University of Oregon

COMPUTING NEWS

SUMMER 2000

IN THIS ISSUE...

Protect Your Email Password 2

Dialpad Internet Phone Service ... 2

Wireless Internet Access on Campus 3

New Modems, Modem Number ... 3

Faster In-building Campus Networks on the Way 3

Computing Center Annex to Open in September 4

New Secondaries Join I2 6

Stay Virus-Free! Don't Open Unknown Email Attachments ... 7

Personal Security Software Review 8

ITC Workshop Schedule 10

UO Home Page Becomes Multilingual 12

UO Staff Participates in Cape Town Network Operators' Workshop ... 13

Designing Statistical Power Analysis Studies 14

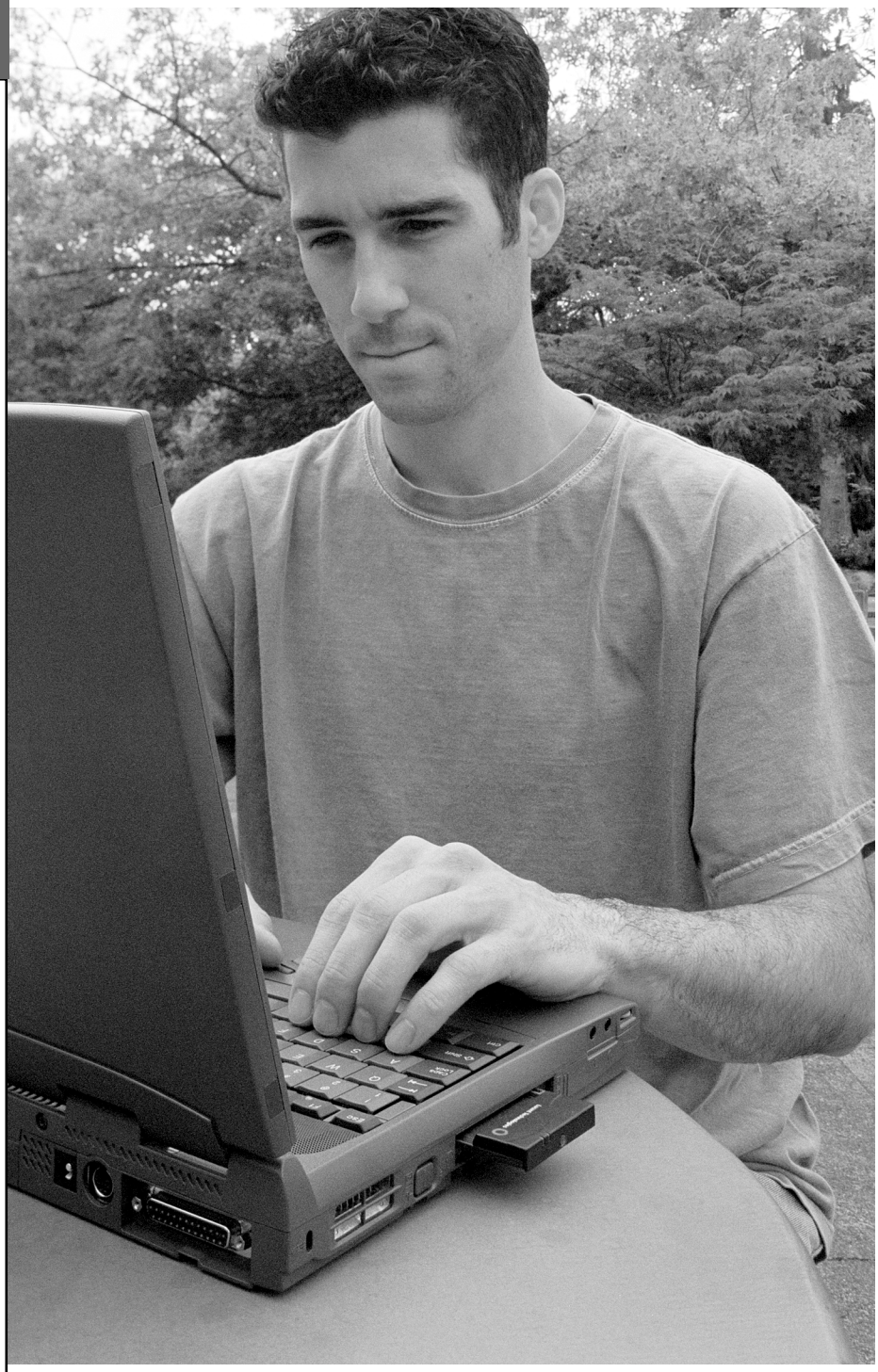
Computing Center Who's Who ... 16

Fiber Optic Primer/Tutorial 18

Suexec Upgrade Affects Some Web Designers 22

Docs Room Acquires New Training Videos 22

Curious About WAP/WML? 23



Wireless UOnet access is now available on campus in the EMU and in the Atrium of Willamette Hall. Just insert a PCMCIA wireless ethernet card in your laptop and go! (See page 3 for details.)

Safeguard Your UO Password When Using Web-based Email Programs

Dan Albrich
Microcomputer Network Specialist
dalbrich@oregon.uoregon.edu

Convenience features of email programs like Hotmail, Yahoo, and Campusi expose your password to possible abuse

While it may be obvious that you should not give your computing account password to a friend, you may not know that it's an even worse idea to give that password to an off-campus email service.

Passwords have become increasingly vulnerable, largely due to external web-based email programs like Hotmail, Yahoo, Campusi, etc. These systems in and of themselves don't necessarily represent a major problem, but most of them have a "convenience feature" that does.

This feature allows you to access your UO email from one of these external web-based mail systems. If you choose to do this, you're asked to enter your UO username and password into the external mail system, thereby exposing yourself to risk.

While you may not realize it, you're extremely vulnerable when you allow your confidential information to be stored on non-UO systems and transmitted through non-UO networks. Here are just a couple of the reasons why:

- Because your UO password is stored on another system, it may be compromised at some point down the road. This has the potential to reveal one—or possibly many—UO passwords to computer criminals.
- While you may not fear for your own account information, a computer criminal can use your information as a means to exploit other accounts or UO systems.

There are alternative ways of accessing your UO email conveniently without jeopardizing your UO accounts.

For example, you can choose to avoid these external web-based systems altogether and use the UO's WebMail system (**https://webmail.uoregon.edu**). Or, you can forward your mail from our system to any email address without revealing your passwords.

Another important precaution is to keep your UO password confidential. *Giving out UO passwords is expressly forbidden by our acceptable use policy. Please don't give out any UO password!*

Finally, when you use an external mail system, make sure it offers adequate technical support. If you experience problems and are unable to contact the provider, you may not have any other support option.

For further information or assistance with email security, please contact Microcomputer Services in Room 202 Computing Center. The office is open 9am to 5pm Monday through Friday, and you can reach consultants by emailing *microhelp@oregon.uoregon.edu* or calling **346-4412**.

UNIVERSITY OF OREGON

COMPUTING CENTER

COMPUTING NEWS

VOL. 15 #4

Computing News is published quarterly by the Academic User Services staff of the University of Oregon Computing Center, 1212 University of Oregon, Eugene, OR 97403-1212.

© University of Oregon 2000

Contact:
Joyce Winslow
jwins@oregon.uoregon.edu

Web site:
http://cc.uoregon.edu/cnews/

Telephone: (541) 346-1724

Photography:
Dave Ragsdale

Free Web-to-Phone Service Lets You Make Telephone Calls With Your PC

Now there's a web site that offers free web-to-phone service (including long distance) in the U.S. Dialpad.com's "software phone" runs within your web browser and enables you to place free phone calls. The person you call doesn't need a computer because the service connects via their telephone.

To use Dialpad, you'll need:

- a Windows PC with Internet Explorer 4 or higher, or Netscape 4.5 or higher.
- an Internet connection (28.8 or faster). Faster connections work better.
- A working sound card with headphones (or speakers) and a microphone.

You can purchase appropriate PC headsets at computer stores.

Dialpad is not without some drawbacks, however. It takes effort to set up for this service the first time, and you must register online to use it. In addition, the audio quality isn't as good as a conventional phone, and the dialing window has advertisements

For more information about Dialpad, see **http://www.dialpad.com**. You can find out about other Internet phone products by going to **http://www.zdnet.com**. Enter "dialpad" into the search field to see recent product reviews.

Network News: Wireless Network Access Now Available on Campus

Connecting to UOnet on campus just got a little bit easier.

UO students now have the opportunity to access UOnet wirelessly, using small PCMCIA radio cards in their laptops. Using one of these cards, you can surf the web from your laptop at speeds that are nearly 100 times faster than a modem connection.

Close-up view of a PCMCIA radio card

Network Services has installed wireless 802.11b networks throughout several public areas on campus, and wireless service is currently available in the EMU, in the Atrium of Willamette Hall, and in some Pacific (AEI) classrooms. Plans are underway to add wireless networking coverage in the Computing Center and some areas of Grayson Hall.

Users who want to test the technology may check out PCMCIA cards from the help desk in the EMU computer lab (22 EMU). For more information, call **346-1769**. This service is paid for by Educational Technology fees.

Get Ready for *More* Modems and Only One Modem Number

In August, 225-2200 will become the *only* UO modem number

By August 23, 2000, the UO modem pool will have nearly doubled and there will be only *one* modem number: **225-2200**.

The new modem pool will have a total of 576 modems, all connected through AT&T. The AT&T connections should be less expensive and will allow for future expansion.

Read *Computing News* Online

Want to read *Computing News* before it hits the stands? You can if you subscribe to the *cnews* mailing list. Once each term, *cnews* will notify you when the issue is online (the web edition is usually available a few days earlier than the printed version).

To subscribe, send mail to *majordomo@lists.uoregon.edu* with the following command in the body of your message:

```
subscribe cnews@lists.uoregon.edu
end
```

Faster In-building Networks on the Way

Faster network connections are in the forecast for campus. Many core routers are being replaced, and costs have been reduced for fast ethernet connections. Here are some of the highlights:

Campus Router Replacement. Over the summer, Network Services will be replacing the core Cisco 75xx routers with Cisco 6509 routers, and any building capable of supporting it will be connected to campus at 100 Mbs. A number of buildings and networks, such as the Education network, will be connected to campus at 1000Mbs.

In addition, some key buildings will be served with redundant connections out of two separate routers via a mechanism called Hot Standby Router Protocol (HSRP).

Fast Ethernet. At $150 per port, Fast Ethernet connections are now more affordable than ever, and special pricing for mass conversions are possible.

Gigabit Ethernet. These very high-performance server connections can be made available over copper ports under special circumstances. Contact Network Services (**346-4395**) for details.

If you have questions about these or other network services on campus, or if you wish to request network service for your department, see **http://ns.uoregon.edu/** or call **346-4395**. If you wish to inquire about the Ethernet capability in your building, send email to *nethelp@ns.uoregon.edu*.

New Computing Center Annex

Lynn Buffing
Assistant to the Director
lbuffing@oregon.uoregon.edu

In September 2000, several key Computing Center services are moving across the courtyard. Microcomputer Services, Computer Accounts, the Electronics Shop, the Documents Room Library, and two new microcomputer labs will all relocate to spacious new offices on the first floor of Grayson Hall.

Contractors have been working since last fall to provide more space and enhance the functionality of these new Computing Center service areas in Grayson. The renovation is expected to be complete by mid-July 2000.

While exact moving dates are not available at this time, we plan to be open for business this fall. Here's what you can expect to see:

Before: *First floor of Grayson Hall, as it looked while still under construction in May.*

Microcomputer Services: Microcomputer Services will be moving its entire operation to Grayson Hall.

This group offers help with almost any personal-computer related problem you may have, including connecting to the Internet, solving virus problems, and helping to set up and troubleshoot computing accounts, file recoveries, and transfers. It also creates and distributes the Duckware CDs.

The new Microcomputer Services area will be located on the north end of the first floor of the building and will include a large reception area and new staff offices. Space has also been designated for several multimedia stations for scanning images, capturing video, and manipulating large media files.

By bringing Microcomputer Services into close proximity to several large classrooms, new computer labs, the Documents Room Library, Computer Accounts, and the Electronics Repair Shop, we hope to offer improved consulting services to an expanded range of customers.

Computer Accounts: The administration of user accounts on the academic and administrative computers (Darkwing, Gladstone, and the VMScluster) and Oracle database systems will also move to the first floor of Grayson's north wing.

Acount clerks will be available to assist users with account access and password questions and to process administrative requests for BANNER access and password changes.

Documents Room Library: The Documents Room Library will be located at the south end of the first floor and will have approximately twice as much space as it currently has to accommodate its collection of books, magazines, CD-ROMs, and videos.

The new Documents Room will include a small conference room, plenty of seating near windows overlooking the courtyard, and carrels where students can connect their laptops to the Internet.

Electronics Repair: The Electronics shop will also be located at the north end of the first floor and will continue to serve the campus with quality computer hardware repair and upgrades.

The reception area has been designed with customer convenience in mind, including increased storage for stocking cables and other supplies and lower counter heights to facilitate equipment drop-off and pick-up. The facility will be located next to a loading dock and customers will have access to 24-minute parking spaces.

Microcomputer Labs: The Computing Center is planning to open both an

to Open in September

instructional lab and an open-access lab in the new Grayson facilities.

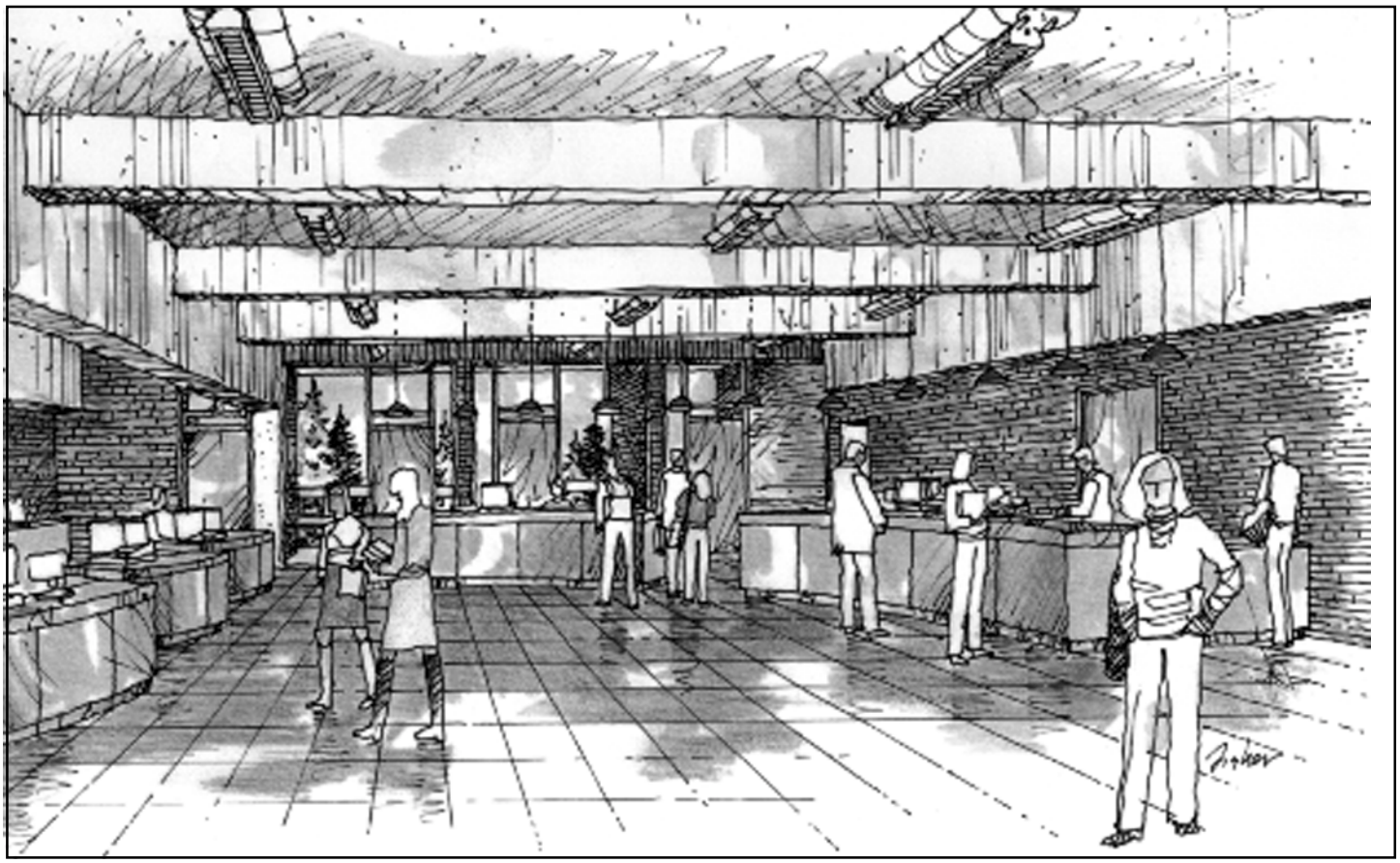
The instructional lab will have 20 Windows-based computers with an LCD projection unit, while the open-access lab will have approximately 25 workstations with Windows and Macintosh computers, color scanners, and laser printers.

Instructors wishing to reserve the instructional lab should contact Mary Bradley at **346-1737** or send email to *mbradley@oregon.uoregon.edu*.

Network Access: Grayson's spacious corridors on the first floor will be furnished with public-access workstations so that students may check email or perform other system functions between classes.

Other New Grayson Facilities. In addition to the space allocated to the Computing Center, Grayson Hall will add approximately 1400 classroom seats to the university classroom pool and will house the departments of History and Ethnic Studies, the Social Science Instructional Lab, and the Oregon Survey Research Lab.

If you would like more information about this project, please contact Lynn Buffing (*lbuffing@oregon.uoregon.edu* or **346-1772**).



After: *Artist's rendering of the Computing Center consulting and reception areas after the Grayson Hall renovation is complete.*

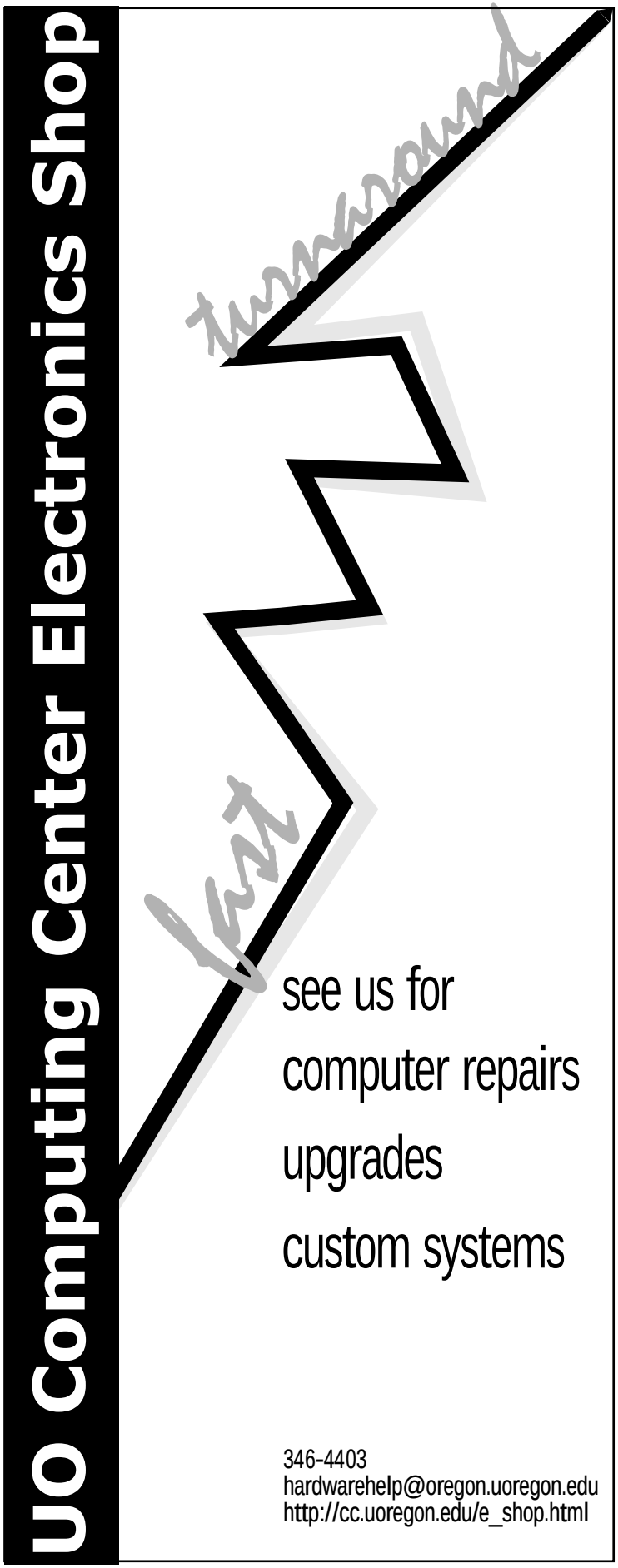
Intel to Replace Faulty Motherboards

Last May, Intel announced a problem with components inside Pentium III computers containing a chip called the "memory translator hub" (MTH). The MTH component is used on some boards and in some systems using the Intel® 820 Chipset, including the Intel® CC820 Desktop Board Family with SDRAM.

Only systems shipped *after* November 1, 1999, are affected. Systems shipped before that date and systems using the Intel® 820 Chipset with RDRAM memory are not affected. Because they do not use the faulty MTH chip, laptops or notebook boards/systems are also not susceptible.

In response to the problem, Intel has cancelled three motherboard designs and has stopped shipping the MTH component and an Intel motherboard that uses the part. The company is also working with computer and motherboard manufacturers and distributors to notify affected computer users and to offer a replacement.

To learn more about the MTH reboot problem, see **http://www.intel.com/support/mth/ami.htm** To find out what to do if you have this problem, see **http://www.intel.com/support/mth/wtd.htm**



New Secondaries Join Internet2

Internet2, the high-speed academic and research network that connects Carnegie Research I and II universities, currently has over 170 primary members and recently began sponsoring secondary members.

While primary members pay to participate in Internet2 and have various privileges associated with their membership, secondary members aren't required to make the financial and technical investments associated with being full primary members.

Typically, these secondary participants comprise nonprofit or government organizations devoted to research or education that routinely collaborate with primary members on instructional and / or research projects and services.

To date, six organizations have been approved for secondary membership in Internet2:

- Seattle Community College District
  http://www.sccd.ctc.edu/
- Survivors of the Shoah Visual History Foundation (VHF)
  http://www.vhf.org/
- Eastern Oregon University
  http://www2.eou.edu/
- Oregon Institute of Technology
  http://www.oit.edu/
- Southern Oregon University
  http://www.sou.edu/
- Western Oregon University
  http://www.wou.edu/

The four new Oregon secondary members are sponsored by the University of Oregon and connect to Internet2 via the Oregon Gigapop, which is located in Eugene and is operated and managed by the UO.

When connection of these secondary members to Internet2 is complete, their traffic will be able to flow over Internet2 just as traffic from the University of Oregon, Oregon State, and Portland State currently does.

Extensive discussions about the form and direction of the secondary program, particularly as it applies to state K12 networks, are currently underway within Internet2 itself.

For more information about Internet2, see **http://www.internet2.edu/** A current list of secondary members is available at
http://www.ucaid.edu/abilene/html/secondaries.html

Stay Virus-Free!
Don't Open Unknown Email Attachments

Here are some steps you can take to avoid getting bitten by a "LOVE" bug…

Joyce Winslow
jwins@oregon.uoregon.edu

By now, most people are aware of the havoc created at some sites by the ILOVEYOU virus, which affected a significant number of public and private computing systems early last May. But some may still be unclear how to protect themselves from similar attacks in the future. This article briefly summarizes common virus hazards and suggests some practical security measures.

How Viruses Work

In general, a computer virus is a "parasitic" program written intentionally to enter a computer without the user's knowledge or consent. A virus attaches itself to a file or disk boot sector and replicates itself to other files or disks in an effort to spread. Viruses that infect the boot sector of a hard disk are known as boot viruses, whereas program viruses ("worms") infect executable program files (e.g., .vbs, .com, .exe, .sys, and .bin).

The ILOVEYOU virus was the latest, most dramatic, instance of the widespread damage a worm can cause. Worms can take several forms, but typically they come as forwarded email containing an attachment. When the attachment is opened, the worm then installs and executes itself, performing any number of annoying or destructive actions, including sending itself to people in the recipient's email address book and infecting or deleting files.

In addition to irrevocably destroying all files with the extensions .vbs, .vbe, .js, .jse, .css, .wsh, .sct, .hta, .jpg, .jpeg, and .mp3, the ILOVEYOU virus also changed the Internet Explorer Start Page URL to a page containing an executable virus file. And while the ILOVEYOU virus uses Outlook and Outlook Express to proliferate, users of other email programs are still vulnerable. (*Note:* The Visual Basic script of the virus is tailored for Microsoft Windows operating systems; Macintosh operating systems were unaffected by the ILOVEYOU virus.)

This virus is pernicious, using Microsoft Outlook and Outlook Express to send itself to everyone in an address book from these programs, and destructively replacing files. The subject line of the infectious email reads "ILOVEYOU," and the message of the email reads "Kindly check the attached LOVELETTER coming from me." The attachment, which contains the destructive Visual Basic script (VBScript), is named "LOVE-LETTER-FOR-YOU.TXT.vbs"

Protective Measures

Don't open attachments! This is the number-one rule of safe computing. Don't download files from strangers, and don't open any files at all unless you know the person who sent them, you were expecting that particular file, and you have an up-to-date virus detection program running.

Install an antiviral program and keep it updated. The UO currently has a site license for the Symantec antiviral products, and you can get copies of Norton AntiVirus (NAV) and Symantec Antivirus Mac (SAM) from the CC Public Domain server on UOnet. Other commercial antiviral tools include Virex, Sophos Sweep, F-Prot Professional, and McAfee's VirusScan.

Once you have installed a virus-protection program, download the latest virus definitions from your software provider. Symantec's Norton AntiVirus has a LiveUpdate utility that makes it easy for you to keep your antiviral software up-to-date.

Consider installing a personal security package. A variety of personal security software packages for personal computers is now available. (For a review of some of the firewall software that's currently on the market, see "Personal Security Software Offers Increased PC Protection" on page 8).

More Questions?

If you have further questions about obtaining or using antiviral programs at the UO, you can contact Microcomputer Services from 9 am to 5 pm, Monday through Friday. Call a consultant at 346-4412, stop by Computing Center Room 202, or email *microhelp@oregon.uoregon.edu.*

Microcomputer Services also has detailed virus information posted on several of its web pages. For a good overview of viruses and virus protection, see their "Practicing Safe Computing" page at

http://micro.uoregon.edu/workshops/virusoutline/

For specific information about the ILOVEYOU virus, see

http://micro.uoregon.edu/taintedlove.htm

Antiviral Resources on the Web

The Symantec AntiViral Resource Center:
http://www.symantec.com/avcenter/index.html

F-SecureInformation Center:
http://www.datafellows.fi/news/vir-news/

McAfee's Virus Info Library:
http://www.mcafee.com/support/techdocs/vinfo/index.html

The AVP Virus Encyclopedia:
http://www.metro.ch/avpve/

The A-Z Antivirus Page:
http://antivirus.miningco.com/compute/software/antivirus/

Don't Spread that Hoax:
http://www.nonprofit.net/hoax/catalog/virus/viruses.htm

The Hitchhikers AntiViral Resources:
http://www.hitchhikers.net/av.shtml

Personal Security Software

John Kemp
Senior Security Engineer, Network Services
kemp@ns.uoregon.edu

It has become increasingly apparent that the Internet is not as benign as it once was. Denial of Service (DoS) attacks, Internet worms, and major web site break-ins have become commonplace events. Because of the heightened level of awareness of these risks, users are now looking for ways to protect themselves from a wide range of attacks.

Traditionally, the best approach for individual protection has been to

1) make sure you have a good, current backup of critical files, and

2) run antiviral software on a regular basis and keep current with the latest antiviral software updates

These two practices continue to be excellent forms of individual protection, but personal firewall software is now also available to the average user.

What are Firewalls and How Do They Work?

A firewall is a mechanism that's used to control the network traffic seen by one or more computers. The set of rules defined by the administrator constitutes the security policy that the firewall implements. These rules specify what types of traffic are allowed in and out, and which sites are permitted to communicate with the computer. Firewalls can also perform additional tests to screen out unusual types of traffic that might be considered harmful.

Hardware firewalls. Firewalls can be implemented as relatively powerful stand-alone hardware devices. These devices are typically used by organizations that have a high-speed connection to the Internet and large numbers of computers they want to protect.

Software firewalls. Firewalls can also be implemented in a lightweight form as software that can be run on a personal computer. Personal software firewalls typically operate as a "shim" below the normal network driver for the computer, or as a complete replacement for the network driver. After installing personal firewall software, you can specify rules that govern how traffic is passed to and from your machine.

What Personal Security Packages are Currently Available?

A number of personal security packages are currently on the market which are fairly inexpensive and relatively easy to work with. Each of these packages has a slightly different approach to personal computer security, and many contain not only a software firewall type of component, but also additional tools that may increase computer security. A few of these products are summarized below:

Norton Internet Security 2000

Windows 95/98/NT/2000
Symantec Corporation
http://www.symantec.com
$59.95 list, ($39.95 UO Bookstore)

Despite the reference to the year 2000 in the name, Norton Internet Security 2000 (NIS2000) is also a Windows 95/98 product. Symantec purchased the popular "AtGuard" product from WRQ Inc. and made both cosmetic and substantive improvements to the software. Previous AtGuard users will immediately recognize that AtGuard is really at the core of NIS2000.

Control features. Symantec's user-friendly front-end screen makes initial configuration a simple task. On the back end, the product has numerous controls for packet filtering, cookie blocking, web site filtering, advertisement blocking, and so on. In simple mode, these features can be set to "low," "medium," or "high," but each can be controlled more specifically by using the "Custom Level" menus. Here you can specify whether to allow Java applets or ActiveX controls to run, whether you want to allow cookies (or be prompted for them), and so on. Similarly, in the "Advanced Options" section, you can define specific rules for controlling inbound and outbound TCP, UDP, and ICMP network traffic.

Useful extras. NIS2000 has an excellent statistics monitor window. The window shows all active network connections, as well as summaries for network activity, web filtering, ad blocking, and firewall rule-matching results. The statistics window updates automatically and can be customized.

Another plus is the ad-blocking feature. Ad blocking is a great way to optimize network performance on slower connections. For example, if you're a dialin modem user, turning on ad blocking can reduce the amount of data your computer downloads by skipping advertisement banners.

Finally, Symantec has done a good job of integrating Norton AntiVirus and NIS2000, so the two products work well together.

Summary. On the minus side, NIS2000 can be fairly complicated to work with due to its large number of features. Working on rules definition in the firewall section, for example, might intimidate some. But overall, NIS2000 is a solid product, and the feature set is more than enough for the average user. The ad blocking, web filtering, and cookie controls are not available in most other products, but depending on your needs, they can be valuable features.

ZoneAlarm 2.1

Windows 95/98/NT (2000 in development)
Zone Labs, Inc.
http://www.zonelabs.com/
Free for nonprofit use

ZoneAlarm has been a popular package for personal network security on

Offers Increased PC Protection

Windows 95/98 machines for some time. The product is free for personal and nonprofit use, and its simplicity of operation is also a key selling point.

The ZoneAlarm interface is intuitive: a network traffic meter showing incoming and outgoing network activity is displayed in the system tray. To make interacting with the software quick and easy, the latest version also has a mini-panel interface that can be configured to appear in the toolbar area.

Control features. A "lock" icon pushbutton is used to quickly disable or enable subsequent access to the Internet. Similarly, a "stop" icon pushbutton adds to the lock functionality by also terminating existing connections to the Internet. The lock can be configured to engage when the screen saver is activated, or after any number of minutes of inactivity. The program front panel also shows icons for any running applications that have open network connections.

Traffic management. ZoneAlarm takes a slightly different approach to managing network traffic. The configuration of ZoneAlarm allows the user to specify which applications on the local machine are allowed to open network connections. For each of the applications, the user can specify the scope of machines with which the application is allowed to communicate. These are grouped into two zones: the "Local" zone, and the "Internet" zone. The local zone can also be expanded to included other subnets or machines, based on IP address or subnet address.

The application-centric paradigm makes ZoneAlarm fairly intuitive to use. Once the local zone is defined and an application is launched for the first time, ZoneAlarm prompts the user to decide whether to allow, disallow, or "prompt each time" the application opens a connection to either or both the local and Internet zones. An application can also be set to allow connections from the outside using the "server" setting.

Summary. Overall, ZoneAlarm is a nice product, although it can sometimes be a little rough around the edges and it does have some impact on networking performance. Sophisticated users might wish for the ability to do more complex configuration. But for the average user, ZoneAlarm's ease of use is a real plus. When an unauthorized connection attempt is detected, ZoneAlarm issues a popup alert and blocks the attempt. And having an auto-lockout timer for Internet access is also very convenient. The latest version of ZoneAlarm is also reported to be able to block VBScript attachments, like the ones seen in the recent "ILOVEYOU" trojan/worm. For the price, ZoneAlarm has a feature set that's hard to beat.

BlackICE Defender

Windows 95/98/NT (2000 in development)
Network ICE Corporation
http://www.networkice.com/
$39.95

BlackICE Defender is perhaps the most unobtrusive of the three personal security packages reviewed here. In normal operation it runs in the background and doesn't call attention to itself.

Settings. Defender is a personal intrusion detection program with an automated blocking mechanism that can lock out sites when it senses an attack. Its security settings are based on IP address and "security level." The four levels available are "Trusting," "Cautious," "Nervous," and "Paranoid." Each of these levels has a predefined set of TCP or UDP ports that are controlled by this setting. (The "Nervous" setting, for example, causes Defender to examine all incoming TCP traffic on all ports, but only incoming UDP traffic on low-numbered ports. In contrast, the "Paranoid" setting examines all incoming traffic on all ports.)

Two lists of IP addresses are also configurable, one containing "trusted" sites, the other containing "blocked" sites. Trusted sites are exempt from all checks. And one other feature, namely the blocking of Microsoft File Sharing over the Internet, is available independent of the security level.

The tasks that Defender performs best are intrusion-detection logging and automated blocking. Defender recognizes a wide range of well-known attacks, ranks them by severity, and only blocks a site when the attack is considered critical. The attack log is detailed and can provide useful information for anyone tracking a specific incident. Each log entry also includes a link to the Network ICE web site, which has detailed information on the specific type of attack. Defender also has a history section that displays graphs of the amount of network traffic, and the number of attacks seen, over a given time period.

Summary. One criticism of BlackICE Defender is that the security controls are fairly coarse. Not being able to precisely control which ports are being allowed or blocked can be frustrating. Another problem is that the Defender installation can be quirky if a machine has more than one network interface. But these drawbacks are usually not critical. A typical user will find that the simplicity of the user interface and the unobtrusive nature of operation of the product more than make up for these shortcomings.

Other products

Two other products you might want to explore are

DoorStop Personal 1.1. (Mac)

Open Door Networks, Inc
http://www.opendoor.com/
$59 (Education discount: $49)

McAfee.com Personal Firewall

(formerly Signal9 ConSeal PC Firewall)
McAfee.com Corporation
http://www.mcafee.com/
$49.95

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 ("ITC") workshops are free and open to currently enrolled students, as well as staff and faculty.

There is no registration; just show up a few minutes before the scheduled start. All seating is available on a first-come, first-served basis. You *must* meet the workshop prerequisites as stated in the description. If fewer than five people are present ten minutes after the scheduled start, the workshop may be canceled or rescheduled at the discretion of the instructor.

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

This schedule is subject to change. See *http://libweb.uoregon.edu/it/* for course outlines/materials and the most current information.

Communication & Research Topics

Net a Job: Use the Web - (*To register for this workshop, contact the UO Career Center at 346-6001)*

Link up to thousands of jobs, internships, employers, companies, and organizations. Learn how to submit your resume electronically. ✔ *Prerequisites:* Familiarity with a graphical web browser (e.g., Netscape or MS Explorer).

Wed July 19 | 3 - 4:20pm | EC | Haynes

Preparing an Electronic Dissertation in PDF

The Graduate School has begun a pilot project that allows students the option of submitting dissertations in Adobe PDF format. This session will discuss the technical issues involved in preparing such a dissertation, and will demonstrate the use of Adobe Acrobat and Distiller software to create PDF versions of your documents.

Wed Aug 2 | 3 - 4:20pm | RSR | Johnson

Basic Web Publishing Skills ´ - ✔ Prerequisites

Web Publishing I

Learn how to create your own web page using the hypertext markup language (HTML). This workshop teaches you all the HTML and software you need to create and publish a basic web page. ✔ *Prerequisites:* Familiarity with a graphical web browser (e.g., Netscape Navigator) and an account on Darkwing or Gladstone (not Oregon). You must know your username and password.

Fri July 7 | 1 - 2:50pm | EC | Frantz

* 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

★ **Requires an active account on DARKWING or GLADSTONE**

SUMMER WORKSHOPS

Workshop	Day/Date	Time	Location	Presenter

More Basic Web Publishing Skills ★ - ✔ Prerequisites

Web Publishing II

Continues to build on the skills learned in Web Publishing I. Focuses on using tables and frames, HTML entities (diacritics, and symbols such as copyright), and using fonts, color, and images.

✔ *Prerequisites:* Web Publishing I or equivalent knowledge and skills; and a web page you've created.

Fri July 14 | 1 - 2:50pm | EC | Benedicto

Web Publishing III

Builds on the Web Publishing II workshop. Focuses on additional HTML features, including more advanced use of images, and on the use of simple HTML editors (Claris Home Page and Microsoft Frontpage Express).

✔ *Prerequisites:* Web Publishing II or equivalent knowledge and skills.

Fri July 21 | 1 - 2:50pm | EC | Johnson

Web Publishing Beyond the Basics ★ - ✔ Prerequisites

Cascading Style Sheets (*http://darkwing.uoregon.edu/~jqj/inter-pub/css/)*

Cascading Style Sheets (CSS) are implemented only in recent versions of web browsers, but provide HTML authors with greatly expanded control over the appearance of web pages. This session will look at CSS and other recent changes to HTML, and what they mean for web publishers.

Mon Jul 31 | 10 - 11:50am | RSR | Johnson

Web Design Principles and Practices (*http://darkwing.uoregon.edu/~cbell/design/*)

What makes an effective web site? What makes a bad one? Web design is a balance of visual appeal, content, and usability. This workshop discusses how to achieve this balance to create a well-designed, functional web site.

✔ *Prerequisites:* Web Publishing I & II or equivalent knowledge and skills.

Mon Aug 7 | 10 -11:50am | RSR | Johnson

Workshops Available on Video

Looking for an alternative to the workshop format?

The Computing Center Documents Room (Room 205) has a growing collection of videos on using computers and computer software. You can use your UO picture ID to check out these videos. For a list of available titles and descriptions, visit ***http://micro.uoregon.edu/workshops/*** 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

★**Requires an active account on DARKWING or GLADSTONE**

UO Home Page Becomes Multilingual

Joyce Winslow
jwins@oregon.uoregon.edu

The University of Oregon home page is going international!

If you've visited the UO on the web lately, you may have noticed links to new foreign language versions at the foot of the page. The foreign language pages are updated daily and have the same news stories and pictures as the English page.

Multilingual web pages are an emerging trend. A few other universities, particularly those abroad, have also begun offering multilingual translations of some key links from their home pages. Eventually, we expect to see an increasing internationalism on the web.

The Computing Center took on this translation project with the intent to make the UO home page more universally welcoming, and to provide a "template" for campus departments that may wish to follow our example in their web pages. (Note that we are not attempting to translate *all* our pages, just those that may be of particular interest to foreign visitors.)

Versions in German, Spanish, French, and Italian are online now, and more continue to be added. Computing Center web specialist Dave Ragsdale is currently working on a Thai version, and eventually he will create UO home pages in Dutch, Russian, Chinese, Japanese, Arabic, and many other languages, including Nordic and African languages.

As Ragsdale notes, one of the challenges in designing a foreign language page is finding appropriate names for the major links. "Our major links are not necessarily links that get used in other languages, so sometimes it's difficult to find a culturally correct term to use for some of our 'American' links," he explains. Ragsdale must also create replacement graphics and drop them into duplicate pages with the new foreign language text and text alts.

The other major part of this project, of course, is translation, and the Computing Center is soliciting translating help from any and all linguists on campus. Thus far, volunteer translators have included:

Spanish: Hervey Allen (Computing Center)

Italian: Steve Huter (Network Startup Resource Center)

German: Helmut Plant (Germanic Languages and Literature)

Portuguese: Sergio Koreisha (College of Business)

French: Andrew Ehrhardt (Romance Languages)

We thank these volunteers for their time and effort!

Want to Help?

If you're fluent in a foreign language and are interested in participating in this project, contact Joe St Sauver (**346-1720**, *joe@oregon.uoregon.edu*).

Google Now Indexing UO Content as a Separate Search

If you're looking for a new way to search for UO content on the web, try Google's new university search engine at **http://www.google.com/uoregon.** If you're among the first to respond, Google is giving away free prizes. To claim your prize, try out the search engine and then go to **http://www.google.com/lucky.html**

UO Computing Center Staff Participates in Cape Town's Network Operators' Workshops

Hervey Allen
hervey@oregon.uoregon.edu

UO Computing Center staff (Hervey Allen, Joel Jaeggli, Lucy Lynch, and Greg Shepherd) and UO Network Startup Resource Center staff (Steve Huter and Randy Bush) recently joined an international team of instructors to teach workshops and set up network facilities in Cape Town, South Africa. These workshops were timed to coincide with the inaugural meeting of the African Network Operators' Group (AFNOG).

Instructors from Ghana, Togo, Mali, South Africa, England, the U.S., and Holland taught the workshops, which were held last April at the Graduate School of Business for the University of Cape Town. Attendees included operators of existing African Internet Service Providers (ISPs), who are developing and enhancing national internets with regional and international connectivity. The classes addressed the issue of network growth, focusing on scalable network infrastructures and scalable Internet services to prepare for expected future surges in demand.

Geert Jan de Groot (Berkeley Software Design, Inc.), Dr. Nii Quaynor (Network Computer Systems, Ghana), and Steve Huter (UO Network Startup Resource Center) take a break between classes.

By encouraging the exchange of ideas and techniques, the AFNOG meetings and workshops helped to increase communication and cooperation among the many African networks. They also gave those of us from the U.S. a better understanding of the challenges some of these network operators face, and their degree of dedication as they continue to build and scale their networks for the future.

Students program a router interface as Greg Shepherd (left) and Geert Jan de Groot (background) look on.

The workshops and meetings were underwritten with help from the Network Startup Resource Center (NSRC), which is based at the UO and partially funded by the National Science Foundation, and from several companies, including Addison Wesley Longman, Cequrux Technologies, Cisco Systems, Cisco Press, John Wiley & Sons, O'Reilly and Associates, PanAmSat, and USENIX.

The help of these various sponsors, volunteers, and instructors from around Africa, the U.S., and Europe was invaluable. Without the concerted effort and coordinated support of so many individuals, companies, and the NSRC, the workshop and meetings would not have been possible.

To see detailed workshop notes and outlines, see **http://www.ws.afnog.org** Information about AFNOG is available at **http://www.afnog.org**, and you can learn more about the work of the NSRC at **http://www.nsrc.org**

Important Factors in Designing

The size of your study sample is critical to producing meaningful results

Robin High
Statistical Consultant, Academic User Services
robinh@darkwing.uoregon.edu

What is "statistical power analysis?" And how and under what circumstances is it applied?

The purpose of many research projects is to search for evidence that a value of a parameter from a population of interest is different from the hypothesized value. In other words, if the computed p-value from a statistical test is "small" (e.g., less than some arbitrary cutoff value), the null hypothesis is rejected in favor of the alternative. This process can be compared to an investigation in which the researcher determines if there is sufficient evidence from a collected sample to change our view of a population characteristic.

Power is broadly defined as "the probability that a statistical significance test will reject the null hypothesis for a specified value of an alternative hypothesis." Another way to define it is "the ability of a test to detect an effect, given that the effect actually exists."

Here is a simple, illustrative example: suppose you want to explore the effect regular exercise has on a person's "quality of life." When designing such an experiment, what questions should you consider ?

Initial Considerations. Assume the exercise program is of scientific value and two groups with an equal number of subjects randomly assigned to each group will be available (one group is assigned to the exercise program and one group assigned as a control). Here are a few important considerations:

- Has any previous research been done on this topic?
- How will the response variable, "quality of life," be measured?
- What experimental design strategy would work best?
- What factors would you need to control or hold constant?
- What personal characteristics should be measured yet are not considered part of the design?
- Sample size: how many subjects are needed?

This is only a partial list of many important questions that must be carefully considered when designing any data collection activity. All too often, however, the question of sample size is slighted—or perhaps even ignored—even though it's critical to the usefulness of the results.

Essential information. When performing a statistical power analysis, you'll need to consider the following important information:

1. Significance level α or the probability of a Type I error. A common, yet arbitrary, choice is $\alpha = .05$

2. Power to detect an effect. This is expressed as power=1 - β, where β is the probability of a Type II error. Power=0.80 is also a common, yet arbitrary, choice.

3. Effect size (in actual units of the response) the researcher wants to detect. Effect size and the ability to detect it are indirectly related; the smaller the effect, the more difficult it will be to find it.

4. Variation in the response variable. The standard deviation, which usually comes from previous research or pilot studies, is often used for the response variable of interest.

5. Sample size. A larger sample size generally leads to parameter estimates with smaller variances, giving you a greater ability to detect a significant difference.

These five components of a power analysis are not independent: in fact, any four of them automatically determines the fifth. The usual objectives of a power analysis are to calculate the sample size (5) for given values of items (1)-(4). In studies with limited resources, the maximum sample size will be known. Power analysis then becomes a useful tool to determine if sufficient power exists (2) for specified values of (1), (3), (4), and (5). The researcher can evaluate whether the study is worth pursuing.

Comments

Significance level. Using $\alpha = .05$ is completely arbitrary. In fact, I am 90% confident that 75% of researchers do not know what α actually means, so how could a "correct" cutoff level be chosen?

Similar comments can be made concerning β, but explaining this important probability is beyond the limited scope of this article.

What effect size is meaningful? The size of a practical difference in the response you would like to detect among the groups is crucial. It essentially measures the "distance" between the null (H0) and a specified value of the alternative (HA) hypotheses. It also relates to the underlying population, not to data from a sample. A desirable effect size is the degree of deviation from the null hypotheses (in actual units of the response) that is considered large enough to attract your attention. Jacob Cohen, an important con-

Statistical Power Analysis Studies

tributor to power analysis documentation, defined effect sizes as small, medium, and large, and he has stated that "all null hypotheses, at least in their two-tailed forms, are false." A difference is always going to be there; however, it might exist in such a small quantity that you should not be concerned about finding it. The concept of small, medium, and large effect sizes can be a reasonable starting point if you do not have more precise information. (Note that an effect size should be stated in terms of a number in the actual units of the response, not a percent change such as 5% or 10%.)

Returning to the example, if a difference in quality of life due to an exercise program exists, is the magnitude of the difference worth detecting? Suppose the levels of exercise you apply to subjects cause an observed change in quality of life of one unit on the chosen measurement scale. Is a one-unit change—or even 5 or 10 units—meaningful when facing the reality that many factors external to the study will also affect a person's quality of life?

Estimates of variation. You'll also need an estimate of the variability in the response of interest before you can determine the sample size needed to estimate an effect. This value is often found from pilot studies or from previous research, although it is all too often not readily available in published documents. Some parameters of interest are dimensionless quantities, such as a correlation or coefficient of variation, so in these cases a standard deviation would not be required.

Power calculations. Computing power for any specific study may very well be a difficult task. However, if you do not evaluate the joint influence of the size of the effect that is important and the inherent variability of the response during the planning stage, one of two inefficient outcomes will most likely result:

1. "Low power" (too little data; meaningful effect sizes are difficult to detect). If too few subjects are used, a hypothesis test will result in such low power that there is little chance to detect a significant effect. Consider someone attempting to start a car on a cold winter morning with a weak battery—it just doesn't provide the cranking power to get the engine going. This is analogous to designing an experiment in which resources were not put to optimal use (i.e., data from fewer subjects than the necessary number were collected to detect a meaningful effect).

2. "High power" (too much data; trivially small effect sizes can be detected). At the other extreme, consider an experiment where data collection is so large that a trivially small difference in the effect is detectable. One could describe this approach as the "Tim the Tool-Man" method ("MORE POWER, eh, eh!"). If you have ever watched the popular TV show '"Tool Time,'" you'll know exactly what I mean. Again, the researcher has not put all of his or her time and resources to good use—in statistical terms, too many subjects have been studied.

A study with low power will have indecisive results, even if the phenomenon you're investigating is real. Stated differently, the effect may well be there, but without adequate power, you won't find it.

The situation with high power is the reverse: you will likely see very significant results, even if the size of the effect you're investigating is not practical. Stated differently, the effect is there, but its magnitude is of little value.

In conclusion, the number of subjects you use is critical to the success of research. Without a sufficient number, you won't be able to achieve adequate power to detect the effect you're looking for. With too many subjects, you may be using valuable resources inefficiently. Either way, implementing a study with too little or too much power does not spend time and resources economically; this is viewed by some reviewers as unethical scientific behavior.

Computer Software for Power Calculations

Several Internet sites will help you understand power analysis and will get you started with either commercial or free software. Descriptions of available software and URL resources are shown below.

nQuery Advisor Release 4.0 - This software, which is used for sample size and power calculations, contains extensive table entries and many other convenient features. For more information, see **http://www.statsol.ie**

SamplePower(r) 1.2 - SamplePower, available from SPSS, arrives at sample sizes for a variety of common data analysis situations. You can learn more about it at **http://www.spss.com/spower/research.htm**

G*Power - You can download this free program from **http://www.psychologie.uni-trier.de:8000/projects/gpower.html**

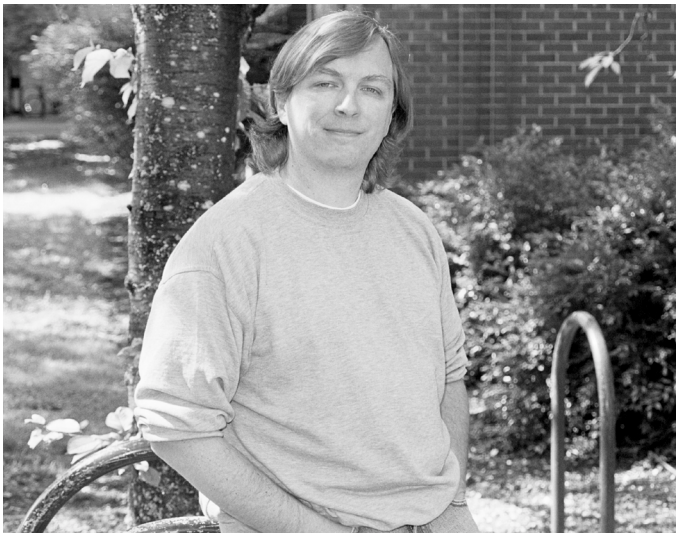
G*Power allows you to calculate a sample size for a given effect size, alpha level, and power value.

UnifyPow is another free power analysis program that uses SAS. You can find example programs and workshop notes at the UnifyPow web site at **http://www.bio.ri.ccf.org/power.html**

Who's Who at the

Meet some of the people who work behind the scenes to facilitate your computing experience on campus

Vickie Nelson
vmn@oregon.uoregon.edu



Hervey Allen
Microcomputer Support Specialist
Microcomputer Services

This summer the Computing Center says goodbye to Hervey Allen, a longtime mainstay of Microcomputer Support Services.

When Hervey arrived at the UO in 1988 with a BA in the History of Science from Pomona College in Los Angeles, everyone at the Computing Center was putting in time at a help desk. Hervey, who was then pursuing a second bachelor's degree in Computer Science, was one of the first student assistants hired primarily to provide microcomputer support.

Born in Ankara, Turkey, Hervey enjoys traveling. After graduating from the UO in 1990, he visited his sister in Chile and joined her on an ecological expedition of the rainforests. Paula, now his wife, was also on that expedition. While Paula attended school, Hervey worked as a programmer and studied computer networking at the University of Chile.

In 1992 Hervey returned to Eugene with Paula, accepted his present job as Microcomputer Support specialist, and began working on a master's degree. In addition to his duties for Microcomputer Services, he has worked for the Network Resource Startup Center, participating in computer networking workshops in Angola, the Dominican Republic, and South Africa.

Hervey is currently working part-time for the Computing Center and part-time for Netcorp, a non-profit organization that trains students to be technical interns for other non-profits. Hervey is also a track-and-field fan and is on the board of Oregon International Athletics.

After a trip to Europe this summer, Hervey and Paula are taking off for San Francisco so Paula can work in the field of visual design. Eventually, the couple plans to return to Chile.

Rebecca Porisch
Computer/Scanner Operator, Operations

Eugene native Rebecca Porisch was an undergraduate working on a BA in English when she landed a work-study job at the Computing Center. She was one of the first people hired to staff the new downstairs Help Desk. After she graduated, she was offered a half-time position as a scanner operator and the position eventually became full-time.

In the mornings, Rebecca operates the ScanMark 2500, which reads optically-marked forms such as exams, course evaluations, grade rosters, ballots, and surveys. In the afternoons, she works as a computer operator, monitoring the campus network and the main computer systems and keeping an eye on their print and mail queues for error messages.

Outside of work, Rebecca enjoys spinning, knitting, and gardening. She's completed the Master Gardeners' Program offered by the Lane County Extension Service and is a regular at the Black Sheep Gathering at the County Fairgrounds. She and her partner, Dan Albrich, share a home with an angora rabbit, two cockatiels, and a few hundred earth worms destined for the garden.

Rebecca also enjoys traveling. Last summer she and Dan took a whirlwind camping trip through many of the National Parks of the Southwest. This summer they may travel to Europe.

Computing Center

Robert Bennett
Computer Services Assistant
Computing Facilities

Meet Robert Bennett, the Computing Center's new downstairs receptionist.

Since November 1999, Robert's been checking in machines for repair, answering the phones, and ordering supplies. He also serves as BANNER clerk, adding and removing BANNER accounts and changing passwords.

Born in Billings, Montana, and raised in the small town of Hardin, Robert began working with computers when he was five and was programming by the time he was seven. He always enjoyed tinkering with things, so technical school was a natural step after high school.

Thereafter, Robert studied Computer Science at Montana State University and found a job at FutureShop in Billings, where he became an A+ Certified Technician. When his supervisor offered him a senior tech position in the Eugene FutureShop, Robert accepted. After the Eugene store closed, he moved on to the Computing Center.

Robert left Montana in minus-50-degree weather and arrived in Eugene on a balmy 75-degree day. Although the change was drastic, it was a good one. Robert likes being close to the ocean and the mountains and finds life in Eugene with a roommate and four cats to his taste.

When not at work, Robert occasionally DJs for dances around town. Robert also enjoys playing electric and classical guitar, skiing, and riding his bike.

Jon Neher
Academic UNIX Systems Manager
Computing Facilities

Jon Neher was born in Topeka, Kansas, and raised in Santa Cruz, California, where he graduated from UC Santa Cruz as a music composition major. A fan of most forms of American music, Jon plays pedal-steel guitar, six-string guitar, and various saxophones. After college, he toured with artists such as Elvin Bishop and Clarence "Gatemouth" Brown.

When the time came to settle down, Jon drew on his technical skills—he's been a ham radio operator since the age of 12 and wrote music education software in school. He found a technical writing job at Hewlett-Packard, where he learned UNIX system administration, and eventually moved on to work for Sun Microsystems as a programmer.

Jon always dreamed of moving to the country and working a more flexible schedule, and in 1989 his dream came true. He bought an 11-acre spread in Fall Creek and in 1992 found his present job at the Computing Center. Jon now works as part of Rick Millhollin's UNIX administration team, providing support for the AUTHORIZE program along with Steve VanDevender and Bob Jones.

In addition to playing with his band, *The JiveMasters*, Jon runs Fall Creek Recording on his property, where he lives in an A-frame with his partner Hilary and his cat Thing2. In whatever spare time he has, he windsurfs, golfs, skis, and tends his vineyard.

A Fiber Optic Primer and Tutorial:

Joe St Sauver
Assistant Director for Academic Services
joe@oregon.uoregon.edu

Recent fiber optic projects in Eugene/Springfield and elsewhere in the state have generated much interest in fiber optic networking. While many projects have fiber in place, at least in some cases fiber projects tend to stall when it comes to actually sending traffic over that fiber—that is, you will hear a lot of people talking about what's involved in "lighting dark fiber."

In an article of this length we can't make you a fiber optic expert, nor do we mean to imply that any of the technologies discussed in this piece will be a perfect solution for any particular actual fiber project currently underway. Our goal is simply to give you some basic background knowledge to help you begin thinking about options related to the fiber projects you may encounter.

The Simplest Case: Point-to-Point Fiber Used For LAN Extension

In the simplest of cases, a run of fiber optic cable can interconnect two points (such as the main university campus and a branch location sited away from the main campus), and essentially operates just as an extension of the local campus network.

Types of Fiber. There are two basic types of fiber that are commonly deployed: multimode and single mode.

Multimode fiber has a large core relative to a wavelength of light (~1.3 micron)—typically 62.5 microns. The relatively large size of multimode fiber means that light injected at one end of the fiber strand ends up bouncing along through the fiber, caroming off the cladding (the "walls" of the fiber optic "pipe"), and traveling many different paths to the other end of the fiber strand.

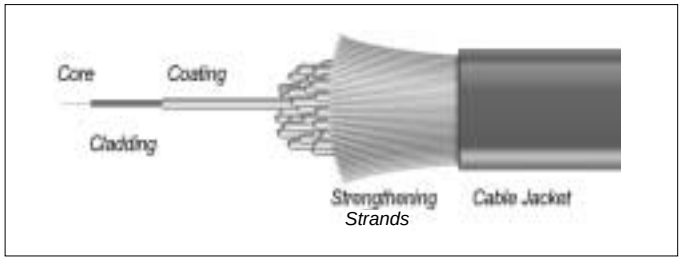


Fig. 1. : The elements of a multi-fiber fiber optic cable

Some of those paths are relatively short and direct, while others are longer and include lots of reflections. Such differences in path lengths result in a phenomena called modal dispersion (pulse "spreading," or a "smearing" of the wave form that was originally injected into the fiber). Modal dispersion limits multimode fiber use to relatively short runs—typically no more than a few hundred meters at gigabit ethernet (1000Mbps) speeds, or a few kilometers at fast ethernet (100Mbps) speeds.

Given this relatively short permissible distance, why do sites bother using multimode fiber at all? First of all, multimode fiber was available before single mode fiber, so a lot of multimode fiber was installed where it was the only common option and gigabit speeds weren't on the horizon. Way back when, a couple of kilometers at fast ethernet speeds probably sounded like more than enough "reach."

Even today, multimode fiber continues to be installed in some circumstances because it is comparatively inexpensive and works fine over restricted distances (e.g., within a building), and because multimode transceivers (the devices that inject and receive light in fiber optic cables) tend to cost less than single mode transceivers.

Where distances are longer, however, single mode fiber is the clear choice. Single mode fiber has a relatively thin core (typically 8-9 microns), thereby virtually eliminating modal dispersion problems. In the case of single mode fiber, the primary factor that serves to limit fiber reach is "attenuation," or loss of optical signal strength as the light passes through the fiber.

Figuring Out How Far Single Mode Fiber Can Reach. Fiber's transparency to light varies from wavelength to wavelength, with some wavelengths losing power in fiber more rapidly than others. For most fiber, the "primary spectral window," (its "sweet spot," or wavelength exhibiting the least optical attenuation) is 1300 nanometers (nm). For long haul applications, a different type of fiber with a primary spectral window centered at 1550nm is commonly deployed instead.

Attenuation, or loss of optical power, is usually quoted in terms of decibels per kilometer (dB/Km). At 1300nm, single mode fiber has a typical attenuation of 0.3dB/Km and a worst-case attenuation of 0.5 dB/Km. Additional power will be lost at splice points (if any), and at the connectors at each end of the cable. Let's assume that splices typically use up 0.06dBm each, and connectors cause a loss of 0.5 to 1.0 dBm each.

Two additional factors affect how far we can go. In order to compute our available fiber loss budget, we also need to know our fiber optic transmitter's launch power and our fiber optic receiver's sensitivity.

For example, consider the Foundry Networks Gigabit LX optical transmitter: it has a minimum of -11.5dBm of power output, and the optical receiver has a minimum sensitivity of -20dBm. Subtracting the receiver sensitivity from the launch power, we see that we have a total of (-11.5)-(-20)=8.5dBm worth of power available. If we assume no splices and subtract a total of 2dBm worth of

Designing Networks for Optimum Performance

loss for connectors at either end, that implies we have 6.5dBm left to overcome attenuation in the fiber itself. At 0.3dB/Km, that implies we should (theoretically) be able to go 6.5/0.3=21.66Km, or a little over 20 kilometers.

What do we do if we need to go farther? We can (a) increase the power we put into the fiber, or (b) increase the sensitivity of the receiver on the other end, or (c) use fiber that has lower attenuation per kilometer.

To consider just one simple example of how we might go farther than we could with a standard gigabit LX interface, Foundry has a proprietary long-haul gigabit interface called "LHB," which has a power budget of 29dB minimum. At that, even assuming 3dB worth of loss associated with connectors and other miscellaneous causes, and assuming you can reduce attenuation to .2dB/Km of cable, you could theoretically go 26/0.2=130Km—a very long way! (In reality, due to random manufacturing variation and installation-related artifacts, you won't really know how far you'll be able to go in a particular situation until you actually test a particular fiber run with a particular transmitter and a particular receiver.)

Why does it matter how far we can drive fiber? Consider a hypothetical fiber run between Eugene and Salem, at a minimum distance of about 70 miles (or roughly 110Km). (Actual distances for as-deployed fiber tend to be longer than as-the-crow-flies distances, but let's assume that it is 110km between Eugene and Salem.) If we had fiber and equipment that could handle distances of 130Km, we could cover that entire span without needing access to the fiber at any intermediate point, a tremendous convenience (and a great cost savings, since we wouldn't require any intervening electronics, nor any facilities to house those electronics).

Fiber Strand Count Requirements. Now let's consider a different issue: fiber strand count. Just as it normally takes a pair of wires to deliver electricity, so, too, you'll normally need a pair of fibers to deliver network connectivity.

In many common network scenarios, however, you may find that you actually want more than two fibers, although in a pinch you can actually make do with only a single fiber. To understand why, you need to develop a pessimistic "network engineering mindset," recognizing that any fiber you deploy will exhibit a perverse affinity for backhoes, brushfires, hungry rodents, and sundry other natural disasters, all aimed at destroying your connectivity.

The normal solution to this problem is to deploy fiber redundantly along two physically separate routes, thereby insuring that if a backhoe cuts the pair of fibers you happen to be using, traffic will automatically reroute onto the backup ("protection") pair. Clearly, this is not a particularly elegant solution nor a particularly cheap one, but if the circuit is crucial, or if it's running through remote areas where quick repairs would be difficult, it's routine to spend whatever it takes to get the required backup circuit deployed, even though that may mean doubling (or more than doubling) the cost.

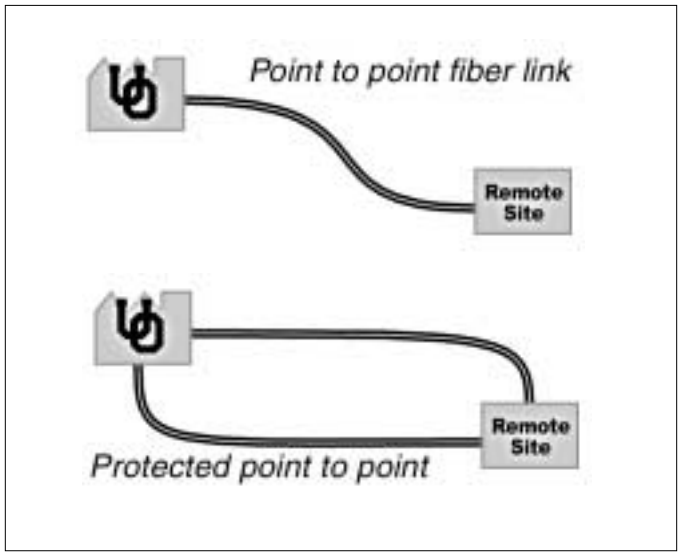


Fig. 2 : Unprotected and protected point-to-point connections

But what if you had only one strand of fiber? Would that single strand of glass be completely worthless? No, by using a device called a "fiber singler" or "single fiber full duplex unit" you can actually send traffic in both directions over a single piece of glass. Traffic going in one direction is sent on one wavelength (e.g., 1310nm), while traffic going in the other direction is sent on a different wavelength (e.g., 1550nm). Examples of this type of product include Canoga Perkins' L65x and 6001 fiber singlers and NBase's Single Fiber Full duplex product family.

Required Bandwidth. On a point-to-point single mode fiber optic circuit running in LAN extension mode, obtaining 100Mbps (fast ethernet speeds) or 1000Mbps (gigabit ethernet speeds) is, for the most part, a simple matter of selecting appropriate interfaces to attach to each end.

When you don't have a tremendous number of fiber circuits to deploy, one expedient and economical (less than $1,000 per end) way of lashing a conventional 100baseT copper network connection to a fiber optic link is via a fiber converter, such as Allied Telesyn's AT-FS201/202 series, which take 10/100baseT (copper) connections in on one side and convert them to 100baseFX (fiber) connections on the other. These devices are available in configurations that will support distances ranging from a couple of kilometers all the way out to 100 kilometers.

At gigabit speeds, connections will normally be made directly between gigabit switches or gigabit router interfaces.

Fiber Optic Primer, continued...

More Complicated Network Topologies

Adding More Sites to the Network Using SONET Rings
What happens if we need to add more sites to the network? Traditionally, once you moved beyond simple point-to-point fiber optic links, you'd install a SONET-based ring network topology.

Think of a SONET "ring" as *two* fiber rings running in opposite directions. The two rings run over two physically separate fibers: one live, and one deployed as a backup (or protection) fiber. Each site thus has four fiber connections (in plus out on the live fiber, and in plus out on the protection fiber). If a catastrophic failure should occur, such as a fiber severed between two of the sites connected to a ring, the SONET ring will typically be able to recover and reroute traffic quite quickly (on the order of 50 msec). SONET rings are also very good at handling multiple categories of traffic, e.g., data traffic plus traditional voice traffic, or data plus traditional voice plus dedicated video traffic.

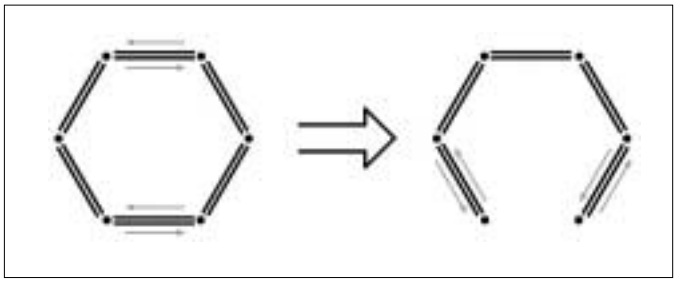


Fig. 3: SONET "rings"

Unfortunately, SONET-based rings also have a number of drawbacks. For instance, the SONET add/drop multiplexers ("MUXes" or "ADMs"), the devices that put traffic onto or take traffic off of a SONET ring, are quite expensive. If money is tight, the sheer cost of these SONET MUXes (tens of thousands to hundreds of thousands of dollars per location) can be a "show stopper" when it comes to lighting a shared fiber optic infrastructure.

Second, SONET rings traditionally allocate their available capacity on a fixed basis using a technology called "time division multiplexing" (TDM). TDM divides the available capacity of a SONET optical ring into fixed time slices. The time slices reserved for a particular partner's traffic are not available for use by anyone other than that partner. This means that often a ring's capacity is wasted, with some partners having capacity that's unused, while other partners may have capacity that's insufficient to accommodate their requirements. This is especially true in the case of "bursty" data flows.

Third, traditional SONET add/drop MUXes have a limited range of tributary speeds. (Tributaries are the connection made to the SONET ring, either direct connections made to a particular customer, or connections to a slower speed subsidiary SONET ring.)

That is to say, if your primary SONET ring is running at OC48 (2.5Gbps) speeds, a typical SONET add/drop MUX (such as the Fujitsu FLM 2400) connected to that ring may only directly support OC12 (622Mbps), OC3 (155Mbps), and DS3 (45Mbps) tributary speeds. To deploy slower speeds, such as T1 circuits (1.5Mbps), you'd typically run cascading tributary SONET rings at lower speeds. That is to say, in order to be able to carve off T1 circuits, you'd first build an OC3 SONET ring attached to the OC48 SONET ring, and then use a slower speed ADM (such as the Fujitsu FLM 150) to carve T1's out of that OC3 ring. Of course, the equipment required for that sort of hierarchical network structure (rings connected to rings) just adds to the cost of deploying a SONET-based system.

For all those reasons and for many others (including the need for special SONET test equipment, the need for SONET trained support personnel, etc.), if you can avoid SONET rings you can greatly simplify your network and escape some very substantial costs.

Adding More Partners By Building Upon Point-to-Point Circuit Technology. So what might we do if our goal was adding more partners while avoiding deployment of SONET based rings?

It doesn't take a tremendous amount of imagination to see that we might be able to extend our basic point-to-point circuits (running at fast ethernet or gigabit ethernet speeds) in a way that might work for multiple partners. For example, assume the university has a number of network partners distributed all around Eugene/Springfield, all of whom want to connect to the UO to exchange traffic at the UO-run Oregon Internet Exchange. How can that be accomplished?

Tree network topologies. One possible solution is to have each partner connect to its nearest adjacent partner using a point-to-point link, thereby forming a tree topology. While doing this would minimize the amount of fiber required, tree network topologies aren't very robust: partners located at the far end of "branches" are quite vulnerable to disruptions anywhere between them and the "trunk" of the tree. Some partners located at the end of branches might also worry that their traffic is being monitored or interfered with by intermediary sites through which it might pass, or be concerned that there wouldn't be sufficient capacity to meet their needs in shared upstream branches of the tree.

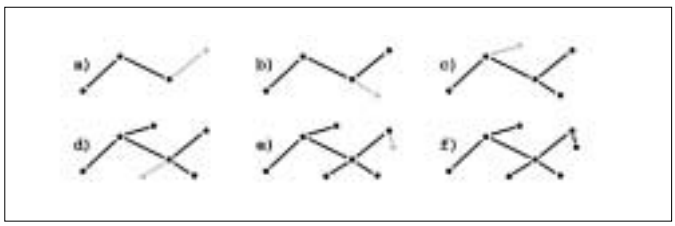


Fig. 4: Examples of tree network topology (newly-added partners are represented by lighter lines).

A more resilient topology would be a "star" or "hub and spoke" topology, where all remote sites connect directly to a single central hub site. As long as we have enough fiber between each of the remote partners and the central hub, and as long as redundancy isn't an issue, it is a comparatively simple matter to build this type of network out of point-to-point circuits. Each link could be a different speed than the other link(s)—for instance, some fast ethernet and some gigabit ethernet—and any problems with one of the links should not impact any of the others. On the other hand, loss of the central hub site could take all the other sites "off the air" because the center of the star is a highly undesirable "single point of failure."

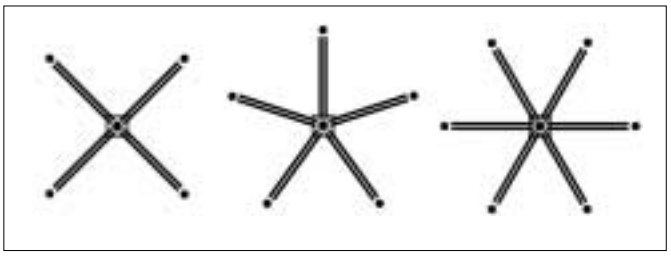


Fig. 5: Examples of "star" topology, with new partners connecting from a central hub

One way to avoid the hub's role as a single point of failure would actually be to connect each remote partner site via two physically separate pairs of fiber, with one pair from each partner site going to the main central hub site, and another (backup) pair going to some second (physically separate) alternate hub site.

Following this approach, we obtain improved reliability, but it comes at a cost: the number of fiber links we require doubles, as does the number of fiber optic transmitters and receivers. Recovery in the event of a hub failure ("reconvergence") also tends to take somewhat longer than in the case of SONET-based solutions, running on the order of a few seconds, rather than fractions of a second (as is the case for SONET).

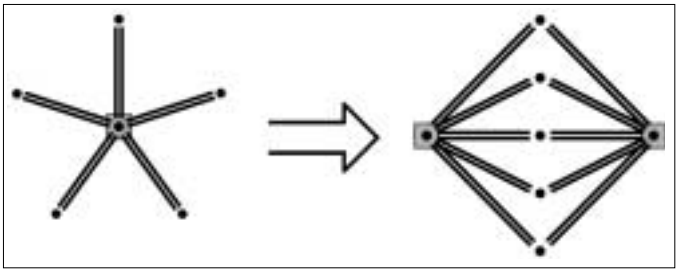


Fig. 6: An example of "star" topology with redundant hubs

We believe this type of star topology with redundant hubs, or still more sophisticated designs based on this fundamental underpinning, has a tremendous amount of potential when it comes to lighting dark fiber, particularly when you realize that it can be deployed for a fraction of the cost of a SONET-based solution.

Bibliography

3Com: Gigabit Ethernet Comes of Age
http://www.3com.com/technology/tech_net/white_papers/503003.html

Allied Telesyn Media Converters
http://www.alliedtelesyn.com/products/conv_feth.htm

Building New Generation MANs
http://www.extremenetworks.com/technology/whitepapers/MANWhite.pdf

"Canoga Perkins Wavelength Division Multiplexers"
http://www.canoga.com/wdm.htm

Dynamic Packet Transport Technology and Applications
http://www.cisco.com/warp/public/cc/cisco/mkt/servprod/opt/dpt/dpta_wp.htm

Fiber Driver Single Fiber
http://fiberdriver.nbase.com/single_fiber.html

Fiber Optic Cable Tutorial
http://www.arcelect.com/fibercable.htm

FNC - Technology Transmission Products FLM 2400 ADM
http://www.fnc.fujitsu.com/technology/flm2400.htm

Foundry Networks Gigabit Info Center High Performance LAN Alternatives
http://www.foundrynet.com/wpvol1.html

Foundry Networks - Service & Support FAQs - Media
http://www.foundrynet.com/genFaqMedia.html

Gigabit Campus Network Design
http://www.cisco.com/warp/public/cc/sol/mkt/ent/cmps/gcnd_wp.htm

Gigabit Ethernet MANs: Where the real action is, 10/04/99
http://www.nwfusion.com/archive/1999b/1004petrosky.html

Gigabit Ethernet ventures into the land beyond the LAN, 05/10/99
http://www.nwfusion.com/archive/1999/65004_05-10-1999.html

Gigabit Networking Gigabit Ethernet Solutions
http://www.cisco.com/warp/public/cc/cisco/mkt/switch/gig/tech/gesol_wp.htm

Service Provider - Optical Internetworking
http://www.cisco.com/warp/public/779/servpro/solutions/optical/opt_rings.html

Technology White Papers - The Glass Story
http://www.occfiber.com/wpglass.html

Tolly Switch Central - Gigabit Ethernet goes Metropolitain
http://switchcentral.tolly.com/tolly_articles/articles/res_926260166_906.html

Transition Networks Fiber White Paper
http://www.transition.com/products/fiber_wp.html

Transporting Gigabit Ethernet and Fiber Channel over the MAN
http://www.csdmag.com/main/2000/02/0002feat2.htm

Web ProForum Tutorial: SONET
http://www.webproforum.com/sonet/

Wide Area and Long Haul Gigabit Ethernet
http://www.canet3.net/papers/wideandlonggigabit.html

Suexec Upgrade Affects Some Web Designers

If you use CGI programs in your web pages, this change could affect you

Steve VanDevender
Academic UNIX Systems Manager
stevev@darkwing.uoregon.edu

Last April, systems managers enabled the *suexec* feature on the Apache web server on Darkwing to control execution of CGI programs. If your Darkwing web pages don't use CGI, or use CGI in simple ways, this upgrade won't affect you. But if you have installed, or are planning to install, CGI programs in your web pages, read on.

In traditional installations, CGI programs executed by the web server run as the unprivileged user "nobody" to safeguard account security. However, many web designers want to have their CGI programs record information for "guest books" or page counters, and in order to accomplish this, they have to make them writable by everyone else on the system.

Unfortunately, such world-writable files can be tampered with by anyone else on the system. Some programmers try to avoid vulnerability by making their CGI programs "setuid,"i.e., they add special permission bits so that the CGI runs as the user who owns it rather than "nobody." This tactic isn't foolproof, however, because in some cases *setuid* CGI programs can be used to gain unwanted access to people's accounts.

A better solution is the Apache *suexec* mechanism, which allows a web server to run CGI programs directly by the user who owns them. *Suexec* also includes a number of security checks to avoid executing unsafe CGI programs. With Apache *suexec*, it's no longer necessary to create world-writable files in order to allow your CGI programs to save data; if you can write to a file, then so can your CGI programs.

***Setuid* programs denied execution.** As part of its security checks, *suexec* will not execute any *setuid* programs, even ones that are *setuid* to you. However, it is still possible that poorly-written CGI programs in your account could be used to gain unwanted access, so you should continue to be careful when installing CGI programs written by others or when writing your own.

Precautions Taken During the Upgrade

To reduce the chance that this change would break existing CGI programs, during the upgrade process:

- any files in user public_html directories (except for those used in virtual hosts) owned by the "nobody" user had their ownership changed to the user of that account
- world-writable files became writable only by the user who owns them
- *setuid* CGI programs had their *setuid* permissions removed

Virtual Host Web Page Owners: Your URL Address Form is Important!

Suppose you have an account "vhost" on Darkwing that contains the web pages for the virtual host name "virtualhost.uoregon.edu." You can refer to your virtual host web pages in two ways:

"**http://virtualhost.uoregon.edu/**"

or

"**http://darkwing.uoregon.edu/~vhost/**"

If you refer to a CGI program with a URL beginning with "**http://virtualhost.uoregon.edu/**," your program will automatically be executed as the "nobody" user, as before.

If you refer to a CGI program with a URL beginning with "**http://darkwing.uoregon.edu/~vhost/**," it will be executed as your "vhost" account user. This is the form you must use if you want the CGI in your virtual host to take advantage of Apache *suexec*.

Troubleshooting

If you find CGI programs are failing in a way that they did not before the upgrade, you can look in the file

/var/www/logs/suexec_log

for possible troubleshooting hints. The command

```
grep USERNAME /var/www/logs/suexec.log
```

(where USERNAME is your own Darkwing login name) will report information about CGI programs accessed in your account.

If your CGI generates errors after it's started by *suexec*, those errors will be recorded in the normal Apache error log file **/var/www/logs/error_log**

For a more detailed explanation of Apache *suexec*, see **http://www.apache.org/docs/suexec.html**

Docs Room Acquires New Photoshop Training Videos

The Documents Room recently purchased a set of Photoshop videos featuring Scott Kelby, editor of *Photoshop User* magazine and president of the National Association of PhotoShop Professionals. These one-hour tapes present many real-world examples and feature clear, easy-to-understand explanations of PhotoShop's tools and features.

Titles include *Adobe Photoshop for Beginners*, *Photoshop Down and Dirty Tricks* (Volumes 1 and 2), *Creating Web Graphics with Adobe Photoshop*, *Adobe Photoshop Color Correction Made Easy*, and *Photo Retouching with Adobe Photoshop*.

The Documents Room Library, 205 Computing Center, is open from 9:30 am to 5 pm Monday through Friday. Call **346-4406** for further information.

Curious About WAP/WML?

If you don't have a special cell phone with wireless access protocol, you can preview WAP sites from your web browser

Joe St Sauver
joe@oregon.uoregon.edu

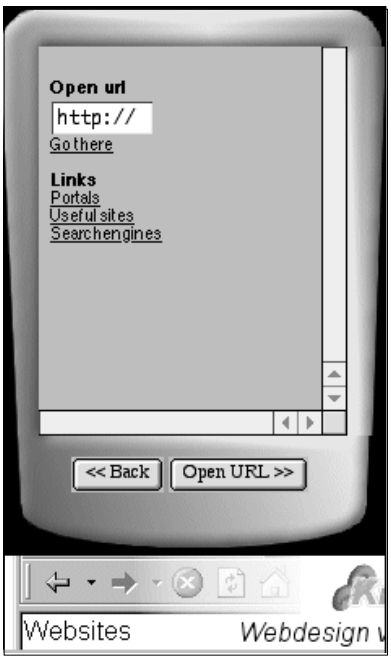
By now you may have seen advertisements for special cell phones that allow you to access the Internet in addition to making regular cell phone calls. Many of those phones are WAP (wireless access protocol)-enabled devices, and use an integrated microbrowser to display decks of WML (wireless markup language) cards.

Some of you may view the tiny monochrome-only screens, input device limitations, and slow transmission speeds with skepticism, but it's estimated that there will be 100 million WAP-enabled devices in circulation by the end of this year.

Viewing WAP/WML Pages Without a WAP/WML-enabled Cell Phone

If you don't have a WAP/WML-enabled cell phone but would like to try viewing some WAP/WML pages, you can preview them from your regular web browser by going to **http://www.wapsilon.com/** and typing in the WAP URLs from there.

If you're on a Windows 95/98/NT PC and would rather have a dedicated WAP browser, you may want to try Slob Trot's WinWAP, instead (**http://www.winwap.org**). (Note that after a 30-day evaluation period expires, there is a $35.00 fee if you'd like to continue using WinWAP.)



A view of the Wapsilon device, for viewing WAP sites from your browser

Where to View WAP/WML Content

At this time, WAP/WML content is actively being developed by many sites. A nice directory of WAP sites is at **http://www.cazac.com/hotlinks/** (unfortunately, this page itself is not accessible via WAP; so for the time being, you'll need to use a conventional browser to see it).

In the meantime, if you want to dive into some WAP pages, here are a few you can try. *(Note:* These are WAP URLs. Remember, you'll need to view them on a WAP phone or via WinWap or Wapsilon on your browser**)**:

123Jump (financial information)
http://www.123jump.com/wap

BBC News
http://www.bbc.co.uk/mobile/mainmenu.wml

Fast WAP Search
http://wap.fast.no

WapWarp
http://www.wapwarp.com

WappyMail
http://www.wappymail.com/wap

As you begin to browse these sites, you'll note that in many cases obvious niche markets for WAP content are still largely unfilled by American sites. Many of the major U.S. corporations haven't yet climbed on board the WAP bandwagon.

In many ways, this is reminiscent of the early days of the World Wide Web. (Attention, budding entrepreneurs: millions of WAP users will soon be looking for *your* content! …but of course be sure to remember not to use your UO account for commercial purposes.)

Need More Information?

If you're interested in learning more about WAP/WML, here are some additional resources:

The Independent WAP/WML FAQ
http://wap.colorline.no/wap-faq/

Open Source WAP and SMS gateway
http://www.kannel.org/

Serving WML Files
http://www.wapdesign.org.uk/server.html

Underwhelmed by WAP
http://www.osopinion.com/Opinions/MikeBanahan/MikeBanahan1.html

WAP Forum
http://www.wapforum.org/

WAP Tutorial
http://www.wapdesign.org.uk/tutorial.html

Will WAP Wireless Live Up to Hype?
http://www.pcworld.com/pcwtoday/article/0,1510,17007,00.html

WinWAP Browser (for Windows 95/98/NT)
http://www.slobtrot.com/winwap/index.htm

WML Tutorial
http://www.wirelessdevnet.com/training/WAP/WML.html

COMPUTING CENTER GUIDE

Computing Center Web Site
http://cc.uoregon.edu/

Microcomputer Services
(Room 202)

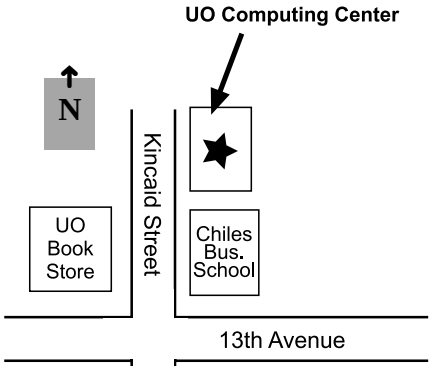
- microcomputer technical support
- help with computing accounts, passwords
- scanning, CD-burning, digital video
- help with damaged disks, files
- system software help
- Internet connections, file transfers
- public domain software, virus protection
- software repair (carry-in only, $60/hr, 1½ hr. minimum)

346-4412
microhelp@oregon.uoregon.edu
http://micro.uoregon.edu/

Large systems consulting
(Rooms 233-239 **)**

- VMS, UNIX (GLADSTONE, DARKWING, OREGON)
- statistics packages
- email

346-1758
consult@darkwing.uoregon.edu
consult@gladstone.uoregon.edu
consult@oregon.uoregon.edu



Documents Room Library
(Room 205)

346-4406
http://darkwing.uoregon.edu/~docsrm

Electronics Shop
For computer hardware repair, installation, and upgrade services, call **346-4403** 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
Dialin modem number for UOnet, the campus network (this will be the *only* number as of August 23, 2000): **225-2200**

Computing Center Hours

Sunday	9 am - 8:30 pm
Monday - Friday	7:30 am - 8:30 pm
Saturday	9 am - 4:30 pm

COMPUTING NEWS
UO COMPUTING CENTER
1212 UNIVERSITY OF OREGON
EUGENE, OR 97403-1212