Flash! The Future of Wireless Ethernet

The Wired Metropolis in the Information Age

Internet2 — Son of Internet

Electronic Attacks? How to Protect Yourself

Connect
Academic Computing and Networking at NYU
Fall 1998
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Editor's Note: After spending the summer issue traveling to the farthest reaches of NYU, we come home to New York this fall to settle in for the new school year. While the new students find their way around Washington Square, we here at Connect are taking a look around as well — at the many new and improved services available on campus.

In this issue, a Back-to-School primer of sorts, we learn about the many ways to use the NYUCard (p. 5), how to order books online (p. 7), and how to view computer displays in three dimensions (p. 29). Gary Chapman looks at the future of wireless networking on page 11, while Josh Feldman checks on the current status of ResNet on page 13, and Carlo Cernivani returns to the foreign outposts of NYU-NET, this time in Prague, on page 15. We couldn’t all stay put on campus, could we?

Also, be sure to catch this issue’s episode of “As the E-mail Bounces,” a campus drama that may just have you on the edge of your seat, if you haven’t been following your Rights and Responsibilities Agreement. I’m sure it won’t apply to you, dear reader, but check it out on page 25 anyway, just for fun.

—Joan Charlotte Matelli
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Internet2: Son of Internet

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It wasn’t so long ago that computer networks didn’t exist. The computer network is essentially an invention of the 1960s that has come into its own in just the last decade or so, and has expanded into general public use only within the past four or five years.

The history of computer networking is riddled with models that failed to capture the support needed for their long-term success, and battles of proprietary commercial standards against freely available interoperable ones. At this time, it appears rather certain that the network we know today as the Internet has won out for the most part against all serious competing standards.

It is no longer merely the prototype for the global information infrastructure, but in fact is rapidly becoming that very infrastructure.

As many people know today, the predecessors of the Internet were conceived initially as instruments for university and research institutions to access remote computing resources. The research and development activity started in California and several other locations in the western United States, and quickly began to spread in North America. The design of these networks, as well as the process that guided their evolution, reflected academic values of sharing, of progress and adoption based upon merit, and of the free flow of information among all participants.

The first users of the Internet were its creators, who understood the importance of sharing software and techniques, obtaining consensus on standards through open discussion and by building working prototypes, and ensuring interoperability to the maximum extent possible. The early Internet community thrived on these fundamental values, which continue to typify much of today’s community.

However, two issues stemming from the early days of the Internet have led to some current difficulties.

The first is the result of an initial design decision to treat all packets of information as equal. No judgment was passed regarding which processes, and therefore which packets, were more important than others. All packets would have the same priority while being transported through the system. That is still very much the rule today, although protocol standards for providing some exceptions now exist. This decision reflected Internet culture, and perhaps also the difficulty of dealing with an added layer of complexity.

In fact, in other markets for goods and services, many dimensions of differentiation exist, and firms succeed or fail depending upon whether they can provide new classes of service. For example, the very successful growth of private mail and parcel delivery services starting in the 1970s was due to consumers responding favorably to a class of delivery service that had heretofore not been available from the monopoly supplier at the time, the U.S. Post Office. Subsequent evolution of the market has been characterized by the introduction of more classes of service.

The second issue stems from an early policy adopted by most (if not all) institutions connected to the early networks. Mindful of the fact that computer networks were in their infancy, institutions implicitly agreed that they would bear network costs centrally and that the marginal cost to the end user...

George Sadowsky is the Director of Academic Computing Facility.
user would be zero. Such a policy is in fact efficient from the point of view of end user innovation, and was a productive policy essential to the maturation of the Internet for some time.

With the commercialization of the Internet, beginning in 1990, most new commercial services retained the zero marginal cost provision of earlier pricing structures. However, to recover costs and make a profit, firms had to charge for their services. This resulted in fixed-rate, “all you can eat” policies of network access, where the user paid a fixed subscription cost per month regardless of the amount of network resources used. There are now some initial departures from this consumer pricing model, but they are not yet significant.

The use of this pricing policy results in patterns of demand that do not correspond to the real costs of providing the services. There is no direct mechanism to ensure that revenue generated from additional demand will find its way to additional services. Rather, increased loads can be passed upstream to a wide area infrastructure that must accommodate the additional load without benefiting from the revenue that should have been collected by the local service provider. The result is that the Internet can deteriorate for everyone. In the absence of a better developed model of settlement costs between Internet Service Providers (ISPs), the negative externalities of such pricing policies can affect an arbitrary and changing subset of Internet users up to and including the entire Internet.

Several years ago the academic and research communities, which were responsible for the evolution of the original Internet, became very concerned about both service differentiation and congestion. Finding no practical solutions to these problems on the horizon, they formed a project to define and build the next generation Internet, called Internet2. This decision recognized that control of the direction networking would take has been substantially overtaken by commercial interests. While the Internet has been successfully commercialized, its ability to serve a rapidly expanding commercial market under the present industrial organization is increasingly incompatible with its research and development focus.

It’s not surprising, therefore, that the Internet2 effort is characterized by substantially expanded bandwidth and differential qualities of service. Some applications, such as video transmission, function successfully only when there is sufficient guaranteed bandwidth over the period that the application operates as well as low latency, or prompt delivery time. Other applications may not require low latency, but may require guaranteed bandwidth in excess of what is available from the commodity Internet. Still others, such as control of remote instrumentation, may need little bandwidth but must have low latency. An important part of the development effort of Internet2 focuses on how to define differential qualities of service that can be implemented across wide area networks to support the very diverse collection of academic and research applications that are candidates for implementation.

Internet2 is also dependent upon substantially increased bandwidth. Fortunately, falling telecommunications costs and the increased availability of recently installed capacity here in North America allow this to be obtained ever more affordably. The National Science Foundation is again financially assisting universities to establish their initial Internet2 connections as it did a decade ago for the current Internet. NYU has been awarded a grant for this purpose, and is working with NYSERNet (New York State Education and Research Network) to build NYSERNet 2000, New York State’s piece of Internet2.

We expect to make our initial Internet2 connection this fall, with deployment of the services offered by Internet2 being made selectively on campus over time. We will give first priority for link-age to those faculty members who contributed to our NSF proposal and who helped us obtain the means to connect to Internet2. At the same time, we are actively looking for additional partners in all fields who have network applications that cannot be supported by the current Internet.

By now, it is generally recognized that we cannot predict with any certainty where the phenomenon known as the Internet will take us in the future. We do know that it cuts across all sectors of society and has great promise, some of it realized, for education in the most general sense of the word. We are generally familiar with the current Internet, but have much less understanding of what Internet2 might provide. Nevertheless, based upon the track record to date, we’re probably in for a wild and interesting ride.
Your NYUCard
(It's More Than Just an ID Card)

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As the official New York University ID card, the NYUCard is an essential part of life at NYU. It can be used for everything from checking out books in the libraries to accessing Coles Sports Center and the ACF labs. It’s also a debit card: students who credit funds to their Campus Cash account may use the NYUCard for making purchases at the NYU Book Centers, certain vending machines, residence hall laundry facilities, and participating off-campus vendors.

The NYUCard has the cardholder’s account information magnetically encoded on the back of the card. When a cardholder swipes his or her card through one of the AT&T access readers installed at numerous locations on campus, the reader refers back to the NYUCard database to determine if the cardholder has been assigned access to that specific location. The response time for this information is less than a second.

Gary Tinsley is the Director of the NYUCard Services Department.

Access privileges are assigned by the Department of Protection on an individual basis, or granted to broad sections of the NYU community based on information supplied to NYUCard Services by Student Information Systems or Human Resources. For example, since only a small number of people are granted access to the new math labs at Warren Weaver Hall, their privileges are controlled through the Department of Protection. On the other hand, access to Bobst Library is granted to all NYU students who are enrolled and financially cleared, and to all active employees of NYU. Currently, there are over 100 access readers installed and active on campus. More readers will be added over the next year.

An added benefit of the NYUCard is the AT&T calling card option, which enables you to use your card as a calling card and be billed directly by AT&T for any calls. All students, faculty, administration and staff members who choose to add this free feature to their card will also get a free one-year membership to the Student Advantage program. Members get discounts at hundreds of vendors in New York and thousands of vendors nationwide, including Amtrak, Dollar Rent-A-Car, Tower Records, and most major movie chains. Check the Student Advantage website at www.studentadvantage.com for full details.

If your NYUCard does not already have this option, come to the NYUCard Center and ask to have a new card issued. When you switch, you will also be given the Student Advantage membership.

Another convenience of the NYUCard is the Campus Cash account, which lets students use the card to make purchases and pay for services around campus. It is currently accepted at campus dining facilities (for students with a meal plan), the NYU Book Centers, Campus Mail Services, Coles Pro Shop, some vending machines, and at the Campus Eatery and the University Café. This fall it has been added to most residence hall laundry facilities, and is accepted at numerous off-campus vendors. Students can even buy MTA MetroCards on campus using the NYUCard Campus Cash account. Within the next year, we plan to offer this option to faculty, administration and staff members as well.

Visit the NYUCard website at www.nyu.edu/nyucard/ for further information on our expansion plans and for a list of locations that accept Campus Cash funds.
Need a Computer?
Check Out the Library
(Or Bring Your Own)

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Like other libraries of its age, Bobst was not designed to accommodate many of the types of resources and facilities users expect today. When the library opened over 25 years ago, there were no computer labs. In fact, Bobst and other libraries were still performing most of their own technical work manually, and renting out typewriters for users to complete their term papers. Since it opened in 1973, Bobst has pioneered the development of library networking and computerization. More recently, the library has seized opportunities to extend the benefits of automation directly to students.

Bobst now loans out laptop computers for use in the library, and provides network connections throughout the building. More than one hundred network ports make it possible for researchers to plug in laptops and navigate the Internet without leaving the library. According to Wayne Ricketts, manager of Bobst’s Electronic Resources Center (ERC), where laptops are available for loan, “Laptops are convenient, because students can take them to where the books are...Like most libraries, physical space is at a premium here at Bobst; it would be difficult or impossible to find space for sixty desktop computers, but laptops can be used with a minimum of space.” The library’s laptop loan program, now in its second year, is very popular among NYU students and has become a model for similar programs nationwide (see Chronicle of Higher Education, November 14, 1997).

Who Can Borrow Laptops?
NYU students and faculty may borrow laptops at no charge for use in designated laptop areas located throughout the building. Borrowers simply leave their NYU photo ID cards at the ERC service desk, located in the library’s B-Level, and then can use a laptop for three hours, renewable for additional three-hour periods if no one is waiting.

Macintosh PowerBooks and PC laptops running Windows95 are available. Each is equipped with a 3.5-inch floppy drive and connections to NYU-NET. All files are saved on 3.5-inch floppy disks. Disks are available for sale in the ERC, where files can also be printed for a small fee.

Both the PowerBooks and the PCs are loaded with MS Word, MS Excel and PowerPoint software. The Windows95 machines also run WordPerfect, Lotus 1-2-3, ProCite 3.0 and Bibliolink 2.0.

For network connections on both platforms, the laptops have Netscape Navigator, ftp and telnet. Network access for e-mail and the Internet is available only to those with NYU accounts. For more information on obtaining an account, call the ACF Accounts Office at 998-3035, or see the article on page 20 of this issue.

Using Your Own Laptop
If you want to use your own laptop for word-processing or other non-network applications, you can simply plug into any electrical outlet in Bobst’s laptop areas. In order to connect to NYU-NET from the library’s plug-in ports, you need to register your computer with ACF and load the networking software they provide (see the library’s Information Bulletin 23). You will also need a 10BaseT ethernet adapter with an RJ-45 female connector and an NYU Internet account.

Tom McNulty is Bobst Library’s Fine Arts Librarian, as well as its Coordinator of Services for Students with Disabilities.
NYU Book Centers’ TextTone and Website
Book Inquiry and Ordering Systems

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Whether you’re trying to find out what books you’ll need for next semester’s classes or just looking for a novel, the NYU Book Centers have made your book shopping a bit easier. You can now use either your touch-tone telephone or NYU-NET to inquire about books and place orders with us.

TextTone Book Inquiry and Ordering System

(212) 443-4000

We welcome NYU students and others looking to purchase NYU course books to TextTone, the New York University Book Centers’ 24-hour touch-tone telephone service for book inquiry and ordering. TextTone is a very user-friendly system with easy to follow prompts to guide you.

Beginning two weeks prior to the start of a new semester, students can call TextTone at (212) 443-4000 to get complete book lists for their classes. You will hear a list of titles with prices and availability. You can order your books using a major credit card and have them shipped to you within two business days via UPS, or you may request that your book list be sent to you via fax.

There are two ways to use TextTone: by course number or ID number.

1. Course Number:
   Either enter the seven-digit course number and the section number, or enter the five-digit call number. For example, for course number Y64.1030, section 1, you can enter 9641030# then 001#, or enter its call number.

2. NYU ID Number:
   You must have completed registration at least 24 hours prior to calling TextTone.
   Enter your NYU ID number or social security number and your birth date (mmddyy). You will then hear a course by course list-

NYU Book Centers makes it easy to find any book at any one of our Book Center locations using our online ordering system. A secure server option is offered from the main page. Select “Use Secure Server” if you intend to purchase your books online with your credit card.

The search engine is not case sensitive, so don’t worry about using either upper or lower case letters. There are five ways to search: by author, title, ISBN, NYU Course Number or NYU Student ID number.

1. To Search by Author:
   Enter at least the first three letters of the author’s last name. You may then choose to sort your search results by either author or title.
   For example, if you are looking for a book by Alice Walker,
you can enter “walker” in the author field. Your results will list all authors with the last name Walker.

You will have to scroll down the list until you find Walker, Alice.

Search Results:
WALKER
WALKER, ADAM
WALKER, ALAN
WALKER, ALICE
WALKER, ANDRE

If you don’t know the first name of the author, choose WALKER. The very first item in the search results contains all books by authors with the last name Walker.

2. To Search by Title:
Enter from one to three complete keywords from the title you are seeking. Don’t worry about lower and upper case letters, but remember that each word must be spelled exactly as it appears in the book title. Do not use articles.

Use as few keywords as possible in this type of search for a faster and narrower search.

For example, if you were searching for the title, “Kafka Was the Rage,” you would enter “kafka rage” in the title field. For “The Tailor of Panama,” you could enter “panama tailor.” And for “Midnight in the Garden of Good and Evil,” you could enter “midnight.”

3. To Search by NYU Course Number:
   1. Choose the semester, such as Spring 98.
   2. Enter the department characters, such as A95.
   3. Enter the course number: 0004.
   4. Enter the section number: 001.

4. To Search by ISBN Number:
Enter the entire number without dashes or spaces, such as 0918266155.

5. To Search by NYU Student ID Number:
   You must have completed registration at least 24 hours prior to using this search method.

   You can search for a listing of your required and optional books by entering your Student ID number and your date of birth, with no spaces or dashes, and then selecting the semester. Your ID number will appear as asterisks on screen. This is for your protection. Your ID number is encrypted when sent to us.

   Book information for a particular course becomes available two weeks before the start of a new semester.

   After your search, you must select the title you wish to purchase. To order this title, indicate the number of copies in “Order Quantity.” You can then choose the option to “Continue Shopping,” which places your book in a Book Bag and allows you to select more books, or choose “Checkout” to purchase the book.

   Choosing “Checkout” will bring you to a series of screens where you will be asked to provide your name, payment method, and billing and shipping addresses. In the Checkout procedure, you can make changes to your order, such as removing a book, changing order quantities, adding more items, or canceling the entire order. Your Book Bag will automatically be updated to reflect any changes you have made.

Before sending us your order, please make sure the information (address, telephone number, etc.) you give is correct and complete. Once you’ve sent your order, you will be given an order number. Write it down or print it out. You will need to refer to this number if you have any questions or cancellations. You will also find your five digit Book Center ID number on the confirmation screen. You may use this number with your password to expedite future orders.

Note: Putting books in your Book Bag does not obligate you to buy them. To remove one or more books from your Bag, change the “Quantity” for each title you wish to remove to zero and click on “Recalculate.”

We accept Visa, MasterCard, American Express and Discover cards. Make sure, however, before you submit any credit card information online that you selected “Use Secure Server” from the main page before starting your search. If you still do not wish to submit credit card information online, please order by phone with TextTone.

We ship via UPS to the U.S. and Canada, and Parcel Post Air to all other countries. UPS does not deliver to post office boxes, so please provide a street address. Also, we cannot ship books to NYU residence halls. They do not have the facilities to receive large quantities of bulk mail.

Our book inventory is updated each morning to reflect sales, new orders, and books received from the previous day. If we don’t have a particular book in stock and it’s not on order, we will gladly special order it for you.
Financial Administration Made Easier
The First Year with fame

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On September 1, 1997, the fame (financial administration made easier) project team put NYU’s new financial system into service. Representatives from around campus played an active part in this effort. The implementation continued through the year as fiscal managers from schools and administrative units shaped these new financial tools for their own use.

Prior to fame’s introduction, our system strained to meet the university community’s needs. It also could not accommodate new demands such as more stringent government accounting regulations and the Year 2000 bug. NYU was not alone. Most major institutions of higher education faced the same difficulties and are now immersed in their own financial system overhauls.

Client/Server Technology
Fame brings client/server technology to campus for administrative use. In this environment, software resides on the user’s machine and is distributed to servers around the university. The servers and local computers must work together to navigate processes.

Under the client/server model, fame seeks to give users better tools to manage finances locally. Central administrative units are freed from localized tasks to provide greater central support. This assumes that the user will accept greater responsibility and that central administration tasks will make the shift. We haven’t reached this stage quite yet, but we are headed in that direction.

The consulting firm KPMG Peat Marwick released a study in May 1995 that discussed the advantages of introducing client/server systems. It said, “Like any technology, client/server solutions involve growing pains during initial rollout, such as supporting an existing infrastructure while building a new one. Many of the potential benefits are, by definition, qualitative rather than quantitative — better decision-making rather than lower personnel costs; or higher customer satisfaction and improvements in product and service quality.” This was certainly true of NYU’s first year with fame.

A Bumpy Road to Success
While fame has had some difficulties in its first year, there are numerous successes to report.

400 users are online with fame at their desk. Fame is available online six days a week, 14 hour a day — providing more data access than in the past.

Each month the system processes an average of 23,000 checks, 1,400 journal entries and 2,300 purchase orders.

It takes only five days to close the books each month, falling from an average of twelve days before fame was fully implemented on campus.

There is a greater variety of online reporting. Schools and administrative units now have the opportunity to enhance their local reporting.

Mary Brooks is a Senior Process/System Analyst for the Controller’s Division and is the communications coordinator for fame. She has been on the financial system redesign project since its inception three years ago. More information on fame can be found at www.nyu.edu/cdvl.
Bringing the Parts Together

What does it take to assemble a financial system with this kind of extended functionality? First, NYU acquired a new SP2 IBM computer, financial suite software from PeopleSoft Inc. and database software from Oracle. Implementation began in February 1997.

To manage a client/server implementation, it was essential that functional, technical and accounting personnel work closely together. From its earliest stages, fame’s implementation relied on representatives from around the university, to handle tough issues while calculating the myriad ways that the system must perform. At many times, this collaboration seemed more innovative than the software.

Functional teams met to decide on performance requirements for the general ledger and for procurement (the purchase and payment process). They relied on technical teams to set parameters, to code software, and to test results.

University Computing Center technicians and consultants pored over the PeopleSoft software and NYU’s requirements. Systems software provided a template of sorts, into which NYU’s specifications and data were coded. Test and production databases were established in Oracle.

Starting in June 1997, technicians loaded “September 1” data content into the test databases. This was a rigorous task. Data had to be drawn from previous records that existed in distinct forms from different units.

As the September launch date approached, many efforts had to be made at the same time. The project group spent hours around conference tables all over campus, reviewing data, testing processing ability and assembling accounts. Even with all of this planning, the project group knew that final adjustments and refinements would inevitably be necessary after the initial implementation.

Apart from functionality, a separate, vital aspect of the implementation concerned user identification. There were no database listings of financial accounting users from the past, just a very general mailing list. Fame needed a user database to record and manage users’ accounting information and authorization privileges.

The project team opted to identify a subset of users to go online as test users. This group became a resource in the creation of the database, and they constantly evaluated new services as they became available online with fame. Everyone else received new monthly reports on paper, using the old mailing list to specify recipients.

Over this first year, schools and units have been able to review their operation and restructure how they arrange their users and chartfield accounts.

The security structure for fame is built in Oracle and based on the user database mentioned before. Fame demands a substantial structure to record who can see financial information and who can spend money. The new user database provides that structure. However, by using the database while building the system, fame technical experts often found themselves juggling multiple demands. A lot of work went into chart security refinement, a virtually invisible aspect of the fame implementation. Test users provided essential assistance with this task.

Most people found out about fame because of the transition from account numbers to chartfields. Details on that change were given out through schools and administrative units, on the web at www.nyu.edu/cdv, and at information sessions. Still, it was difficult to contact everyone with explanations about the new system and chartfield information.

No one wanted to learn about new chartfields or forms while trying to place an order. However, early feedback paid off in September when web page complaints pinpointed problems, and we were able to make workable adjustments in a short time.

Another advance came in January 1998, when we heard about the need to focus attention on the Organization Budget Report. Fiscal officers provided a laundry list of adaptations that were needed for both the online and paper versions of this vital report. Many improvements were coded right away. Frequent reporting enhancements are a top priority for fame.

This glimpse at the last year demonstrates the interaction that is needed to build fame into a strong financial system that serves us all. Even though more work lies ahead, the benefits of implementation in 1997 surpassed the drawbacks. Our current focus is on improving functionality rather than on creating new system cut-overs. Your input is valued and essential to improving fame, and we welcome your comments.
Imagine you are using your laptop computer in Bobst Library to access information resources on the Internet. Occasionally you send an electronic mail message, or receive one from a friend or colleague. Without turning off your machine, without plugging or unplugging any wires, you move from one location to another within the library, continuing your work. For a breath of fresh air, you carry your machine out to a bench in the park, and continue to browse the Web and receive e-mail. Time for class? Off you go to a classroom in Main Building; upon arrival, you find your machine has received another e-mail message while you walked.

While such a continuous connection to the Internet is not yet a practical reality on NYU’s campus, the technology now exists to make it entirely possible, thanks to recent developments in wireless communications. ACF has been experimenting with, and has actually begun to deploy, wireless networking gear at the Washington Square campus. This is providing us with our first glimpse of what we believe to be a major evolutionary step in data networking: the combination of wireless with wired networks to provide a more flexible, versatile and even economical network infrastructure than has previously been possible.

The first application of wireless networking on NYU-NET was installed in early August to hook up a set of new offices at 411 Lafayette Street. While leasing a high-speed data line from Bell Atlantic would have been the traditional approach, we judged that wireless equipment was now sufficiently mature to put into production use here at NYU. From the front windows at 411 Lafayette, looking northwest across the street, you see the back of 726 Broadway, a building that is equipped with fiber-optic cabling and networking gear linking it directly into the NYU-NET infrastructure. To make the link, we needed two small antennas and two wireless devices. At 411 Lafayette we positioned a wireless bridge, and at 726 Broadway we installed an access point device that makes the transition from wireless technology to the wired local network. Within each building the wireless devices are physically wired into their respective local area networks. Providing 2.5 to 3 megabits per second of communications bandwidth, the wireless link across Lafayette Street doubles the capacity of a leased T1 line, and has no additional monthly charge. Very high frequency radio waves are used; in fact, we use continuously changing frequencies, an approach that makes the communications link highly secure and highly resistant to interference from other radio sources in the vicinity.

This example of wireless networking is just one possible application. In this case, the purpose is to make a link between two different wired segments of the network. A potentially far more exciting application involves using similar wireless equipment to provide network connectivity to laptops or desktops, either on an individual basis or for a group of machines in a given location.

What would be needed to create the scenario described at the beginning of this article is a handful of combination antenna/transmitter/receivers on NYU buildings and a laptop equipped...
with a wireless communications card (a PCMCIA or PCard) to send and receive signals.

A third, intriguing application is to use wireless links in place of the standard jacks and wiring that run from wall-mounted data jacks in nearly all NYU offices back to equipment located in nearby telecommunications closets. The approach would be to install one or more wireless access points attached to the wired NYU-NET infrastructure in the closet. Then, for each computer, purchase what might be called a "wireless ethernet jack" — a wireless transmitter/receiver which communicates over NYU-NET via the access points. Each computer then plugs into the wireless ethernet jack via a standard twisted-pair cable from its ethernet port. From the computer's point of view, it is attached to this network just like any other network.

This solution would be of particular interest for an office floor or similar location where the cost of wiring to each computer is unusually expensive or difficult, or for an office in a temporary location where the cost of installing permanent wiring is not justified. We could even take this approach for a situation where installed wiring is at capacity, and there is a need to connect a few additional computers to the network. It could also be used in a laboratory where a computer on a cart is moved frequently from location to location.

All of these applications are entirely practical at this time, although in many situations traditional wired approaches may involve less equipment, lower installation costs or greater communications bandwidth. We can anticipate, however, that wireless equipment costs will continue to decline as capabilities and speed increase. For right now, wireless networking offers solutions for special cases, and thus represents a new set of tools in our networking tool chest. Within a few years, wireless networking may conceivably achieve full parity with wired solutions and become commonplace on NYU-NET.

Recent NYU-NET Developments

Router Upgrades

Our Network Operations Center staff performed hardware upgrades this summer on the core NYU-NET router equipment. Chassis and memory improvements now provide greater router horsepower and greater traffic monitoring capabilities across the network. The upgraded routers now offer greater support for future technologies, such as IP multicasting and RSVP, that are integral to Mbone and Internet2 applications.

Preparations for Internet2

ACF is now assembling the equipment that will link NYU-NET to the vBNS, the national high-speed network sponsored by the federal government that is serving, to a certain extent, as an Internet2 testbed. NYU’s link, supported by an NSF award, is part of the NYSERNet 2000 project. NYSERNet 2000, the next-generation New York State data communications network, is our region’s effort in the Internet2 initiative.

Network News Service Upgrade

The NYU-NET network news service, managed by ACF staffer Gary Rosenblum, will be enhanced this fall thanks to the acquisition of a new Sun Microsystems news server and updated news software. With the server’s increased storage capacity and better news management tools, the retention period for news articles, now typically two to three days, will be raised to seven days on average.

External Proxy Access to NYU-NET

It is now possible to configure your Internet browser, specifically Netscape or Internet Explorer, to access NYU-NET from locations outside NYU via the NYU-NET proxy server. This is desirable in cases where you wish to access certain information sources, such as the RLIN catalog database accessible through BobCatPlus, which are only available to NYU computers.

The proxy server performs this service on your behalf if you configure your browser for automatic proxy configuration using the URL proxy.nyu.edu/proxy.pac. Upon accessing the Internet with your browser, you will be prompted for your NetID and associated password, since only members of the NYU-NET community are entitled to this privilege. See www.nyu.edu/acf/nyunet/proxy.html for more information.

Old Modem Pool and Number Will be Retired

Over the course of the Fall 1998 semester, the old NYU-NET...
NYU ResNet, NYU's program to provide direct Ethernet connections in residence hall rooms, is transforming itself from a small niche service into what we hope will become a central part of residence hall life for undergraduate students. ResNet provides Internet access through a wired jack, along with software, documentation and technical support. The transformation is taking place not only in the program's scale, but also in its methodology and style.

Most obvious is ResNet's physical expansion, an increase of over 50 percent in size to encompass more than 5600 ports in 10 residence halls. Alumni, Carlyle, East 7th Street and the new University Hall are joining Brittany, Goddard, Hayden, Rubin, Third North and Weinstein in offering direct Ethernet connections.

Simultaneous with the growth in our service area, we see a growth in the use-rate of these ports. In 1996, 17 percent of people with access to a ResNet port chose to activate a connection; in 1997, that figure rose to 35 percent. For 1998, we expect that figure to rise to at least 50 percent.

At many schools, activation rates top 80 percent after service has been offered for a while.

There is every reason to expect that NYU's future student population will be just as digitally inclined as those of other schools. As we scale the project into big-league proportions, we are simultaneously attempting to rework our methods to provide better service, not just more of it. The growing importance of computers for communications and research is leading more people from outside traditionally computer intensive fields to require and seek out networking service. These people have greater needs for service and support. The real action at ResNet is in our attempts to revolutionize our service and support models.

The first thing that became apparent when we attempted to engineer a support model for ResNet was that the vast majority of service requests come at the very beginning of the school year. Obviously, most people want their machines hooked up when they move in, during the week before fall classes start, or as soon after that as possible. There's a second peak at the start of the spring semester, because some people move or get new computers over the holidays, but basically users' needs all clump up in a three-to-four-week period at the beginning of the school year.

This presents a host of challenges. First is the issue of staffing. There are a limited number of students available for training before move-in week. Even with training, the period of greatest need coincides with the period when our staff is the most raw and inexperienced.

Another challenge is the volume of questions. In the chaotic atmosphere that prevails during this peak time, it can be easy to lose track of individual service
requests when so many are made in such a short time.

To meet these challenges, we have changed almost every aspect of the way we support our users. The ResNet project has become a part of ACF’s User Services division. This fall, we have already begun to reap the benefits of greater integration with the resources of User Services. For instance, an ongoing resource for ResNet is NYU’s system of computer labs. Labs provide access to online support materials and are a visible and accessible location for users to look for answers.

The ACF HelpCenter (998-3333) is now much more integrated into the process of supporting ResNet users. By routing the lion’s share of information and service request calls through the HelpCenter, our staff is free to go out and provide on-site support. ResNet is also part of an emerging ACF-wide trouble ticket system, which will foster greater efficiency in resolving trouble cases by coordinating the resources of the HelpCenter, the ResNet staff and other parts of ACF.

Next, we have adopted a two-tier strategy for ResTech staffing. The first tier consists of ResNet Aides who were hired for the fall rush period and were trained to provide information on ResNet and basic assistance in system configuration. We dispatched them to the residence halls and at the NYU Computer Store. By proactively putting our staff around campus, we hope to shorten a confused student’s search for information and support.

If a ResNet Aide cannot resolve a student’s technical problem, he or she creates a trouble ticket to route the problem to the second tier, our staff of more experienced ResTechs. These are student employees, selected on an ongoing basis from the pool of ResNet Aides, who have demonstrated superior troubleshooting ability. ResTechs, in turn, are able to send stubborn problem cases to full-time staff. This chain of command should help ensure both that simple problems get addressed quickly and that full-time staff are used to maximum effect.

This year, ACF has introduced an automated online registration process. More information about this can be found at www.nyu.edu/acfr/resnet. This has been a big help to students, getting many more of them online than ever before.

We have put ResNet information cards into the packages that students receive when they move in. And this fall, we are also offering ResNet classes as part of ACF’s free class series. By projecting our resources on so many fronts, we hope to cast a net that will catch every student in need of service or support.

Because of ResNet’s youth and rapid growth, each year is an experiment. We hope that with a growing pool of experience and greater integration into ACF processes, ResNet’s latest growth spurt will take us beyond a gangly adolescence into an effective maturity. For the first time, ResNet will be able to serve the majority of NYU’s undergraduate campus residents. As faculty and staff work to integrate electronic communications into the learning process, we are working hard to provide students with avenues to join in.
NYU-NET = nyu.edu + nyu.florence.it + nyu.cz

Carlo Cernivani
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This fall, NYU has expanded its study-abroad program to include a center in Prague, Czech Republic, located in the old town section of the city. In a 600-year-old building with large, exposed wood ceiling beams, students will be taught by an all-Czech faculty, exposing them to the rich cultural, political and social heritage of the Czech Republic. At the same time, they will be networked to the Washington Square campus, for the building is also home to the latest expansion of NYU-NET abroad.

As always, communications and networking play an important role in academic endeavors. So, once again ACF's associate network manager Jimmy Kyriannis and I packed our bags and set out to put the nyu.cz domain on the map. Although not as sophisticated as some applications may be, our Prague installation is a "meat and potatoes" network providing all of the most necessary basics. Faculty, staff and students have access to e-mail (provided by a local server), telnet, web browsing, word processing, networked laser printers and more.

NYU’s facility is spread over two floors in the four-story building that includes classrooms, offices, a conference room, a library and a spacious computer lab. The facility provides sixteen Dell Optiplex PCs running Windows95. These PCs, as well as four Hewlett-Packard 4000N laser printers, are connected to a 24-port Cisco Catalyst 1924EN ethernet switch. We use the Catalyst to tie together all of the elements of our network. We’ve installed a Sun Microsystems Ultra-1 UNIX system to provide e-mail, Domain Name Service, DHCP/bootp and web server capabilities for the network.

Our access to the Internet comes by way of a Cisco 2514 router that is connected to our local Internet Service Provider’s Cisco 2000 series router. The ISP is conveniently located on the top floor of the building, which facilitates our connection to their network. The ISP utilizes a two-megabit wireless link from our location to the nearby stock exchange building, where the ISP accesses the Internet via a dedicated E1 (two-megabit) circuit. We have been provisioned 256 Kbps worth of bandwidth out to the Internet for our use, which we feel will be adequate given the relatively light traffic loads anticipated in the early stages of the facility’s development.

Of course, increased networking demands will undoubtedly necessitate augmentation to this circuit relatively soon. The ISP’s owner has told us that an additional high speed circuit will be provisioned in the near future, and that we will be able to utilize it once it is in production. The 256 Kbps mentioned above is the maximum baud rate we are permitted over the ISP’s link. It is not a guaranteed or dedicated amount of bandwidth available to us at all times. We are, after all, contending for bandwidth on a shared circuit with other customers. The 256 Kbps figure merely represents a ceiling, providing the ISP an assurance that our network demands won’t overwhelm their link.

The Best Laid Plans ...

Upon arriving at the facility, Jimmy and I found that various continued on p. 43
Streaming Video Over the Internet

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The evolution of information services on the Internet is proceeding rapidly. For many years, the typical transmission, whether via e-mail, ftp or gopher, was in plain text. Of course it was also possible to send files that weren't text, like binary programs or graphic images, but they had to be used or viewed as a second step, after having first downloaded them.

The graphical web browser changed this. Documents consisting of formatted text with images could be easily and immediately delivered by simply clicking on a page. It was also possible, but not very convenient, to view video files by clicking on them, waiting for them to download to your local computer, then viewing them with appropriate software.

In 1995, RealAudio 1.0 was released. This was the introduction of a new technology called streaming media. When you click on a streaming media item such as an audio file, a download of the file begins. But instead of having to retrieve the entire file before viewing it, playback starts when enough of the content (commonly referred to as a buffer) has arrived to ensure a smooth and continuous broadcast of the file. So, you click, wait a few seconds for the audio to be buffered, and then start listening. RealNetworks then came out with RealMedia, which added video. This enabled true broadcasting over the Internet, with webcasts either live or on demand. In other words, one could tune in to a live broadcast at the time the event was actually taking place, or see a rebroadcast at any later time.

How does it work?

RealMedia webcasts are distributed via a three-component architecture, consisting of an audio/video encoder system, a media distribution server and a web server. The encoder system receives input video and audio signals through its interface boards, and then digitizes and compresses the signal with RealNetworks' RealEncoder software. This encoded data is either saved to disk during the event for later viewing, or sent directly over an IP network to the distribution server for live broadcasts (or both).

Either method is highly computation-intensive, since the video and audio signals must be processed quickly enough to keep up with the constant incoming video and audio feeds. Typical single-processor Pentium systems simply aren't powerful enough to do the job, so ACF uses a dual processor 400MHz Pentium II system, with a PCI bus for best possible I/O (Input/Output) performance from the video and audio acquisition boards. It's also portable, for easy transport to the location of an event.

The RealEncoder software allows us to select how lossy the compression of the audio/video sessions are. Lossy refers to the degree of information discarded to reduce the size of the file. The more lossy, the less information stored per time unit and the less bandwidth required to transmit the data to the audience. With the current technology, full-motion video compressed down to meet the transmission speed of a 28.8 Kbps modem link will lose a significant amount of its video information, resulting in poor broadcast quality.

We've found that encoding at 110Kbps (compared to an ether-
net LAN connection that operates at 10Mbps) offers fairly good video and excellent audio quality, without impacting network performance to a significant degree. The next-generation RealSystem G2 software from RealNetworks promises to address video demands over a modem link by significant enhancements to the distribution and transmission.

RealServer, the current distribution server, transmits the encoded multimedia session to the RealPlayer client at a fairly constant rate. This is called streaming. The streamed data is transferred through the RealEncoder either as a saved file or live as the event is being digitized.

Due to the potential for many RealPlayer viewers to connect to the RealServer at any one time, we have chosen a very powerful dual processor Sun SPARC system with a 100Mbps connection to NYU-NET as our server. The centralized placement of the server on the network offers the best possible performance to viewers within NYU, as well as to others on the Internet who wish to view NYU events.

Traditionally, RealServers send out one stream of multimedia data per RealPlayer viewer. This poses network scalability problems since it's highly inefficient for a server to simultaneously transmit the same stream many times. Individual RealMedia streams are sent to the RealPlayer in unicasted IP packets. Unicasted packets are sent directly from one machine to another, just as they are for telnet, ftp or HTTP sessions. Using this scheme, 100 players would require 100 unicasted packet streams on the network. At 110Kbps, this would saturate a 10Mbps Ethernet.

For live webcasts and scheduled broadcasts of a recorded session, there's an alternative. One single data stream transmitted with multicasted IP packets can support an indefinite number of RealPlayer clients. The RealPlayers are instructed to tune in to this single continued on p. 43

Source Feed
- S-video
- Audio

Encoder Machine (encoder.nyu.edu)
- Hardware: portable dual processor 400 MHz Pentium II with 128 Mb RAM, audio card, and video for Windows (VFW)
- Software: RealEncoder on NT
- Function: takes in live video and audio feeds and transmits stream to video server

Video Server
- Hardware: Sun UltraSPARC multiprocessor with 1 Gb RAM and 100 Mbps connection to NYU-NET backbone
- Software: 400 stream RealServer on Solaris
- Function: receives media stream; transmits to viewer

Web Server (www.nyu.edu)
- Hardware: dual DEC Alphas (for failover) with 256 Mb RAM and 100 Mbps connection to NYU-NET backbone
- Software: Stronghold secure server on Digital UNIX
- Function: announces webcast integrated with text and graphics

Personal Computer
- Hardware: any capable of running the software below
- Software: graphical web browser with RealMedia plug-in
- Function: access webcast

Breaking Down Our Bloomsday Webcast
Maintaining high quality video and audio required substantial hardware, software and network connectivity.
When Disaster Strikes Your PC Hard Disk
Ways to Help Yourself

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When your PC has hard disk problems, there are several things you can do right away without any help from technical support. The tools you need may have come with Windows95 or 98, or they can be installed from the CD-ROM or disks that came with your operating system.

Prevention
There are ways to prevent a disaster from ever happening. The most important is to back up your files. Any time you install a software application, make a backup of your hard disk first. Of course, backups should be done on a regular basis. But if you only backup once in a while, an installation should be one of those times.

Windows95 comes with a utility called Microsoft Backup. This utility will try to detect a tape drive and stream data to it. It will also work with Iomega drives. The downside is that it will not span tapes or cartridges, and it won’t work with 4mm tapes. So you will need a Jaz or 1/4-inch tape drive to use with this utility. Alternately, Iomega has a backup utility called 1-Step that works with their drives and will span Zip disks.

Another tool that comes with Windows95 is the Emergency Recovery Utility. This is not installed with Windows, but it is on the 95 CD-ROM. ERU will not back up any hard drive data, but it will make a backup of registry and system information and copy it to a floppy for later restoration.

ERU should be used before installing anything that will make extensive registry changes such as large programs like Adobe Photoshop or Macromedia Director. When something goes wrong, restoration can be done from the floppy with just one command. It’s a good idea to use this utility frequently, because the registry information can easily be corrupted for a variety of reasons. Having a backup like this can enhance your PC peace of mind.

Another thing you can do to prepare for disaster is to make a Windows95 startup floppy. To do this, go to the “Add/Remove Programs” control panel and click on the “Startup Disk” tab at the top, then click “Create Disk.” Use a new floppy or one without any needed data, as the disk is reformatted by this operation.

If you do all three of the above operations, you should be well-guarded in case disaster strikes. However, make sure you repeat these steps frequently for up-to-date protection.

Minor Problems
There are several things you can do to maintain a healthy hard drive and keep annoying problems from cropping up. Some solutions are available from Microsoft, and some are from other vendors.

Install virus protection software. There are many good ones available, like McAfee’s VirusScan and Command Software’s F-Prot Professional, which are both used in the ACF labs. Whichever one you choose, make sure you can get updated virus definition files easily, and make sure you install the updates regularly. There are many macro viruses around which can be transferred to your computer via a word processing document macro stored within a file. A good virus protection program can be set up to automatically check files on floppies and disinfect them if necessary.
ScanDisk and Defrag are two Windows95 utilities that should be used at least once a week. ScanDisk can check for physical errors on your hard disk and on the directory structure. Defrag can optimize the stored files on your disk so they can be found, and hence launched, faster. To run these utilities, go to your start menu and select “Programs” and then “System Tools.”

A good third-party utility is Norton Utilities. This can take the place of ScanDisk and Defrag, while also providing limited virus protection and many other goodies. Plus, it will update itself automatically over the Internet. Norton also automatically and periodically checks the state of your hard disk, and informs you when there are problems.

**Major Problems**

The worst that could happen is if either “OS Missing” or “No Bootable Partition Found” displays when you turn on your machine. In either case, your machine can’t boot up from your hard drive as it usually does, so you’ll have to start up from an external floppy disk. If you did not make a Windows95 startup floppy as was recommended above, you can have someone with a functioning PC make one for you to use.

“OS Missing” means that something has happened to the Windows startup or operating system files. In this case, you should use the Emergency Recovery Utility disk you so diligently created the day before this tragedy occurred. First, reboot the machine from the bootable Windows95 startup floppy, then insert the ERU disk. At the DOS prompt, type in “ERD” to begin the process of recovering your old system files.

“No Bootable Partition Found” means that you may have a major disk hardware problem. Your computer may have forgotten its configuration settings, or there may be physical damage to your hard disk. In this case, there are two things you can try. Test to see if there is a startup partition. Boot with the Windows95 startup floppy and try to invoke the C drive (or whatever letter you assigned to the startup partition) by typing “c:” at the a:> prompt.

If you get the error message “Invalid Drive Specification,” you can try booting up with the Windows95 bootable floppy and run ScanDisk from there. If you have Norton Utilities, it comes with an Emergency Startup Disk that can check all sorts of things for you.

If your machine has lost the information about its drive specifications, it will have to be reminded of them. If your machine is older, the information in the CMOS (a special area of memory reserved for system hardware information) may have been lost. Older machines need to have this information entered manually; newer machines autodetect the information. Getting to the CMOS information means rebooting your machine and holding down some command key or sequence (usually F1 or F10, but check your machine’s manual) to activate the CMOS setup program stored in memory.

After completing the next steps, you will have to save any changes you made to the CMOS, so be careful not to change anything in the CMOS setup if you’re not sure about it.

The CMOS program usually presents the system information in pages. The Hard Disk information should be on the first page. The settings can be easy to configure if your machine is relatively new; all it requires is that Hard Disk 0 be set to “AUTOCONFIG.” If your machine is older, you may have to insert several parameters, such as Heads (Hds), Cylinders (Chn), Sectors (Sec) and Leaving (Li).

Unfortunately, the correct parameters to enter, in this case, are usually printed on the top of the hard disk itself, so you would have to open the case on your machine to read them. But if you open it, do so with caution!

**Warning!**

Please don’t open the case if you are at all unsure of what you’re doing. You don’t want to injure yourself by exposing yourself to the electric current in the components inside the PC. We recommend, at this point, calling a qualified technician that can repair it for you.

If you were able to reset the CMOS parameters yourself, rebooting the PC should revive your machine entirely. This is because loss of CMOS information does not mean loss of information on the hard disk. The PC should recognize the boot partition and restart normally. If not, have a qualified technician look at the PC to determine the problem.

These major problems seem to be the exception rather than the rule for problems with your PC’s hard disk. Aside from these situations, there are relatively cheap and easy things you can do to diagnose and fix hard disk problems on your PC.
Intranet Services at NYU

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The next step in evolution for NYU’s Internet Account with DIAL service is ACF’s Intranet Services. The term “Intranet” is used to describe services within a closed network environment (such as a business or institution) with which authorized users gain access to information and services to which the outside world is blocked.

As of the beginning of the Fall 1998 semester, ACF has expanded its services to include online activation of Internet service accounts for matriculated students and faculty and staff, as well as online password changes and information about their ACF computer accounts.

To Apply
Go to www.nyu.edu/acf/start from any NYU-networked computer in an NYU residence hall or office, or at an ACF computer lab, and follow the instructions on the ACF Start page.

Shaaron Francis is the Assistant Director for Business Administration at ACF.

To Activate
Follow the instructions at this website to activate your account and set your initial kerberized password. Kerberos is a central database of usernames and secret passwords allowing for usage across systems. For instance, your NetID (username) and password will be the same for your class accounts, Internet services account and DIAL service, as well as for other services which may be added in the future.

Students can complete the process entirely online by using their NYUCard with NetID and their TorchTone PIN. Faculty and staff may complete the online process up to the point of being authenticated, which is done at ACF’s Accounts Office (251 Mercer Street, Room 305). When you are finished with the process, your e-mail account will be activated within ten minutes, with DIAL access activated within 24 hours.

We will continue to expand this service and include other services in the future. You may access the Start page at any time to change your password or view updated information about your ACF accounts.

For more information regarding accounts, expirations, usage and more, please see the ACF Accounts page at www.nyu.edu/acf/accounts. From there you can link to information about Internet accounts at NYU. Also, feel free to e-mail any questions to us at afc.accounts@nyu.edu.

ACF Start

Enter your NetID and Password

ACF Intranet Services provides a variety of access to information and services related to network and computer use at New York University: apply for account services, obtain information about your accounts, update information about yourself.

To begin this process, please enter your NetID, your password, and click the Start button. If you don’t know your NetID, you can find it by looking on the front of your NYUCard. NOTICE: Your NetID is not your Student or Employee ID!

Your NetID

Your Password
(leave blank if not set)

START!
Recent Electronic Attacks at NYU

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Many folks who used to have simple terminals or personal computers that ran only local programs, have recently acquired more powerful desktop machines, such as scientific workstations of various sorts. People see these computers as freestanding and individual, so they don’t consider the fact that now that everyone’s networked, their machines can pose security risks to other users.

As desktop machines became more powerful and better connected, people started using the machines to reach out and take advantage of remote services such as mail servers, websites and news groups.

Now, a number of people have purchased powerful computers that have the capability to offer services to others as well. Desktop computers running versions of the UNIX operating system are available from Sun, SGI, IBM, HP and DEC. The Linux variant of UNIX can be found running on Intel machines, Alphas, Power PCs and others. Even Microsoft and Apple’s latest desktop operating system releases come with a few pieces of server software (Web servers and file servers) already installed.

Unfortunately, as more systems are connected to the network and have the options enabled to provide services (as is the default for Linux and most all the other UNIX systems), the risk of people misusing these services gets higher.

Spam Relaying

Most UNIX boxes run e-mail by default. Since they are designed as multi-user systems, they are mail servers in their own right and can receive mail (so you can get messages there), send it to remote systems, and store messages in between, so you can read them at your leisure or wait for a remote system to come up and accept a message you sent.

The risk this poses is that spammers can use your system to deluge others with unwanted and sometimes offensive advertising or political statements.

Spam, you will recall, is the technoslang term for unsolicited, repetitive or commercial mass mailings or postings. It refers to a Monty Python skit in which a group of Vikings were so enthusiastic about the meat product that if its name were mentioned, they started singing it over and over and over, preventing all rational conversation. (For more information on spam, please see the Postmaster column in the Spring 1998 issue of Connect.)

Many people do not like unsolicited mass mailings, especially commercial ones, and most especially unsolicited ads for products they neither want nor need. Sometimes, in an attempt to block spam, all traffic from a site that has sent spam in the past is blocked.

In response, many spammers try to avoid those blocks by passing the mail to another host on the network that is not on any blacklist.

Traditionally, any Internet host would accept mail for anyone else and send it along in the interest of keeping information flowing. This traditional helpfulness is very convenient for spammers. A small number of bad actors with very powerful machine-gun mailing tools can swamp a host or an entire piece of the network with outgoing mail to literally millions of users. Clearly it is important that all mail servers here at NYU block such attempts.
to misuse our mail forwarding services.

A feature called mail relaying block lets you permit other hosts within NYU to pass you mail for the outside world, and lets outside hosts pass you mail for NYU destinations, but will not forward mail from an outsider to another outsider. Thus, attempts to spam innocent third parties using an innocent system as an agent will fail. The general NYU-NET operating procedures, which can be found at www.nyu.edu/acf/nyunet/tech/policy/principles.html, require a user running a server to have the appropriate anti-relaying software on that system.

End-user mail programs such as Eudora do not have this problem. If you are just reading your mail using a POPmailer like Eudora, don't worry. But anyone running a UNIX box or another mail server (such as cc:Mail server, Mercury mailer, or any of the Microsoft mail servers) may well be at risk. For a summary of the current vulnerabilities of different mail transfer agents like sendmail, see maps.vix.com/tsi/.

Because spammers run sweeps over large ranges of IP addresses, you cannot assume that you do not need to worry about this simply because your network-connected SGI or Sun workstation is not known to the outside world. We have seen quite obscure machines being found and abused in this way.

**Denial of Service Attacks**

NYU has detected regular attempts by automated cracking tools to sweep all of NYU-NET, using the known bugs in some personal computer vendor’s TCP/IP implementations to cause machines to hang or crash. To avoid such automated attackers, it is important to have the most recent set of patches for systems like Windows95, Windows 98, Windows NT, HP-UX and Linux, since it is hard for network staff to detect and block such attacks before they have done their damage.

The Security Group maintains a mailing list of alerts for system managers, but it is the responsibility of every person who maintains a computer system to track problems and fixes from their vendor. For popular or rapidly changing products like Windows and Linux, it is especially important to track problems as they are reported and to install fixes promptly.

Data sent over the Internet is broken down into packets. Some implementations of the fragmentation re-assembly code do not properly handle overlapping packets. Teardrop is a widely available attack tool that exploits this vulnerability.

Some implementations of TCP/IP are vulnerable to packets that are crafted in a particular way (a SYN packet in which the source address and port are forged to be the same as the destination). Land is a widely available attack tool that exploits this vulnerability.

A copy of the Computer Emergency Response Team advisory on this topic can be found at ftp://ftp.cert.org/pub/cert_advisories/CA-97.28.Teardrop_Land, which includes specific vendor version and patch information. Because of their wide use, Windows95 and Windows NT are supplanting Sun systems and even Solaris as the preferred target of cybervandals. They want to do as much damage to as many systems as possible, either to build a reputation or to prove to large software companies like Microsoft that their software design and testing practices are inadequate.

**RPC and IMAP Hole Scanning**

People are not only scanning NYU-NET to crash systems. Most recent UNIX operating systems include a variety of features created at Berkeley that let users access systems and move files from account to account without having to prove their identity each time they start another operation on a different system. The Berkeley R* tools (rlogin, rshell, rexec and rmt) and the Sun-popularized Network File System (NFS) are some examples.

We have run into a number of cases lately where crackers seemed to be scanning for known holes in the remote procedure call (RPC) programs used by NFS to share files among several cooperating systems. NFS was designed to work in a small local network of secure systems run and used by responsible engineers who trust each other to protect each other's privacy.

Although it lacks strong security features and can be used in a number of ways to break system security, NFS is popular. Sun is working on patching some of the holes and adding some additional privacy protection code.

Nonetheless, there are a number of systems where the responsible party has not been aggressive about patching holes as they were reported. When a cracker has found a hole and used it to break in, starting from that account he can infiltrate all the

*continued on p. 44*
Classes and Talks
Academic Computing Facility — New York University
The full contents of ACF Classes and Talks is on NYU Web at www.nyu.edu/acf/classes/

Fall ’98 Schedule

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ACF: Using a PC at ACF C-3
ACF: Using Unix at ACF C-3
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H
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I
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About ACF’s Fall Classes and Talks
This fall we have added new and exciting talks on the use of digital technology in the arts, humanities and sciences, as well as new topics in digital multimedia.

All members of the NYU community are welcome at ACF’s classes, workshops and talks. There is no charge for any of the ACF classes, but participants should have a valid NYU Card.

Seating capacity: To avoid overcrowding, we have listed maximum seating capacities for each class. We recommend that you arrive a few minutes early in order to secure a spot.

Classes by arrangement: Faculty members may arrange special classes for a specific course or research group. These do not necessarily have to be given at an ACF site. For classes in statistics, call Frank LoPresti (998-3398); for other applications, call the ACF Innovation Center (998-3044).

Additional information: A list of ACF locations and phone numbers, and pointers to further information about ACF resources, can be found on page C-8.

— Vincent Doogan
Associate Director, ACF
vincent.doogan@nyu.edu
This talk is intended to help you select the best personal computer for your needs. It will cover the basic components of a computer, as well as the other hardware required for various tasks. We will also discuss how you can assess your particular needs to establish your criteria for selecting computer tools. NYU Computer Store Staff.

www.ydu.edu/acf/labs/
www.bookc.ydu.edu/computer/

Choosing Your Computer (Mac and PC)

This talk is intended to help you select the best personal computer for your needs. It will cover the basic components of a computer, as well as the other hardware required for various tasks. We will also discuss how you can assess your particular needs to establish your criteria for selecting computer tools. NYU Computer Store Staff.
Using Unix at ACF
An introductory class on using the Unix operating system, variants of which run on several different types of computers at ACF. Most are accessed at ACF labs through PCs, Macs and terminals, but the SGI workstations also use Unix. The basics will be covered: logging onto the host machines, organizing files, editing text, printing files and using applications. ACF staff.

ACF Unix account required.

Tisch Hall, room LC8
Seating capacity: 15; first come, first served; hands-on class.

Wednesday 11:00-12:00
September 16

14 Washington Place, basement
Seating capacity: 15; first come, first served; hands-on class.

Friday 1:00-2:00
September 18

Protecting Your Files: Anti-Virus & Backup Strategies
(Mac and PC)
This talk will focus on strategies to protect classwork, research project data and other documents. Viruses will be explained and use of virus protection will be demonstrated. Various backup strategies will be outlined. ACF staff.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk/demonstration.

Wednesday 12:00-1:30
October 14
Oriented towards Arts faculty and graduate students, this session will provide a broad state-of-the-digital-arts overview and update, as well as focused presentation of ACF and other University resources available to artists working with digital media. Topics will include high-resolution film input and output, color management, tools for video and audio production and installation, alternatives for digital print output, electronic painting, 2-D and 3-D animation, and art on the World Wide Web.

Shelly J. Smith, Philip Galanter.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk/demonstration.

2:00-3:30 September 29

3. Multimedia and the Humanities
A demonstration of multimedia applications developed for the humanities, and a discussion of the pros and cons of using hypertext and multimedia in traditionally text- and book-based humanities subjects. The session will include an overview of the process of digitization and a discussion of the process of capturing graphics, sound and video.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

Wednesday 2:00-3:30 October 7

4. Introduction to Electronic Editions
A presentation of electronic journals, CD-ROMs and online editions of primary sources. This session will also include a demonstration of tools to facilitate the creation of basic electronic editions for teaching and researching.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

Wednesday 2:00-3:30 November 25
NYU-NET Software
(DIAL and Office Connections)
This talk is intended for those who have an NYU-NET office connection or NYU ResNet connection, or who use NYU DIAL from home or while traveling. Four popular Internet applications for use with these connections will be explained and demonstrated. The software to be discussed includes Netscape, Eudora and Fetch/WS-FTP. Lisa Barnett, Jane DelFavero.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

1. For PC Users
Wednesdays 2:00-3:30
September 9
October 14
November 11
December 9

2. For Mac Users
Wednesdays 2:00-3:30
September 16
October 21
November 18

Uploading & Downloading
This talk will introduce the concepts of moving files between computers. The file transfer protocol and the Kermit protocol will be discussed. Specifically, tools for uploading and downloading files from a desktop computer to the NYU-Internet system will be demonstrated, including WS-FTP, Kermit, and HyperTerminal (for PCs) and Fetch and MacKermit (for Macs). ACF Staff.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

1. Introduction to the World Wide Web
Lynx and Netscape are programs that allow you to browse World Wide Web servers — repositories of digital images, sounds and text. The evolution of these easy-to-use browsing tools has made it possible for even novice computer users to locate desired information resources from across the Internet. This talk will feature a demonstration and explanations of basic concepts and commands.

Warren Weaver Hall, room 102
Seating capacity: 50; first come, first served; talk.
Friday 2:00-3:30
October 9

2. Introduction to HTML
Beginning with the basics of what an HTML file looks like, the speaker will explain the structure of a document and its HTML elements. Sample pages will be analyzed and con-
structured. Topics will include tags, links, URLs and embedded graphics. Other components such as “image maps,” frames, CGI, Java and plugins will be explained.

Warren Weaver Hall, room 102
Seating capacity: 50; first come, first served; talk.
Friday 2:00-3:30
October 23

3. Graphics and other Multimedia for the Web
See entry under Multimedia.

Multimedia

Introduction to Authoring Tools
A survey of four software applications for integrating multimedia in web-based and CD-ROM-based presentations. These will include: Powerpoint, Flash, Director and Authorware. Vincent Doogan and Jeffrey Lane.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 2:00-3:30
October 6

Image Scanning (Mac)
A focused class in the use of a flatbed scanner to digitize photographs and artwork. Basic knowledge of the Macintosh is required. ACF Staff.

Education Building, 2nd floor
Seating capacity: 15; first come, first served; hands-on class.
Fridays 1:00-2:30
September 18
October 16

Graphics and Other Multimedia for the Web
This session focuses on methods for designing and preparing graphics for the World Wide Web. Topics include: creating small fast-loading graphics, cross platform compatibility, scanning tips, image maps, animated GIFs and the use of other media such as sound and video. Vincent Doogan.

Warren Weaver Hall, room 102
Seating capacity: 50; first come, first served; talk.
Friday 2:00-3:30
November 6

Practical Non-Linear Video Editing
This session will focus on specific namebrand systems, as well as basic concepts, considerations, and technical and economic trade-offs involved in considering the use or purchase of a non-linear video editing system.
ACF Staff.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 2:00-3:30
November 10

Powerpoint (Mac, Windows)
Powerpoint presentation software is platform-independent, part of the Microsoft Office suite. This demonstration and workshop will explain the main features of Powerpoint and how best to use it for lectures or other public-speaking activities. Discussion will include using text and graphics, slide transitions, and options for displaying or distributing a completed presentation. Jeffrey Lane.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 2:00-3:30
October 20

World Wide Web Publishing
See entry under Internet and NYU-NET Services.

Scientific Computing and Visualization

www.nyu.edu/acf/science/

Introduction to Scientific Computing & Visualization
An overview of local and remote computing and visualization resources. Presentation will include available software, workstations, color printing and videographics devices. Adel Hanna.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 2:00-3:30
September 22

Scientific Visualization
This talk will focus on scientific visualization software, including AVS, tecplot, SGI Cosmo and Iris Explorer, among others. Adel Hanna.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 2:00-3:30
October 13
An introduction to high-performance computing at NYU and elsewhere. The speaker will discuss the uni- and various multi-processor systems at NYU and the various systems available at the NSF supercomputing centers. Frances Bauer and Adel Hanna.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

Tuesday 2:00-3:30
October 27

Statistics, Databases, and Spreadsheets

**Introduction to Excel (Mac)**
Microsoft's Excel is a major spreadsheet for the Mac. A start-up talk-demonstration on creating a basic spreadsheet. Howard Fink.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

Friday 2:00-3:30
October 16

**SAS (Windows, Unix)**
This series will progress from the basic description and operation of this statistical package to advanced concepts and usage. Robert Yaffee.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

Microsoft Word (Mac)
Microsoft Word is a major word-processing program on Macintosh computers and is especially strong on typography and formatting. This is a getting-started talk/demonstration. The basics of creating a document will be covered. Howard Fink.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

**Qualitative Analysis Tools (QSR NUD*IST)**
This talk will introduce qualitative data analysis and survey the software tools currently available. The talk will include a demonstration of NUD*IST (Non-numerical Unstructured Data Indexing Searching & Theorizing) software from QSR and TextSmart from SPSS. Frank LoPresti.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

Tuesday 2:00-3:00
November 3
Important Dates for Users of ACF Services

(For updates to this list, please check NYU Web at www.nyu.edu/acf/nyu-events/.)

Current — Individual computer account renewal applications accepted.
Sept. 5-6 — Labor Day weekend
Sept. 4-9 — 1998 Class Accounts distributed to instructors.
Sept. 7 — Labor Day*
Sept. 8 — Fall '98 semester begins; ACF labs’ regular hours begin.**
Oct. 1 — New Individual Accounts and renewals begin.
Nov. 17 — Instructors may begin applying for Spring '99 class accounts.
Nov. 26-27 — Thanksgiving Holiday*
Nov. 28-29 — Thanksgiving weekend; regular hours.
Dec. 1-14 — Students expecting incompletes in courses should apply for account extensions. Instructor’s signature required.
Dec. 14 — Last day of classes.
Dec. 16-23 — Fall '98 Semester Finals.
Dec. 21 — Students with class accounts should store files they wish to keep after their accounts expire.
Dec. 24-Jan 3 — NYU Holiday*
Dec. 24-Jan 18 — Winter Recess**
Jan. 4 — Fall '98 Class Accounts expire.
*NYU holiday: Labs & offices closed.
**Please check at labs and at above Web address for updates on ACF hours.

Additional Information

Class Locations
www.nyu.edu/acf/classes/
The following are the street addresses of the locations referred to in the course descriptions.
Warren Weaver Hall, 251 Mercer Street
14 Washington Place, lower level
Education Building, 35 West 4th Street, 2nd floor
Third Avenue North Residence Hall, 75 Third Avenue, C-3
Tisch Hall, 40 W. 4th Street, lower concourse

HelpCenter
www.nyu.edu/acf/help/
251 Mercer St., 2nd floor 998-3333
Troubleshooting; software distribution; information about ACF services and academic support.

Accounts Office
www.nyu.edu/acf/accounts/
251 Mercer St., 3rd floor 998-3035
Faculty and staff account applications and information: individual, coursework (class), and NYU-Internet accounts.

Innovation Center
www.nyu.edu/acf/ic/
251 Mercer St., 2nd floor 998-3044
Discipline-oriented resources and services for faculty and advanced students; instructional computing support; new and emerging technologies.

Student Computer Labs
www.nyu.edu/acf/labs/
14 Washington Place 998-3457
Education Building 998-3421
3rd Avenue North Residence Hall 998-3500
Tisch Hall 998-3409
Student NYU-Internet services; computer and Internet access. (See ACF flyers and above Web address for hours and rules of access.)

Publications
www.nyu.edu/acf/pubs/
Pamphlets, flyers, brochures and the magazine Connect for users of NYU computer and network services. Printed copies are available at the HelpCenter and labs; online editions are at the above Web address.

News and Announcements
www.nyu.edu/acf/nyu-events/
Updates on hours and services; special events and other notices of interest.
The "Wired" Metropolis: The Internet Backbone and the Future of Cities in the Information Age

Anthony Townsend
townsenda@acf2.nyu.edu

People tend to take telecommunications for granted, especially in New York, which arguably has the world's most advanced communications infrastructure. The federal government has long endorsed policies that sought to bring affordable telephone service to everyone, often overcharging businesses and residents in cities to subsidize those in the suburbs and outlying areas. As a result, over 95 percent of the nation's households have been connected to the telephone network since its invention a century ago.

Cyber-City?
The Internet, however, has grown at lightning speed without government restrictions, leading to wide disparities among cities and regions in the deployment of high-speed network infrastructure. It appears that a select group of "cyber-cities" is emerging.

At first, it seems an oxymoron to talk of cyber-cities. A city is fixed in space, immobile, a sculpture in concrete and steel, while cyberspace is by definition placeless — everywhere and nowhere at once with no regard for borders of any kind. But in reality, cyberspace is merely an extension of the social, political and economic systems that define urban America. There is a connection between the physical and the virtual, and as Peter Huber noted recently in City Journal, cities like New York are where "cyberspace hits the road."

In the increasingly deregulated telecommunications industry, cutthroat competition dictates that companies must choose markets carefully when building the complex and expensive networks that today's business customers demand. The cross-subsidies that made the telephone system a seamless, universal means of communications are being dismantled, and companies are free to pursue the most lucrative markets while bypassing less profitable ones. Despite the prevailing wisdom that the Internet will decentralize the economy and liberate individuals even faster than the automobile and the Interstate Highway System did, we may actually be building the most centralized communications network in modern history.

Out with the Old, In With the New
Every year magazines like Money, Fortune and Forbes rank American cities on a number of factors such as quality of life, business climate and economic growth. However, they have yet to revise their scoring systems to include factors like the availability of high-speed Internet connections, the percent of schools connected to the Internet, the percentage of adults with a college education, or the number of businesses with an Internet presence, despite the growing importance and phenomenal growth of telecommunications that those glossy pages periodically report.

It is increasingly clear that the future of cities in the Information Age rests upon their ability to collect information, process it to extract knowledge, and sell that knowledge around the world. It's no coincidence that the parts of the country with the highest per capita income — New York, San Francisco, Washington and Boston — are dominated by industries that don't produce anything tangible. These cities...
thrive on the creation of knowledge and innovation.

The most recent ranking of cities by Money magazine underscores my argument that we need a new set of urban indicators to guide decisions on where we should live, work and play. Based on a variety of criteria including air and water quality, job opportunities and weather, Money actually picked Trenton, New Jersey as the best mid-sized city on the East Coast. Now, as anyone who’s ever spent time in Trenton can agree, Money’s rating system has some fundamental problems. When the five o’clock bell rings, and the suburban workforce abandons the Garden State’s capital, quality of life in Trenton is more a function of avoiding stray bullets than living out a happy and healthy existence. Money also ranked dangerous Newark, New Jersey (the nation’s car theft capital) above affluent Bergen County, New Jersey (the third richest county in the nation).

The Ten Most Wired Cities

One example of a new indicator of urban vitality in the Information Age is the capacity and diversity of Internet backbone links to other cities. The Taub Urban Research Center has been compiling a list of links between cities for each of the 29 major backbone networks in the United States, which represent over 95 percent of the wholesale Internet market. National providers sell their capacity to local Internet Service Providers and institutions like NYU, which then parcel out that resource to employees and customers for office and home Internet access. The table below shows the ten most “wired” metropolitan areas and the total capacity of all backbone networks that maintain a node there. Surprisingly, despite rhetoric from futurists, cyber-prophets and even Vice President Al Gore, nearly two-thirds (62 percent) of Internet capacity is centrally located in just seven metropolitan areas — San Francisco, Washington, Chicago, New York, Dallas, Los Angeles and Atlanta — where barely one-quarter of the U.S. population actually lives. Furthermore, more than half the network links in these cities are used to connect to the other six top metro areas. Rather than a widely decentralized network, it appears that these seven cities are driving the development of a tightly linked, exclusive set of inter-connected cities and regions.

To understand just how massive these data pipes really are, consider this. If the entire San Francisco Bay Area’s Internet infrastructure were under my control, I would be able to send over 25,000,000 copies of this article per second to any number of cities around the world! In the information economy, the power and capacity to export information says more about the vitality and future prospects of cities than any other indicator. Companies that are in the business of selling information will locate at the top of the food chain, where they have best access to distribution networks. While in the past, proximity to rail lines or Interstate highways was the deciding factor for which cities grew or declined, in the future access to advanced telecommunications will play a commanding role in where businesses decide to locate.

continued on p. 44

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Backbone Capacity (in Megabits/second)</th>
<th>Percentage of National Backbone Capacity</th>
<th>Cumulative Percentage of National Capacity</th>
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<td>San Jose, CA</td>
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<td>Washington, DC</td>
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<td>Chicago, IL</td>
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</table>
"As the E-mail Bounces"
An Episodic Drama for NYU

Jane Delfavero
jane.delfavero@nyu.edu

Scene 1: A residence hall room

SUZIE: It's so cool, Tamara. Bobby set his password to my name! Now whenever he logs in, he thinks of me. So I set my password to his name and birthday. I wouldn't want him to think that I love him any less than he loves me.

TAMARA: Oh, yeah, you have to do that! While you're over there, will you log in for me? I want to see if Tom sent me mail about where to meet for dinner, but my nails are still wet. Like this color? It's Tropic Ooze.

SUZIE (giggling): Uhuh, maybe you want to read this mail yourself... I think Tom is thinking about skipping dinner and going straight to dessert!

Scene 2: The computer lab

TOM: Hey, this moron left himself logged in! Excellent! Now I can send e-mail to his friends, and they'll think he sent it and get all ticked off. Excellent. So what should his signature file say? "qqq200" is just not memorable enough. Hmm, how about "CheezeBreath"? Nope, let's try "IMoron."

Now, a quick letter to senator.smith@senate.gov:

"Dear Bill, I hate you and I hope someone thinks to waste you before I get around to it.

Love, yer gun-toting buddy Quentin Q. Quarrell — qqq200@nyu.edu."

Scene 3: The library

SAMANTHA: Hey, can I borrow your computer? I need to do some research and I don't feel like going to the lab.

ED: I don't know, I had to register this network card and give them my name and everything. Are you sure it's okay?

SAMANTHA: What's the matter, don't you trust me? I just have to go to this anthropology chat room that has all the info I need to finish this project. Otherwise, I'll fail this course! Pleeease?

ED: Well, okay, I guess. It is for schoolwork, and I'm not telling you my password or anything, so it must be all right. Just let me finish up my Urdu homework first.

Scene 4: Back in the residence hall

TAMARA: Any mail other than from Tom?

SUZIE: Do you know some guy named Ed? He sent you a way creepy letter.

TAMARA: Huh? Let me see that — Eewwww! That's gross! He's a freak from my Urdu class — I don't even speak to him. How'd he get my address? I'm going to report him to Campus Security!

But when they break up, who gets to keep the e-mail account?
And now, a word from our sponsor...

The problems we've seen so far on "As the E-mail Bounces" could have been prevented if the users had looked at the Rights and Responsibilities they accepted when they first activated their accounts. If you are interested in the full texts of all the statements, the documents are available at www.nyu.edu/acf/accounts/practices.html.

Scene 1: Personal Security

"I understand that computer accounts are for sole use by the account owner, and I will not share my account with other individuals or use an account assigned to another individual."

Often, users are the greatest threat to the security of their own accounts. Passwords are more often given away to friends than they are stolen by strangers. It's not a question of trusting your friends, but of trusting all the people that they know. And although the sharing Bobby and Suzie are doing seems harmless, almost cute, such a situation can easily turn ugly. The couple breaks up, and the once-trusted loved one is now an enemy with access to private information, and the ability to do a lot of damage in your name.

Scene 2: Good Citizenship

"Each holder of an ACF account, or of any school or departmental account permitting network access, has the responsibility to use resources ... in an ethical and legal manner."

"I will respect the privacy and reasonable preferences of other users (both at NYU and elsewhere on all connected networks), including the privacy of their accounts and data."

The firmest boundary of acceptable behavior is the law. Just because you're using a university account doesn't mean you are exempt from any federal, state or local laws — including threatening a senator, which, by the way, is a felony. Additionally, the University Policy on Student Conduct further defines appropriate behavior within the NYU community.

Above and beyond laws and policies, we also expect you to behave ethically. The scenario above shows two lapses in judgement. By leaving himself logged in, Quentin left his account vulnerable to the mischief of others (see more on this in Scene 3). His mistake gave Tom the opportunity to behave unethically without fear of getting caught.

Scenes 3 and 4: Accountability

"I will take precautions to safeguard passwords and other privileged information to which I have been given access. Any passwords, verification codes or electronic signature codes assigned to me are for my individual use only. I will regard them as personal identifiers of my computer use, similar to my signature on a document."

"I understand that I am responsible for all actions performed from my computer account."

Letting other people use your account is the same as letting
Jodi knows that to make big bucks on the Internet, she has to use a commercial account.

Paul: Yeah, the colors are cool and I love the movie, but can't you move that image over a bit? You can't see the top line of the order form.

Mary: Oops! We can't mess with the order form if the whole point is for people to buy our album. Man, this website is the Rockin' Balladeers' ticket to worldwide fame! Don't forget to put the banner ad for the record company at the bottom of the page, or else we won't be able to pay the rent on the studio next month. Good thing you get this page free from NYU or else we'd be rehearsing in a box on the street!

This is not an appropriate use of an NYU account.

"I understand that my access to NYU computing resources is for the sole purpose of facilitating my work as a University student, staff member or faculty member."

We are a non-profit institution. Your account is to be used for educational purposes, not commercial purposes. You cannot make money from a business run through your account; you cannot provide advertising on your website for a commercial business; nor can you trade advertising on your page for services or other non-monetary compensation.

Scene 6: Another residence hall room on the network:

Max: Hey, did you see the latest hack at Tom's Warez 'R Us? That software rocks! We can tap into all the traffic coming across this part of the network and see what people are doing with the machines in their rooms. Maybe we can send your buddy the "ping of death" and crash his machine again.

Bart: Nah, he's already ticked at me for the 'bot software I hid in his is7 account. Can we use it to redirect some of the traffic coming to your ftp site? We don't want anyone sniffing around to see your hacked copies of PhotoShop and Win98.

"Billy, haven't I already told you that hacking is very, very bad?"
We all know that hacking is bad, don’t we?

“I will respect the integrity and security of the systems and network, and will exercise care to maintain their security.”

“I will not attempt to monitor other individuals’ computer or network use, nor will I attempt to obtain their passwords or any other private information.”

“I will not make unauthorized copies of software, or perform unauthorized installations of software or reconfigurations of systems.”

Hackers like these guys are most people’s idea of a security threat. Not surprisingly, it is against our rules of service to enter or attempt to enter machines on which you do not have an account, or to monitor others’ use of their own accounts. Because the is* systems are shared resources, this also means that you cannot install software of any kind on those servers.

Clearly, you cannot violate copyright laws by giving away pirated software, or “warez.” That’s illegal.

Scene 7: HelpCenter

CALLER: I want to lodge a complaint about one of your students! I was in the “Love Them Furry Bunnies” chat room, and he kept talking about dogs! It says right in our Rules of Service that dogs are the sworn enemies of bunnies and he just went right on typing “BARK, BARK, BARK!” Fluffy and I were deeply insulted.

STAFFER: Well, have you asked him to stop?

CALLER: Loads of times, but he says we can’t do anything to him! I even have a transcript of the last session, which I saved.

STAFFER: You can e-mail a copy of the transcript to postmaster@nyu.edu and we can have our security staff follow up on the complaint. Just so you know, though, we won’t be able to tell you about any measures taken against the user, since students are protected by privacy laws.

It seems that the man with the barking habit needs a lesson in respect.

“I understand that my use of computing resources accessed via NYU-NET — whether provided by organizations within or outside the University — may be subject to additional norms of behavior or regula-

tions specific to the resource, which I agree to follow.”

We do not restrict the areas of the Internet that you can go to with an NYU account, nor do we tell you what you can say while you are out there. However, many chat services, public websites, moderated newsgroups and mailing lists have their own rules, and we expect you to abide by them. When you subscribe to such services or use them, take note of their rules. If you do not like them, do not use the service.

We also expect you to respect another user’s request that you not correspond with them, either by e-mail or in a chat. If you keep writing to them, it could be considered harassment, which is also illegal.

How We Catch You

We are not spies; we are not constantly monitoring your account to see how you use it. If you violate the Rights and Responsibilities, however, we will hear about it soon enough. Usually, we get problem reports from other users, either within NYU or outside, who are disturbed or irritated by something that a user has done. Never assume that what you do or say in cyberspace is anonymous; it usually leaves a trail of bits behind.

When we get a complaint, we follow up on the report to check for truth and accuracy. First, we check public logs and information sent to us to make sure that they match and are not forged or continued on p. 45
Stereo Viewing for Scientific Visualization

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The two eyes on a human head see slightly different views of the world due to their different locations on the head. Because of this difference, corresponding areas of the retinas do not always receive exactly the same visual image. Through the ages, people have wondered why we do not see a double image of the visual world.

In 280 AD, Euclid showed that two eyes see more of a sphere than either eye individually. But it was Sir Charles Wheatstone who demonstrated in 1838 that the mind fuses the two retina images to produce stereopsis, 3-D depth perception, by presenting slightly different images to the two eyes with a device he called a stereoscope. A stereoscope display is an optical system that functions by presenting the mind with the same kind of left and right views one sees in the visual world. In 1939, View-Master stereoscopes became available and gained wide use. If you close one eye while looking into a View-Master viewer, the image looks flat; with both eyes open, you see an image with stereoscopic depth.

Stereo viewing in scientific visualization enhances the comprehensiveness and understandability of the information conveyed in three-dimensional data, it harnesses the power of the human perception vision as a means of gaining understanding and insight into the data. By presenting three-dimensional data in stereo mode, it is possible to create strong depth impressions from pictures by sending to each eye separately the projective drawing that the eye would see if an actual object in depth were presented. Among the areas which are using stereo are medical science (radiology), molecular modeling for chemistry and biology, computational fluid dynamics, cartography, archaeological reconstruction, and oceanography.

To view stereoscopic images on a computer screen, each eye...
In a binocular system, each eye sees a view with a slightly different perspective.

must see only its appropriate image. The most common way to do this is to alternately draw each image on the screen and to use special eyewear that alternately blocks the vision of each eye synchronously with the display of the images. The ACF Scientific Visualization Laboratory, online at sciweb.nyu.edu/scivis, has made available CrystalEyes from StereoGraphics Corporation (www.stereographics.com). CrystalEyes consists of a pair of synchronizing goggles that are driven by an infrared emitter box connected to a special port on the workstations. A stereo synchronization signal is sent from the graphics display system to the emitter box, which sends an infrared signal to the stereo goggles. This signal tells the goggles when the image for the left or right eye is being displayed, so that the stereo goggles can synchronize the opacity of the lens for each eye with the display. The left image on the screen is shown while the right lens of the goggles is made opaque. The opposite behavior occurs respectively with the right image and left lens.

The display is redrawn at a high rate, so the user perceives the left and right images simultaneously. Common rate is 120 fields per second, depending on the stereo display method used. In full-screen stereo viewing, the screen is divided into left and right pixel lines. When the monitor is put in stereo mode, half of the screen’s vertical resolution and the full horizontal resolution is used for each view, that is, 1280 lines wide by 492 lines high.

An alternative technique for viewing stereoscopic images is to use the VREX 3-D LCD projector display technology from VRex, Inc. (www.vrex.com). The VRex system, which is also available at the Visualization Laboratory, uses spatially multiplexed imaging. Spatial frame buffers in the 3-D LCD panel essentially keep both left and right images on the display simultaneously for optical multiplexing by µPol (encoding left and right views using orthogonal polarization) and optical demultiplexing by passive, polarized glasses. This technique can be more cost effective because the glasses run cheaper than CrystalEyes for applications in which many people view one display, such as a presentation to a large group.

Now scientists are beginning to recognize that stereoscopic visualization of scientific data greatly facilitates their efforts to gain support for research and to help them get needed funding. Presenting their work in 3-D stereo in a way that clearly conveys the meaning of the data not only helps explain the researcher’s idea, but also casts a glow of both credibility and capability.

For access to the Stereoscopic Displays at ACF, or for more information on using these resources, contact the author at adel.hanna@nyu.edu.
In the world of data and computers, the tools of data analysis have always evolved towards more graphics and away from text. One could say that graphs are hot and tables are not.

The work of data analysis always involves describing the data. Early on, during data collection and cleaning, the tasks involve repeated checking using frequency counts, means and ranges. Over and over again, simple tables such as the table "AIDS Rates by States" in Figure 1 are used to search for outliers, look for inconsistencies, and make initial and progress reports. This allows research data preparation to proceed. As this reporting continues, one gains confidence in the accuracy and consistency of the data set from frequent listings and cross-tabulations. Simple univariate statistics from the analysis of dependent variables or scales and demographic variables often make the most useful understandable and valuable presentations in the final report.

The AIDS data has two variables, State and Rate. A bar chart lets you quickly see which has the highest rate and how big the difference is from one state to another. However, a bar chart treats the independent variable, State, as if it were a purely categorical variable, when it's not. The state names have more information than simply that New York and New Jersey are different values. There are spatial, political and geographical differences as well. We miss out on visualizing patterns of the disease.

Certainly, data with a geographic variable begs for a map. Where are the states that have higher incidents of AIDS? Are there geographic patterns in the spread of the infection? Are there political factors in the clustering of AIDS cases? Figure 2 shows the simplest default SAS/MAP produced displaying these data.

SAS’s PROC GMAP produces four types of thematic maps: choropleth, block, prism and surface. Choropleth maps show relative values of a dependent variable using different colors. Usually we would use a color scale, for example going from white to red where white represents a low value, progressively darker shades of pink represent higher values, and the darkest red shows the highest value in the range.

Figure 2 shows a block map. Figure 3 shows a prism map, attractive but also the most difficult to produce.

<table>
<thead>
<tr>
<th>State</th>
<th>AIDS Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington, D.C.</td>
<td>188.0</td>
</tr>
<tr>
<td>New York</td>
<td>72.7</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>53.3</td>
</tr>
<tr>
<td>Florida</td>
<td>41.6</td>
</tr>
<tr>
<td>New Jersey</td>
<td>40.1</td>
</tr>
<tr>
<td>Connecticut</td>
<td>37.4</td>
</tr>
<tr>
<td>Maryland</td>
<td>36.8</td>
</tr>
<tr>
<td>Nevada</td>
<td>35.3</td>
</tr>
<tr>
<td>Delaware</td>
<td>31.6</td>
</tr>
<tr>
<td>Louisiana</td>
<td>25.1</td>
</tr>
<tr>
<td>Texas</td>
<td>24.3</td>
</tr>
<tr>
<td>Georgia</td>
<td>23.0</td>
</tr>
</tbody>
</table>

Frank LoPresti heads ACF's Statistics and Social Sciences Group.
Functionality.

SAS has global definitions that will allow you to finely control the map features. Figure 4 shows a different viewing position from Figure 2, where New York State is hidden behind Washington, D.C.

SAS’s PROC GMAP procedure requires a map data set and a response data set. A map data set is an SAS data set that defines the boundaries of unit areas, such as states or counties. A map data set must contain two numeric variables, X and Y, along with a variable ID that identifies the unit that the X and Y coordinate helps define. In other words, the unit Alabama has enough pairs, X and Y, to define a reasonable boundary of the state.

For these maps, I prepared the response data set in SPSS and then used the software DBMS/COPY to make the required SAS data set. Response data is also called attribute data — that is, the data values attributed to the states on the map. Given the map data set, all you need to produce these maps is a response data set with one variable, State, and a second, Rate.

The variable State in the response data set must be able to be matched against the values of the variable State from the map data set.

The SAS maps used above are available in the SAS System for Windows. Both packages are available at ACF’s Tisch Lab in LC 8. SAS maps of the U.S. and the world are included with the software.

We can also create maps if we have files that define the boundaries. ACF’s Statistics and Mapping Lab in Tisch LC7 has a digitizer board where your hard copies of maps can be automated to create thematic map graphs. Refer to SAS Technical Report A-107, “Creating Your Own SAS/GRAPH Map Data Sets with a Digitizer.” You can automate a scanned image to create a map suitable for the SAS GMAP procedure by using your computer’s mouse to trace geographical boundaries.

Researchers no longer have to be jealous of the statistical maps in the Times. For a complete description of PROC GMAP, see the GMAP procedure description in “SAS/GRAPH Software: Reference, Version 6,” part of the SAS reference set.
Early in my career as a data analyst, I was taught that a research project using questionnaires could easily spend 90 percent of its budget collecting and preparing data. To end up with a good data set, a substantial effort should go to the investigation and resolution of missing data.

It is the exceptional study that has no missing data. Missing data occurs for many reasons. Questionnaire respondents often feel uncomfortable answering certain questions, such as those dealing with age, income, sexual behavior or religious beliefs. Also, respondents accidentally skip items, sections or even entire pages of a questionnaire. Accidental omissions are usually made randomly and may not have a serious effect on the outcome. But sometimes, if the omissions are caused by poor questionnaire design or collection, they follow a pattern.

For example, research staff may be hesitant to enter neighborhoods they consider dangerous or out of the way. Thereby, a pattern of missing data might accidentally develop. Or perhaps language difficulties might lead to incomplete or incorrect responses. The pattern would be related to literacy.

Questions like income and age will frequently be missing in a non-random pattern. The distribution of missing ages would probably be skewed towards older ages. Income tends to be more heavily missing at both the lower and higher ends of the scale.

Missing items in a scale are a separate area of concern. Certainly, missing items from a list of vegetable preferences can be treated differently than items left unanswered in a questionnaire section dealing with a range of sexual behavior. When a person answers the first ten of 20 questions about green vegetables, it would probably be valid to use an average of the answered questions to calculate his or her “Green Vegetable” scale. This is not so with questions left unanswered in the sexual behavior section. The missing data may be linked to religion or gender.

Respondents who don’t answer all the questions often show a pattern in their skipped questions. Their missing responses merit investigation.

Missing data is so central to creating a useful data set that statistical packages, like SPSS and SAS, allow the researcher to code missing responses for further study and for special treatment in the statistical procedures. SPSS has a “System Missing” response that shows up on their spreadsheet as a period.

SPSS also allows the researcher to code several other values as missing in order to keep track of the specific reason the data was missing. For example, a valid value of the variable “Spouse’s Age” could be coded as the actual value. That is, a respondent with a 22-year-old spouse would be assigned the value “22” for Spouse’s Age. The number “98” could be used if the person refused to answer, and “99” used if the question was not applicable, such as if the person had no spouse.

Ask SPSS to prepare a frequency table of spouses’ ages, and the table will give frequencies and percentages for the entire sample, and again for the sample without the missing values.

The missing data problem is illustrated by a data set calculated for three variables. For example, if some people in a study answer only two of the three questions asked, what number should we use as our sample
size? Should we throw out any incomplete responses? Should we use different numbers in different sections of our report? Who did not answer each of the three questions? Are there non-random patterns of missing data? Missing data can make a mess of analysis.

**SPSS Missing Values Analysis**

SPSS has introduced a new Missing Values Analysis option to add to the current version, and ACF has acquired a small license to use and distribute it. This new option performs three primary functions. First, it describes the patterns of missing data. Second, it describes the data using univariate and multivariate statistics. Third, it creates a data set with imputed values for the missing data with a method chosen by the user.

The analysis starts by asking for a list of quantitative and categorical variables to be considered. It then produces a table showing univariate statistics — number of cases, mean, standard deviation, frequency and percentages of missing data — and it uses the Tukey robust boxplot criterion for extreme low and high values. A two-way table details percent mismatch for pairs of indicator variables. A mismatch occurs between a pair of variables when either of the two variables has a missing value for a particular case.

A multivariate table called “Tabulated Patterns” gathers groups of cases that have missing values for sets of variables. In other words, it shows us clusters of missing values within a set of variables. We could investigate the groups of cases and determine if the cases are randomly distributed in our sample. If they are, and our number was large enough, we might choose to drop those cases and improve our valid data. For instance, we might find that a large group of people had the same six variables missing and then, by creating a flag variable for those cases and then listing cases, discover that they were all in our “Poor” socioeconomic group. Since this cluster of missing data was not randomly distributed, we must use a method other than simply dropping the cases.

Split the responses into two groups where the first group has a missing response on an important variable such as income, and the second group has answered that question. Do these groups differ significantly in their mean on other variables? In other words, are the people who form the group missing income data randomly drawn from the respondents? If not, we must treat those cases differently than we would if they were randomly taken from the respondents. We can’t simply drop those cases. The missing values option readily generates t-tests to check for random distribution.

There are many considerations in choosing which variables to impute valid values to missing data, and in deciding which method to use. Before this new option was available, SPSS could still gather information, but the methods were much more tedious and less organized. Finally, this SPSS option creates a new data set with valid values replacing missing data. Values are imputed to the new data set using multiple regression and other methods.

The regression method lets the researcher choose the variables which best explain the variation in the missing data to be recoded. Multiple imputation allows randomness to be incorporated in regressed values. Therefore, randomly selected values from a chosen distribution around the regressed value will be imputed to the variable.

Most studies include a discussion of the factors responsible for missing values. In reputable studies, analysis of missing data is called for. It is very helpful to have all these analysis tasks in one procedure. A quick pass through this new SPSS option should improve the validity of even the most casual study.

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**Pricing for SPSS Licenses**

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Please contact Sana Odeh at the ACF HelpCenter at 998-3333 to arrange a license.
Accurate Statistical Analysis with SUDAAN
(Survey Data Analysis)

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SUDAAN is a very powerful and flexible statistical package designed for analysis of complex samples. The fact that it can read either SAS or SPSS data sets makes it widely applicable to already existing national or large-scale survey research data sets distributed by ICPSR and other institutions. Its user-friendly syntax makes it an ideal teaching tool for professors who teach survey sampling or do serious research.

Caveats for Complex Samples Analyzed with Standard Statistical Packages

Researchers often find, when analyzing large-scale data sets from national probability samples, that the sets were collected using complex sampling designs involving stratification, clustering and/or replication. Such collection techniques can affect the statistical analysis. For instance, stratification involves basing the study’s focus a set of grouping variables, stratifying the whole population into cross-classified groups and randomly sampling within those groups. This stratification yields sampling variances within the strata that are significantly smaller than those of a simple random sample.

Many researchers are not aware that standard statistical packages presume a simple random sample. In other words, the packages by themselves do not adjust for aspects of complex sample design. In most complex designs, statistical adjustments have to be made by weighting for unequal probability of selection, nonresponse, stratification, replication and clustering at each stage of the sampling.

Accurate estimates of population parameters depend on the weights used in the analysis, and these in turn are based on the selection probabilities along with other characteristics of the stratification or clustering. Generally, weighting adjustments are separately made for enumeration when the original census is taken, and for interview response during the survey. If researchers ignore the issue of weighting, statistics estimating point parameters will be biased.

Moreover, without adjusting for strata or clustering effects, the variance, standard error and confidence interval estimation would be wrong. Stratification into relatively homogeneous subpopulations is usually performed so that the strata variances are more compressed than are those of a simple random sample. The effect is to yield more accurate estimates of population parameters. If the statistician were to presume a simple unweighted, random sample, strata variances would be inflated. To properly assess the strata variances, adjustments must be made.

Statistical Corrections

Some government granting agencies are inclined to insist on sampling design adjustments to ensure the accuracy of their significance tests and other estimates. SUDAAN is a program widely used by U.S. government agencies, including the U.S. Centers for Disease Control and the U.S. Food and Drug Administration, to adjust the variances, standard errors and confidence intervals in accordance with the sample design.

SUDAAN version 7.5.2 allows the user to specify variables for stratification, levels of stratification, clustering, nesting, subpopulations, levels of subpopulations, the case identification vari-
variable, total counts, sample counts at each sample stage, and joint probability variables for unequal selection without replacement. In multistage sampling, the nesting variables are listed. Nesting variables specify the primary sampling unit level and the number of stratification levels, as well as whether the records are sorted or not. The ID variables are indicated, and in order to calculate the sampling fractions at each stage, the total count and sample count variables are indicated. From these the sample weights are computed. These variables may be specified in the regular data file or they may be specified in a special PSUDATA file, which SUDAAN reads separately.

Corrected Statistical Analysis

Once the design is specified and the sample variables are constructed in the data set, adjustments are made and the variances are corrected specifically for the statistical procedure invoked. SUDAAN allows an examination of the data dictionary with a records procedure. With a Descriptive procedure, it can estimate the sample size, population size, means, proportions, geometric means, quantiles, standard errors, and design effect for each level of a variable under examination.

With the Ratio procedure, estimates and standard errors for generalized ratios can be computed. With the Crosstabs procedure, SUDAAN can compute frequencies, percentage distributions, odds ratios, relative risks and standard errors, as well as chi-square tests for independence and Cochran-Mantel-Haenszel Chi-square tests for stratified two-way tables.

With the Regression procedure, the program fits linear regression models and tests hypotheses for model parameters. It uses generalized estimating equations to efficiently estimate the regression parameters with robust variance estimation. The values of the dependent variable for different levels of an independent variable or interactions between two or more independent variables may be tested with effects or contrasts statements. Even least square means for different levels of categorical covariates may be computed.

The program can perform an assortment of logistic regression analysis for binary, ordinal and multinomial dependent variables. It can estimate odds ratios and confidence intervals for the model parameters. It can employ generalized estimating equations for robust variance estimation to calculate the standard errors for cross-sectional or longitudinal models with dichotomous, count, ordinal or continuous dependent variables. In sum, SUDAAN provides a wide variety of powerful statistical analyses that can be adjusted for complex sample design.

File Management

File management in SUDAAN is easiest when most of the work is done in either SAS or SPSS. SUDAAN version 7.5.2 can read SAS 6.12 and SPSS/Windows version 8 data sets directly, but if SUDAAN reads ASCII files two ASCII files are needed and two additional optional files are recommended. The different SUDAAN ASCII file types are distinguished by the file suffixes. It needs a data file, called a DBS file. To indicate which variables are to be found where in the data set, SUDAAN needs a codebook file called a .LAB file. Two optional documentation files are a .FLD file, which specifies a Title for the data set, and a LEV file, which specifies the labels for the levels (answer categories) of discrete variables. To make the syntax easy to understand for the sophisticated user, the SUDAAN syntax is almost identical to that of SAS. The SUDAAN file has input syntax defining the design and accessing the data and output syntax that formats the output.

Limitations

SUDAAN users are advised to do their preprocessing and data management with another program beforehand. SUDAAN is not designed to be a data management package and it lacks the features that would endow it with good data management capability. Even so, all data must be converted to numeric type and sorted according to the ascending levels of the nesting variable. Categorical data must be recoded so that none of the variables has a 0 code, for in SUDAAN that code stands for a missing value. Recoding is better done with other packages, although SUDAAN can handle perform this task. Missing value estimation should be taken care of before SUDAAN analysis. No missing values are tolerated among the sample design variables. Nonetheless, observations without complete sample design data are unforgivingly dropped from the analysis.

Comparative Advantage

In SUDAAN, the sample design has to be specified sepa-
rately under each statistical analysis invoked. SUDAAN can handle the basic kinds of analysis, such as fixed effects in a general linear model. It cannot perform mixed model ANOVAs, for the procedures within SUDAAN do not handle random effects.

Like WesVar Complex samples, its less expensive competitor, SUDAAN performs the BRR and jackknifing estimation of robust variances, but it also can perform robust variance estimates with Taylor Series linear approximation. If public use files are designed for a particular type of variance estimation, SUDAAN, unlike its competitors, has the capability of handling all three of them.

SUDAAN, unlike WesVar, can handle multiple types of survival analysis, including Cox regression. While neither SPSS nor WesVar does generalized estimating equations for longitudinal analysis, SUDAAN does. In short, SUDAAN is currently the most powerful of all of these packages that performs complex sample data analysis.

Platform and Environment

To process SUDAAN, the computer needs to be a 386 or more powerful PC compatible with a math coprocessor, with at least 4 MB of random access memory. In fact, it is recommended that it have 8 MB of ram, with 5 MB of hard disk space, for best results.

SUDAAN 7.5.2 runs as a standalone or as a procedure within SAS. Standalone versions can run on PC DOS, Windows 3.1, Windows95, Windows NT, SUN Solaris, VAX/VMS, and DEC Alphas with Open VMS. The SAS callable version, which is installed as a procedure within SAS, can run under Windows95, Windows NT, SUN Solaris, DEC VAX, or IBM MVS.

SUDAAN provides several very informative and well-organized training workshops each year at different locations in the United States. Interested persons should contact either SUDAAN in Research Triangle Park, N.C. (919) 541-6602 via phone or www.rti.org/patents/sudaan/sudaan.html via the World Wide Web. For questions about ACF availability of the software, interested persons may contact the author by phone at (212) 998-3402 or by e-mail at robert.yaffee@nyu.edu.

Acknowledgements

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References


Repertitive Strain Injuries
Prevention Remains the Best Cure

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Although Repetitive Strain Injuries (RSIs) are the fastest growing industrial injury in America, they are commonly misunderstood. Carpal tunnel syndrome, relatively easy to describe and illustrate, is often the only RSI clearly described in media reports about these injuries. As a result, many people believe that RSI and carpal tunnel syndrome are interchangeable. However, repetitive strain injury is an umbrella term that covers many musculoskeletal injuries caused by repetitive stress or cumulative trauma; carpal tunnel syndrome is but one possible diagnosis. Other injuries include cubital and radial tunnel syndromes, tendinitis, thoracic outlet syndrome (vascular or neurogenic), DeQuervain’s syndrome, tenosynovitis and vision problems, to name a few.

The media has done a disservice by emphasizing carpal tunnel syndrome to the near exclusion of other injuries. When other symptoms are not recognized as a sign of RSI, accurate diagnosis and medical treatment are often not sought until problems become acute. Many doctors prefer the term Cumulative Trauma Disorder (CTD), since repetitive stress may not be the only cause of the injury, whereas all are cumulative over time.

These injuries are notable in that they are counterintuitive. In the early stages, when discomfort subsides with rest, the injury has not healed, as the victim may assume, but is simply lurking below the threshold of pain. The injury may seem to be caused by an incident that triggers pain. However, the causes are multifactorial and pain is not always the first indication of their presence. Early, often unidentified symptoms may include generalized or specific fatigue (such as if your arms feel heavy), clumsiness due to loss of grip sensation, and headaches. Numbness, tingling and intermittent pain may follow. Avoiding or denying symptoms is dangerous, since injuries left untreated may progress to chronic pain and permanent damage. Early intervention, treatment and changes in working conditions and processes can minimize or prevent disability.

Hidden Office Dangers

Computers don’t look dangerous, which may be why they seem safe to use. Keyboard design has been implicated in injuries, and a variety of alternatives are now available. Individuals find different designs to be beneficial. The mouse can also be a cause of hand problems; both size and design are considerations for individual users to take into account. Alternatives include a track ball, touch pad or stylus.

The importance of furniture arrangement is often discounted or not even considered. A properly sized, adjustable and well-designed chair is essential in maintaining proper posture and alignment. Bad chairs may also contribute to lower back problems and poor circulation in the legs, if a poorly angled seat pan is causing pressure. Computers are often placed on desks designed for writing, which are too high for keyboard use and sometimes too narrow to put the monitor far enough away.

The monitor should be approximately an arm’s length (18 to 20 inches) away and directly in front of the keyboard to prevent neck problems. The keyboard and mouse should be at the same level. It is important when
purchasing a keyboard tray to get one wide enough for the mouse, with height and tilt adjustments. Research indicates that arms should be at an angle of 90 to 110 degrees, with forearms parallel to the floor or slightly angled down. A keyboard tray with a negative tilt can assist in maintaining a neutral position of arm, wrist and hand in alignment during typing. This prevents pressure and uses the larger muscles of the arm rather than smaller hand muscles. Avoid resting wrists on a pad or desk edge while typing; use a wrist rest only when resting. If hands and arms are so tired that they cannot hold position, it is an indication of a problem.

Laptops are often used in awkward positions in makeshift spaces — on trains, planes and tabletops meant for other purposes, adding to the injury rate.

Lighting, glare and temperature can also contribute to injuries when the workplace is poorly designed. Most overhead lighting, including fluorescent, is designed for writing on paper, not working with a computer screen, and is often too bright. Overhead lights should be adjustable, using a full range slider. An alternative is to use dimmer overhead lights with adjustable workstation lamps. Reflection and glare on the screen contribute to vision problems. Temperature comfort is also important; muscles tighten and tense in the cold, encouraging stress and injury.

One size does not fit all, and equipment that is not adjusted for the individual can contribute to injury. Badly designed workstations can contribute to poor or awkward posture, which increases static load on the body. Take frequent breaks, drink plenty of water to prevent dehydration and vary work tasks to help prevent physical stress and contribute to overall improved productivity. Injury is more likely to occur when you are fatigued.

When evaluating tools or equipment labeled “ergonomic,” it is essential to be an informed consumer. There are no legal guidelines for using this term, and simply labeling a product ergonomic doesn’t make it so.

**Solutions and Treatments**

Voice recognition software is often viewed as a solution to RSI, but such a view is premature, at best. Most voice recognition is not completely hands-free, and while great strides have been made, this is still a new technology. There is a potential for additional injury when using voice recognition. Regular rest breaks are important, as is appropriate ergonomic design. Vocal chords need to stay hydrated, so take regular water breaks.

Anyone interested in using voice recognition, natural voice programs or discrete speech should consult with a qualified speech therapist familiar with computers and voice recognition. Evaluation and training, including proper breathing and warm-up exercises, can prevent vocal strain or damage.

When seeking medical evaluation and treatment, it is essential to find a physician with both training and experience in diagnosing and treating RSI. Never assume all doctors understand these complex injuries. Many know no more than the average person and misdiagnose other injuries as carpal tunnel syndrome.

Doctors not trained in occupational medicine rarely include questions about work and work-related tasks as part of a routine medical history, and they may not recognize the source of the injuries. Conservative courses of treatment are preferred. If a doctor insists upon surgery without first trying other treatments, seek a second opinion.

Physical and occupational therapies are essential in effective treatment. Here, too, a practitioner with knowledge of RSI is necessary. Look for myofascial release training in a physical therapist. Occupational therapists may assist in evaluating work practices and activities of daily living to develop ways to minimize stress and limit the chance of reinjury.

Ergonomists, a relatively new (and still evolving) profession, assist in fitting tasks and tools to the person, both to prevent injuries and to help those already injured to work safely. Again, it is important to seek an ergonomist with experience working with computer users.

Complementary and alternative treatments have been found to be very helpful to many. Alexander and Feldenkrais techniques teach body awareness and postural alignment. Biofeedback, acupressure and acupuncture can help with muscle relaxation and stress reduction.

With repetitive strain injuries, as with any health-related condition, prevention and awareness are essential. ComputerAdvocacy maintains a basic RSI bibliography, a list of selected Internet resources and a general resources lists. These are available at [www.nyu.edu/pages/advocacy/committee/health/](http://www.nyu.edu/pages/advocacy/committee/health/).
Mailing Lists Redefine
Extra Help

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As we all know, a lot of learning here at NYU is happening outside the classroom. People learn in the library, or in a study lounge, or over the telephone. I find that I get the most out of a class when I talk to instructors or friends about lectures and we explain difficult ideas to each other. Most professors understand this, and occasionally break large classes into small discussion groups to foster this type of interaction.

In a large university environment such as ours here at NYU, students live in many different places and have very different schedules. Some live in dorms, others commute from other states. As a result, it can be difficult to schedule a study group that accommodates many students.

Fortunately, we can look to the Internet for a solution to this problem. In fact, collaborations much like this were the basis of the first Internet. Students can communicate, exchange ideas, ask questions and help each other. Now, instead of classes full of small, disparate study groups, there is one large group that still can feel like a small one. When a student in the group has a question, he or she will get a thorough answer, because the knowledge of the entire group is pooled together by this electronic medium. The best part is that this can all be done with the convenience of a computer terminal at any time of day.

Which electronic medium is the best for this type of communication and collaboration? More options exist today than there were when the first academic networks were established. In addition to e-mail there are newsgroups, Internet Relay Chat, Web boards and video conferencing. While some of these technologies are not completely practical, they are all feasible.

A class-sponsored newsgroup is an interesting option for classes. Unfortunately, the NYU-NET community doesn’t use newsgroups very much. Perhaps this is because the tin or rm newsgroup interfaces on the IS machines are not particularly user-friendly. Most people do not realize a powerful newsreader is built into most web browsers such as Netscape Communicator. Newsgroups can act as a good environment for discussion because all messages are automatically kept in threads. This means they are sorted by subject, so separate discussions can be followed easily. In addition, messages are archived, which is helpful when you forget what was discussed at the beginning of the semester.

ACF offers special class accounts with separate access from the public newsgroups, so discussions can be kept more private.

Web-based conferencing, or web boards, are very similar to newsgroups. Instead of using a difficult interface, everything can be done within your web browser. The whole system is built from web pages which most people are familiar with. This technology is still in its infancy, and there are many different implementations of these web boards around. Currently, different adventurous classes are experimenting with different systems. As NYU-NET continues to mature and more services are offered via the Web, I anticipate that this will become a popular medium for discussion groups.

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Changes at ACF's Arts Technology Group

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Seven years ago, the ACF Arts Technology Group was formed as a discipline-centered unit focusing on digital tools for artists. At that time, there was no World Wide Web, nonlinear digital video editing was prohibitively expensive, and flatbed image scanners were a bit obscure and tricky to operate. Providing access to even the most basic multimedia computing resources required a specialized central unit.

As powerful digital media technologies have become commodity products, the role of the Arts Technology Group has evolved. NYU provides computing support for the arts in a distributed manner. Departments such as Photography, Film and Interactive Telecommunications in the Tisch School of the Arts; and Music and Fine Art in the School of Education, maintain digital labs and studios for their students. The Tisch School of the Arts has also announced a plan for a school-wide multimedia center.

The Arts Technology Group now focuses on newly emerging technologies that require expert technical support, or that need centralization for economic or technical considerations. Starting in the 1998-99 academic year, all ACF support for artists using basic and intermediate imaging and multimedia tools will be provided by the ACF User Services Group. The Arts Technology Group will provide newly improved facilities for advanced digital video, audio, imaging and 3-D animation.

ATG Services

The ACF Arts Technology Group provides consulting services that can range from a detailed facility plan or advanced technology white paper to a quick response to a question. The ATG also offers faculty workshops and in-class student training sessions with the instructor.

In the coming academic year, ATG will provide digital video and color management workshops for faculty and technical staff. We will also be active in high bandwidth Internet2 artistic applications and other new technology initiatives, including support for performances, installations and other arts events.

The ATG Digital Video Studio

The Arts Technology Studio supports individual students and classes in the arts with Macintosh systems for video and audio production and post-production. The systems are available on a reservation basis, and the studio includes a small classroom that can be reserved by faculty members.

There are six video systems that are based around the new DV standard for digital video. Using software such as Adobe Premiere and After Effects, students can create short broadcast-quality video pieces, as well as video components for use on web sites, in multimedia or in fine art installations.

In addition, four video editing booths offer Media 100 and Avid systems for larger video post-production projects. These systems are primarily used to edit Betacam SP source materials. Digitized video is stored on a very large shared video server that uses a fibrechannel switch to deliver the high bandwidth that Media 100 and Avid systems require.

Four ProTools systems are also available to directly transfer and manipulate digital audio from

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industry-standard DATs and CDs. Up to 16 tracks of audio can be mixed with automation in real time. Each station also has an Emu Proteus MPS MIDI keyboard and interface, and supports SMPTE lock-up and video monitoring with S-VHS workprints.

Two interformat racks are available for dubbing video materials between formats and digitally cloning DV tapes. The following formats are supported: mini-DV, Sony DVCAM, Betacam SP, Hi-8, Umatic 3/4-inch, SVHS and VHS. Some limited support for Panasonic DVC-Pro is also available.

The small classroom adjacent to the larger studio space may be reserved by instructors for class instruction or demonstrations. The room has both audio and DV video systems.

All Arts Technology systems support both Iomega Zip and Jaz removable disks as well as CD-ROMs. In addition, an Apple Color Laserwriter 12/600 PS is available for general use.

The ATG Advanced Imaging Studio (at the Innovation Center)

At the ACF Innovation Center, new, exotic or relatively expensive technologies are available to pioneering faculty members and their advanced students. The Arts Technology section of the Innovation Center currently provides an Advanced Imaging Studio for NYU artists.

The studio has implemented a ColorSync workflow providing a high degree of color fidelity from scanned film and paper, to the screen for processing, to various options for print and photographic output. Included as part of the color management environment are Radius Pressview 21 SR calibrated monitors, X-Rite DTP41 and Colortron II spectrophotometers, and an industry standard D50 viewing booth.

Several scanning devices are available, including a Leafscan 45 film scanner. The Leafscan 45 uses a 6000-element CCD allowing up to 5080 dpi image resolution. It supports a number of film formats and sizes: color and black-and-white; negative and positive; 35 mm, 6"x9", 2 1/4" and 4"x5".

Output options include the 3M Rainbow and the LFR Mark III film recorder. The 3M Rainbow creates Matchprint-quality color and black-and-white output of 300 dpi, and can make prints as large as 17.2" x 11.9" that appear similar to high-quality color photographic prints. The LFR Mark III film recorder offers 800 lines of resolution on either positive or negative film, in 35 mm and 4"x5" color formats.

Other forms of color output include high resolution Epson inkjet prints and Apple color laser prints. We also plan to add a 42-inch poster-sized output device.

The ATG Animation Classroom

The ACF Arts Technology Animation Classroom is a mixed-function classroom and production space. It supports classes in 3-D animation as well as various advanced projects.

We have six Silicon Graphics (SGI) Octane and Indigo 2 workstations running the Maya / Alias / Wavefront suite of 3-D animation, effects and digital compositing software from SGI. In addition, a dual CPU SGI Origin 200 system is available for rendering animations 24 hours a day. During class, students use an RGB switching system that allows them to alternate between the instructors display and their own system.

A video station is also part of the classroom. This station includes an Accom WSD/XLS video disk recorder for the real-time transfer of up to five minutes of uncompressed CCIR-601 broadcast-quality component video to or from any of the SGI systems. This station also has a Betacam SP deck, an S-VHS deck, a NTSC production monitor and a Macintosh computer available for video and data transfer.
critical aspects of our network’s wiring and power distribution had not been handled properly by the landlord. Also, we’d been provided with a totally inadequate, misconfigured communications rack, which we needed to mount and install our gear. This meant that we had to scramble and improvise. Our first day in Prague was dedicated to damage control. We assessed what we had to work with and what shape the network would eventually take, and then worked with various vendors and contractors with the hope of pulling the site together in the few days we were going to be there.

We arrived at the site at 8:00 on the second morning and began deploying our revised network. Packed with meetings with contractors, the landlord and vendors, along with the odd trip to the local hardware store, the day flew by. In fact, it was close to dinnertime before we noticed that we hadn’t eaten lunch. Having lost a significant amount of time because of the landlord’s snafu, we worked through dinner, fueled with Coca-Cola.

By the end of Day Three, the network was taking shape, we’d gotten some pizza delivered for lunch, and we were prepared to wrap things up on our last day there.

Our original plan was to make sure that every device on our network was connected to a switched ethernet port on a Cisco Catalyst. We stuck to the plan for the administrator and faculty systems, but we found ourselves having to compromise and connect 10 PCs and two printers to only two data jacks in the lab. This isn’t a terrible situation, but it’s not as good an arrangement as we would have preferred. The twelve devices were ultimately wired to a pair of Cisco hubs that we had to purchase locally. The hubs were then connected to the Catalyst switch.

A Bay Networks Annex2000 terminal server is now in place, providing access to the console ports of the Sun, router and Catalyst switch through either the network or a pair of modems. This is a valuable tool, because we can solve problems with systems or devices whether direct network access is available or not.

There are still some minor issues to be addressed. We hope that with the help of some newly hired staffers in Prague we’ll be able to put the finishing touches on the network. We experienced firsthand the energetic work ethic and spirit of the people of Prague; without them, getting the network up and running would not have been possible.

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data stream, similar to tuning in to a TV broadcast. IP multicasting requires highly specific support from the network router infrastructure. Though NYU-NET has been engineered to support it, the commodity Internet still does not. Experimental and future networks, such as the mBONE and Internet2, will pave the way for the future use of multicasting on a worldwide level.

The RealServer is responsible for transmitting the webcast to the viewer. Available webcast sessions are listed on a web page. When a viewer clicks on a RealMedia URL, the server tells the browser to play the session with RealPlayer. This provides a quick and efficient means of integrating webcasts with descriptive text and graphics on a single web page. It also allows for the creation of an online multimedia archive for video-on-demand applications.

Bloomday Webcast at NYU

Bloomday, June 16, commemorates the day in 1904 on which James Joyce’s epic novel Ulysses is set. For many decades, Bloomday has been an opportunity for a celebration of the life and work of Joyce, one of Ireland’s greatest literary figures. At Bloomday readings, Joyce scholars, literary enthusiasts and leading public figures from Ireland gather at events held around the world to read sections from Ulysses.

Thanks to the use of webcasting, Bloomday has now gone global. This year, readings were broadcast over the Internet in RealAudio, allowing people worldwide to listen to readings being held sequentially in 18 cities across the globe. Melbourne, Dublin and New York also broadcast RealVideo coverage of their Bloomday events.

ACF broadcast the New York reading live from NYU’s Glucksman Ireland House. The readers were Frank McCourt, Fintan O’Toole, Brian F. O’Byrne, Tim O’Connor and Nicholas Joyce. The global event was broadcast at the Irish Times website at www.irish-times.com/globalreading/. The NYU event can still be viewed at www.nyu.edu/acf/live/.

Information about Bloomday was provided by Lorna Hughes, ACF Assistant Director for Humanities Computing.

Connect: Academic Computing and Networking at NYU
other machines that trust that one. (If any user on one system lists an account on another system in his or her .rhosts, .shosts, .netrc, or similar authorization files, or if the second system’s name appears in the /etc/rhosts files or their equivalents under other operating systems, then the first system can be said to trust the second system.)

Once infiltrated, those other machines’ accounts can be used to collect passwords as they fly over the network past those systems; to crack the encrypted passwords stored in the password files on older and less secure UNIX systems; and to set up unauthorized network servers. During the last academic year, we have found servers sharing stolen programs and access codes, running attacks on systems at other schools and companies around the network, and sending out e-mail and IRC SPAM of one sort or another, advertising dubious products and websites.


Individual weaknesses in machines’ security systems can cause the same or more damage than obvious security breaches like giving out a password. It can be very embarrassing for an innocent party to start getting incoming mail complaining about a pornographic advertisement sent from their account — all because they choose a poor password or because a researcher on the same local area network was lax in managing his system or the department network has not been upgraded to reduce the impact of a break-in on that person’s machine.

More information
For more information visit the NYU-NET Security page at www.nyu.edu/acf/NYU-NET/security/.
For more information on unwise behaviors, please see the Postmaster column on page 25 of this issue.

Taub continued from p. 24

There are clear losers in the Internet race, as well. Detroit has twice the population of Denver, yet only one-third as much Internet backbone capacity. Philadelphia is also falling behind other metro areas, having about the same amount of bandwidth as the much less populous Miami/Fort Lauderdale region.

While it is clear that disparities in Internet infrastructure among metropolitan areas are clearly related to economic health, the nature of this relationship is complex. Do investments in telecommunications drive economic growth, or do prosperous economies invest in new technologies to maintain their competitive advantage? I believe that the truth is a little bit of both, which is very disturbing. For if that is the case, it will mean that metropolitan areas with healthy, vibrant economies can and will invest in advanced telecommunications, creating a feedback loop that drives their growth. On the other hand, less prosperous regions that lack the resources to compete may actually fall further and further behind.

Considering the federal government’s continued apathy towards urban policy initiatives and its reluctance to interfere in the telecommunications industry, those cities least prepared to compete in the information age will likely be left to fend for themselves. While we should not restrain the most productive cities from forging ahead into the future, it is becoming clear that public leadership is necessary to bring the opportunities of the Information Age to all of our cities.

For a more thorough look at geographical patterns of Internet development, see the Taub Urban Research Center’s report, “Spatial Analysis of the Internet in U.S. Cities and States.”
urban.nyu.edu/research/newcastle/

For a series of articles on how Internet backbones actually work and the business of building the information superhighway, see Boardwatch Magazine’s Internet Service Providers Quarterly Directory.
www.boardwatch.com/ISP/index.html

To read New York Times coverage of a battle to ensure information equality in the inner city see, “Trenton Tells Bell Atlantic to Speed up Urban Cable Connections,” April 22, 1997.

Imperative, Inc. of Pittsburgh, Pennsylvania offers a comprehensive, if somewhat cryptic “Index of Internet Cities” and a national 3-D map of registered Internet domains by city.
www.internet.org
Lists continued from p. 40

E-mail and CC lists are probably the easiest and most commonly used method of electronic class discussion. Students and faculty have access to e-mail, and most have experience sending and receiving it, so everyone can jump right in. Typically, an instructor will collect students' NetIDs and add them to his mailer’s address book. Instructors will then send announcements to the list. When students reply, discussions begin.

While this works well for small groups, if the list grows to 20 or more people, it can become very cumbersome. All the recipients e-mail addresses are carried on each message, which raises privacy issues. If a discussion strays off-topic, it is difficult for the moderator to control it.

The best way to go, in my opinion, is mailing lists, or list servers (see www.nyu.edu/acf/lists for information and online registration). Members can be manually or automatically subscribed by the list’s moderator, and the list of e-mail addresses is kept on a server maintained by ACF. When someone wishes to send an e-mail to the group, the message is addressed to the list server in the form “listname”@ lists.nyu.edu. If members find the number of messages too overwhelming, the server can combine the messages into a single daily mailing, called a digest.

One example of a class mailing list is Science-Help, a list I recently established, with the help of John W. Draper Chemistry Society, the Chemistry Department and Computer Advocacy, so my classmates can help each other with science questions. Among the hundreds of subscribers, there are professors, teaching assistants and students. Discussions have covered undergraduate research opportunities, tips on choosing classes for the fall semester, homework topics and more.

ACF is working to improve the technology behind online collaboration available on NYU-NET. Available software combines list servers, web boards and newsgroups, making your decision to start an online discussion much easier. This extremely flexible software allows people to participate in the same discussion using a web browser, a newreader or e-mail. This exciting solution is currently being tested and evaluated, so I would expect to see this offered in some form in the near future.

Bounces continued from p. 28

changed in some way. If necessary, we also have the authority to go into your account to confirm, for example, the presence of illegally obtained software. Rest assured that this level of intervention is saved for only the most extreme cases.

“All persons accessing New York University computing resources will be held accountable for their conduct. As a matter of routine, use of NYU computer systems and NYU-NET is monitored and recorded by authorized University staff members in order to safeguard the security and smooth operation of these resources.”

Additionally, system administrators do general scans of the is* systems and NYU-NET to ensure consistent service and reasonable network traffic. Often, we catch people doing bad things because of network traffic spikes, which directly impact other users. When you bog down the network, you inconvenience many people you weren’t intending to target, and we will find you.

What We Will Do to You

“Any abuse or violation of the rules outlined here (or of other rules and practices governing the use of computer networks to which NYU is attached) will lead to account suspension and immediate review, with the possibility of account revocation, further disciplinary action in accordance with New York University rules and procedures, and referral to local, state and federal law enforcement authorities.”

If there has been a violation of the ACF standards, we will first call you in for a meeting with ACF security staff. However, if the offense is more serious, or happens repeatedly, the case may be referred to your dean (or supervisor in the case of an employee) for further follow up. If the actions violate the laws of the State of New York or the United States, we may also refer it to law enforcement officials.

While I have tried to amuse you, dear reader, with these stories, their message is quite serious. Actions that you take through your NYU-Internet account do not happen in a vacuum. We expect you to follow the standards of conduct dramatized here because transgressions of those standards can have serious consequences.
ACF is proud to announce our new

NYU-NET CD

The easiest way to get the software and instructions you'll need to make the most of your connection to NYU-NET and the Internet.

If you are new to NYU-NET, or if you're using your DIAL connection for the first time, the CD has all the installers and information you need to get started on your home computer.

If you've been using NYU-NET for a while, you can update the software you already have at the CD's companion website. Check it out at www.nyu.edu/acf/software.

The NYU-NET CD.
Your palm-sized launchpad to the Internet.

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