is an add-on shell or utility of some sort. I don’t blame these folks for thinking that at all. Look at the front lower right hand corner of the red Warp box. Right by "Version 3" it says "Enhances Your Existing DOS and Windows." Excuse me? As Bubba User, who doesn’t know the difference between an "archaic 16-bit real-mode single-tasking operating system" and the "pudgy" graphical shell that sits on top of it, how on earth am I supposed to know that OS/2 Warp is a full fledged operating system on its own merit? Trust IBM Marketing to package Warp like this. Well let me tell you, Warp can be installed in a brand new computer that doesn’t have anything in its hard drive at all. Warp includes DOS support by default. Say you installed the "red" pack on your new computer. You will be able to run all native OS/2 software right away. If you installed DOS support, you have the capability of running almost all DOS software. If you want to run Windows software, you will have to install the Windows support. If you installed the red pack, you will need the Windows code sold by Microsoft. If you installed the blue pack, Windows support (in the form of Win/OS2) is already included.

**Boot Manager/Dual Boot**

Like other advanced operating systems, OS/2 includes the capability to allow the user to select the environment she wants to boot to. Warp includes two such utilities. By default, Warp installs “Dual Boot.” This allows the user to boot into either DOS or OS/2 depending on the environment she was in the last time she “shut down” the computer. Dual Boot, as the name implies, allows only two OSs to reside on your system and on the same partition of your hard drive. The other one is called “Boot Manager,” which allows more than two OSs to cohabit on your computer and gives you a menu at boot time to pick the environment you want to boot into. Boot Manager installs in its own 1MB partition. With Boot Manager you can have a partition for DOS, one for OS/2 Warp, one for Linux, one for Windows NT, and so on. Boot Manager is slightly more difficult to install and configure than Dual Boot, but is a whole lot more flexible.

**Multitasking/Multithreading**

The concept of multitasking and multithreading originated in the mainframe environment. Multitasking, as the name implies, is performing two or more tasks at the same time. There are two kinds of multitasking, cooperative
and preemptive. Under cooperative multitasking, each program is supposed to give up the control of the CPU after a certain amount of time. This is fine when you are running only well written applications. But in the real world, it is seldom the case. One misbehaving program can thus grab hold of the CPU and not let go of it, causing all other active programs to stop running. Microsoft Windows 3.1x and Macintosh System 7 use co-operative multitasking. Under preemptive multitasking, the operating system controls which program will get how much CPU time and when. Modern operating systems like OS/2, different flavors of UNIX, NEXTSTEP, etc. implement preemptive multitasking.

Multithreading is the concept of spawning child-processes under a parent-process, which will be treated as another independent task by the operating system. Let me give an example. I'm working on my 1000 plus page document (Titled “One surefire way to win big in Lotto - a loser's perspective”) on my native OS/2 word processor. I need to print this document on my printer, fax a copy of it to my publisher in Timbuktu, and save it on my hard drive. I start the save and it opens up a thread of its own, returning the control of the program to me in no time. I select print to printer, and it opens up two different threads (one to spool the document and the other to print it out), returning the control again to me in no time. Then I select print to fax (Note: the fax is configured as a printer and uses LPT3 on my machine) and it activates the fax software on yet another thread. I select the fax number of my publisher and press the ‘send’ button. I am back to my word processor instantly. Now my word processor is saving the file, printing it, and faxing it, all in individual and independent threads. This is multithreading.

I can now open my Drive A object and format the stack of diskettes that has been sitting on my desk for a few days. As I am formatting the disks in the background (mind you, without slowing down any other programs running on my machine), I remember that I need to back up my system. So I insert a blank tape in the attached tape drive and thump on the icon for GTAR (This is a port of GNU TAR, a UNIX program). The tape backup starts in the background and I hear the tape drive going through its see-saw motion. Now that my computer is taking care of business in the background, I decide to check out Galactic Civilizations, a 32 bit OS/2 game. This is multitasking. While playing a round of GalCivil I am thinking, WOW — this preemptive multitasking is so cool, why didn't I start this two years ago?

**Crash Protection**

What do you do when one of your active programs Trap under Warp (Windows users: read GPF? Most of the time, you just kill that program and chug along. (There are many ways to kill a program, but that is a topic for another time.) I have yet to find a released version of an OS/2 program to Trap on me (I'm not talking about beta stuff, but the real ones that you pick up the phone and call Indelible Blue or OS/2 Express and have delivered to your door in two business days). But it happens to me every time I run a certain word processing program on my machine (hey, no names here, I'm just trying to avoid a civil war on this campus, okay). So now that I know that I'll have to use this un-kosher bootware for a few more weeks, I just run it under its own VM (Virtual Machine). As far as that WP is concerned, it thinks it is the only program running on the computer. I have set its auto-save feature to activate every five minutes. So when it dies (and yes it dies), all I lose is a max of five minutes worth of work. And since it was running under OS/2 in a separate session, I just kill that VM and restart it again. Misbehaving DOS and Windows software can be run (you will have to configure it, though) in separate sessions, so when one goes down it leaves the rest of the system unscathed. In my DOS days, I'd have to
do the "three finger salute" (you know, the popular CONTROL[ALT][DEL] routine) when something died. Warp recovers gracefully from a crash. Crash protection under OS/2 is far from flawless, but it is the best I've seen on a PC so far.

Hardware Requirements

The box of OS/2 Warp lists the following as hardware requirements:

- Intel 386SX - compatible or higher based personal computer
- 4MB of random access memory (RAM)
- 35-55MB free hard disk space
- 1.44MB 3.5" diskette drive
- VGA video support
- IBM-compatible mouse
- An OS/2 compatible CD-ROM drive
- Multimedia-ready system for sound

Note to the unwarized. The above is the minimum requirement to load Warp on a computer. With a configuration like this you will be able to install Warp all right, but you will not be able to run much software without jumping through fire rings.

In my brief experience with OS/2 Warp, I have found that the amount of RAM in your system is more important than the speed of the processor. I would suggest at least 8MB of RAM. Warp starts to shine at 12MB and glow at 16MB and above. For the processor (CPU), I would suggest at least a 386DX/33; if you have a faster CPU, more power to you. Note that there isn't much difference in the performance between an SX and a DX processor as far as Warp is concerned. If you do a lot of numeric calculations or work with large graphic files, a DX CPU or a numeric co-processor is highly recommended. Otherwise, an SX processor will serve you just fine. The recommended disk space of 35-55MB is only to install Warp. You will need more space (the box says up to 30MB) to install some of the slick packages from the included BonusPak. The CD-ROM is required only if you want to install Warp from the CDs and want to use the CD-ROM for other things. Remember, Warp also comes in 1.44 disks for people like me that don't have a CD-ROM drive.

Subpar Hardware

You will hear a lot of people grumbling that Warp is hard to install and/or doesn't install on their computer at all. Others will say that something works fine under DOS but doesn't work under Warp. This is the result of either one or all of the following.

(a) They don't know how to because they didn't read the superb (sarcastic intended) manual that came with Warp.
(b) They have one or more hardware conflicts.
(c) They have sub-par hardware.

For (a) above, I suggest reading the manual. Things work differently under OS/2 than under DOS. Also OS/2 does a whole lot more than DOS. If you don't know how to work it, reading the manual is one way to find out.

For (b), you will be better off enlisting the help of somebody that knows hardware. DOS never cared if you share IRQs and DMAs (please don't ask me to explain these — I don't understand them much myself) between your modem, mouse and sound card for instance, but just try it with OS/2. It will have a cow. Under DOS, you can share these things because two or more programs are quite unlikely to access an equal number of devices that share the same interrupt at the same time. Not quite so in a multitasking environment like OS/2, where you are running two or more programs concurrently. Note that there is no easy way of finding which component is using which IRQ in your computer unless you open it up and compare the jumpers on the cards against their manuals. You can use the MSD program that comes with DOS to find out about the IRQs, but it will work only if you have a Plain Jane setup, MSD is good for ferreting out certain things, but I certainly don't use it for my IRQs anymore.

For (c), you will have to understand that OS/2 pushes your hardware to the extent that DOS never dreamed of. A lot of hardware manufacturers have been getting by, making stuff that does not quite conform to the specs they were supposed to. If you want to test your hardware, install OS/2. It will tell you right away if your computer has kosher components or not. One example is memory. A flawed SIMM module may work just fine under DOS for years, but it'll promptly give you an error (one of those ugly SYSSxxx errors) under OS/2 at bootup time. If you wanted to detect this flaw under DOS, you'd have to run some memory checking program for a few days in a row. So if you want to run Warp (or any advanced 32 bit OS for that matter), proper hardware is essential.

Virtual Memory

OS/2 uses a flat memory model, quite unlike DOS. It uses a file called "swapper.dat" on your hard drive to provide virtual memory. This is a dynamic file in that it changes its size whenever it needs to. If you are running more programs than you have physical memory for, OS/2 will actively page parts of the memory in and out of this file. It will expand in size accommodate the memory requests of your applications. When you exit some applications and OS/2 does not need to provide as much memory, it will shrink the size of "swapper.dat". It almost acts like a living being. On memory constrained systems (6MB or less RAM), "swapper.dat" gets quite a workout depending on what applications you are running. Hence people complain that OS/2 thrashes the hard drive. I've taken a computer with 64MB of physical RAM through its paces, and believe me, it hardly touched swapper.dat! OS/2 provides excellent memory management for itself and any application you wish to run on it. Gone are the days of a 64K limit and 16 bit memory addressing. With the 32 bit memory
Operating Systems

Windows 95 — Your Next Desktop Environment

By Chris Strauss, Computer Support Services Coordinator (Strauss@unt.edu)

The press remains full of speculation and rumor over the anticipated release of Windows 95. Microsoft continues to stand by its expected August 24 ship date, but no one is holding their breath. It will ship when it ships, won’t it? The real question for computer users at UNT should be, when does Windows 95 finally do the ship, what will that mean to us? A number of computer support people in the Computing Center and elsewhere around the campus have already been evaluating the various “final beta” versions (there are more than one) of Windows 95 for several months now. As one of those early beta users, I can tell you that you will “have to have it,” but also that it is not quite ready for prime time yet. Considering my two months of fairly intense Windows 95 use, four things appear to me to be clear already.

Interface

First, the interface has a significantly different feel from Windows 3.1, and there will be some transitional adjustment for every user who switches. Even my experienced helpdesk consultants had to get past the initial shock of not knowing where anything was, or how to operate it. Once you have made the adjustment, however, Windows 3.1 will feel clunky and antiquated by comparison. Even the applications feel different, since they use the standard Windows 95 dialog boxes for many routine functions. Macintosh users will not necessarily have an advantage, either, as the environment only appears to be similar at first glance. Many comparable functions, such as placing an alias on the desktop (called a “shortcut” in Windows 95), are actually much easier to do in Windows 95 than on a Macintosh. Concepts such as “folders” and long file names are very similar to the Macintosh, but other procedures are completely different, such as the massive increase in right-mouse button functions incorporated into Windows 95. Using the right-mouse click to pull up a functional menu is actually the preferred method of doing business, just about everywhere in Windows 95.

Some of the tools have changed significantly, too, with file manager being split up into Explorer (file and network functions) and My Computer (disk drive functions). The cumbersome Program Manager has disappeared behind a more efficient combination of desktop icons and a new “Start button” with its own cascading menus. You soon will find yourself taking shortcuts as a matter of course, such as putting an icon for your network printer on the desktop, dragging files to it to print from Explorer, and double-clicking on it to view the status of your print job in the printer queue. IMHO (in my humble opinion), the best part of Windows 95 is the task bar on the bottom of the screen. Every program you launch appears on the task bar, and

1 According to TIME Daily (http://www.timeinc.com/time) for Friday, July 14, 1995, Microsoft completed it’s “master golden code” for Windows 95 that day. TIME called it “the single most significant consumer event for the computer industry this year.” According to TIME, Microsoft will now manufacture 1 million copies of the program a week at 12 locations around the country to be ready for sales August 24. The Justice Department has still not decided whether to take steps to prevent Microsoft from selling Windows “95 with software for its imminent online service, the Microsoft Network. Stay Tuned!” — ED.

Please see Warp on page 10.
each can be minimized to the task bar. You then open a window to any running program by single clicking on the task bar. Although the old speed key combination to change between program windows still works, and has been improved to show everything that is running at once, you may find that the task bar works better for you. This is a good example of another characteristic of Windows 95; there are always several different ways to accomplish the same thing. The task bar will become even more significant when applications are re-written specifically for the Windows 95 interface. The Office 95 suite uses the taskbar to drag and drop selected items between applications without having to re-size those applications to adjacent areas of the screen. In fact, drag-and-drop works everywhere in the Windows 95 interface, the way you think it should have all along.

**Speed**

The second point I will make is that whatever you were doing in Windows, you will do it noticeably faster in Windows 95. All of the Windows applications we use now on campus run significantly faster in the Windows 95 full 32-bit environment, even if they are still 16-bit applications. Word, Excel, WordPerfect, and so on, all run faster than they do on the same machine under Windows 3.1. Much of this is due to the way Windows 95 makes use of 32-bit drivers for the hard disk, network and video cards, and file access. Many of the more inefficient parts of the old DOS-based “plumbing” have been replaced by the Windows 95 drivers. Internet applications in particular, operating over the Microsoft 32-bit TCP/IP stack instead of Trumpet Windows Socket, fairly scream in terms of data throughput. Only DOS applications stay pretty much unchanged. Running DOS apps in a DOS window is not noticeably faster, but you can run more of them, with better stability than before.

**Smooth Work Environment**

My third observation is that once users have made the transition to Windows 95, they will enjoy a smoother, easier to use, and significantly more robust work environment. By robust, I mean much harder to crash than the current Windows 3.1 system. Error recovery, even in the beta releases, is much better than in Windows 3.1. The few programs that have succeeded in locking up the beta have been ones that the vendor has admitted must be re-engineered to work properly with Windows 95. These include programs that go around the standard Windows 3.1 procedure calls to address your hardware directly, or that used some portion of DOS that Windows 95 has abandoned. In any case, the beta version of Windows 95 is in many ways already more stable than the production version of Windows 3.1. Where Windows 95 starts having problems is in communicating with NetWare, specifically NetWare 4.1 directory services; more on this in my fourth observation.

Using Windows 95 also means not running out of system memory resources every time you try to load another program. I have cluttered my test system up with three or four DOS sessions and even more active Windows applications before the response time slowed enough to notice, and then went on to run all day without incident. A key point is that all the network drivers, CD-ROM and sound drivers, and other memory resident programs you used to load in DOS before starting Windows are now loaded by Windows 95 into places where they do not significantly affect system resources. Programs I could not run under Windows 3.1 while my CD-ROM and sound card were active are running fine in Windows 95, with “conventional memory” to spare. Also, Windows 95 really is (finally) a multitasking environment. I am formatting disks with My Computer while writing this article. Do NOT try doing that in Windows 3.1; it is a complete waste of time. In Windows 95, there is only a slight slowdown to the other applications that is just barely noticeable.

**Windows 95 and NetWare**

My fourth observation is that the current beta versions of Windows 95 are not yet ready to operate properly on a NetWare 4.x campus like ours, one that is moving rapidly towards NDS (NetWare Directory Services) and NDS dependent software (GroupWise). It currently ignores all aspects of NDS and will not run the GroupWise clients. We do not expect this to be remedied until the Microsoft and Novell NetWare requester layers for Windows 95 are released this fall, opening the door from Windows 95 to NDS. Since a beta of the Microsoft NetWare requester for Windows NT is already out, this may come sooner instead of later. The Novell version will probably take longer (they have said it will come out 90 days after Windows 95 is released), but it will probably be a better choice for our NetWare-centric campus. Even with these limitations, Windows 95 is dramatically more network aware than any previous version, and has much better tools for navigating the campus local area networks. It will share drives and files under either Microsoft network or NetWare network protocols, although there are some pitfalls and limitations. Again, many of our networking concerns may be resolved when the NetWare requester products arrive. They will have to be before the widespread implementation of Windows 95 can be accomplished comfortably on our campus.

**Installation and Device Support**

One area I have not touched on yet is installation and device support. The installation program for Windows 95 really is as smart as they have advertised. It will go out on your machine and identify the network interface card, the CD-ROM and sound card, the video card, the modem, and usually gets them right on the first try. It is much, much more hardware and network aware “out of the box,” and in-
stalling it has been relatively easy when you realize that half of what it does required help from your network support staff in the past. Do not get me wrong; the support staff will still have a lot to do to get you set up with Windows 95 when we finally have all the pieces to implement it on campus. They will have to hand enter the TCP/IP information on your individual machines before you can use any of the Internet tools, and they will have to decide what file sharing modes you can use since one of them is rather troublesome on NetWare networks. What this does mean, however, is that getting your home machine upgraded to Windows 95 should be a lot easier than working with Windows 3.1 has been in the past.

SLIP and PPP Support

Another home-use issue that Windows 95 may go a long way to solve will be remote access to UNT computer systems. It has built-in SLIP and PPP support, and once we begin supporting PPP connections over our dial-ins it will offer users one more way of making that connection. It may be easier to use than the windows socket software we are testing now, but we will not be sure until we are able to test the production version.

Conclusion

To this observer, Windows 95 looks like it will be the desktop operating system you want on your machine by the end of the year. I certainly want it on mine. How fast we can implement it on campus depends on how rapidly we can resolve some outstanding networking issues. What is already clear is that Windows 95 is a far better work environment than Windows 3.1. Our previews of Office 95, the Microsoft applications suite for Windows 95, have also shown us that the 32-bit application software designed to exploit its features will be the software that you want to use. If for no other reason than that, there will be increasing pressure to move to Windows 95 as this year closes. Start thinking about it now.

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The New Face

By Jason Myre, Computer Support Specialist

Mac OS

The only shock users upgrading to system 7.5.1 might experience is the new face of the Macintosh Operating System. During the boot process of previous system versions, the user was greeted with a dialog box saying Welcome to Macintosh. You won’t see that tired-out box in system 7.5.1 and above. Apple replaced it with the new icon — shown above, left — representing their operating system, recently named Mac OS. The new symbol, based on the happy Macintosh face of old combined with a human-face profile, will make it easier for Macintosh users to identify whether a product is compatible with their computer, not unlike the Microsoft Windows icon. This is especially necessary since Power Computing introduced the first Macintosh clone in May. The Apple Macintosh is no longer the only computer on the market using the Mac OS.

OpenDoc: Component Software Architecture

No matter how good a program is, there is probably something more that you’d like it to do. But at the same time, it probably does things you’d never do. Apple has joined with IBM, Lotus, Adobe, and Novell to set standards for a customizable component software architecture called OpenDoc. With OpenDoc, to be released later this year, users access multiple part editors and services in a single Open Doc document. Not only does this mean you can combine parts from traditionally competing products and use them all together, but you can combine modules to take care of your word processor, spreadsheet, and graphics needs without shuffling through multiple applications.

Future...

The first major rewrite of the Macintosh Operating System promises many long awaited and badly needed improvements. A big criticism about system 7.5 is its memory requirements. Even if you run a clean system (with very few third-party extensions) it’s hard to get by with only 8 megabytes of RAM and expect to do much more than run one major application.

With system 8, code-name Copland, you can use the entire system, with all its bells and whistles, and have plenty of room left over for applications on 8 megabytes of RAM. You’ll also experience fewer crashes with Copland. In current versions of the Mac OS, its up to each program to cooperate and not steal allocated blocks of memory. With Copland’s protected memory, it’s less likely for applications to bump heads with each other and with the operating system. And because Copland is multi-threaded, if an application does crash, you can just reboot that application without disrupting processes like printing.

Copland addresses the growing networking needs with the a product they call OpenTransport. OpenTransport, the replacement for MacTCP, is currently released with the new PCI PowerMacs such as the Power Mac 9500, and soon released 8500 and 7500. It will be available for other Macintosh computers later this year. Currently it supports AppleTalk, Novell IPX, and TCP/IP. PPP and SLIP will not be supported at the time of OpenTransport’s initial release, but will be at a later date.

For more information on Copland, OpenDoc, OpenTransport, and other Macintosh related issues, check out the following WWW sites:
Operating Systems

- Apple Computer
  http://www.apple.com
- Mac OS
- Copland

Warp continued from page 7.

- IBM Works and Personal Information Manager — This is a suite of mini applications including a word processor, spreadsheet, database, report writer, charting program, calendar, monthly planner, appointment book, phone book, contact list, To Do list, and a notepad. The quality of this product is average and it has the capability to adequately serve the needs of home users. Business (power) users will find this package rather limiting. I have installed and used most of it quite often. A word of warning: this entire suite is a memory hog. On “memory challenged” systems it tends to slow down the computer as soon as you install it. One way to alleviate this problem is to run the “IWDREG.CMD” file. Don’t ask me how, but this will de-register IBM Works from the WPS and free up quite a bit of memory.

- FaxWorks for OS/2 — This is one of the winners in the BonusPak. The driver for this is installed as a printer driver and is assigned LPT3 by default. Although this is a “lite” version, it is a very capable piece of software. I just love the way I can drag a document icon and drop it on the FaxWorks icon to fax it and away goes the fax. Incoming faxes can be viewed, printed, archived for later reference — the works. I can upgrade to the “Pro” version for a small fee, but don’t really see the need for that.

- HyperACCESS Lite for OS/2 — This is a communication package that I haven’t installed. I have, however, heard from a lot of people that this is one of the lame applications in the Pak and IBM would do a lot better if they bundled either ZOC (Zap-O-Comm - a shareware package) or LiveWire (another shareware package) instead of this. One of these days I’ll install it and see if all these grumblings are justified or not.

- IBM Internet Access Kit (IAK) for OS/2 — Here IBM packed a powerful suite of applications to “surf the net.” The quality of the components range from superb to mediocre. The suite includes a mail program (send/receive E-mail), news reader for USENET, gopher, telnet, ftp, and WebExplorer (the Warp counterpart of NetScape/MOSAIC). I had it in my system for a little while to check out the service of a local ISP (independent service provider), the folks that sell you dial-up access to the net). I loved the WebExplorer and ftp on a borrowed 14.4 fax/modem (mine is a 24/96 dinosaur). Good things tend not to last for long, I really hated returning that 14.4. I was able to run multiple copies of WebExplorer to connect to different web sites simultaneously (while one window was loading I was reading another one and downloading a file from yet another one! Cool, huh?). If you use this package, you will have to subscribe to a service. You can choose between IBM’s Advantis or another ISP. IBM’s Advantis comes with a few hours of trial (free) time, after which you’ll have to pay IBM-grade price for the service. You can find a much better deal if you shop around.

- Multimedia Viewer — This is a manager/organizer/manipulator of multimedia stuff like audio, video, image, etc. I didn’t install this on my computer.

- Video IN for OS/2 — This is a video editing facility that allows you to make video clips for your word processor, spreadsheet, presentations, etc. I don’t have this installed on my computer.

- Person to Person — This is a work-group conferencing tool where you can hook up a total of eight computer users over a network of phone lines, LANs or ISDN and share thoughts and documents on a real-time basis. It has a “chalkboard” area where changes to the document can be made by any member and seen by everyone connected. It also allows file transfer between the connected machines. This package requires at least 8 MB RAM to operate, performance improves radically with more RAM.

- Systems Information Tool — This is supposed to tell all the secrets of your computer. It has known bugs and I don’t know if any update (CSD) has been issued for this yet. My friend’s Pentium 90 was detected as a 486DX2/66. He was quite upset because he thought his Pentium was a 486 in disguise. He, however, didn’t know about the bug at that time.

Launchpad

This is a program launching template that is new in Warp. It is a very customizable and attractive little tool. You can drag and drop all of your frequently used programs on the Launchpad. Then just click on the desired icon once (not even a double click) to start the program. The Launchpad can be configured to float to the top, to be in a horizontal or a vertical position, to start programs with double-clicks, etc. It has drawers that you can use to put more icons in. I just cannot imagine living without it.

Minimize To — Desktop, Viewer, Hide

One feature I like in Warp’s WPS is the options I have to manage the clutter on my desktop (screen). I can minimize all my background programs to an icon on the bottom of the desktop, just like the way Windows 3.1x does. I can also
Software Houses:
- Indelible Blue (*) — (800)776-8284
- OS/2 Express (*) — (800)OS2-KWIK
- MicroWarehouse — (800)367-7080
- EggHead Software — (800)EGG-HEAD
- Provantage — (800)336-1166
- Programmer’s Paradise — (800)445-7899
- CompUSA — (800)COMP-USA

(*) Exclusively for OS/2 stuff.

FTP Sites:
The following two are the main OS/2 archive sites on planet Earth.
- Hobbes: hobbes.nmsu.edu in the /os2 directory
- CD-ROM: ftp.cdrom.com in the /4/os2 directory

There are many more ftp sites around the world that mirror the above two for the most part. Whatever is uploaded in these minor sites quickly shows up on the two major ones. The best thing to do is to download the index file from the root directory to find what they have there. If you find anything interesting, just go back and grab it. Please remember to register any shareware that you like and use on a regular basis.

WWW SITES
I’ve found quite a few places on the World Wide Web that offer information on OS/2. Some of the places I like are
- The MIT OS/2 WWW Home Page http://www.mit.edu/8001/activities/os2/os2world.html
- The Berkeley OS/2 Home Page http://warp.eecs.berkeley.edu/os2
- Team OS/2 http://www.teamos2.org/
- PC Lab & Tune’s OS/2 Warp Internet Access Pages http://pclt.cis.yale.edu/pclt/winworld/os2.htm
- LEO’s OS/2 Archive http://www.leo.org/archive/os2/
- Jack Tan’s Web Page http://www.cen.uiuc.edu/~jt111635/os2/os2.html
- BMT Micro Shareware Catalog http://166.82.142.130/bmthtm/bm tmicro.htm

(Note: The World Wide Web is very dynamic. Some of the URL’s above may change from time to time.)

Easy Ports From UNIX, WIN95/NT
The internals of Warp are said to be quite similar to the internals of UNIX. Both are 32 bit preemptive multitasking multi-threading environments. There have been a lot of ports of software from the UNIX environment. I am using the port of Gnu tar, an archiving package on my computer. The resulting port is a command line OS/2 software that I use to backup/restore from an attached SCSI tape drive and/or diskettes. The source code of most 32 bit software is supposed to be transportable between operating systems. If an ISV writes software for Windows 95 or NT, for example, that can be easily ported to OS/2 and vice versa. This should facilitate the (decreasingly) anemic native OS/2 applications market.

New Developments
The market for suites for OS/2 is quite lucrative at this point. The lite suite made by Footprint is included with Warp as IBM Works (IBM made a deal with them). Then there is the Smart-Suite for OS/2 by Lotus. And that is all you can get right now.

But that is about to change. Star Division of Germany is working on another suite for OS/2 (to be called Star Office,
Operating Systems

maybe?). I've only seen their Star Writer2, the word processor in the suite. Its demo is on Hobbes, if you are interested. Rumor has it that a small startup company in Hartford, Connecticut is working on another suite. If this is true, they are being very tight-lipped about it.

A company named Mount Baker Software is working on an accounting package that will compete feature to feature with the industry leader Quicken (by Intuit). Maybe it is time for Intuit to release a native OS/2 version of Quicken.

On the word processor front, you have Ami Pro by Lotus, the word processing package in IBM Works, the orphaned WordPerfect, Clearlook, Describe, the up and coming Star Writer/2 and a few others not worth mentioning yet (I'm writing this article on one such package that's in beta. My lips are sealed, so can't say anything about it yet.)

In the database front, you have the "lite" database included with IBM Works, and the mighty DB2/2 by Big Blue him/her/itself. In my Programmer's Paradise Summer '95 catalog, I see ADABAS for OS/2 by Software AG. You also have OnCmd by Online Data, IBM's Watcom SQL, and R:Base by Microrim. I'm sure there are more that I don't know of.

For spreadsheets, we have Lotus 1-2-3, Mesu/2 (Mesa/2 by Athena was ported from NEXTSTEP) and the one included with IBM Works. I'm sure the suite from Star Division will include a spreadsheet package, but don't have any information on it yet.

Take a good look at the above sampling. What do you see? Yes, you are right, not a whole lot of native OS/2 software. What else do you see? Ah hah! You see the opportunity to make oodles of money! The OS/2 marketplace is not saturated like DOS/Windows. The installed user base is growing rapidly, and they are clamoring for good software. If you know how to write software, good stable ones that is, you can make some serious money here. Wanna take the gamble?

Games

I'm not much of a game enthusiast, but I really couldn't help noticing the developments occurring in this arena. There aren't many commercial games available for OS/2 yet, but watch out. By Christmas this year, or even before that, we will have some that will take the games market by a storm. Some of these games in development right now are making real good use of OS/2's multithreading, graphics and multimedia capabilities. I'm aware of two such games in the making by StarDock Systems. One is called Avarice and the other Entrepreneur. Knowing StarDock System's track record for producing quality software and games, these two games will certainly vie for my wallet.

Among others that are already out there and worth mentioning is SimCity Classic for OS/2. This was originally made by Maxis and is available in DOS, Windows, UNIX and the Macintosh platform. The OS/2 version was a port from UNIX. Another game worth mentioning is StarDock System's Galactic Civilizations. This is an original OS/2 game. I don't know if it is (or will ever be) available in other platforms.

There are quite a few shareware and freeware games available under OS/2 also. The quality of these games range from totally horrendous to dangerously addictive. Warp itself comes with some card and board games. Then you have the likes of Aquanaut, VPoker, Roids, HeliRescue and Trickle Down. Since my interest in computer games is very feeble, I haven't taken much time to evaluate these. Again, if you like and regularly use any of the shareware offerings, please remember to register it with the author. That way you not only encourage future developments and enhancements, but also in most cases, receive upgrades and additional modules for free. Besides, you have a clear conscience.

My Installation Escapades

Installing OS/2 is not for the faint of heart. You never know which included device driver will work and which will not. If something doesn't work, you will have to go hunting for the proper drivers and/or parameters, assuming you know how and where to find them. You may end up with a smooth-as-silk install or you may end up with the worst nightmare of your life. I had to wrestle with it on my computer quite a bit the first time I installed Warp. That was, however, a Beta copy loaded with high quality bugs. When I installed the released version, I already knew the pot-holes and was able to avoid them with no problem at all. In fact, I installed Warp three or four times on my system because I either wanted it on a different partition on my hard drive, or had to re-size the partitions to keep SWAPPER.DAT in a specific place, or wanted to reformat the partition from FAT to HDFS, or messed up my configuration so bad that reinstalling was the cheapest way out. Installing Warp was the best entertainment I never paid for.

Let Somebody Else Install it for You

Since then, I've installed Warp in a few other machines with mixed results. A few were quite, um, boring. Warp installed without much ado at all. On some others, I had to logon to some card-manufacturer's BBS and download the latest drivers and stuff, fiddled with the jumpers and dip-switches, cleaned the cobwebs inside the case, etc. One installation left me totally baffled. Warp couldn't agree with that hardware at all. Later, my friend told me that IBM Support gave up on it too. He took the copy of Warp back to Computer City for a full refund. He is still running DOS/Windows quite happily. So the moral is, if you are squeamish about wading through IRQ's, DMA's, COM ports, device drivers, BBS's, etc., find somebody with the expertise and patience who will be willing to do the dirty work for a six-pack of beer. Or
buy a computer with Warp pre-installed (see below).

**Vendors Pre-installing Warp**

IBM is finally getting manufacturers to pre-install Warp on some of the new computers they sell. This is excellent news for people buying new computers that want to run OS/2 Warp, but don’t want to go through the **adventure** of installing it. New computers from companies like Dell, Alarid, Compaq, Austin Direct, IBM PC Company (about time!), Toshiba, etc. are getting Warp pre-installed either as an option or by default. Rumor has it that AST, Compaq and Micron will also join the ranks. In Germany, Vobis and Escom, two major manufacturers, are exclusively pre-installing Warp on ALL their computers.

**Tweaking**

The default settings of Warp at installation are not always optimal. People try to blame this on IBM, but I don’t agree with them. The Warp engineers probably took the middle-of-the-road approach because of the myriad of PCs Warp will run on. No two PC’s are alike. After a short while, PC’s tend to take on the personality of their owners. So something that works great on my computer may not work the exact same way on my identical twin brother’s computer. Like OS/2, its users tend to be very demanding. Hence you find them tweaking their CONFIG.SYS to squeeze out that last dropper. There are two great tools to make tweaking a pleasurable experience. The first one is a freeware called CFGINFOx.ZIP. Look for it on your favorite BBS or ftp site. The second package from Clear & Simple is called Performance Plus. You can use either or both of these packages to boost the performance of your Warp machine.

**Shut Down**

Always remember to “Shut Down” your system when there is a thunderstorm in your area. You may also shut down your system after you are done working for the day. I prefer to shut down my machine only on inclement weather and when I am tweaking my system and have to reboot anyway. OS/2 uses a lot of temporary files and caches your memory and hard drive etc. So before you turn your computer off, please make sure you shut down your system. This flushes the caches, closes all temporary files, brushes its teeth, and does other house cleaning stuff before it goes to sleep. This is the way it was designed to work, don’t try to defeat it. It can bite real hard. If for some reason you have to power down without a proper shut down, make sure you run CHKDSK with the “F” parameter on all partitions on all hard disks in your computer BEFORE it boots up (do the ALT-F1 and < > when the white blob comes up on the upper left corner). It’ll take ages for CHKDSK to finish and hopefully it will clean up the mess left by open files, pointers, and the like.

**Conclusion**

I really like Warp. I have been using it for about a year now and am quite comfortable with it. I like the way it allows me to work on my computer doing more than one thing at the same time. I like its flexibility in accommodating my needs and am quite happy with it.

Once we have more ISV’s putting out some quality native software, its acceptance will grow among the general public. The looming release of Windows 95, hopefully, will be a strong incentive for IBM to release a more polished version of Warp with more neat features. IBM, however, needs to motivate more hardware and peripheral manufacturers to support Warp. It also needs to improve the installation routine and some of the underlying weaknesses (like the message queue — a topic for another time). Bubba, the average user, will not be inclined to put up with a user-unfriendly installation. He will ditch Warp and go elsewhere, resulting in a lost sale for IBM. They certainly have a good product on their hands — hopefully they also have the wisdom not to choke it with that red tape. Maybe IBM should send its OS/2 marketing team to Redmond, Washington for a training session or two.

What’s in it for you, you ask? Well, if you have a kosher computer that will be able to handle the pressures of OS/2 Warp and your needs have outgrown the limitations of DOS/Windows, why not give Warp a try? If it works for you, you will “operate at a higher level” for sure. If it doesn’t, you haven’t lost anything. If you are the programmer type and have some wild ideas, go ahead and write that killer app. If it is a good one and you market it right, make sure your bank has a vault large enough to hold all that money you will be raking in.

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**Operating System Information on the Web**

By Claudia Lynch, *Benchmarks* Editor ( Lynch@unt.edu)

Naturally, the World Wide Web is chock full of all kinds of interesting operating system stuff. Most of the articles in this issue have given you a list of places to look on the Web, FTP sites, etc. Besides those references, a real good place to start is at Yahoo. Yahoo has one whole page of links to operating system information (http://www.yahoo.com/Computers/Operating_Systems/).

If you are trying to make some purchasing decisions, a Canadian publication *The Computer Paper* (http://www.top.ca/TCMain.html) had an excellent series of articles called “Showdown at the OS Corral” in their March and April 1995 issues. Another helpful document in this regard is “OS/2 Warp vs. Windows95: a decision maker’s guide” (http://www.austin.ibm.com/psbinfo/ps2vschp.html).
Linux, an Operating Environment

By Darren Loher, former Computing Center employee

So many operating environments, so little time. Aren't operating environments, GUI's and modern operating systems, supposed to save you time? How do you choose which environment you want to work in? You could spend half your life just trying all of them out!

What is Linux?

Linux is a full fledged multi-user UNIX system that runs on IBM compatible PC's with a 386 or better processor. You can use it to learn UNIX and the X-Window GUI, develop programs, run a server, cruise the Internet, play games or all of the above.

Why use Linux?

Linux is UNIX. UNIX is a multitasking operating system along the lines of OS/2 or Windows NT. Unlike OS/2 or Windows NT, it is also a multi-user system and as such has security to control access to files and the rest of the system. It also comes with all the software you need to hook up to a TCP/IP network, whether it is by a dialup connection or a LAN connection. Linux is also easy to set up for the first time UNIX user. To make it easier to find the packages you want, the Linux slackware distribution is available. It's a compendium of software including the base operating system and numerous tools and applications. To top it all off, Linux is free. You can download the entire system from the Internet or purchase a set of CD-ROMs from a vendor.

UNIX Features

Linux is a complete UNIX clone for Intel 386/486/Pentium machines. It includes Emacs, X11R6 (the latest X-Windows system), gcc, TeX/LaTeX, groff, TCP/IP, SLIP, UUCP, the works.

X-Window

XFree86 is the standardized GUI that comes with the slackware distribution of Linux. It is a full featured implementation of the the X-Windwos system, X11R6. R6 (release 6) is the absolute latest implementation of X-Window. It's not uncommon for Linux to have the latest and greatest features out there since all the Linux developers are on the Internet. X-Windwos is a powerful and arcane GUI for the new user.

Development

Nearly all the GNU development tools are available for Linux. This includes C, C++, objective C, as well as other free packages like and XView toolkit, objective C and Tk/Tk. GNU is an organization of programmers that creates free software that is copyrighted under a special agreement detailed in the GNU Copyleft. This document essentially states that all material produced by GNU cannot be sold and must remain free. However, you can develop software with GNU tools and then sell the software you have developed. Many special conditions apply so you should read the copyleft document before you go about making your fortune.

Internet Tools

Loads of Internet tools exist for Linux. In addition to all the standard UNIX tools such as telnet, ping, traceroute, whois, sendmail and others. In addition, more user oriented tools are available like the widely used Netscape WWW browser. Also included in the slackware distribution are Pine and Elm; popular, easy to use UNIX E-mail programs.

Games

The wildly popular DOOM is available for Linux and, in fact, is a part of the slackware distribution. Also in the slackware distribution is a collection of the classic BSD games distribution and a couple of X-Windows games like connect 4, lunar lander, and an X-interface for GNO Chess. Netrek, a 16 player real time space battle game played over the Internet (virtual sport of the gods) is also available. Many more games are available on the Linux distribution sites listed on page 16.

Requirements for Linux

Since Linux can support many different configurations, there are many different system requirements. Below I've made a little list of the MINIMUM I would recommend to each class of user or developer.

- CPU RAM Hard Drive
- Bare minimum: 386sx16 2Mb 40Mb
- Regular user: 386DX33 8Mb 80Mb
- Power user: 486DX33 16Mb 200Mb
- Developer: 486DX2/66 16Mb 400Mb

Please see Linux on page 16.
Solaris: Environment or Operating System?

By Amos Gounix, Jove System Administrator (amos@unt.edu)

Back in January we upgraded Jove from a Solbourne 700 running a variation of SunOS 4.1.2 to a Sun SPARCserver 1000 running Solaris 2.4. The new operating system, Solaris 2.4, represents a radical departure to what we have been using in the past. So why the change? What’s different? What’s in store for the future?

OS or Environment?

First, a little clarification on names. SunSoft, a branch of Sun Microsystems Computer Corp. (SMCC), names their UNIX operating system SunOS. The Solaris operating environment includes SunOS, the OpenWindows windowing environment, the DeskSet tools, and the AnswerBook online documentation. Solaris 1.x contained SunOS 4.1.x, while Solaris 2.x contains SunOS 5.x. Typically, when folks say “Solaris,” they mean the Solaris 2.x/SunOS 5.x environment; and when they say “SunOS,” they mean the Solaris 1.x/SunOS 4.1.x environment.

Background

A brief digression might be helpful before discussing why Sun changed their operating system. Instead of wandering through the long, though interesting, history of how UNIX became what it is today, I’ll summarize by saying that two major schools developed. One camp was on the east coast at AT&T Bell Labs, the other was on the west coast at the University of California at Berkeley (UCB). Beginning in the early 1970s at AT&T, and then shortly thereafter at UCB, both sides developed their own version of UNIX, borrowing pieces from one another. The version of UNIX from AT&T eventually became known as System V. UCB developed a UNIX kernel that was packaged as the Berkeley Software Distribution (BSD). AT&T worked to make UNIX a commercial success, stressing the need to create open systems through the use of standards bodies, while UCB produced much of the innovation.

Early on, Sun based their UNIX on BSD. While developing SunOS 4.1.0, Sun and AT&T worked together to develop System V Release 4.0 (SVR4). Out of this venture, Sun gained such features as STREAMS and shared memory while AT&T gained NFS and XView. SunOS 4.1.0 also included some of the SVR4 commands and libraries, locating them in /usr/bin, /usr/include, and /usr/lib.

Sun recognized the need to improve portability across various UNIX platforms. Several other vendors, most notably IBM, HP, and SGI, had already adopted the System V specification. With this momentum, when these vendors get together to work on developing a common UNIX standard, it seemed natural to use System V as the basis for this standard. The document that was produced by this effort was informally known as Spec 1170.

Today, X/Open Co. Ltd. owns the UNIX® trademark, acquiring it from Novell, who acquired it from AT&T’s UNIX System Laboratories (USL). X/Open incorporated Spec 1170 into their definition of UNIX®. Now, a vendor must be certified as being compliant with these standards before X/Open will grant their use of the UNIX® trademark. Solaris 2.4 compiles with X/Open as well as POSIX 1003.1, POSIX 1003.2, and X11R5.

So, by adopting the System V standard, Sun brought their operating system into greater compliance with the UNIX market. However, Sun did not merely port SVR4 to the SPARC architecture. They enhanced SVR4 by adding a full symmetric multiprocessing and multithreaded kernel along with a scheduler that supports three run-time classes, including a real-time class. With threads, it is now possible to achieve a form of parallelism on machines with more than one processor.

Differences

Okay, so what all is different from SunOS 4.1.x and SunOS 5.x (remember, SunOS 5.x is contained in Solaris 2.x)? Well, basically SunOS 4.1.x was BSD with a little bit of SVR4 thrown in. Now, with SunOS 5.x it’s just the opposite: SVR4 with a little bit of BSD thrown in. Remnants of the old BSD system can now be found in /usr/ucb, /usr/ucbiinclude, and /usr/ucb/lib.

The Table on page 16, shows some of the differences in the most commonly used commands. The commands under the “New” column are located in /usr/bin and represent the SVR4 commands. The commands shown under the “Compatibility” column represent the pieces of the BSD compatibility package. And the commands under the “Old” column are the ones used in SunOS 4.1.x.

There is also a utility on Jove called whatnow. This is a package written at Sun that can be used to help track down differences in the new system. An example of its usage would be:

% whatnow ps

The whatnow(8) man page goes into all the details of this command.

Those wanting to use the BSD style commands may be tempted to put /usr/ucb first in their command path. However, this is not recommended. Putting /usr/ucb first in your path will cause problems when trying to compile programs. Furthermore, not all the commands in /usr/ucb are exactly as they were under SunOS 4.1.x.
A better solution would be to make aliases for specific commands in /usr/ucb that you would prefer to use. Below are two examples:

```
alias ls /usr/ucb/ls
alias du /usr/ucb/du
```

To preserve these aliases between logins, place the above commands in your .teshrc or .cshrc, depending on the shell you are using.

Sun also provides a Binary Compatibility Package which provides the ability to run executables on a SunOS 5. x machine that were compiled on a SunOS 4.1.x machine, provided they are "well behaved." According to Sun, an application is well behaved if it adheres to the following criteria:  

- must be dynamically linked
- must not access libkvm or /dev/kmem
- must not write directly to system files
- must not rely on customer-supplied drivers or ioctls
- must not trap directly into the kernel
- must use only publicized SunOS interfaces

Those attempting to compile BSD C code on Unix and other ACS systems can try using the command ucbec. This is simply a wrapper that makes certain to use the BSD header files and libraries. While this can save time in getting an application up and running, ultimately the better approach would be to port the code to use the SVR4/POSIX routines. Doing so will ensure the greatest portability in the future.

**Future Plans**

Speaking of the future, what is in store for future releases of Solaris? As it turns out, Solaris 2.5 is expected to be released at the beginning of 1996. The most noticeable feature to appear will be the Common DeskTop Environment (CDE). CDE is based on the

**The Table**

<table>
<thead>
<tr>
<th>New</th>
<th>Compatibility</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>ps -ef</td>
<td>/usr/ucb/ps -aux</td>
<td>ps -aux</td>
</tr>
<tr>
<td>du -k</td>
<td>/usr/ucb/du</td>
<td>du</td>
</tr>
<tr>
<td>ls -ls1</td>
<td>/usr/ucb/ls -ls</td>
<td>ls -ls</td>
</tr>
<tr>
<td>lp -d pr2</td>
<td>lpr -Prt</td>
<td>lpr -Prt</td>
</tr>
<tr>
<td>lpstat -o pr2</td>
<td>lpc -Prt</td>
<td>lpc -Prt</td>
</tr>
<tr>
<td>mailx3</td>
<td>/usr/ucb/mail, Mail</td>
<td>/usr/ucb/mail, Mail</td>
</tr>
<tr>
<td>cpio -H bar4</td>
<td>—</td>
<td>bar</td>
</tr>
</tbody>
</table>

¹Sizes shown in the first column are in 1/2 KByte blocks, not Bytes as previously.

²On the ACS UNIX servers, it is not necessary to specify the printer on the command line if a default printer has been defined using the 'printer' command at any time since getting an account.

³Not to be confused with the mail alias, which calls Pine, that is defined globally on the ACS UNIX servers, which still run Pine.

⁴`cpio -H bar` can only be used to read `bar` format media.

**Motif mwm window manager**

With features borrowed from HP/VUE and DeskSet tools from a variety of vendors, CDE provides a virtual desktop using the concept of rooms, each containing its own display layout or desktop. It's hoped that CDE will provide a consistent windowing interface across platforms. Solaris 2.5 will also support Access Control Lists (ACLs). ACLs provide greater flexibility with file permissions. It will be possible to grant access to specific users, instead of just groups or everyone on the system. There will also be support for the new UltraSPARC 64 bit processor. And, due to popular demand, additional BSD commands and system calls will be restored. We will write more on Solaris 2.5 as it becomes available.

**Bibliography**


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**Linux continued from page 14.**

The bare minimum setup is just barely a usable system, in my opinion. Smaller configurations are possible than even this bare minimum, but they are useful only in very specific applications, such as a (slow) router for a network, or a dialup terminal server. A more practical system setup that will support the X-Windows GUI and run several applications at once would have a 386DX 33 and 8Mb of RAM and an 80Mb hard drive. This configuration will support a regular user, and even development of small applications. For a serious development system I would recommend at least a 486DX33 with 16Mb of RAM and 200Mb of disk space at least. All the development tools can take up quite a bit of space. And with all the information, source code and programs you may find on the Internet to help you out, you can easily consume that 200Mb.
Operating Systems

Supported Hardware
In all cases the IBM PS/2 MCA (microchannel) bus is not supported. PCI, VESA Local Bus, EISA and ISA buses are all supported. Many common brands of ethernet cards, SCSI adapters and the SoundBlaster sound card are supported. It is beyond the scope of this document to list all these items individually, but complete lists may be found on the Linux Documentation Project homepage, which is listed below in the Support section of this document.

Of course, Pentiums are really nice, but they are definitely not required for any user configuration of Linux, but perhaps only for servers or serious developers. After a 486DX2/66, it's really a matter of user preference and how patient you are!

How to get Linux

- Via the 'Internet:
  - Ftp to ftp.cc.gatech.edu
  - Ftp to tsx.mit.edu
  - Ftp to sunsite.unc.edu
  - Ftp to ftp.phil.com

- Via a CD-ROM vendor:
  - Walnut Creek CD-ROM 1-800
  - Other CD-ROM vendor

Support
Because Linux was developed as a collaborative effort on the Internet, there's no better place to find information about it than the Internet. Guess what? It's free too.

- Linux Documentation Project (http://www.sunsite.unc.edu/mdw/index.htm)
- Resus Linux Information Server (http://www.resus.univ-mrs.fr/Us/CS/Linux/Linux.html)
- Linux Announcements (news:comp.os.Linux.announce)

New Mainframe Installed

By Dr. Philip Baczewski, Assistant Director of Academic Computing (baczewski@unt.edu)

In July, the UNT Computing Center installed a new IBM 9672/R51 mainframe computer. This system was acquired to support both the Administrative and Academic mainframe systems in separate partitions of the same machine. The new mainframe features IBM's latest technology. It uses redundant and easily configurable CMOS processors to provide the same power as previous monolithic mainframe architectures. These new processors have resulted in a mainframe that is reduced in size and power consumption, thereby saving the University in the areas of space and electricity.

According to Coy Hoggard, Senior Director, Administrative Computing Services, the new machine has been christened "Bubba Ray" in honor of outgoing chair of the IRC Dr. Ray vonDran [he has accepted a position at Syracuse University]. "Bubba Ray" was a nickname vonDran adopted upon moving to Texas from New Jersey.

As of July 15, all Administrative mainframe processing was running on Bubba Ray. Academic users are slated to move to the new machine starting around August 14. A one or two day period will be required to make the transition from VM/XA to VM/ESA, the latest version of the VM/CMS system. We expect to provide a more efficient and powerful VM system for the Fall semester.

Senior Director of Academic Computing Services Resigns, Interim Director Appointed

By Claudia Lynch, Benchmarks Editor (lynch@unt.edu)

Dr. Paul Gandel, Senior Director of Academic Computing Services, left UNT in July to accept the position of Associate Provost for Information and Instructional Technology at Ohio University. Paul came to the Computing Center in 1992 from AT&T Bell Labs in New Jersey. While at UNT, Paul presided over the formation of Support Services (the Helpdesk), the Interactive Learning Team (ILT), the campus-wide WAIS system and the Campus-wide Distance Learning Initiative.

Dr. Kandice Salamone Gandel, Paul's "better half," also left her position as an Institutional Research Analyst in the Office of University Planning and Analysis in July. Kandice will join the E.W. Scripps school of Journalism at Ohio University, where she will be an assistant professor. We wish them both well.

Dr. Maurice Leatherbury, Assistant Professor in the School of Library and Information Sciences here at UNT has been named Interim Director of Academic Computing Services. He will assume this position in early August. If you are interested in contacting Dr. Leatherbury, he can be reached at his LIS account (leatherb@lis.unt.edu) for the time being.
Staff Activities

Transitions
- Dr. Paul Gandel, Senior Director, Academic Computing. See article on preceding page for further details.
- Darren Lohrer, Data Communications Analyst, resigned to accept a position at Paracel in Dallas.
- David Young, a programmer in Mainframe Technical Services, accepted a similar position at UTA.
- Malathi Boddu, joined Support Services as a Helpdesk Consultant. She is a Computer Science major.
- Roland Wade, is also a new Helpdesk Consultant. Roland is currently working on an MBA, having recently graduated with a BS in BCIS.

Awards
- Cathy Hardy, Academic Database Consultant, was recognized as a Soaring Eagle at the Chancellor’s Sack Lunch, May 10.
- Sandy Burke, Computer Support Specialist, was presented with a Soaring Eagle afghan rug at the same Sack Lunch for all her hard work during the SACS study.

In the News
- Erik Neale made the front page of the “Today” section of the Dallas Morning News, Monday, June 26, 1995. His Homepage (http://lipsmac.acs.unt.edu/) was featured as an example of personal pages on the World Wide Web.

Helpdesk Expands Hours
Support Services has announced their new expanded hours: 7 a.m. to 7 p.m. Telephone support is available until 11 p.m. on weekdays and from 5-10 p.m. on Saturday and Sunday.

News From the CWIS/Gopher Hole

By Doug Bateman, CWIS Coordinator (dbateman@unt.edu)

This column covers features and resources available through the University’s Gopher Campus Wide Information System (CWIS). Gopher is available on various UNT host computers including the VAX, Sol, and Iove. It is also available in the General Access Labs and on various Novell file servers around campus.

A Homepage of One’s Own

I suppose that no matter what else was taking place in my area, the most important news to the majority of you reading this is the “opening up” of the UNT World Wide Web to serving personal homepages. If you haven’t heard about it before now, I’m very surprised. Yes, anyone who has an active account on Iove (our general-purpose UNIX host system) can now publish on the Web. Before I go into the details of how to do this, let me first lay out some of the ground rules.

Rules of the Road

Now before you go off saying to yourself, “Oh no, I knew there had to be catch!”, I want to assure everyone that as much concern and thought was put into this process as was humanly possible. At no time was any consideration given to making this opportunity “restrictive” by nature—quite the opposite as a matter of fact. Every attempt has been made to allow everyone the freedom to express his/her own individuality and creativity. Also, please make a note that there has been no attempt to single out student homepages—any reference to personal or individual web pages is without regard to that person’s status with the University.

The end result is that instead of me or the Computing Center or whoever coming up with new rules, regulations, etc. to govern the content of personal web pages, existing University policies and regulations regarding the printing or public dissemination or display of materials will be extended to cover individual web pages. Of course, policies that govern use of University computing resources naturally apply here as well. I won’t use this column to quote all the pertinent policies or regulations since they are freely available and many are included in either the student or employee handbooks we’ve all received or the graduate and undergraduate catalogs.

Let me add that neither I nor anyone that I work with has any intention of playing “Web cop” to enforce any of these policies or regulations. UNT already has in place adequate “grievance” procedures that can be used by anyone who takes issue with anything published or displayed on campus, no matter what form the material may take. So, what should you do if you should happen upon a web page (published at UNT by someone affiliated with the University) that you consider objectionable?

Your first action should be to contact the author of the web page to express your concerns directly. You’d be amazed at how unintentional some offenses are, and how cooperative people can be when their offense is called to their attention. If you are reluctant or unable to do this, or you have tried this without success, I offer myself...
General Information

as a mediator of sorts. You can contact me by phoning (817)565-2568, E-mail me at www@unt.edu, or drop by my office at Room 119, Information Sciences Building (ISB). I will discuss the matter with you, privately and confidentially, and may even attempt to convey your feelings to the individual myself. Ultimately, however, any issues of this nature will be between you and the individual concerned, which may involve your following formal grievance procedures.

If you are in the process of creating your own homepage, and have questions about whether something you want to publish may be offensive or objectionable, I would be glad to discuss the matter with you. I certainly do not consider myself the ultimate judge of good taste, but I do feel I can be reasonably objective and nonjudgmental and can provide sensible advice or guidance. Of course, you'd certainly be free to regard or disregard my advice as you saw fit.

How to Start

The following instructions are basically a rehash of the instructions that are available online on Jove. Just enter "help" at a Jove prompt and follow the menu to recall these instructions while you are online.

1 In your home directory, create a subdirectory named www. Note: this directory must be named www.
   % cd ENTER
   % mkdir www ENTER

2 Change your current working directory to the www directory you just created. This will be the directory in which you create your homepage and any supporting web pages you want to make.
   % cd www ENTER

3 Create an empty file named index.html. This file will ultimately become your homepage, but even an empty file is necessary in order to prevent a web browser from "seeing" everything in this directory.
   % touch index.html ENTER

4 Use your favorite text editor to edit the file index.html and create your homepage. That's it!

Guidelines for Personal Web Pages

I've written a web page that contains links to a lot of good material on the Web—material that teaches you how to write web pages, provide style guides, etc. You can find this information at http://www.unt.edu/~dhateman/links.html. I also teach a basic web-authoring workshop a few times each semester, one of several Computing Center Short Courses that are available. Here are some additional guidelines, based upon my own experiences:

- Keep the use of graphics to the minimum necessary to convey the information you want. A single inline image should not exceed 20-30k in size, and you shouldn't sprinkle images all over your page just because you can. People will quickly grow tired of how long it takes for your page to be displayed in their web browser if you disregard this.
- If you do want to use graphics, check out the collection available to everyone at http://www.unt.edu/icons/. No sense using up your Jove disk quota when you can "borrow" graphics from the server.
- Don't use Netscape's non-standard extensions to HTML unless you are deliberately limiting access to your page to only those people who use Netscape. The results displayed in another browser may be hideous!
- Be proud of your work—sign it. At the very bottom of your page you should put your E-mail address so people can easily send you comments. Depending on the information you are publishing, you might also put the date you last updated the information.

- Always keep in mind that the very nature of HTML is that ultimately the web browser determines the appearance of a web page, not the author. Don't try to force HTML to do what you think it ought to; the end results (to the person viewing your page) are usually not worth the effort.
- Do use this opportunity to tell "the world" a little about yourself. Include your likes and dislikes. Include your interests and hobbies. If you have collected a lot of information about a particular interest of yours, be sure to include it. And let people know about your homepage. There are a number of sites, newsgroups, etc. that encourage individuals to announce their homepages.
- For those of you who want to be on the cutting edge of web-authoring, I'm afraid you may find UNT's WWW site somewhat restrictive. Imagery maps should be supported by the time you read this, although there could always be an unintentional delay due to unforeseen circumstances. "Server-side includes" and locally executable CGI scripts are not available due to security concerns. Unfortunately, this means that HTML forms are not generally available since each form usually requires its own CGI script to process the form data. I will attempt to make generic CGI scripts available that those of you who wish to may use.
- As always, I am available for any questions, suggestions, or comments you may have. I hope that you make use of this opportunity and that it proves useful for you in some way. But most of all: Enjoy it!
The Network Connection

By Dr. Philip Baczewski, Assistant Director, Academic

This column is a continuing feature of Benchmarks intended to present news and information on various aspects of wide area networks.

WEB of Lists

Electronic mailing lists are still among the most popular of Internet services. Their numbers are continually on the increase which makes it more likely that there is a discussion list that you might be interested in, but less likely that you'll be able to find it. Fortunately, there are some new services that can help solve this problem. Several World Wide Web pages and Gopher sites are now available to search for electronic mailing list citations and browse their descriptions.

A Load of Lists

Mailing lists have been popular since the old BITNET days (ancient history, by computer standards) as a way to exchange information with others that share the same interest or profession. When there were only several hundred mailing lists, they were quite easy to find and to access. Now there are many thousands of these on-line discussion lists and finding one on a particular topic can be a daunting task. It is possible to get a list of all LISTSERV mailing lists by sending E-mail to any LISTSERV installation (like listserv@utarlvm1.uta.edu), with the command LISTSERV INSTALLATION as the body of the message. What you will get, however, is a 20,000-plus line file that itemizes over 6000 different lists. You can narrow this down by sending the command LISTSERV INSTALLATION /topic, where you replace topic with whatever word or string which reflects a subject that interests you. The downside to this technique, is that you receive very minimal information about the mailing list and browsing through the long listing can sometimes be quite tedious.

The World on the WEB

There are several World Wide Web pages that can help you find or quickly browse through collections of electronic mailing list citations. You can visit these by using a Web browser like Netscape or NCSA Mosaic. In Netscape, for example, use the 'Open Location' menu item to point your browser at the sites mentioned below.

The netspace LISTSERV

http://www.netspace.org/cgi-bin/lwgate/ is a page that provides an interactive interface to the LISTSERV that is installed at the Internet site, netspace.org. This LISTSERV maintains quite a few lists of its own and you can browse through the list and even subscribe through this WWW service. The Web-based subscription process is limited, however, to only those lists on the netspace LISTSERV. Another service of Netscape, however, is to allow you to get a list of LISTSERV lists mailed to you. The item, "Search for Other Mailing Lists" lets you request that a complete list of lists or a list narrowed by a substring search be mailed to you at a specified E-mail address. This page also points to documentation for using the popular mailing list software packages under the heading, "Info on Mailing List Software."

All the LISTSERV Lists

A more global collection of LISTSERV mailing list citations is found at http://www.tile.net/tile/listserv/.

You can see lists of mailing lists grouped by number of subscribers, first letter of the list name, archive policy, country of list origin, list membership policy, list server name or the sponsoring organization of the mailing list. You can also look at a complete collection sorted in a couple of different ways: by list description, by list name, or by the number of list subscribers. These are long listings, however, so you might want to browse the different groupings before selecting any of the sorted lists.

Another feature of this Web page is the ability to do a keyword search on the collection of mailing list citations. You'll find this to be a much quicker way to explore the breadth of LISTSERV mailing lists than the traditional E-mail LISTS GLOBAL query.

Scholarly Lists on Line

For quite some time, one resource that's been available to find mailing lists that has been a grouping of scholarly electronic mailing lists organized by subject. This collection, compiled by Diane Kovaks at Kent State University, was previously only available as a series of computer files. It has now come to the Web at the location: http://www.mid.net:80/KOVACS/. You can also access it via Gopher at the address, gopher://gopher.mid.net:7002. (You can use your Gopher client to see this information by pointing to gopher.mid.net using the port number 7002.) The Web page lets you view hierarchical lists of mailing list citations organized by subject or by alphabet. You can also search the collection by subject, keyword, list name, and other associated information.

Please see LISTS on page 22.
Minutes provided by Sue Ellen Richey, Recording Secretary

IRC Regular Voting Members: Ray von Dran, Library and Information Sciences (Chair); Cengiz Capan, College of Business; Carolyn Cunningham, Student Affairs; Paul Dworak, College of Music; Brian Foraman, UNTCH Information Resources Council; Chuck Fuller, Fiscal Affairs; Larry Gleeson, School of Visual Arts; Don Grose, Libraries; David Hartman, School of Community Services and School of Merchandising and Hospitality Management; Sam Mogill, UNTCH Director of Information Technology Services; Steve Miller, Administrative Affairs; Tom Newell, Telecommunications (Ex-officio); Don Palermo, Academic Administration; Jean Schaeke, College of Arts and Sciences; Paul Schlieve, College of Education; Ronald Sutcliffe, Graduate Student Council; John Todd, Faculty Senate; Virginia Wheelers, Associate Vice President and Director, University Planning and Institutional Research; Steve Williams, Undergraduate Student Association. IRC Ex-officio Nonvoting Members: Bill Buntain, Computing Center; Jim Curry, Microcomputer Maintenance Shop; Paul Gondel, Computing Center; Richard Harris, Computing Center; Coy Hoggard, Computing Center.

May 16, 1995

The Chair announced that his last meeting would be in June, since he has accepted a position as Dean of the School of Information Studies at Syracuse University.

Research Program Group

Dennis Mueller presented a report from the Research Program Group outlining how research needs at UNT might be met. The two proposals contained in the report are:

1. To enhance UNIX capability to meet centralized (host) academic computing needs with a $750,000 allocation for the purchase of a new machine; and

2. To meet needs not covered in the first proposal by allocating resources for Innovative Projects.

Discussion followed during which it was pointed out that most LAN Managers are familiar with UNIX systems, more so than with mainframe technology, for the purpose of helping users. It was mentioned that the proposal assumes that the College of Business would continue to use the mainframe for its curricular needs. Concern was expressed that the proposal does not take into consideration the needs of College of Education faculty researchers who do most of their work on PCs. Mueller explained that the solution being presented does not presume to try and meet everyone's needs by upgrading the UNIX system; that is why the second proposal was included. He feels that through the establishment of a fund for Innovative Projects, other non-UNIX research needs could be met.

Kathy Swigger moved that IRC rules of practice, which provide that action be taken on an item one month after it is presented, be waived. Virginia Wheelers seconded the motion. There was some concern expressed about voting on the proposal without having time to think about it and discuss it with others. On the other hand, there was concern about delaying a vote since that would mean a delay in HEAF allocation for any new purchase being recommended. A vote on the motion to waive the IRC rule was taken with 11 voting for and 3 against.

On behalf of the Research Program Group, Dennis Mueller presented Proposal 1 of the report to the IRC for a vote, the motion being to enhance UNIX capability to meet centralized (host) academic computing needs with a $750,000 allocation. The proposal was approved unanimously.

Discussion followed on the second proposal regarding the establishment of an Innovative Projects fund. It was suggested that the Program Group also address the issue of providing support for equipment and software purchased under research grants. Don Grose suggested a friendly amendment to Proposal 2 adding a dollar amount of $500,000. Dennis explained that Proposal 2 is intended to provide additional money in the Academic Computing budget; it does not preclude spending money on other projects already in existence on the campus. He further explained that the idea is to provide funds and some structure to solicit proposals from faculty who wish to apply for some of those funds.

Paul Dixon stated that he would like to see funds like this made available to faculty, but there needs to be further clarification of how this allocation would fit into the Provost's overall allocation of HEAF funds. He also suggested that this proposal needs the endorsement of other committees such as Faculty Senate.

A motion was passed to table Proposal 2 until the June 20th meeting.

Other Business

Since there was a question regarding the representation on the Council by members of the UPC who also repre-
sent a College, the Chair explained that the UPC had selected people to represent them on the Council, and so as not to enlarge the membership of the Council they chose people who were already on the IRC. Paul Dixon stated that he would like further clarification of this point from the UPC.

Dr. von Dran announced that the Alliance for Higher Education was again trying to sell its services to UNT. He charged the Instructional Program Group to prepare a memo to convince the Steering Committee and the President not to buy into their offer.

Richard Harris distributed a spreadsheet that outlined three views of the Computing Center’s HEAF budget. He explained that this is an attempt to put the first dollar figures with the strategies as proposed. He pointed out that the figures given in the first view are probably more money than can be allocated, but it shows what would be needed if everything was done. The second view shows each item funded in order of priority. The third view is funding by project. No action is needed on this at the present time; it was presented as an information item, and members are requested to provide input to Richard. Opportunity for further discussion will be given in the June meeting.

Richard also announced that it has been agreed to by the President to put the mainframe upgrade on the Board of Regents agenda.

General Information

List of the Month

Each month we will highlight one BITNET, Internet, or USENET Special Interest Group (SIG) mailing list. This month’s list...

WIN95-L — Windows 95 Give-and-Take Forum
Owners: Nathan Brindle (nathan@lssoft.com), Scott Ross (ross@primenet.com)
WIN95-L is an open, unmoderated give-and-take forum relating to Microsoft’s Windows 95 operating system. (WIN95-L is running on L-Soft’s LISTSERV TCP/IP Version 1.8b for Windows 95.)
Archives of WIN95-L mail items are kept in weekly files. You may obtain a list of files in the archives by sending the command INDEX WIN95-L in the body of E-mail to LISTSERV@WIN95.DC.LSOFT.COM.
To subscribe to WIN95-L send E-mail to listserv@win95.dc.lsoft.comm with the following message: subscribe WIN95-L Firstname Lastname substituting your own first and last names.

LISTS continued from page 20.

E-Journals and Magazines

Electronic journals and magazines have been around almost as long as electronic mailing lists. One Web-accessible collection of these can be found at the site, http://www.csi.uottawa.ca/info/mags.html. If you browse this page, you’ll find references to other on-line lists as well as a few direct references to on-line journals. By following some of these paths, you can access copies of some of the electronic publications.

The Web’s the Way

As the World Wide Web becomes more extensive, it is becoming a tool to organize a lot of information that has preexisted it on BITNET and the Internet. By knowing a few key references like those above, we can benefit from this new technology in order to access a more established information service. As more of these services are indexed by various Web sites, your access to information can only get easier to accomplish.

The Unabomber Gets a Web Page

The Unabomber has been stirring up such a fuss lately that TIME (http://timeinc.com/time) has dedicated a page to him/her/them. It can be accessed by connecting to the TIME homepage and searching for it, or you may be able to get to it via http://www.pathfinder.com/@@MNCrLAAAAAAA OkF/pathfinder/features/unabomber/index.html
Get a Subscription to *Benchmarks*

*Benchmarks* is a vital link between the UNT Computing Center and the users of our facilities. It is important for all users of the computing facilities to maintain a file of these newsletters because they contain materials that will periodically update existing documents as well as information and suggestions on uses of OS/MVS, CMS, Sol, Jove, Microcomputers, and other resources available to UNT students and faculty. To receive your ***FREE*** subscriptions to *Benchmarks*, send the following information to us either by snail mail (the post office or campus mail), FAX (817) 565-4060, or via the Internet or electronic mail, to lynch@unt.edu.

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