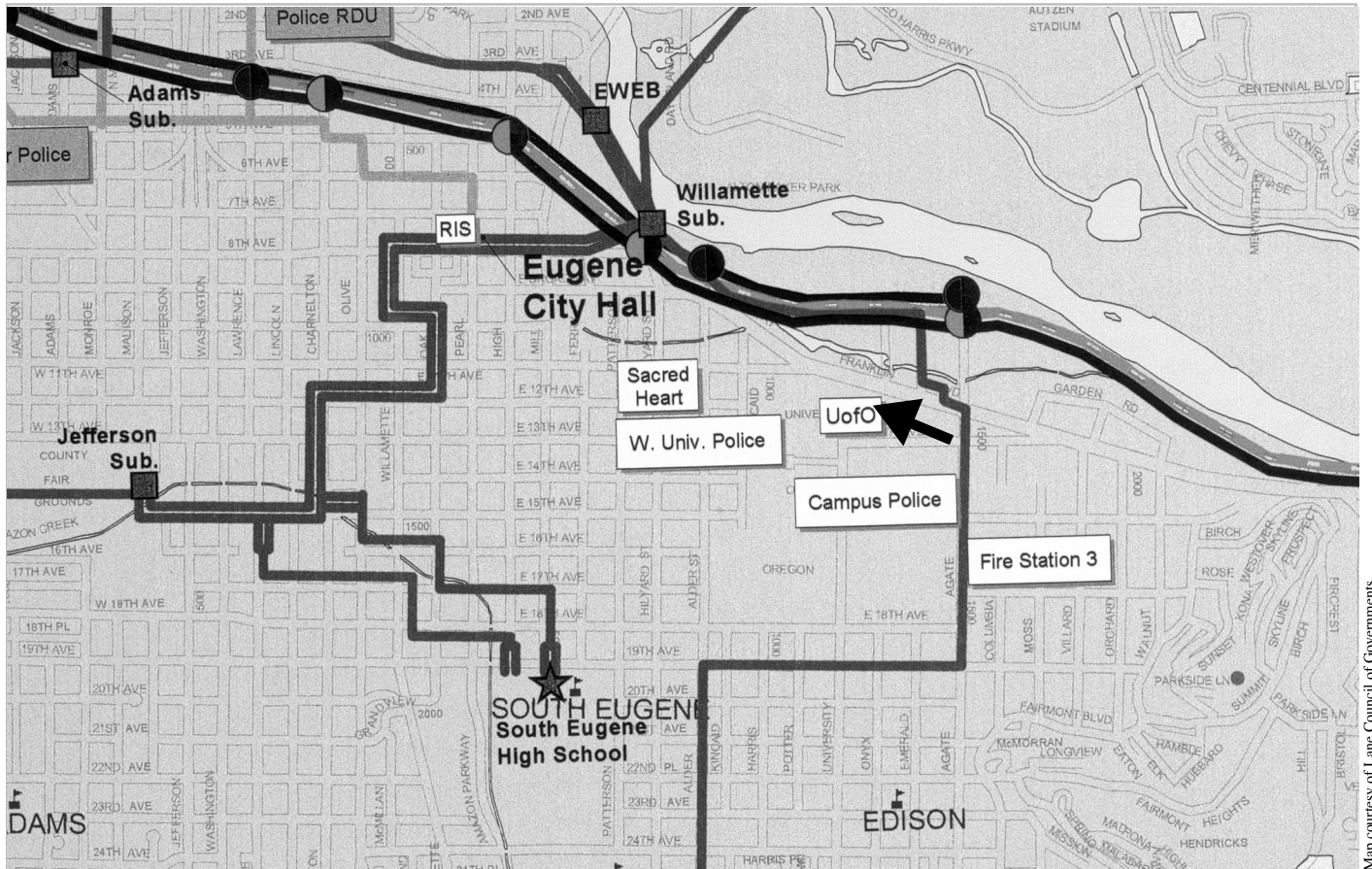


COMPUTING NEWS

SUMMER 2001



Map courtesy of Lane Council of Governments

Enlarged portion of a map showing fiber-optics networks in the Eugene-Springfield area. The UO switchroom (arrow) is the interconnection point for these networks. The complete map is available at <http://cc.uoregon.edu/fiber/>

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Docs Room Catalog Now Online

Now you can search the catalog anytime at
<http://docsrn.uoregon.edu>

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With its latest software upgrade, the Documents Room library catalog became web-accessible.

Anyone can now check the Documents Room catalog by author, title, keyword, or subject from any computer that is online.

The URL for the Docs Room catalog is <http://docsrn.uoregon.edu>

In addition to searching the catalog, you can place holds on library materials and check the status of your account over the web, using your Documents Room username and password.

Catalog password system. Catalog usernames and passwords are unique to the Documents Room system, so if you want to be able to use the online catalog to place holds or check your account status, ask for your username and password the next time you visit the Documents Room.

If you don't want to be bothered with

having to remember yet another name and password, you can simply email docsrn@oregon.uoregon.edu to request a hold on any item.

Note: You do *not* need a username and password to merely search the web catalog.

The Documents Room plans to have web access to the catalog available 24 hours a day, seven days a week, with short intermissions for backup each weekday around 5 pm.

You can visit the Documents Room on the ground level of Grayson Hall in Room 175. Call 346-4406 for more information.

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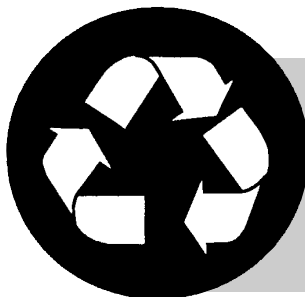
Support Dropped for Internal Software-based 'Winmodems'

As we noted in the Spring 2000 newsletter (see "Problems with WinModems, Some Older Modems" at <http://cc.uoregon.edu/cnews/spring2000/modemproblems.html>), we have found that certain internal modems can be very difficult to properly install and troubleshoot.

Because of these issues, Microcomputer Services staff will no longer be able to support or provide assistance for so-called Winmodems (modems which rely on the host CPU or host software to function, and which typically are targeted to work only with selected versions of Windows 95 or 98).

If you are purchasing a modem identified as "Windows only," it's very likely a software-based modem—one that we will not be supporting.

When purchasing a modem, your best bet is almost always to buy a name-brand external modem from a reputable vendor. If you have further questions about modems, contact Microcomputer Services (microhelp@oregon.uoregon.edu, 346-4412). You'll also find pertinent information on the "Buying Networking Hardware and Software" page of their website at <http://micro.uoregon.edu/buyersguide/buyingnetstuff.html#Modems>



Got Extras?

We can always use extra copies of *Computing News*. If your campus department receives surplus copies, you may return them to the UO Computing Center for redistribution.

Local Fiber Initiatives: What's in Store for the Metro Area?

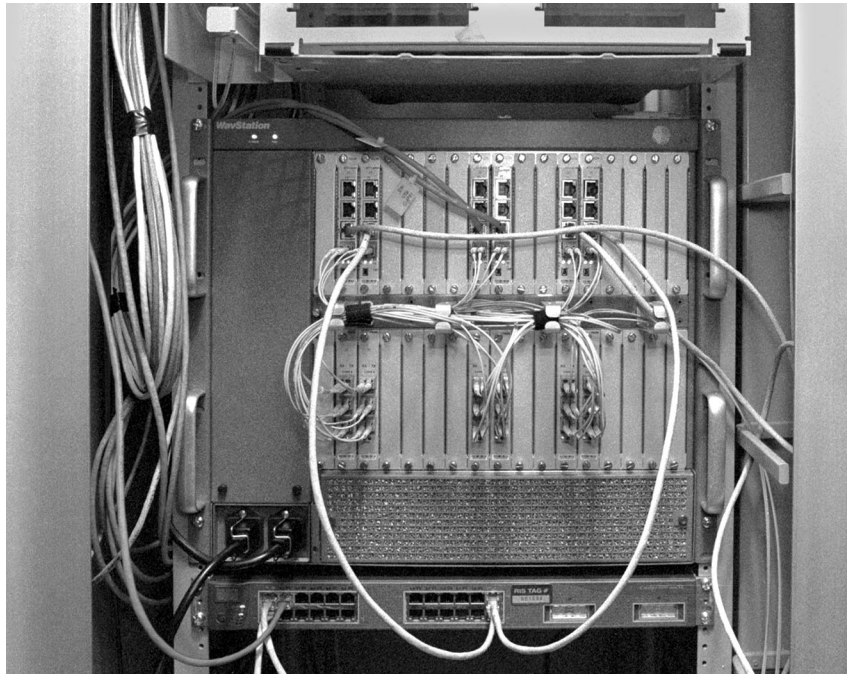
A quick overview of fiber-optic communications resources in Eugene-Springfield

Joyce Winslow
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As demand for Internet connectivity increases, public agencies and local municipalities are accelerating efforts to deploy fiber to meet that need.

In the Eugene-Springfield area, the University of Oregon and other agencies have purchased and installed their own fiber to replace the leased high-speed phone lines. In addition to the UO, the consortium includes the City of Eugene, the Springfield Utility Board (SUB), the Eugene Water and Electric Board (EWEB), the Lane Transit District (LTD), Lane County, the Lane Council of Governments, and the 4J School District.

To better serve the community, these agencies have created a cooperative network called PANet (Public Agency Network) to share fiber resources. Thanks to PANet's efforts, a very high-speed LuxN DWDM (dense wave division multiplexing) network running



LuxN's DWDM network box in the UO switchroom. This very high-speed network connects the UO, 4J, LTD, the Lane Council of Governments, EWEB, and the Springfield Utility Board.

at gigabit ethernet speed, is now available. This network sends colors of light over two fibers, connecting downtown Eugene, 4J, LTD, the UO, and the City of Springfield.

Future projects. EWEB is currently working on a plan to expand its existing 70-mile fiber-optic network to pro-

vide ultra-high-speed universal commercial services to Eugene businesses and homes over the next decade. The proposed network, called "MetroNet," would transmit large volumes of information at speeds 100 to 1000 times faster than those of most commercial telecommunications networks today.

Sony Donates Technical Equipment and Services to UO

Thanks to the generosity of Sony Disc Manufacturing in Springfield, next fall's Duckware CD will be manufactured without charge. The Duckware CD is designed and distributed each year by the Computing Center and contains valuable software and networking tools for UO students, faculty, and staff.

Other Sony beneficiaries include the UO Library, the Bach Festival, the School of Music, the Erb Memorial Union, and the Multimedia Design Program. Both the Library and the School of Music will receive technical equipment. The School of Music will also benefit from Sony's manufacturing services to produce a recruiting CD, while the Bach Festival will receive not only a \$10,000 sponsorship for the Youth Choral Academy, but free digital authoring and CD-replication services.

Sony is also setting aside \$12,000 to fund technical internships for UO students.

Thank you, Sony!

New System Stops Trojan Horses at the Gate

To reduce the number of Trojan Horse infections spread via email attachments, the Computing Center has begun blocking email-delivered Vbs scripts

Patrick Chinn

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Like the treacherous steed in Greek mythology, Trojan Horse viruses are most often cleverly disguised. They frequently appear to be innocuous, such as applications found on the Internet or attachments to email messages.

The best known Trojan Horse is "ILoveYou," also known as "Melissa," which began infecting Windows systems on May 5, 2000 (these Trojan Horse viruses have no effect on computers running an operating system other than Windows). Since then, virus investigators have detected over 72 variants of "ILoveYou" alone.

To counter this threat, the Computing Center has implemented a new Vbs

script block on Oregon, Darkwing, and Gladstone that checks the file names of email attachments. If the file attachment is of a type that could cause an infection, the system adds the suffix ".txt" to the name. The attachments are not otherwise altered in any way, and this precaution prevents most inadvertent infections on Windows machines.

If you wish, you can restore an email attachment to its original state by simply removing the ".txt" that was added to the end of the file name. But if you choose to do this, be careful! Before making such changes, we recommend you verify that the sender intentionally sent the email message and attachment to you.

File attachments affected by this system end with one of the following filename extensions: **.dll, .exe, .hta, .js, .pif, .shs, .vbe, .wsf and .wsh.**

On some Windows machines, the complete filename extension may not be displayed. To display full filename extensions, double-click "My Computer," select "Tools" and "Folder Options" and click the "View" tab. In the list, uncheck the option that states, "Hide file extensions for known file types." Click "Okay" to save changes.

Watch for Windows 2000 Index Server Vulnerability

Last May, Microsoft acknowledged a serious flaw in its Windows 2000 server software that exposes any system running both Windows 2000 and Microsoft's Internet Information Services (IIS) 5.0 server to malicious hacking.

Because of a coding error in an extension that implements the Internet Printing protocol, a hacker may take full control of a vulnerable system. Windows 2000, Windows 2000 Advanced Server, and Windows 2000 Datacenter are all affected.

Security bulletins about this problem are available at

<http://www.microsoft.com/technet/security/bulletin/MS01-023.asp>

<http://www.microsoft.com/technet/security/bulletin/MS01-025.asp>

<http://www.microsoft.com/technet/security/bulletin/MS01-026.asp>

You'll find the patch at

<http://www.microsoft.com/downloads/Release.asp?ReleaseID=29321>

Service administrators wishing to ensure their servers are up-to-date on all security measures should check

<http://www.microsoft.com/downloads/Release.asp?ReleaseID=24168>

OREGON Email Glitch Underscores Potential Problems of Mass Mailings

Early last May, OREGON's email queues slowed to a crawl due to a mass mailing by a campus user. Approximately 5,000 backlogged messages, including many additional entries resulting from messages being bounced back to the sender for having exceeded message size and quotas on other systems, clogged OREGON's email queues for several hours until systems analysts could clear up the problem.

This episode underscores the importance of using mass-mailing capabilities judiciously, as outlined in the article "Getting Your Message Out Via Email" on page 18 of the Spring 2001 *Computing News*. This article is also online at <http://cc.uoregon.edu/cnews/spring2001/massmail.html>

Computing Center Gets Major Facelift

When construction is complete, the renovated building will be lighter and airier, and staff offices will be more accessible to the public

Lynn Buffing

lbuffing@oregon.uoregon.edu

Look for some radical changes in the Computing Center this fall.

Last month, workers began demolition and reconstruction for a major remodeling project on the Computing Center building. When the dust settles in August and all the new windows and skylights are in place, the renovated building will be lighter and airier. Staff offices will not only be more accessible to the public, they will gleam with new paint and carpeting. In addition, Scanning Services will have a new home in Room 104, making way for an expanded machine room.

This facelift is long overdue. When the Computing Center was built in 1966, computing was oriented toward large machines and punch card data, and little thought was given to the staff associated with those functions.

Four years later, a second floor was added to accommodate office space and growth in administrative and academic computing, but this space, too, has long been outgrown.

Until recently, the 13,525 square foot facility also housed the Microcomputer Support Center, the Documents Room Library, the

Electronics Shop, and the VMS/Banner/Unix account service group. When these services and staff offices moved to Grayson Hall last summer, focus shifted to upgrading the Computing Center building itself.

University Planning, Facilities Services, and Robertson, Sherwood Architects assisted with setting priorities and establishing a plan of action.

If you have any questions about this project, please contact Lynn Buffing (*lbuffing@oregon.uoregon.edu*).



The west hallway on the first floor, shown here in the early stages of remodeling.



A worker plasters a wall of one of the new Facilities Services offices on the first floor.

UO Members Participate in Network

Hervey Allen
hervey@nsrc.org

Last May, the African Network Operators Group (AfNOG) held its second annual meeting and educational workshop in Accra, Ghana.

A forum for technical coordination and cooperation among African Internet Service Providers and academic/research network engineers, AfNOG developed during last year's inaugural training workshop in Cape Town, South Africa. The Network Startup Resource Center (NSRC), which is based at the UO Computing Center, helped facilitate its creation.

This year, NSRC and UO Computing Center staff collaborated with several friends and colleagues from Ghana,

Togo, Kenya, Gambia, South Africa, England, and the Netherlands to organize and teach two technical tracks at the one-week training session. The 47 workshop participants came from Ghana, Togo, Nigeria, the Democratic Republic of the Congo, Kenya, Uganda, Niger, Mauritius, Ethiopia, Gambia, Cameroon, Sudan, Eritrea, and Burundi.

NSRC/UO staff who took part in this year's activities in Ghana included Hervey Allen, Randy Bush, Steve Huter, and Joel Jaeggli. Other Computing Center staff members also provided logistical support and assisted in developing the workshop curriculum.

The workshop sought to achieve three main goals:

1. To train a critical mass of network engineers in Africa who are expanding the backbone infrastructure on

the continent so they may share their expertise with others in their home countries

2. To encourage African network operators to share their experience and knowledge in the region

3. To freely share contacts and information sources that will assist the process of national development, using international Internet connections

The workshop was followed by a day of presentations on a variety of topics, including how to deploy wireless networking technology and establish local Internet exchange points. Speakers also discussed IP address issues and gave updates on the state of the Internet in various countries on the continent.

The events in Ghana concluded with an AfriNIC meeting that was part of



digital photo by Steve Huter

Track 2 instructor Adiel Akplogan makes a point about routing and infrastructure to (seated, left to right) Dr. Harouna Naroua (Abdou Moumouni University, Nigeria) and Ola Abraham (African Regional Centre for Space Science and Technology Education, Nigeria)

Training Workshop in West Africa



A publicity banner for AfNOG spans the exterior wall of the Miklin Hotel in East Legon. Nancy Dotse coordinated the local hosts to help welcome the workshop staff and instructors to the Miklin.

digital photo by Steve Huter

the ongoing process to establish an African IP address registry, a Local Internet Registries (LIR) Training Course taught by the RIPE Network Coordination Centre, and a one-day AftLD forum to discuss issues relevant to African country code Top Level Domains (ccTLDs).

The Network Computer Systems technical team, led by William Tevie and Ayitey Bulley, coordinated the setup of the classroom labs and infrastructure for the workshop and subsequent meetings. Ghana Telecom donated network connectivity and provisioned dual 128K ISDN lines to give a 256K connection from the Miklin Hotel to the Internet.

The workshop was split into two separate tracks that were held Monday through Friday and offered morning, afternoon, and evening sessions. Track 1, which was aimed at technical staff who already provide TCP/IP-based services to a growing body of users, focused on the provision of scalable Internet services.

Track 2 participants were engineers who operate wide-area TCP/IP networks with international and/or multiprovider connectivity. These workshops centered around configuring and operating large-scale backbones, and covered such topics as OSPF and BGP routing, as well as how to manage router configurations, design Network Operations Center facilities,

and establish peering and exchange points.

Brian Longwe of Nairobi, Kenya, led Track 2 this year. His goal was to give the students maximum hands-on experience, and he credited the NSRC and Computing Center staff with making this possible. "Through the efforts of the NSRC and UO Computing Center," Brian noted, "it was possible to secure enough equipment for both tracks as well as the connectivity infrastructure for the workshop and con-

Sponsor Support

Many individuals and organizations from all over the world played a part in the success of this year's workshops. The NSRC, with the support of a National Science Foundation grant, coordinated numerous in-kind contributions and donor support from high-tech corporations, publishing houses, and public and private networks.

All workshop participants received a generous supply of technical reference

"...the successful organization of the second annual event in a sub-Saharan country...reinforces the AfNOG objective of Africans organizing network technology workshops for Africans in a sustainable way."

*- Dr. Nii Narku Quaynor
CEO of Network Computer Systems in Ghana*

ferences. Of note was the 802.11 wireless network that provided coverage throughout the entire hotel, workshop, and conference facility."

One workshop participant, Tewelde Stephanos from Asmara, Eritrea, spoke for many of his colleagues when he commented that he'd like to see the AfNOG workshops "occur more than once a year."

books donated by O'Reilly Books, Addison-Wesley, John Wiley & Sons, Cisco Press, and Prentice Hall. Walnut Creek CDROM provided FreeBSD books and FreeBSD CDs for everyone.

Cisco Systems provided two routing kits, one of which is on loan to the NSRC, containing ten routers and two switches, and the main Cisco workshop kit, which contains twenty rout-

AfNOG 2001, continued...

ers and five switches. Cisco also provided a generous cash donation to cover travel costs for some of the participants.

Significant financial support also came from the World Bank's Information for Development program, the United Nations Economic Commission for Africa, and the Commonwealth Telecommunications Organisation.

This year, more of the instructors at AfNOG 2 were African, and this trend

is expected to continue, as is increasing African collaboration to organize AfNOG 3. NSRC Director Randy Bush, an ally of African networking since he helped South Africa establish its first link to the Internet in 1988, finds this heartening. "It is cheering to see the ISPs on the continent stand on their own, especially considering the massive colonial obstacles, old-think and fear at the PTTs, and neo technocolonialists," he commented.

For more information about AfNOG and some of the related organizations mentioned in this article, see

<http://www.afnog.org/>

and the workshop pages at

<http://www.ws.afnog.org>

AfriNIC - <http://www.afrinic.org/>

AfTLD - <http://www.aftld.org/>

NSRC - <http://www.nsrc.org/>



digital photo by Steve Huter

Ayitey Bulley, one of the local hosts in Ghana who works for Network Computer Systems, confers with Hervey Allen about an email security issue. The two network specialists jointly taught the Track 1 session on mailing lists.

Web Server Administrators: Review Platform for Privacy Preferences Initiative (P3P)

University web server administrators who are interested in privacy issues may want to begin familiarizing themselves with the P3P initiative (see <http://www.w3.org/P3P/>), the World Wide Web Consortium's Platform for Privacy Preferences Project.

While the P3P specification is not yet completely finalized, its prospects are quite strong. P3P is quickly progressing and has already won the support of a wide variety of vendors and organizations. We encourage you to check out their website, and particularly to review their FAQ.

What's New with Internet2?

Recent I2 news includes a fall 2001 meeting announcement and new network peering in Asia and Europe

Fall 2001 Member Meeting

The agenda for the Fall 2001 Internet2 Member Meeting, scheduled to be held October 1 - 4 in Austin, Texas, has been announced. Here's a brief outline of the main events:

Monday, October 1, will be a pre-meeting day with tutorial sessions and constituency group meetings. The main meeting will be held at the Renaissance Austin Hotel, opening with a plenary session the next morning.

On the afternoon of October 2, attendees will have the opportunity to see applications demonstrations on the Austin campus of the University of Texas. The meeting will conclude on Thursday morning, October 4.

More detailed program information will be available in mid-July. For general information about the fall meeting, see <http://www.internet2.edu/activities/html/fall01-agenda.html>

Registration. If you're interested in attending the meeting, you can complete the registration form at <http://www.internet2.edu/activities/html/fall01-registration.html> (Register by September 7 to be entered in the Early Registration prize drawing!)

New International Network Peering

STAR TAP. STAR TAP, the NSF international interconnection project, is enabling a new connection between the Korean research education community and Internet2 backbone networks.

Two key Korean research networks, KOREN and KREONET2, have jointly brought a 45mbps connection to Chi-

cago. The two networks support high-performance connectivity for institutions that are also part of the Asia-Pacific Advanced Network-Korea consortium, an Internet2 International MoU Partner.

For more information on STARTAP, go to <http://www.startap.net/> To learn more about KOREN and KREONET2, see <http://www.koren21.net/> and <http://www.kreonet.re.kr/>

BELNET (Belgium). New connectivity is available via Internet2 backbone networks to the Belgian National Research Network (NRN), BELNET. BELNET peers with Abilene at 155mbps in New York City.

An Internet2 International MoU Partner, BELNET operates a high-speed backbone service within Belgium for research and education institutions. See <http://www.belnet.be/> for more information.

JANET (UK). JANET, the academic network in the United Kingdom, has increased network capacity between the U.S. and the U.K.

JANET is run by UKERNA, an Internet2 International MoU partner and connects directly with Abilene and ESnet at 622mbps in New York City. You can reach JANET via the International Transit Network. For more information on UKERNA, see <http://www.ukerna.ac.uk/>

uniNET (Thailand). On June 14, the peer network uniNET, Thailand's inter-university network, was connected and began passing traffic. For more information about uniNET, see <http://www.uni.net.th>

REUNA (Chile). When the AMPATH network was connected to I2's Abilene network last June, REUNA (National Research Network of Chile), the first participant in the AMPATH project, began peering with Abilene.

Services going through AMPATH to

REUNA include unicast and multicast peering.

Using Global Crossing's terrestrial and submarine optical-fiber network, AMPATH will interconnect the Research and Education networks in South and Central America, the Caribbean and Mexico to international peers via Abilene and Star Tap.

For more information about the AMPATH project, see <http://www.ampath.fiu.edu/news.htm>

McKenzie River Stations No Longer Multicast

After four years on the air, three McKenzie River stations (KKNU, KKXO, and KMGE) are no longer being broadcast on the MBONE due to changes in content licensing requirements. However, live streaming MP3 radio from the University of Oregon's own KWAX Classical radio station remains available to a dedicated audience of listeners throughout the U.S. and the world.

Operated by Computing Center network specialists, the MBONE, or Internet multicast backbone, transmits quality broadcast programming to desktop computers worldwide.

If you are interested in learning more about Internet broadcasting at the UO, see http://videolab.uoregon.edu/tools/multicast_tools.html

Learn the Essentials for Securing



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Systematic approach to system administration pays off

Because Microsoft Windows 2000 is such a large and complex operating system, securing Win2K machines may initially appear to be a daunting task. If basic standard practices of system administration are followed, however, securing a Win2K machine can be fairly manageable.

Below I've outlined the basic security measures necessary for setting up any Win2K machine. Some of these recommendations may look familiar, since the most common computer security practices generally apply to all types of machines.

Perform Regular Backups

The most important thing you can do to protect your data is to implement a full backup regimen. This makes your job easier in case of a break-in and also helps in the event of a hardware failure.

Commercial backup programs. Win2K comes with a built-in backup program called "Microsoft Windows Backup" that should be adequate for most backup tasks. The full commercial version of the program, *Veritas Backup EXEC*, has additional features for users with larger installations. Another commercial program that is popular for backups is Symantec's GHOST. GHOST can be used to perform full image dumps and restores.

Using a second hard disk for backup. Now that hard disks have become more affordable, it is becoming more popular to use a second hard disk as a fast, near-line backup storage device. For example, by GHOSTing a copy of the entire system disk to a second hard

disk on a regular basis and then unmounting the disk from the running system, you have a poor man's mirroring system that can be extremely helpful in recovering from a problem on the primary disk.

A larger disk with multiple partitions can also be used to add multiple copies of the image, or to store incremental backups. Reports from incremental backup runs can also prove to be valuable in providing a list of all filesystem modifications that occur on a system from one day to the next.

Monitor System Integrity

The only way to know with any degree of certainty that your system's been compromised is through careful system monitoring. This can be done using built-in checking mechanisms, add-on commercial system integrity checking tools, or by monitoring system event logs.

page 6 of the Spring 2001 *Computing News*; the online version of this article is available at <http://cc.uoregon.edu/cnews/spring2001/tools.html#tripwire>.

With *Tripwire*, you can customize the set of files that are checked to include files other than the small set of system files Win2K normally monitors. A typical set of *Tripwire* commands is listed below for reference:

```
C:\> twadmin -print-polfile > policy.txt
C:\> twadmin -create-polfile policy.txt
C:\> tripwire -init -verbose
C:\> tripwire -check -verbose
C:\> at 03:00 /every:M,T,W,Th,F,S,Su "cmd.exe /c
tripwire\bin\tripwire.exe --check --email-report"
```

Win2K also includes very fine-grained access auditing mechanisms. The local control interface for these settings on a Win2K Professional machine is in **Administrative Tools // Local Security Policy // Security Settings // Local Policies // Audit Policies**. Here you

The most important thing you can do to protect your data is to implement a full backup regimen

Win2K includes a system file checker called "SFC." This command can be run from the command prompt to verify the signatures of some of the default system files against signatures on the install CD-ROM. Insert the original install CD and run the command "sfc/scannow," and the program will check the integrity of critical system files. Win2K also includes, by default, a Windows File Protection feature which prevents anyone but the Administrator from replacing critical system files.

Tripwire is a commercial tool that can provide a more complete set of tests for system modification (for more information about *Tripwire*, see "Concerned About File System Integrity? Try Some of These Useful Tools" on

can enable auditing of logins, file accesses, and so on. To view the logged information, go to the **Administrative Tools // Event Viewer** and select the appropriate log to see the events.

Block Selected Attacks with Packet Filters

Monitoring system integrity is the necessary approach for determining whether or not a machine has been compromised. But it is clearly much better if the machine is never compromised in the first place. Packet filtering is one method to actively block selected attacks from being successful.

Packet filters are derived by understanding the TCP/IP services your computer offers, as well as the range of

Windows 2000 Operating Systems

IP addresses that will have access to those services. For example, the IP addresses on UOnet are almost all within the range 128.223.0.0 - 128.223.255.255. By restricting access to that specific range of addresses, the number of possible attackers is reduced from "every machine on the Internet" to "just UOnet machines." For services that necessitate only local access, this can be a good approach.

BlackICE Defender is a commercial product that implements a coarse set of filtering rules. Using BlackICE, a system can be configured to refuse connections from remote sites by selecting one of the pre-configured settings—"Paranoid," "Nervous," "Cautious," or "Trusting." Custom rules can be added to allow specific hosts or specific types of traffic to get through. BlackICE has additional features for logging that can be helpful in back-tracing connections when attempted intrusions do occur.

Microsoft added IPSEC support when it released Win2K. As part of the IPSEC engine, Microsoft included a new IP Filter Lists component that can be employed whether or not the more complex IPSEC associations are being used.

This new feature provides very precise construction of rulesets for performing packet filtering. The controls for this functionality are located under **Administrative Tools // Local Security Policy // IP Security Policies on Local Machine**. Select and right-click to select "Manage IP Filter Lists." Once a list is created, it can be added as part of an "IP Security Policy" for the machine.

IP Filter Lists allow you to specify addresses, protocols, ports, interface, and direction. Because these rule sets can be complex, it's best to understand which network traffic is going to be blocked or permitted by your rules before you begin putting them in place.

The Win2K Resource kit also provides a command-line utility called

"ipsecpol" for performing these same functions. A good article describing the process of activating a filter list can be found on the Microsoft website at:

http://www.microsoft.com/ISN/columnists/using_ipsec.asp

Virus Prevention

Computer viruses are one of the most serious threats to a system based on a Microsoft OS. With all the outbreaks that have occurred recently, no one should doubt the need to install anti-virus software on their machine. The UO has a site license for Norton AntiVirus 2001, and you can download the software from

<ftp://public/software/AntiVirus/NAV2001/>

"Safe computing" practices go a long way toward preventing infection. Simple commonsense can prevent most virus infections. For example, do not:

- download software from sources you don't trust
- swap files with unknown parties
- visit websites cited in questionable emails

Exposed file shares are a frequent source of abuse. *If you are not using File Sharing, disable it* (open Settings -> Control Panel -> Network -> File and Print Settings, and make sure the file sharing options are unchecked). You might also want to review the information on Steve Gibson's "Shields Up!" site at

<http://www.grc.com/su-rebinding9x.htm>

Stay Up To Date

As new vulnerabilities are discovered in Win2K, they need to be addressed. Microsoft releases security updates on a regular basis and you should periodically check the following site to see if any of those updates apply to your environment:

<http://www.microsoft.com/technet/security/current.asp>

Microsoft periodically bundles updates into "Service Packs." As of this

writing, Microsoft has released "Windows 2000 Service Pack 2." To check for updates, visit the Microsoft Windows Update Homepage at <http://windowsupdate.microsoft.com/>

Summary

Here are six essential points to remember when securing your Win2K environment:

1. Some work is required if you want to improve the security of your machine.
2. Good backups are a must
3. System integrity monitoring is critical in order to know if there has been a break-in
4. Packet filtering is an excellent tool for preventing break-ins
5. Anti-virus software is essential for preventing the destructive effects of common computer viruses
6. And system updates are necessary to make sure that your machine stays secure over time.

Used in combination, these practices can help ensure that you have a safe computing experience.

Other Useful Resources

Additional information on Win2K security is available from the following websites and publications:

<http://www.microsoft.com/technet/security/>

http://www.sans.org/infosecFAQ/win2000/win2000_list.htm

<http://www.cert.org/>

<http://www.securityfocus.com/>

<http://www.securityportal.com/>

<http://www.windowssitsecurity.com/>

"Windows 2000 Security: Step by Step" <http://www.sansstore.org/>

"Securing Windows NT/2000 Servers for the Internet" Stefan Norberg and Deborah Russell. ISBN: 1-56592-768-0

Wireless Security Poses Challenges

What can you do to protect yourself from eavesdroppers?

If you're considering deploying a wireless Ethernet system, you'll need to take special security precautions.

Because it's much easier to surreptitiously monitor wireless networks, attackers can have a field day at your expense (for an eye-opening discussion of potential privacy violations, see <http://www.theregister.co.uk/content/archive/18285.html>).

Unfortunately, the Wired Equivalent Privacy algorithm (WEP), which was designed to encrypt 802.11 wireless transmissions, provides a false sense of security. Even with WEP protection, there have already been instances of both active and passive attacks to decrypt traffic, as well as a dictionary-building type of attack that can perform real-time automated decryption after several hours of analyzing network traffic.

Alternative Measures. Instead of relying on WEP, Microcomputer Services staff recommends using end-to-

end encryption, such as UOWeb email with SSL, POP or IMAP over SSL, or SSH (Secure Shell).

The email clients available from the Duckware 2000 CD already utilize SSH, and Windows users can also use the SFTP program included with the SSH.COM package. (To download SFTP, go to <ftp://public.uoregon.edu/> and open the folders "Software," "Network Software," and "Secure," and select "SSH240.exe". Then double-click the downloaded program to activate it.)

Resources

For more details on WEP security issues, see <http://www.isaac.cs.berkeley.edu/isaac/wep-faq.html>

To keep abreast of new network security applications in general, see <http://security.uoregon.edu>. You might also want to check the Microcomputer Services security page at <http://micro.uoregon.edu/security/> for updates.

Dell Recalls Thousands of Defective Notebook Batteries

On May 3, Dell recalled nearly 300,000 batteries used in its Inspiron 5000 and 5000e notebook computers. The defective batteries can overheat and may catch fire.

The recalled batteries were shipped to customers between Jan. 7, 2000 and March 21, 2001.

If you own an Inspiron 5000 or 5000e series notebook, you're advised to remove the battery from the unit and consult the "Battery Recall Program" section of Dell's web site at

<http://support.dell.com/I5000Battery/>

to see if the battery is part of the recall.

Some Noteworthy URLs...

Here's a list of URLs you may want to investigate the next time you're browsing the web:

Architectural Requirements for Inter-Domain routing in the Internet. The full text of these working documents of the Internet Engineering Task Force (IETF) is online at <http://www.ietf.org/internet-drafts/draft-iab-bgparch-01.txt>

Accessible Web Design Law. Web designers will want to read about the implications of "Section 508," an amendment to the Workforce Rehabilitation Act of 1973 that sets accessibility standards for web-based intranet and Internet information and applications: <http://adaptive-tech.uoregon.edu/508.htm>

For a review of web accessibility issues, see the Fall 2000 *Computing News* article, "Designing Web Pages for Everyone," at http://cc.uoregon.edu/cnews/fall2000/accessible_web.html. Other URLs pertaining to web accessibility are

<http://www.access-board.gov/sec508/508standards.htm>

<http://www.gigalaw.com/articles/towns-2000-12-p1.html>

<http://trace.wisc.edu/world/web/>

<http://www.webreference.com/authoring/design/usability/>

<http://www.w3.org/WAI/>

<http://www.gigalaw.com/articles/2001/isenberg-2001-02-p1.html>

<http://www.section508.gov/>

<http://www.webstandards.org>

Computer Security Products, Inc. See what products are currently available for protecting your computer hardware and peripherals: <http://www.computersecurity.com/main/products.htm>

University of Oregon Policy Guidelines for Electronic Commerce. All those who use university resources to perform financial transactions electronically will want to review the standards and recommended practices outlined in this document: <http://baowww.uoregon.edu/Policy/EcommercePolicy.htm>

What's Wrong with High Bit Rate DSL Service Offerings?

Given the huge differences in pricing and capacity, why would anyone still buy point-to-point T1 service?

Joe St Sauver
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When we think about DSL service, most of us think about the 256Kbps (or maybe 640Kbps) DSL service we can get for home use for \$30/month plus \$20/month for ISP service.

However, DSL service is also available at much higher speeds. Many businesses and smaller schools may be tempted to consider it as an alternative to traditional point-to-point T1 service, which may run \$700 to \$2000/month for ISP service, plus additional hundreds of dollars (or more) per month for the leased T1 line itself.

Given those charges, many would be intrigued to learn that they could buy 7.1 Mbps worth of download and 1.1 Mbps worth of upload DSL service for only \$405/month (\$250/month for the circuit plus typically \$155/month for ISP service on the circuit).

Given that huge difference in pricing and capacity, you may wonder why anyone still buys point-to-point T1 service. In fact, there are actually a number of reasons why high bit rate DSL hasn't driven point-to-point T1 service out of the marketplace:

1. High bit rate DSL service is not going to be available everywhere. Typically, DSL service is limited to sites no more than 18,000' from a DSLAM equipped telephone company central office, and high bit rate DSL

service may require that you be even closer. T1s, on the other hand, can be installed virtually anywhere.

2. High bit rate DSL service is asymmetric. While you will be able to download content at 7Mbps from the Internet, you will only be able to upload content to the Internet at 1.1Mbps. (Contrast that with a point-to-point T1 which would offer you 1.5Mbps symmetrically in each direction.)

3. At least some DSL-servicing ISPs (such as qwest.net) force all web traffic through their local web cache box, thereby breaking Internet transparency. You wondered how they could afford to offer those great prices—and now you know! ISPs are taking advantage of the fact that some large fraction of your traffic will probably be http—and most likely web pages serviceable from a local web cache, at that.

4. Your equipment options may be limited. Most DSL service providers have standardized on a particular brand of DSL modem (such as the ~\$300 Cisco 675 or 678), and that is what you'll need to use if you want DSL service, like it or not.

Why is this an issue? Well, for example, many DSL modems are clearly consumer grade products rather than carrier grade gear.

5. You have a restricted set of possible ISPs to offer service on your DSL circuit. Most national backbones and many regional ISPs will *not* be available, with the result that you need to pick either a local DSL-servicing ISP or the phone company's unregulated ISP affiliate. See, for example, <http://www.qwest.com/dsl/learn/isplist.html>

6. Finally, because DSL service is basically positioned as a consumer

Internet access technology, outage response and repair times—critical factors for commercial/institutional connectivity—are essentially unbounded for DSL service. Given the thin profit margins associated with DSL service vis-a-vis traditional leased line T1 service, it is simply not realistic to expect the same level of service from the telephone company in case of a loss of service.

For all of these reasons, do not expect to see high bit rate DSL service completely displace traditional point-to-point T1 service any time in the near future.

Campus Wireless Users Alert

This fall, the UO wireless network will require you to install authentication software on your computer.

After it's installed, you can connect to the wireless network with your UO email address and corresponding password. A software update will also be required sometime in late December.

Microcomputer Services will post timely information about the authentication software at <http://micro.uoregon.edu/wireless/>

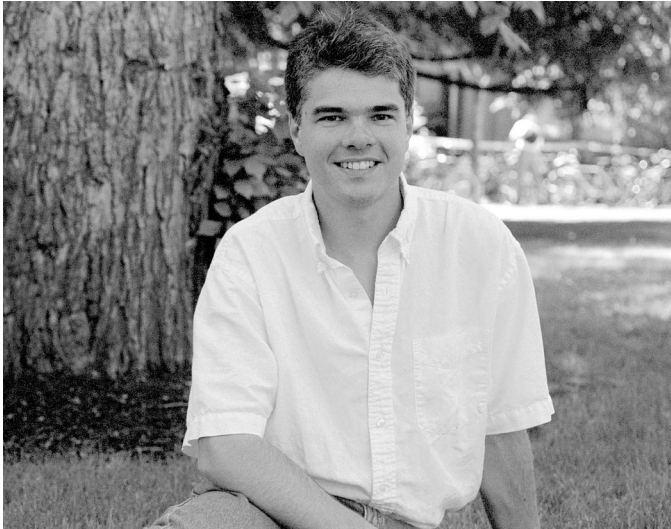
Please check this website during the summer and again in December, and feel free to call 346-4412 for more details. The Microcomputer Services office in 151 Grayson Hall is open weekdays from 9am to 5pm.

Who's Who at the

Meet some members of our staff

Joyce Winslow

jwins@oregon.uoregon.edu



Patrick Chinn

*Distributed Network Computer Consultant
Microcomputer Services*

This Oregon native's long history with the Computing Center began over ten years ago, when he was a student majoring in journalism at the UO. During that time, Patrick worked as a student consultant and advertising copy writer for the Microcomputer Purchase Program (MPP), which offered educational discounts on computer hardware and software, and assisted UO students, faculty, and staff with technical questions.

Shortly after graduating in 1991 with a B.S. in Journalism, Patrick signed on as a software trainer with Custom Business Systems, a small software company in Reedsport, Oregon. But Patrick didn't stay away for long. Nearly a year later, he was back in Eugene working for Symantec Corporation as a consultant on Norton Utilities for the Macintosh, and two years after that, he returned to the Computing Center—this time, working as the sales floor manager for the MPP. When the MPP closed in 1997, Patrick moved on to become the Biology Department's Mac lab manager and later, the computer support manager at the EMU.

Last November, Patrick once again joined the Computing Center, this time as a member of the Microcomputer Services team of consultants who assist faculty, staff, and students with a multitude of microcomputer questions and problems. His journalism background made him the ideal candidate for updating and revamping the Microcomputer Services website at <http://micro.uoregon.edu>, a task which has consumed the bulk of his time since assuming his new position.

Patrick is often mistaken for his identical twin Andre, who is the director of Information technology at the UO School of Journalism and Communications. The brothers are close, and share a passion for soccer as well as an interest in technology. Together, they jointly manage *Equilibrium*, a city league team primarily comprised of UO students. Patrick's other favorite sports are long distance running and whitewater kayaking. This year, he ran in the Hood-to-Coast relay and is currently training for this fall's Portland Marathon.

Patrick and his wife Pamela are enthusiastic world travelers. Together, they've explored most of Western Europe, including Scotland, England, France, and Italy. This summer, though, they're suppressing their wanderlust in order to sell their house and hunt for a new home in south Eugene.



Rob Jaques

Microcomputer Technician, Electronics Shop

If you've ever called the Computing Center's Electronics Shop for help with hardware problems, chances are the

Computing Center

cheery voice that greeted you was Rob Jaques'. Rob has repaired computers and peripheral devices and performed system upgrades since he joined our staff in 1991.

Rob grew up in Southern California and initially he had no intention of leaving his sunny home base. After graduating from high school, he had some fun playing rhythm guitar in a couple of rock bands, but he soon turned to the electronics field for more stable employment.

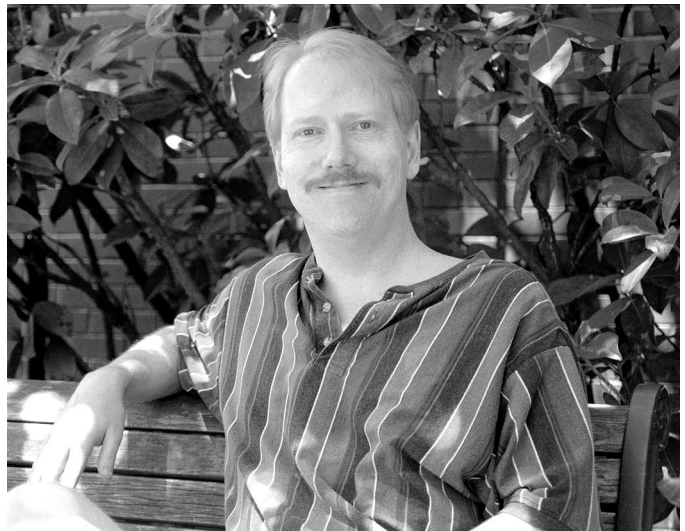
After a year of concentrated study, Rob got a job maintaining the computer facilities at Norton Air Force Base. For two years, Rob and his staff were responsible for keeping the entire complex humming, including an IBM mainframe and five miniframe systems, tape backup, CompuCorp 2200 terminals, and numerous modems and printers.

Life was good. But after Rob and his wife Darla started their family, the couple began to have second thoughts about raising their two children in the urban crush of Southern California. In 1984 they packed up and headed north to live in an old farmhouse just outside of Sweet Home.

At first the romance of farm life was compelling, and the transplanted city dwellers enthusiastically bought calves and a couple of pigs, and planted a large vegetable garden. They began canning their own produce, and proudly turned out jars of blackberry jelly.

However, after several years of laboring on the farm while holding down full-time jobs, Rob and Darla decided it was time to cut back. They now have only two dogs to care for, and leave the jelly-making to Smuckers. In his new-found spare time, Rob occasionally builds cabinets and small furniture pieces in his woodshop, and he and Darla enjoy camping and fishing trips.

In recent years, Rob's role at the Computing Center has expanded to include teaching informal workshops on the safe disposal and recycling of discarded computer and electronic equipment. Most recently, he's been working with UO Environmental Manager Nick Williams to educate campus users about computer recycling issues.



Tim Ketchum
Systems Analyst, Administrative Services

Tim Ketchum has lived in the Northwest all his life. The son of a Forest Service Ranger, Tim grew up in the scenic Sisters area and helped pay his college expenses by working as a fire lookout for the State Forestry Department each summer for seven years.

Tim gravitated toward a career in computer programming early on, and he earned a B.S. in Computer Science from OSU in 1987. His first job out of college was as a Special Applications Programmer for the Forest Service. After working there for several years on temporary appointment, he moved on to become a systems analyst at the Computing Center in 1992.

Tim's duties include developing and maintaining Student Systems on campus. He is one of the three programmers who implemented DuckCall, and he also created DuckHunt (the online schedule of classes) and managed the implementation of DuckWeb, the interactive student information system. In addition to keeping these systems running smoothly, Tim provides backup support to the database administrator and works on ongoing development projects as needed.

Tim and his wife Darcy have two boys: eight-year-old Cory, a Pokeman enthusiast, and four-year-old Nick, whom Tim describes as "a wild bundle of energy." While Tim is not known for his love of cooking, the boys have pressed him into service as a Sunday morning chef. His speciality, blueberry pancakes, unfailingly gets rave reviews.

The family enjoys exploring new territory together. Last summer they drove cross-country to a Ketchum family reunion in Iowa and stopped along the way to investigate such natural wonders as the Dinosaur National Monument near Vernal, Utah, and the Black Hills of South Dakota.

UO Environmental Health and Safety Pioneers Computer Recycling

Program helps campus departments recycle their old equipment and safely dispose of dead CPUs

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Last spring, the Office of Environmental Health and Safety launched its campus campaign to keep toxic electronic waste out of our landfills.

By mid-June, the program had shipped off two truckloads of surplus property and demanufactured computer monitors from the UO Science complex and the UO Library, diverting over 2000 pounds of lead from the landfills. Most of the surplus equipment is donated back to the community through the state's surplus property program, but the UO Art Department appropriates

some of the disassembled pieces for various individual art projects.

Spearheading the effort is UO Environmental Manager Nick Williams. Nick gives a lot of credit for the initial success of the program to Computing Center electronic technician Rob Jaques (see "Who's Who..." on page 14), who provides safety training, and Education's Irene Smith and her "crack team" of students, who perform the bulk of sorting and demanufacturing tasks. He also praises Property Control Specialist Susie Endow for her help in expedit-

ing the recycling of surplus electronic equipment.

The next consignment of recycled equipment is scheduled for mid-July. You can help by sorting through monitors, CPUs, keyboards, and similar computer and electronic equipment that you no longer use, tagging those that don't work and separating them from those that do. For full details, contact Connie French at connie@oregon.uoregon.edu and use "Computer Harvest" in the subject line of your message.

New Authentication Software Installed on Gladstone, Darkwing, Oregon

New programs pre-crack requested passwords and use PACs instead of birthdates

Last month, Computing Center staff installed new versions of account-creation and password-changing programs.

These programs introduce two new features:

1. They use CRACKLIB routines to test requested passwords for vulnerability.

2. The programs will no longer accept birthdates as minimum-security second pieces of authentication. Instead, only Personal Access Codes (PACs) will be accepted. This is true for *all* campus users, including faculty and staff.

(Last term, all UO faculty and staff were issued PACs for DuckWeb to give them access to their employee information online. If you don't know your PAC or have misplaced it, come in person to the Human Resources office in Room 463 Oregon Hall and bring your photo ID.)

One very welcome feature of this change is that users with new accounts are no longer prompted to change their passwords at first login.

Free Windows 2000 Resource Kits!

To get your free copy of browsable versions of Windows 2000 print books and Resource Kits references, visit

<http://www.microsoft.com/windows2000/techinfo/reskit/en/default.asp>

Prices of Computer Components Continue to Drop

Joe St Sauver

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If you don't routinely check the price of computer components, you may be amazed at how cheap mainstream computing parts have become.

For example, if you look at the prices quoted on <http://www.pricewatch.com>, you'll see Intel PIII 1GHz FCPGA CPUs for approximately \$175 plus S&H, or for the same price you can get an AMD Athlon TBird 1.4GHz.

Hard drives have gotten cheaper, too. Eighty gig EIDE hard drives are down to under \$200, and 20 gig EIDE drives are only \$60.

Or consider memory: 512MB of Memory (PC133 SDRAM) is down to ~\$50-\$60 plus S&H, and 256MB of Memory (PC133 SDRAM) is only about \$20-\$25 plus S&H.

Of course, some components haven't come down in price as quickly. For

example, you will recall that we warned you in an earlier edition of *Computing News* against buying RDRAM-based systems. If you have to buy RDRAM instead of SDRAM, you'd be dismayed to find that 512MB of RDRAM starts at just under \$400 (plus S&H), and that even 256MB of RDRAM still runs right around \$135 (plus S&H).

On the other hand, it is now routine to find excellent quality workhorse 19" monitors in the \$250 price range from Internet retailers such as www.buy.com, and top-of-the-line video cards have become comparably inexpensive.

Bottom line, when you configure or upgrade a system, be careful not to end up building a system that is underpowered, or which will have an unnecessarily short life span.

You *can* afford a more powerful system than you may have thought!

Software Pirating on Campus Draws Legal Fire

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Recent incidents of software pirating on U.S. campuses are inviting legal crackdowns.

Last April, a UO graduate convicted of software copyright infringement while a student was fined more than \$100,000 and sentenced to a year in prison (see the Register Guard report at <http://www.registerguard.com/news/20010417/1a.copyrightcase.0417.html>).

Electronic copyright infringement on other campuses is also drawing fire. The Motion Picture Association of

America (MPAA) recently warned Harvard University and the University of Connecticut, among others, that some people on their networks are violating the Digital Millennium Copyright Act by trading copyrighted movies through the Gnutella file sharing service (see http://news.cnet.com/news/0-1005-200-5641576.html?tag=tp_pr).

Anyone wishing more information about copyright infringement issues and acceptable use of campus computing resources should review the UO's Acceptable Use Policy document at <http://cc.uoregon.edu/acceptableuse.html>

Time to Begin Using SSH

Effective immediately, if you telnet to the UO's large time sharing hosts, you will now see this new warning banner:

CAUTION! This telnet connection is unencrypted and hacker/crackers may be able to eavesdrop upon your username and password and other network traffic. Because of this vulnerability, unencrypted telnet access to <host name> will be discontinued effective January, 2002.

That warning is designed to remind you to begin using SSH, a secure (encrypted) replacement for telnet that eliminates the possibility of your username and password being "sniffed" (eavesdropped upon) by hacker/crackers.

We strongly recommend you use SSH (secure shell) instead of telnet. Free SSH clients for your PC or Mac are available on the both the UO Duckware 2000 and 2001 CD-ROMs.

To install SSH, select the "Install Now - Network Applications" link on the main Duckware 2000 screen. (The Duckware 2001 CD, which will be released in September, automatically activates the installer when it's inserted in your machine.) After the installation is complete, Mac users will find SSH under the Apple Menu->UOnet->Telnet->Nifty Telnet (or "Better Telnet" if Duckware 2001) SSH. Windows users will find the SSH links under Start->Programs->Network Applications->Telnet (SSH).

If you need help installing SSH, contact microhelp@oregon.uoregon.edu (346-4412).

Also note that as of January 2002, you will no longer be able to use telnet to connect to Darkwing, Gladstone, or Oregon—so don't delay! Switch from telnet to SSH today.

Computing in the Humanities...

***Renascence Editions* introduces Internet audience to early modern English**

Spenser online? Works by this 16th century author—together with texts by Milton, Shakespeare, and a host of others dating from 1477-1799—are now available via 21st century technology, thanks to the painstaking efforts of Richard Bear.

Bear had a passion for textual design from his earliest years. Before coming to the UO he worked as a commercial pressman, doing foil stamping, embossing, and die cutting, and operated a small printing business on the side.

Now Documents Supervisor in the Knight Library, Bear has since turned to digital technology to provide readable web editions of early English works to the general public. *Renascence Editions*, the site he created at <http://darkwing.uoregon.edu/~rbear/ren.htm>, evolved from earlier experiments in reproducing the works of Edmund Spenser online.

The *Renascence* site has grown rapidly in the four years since its inception. It has won over a dozen awards, including citations from Great Books, Times Pick, Webivore, LookSmart (editor's choice), and IrishKnowledge.com.

If you're looking for an old-spelling reading experience with early modern typographic conventions, check out *Renascence Editions*. You won't be disappointed.

How to Disable SmartTags Parsing in IE6

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Smart Tags are a new feature of IE6 that add links to web pages you view. When you roll your mouse over the name of a company cited in a web page, for example, Smart Tags provide a list of links to information about that company.

Although this may be a convenience for some, it's easy to see how this feature could be used for advertising and promotional purposes, adding to the ad junk that already clutters many web sites and distracting users from the content on a page. (To see an example of Smart Tags in action, go to <http://www.microsoft.com/windows/ie/preview/smarttags/default.asp>)

If you'd like to avoid Smart Tags, there are two main things you should do:

1. Don't install any Smart Tags package on your own copy of IE6 (it should ship without any Smart Tags package preinstalled)
2. Disable Smart Tags parsing in any web pages you write. To do this, add the line:

```
<metaname="MSSmartTagsPreventParsing" content="True">
```

to each of those pages.

Last-Minute Update: As we go to press, Microsoft announced it will omit Smart Tags from IE6, although they will apparently remain a feature of Office XP. For more details, see "Critics Force Microsoft To Drop Smart Tags" at http://dailynews.yahoo.com/h/nf/20010628/tc/11614_1.html

Compaq Phases Out Alpha Chip

By 2004, Compaq will have phased out all its high-end server production, abandoning its Alpha chip and leaving the field to next-generation Itanium microprocessors being developed by Hewlett-Packard and Intel.

Compaq's speedy 64-bit Alpha microprocessor is used for some of the most advanced and demanding scientific research. Both the National Science Foundation and French Atomic Energy Commission use clusters of AlphaServers to simulate the impact of nuclear explosions, and the Pittsburgh Supercomputing Center uses Alpha to predict complex weather patterns.

Compaq intends to support Alpha architecture through 2003, but the following year it will consolidate its entire 64-bit server family on the Itanium architecture. As part of its joint engineering agreement, Compaq is transferring significant Alpha microprocessor and compiler technology, tools, and resources to Intel. The new family of Compaq enterprise servers will support Tru64™ UNIX, OpenVMS™, and NonStop™ Kernel.

For more details on this development, see the following press releases:

http://dailynews.yahoo.com/h/ap/20010625/tc/compaq_intel_2.html

<http://www.compaq.com/newsroom/pr/2001/pr2001062501.html>

Intel Plans New Chip Manufacturing Plant in Oregon

Anticipating future demand, Intel Corporation is planning to build a \$2 billion chip-manufacturing plant in Oregon this summer.

When completed, the three-story, 175,000-square-foot facility will likely add up to 3,000 jobs in the area. Currently, its Oregon facilities employ about 16,000 workers. The new plant, known as D1D, will make chips on 300 mm silicon wafers that have 225 percent more surface area than the current standard.

For more information about Intel, see <http://www.intel.com>

1931 UO Yearbook Now Online

Celebrate our approaching 125th anniversary by sampling a bit of old *Oregana*

Joe St Sauver

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As we approach the University's 125th Anniversary year, we'd like to encourage you to take a minute to reflect on a period of time when life at the University of Oregon was simpler and completely innocent of computing and networking technology.

Let's look back to the events of 1931, as recorded in the UO's 1931 yearbook *Oregana*, which we recently reproduced online at <http://31yearbook.uoregon.edu/>

Why 1931? We wanted a yearbook that was "old," yet recent enough that connections between today and the past would be readily apparent. We considered doing a yearbook from the turn of the century or the World War I era, but in the end we felt those periods were too old. Likewise, an issue from the 1940s or 50s seemed "too new." 1931 split the difference nicely.

Another reason for choosing 1931 was because that was a year during which the university was active and growing rather than consolidating or retrenching. In 1931, the Great Depression was well underway, with unemployment running in excess of sixteen percent, but enrollments at the UO were at what was then an all-time high of 3,358 students. Only a few years later, as the Depression deepened and unemployment reached nearly forty percent, enrollments dropped by nearly a thousand students. But in 1931 there were still grand balls, summer trips to Alaska and Hawaii, international debates with Liverpool and Oxford, and polo and football games played in Chicago. The Great Depression had begun, but its effects had still not fully been felt at the university.

As you look through the online edition of the 1931 *Oregana*, you'll know immediately that you're reading a vintage issue: Some obvious clues are the old cars and the absence of street signs on page 12, reviews of Oregon's athletic contests against St. Mary's and Drake University instead of Pac 10 schools, and the hair styles and clothing of the period.

You'll also see some scenes that are virtually unchanged today from 1931 (such as the picture of the classic entrance to the College of Business on page 31 of the *Oregana*), as well as some familiar names that are immortalized today



as the names of campus buildings. In 1931, those names were the names of faculty, staff and administrators instead of facilities: Straub...Gilbert... Lawrence... Allen... Hayward... Carson...and many more.

Compared with other Oregon yearbooks of that era, the 1931 *Oregana* stands out. Many of the photographs are striking and the layout is exceptionally pleasing. Is it perfect? No, there are a few irritating drawbacks—including a fragile typeface, inadequate margins and frustratingly small fonts in spots—but all in all, it is a beautiful book, well deserving of a second opportunity to be read and admired.

The copy we worked from showed signs of its age, being yellowed and warped in places. We made no attempt to eliminate those historical artifacts; they are an honest and integral part of a 70-year-old publication.

We hope you find browsing through the 1931 *Oregana* to be worthwhile, entertaining and informative.

Should You Be Using PROC MIXED



Here are some examples
to help you determine
the answer

By Robin High
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SAS continues to enhance existing products and develop new ones to fulfill data analysis needs as computational technology advances. Recently, the next level of sophistication has become available with PROC MIXED, a statistical procedure that even ardent SAS users may know very little about. PROC MIXED offers many features to work around assumptions in your data that are often overlooked or ignored. The purpose of this article is to show you how ANOVA, GLM, MIXED (all SAS) and UNIANOVA (SPSS) are alike, and to demonstrate how PROC MIXED is superior.

Suppose you set up six greenhouse benches as blocks for a plant-growing experiment. Within each block, you grew each of four varieties of a house plant, and after a given length of time you measured the plant heights in centimeters:

Plant Heights	Plant Variety			
	1	2	3	4
Greenhouse bench				
1	19.8	21.9	16.4	14.7
2	16.7	19.8	15.4	13.5
3	17.7	21.0	14.8	12.8
4	18.2	21.4	15.6	13.7
5	20.3	22.1	16.4	14.6
6	15.5	20.8	14.6	12.9

This is an example of a randomized complete block design where the blocking factor (bench) has six levels and the treatment factor (variety) has four levels. Variety is considered to be a "fixed" effect in this analysis because the levels used are the only ones of interest. Bench (block) is defined as a random effect because it is a component of the design structure and reflects a random outcome that many similar experiments would produce. (A random factor occurs when its specific levels could be replaced by other equally acceptable levels without changing the research questions or the conclusions.) A two-way analysis of variance could be performed on the data with the following SAS code. This example briefly reviews how to use PROC GLM.

```
DATA heights;
LABEL bench='Greenhouse Bench' variety='Plant Variety';
INPUT bench variety height @@;
DATALINES;
1 1 19.8    1 2 21.9    1 3 16.4    1 4 14.7
2 1 16.7    2 2 19.8    2 3 15.4    2 4 13.5
3 1 17.7    3 2 21.0    3 3 14.8    3 4 12.8
4 1 18.2    4 2 21.4    4 3 15.6    4 4 13.7
5 1 20.3    5 2 22.1    5 3 16.4    5 4 14.6
6 1 15.5    6 2 20.8    6 3 14.6    6 4 12.9
;
PROC GLM data=heights;
CLASS bench variety;
MODEL height= bench variety;
RANDOM bench;
LSMEANS variety / stderr pdiff;
TITLE "Analysis of Variance with PROC GLM";
RUN;
```

The PROC GLM statement invokes the General Linear Model procedure. The CLASS statement specifies that bench and variety are classification variables in the model. Dummy (indicator) variables are automatically created by SAS corresponding to all distinct levels of bench and variety. The MODEL statement specifies the response (dependent) variable "height" to the left of the equal sign (=). It then lists both factors as explanatory variables, with the RANDOM statement specifying that bench is considered a random effect. The LSMEANS statement computes least square means for "variety" and the "pdiff" option computes all pairwise differences. (Note: least squares means are important to use with unbalanced data; when the data are balanced, they are the same as averages for varieties across benches.)

In this example the two explanatory variables are "bench" and "variety," and they comprise the main effects of interest. An edited version of the SAS output appears below:

Class Level Information

Class	Levels	Values
bench	6	1 2 3 4 5 6
variety	4	1 2 3 4

Number of observations 24

Dependent Variable: height

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	208.33167	26.0415	59.85	<.0001
bench	5	19.79333	3.9587	9.10	0.0004
variety	3	188.53833	62.8461	144.44	<.0001
Error	15	6.52667	0.4351		
Corrected Total	23	214.85833			

The residual mean square from this model is $\hat{\sigma}^2 = .4351$. Notice that the statistical test for differences in the levels of variety is very significant (F-value of 144.44 (3,15) with a p-value < .0001). This implies that the average plant height for at least one of the varieties is significantly different from the others.

Least Squares Means

variety	height LSMEAN	Standard Error	Pr > t	LSMEAN Number
1	18.0333	0.26929	<.0001	1
2	21.1667	0.26929	<.0001	2
3	15.5333	0.26929	<.0001	3
4	13.7000	0.26929	<.0001	4

The column of p-values (Pr > |t|) are computed using a standard error of a treatment mean equal to

$$\sqrt{\hat{\sigma}^2/t} = \sqrt{0.4351/6} = 0.26929$$

These p-values are usually of little practical value in hypothesis testing, since they test whether the average plant height for each variety equals 0.

It is very useful to test pairwise differences of interest between types of plant (variety). Since the F-test for variety is significant, one approach to determine where the significant differences lie is to compute p-values of pairwise

to Analyze Continuous Data?

differences. With a balanced design, the standard error of a difference between any two means is:

$$\text{Std Err}(\hat{\mu}_i - \hat{\mu}_j) = \frac{\sqrt{\hat{\sigma}^2/k}}{\sqrt{\frac{1}{t} + \frac{1}{t}}} = \frac{\sqrt{.4351/6}}{\sqrt{\frac{1}{4} + \frac{1}{4}}} = .3808$$

$\hat{\mu}_i$ and $\hat{\mu}_j$ are the estimated means for two specified levels of variety, k is the number of blocks, and t is the number of treatments. PROC GLM prints the following symmetric matrix of p-values with the four levels of variety indexed by $i=1$ to 4 and $j=1$ to 4 with the respective LSMEAN number given in final column of the table above.

Dependent Variable: height

i/j	1	2	3	4
1		<.0001	<.0001	<.0001
2	<.0001		<.0001	<.0001
3	<.0001	<.0001		0.0002
4	<.0001	<.0001	0.0002	

When interpreting multiple p-values, you should use a smaller critical value (depending on the number of pairwise differences of interest) as the cutoff to get the desired overall alpha level test (usually 0.01 or 0.05). You can obtain similar conclusions with one of the many multiple comparison procedures. The results shown in this GLM example are identical to the output from the SPSS UNIANOVA procedure.)

But is this really the complete picture? One important aspect of PROC GLM and UNIANOVA is that both do not treat the random effects properly in the computation of expected mean squares, as the following results will now show. The same data analysis can be performed with PROC MIXED as follows:

```
PROC MIXED data=heights;
CLASS bench variety;
MODEL height = variety;
RANDOM bench;
LSMEANS variety / diff;
TITLE "Analysis of Variance with PROC MIXED";
RUN;
```

This set of statements for PROC MIXED looks nearly the same as for PROC GLM. The PROC MIXED statement invokes the procedure to analyze the data from the SAS dataset called "heights." The CLASS statement creates dummy variables associated with bench and variety effects. Variety appears on the MODEL statement as a fixed effect and the random effect for bench now appears only on the RANDOM statement. The LSMEANS statement computes least square means, and the "diff" (not "pdiff") option computes all pairwise differences. Even though the coding is nearly the same as the GLM procedure, the output from PROC MIXED is structured quite differently, as indicated by the following edited portions:

Covariance Parameter Estimates (REML)

Cov Parm	Estimate
Bench	0.8809 [= $\hat{\sigma}_{\text{blk}}^2$]
Residual	0.4351 [= $\hat{\sigma}^2$]

The "Covariance Parameter Estimates" table displays the estimates of the variance components, including the variance due to "Bench" ($\hat{\sigma}_{\text{blk}}^2 = .8809$) and the "Residual" error term ($\hat{\sigma}^2 = .4351$) which is the same value computed with PROC GLM.

The "Type 3 Tests of Fixed Effects" table displays significance tests for the one fixed effect (variety) listed in the MODEL statement. This table is analogous to the ANOVA table from GLM:

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
variety	3	15	144.44	<.0001

The degrees of freedom, F-statistic, and p-value for variety are identical with those produced by the GLM procedure. However, PROC MIXED uses a restricted maximum likelihood-based estimation routine (REML) based on normal distribution theory and therefore does not compute nor display sums of squares as observed with PROC GLM. But what happens with the least squares means?

Least Squares Means

Effect	variety	Estimate	Standard Error	DF	t Value	Pr > t
variety	1	18.0333	0.4683	8.53	38.51	<.0001
variety	2	21.1667	0.4683	8.53	45.20	<.0001
variety	3	15.5333	0.4683	8.53	33.17	<.0001
variety	4	13.7000	0.4683	0.53	29.25	<.0001

The numbers in the column labeled "Estimate" are the same as those computed with PROC GLM. However, one noticeable difference is that the column labeled Standard Error is now equal to 0.4683, which is considerably larger than the standard error used by PROC GLM. This is because the variance of a predicted mean needs to account for both the variance due to the random effect of block and the residual:

$$\begin{aligned}\text{Std Err}(\hat{\mu}) &= \sqrt{(\hat{\sigma}_{\text{blk}}^2 + \hat{\sigma}^2)/k} \\ &= \sqrt{(0.8809 + 0.4351)/6} = .4683\end{aligned}$$

PROC MIXED correctly includes the variance component for bench in the estimate of the variance (whereas PROC GLM and UNIANOVA do not). However, the standard error of a difference between two least squares means is the same as found with PROC GLM because the mathematics show that differences between two means does not involve the blocking factor, since all four varieties appear in each block. Thus, interferences for pairwise differences will be the same as with GLM.

Using PROC MIXED, continued...

Differences of Least Squares Means

Effect	variety	Estimate	Standard Error	DF	t Value	Pr > t
variety	1 2	-3.1333	0.3808	15	-8.23	<.0001
variety	1 3	2.5000	0.3808	15	6.56	<.0001
variety	1 4	4.3333	0.3808	15	11.38	<.0001
variety	2 3	5.6333	0.3808	15	14.79	<.0001
variety	2 4	7.4667	0.3808	15	19.61	<.0001
variety	3 4	1.8333	0.3808	15	4.81	0.0002

Why Use PROC MIXED Instead of PROC GLM or SPSS UNIANOVA?

Given that these two analyses are virtually the same, why should you even consider using PROC MIXED rather than PROC GLM or UNIANOVA? First, consider the following important assumptions concerning the residuals computed from linear models by the GLM and UNIVANOVA procedures:

- normally distributed
- independent
- constant variance across groups

The normality assumption is usually realistic when the original data are measured on a continuous scale and are not highly skewed or contaminated with outliers (a suitable transformation can help). However, the remaining two assumptions are often not satisfied, especially when data are collected over time or space or come from subjects that are somehow related to each other within blocks.

The methods implemented in PROC MIXED are also based on the assumption of normally distributed residuals. However, several important reasons emphasize why MIXED is superior to GLM or UNIVANOVA, of which I will only list a few:

- it can model data with non-constant variances across groups
- in many cases it automatically uses the correct error terms—which are either not available with PROC GLM, or which you ordinarily would need to specify in the program
- In a repeated measures study or any study that involves within-group correlations, it allows more flexibility to model the variance/covariance matrix (i.e., the within-subject correlations) in a manner that essentially allows you to minimize concern about the lack of sphericity condition
- it will include subjects with multiple responses that have one or more data values missing at random, whereas PROC GLM and UNIANOVA eliminate them
- it can use continuous time-dependent covariates, whereas GLM and UNIANOVA have limited capabilities

PROC MIXED is more complicated than PROC GLM, but it allows you to use a more flexible approach to linear model applications. This brief comparison with PROC GLM merely illustrates how you can begin to explore its many useful

features. A good introduction to analyzing a randomized complete block design with PROC MIXED using the concepts discussed in this article is found at <http://animsci.agrenv.mcgill.ca/servers/anbreed/statisticsII/rcb2.htm>

If you plan to perform repeated measures analysis, you should read the following PDF document comparing PROCs GLM and MIXED:

<http://www.sas.com/rnd/app/papers/mixedglm.pdf>

Data Structure

For repeated measures and other multivariate analyses, PROC GLM and other similar programs require all data for each subject to be listed on a single record—that is, in a horizontal or multivariate format. For example, PROC GLM requires data from a repeated measures study with weights collected on the first two subjects at three points in time to have the following multivariate structure:

Subject	weight1	weight2	weight3
1	150	155	158
2	200	212	216

When using PROC MIXED, the data shown above must be structured in a univariate format (i.e., placed in a column):

Subject	time	weight
1	1	150
1	2	155
1	3	158
2	1	200
2	2	212
2	3	216

A new variable, time, is now included, rather than an index on the variable name. There are several ways to transform data into this structure. Details can be found in Section 2 of the document at

<http://darkwing.uoregon.edu/~robinh/06appl1.txt>

Note: The examples in this article are based on a sample problem in Chapter Two (“Randomized Complete Block Design”) of *Mixed Models for the Practicing Statistician Using SAS* by Linda J. Young and George A. Milliken. ©Kansas State University, 1998.

References

Three very important references for further information on these techniques include:

- Brown, H. and Prescott, R. (1999). *Applied mixed models in medicine*. Wiley and Sons.
- Jackson, Sally, and Brashers, Dale (1994). *Random Factors in ANOVA*. Sage University Paper series on Quantitative Applications in the Social Sciences, 07-098. Newberry Park, CA: Sage.
- Littell, R.C., Milliken, G.A., Stroup, W.W., and Wolfinger, R.D. (1996). *SAS System for Mixed Models*, SAS Institute, Cary, NC.

SUMMER WORKSHOPS

The Library and Computing Center are committed to making sure you have opportunities to build your technology skills. Toward that end, we provide a full range of computer and Internet training, from novice to advanced skill levels. These information technology ("IT") workshops are free and open to currently enrolled students, as well as staff and faculty.

There is no registration; all seating is available on a first-come, first-served basis. You *must* meet the workshop prerequisites as stated in the description.

Requests for accommodations related to disability should be made to **346-1925** at least one week in advance of the workshop. For more information, contact the Office of Library Instruction (**346-1817**, cbell@darkwing.uoregon.edu, <http://libweb.uoregon.edu/instruct>).

Note: The skills taught in these workshops, whether taught in a Mac or Windows environment, are transferable across platforms.

Workshop	Day/Date	Time	Location	Presenter
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This schedule is subject to change. See <http://libweb.uoregon.edu/it/> for course outlines/materials and the most current information.

THE FALL WORKSHOP SCHEDULE WILL BE AVAILABLE SEPTEMBER 5

Communication and Research Topics ✓ Prerequisites

How to Link Directly to Full-text Articles in Library Databases (New!) ✓ Prerequisite: basic knowledge of web page creation via Blackboard, HTML, or web publishing software

Thu July 26	1 - 2:50pm	EC	Michel
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Web Publishing ★✓ Prerequisites

Web Publishing I - ★✓ Prerequisites: Familiarity with a graphical web browser like Netscape or Internet Explorer and an account on Darkwing or Gladstone (not Oregon!); you must know your username and password

Fri July 6	1 - 2:50pm	EC	Nesselroad
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Tue July 17	10 - 11:50am	EC	Benedicto
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Web Publishing II - ★✓ Prerequisites: Web Publishing I or equivalent knowledge and skills, and a web page you've created

Fri July 13	1 - 2:50pm	EC	Michel
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Tue July 24	10 - 11:50am	EC	Benedicto
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Web Publishing III - ★✓ Prerequisites: Web Publishing II or equivalent knowledge and skills

Tue July 31	10 - 11:50am	EC	Bell
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Dreamweaver Basics - ✓ Prerequisite: Web Publishing I & II or equivalent knowledge and skills

Fri July 27	1 - 2:50pm	EC	Johnson
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More Dreamweaver - ✓ Prerequisite: Web Publishing III or equivalent knowledge of HTML and Dreamweaver Basics or equivalent knowledge and skills

Fri Aug 3	1 - 2:50pm	EC	Johnson
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Training Videos

Looking for an alternative to the workshop format? The Computing Center Documents Room (175 Grayson Hall) has a growing collection of videos on using computers and computer software, and you can use your UO picture ID to check them out. For a list of available titles and descriptions, visit <http://darkwing.uoregon.edu/~docsrm/video.html> Call 346-4406 for more information.

* WORKSHOP LOCATION CODES *

EC: Electronic Classroom (Windows)	16 PCs	144 Knight Library
ITC: Macintosh Classroom	20 Macs	267B Knight Library
RSR: Reed Seminar Room (Windows)	7 PCs	235 Knight Library
St A:		Studio A Knight Library

★ Requires an active account on Darkwing or Gladstone

COMPUTING CENTER GUIDE

UO Website

<http://www.uoregon.edu/>

Computing Center Website

<http://cc.uoregon.edu/>

Microcomputer Services

(Room 151 Grayson Hall)

- microcomputer technical support
- help with computing accounts, passwords
- scanning, CD-burning, digital video
- help with damaged disks, files
- system software help
- Internet connections, file transfers
- public domain software, virus protection
- software repair (carry-in only, \$60/hour, 1/2 hour minimum)

346-4412

microhelp@oregon.uoregon.edu

<http://micro.uoregon.edu/>

Statistics Consulting

Robin High

346-1718

robinh@darkwing.uoregon.edu

<http://darkwing.uoregon.edu/~robinh/statistics.html>

Large Systems Consulting

(Rooms 233-239 Computing Center)

- VMS, UNIX (Gladstone, Darkwing, Oregon)
- email, multimedia delivery
- scientific and cgi programming
- web page development

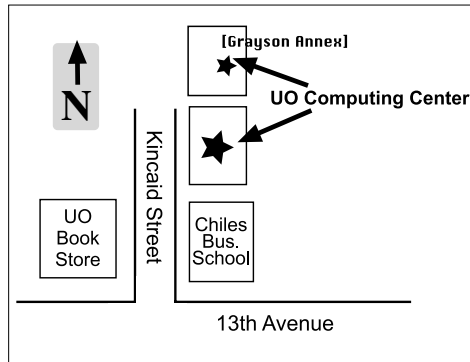
346-1758

consult@darkwing.uoregon.edu

consult@gladstone.uoregon.edu

consult@oregon.uoregon.edu

<http://cc.uoregon.edu/unixvmsconsulting.html>



Documents Room Library

(Room 175 Grayson Hall)

346-4406

<http://darkwing.uoregon.edu/~docsrm>

Electronics Shop (151 Grayson Hall)

For computer hardware repair, installation, and upgrade services, call **346-3548** or write hardwarehelp@oregon.uoregon.edu. Also see http://cc.uoregon.edu/e_shop.html

Network Services

Provides central data communication and networking services to the UO community.

346-4395

nethelp@oregon.uoregon.edu

<http://ns.uoregon.edu/>

Administrative Services

Provides programming support for administrative computing on campus, including BANNER, A/R, FIS, HRIS, and SIS. Call **346-1725**.

Modem Number

Dial-in modem number for UOnet, the campus network: **225-2200**

Computing Center Hours

Monday - Friday 7:30 am - 5:00 pm

Grayson Hours

Monday - Thursday 7:30 am - 11:30 pm

Friday 7:30 am - 7:30 pm

Saturday 9 am - 9:30 pm

Sunday 9 am - 8:30 pm

COMPUTING NEWS

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