Letter from the Editor:

Hello, and welcome to the Spring 2001 edition of Connect! This issue focuses on the various branches of ITS’ Academic Computing Services: the services they offer and their recent innovations.

As a new Editor of Connect, I’d like to take this opportunity to say hello to all the readers, and to bid a fond farewell to Joan Matelli, who served as Editor of Connect for the past three years. I’m sure I speak for everyone who had the pleasure of working with her when I say that she is missed and that we wish her much luck in her new career.

Although I have a lot to live up to, I am very pleased to accept the passing of the Connect torch from Joan. I am excited to be working with such rich and interesting material, and with a remarkable group of contributors. This magazine’s potential is as expansive as the field of information technology itself, and, as Editor, I hope to continue expanding the scope of Connect to include new topics and the voices of faculty, staff and students from across the NYU community.

I will do my best to ensure that Connect continues to be relevant, informative and entertaining for all who read it. To that end, I would love to receive feedback, ideas, or article submissions from anyone who has something to share.

I hope that you enjoy this issue and that I will have the opportunity to speak with many of you in the future.

– Kate Monahan
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About Connect

Connect: Information Technology at NYU
When it comes to having impact on computing and connectivity in education, George Sadowsky joins a very short list of individuals who have made a very big difference. George’s impact on NYU during his decade of technology leadership here has been visible to us all. Less apparent on a local level are the contributions George has made to the expansion of the Internet throughout the world. Excerpts from some of the messages George received in celebration of his recent retirement from NYU offer us a glimpse of his broader impact:

“You have more than earned a reputation as the most active and effective teacher of the whole Internet movement. ...You were the foremost evangelist of the Internet gospel to the third world ... .In all of these efforts, you have achieved the most because you have been the most giving of yourself.”

Glenn Ricart, Chief Technology Officer, CenterBeam, Inc.

“I want to express my astonishment at the amount of work you have been able to accomplish on behalf of ISOC and the Internet Community, especially in the parts of planet Earth where the Internet is still in early stages of development. ...I want you to know how much your efforts have meant to me, personally, and, I am sure, to many thousands around the world, touched by your enthusiasm and your educational magic wand.”

Vinton Cerf, Senior Vice President for Internet Architecture and Technology, WorldCom Corporation

To perpetuate the spirit of this commitment, Information Technology Services at NYU has established the George Sadowsky Prize, to be awarded annually to an NYU student who exhibits exemplary innovation using the Internet for community service. We invite nominations for the 2001 award by March 30. More information is available at: www.nyu.edu/its/. [As NYU’s Chief Information Technology Officer, Marilyn McMillan is head of Information Technology Services. Please be sure to see George Sadowsky’s article on p. 9, entitled “My Second Computer Was a UNIVAC I.”]
ACH/ALLC 2001
Humanities Computing Conference to be held at NYU

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From June 13th through the 17th, NYU will host the Joint International Conference of the Association for Computers and the Humanities (ACH) and the Association for Literary and Linguistic Computing (ALLC). The conference is sponsored by NYU's Information Technology Services, the Faculty of Arts and Science, NYU Libraries, and the NYU Humanities Council. Lorna Hughes, Assistant Director for Humanities Computing here at ITS, is the conference organizer.

The ACH and the ALLC are professional organizations dedicated to the computer-aided study of language and literature, history, philosophy and other humanities disciplines. The ACH has traditionally been North American-based, while the ALLC is based in Europe.

Each year since 1988, the two groups have joined together to hold an international conference. The conference site alternates each year between North America and Europe. Past locations of the conference include Oxford University, the Sorbonne, the University of Bergen, the University of Toronto, and the University of Virginia. This year, NYU has the honor of hosting the event.

Typical research topics covered at ACH/ALLC conferences include textual encoding and analysis, hypertext, electronic editions, digital libraries, and the use of computers in humanities instruction. The theme for this year’s conference is "Digital Media and Humanities Research," and will focus on the impact of new media on research methods and intellectual practices.

A call for papers went out in fall 2000 and the conference program will be announced in February 2001. Registration will also open in February, and the conference expects to attract 250
participants from all over the world, including Canada, the U.S., the U.K., Norway, Finland, the Netherlands, and a host of other countries.

This year's conference will run from June 13th until June 17th, with a combination of parallel paper sessions, posters and demonstrations, and keynote speakers. The keynote addresses for the 2001 Conference will be delivered by Johanna Drucker, director of the Media Studies Program at the University of Virginia, and Alan Lui, Professor of English at the University of California at Santa Barbara. Social events will include receptions each evening and a conference banquet on Friday, June 15th.

ACH/ALLC 2001 promises to be an exciting conference for presenters and attendees alike. If you would like to attend, there will be a special conference registration rate of $100 for NYU faculty and staff (this compares to the normal fee of $200 for ACH/ALLC members). A subsidized rate will be available for NYU graduate students (please contact Lorna Hughes at lorna.hughes@nyu.edu). The registration fee includes admittance to all conference events, teas, and receptions.

To register or find out more about the conference, please contact the local organizer, Lorna Hughes at lorna.hughes@nyu.edu, or visit the conference website (www.nyu.edu/its/humanities/ach_allc2001/). There, you will find more information about the conference, including the program, schedule, and an online registration form. Conference registration is limited to 250 people, so if you do plan on attending, you should register as soon as possible.

If you would like to know more about the ACH or the ALLC, please visit their websites:

ACH: www.ach.org
ALLC: www.allc.org

We hope to see you in June!
The Studio for Digital Projects and Research
A Unique Center for Technology

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The Studio for Digital Projects and Research is a new center for advanced research and experimentation with technology applications in the Arts, Humanities and Digital Libraries. It is a collaborative venture between the NYU Libraries and Information Technology Services (ITS), and has been developed under the leadership of NYU Dean of Libraries Carol Mandel and Chief Information Technology Officer Marilyn McMillan.

This exciting project is the result of long-term planning and discussion with staff from several groups at ITS and the NYU Libraries. The center consolidates a number of existing ITS and Libraries programs and services, which will foster the development of initiatives in creating digital resources for the Arts, Humanities and related fields, and provide a venue for the emerging NYU digital library.

Lorna Hughes is the Assistant Director for Humanities Computing at ITS. Philip Galanter is Associate Director for Arts Technology at ITS.

Occupying the east side of the second floor of Bobst Library (the former home of NYU Press), the Studio is a center where NYU faculty will find state of the art equipment for the creation and use of digital resources for research, including resources that are uniquely available, both locally and remotely. These materials include primary texts, reference works, finding aids, analytical tools, images, video and audio resources, and the most up-to-date hardware and software. In addition, the Studio provides a home for long-term digital scholarly content development projects, which will facilitate the creation, use, analysis, and repurposing of digital resources in non-quantitative investigations.

All NYU faculty are welcome to explore the resources of the Studio: as walk-in users to get information about the resources available there; as users of resources only available at the Studio; or as users working on long-term Studio projects.

The Studio is a center for information, training, referral and advice about the resources and collections that are housed there. It is staffed by a rotating group of experts from the NYU Libraries and ITS. These experts will work with all faculty at NYU who are interested in using the equipment and digital collections to be found there, or in finding out more about using new technology in academic research.

The Studio also serves as a clearinghouse for information about other technical resources and centers at NYU. Studio staff coordinate closely with the Faculty Technology Center, the other ITS labs and the Avery Fisher Center to ensure integrated access to Libraries and ITS services.

It is also a home for extensive content-creation projects that have been accepted for Studio support. Researchers and staff working on projects of this nature may become fellows or affiliates of the Studio, and the Libraries and ITS staff have opportunity for professional development through work on internal projects.
that enhance and support the objectives of the Studio.

The Studio includes the following areas:

**Humanities and Digital Text Area**
A large user area with Macs, PCs, text scanners, CD-ROM collections of digital texts and humanities computing tools.

**Multimedia Area**
A partitioned area for simple image scanning, digital audio, and digital video.

**Digital Library Area**
A partitioned area with a PC and Macintosh for development of digital library tools and resources.

**Staff Office**
A two-person office with shared desks for the use of the core staff.

**Technical Room**
A non-public room for system repair and configuration, beta-test hardware and software, Internet2 experimentation, and media server prototypes.

**Media Production Room**
A broadcast quality video and audio production room with live sound and enough room to screen media for small project groups.

**Server Room**
Houses production servers and other support equipment.

**Project Cubicles**
An area which contains four partitioned desks for those involved with long-term Studio-sponsored projects to work and store their materials.

In support of its advanced technology functions, the Studio is enabled with a high speed network including special Internet2 connections, as well as taps for the campus broadband.

The Studio will be open to all NYU faculty early in the spring 2001 semester. For more information about the Studio, including opening hours and details of how to contact Studio staff, please see our website at [www.nyu.edu/studio/](http://www.nyu.edu/studio/), or send e-mail to digital.studio@nyu.edu.

For more information, please contact studio@nyu.edu

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**Meet the New Employees at ITS' Academic Computing Services!**

**The Humanities Group**

**Matthew Zimmerman** joined ITS in November 2000, and is working in the Academic Computing Services' Humanities Computing Group under Lorna Hughes. Matthew came to NYU from the University of Georgia where he received his M.A. in English Literature with a focus on Renaissance Literature, History of English, and Humanities Computing. While at the University of Georgia, Matthew worked as a research assistant for the Linguistic Atlas of North America ([http://us.english.uga.edu](http://us.english.uga.edu)), an online sociolinguistics project, where he was responsible for web development, technical support and digitization of analog recorded interviews. Matthew was also on the development team of Online@UGA ([www.uga.edu/online](http://www.uga.edu/online)), a computer and information literacy course developed by the University of Georgia Information Technology Advisory Committee and the University of Georgia Libraries. Matthew's particular interests in Humanities Computing are electronic editions and digital archives, computer-assisted instruction, textual analysis, and multimedia development. His immediate duties at NYU, however, will be to help organize the ACH/ALLC conference that will be held here in June (see p. 3). Matthew is happy to be here at NYU and looks forward to facilitating the use of technology in the humanities.

**Gary Shawver** joined ITS' Academic Computing Services in July 2000 as a Humanities Computing Specialist. Since coming to NYU, Gary has worked on a variety of projects, including overseeing the operation of the new Language Lab in Room 618 of the Main Building and the King Juan Carlos computer lab, and collaborating with the NYU Libraries to develop digital resources. He is also responsible for creating digital content for the Web, facilitating communication between humanities instructors and various branches of ITS, managing servers and new applications in the humanities, and installing software at computer labs. Gary finds the inherent variety of his new job particularly appealing, and enjoys the range of learning opportunities created by his interaction with NYU's humanities departments. Gary earned a Ph.D. in Medieval Studies, basing his thesis on a computer-aided text analysis of Chaucer's works. Gary has also published a number of e-texts. A list of his publications and papers can be found at [www.geocities.com/gary_shawver](http://www.geocities.com/gary_shawver). His educational background in the humanities, professional experience as an English instructor at York College, CUNY, and expertise in text analysis markup make Gary an excellent fit for his new role at NYU.

If you are interested in learning more about the Humanities Computing Group, please visit their website at: [www.nyu.edu/its/humanities/](http://www.nyu.edu/its/humanities/).
Reinventing Public Terminals
Providing Safe and Secure Access to NYUHome

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Several years ago, ITS deployed approximately 100 e-mail and Internet stations around campus. These public-access terminals were provided to allow students and faculty a quick and easy way to check their e-mail, access the Internet, or connect to the network while they were out and about on campus. The terminals were distributed in many places around campus in order to provide convenient access.

At the beginning of last year, ITS began the process of upgrading these terminals, which were more commonly known as “X-stations” or “NYU-Internet Stations.” The machines were getting old, they ran e-mail and browser applications over the network, which made them slower and more cumbersome to use, and they were badly in need of upgrading. With the introduction of NYUHome, ITS wanted machines that were more up-to-date and attractive, and easier to use. So began the NYUHome Station Project.

NYUHome is an Internet portal service created by ITS to allow individuals within the NYU community access to University-related services and other web-based tools. Students are able to see their schedules and grades, professors can use the online directory to look up colleagues, administrators are able to check their e-mail, and so on. The customizable channels of NYUHome also offer access to web forums, research tools, news, campus events and more.

Key to the functionality of NYUHome is that you are able to access it anywhere that you can run a web browser. Now, when an NYU professor or student travels abroad, he or she will still be connected to his or her NYU community. Right in step with this “on-the-fly” access are the NYUHome Stations. They provide a convenient doorway for everyone on campus to access their NYUHome accounts.

In deciding what aspects of the public terminals to upgrade, ITS staff agreed on a number of requirements that had to be met:

• The machine had to be able to run a web browser.
• The software had to run locally on the machine.
• The machine and operating system had to be accessible for maintenance and capable of being administered over the network.
• Some type of idle time-out had to be in place to protect users from having their accounts hijacked if they ever forget to log out from their NYUHome session.

Each of these elements was necessary in order to make the upgrade a success.

To get the project started, ITS worked with Apple Computer, Inc. to create an operating system and interface that would both provide the most functionality to users and secure the machine against tampering with its configurations. This took a lot of going back and forth—securing the operating system, testing it, and implementing any corrections.
We set up a machine in an area where many different individuals within our department were able to sit down at the machine and try to break into it.

We continued this testing and reconfiguration process for about a month, until we could be sure the configuration worked well and was secure. Once this was completed, we were ready to look at other issues involved in getting this machine out to the general public for further testing. The various issues we needed to consider next were the physical security of the machine, the size of the unit compared to the existing station setup, and how it fit into the surrounding environment.

We decided to go with plexiglass as a method of securing the machine to each station. The computers are housed in plexiglass units that have holes in strategic places to ensure heat dissipation from the units and to allow for security cabling.

After we had had the machines out on campus for a few months, they still seemed to be working well. In fact, we even received a message from a student using one in the library requesting additional machines so that there wouldn't be so many students waiting in line to use them!

Once the migration of all accounts to NYUHome is complete, there will be approximately 100 new NYUHome Stations in various locations around campus. We have many other plans for these stations in the future. If we are able to develop a secure way of doing it, we want to work on a method of multiplying the number of connections in a specific area by employing wireless technology. This would make it possible for students, faculty, and staff with laptops and wireless cards to use them at the various NYUHome Stations to connect to the Internet. We also hope to integrate more advanced authentication methods.

As technology evolves, we try to evolve along with it. ITS is constantly searching for new ways to provide services to the NYU community. We always welcome new ideas and suggestions. These stations are just another example of our commitment to the University community and to our goal of connecting people to other people, to their work and studies, and to the information, training, and technical resources they need to achieve their goals.
My 2nd Computer Was a UNIVAC I

Some reflections on a career in progress

George Sadowsky
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[This article is an excerpt from reminiscences given by the author at an occasion celebrating his retirement from NYU on Nov. 17, 2000.]

The first time I came to New York University, it was to program an IBM 704 computer. It was during the fall of 1958, and the 704 was installed in what is now Meyer Hall behind the translucent glass blocks on the 2nd floor. The computer belonged to the Atomic Energy Commission (AEC), now known as the Department of Energy, and was installed at NYU for use by the Courant Institute.

The previous summer, I had learned to program a 704 during a summer job at the General Electric Research Laboratories in Schenectady, New York. Almost all programming at that time was done in assembly language, with corrections often done in the actual native binary language of the computer itself. Operating systems were fairly rudimentary, consisting of basic input-output packages, program loaders, and core dump programs.

The next fall in graduate school, I took a course in numerical analysis, and used a UNIVAC I that Harvard had obtained through a donation. It was an interesting machine to program, with advancements such as a mercury delay line storage and a short mean time to failure. Programs were entered into the computer by typing them onto steel magnetic tape, a major innovation at that time. At the end of the year, I joined Combustion Engineering’s Nuclear Division, which was given computer time on the IBM 704 located at NYU.

Working with the 704 was an entirely different experience from the UNIVAC I. It was built for executing scientific applications, and had as its major innovation a magnetic core memory. It also had a floating point arithmetic unit and index registers to form effective addresses, both of which were significant advances at the time. The machine had the equivalent of 128 KB primary memory, 32 KB of secondary drum memory, and magnetic tapes that held 5 MB of data. It operated at 0.04 MIPS and cost three million dollars.

The AEC installed the IBM 704 at NYU because the Courant Institute was doing contract work for them. Combustion Engineering, historically a maker of boilers for steam-powered electrical generating plants, had recently entered the nuclear energy business and had already manufactured several reactors for the U.S. Navy submarine program. The company was rapidly establishing itself in both the civilian and military sectors, and had a lot of design contracts with the AEC. As a result, the entire second shift of the 704 was often used for production and debugging work.

The computing environment was both primitive and exciting. Although Fortran II had just been announced and looked interesting (the original Fortran I had no subrouting capabilities), most work was done in assembly language because the Fortran compiler was buggy and slow. In addition, the compilation algorithms produced code that was obtuse and slow running at best, and sometimes just plain wrong. Since even the assembler was costly to use, corrections to the program were often made by adding binary correction punch cards directly to the end of the object program deck. Sometimes so many corrections were made—some documented, some not—
For beginning programmers, it was an exciting time. The 704 was, in effect, a very expensive personal computer. Only one person and program could use it at a time, and often program execution, as well as dumping the evidence of failure, was done at the system console, as fast as one could figure out what to do.

I remember writing a program disassembler that would take the substantially modified object programs described above, together with a symbol table, and produce a reasonable assembly language listing of the modified code. For some jobs, I wrote a one-pass octal assembler because the IBM assembler was too cumbersome—constant human intervention was required, causing many errors. Finally, I wrote an operating system that would do batch job initiation, automatic job sequencing, system resource management, error recovery, and accounting.

Sometime in 1960, the main offices of Combustion Engineering moved from New York City to Windsor, CT, where the Nuclear Division was headquartered. One of the people who made the move was NYU's own Edi Franceschini, who had temporarily left the life of the arts to immerse himself in the real world. "Big teakettles," as he referred to Combustion's boiler business, seemed right in the middle of the real world to him. Those of you who know Edi will appreciate why, as he more fully understood the path that he had taken, he retreated from that business into the world of computing and abstract mathematics.

After leaving Combustion Engineering in 1962, I went on to Yale, first to work and then to the Graduate School, then to the United Nations in Washington, DC to do computer technology transfer work in developing countries. I left the UN in 1986 to work at Northwestern University, and after 4 years in an environment that seemed parochial compared to New York and the rest of the world, I looked forward to the opportunity to return to a more advanced and cosmopolitan environment. I returned to New York University in 1990, this time to take over the Directorship of the Academic Computing Facility from Max Goldstein, who had handled much of NYU's computing needs for over 30 years.

Much had changed at NYU since 1958. The Courant computing group had formalized itself as the Courant Mathematics and Computing Laboratory (CMCL) in 1964, as Warren Weaver Hall was being constructed, and had installed serial no. 4 of the CDC 6600 as its computing platform. By the time I arrived, Control Data equipment had just been phased out of use, and there was a plethora of systems being used for various purposes.

One very fortuitous development in the evolution of the CMCL and its transition into the ACF was NYU's early involvement in computer networking. In the early days of scientific computing, there were different types of computers, each with a unique operating system, programming language, and data format. Interoperability was the exception, not the rule.

The post-World War II climate was quite favorable for the growth of scientific research, and applied mathematics research groups sprang up at other research centers and universities. Much of the research required collaboration among this community, and that often required the use of distant computing facilities. Courant was one of the leaders in the field, working to make this sort of networking possible. The CMCL staff, notably Edi Franceschini and Bill Russell, contributed substantially to parts of the ARPANet (DOD's Advanced Research Projects Agency Network) protocols and applications in the 1970s and early 1980s.

The computer and networking revolution has been extraordinary and exciting, and I feel very privileged to have been a part of it thus far. Those of us who work in information technology are the beneficiaries of technological progress that is unmatched in nearly any other industry. Since 1955, the performance-to-price index for general information technology hardware, a scale which reflects technological progress, has been in the range of 25-30% per year. Historically, the same measurement for the telecommunications industry has been considerably lower. In recent years, however, as this technology has become increasingly dependent upon the semiconductor industry and digital communication using optical fiber media, those numbers have risen sharply.

Though the cumulative effect of this rate of progress can be measured quantitatively, it is felt qualitatively, as technology that was once infeasible suddenly becomes possible. Markets spring
up without much warning, the demographics of capitalism accelerate, and firms are born and die off with great rapidity. We have appropriately chosen to call this phenomenon "Internet Time," and it sets the speed of the clock for those of us in this profession.

The nature of academic computing has changed substantially during my association with it. The early 1960's, when I managed the Yale Computer Center, were an exciting time for quantitative techniques, since algorithms that had little hope of being executed manually could now be executed on digital computers.

At that time, the universities were one of the few sectors empowered with high speed scientific computing, and they were a magnet for businesses and entrepreneurs wanting to discuss and implement experimental techniques. There were, of course, commercial computing operations in most large companies at the time, but they were more concerned with the automation of large file organization and processing. Many useful innovations flowed from these activities, but commercial computing was viewed as a different culture that chose to work on a different set of interesting questions.

Academic computing as a named field is now disappearing. The name "Information Technology Services" (ITS) better captures the major role of information technology, not only at NYU but also at other institutions. Our old name, the Academic Computing Facility (ACF), became a complete misnomer during the 1990's. As we expanded our networking and eServices sectors, our role transcended the purely academic, and computing became only one of many services we offered.

The current paradigm, providing services through the creative and productive use of various information technologies, suits the University's needs. This does not mean that innovation is unimportant; it does mean, however, that the locus of that innovation in the academic sphere has shifted toward faculty members and their collaborators.

Looking back on my career at NYU, I think we've accomplished a lot in the last 10 years. During that time, the ACF evolved from a scientifically oriented computing organization to a much more general-purpose academic computing support organization. Among the turning points were the creation of the Arts Technology and the Humanities Computing groups,

...and I feel some obligation to work towards ensuring that my version of the future prevails.

the emancipation of user services from technical services, and the growth of a multifaceted Help Center. The aggressive leadership and coordination in the evolution of NYU Web were key to restructuring for the information age. The colloquium series on the use of computers in instruction and research brought people from other institutions that were involved in the use of computing in their disciplines and countries. When NYU was ready to move to a more comprehensive framework for offering information technology services, the branches of the old ACF offered appropriate support structures for significant parts of the new organization.

During my time at NYU, I am very gratified to have worked so closely with an intelligent, thoughtful, provocative group of people—the managers of the ACF and key staff people who served under them, as well as some new colleagues who joined NYU to help form ITS. By and large, we worked together as a team, often successful, sometimes not, but always with a spirit of mutual respect for ideas and opinions.

Retirement from NYU is a legal transition, not a behavioral one, unless you want it to be (and I don't). Like almost everyone else—or so it seems—I plan to continue consulting on a freelance basis. Much, perhaps most, of my involvement will be with the so-called "digital divide" issue—the disparity among countries and people regarding their ability to turn to information technology to help solve the more basic problems of economic and social progress—with the Internet Society, and with other organizations that focus on related issues.

I remain optimistic about the future of computing, and I feel some obligation to work towards ensuring that my version of the future prevails. I'll continue to serve on the Board of the Internet Society and as its Vice President for Education, and will continue to formulate projects and seek funding for them.

I wish you all good fortune in dealing with the future of information technology at NYU. It's sure to be an exciting time, and under Marilyn McMillan's capable and perceptive leadership, I am certain that all will go well.

[A complete version of this article will be printed as a separate booklet. Contact its.pubs@nyu.edu for copies.]
What’s New at the 3rd Avenue North Dorm?

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What is new at the Third Avenue North Dorm? you ask. It looks the same from the outside. It’s still located at 75 Third Avenue, between 11th and 12th Streets, on the east side of Third Avenue. It remains a ten minute walk from the Washington Square Campus to 12th Street and Third Avenue. Some people find the walk invigorating! It may even stimulate your neural activity: at the corner of Astor and St. Marks, that idea for your final project, the one that has been playing hide and seek with your mind’s eye, may suddenly come into view and blossom!

Others find riding on the NYU Bus (14th Street and Third Avenue stop) to be a mental stimulant. Of course, students living in the Third Avenue North Residence Hall are just an elevator ride away (slippers and flannel pjs are sometimes worn). Students living in other nearby residence halls or those taking classes in the Barney Building are only a five-minute walk away and may have already discovered what’s new at the Third Avenue North Dorm.

WHAT IS NEW at the Third Avenue North Dorm?! you demand. Take a deep breath! Just visit the ITS Student Computer Lab located on sub-level C-3. Enter at Third Avenue and 12th Street to find out. Present your NYUCard to the guard. Take the elevator on your right (if you need to rest after that exhausting ten minute walk) to level C-3, or take the stairs on your left. On the bottom landing, turn right; skip down the last stairway. Say “Hi” to the smiling Lab Technicians and Student Lab Assistants welcoming you to the ITS Third Avenue North computer lab. And, if you catch a glimpse of the busy Lab Manager, David Beard, be sure to return his smile too!

Don’t forget to swipe your NYUCard before...Wait a minute! Why are they all smiling? Patience, you’re almost there! Turn to your left. Walk ten paces. Now open and close your eyes a few times, to give them time to adjust to the glow. No, you’re not hallucinating...now walk slowly forward. Gently touch one of the Sixty (60) new Dell Optiplex Pentium III/733 MHz computers, each with 128 MB of RAM, a 20 GB hard drive, a 250/100 Zip drive, a CD-ROM drive, an Integrated SoundBlaster Sound Card, and a 15” Flat Panel Display monitor. Yes, a flat panel display. Remember to breathe! Running in Windows 2000, Microsoft’s latest operating system, are ArcInfo, ArcView, FTP, Internet Explorer 5.5, MSOffice97, Matlab, MapInfo, Minitab, Netscape Navigator 6, Norton Anti-Virus, SAS, S-PLUS, SPSS, STATA, and Telnet.

Several of the once-dark offices are now alight with activity. The ITS Social Sciences, Statistics and Mapping Group, previously located in Tisch Hall, LC-7, has recently moved in and will provide guidance to faculty and students using statistical/mapping applications. The Stats/Mapping Group specializes in statistical analysis and modeling, data collection, data storage and retrieval, and database issues. The Group provides access to the NYU data archives at ICPSR, support for mainframe tape readers, tutorials in SPSS and SAS and on various research topics, and demonstrations of new software for web-based data collection, questionnaire data scanning, web...
mapping and more. The Group also assists faculty in the use of qualitative research tools and with data archival projects in collaboration with the Business and Social Science Department of Bobst Library. Please contact Frank LoPresti for more information (frank.lopresti@nyu.edu or 212-998-3398).

During the spring 2001 semester, we will also be adding multimedia applications to the Windows platform computers. You will be able to create and edit images using Photoshop and Illustrator, design animations using Macromedia Flash, and pull all these elements together to create your very own web pages using Macromedia Dreamweaver. Two new Epson Perfection scanners enable you to transfer printed and 35mm images to digital formats for editing. Printing is now fast and reliable with two new Hewlett Packard 8100, 600 dpi high-capacity laser printers.

If you are a Macintosh follower
and you are beginning to feel like a stranger in a strange land, don’t give up hope. Retrace your steps to the front desk and turn right. Walk 15 paces and pass through the metal door. Glistening in the timeless glow of fluorescent lighting are 50 Apple Power Macintosh G4/400 MHz computers with 128 MB RAM, a 10 GB hard drive, a Zip drive, a DVD-ROM with DVD-Video and a 16” Studio Display. For the spring 2001 semester, we will be adding to our multimedia suite of applications. iMovie will be upgraded to version 2.01. Faculty and students with a DV camera can create and edit videos for the Web by capturing video directly from their cameras using a FireWire cable to the G4. For image creation and editing, Adobe Photoshop with ImageReady, Illustrator, and MetaCreations’ Painter 6 will be installed. Of course, Macromedia Flash 5 will help you create animated and interactive web pages. To bring all these elements together to create an astounding website, you can use Macromedia’s Dreamweaver with BBEdit or Adobe GoLive. Two new Epson Perfection scanners have been installed on the Mac side of the lab enabling you to transfer your printed and 35mm images to digital formats for editing.

For those times when you just want to write a paper, create a spreadsheet or design a presentation, MS Office98 (Word, Excel, PowerPoint) is available. Web browsing can be done using Internet Explorer 5.5, and Telnet and FTP applications have been installed. SPSS is now available on the Macintosh platform and will be available for those who prefer working on statistics with an Apple Macintosh at their fingertips. A new Hewlett Packard 8100 printer has also been added to this side of the lab.

Yes, the ITS staff at the Third Avenue North lab are smiling a lot these days. And it’s not because they have 110 new computer workstations, new scanners and printers. It’s not because of the up-to-date multimedia software or their newly-arrived and cheerful co-workers. Nor is it because of the new 100baseT network and state of the art network switches. ITS staff are smiling because they’re happy to see you and want to make you feel welcome!

Wasn’t it worth the walk? We hope to see your smiling face often at the Third Avenue North lab this spring. And when you are asked why you’re smiling, you can tell everyone what is new at the ITS Third Avenue North student computer lab.

The ITS Third Avenue North student computer lab is open:
- Sunday through Thursday
  10:30 a.m. to 1:30 a.m.
- Friday and Saturday
  10:30 a.m. to 5:30 p.m.

Meet the New Employees at ITS’ Academic Computing Services!
The Arts Technology Group

Jed Weaver recently joined ITS as a Senior Arts Technologist in the Arts Technology Group with Phil Galanter and his team. For the previous two and a half years, Jed worked in Tisch’s Department of Film and Television as their Digital Media Coordinator in the Video Post-Production area. Jed is a native New Yorker and an alumnus of NYU, with a BFA in Film Production and Cinema Studies from Tisch School of the Arts. He specializes in audio and video post-production and motion graphics design, and brings a variety of valuable work experience to his new position. His background includes Avid non-linear editing, film and video production, music composition, electronic synthesis and sound design; and he has worked as a Macintosh consultant for many corporate clients. He has also worked at Lifetime Television and many other professional broadcast facilities. His role with the ATG involves, among other things, supporting video users at the Digital Multimedia Lab in the Education building (35 West 4th Street, 2nd floor) upgrading multimedia systems, and providing systems support. Jed is excited about the artistic implications for students and faculty in this rapidly developing field, and values his new job as a means of fulfilling his professional and creative goals working with evolving digital technologies.

If you are interested in learning more about the Arts Technology Group, visit their website at: www.nyu.edu/its/atg/.
The New Faculty Technology Center at ITS

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In October 2000, ITS Academic Computing Services opened the Faculty Technology Center as a new resource in support of teaching and learning. The Center provides resources for faculty in all disciplines to explore and use digital multimedia, telecommunications and information technologies in instruction, educational research, and the production of educational and scholarly materials.

The staff of the Center provides a range of services that include advising, project management, faculty training, and production assistance. The staff comprises instructional technologists and members of various discipline-based groups of ITS Academic Computing Services.

The Faculty Technology Center contains an array of leading edge equipment and software. A growing library of authoring software, along with staff Blackboard, the staff of the FTC facilitates the construction of online course sites. The Faculty Technology Center is also actively involved in the application of new, highly interactive technologies for teaching and learning over Internet2.

The Center is located at the Education Building, 35 West 4th Street on the second floor.

Faculty work areas are open seven days a week:

**Sunday**
12 noon - 11:30 p.m.

**Monday - Thursday**
8:30 a.m. - 11:30 p.m.

**Friday - Saturday**
8:30 a.m. - 5:30 p.m.

ITS Instructional Technology Specialists are available for consultation on weekdays from 9:00 a.m. - 6:00 p.m.

Website: [www.nyu.edu/its/ftc/](http://www.nyu.edu/its/ftc/)
E-mail: its.ftc@nyu.edu
Telephone: 212-998-3044

Vincent Doogan is the Director of ITS' Academic Computing Services.

Using web-based authoring and management tools such as...
The Electronic SPARC

Suzanne Fedunok
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Last fall, I was one of a small group of NYU librarians interviewed for an article in the New York Times about an upcoming merger of two scientific publishing giants, Reed/Elsevier and Harcourt Publishing. Although the article covered the story very well from a business perspective, it was not the story we NYU science librarians would have written. The piece included little information about what occupies much of our time these days: the revolution in scholarly communication occasioned by new information technology. Perhaps due to the scope of the Times article, it omitted any mention of a key organization that is deeply involved in tracking these changes and addressing the resultant issues that arise: SPARC, the Scholarly Publishing and Academic Research Coalition (www.arl.org/sparc/).

SPARC is an international group of over 175 institutions created under the auspices of the Association of Research Libraries to facilitate a more effective and responsive system of scholarly communication. Some faculty members may know SPARC through CREATE: New Systems of Scholarly Communication (www.createchange.org/resources/brochure.html), a brochure co-sponsored by SPARC that was sent to NYU editors of scientific and health sciences journals last fall. One section of the brochure is particularly relevant to readers of Connect. It makes some important points about electronic publishing:

1. Some publishers seek to restrict access to electronic information through legislation and technical protection.
2. Many of the electronic resources available on a campus are governed by licenses which often restrict how faculty and students can use the content.
3. Small societies and university presses do not have the capital to invest in the new media.
4. Societies worry that individual faculty will drop their memberships if the societies’ journals are available on a campus network.
5. Societies and presses fear that they may not be able to attract quality manuscripts if faculty members are uncertain about the perceived value of electronic publications in the promotion and tenure process.
6. Libraries are concerned with the long-term preservation and archiving issues raised by electronic media.

What SPARC is Doing

Fostering a more competitive and diverse marketplace through support of high-quality, economic alternatives to high-priced journals was one of SPARC’s first initiatives. SPARC is not a publisher; it partners with key learned societies like the American Chemical Society, the Royal Society of Chemistry, and the Institute of Physics to offer member subscription support of new journals that

offer faculty high-quality, more affordable places to publish. \*Organic Letters (http://pubs.acs.org/journals/orlef7/index.html)\* from the American Chemical Society was the first of these journals. SPARC also supports what it calls “leading edge” journals that have no paper versions and exploit the possibilities of electronic publishing, such as multimedia figures. \*The Internet Journal of Chemistry (www.ijc.com)\* is one example; the \*New Journal of Physics (www.njp.org)\* is another.

A new consortium called BioOne (www.BioOne.org) is an even more innovative venture in electronic publishing, bringing together SPARC, the American Institute of Biological Sciences (AIBS), the University of Kansas, the Big Twelve Plus Library Consortium and Allen Press to create full-text electronic versions of dozens of high-impact biological, ecological and environmental sciences titles. The 59 small learned societies which make up the AIBS membership will be able to compete against commercial publishers and reinvest subscription revenue in the scientific process. The sixty-odd SPARC members contributed seed money towards this project, which begins offering the first of 14 journals in spring 2001.

SPARC also awards funds to projects aimed at fostering new digital science publishing ventures based in academe. The idea is to stimulate and accelerate the creation of new non-profit information communities for users in key fields of science, technology or medicine. Two such projects are eScholarship and MIT CogNet.

**eScholarship (http://escholarship.cdlib.org)**

Hosted by the California Digital Libraries, the motto of this initiative is: “Scholar-led innovations” in scholarly communication. Right now this means creation of "eScholarship communities”—discipline-specific electronic archives managed by scholars ready to make the move toward self-publishing. The pioneering Los Alamos National Laboratory arXiv (www.arxiv.org/) is the model, and a link to it appears on the eScholarship welcome page for Physics/Mathematics/Computer Science, along with links to subject platforms for Archaeology, Dermatology, and International and Area Studies. From this foundation it is expected that new forms of electronic resources will develop for scholars as new technologies appear. Special features such as alerting, review, citation and annotation services are mentioned. In 2001, migration of existing electronic journals and creation of new ones are envisioned, as is the addition of electronic books from the University of California Press to the discipline platforms.

**MIT CogNet (http://cognet.mit.edu)**

MIT CogNet is an example of a focused platform for a series of related disciplines, with six core areas of cognitive science: philosophy of mind, computational intelligence, cognitive psychology, linguistics, neuroscience and cognitive anthropology. It has an impressive digital library for books, journals, conference proceedings, poster sessions and key reference works. MIT Press’ list of books and journals in the cognitive and brain sciences are all in electronic form or are being digitized for access through CogNet, and these files are readily searchable. The aims of the service are similar to those of eScholarship, and they point to what many scholars feel is needed in the new electronic environment:

1. A central repository for the most current and topical electronic resources.
2. Dynamic partnerships with users, professional societies, academic departments and publishers to create links and deposit relevant material on an ongoing basis.
3. A range of customized services.

**What Faculty Can Do**

SPARC encourages faculty members to join the effort to refashion the system of scholarly communication. You can make a difference in a number of ways, such as encouraging discussion of scholarly communication issues and proposals for change in departments and schools, lending support to learned societies’ publishing efforts, and encouraging them to consider creating enhanced competitors to expensive commercial titles. Lending support to learned societies’ electronic publishing programs by submitting papers, reviewing and serving on editorial boards is also recommended. If a society’s publications are already contracted to commercial publishers, encourage the exploration of alternatives.

Becoming aware of intellectual property rights policies and modifying, if appropriate, any contract with a publisher to ensure one’s right to use the work, including posting on a public
Archive, is important, as is faculty examination of the pricing, copyright and licensing agreements of any published journal one contributes to as an author, reviewer or editor. It is also important for faculty to work with librarians by inviting them to meetings with publishers' representatives and inviting them to departmental meetings and seminars to discuss communication issues.

Some members of the NYU community believe that development of the Library collection may safely be left in the capable hands of the Library staff. Issues such as publisher mergers and the technology and economics of scholarly publishing have been of little interest to the University community at large. However, now that the Library collection increasingly requires access to electronic resources beyond the Library walls, those in the University community who create scholarly information must get involved in deciding how these resources are paid for, retrieved, and stored. As the SPARC brochure says: "Projects and proposals to transform the system are being shaped primarily by stakeholders outside the faculty: publishers, librarians, administrators, state legislatures, information technologists. Involvement by faculty is critical to ensuring a new system that meets your needs and those of future scholars."

To get involved, contact your Library Faculty Liaison. A directory is available in the back of the Libraries and ITS Faculty Information Handbook, or see the online version at: www.nyu.edu/its/faculty/handbook/LibraryDirectory.html.

Meet the New Employees at ITS' Academic Computing Services!

ITS Computer Labs

Tal Halpern is the newest Instructional Technology Specialist at the recently renovated Faculty Technology Center, 35 West 4th St., 2nd Floor. Tal works closely with NYU faculty and staff to develop, produce and manage new media projects. He gained his expertise in instructional technology in numerous academic and commercial settings as a program developer, project manager and new media designer. As project coordinator for the global reproductive health forum affiliated with the Harvard School of Public Health, Tal developed and managed the South Asia section of the Health and Reproductive Rights Information Service. He has also worked for a wireless software development company, consulted on new media communications projects for commercial and United Nations organizations, and designed and produced websites for Silicon Valley agencies and independent clients. Tal earned his undergraduate degree in Urban Studies with course work in Visual Arts, and his masters in Literature and Media Theory. Within the field of Instructional Technology, Tal is particularly interested in the interface between technology and organizational form, especially the ways in which new technologies are implicated in changes in the organization of work and the production of new types of knowledge. Any NYU faculty or staff member who is interested in learning more about the services offered at the Faculty Technology Center should visit www.nyu.edu/fts/ or call 998-3044.

Jamil Hamilton joined ITS in late November as Lab Manager of the ITS computer lab at 14 Washington Place. Jamil's background is in both architecture and networking. In his last position, he worked for a design firm in Washington, DC as the network administrator and as an architectural designer. For him, this was on-the-job training in network design, implementation, hardware maintenance, and vertical application integration. He also learned some valuable lessons about planning for the future. Last fall, Jamil moved to New York from his hometown, Washington DC, in pursuit of his goal to redevelop under-utilized areas in American cities. His previous volunteer work with non-profit organizations dovetails nicely with his current academic pursuits: a Masters of Science in Real Estate Development here at NYU's School of Continuing and Professional Studies. Jamil is glad to be part of the NYU community, both as a student and as an employee, and looks forward to providing the best possible service for NYU students, faculty and staff. Due to the fact that the computer lab that Jamil manages is primarily Windows-based, it is used by a large number of Computer Science students. To that end, ITS is working to improve the availability of key applications for CS students, such as: Kawa, C++, Java, and statistical packages like SPSS, MapInfo, and S-PLUS. If you would like more information about any of the ITS computer labs, please visit www.nyu.edu/its/labs/.
Blackboard 5
“...in dreams begin responsibilities...”

Vincent Doogan
vincent.doogan@nyu.edu

During the past few years, the collection of network-based applications commonly used by faculty and students in support of classroom-based teaching and learning has included e-mail, discussion groups, and websites. The predominant model for creating course websites at most higher education institutions has been an informal one in which enterprising teaching faculty members develop their own web-based education tools. Using their own personal initiative, along with university resources, student employees and a variety of software applications, faculty members have created course-related websites that range in quality from fair to excellent.

In the year 2000, NYU’s Information Technology Services introduced Blackboard—a commercially available course development and management system currently in use at numerous American colleges and universities. Presently, Blackboard software products and web services reach more than 6,500 institutions in each of the 50 states and in more than 70 countries. Upwards of 3.5 million people worldwide teach and learn in online education environments powered by Blackboard. The principal features of this versatile course delivery system include web browser compatibility, a course template, use of text and multimedia content, search tools, student home pages, threaded discussions, chat rooms, e-mail, file sharing, whiteboards, student grading, test authoring, assessment tools, access control, class roster, and a built-in help manual.

During spring 2000, 30 faculty members began using their new web-based Blackboard course shells to post announcements, syllabi, and course documents, and to host after-class discussions among their students. Through vendor presentations and hands-on training with ITS, dozens of faculty members learned the basics of navigating, authoring and managing a Blackboard-based website. In June 2000, ITS and NYU EQUAL partnered together to use Blackboard to deliver an Online Institute course for faculty, designed to assist instructors in learning to use the Web to enhance their teaching of classroom-based courses. The Online Institute course was offered again in the fall semester, as the number of faculty members using Blackboard rose to just over 200. These faculty members were responsible for more than 300 classes, with enrollments numbering over 4,000 NYU undergraduate and graduate students.

Use of Features
Blackboard is a hybrid product. It contains a score of features that are also found in the software market as independent, robust, and fully-developed products. Helping faculty members determine which software product best fits their needs is one of the roles of the Instructional Technologists at the ITS Faculty Technology Center (FTC). For example, a faculty member who is only seeking a discrete software functionality for supporting after-class online discussion groups and e-mail lists, is likely to be best served by NYU’s Lyris forums group software. Another faculty member’s needs might be met by a simply constructed website for posting office hours, a class reading list and syllabus. With the addition of Blackboard to the software “menu,” it was important for the FTC to understand what features of the software faculty members found most useful for...
Imagine a world where technology means opportunity, not complexity. Where teachers can extend their expertise and guidance beyond the classroom—to students on campus, across town, or even across the world. Where students can reach teachers, interact with classmates, and access learning materials anytime, anywhere. And where administrators can more easily support faculty, strengthen their educational communities, and foster lifelong relationships between their institution and its students.” (From the Blackboard website: www.blackboard.com.)

Therefore, at the conclusion of the fall semester, ITS Academic Computing Services conducted a survey of the 200 faculty members who had just completed their use of Blackboard. Fifty-three respondents, of whom 72% were first-time Blackboard users. While 81% of the respondents primarily use MS Windows, their range of software experiences varied. Faculty reported that their prior computer and Internet experiences were distributed as follows:

- 96% had used word-processing software
- 96% had used e-mail
- 75% had been a Listserv subscriber
- 55% had used data analysis software
- 49% had used multimedia software
- 42% had participated in online discussion groups
- 40% had created a website
- 9% had used desktop video conferencing software.

From a list of a dozen features, our faculty survey respondents were asked to choose their top five most useful Blackboard features:

- 60-70% included one or more of the following in their list: the content editor, announcement editor, content uploading, discussion board, and web-link editor
- 30-40% included the assignment’s drop-box, tracking student work, and the grade book function on their top five lists
- 10-20% placed student work-groups, the test/survey editor, online manual, and chat features among their top five items.

**Time and Materials**

Eighty-nine percent of faculty respondents reported posting documents to their Blackboard websites during the semester. Of these faculty members, 25% reported spending one to two hours creating content or documents to “build” their site, while 40% spent five hours or more.

The kinds of material posted by faculty were reported as follows:

- 72% posted materials in word-processing format (e.g., .doc, .pdf, and .rtf)
- 60% posted text content that was directly typed into Blackboard
- 58% posted links to other websites
- 30% posted content in HTML
- 26% posted images or other graphics
- 9% posted animation, video, or audio materials.

Mediating online class discussions required a variety of time investments from the faculty:

- 47% reported that they or a designee spent one to two hours a week mediating the online component of their class
- 17% spent three to four hours
- 8% spent five or more hours for mediation
- 17% reported that mediating their online environment was not applicable to their present use of Blackboard.

**User Feedback**

Overall, 91% of faculty responded that they plan to use Blackboard again. Seventy percent of faculty reported that they were satisfied or very satisfied with Blackboard. As one survey respondent expressed it, “Blackboard is a fantastic tool to help professors.” Although we did not conduct a student use survey, 64% of faculty estimated their students’ overall response to Blackboard was in the satisfied to very satisfied range. However, 47% of faculty respondents believed that student participation using Blackboard was lower than they had anticipated.

One faculty member stated, “The use of Blackboard incited students to explore the Internet in a mindful and eventually savvy manner...It also generated discussion about accessing different sites and the difference between primary data and popular culture data on the Internet. Students shared resources and even read a novel to which I posted a link online. (It is not otherwise available.) They communicated with museum directors, artists, and scholars all over the country to do their work. We easily sent one another images and favorite websites during the course of the semester. Blackboard instigated students to expand their research horizons beyond the books and...
journals in the library. I also posted many announcements about exhibitions, plays, and lectures as I found them in various places.”

Implementing Blackboard has also involved a fair share of growing pains. During the fall semester, many students and faculty experienced system performance slowdowns, software bugs, and difficulties with ITS business processes. “Blackboard was extremely unreliable,” one faculty member complained. “It was so unreliable that I was too discouraged to actively use it. I had high hopes for it but it fizzled.”

The main cause of these problems was the new version 5 of Blackboard, installed just prior to the fall semester. Although NYU signed up as a beta-tester of the new version in May 2000 so that any problems could be worked out over the summer, software development delays held back testing and the full release of Blackboard 5 until late summer. When Blackboard 5 was finally released, it contained bugs that the developer worked to fix over the course of the fall semester. Additionally, unresolved interoperability issues among web browsers, Java, and PC operating systems negatively impact the usability of many web-based applications, including Blackboard. Unfortunately, the problems caused by Internet software complexities will surely affect many program implementations for years to come.

Further complications which negatively affected Blackboard use arose from local issues, such as integrating Blackboard and NYUHome, unifying ITS account authentication and creation processes, and the migration of is* type Internet accounts to NYUHome accounts. As the spring semester progresses, however, these issues have been completely overcome or minimized through the efforts of ITS staff. Integration of Blackboard and NYUHome has been accomplished; the migration of is* accounts to NYUHome has been completed; and the request for new accounts has been aided by new software tools and a web-based request form: www.nyu.edu/its/accounts/.

Spring 2001

The spring semester offers a new collection of online courses for faculty and students. For example, the spring 2001 Online Institute class for faculty, led by Tisha Bender, Ph.D. of NYU EQUAL, has just begun. This semester’s class enrollment focus is directed at faculty teaching humanities courses, with additional support from the Humanities Computing Group of ITS Academic Computing Services. The Group, led by Lorna Hughes, will support faculty learning and participate in developing content for the course.

As Connect goes to press, approximately 275 spring classes have active Blackboard-based websites for their enrolled students, and additional departments and programs are expected to submit requests for new Blackboard class accounts in the near future.

Our efficiency in account creation and in technical support for the first two weeks of classes has vastly improved from last fall. We believe that this is directly attributable to our new business processes, support structure, and Blackboard’s software update.

ITS has also established an e-mail address for Blackboard questions and problem reports: blackboard.problems@nyu.edu. Inquiries directed there will be answered within one business day. Of course, the staff of the ITS Faculty Technology Center (212-998-3044) and the ITS Client Services Center (212-998-3333) continue to provide support by telephone.

Overall, the past twelve months have provided us with many important lessons and experiences in the use of online learning for classroom-based courses. It is clear that both faculty and students find value and promise in their experiences with learning management systems such as Blackboard. Most people involved appear to be optimistic about these early trials with technologies that are rapidly evolving to meet the expanding needs and expectations of the higher education community. During the next twelve months, we plan to leverage our collaborations and partnerships with eLearning software vendors, the NYU Libraries, the NYU Center for Teaching Excellence (NYU EQUAL), and NYU Online to expand the available resources for supporting Internet-based technologies for teaching and learning at New York University.

To learn more about Blackboard, please visit www.nyu.edu/its/ftc/, or contact the Faculty Technology Center at 212-998-3044.
The Distribution of the Black Squirrel Monkey

ArcView GIS at NYU helps visualize the biology of a species

Dylan Schwindt
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The Black Squirrel Monkey (Saimiri vanzolini) (fig. 1) has the smallest distribution of any South American primate. The species only occurs in a small area of Amazonian floodplain at the confluence of the Japura and Amazon Rivers in northern Brazil (fig. 2). Large areas of uninhabitable swamp habitat and water fragment the already geographically restricted species. Because of its small distribution, the species is considered vulnerable by the World Conservation Union (IUCN), even though most of its range is protected. Better knowledge of the nature of this fragmentation could help to identify factors that might affect the Black Squirrel Monkey’s survival and better represent the species’ unique biogeography resulting from its history.

I recently traveled to Brazil to collect data on the Black Squirrel Monkey as part of an independent study sponsored by the School for International Training study abroad program, an NYU Morse Scholarship, and the Mamirauá Sustainable Development Reserve. Upon my return to NYU, it was essential to find the appropriate tool to organize and present the information. I used ArcView GIS 3.2, a software package provided by the Environmental Systems Research Institute, Inc. (www.esri.com), to create a map that clearly visualizes and calculates the data from my observations.

The relationship of the Black Squirrel Monkey to other South American Squirrel Monkeys has been the subject of debate. Some researchers have questioned whether the Black Squirrel Monkey is a full species or a regional

Dylan Schwindt is an NYU student and a GIS technician working with Frank LoPresti at the ITS Social Sciences, Statistics and Mapping Group.

Figure 1. The Black Squirrel Monkey has the smallest range of any South American primate. Adults are slightly larger than a squirrel and weigh approximately 1 kilogram. (Photo courtesy of Luiz Claudio Marigo.)
Figure 2. The Black Squirrel Monkey’s range is located in Amazonas, Brazil.

subspecies. Recent visitors to the area within the range of the Black Squirrel Monkey have reported sightings of Common Squirrel Monkeys (*Saimiri sciureus*), a closely related Squirrel Monkey species with a much wider distribution.

This has raised questions about the size and significance of the area of overlap between the Common Squirrel Monkey’s distribution and that of the Black Squirrel Monkey. Might the two interbreed where they co-occur, making the Black Squirrel Monkey a geographically restricted subspecies of a more widely distributed South American Squirrel Monkey species?

Nearly all the Black Squirrel Monkey’s range lies within a corner of the Mamirauá Sustainable Development Reserve, which, together with adjoining Amaná Sustainable Development Reserve and Jaú National Park, conserve the largest rainforest corridor in the world, an area larger than Costa Rica.

With encouragement from primatologist José Márcio Ayres, who discovered the Black Squirrel Monkey and founded both the Mamirauá and Amaná reserves, I traveled to Mamirauá to better understand factors affecting the species’ range, and to document its geographic overlap and interaction with the Common Squirrel Monkey. I recorded the locations of 350 different social groups of Black and Common Squirrel Monkeys.

Upon my return, I used ArcView GIS 3.2 to create a map with multiple layers of data representing different forms of geographical information that shape the biology of the Black Squirrel Monkey. For instance, one layer of data may be rivers, another vegetation type, and so on. Figure 3 is a map developed in ArcView showing the distribution and major environmental factors affecting Squirrel Monkey distribution in the Mamirauá Reserve and surrounding areas.

Using ArcView’s Geoprocessing Wizard, it was possible to create data layers representing the distribution of both Black and Common Squirrel Monkeys that overlay exactly with previously mapped geographic features. The layers representing both Black and Common Squirrel Monkeys were intersected to create new layers showing the overlap between the two species. Finally, based on visual analysis of publicly available NASA Landsat Thematic Mapper (TM) satellite images with 10-meter resolution (www.bsrsi.msu.edu/trfic), a final layer was created, roughly estimating the large area of habitat that is unsuitable to Squirrel Monkeys, which typically contains flooded swamps and nearly impenetrable chavascal vegetation.

A script written in ArcView’s programming language, Avenue, allowed areas of these different layers to be calculated, representing distribution, overlap, unsuitable habitat, and areas of suitable habitat not yet colonized by Squirrel Monkeys.

A computerized tool such as GIS is ideal for tasks involving the irregular shapes of natural features and habitat areas. The major water features were excluded from the area calculations, due to the fact that permanent lakes and channels between the Japura and Amazon rivers take up 10 percent of the surface area in this region.

The GIS map allows visualization of major factors affecting both Black and Common Squirrel Monkey distributions, including areas where they intersect. The range of the Black Squirrel Monkey had previously been estimated at no more than 950 square kilometers. However, using the detailed survey data and GIS, a better maximum estimate of 722 square kilometers was obtained. If the major swamp areas are excluded (fig. 4), the range is further reduced to 533 square kilometers. This is an area approximately the size of Brooklyn, Queens, and Manhattan combined.
Figure 3. This map of Black and Common Squirrel Monkey distributions and important interpretive data points was generated using ArcView GIS 3.2.

[Portions of this document include intellectual property of ESRI and are used herein by permission. Copyright © 2000, Environmental Systems Research Institute, Inc. All Rights Reserved. ESRI has global coverage data available for free, which was used to produce this map.]
Very little overlap was observed between the two species of Squirrel Monkeys, with a maximum of only 10 square kilometers. Where overlap was present, no evidence for hybridization was found. On several occasions, groups of Black and Common Squirrel Monkeys were seen feeding together. However, these groups were always observed for some time after sighting and without exception, they split into separate groups of Black and Common Squirrel Monkeys.

An isolated Common Squirrel Monkey bachelor male was observed in an area with only Black Squirrel Monkey groups. This male was traveling with a group of young Black Squirrel Monkey males, even though his large size indicated that he would be capable of breeding.

Although it is not known whether Black Squirrel Monkeys are biologically capable of interbreeding with Common Squirrel Monkeys, these observations suggest that significant barriers to interbreeding do occur in the wild. Therefore, the Black Squirrel Monkey probably deserves full species status.

The dynamics of shifting floodplain channels and the creation and destruction by river fluctuations of higher, forested levees with suitable habitat (fig. 5) probably play a very important role in the isolation of Squirrel Monkey populations, even when they live very near to each other. A large island was found with 65 square kilometers of suitable habitat that was not yet colonized by either species of Squirrel Monkey. Although the age of the island is not known for sure, it is probably at least several hundred and maybe as many as several thousand years old. The only thing that separates it from nearby Black Squirrel Monkey populations is a narrow channel of water, only 100 meters wide. That Squirrel Monkeys have not yet colonized this area suggests that even small bodies of water may act as substantial barriers to colonization and to gene flow between populations of Squirrel Monkeys. A larger waterway such as the Amazon River, which is several kilometers wide in this region, must prove a significantly more formidable barrier. The large swamp areas must also play a role in fragmentation; indeed, due to their sheer size, their local effects may rival those of the rivers.

There are no known differences in the ecology, behavior, or social structures of either Black or Common Squirrel Monkeys. However, their limited overlap may suggest competition between the two. Evolutionary biology suggests that coexistence between two species with identical ecological niches is difficult to maintain over long periods of time, especially as their populations grow.
Figure 5. Forested levees have ideal habitat for Squirrel Monkeys. However, isolation of these areas by channels and rivers may prevent colonization. (Photo courtesy of José Marcio Ayres.)

The two species will either diverge with respect to niche, or one will go extinct due to competition.

José Márcio Ayres reported a group's location at least 10 km north of where it now occurs. Now, only Common Squirrel Monkeys have been seen in this area. This observation, coupled with the distribution data, may suggest that the Common Squirrel Monkey is invading the Black Squirrel Monkey's range. If this is the case, the Black Squirrel Monkey may represent one of the only known examples of a natural extinction in progress.

However, there is an outside chance that natural disturbance may prevent the extinction of the Black Squirrel Monkey through competition. The dynamics of the floodplain environment may have isolated an ancestor to the Black Squirrel Monkey, allowing the population to diverge and become separate. Will these same dynamics stymie an invasion of its territory by the Common Squirrel Monkey, or will they further reduce the area in which the Black Squirrel Monkey lives? There are many factors that could affect the evolutionary drama that will eventually play out in this small Amazonian theater. The dynamics of competition and colonization will inevitably play an important role in nearly all scenarios affecting the future of this species.

### About ArcView® GIS: "The Geographic Information System for Everyone"1

The ArcView® GIS website describes Geographic Information System (GIS) software as a tool which “lets you see, explore, and analyze data by location, revealing hidden patterns, relationships, and trends that are not readily apparent in spreadsheets or statistical packages.” ArcView® GIS software by ESRI is a popular solution for desktop GIS analysis and map presentation, allowing the user to create, visualize, analyze, and present information more effectively.

The ArcView® website goes on to say that an estimated 80 percent of all data contain a geographic component such as country, state, ZIP Code, or street address. “By using ArcView® GIS and the power of geography, you can integrate this data for analysis and better decision making. You can create intelligent, dynamic maps using data from virtually any source and across most popular computing platforms.”

The package includes tools and data you can use to perform state-of-the-art analysis on key issues. It lets you work with presentation-quality maps, database tables, and business charts all in a single application.

ArcView® GIS is said to be the most popular desktop GIS and mapping software, with more than 500,000 copies in use worldwide. The software contains hundreds of ways to query and analyze your data. “You can even link multimedia or Internet data to your map, providing the next level of visual context for your data. Not only will your results be better understood, but they can also be easily integrated into many different types of analyses.”

ArcView® GIS software is easy to learn and easy to use. Powerful, flexible, and intuitive, the software is unique in that it is easy to get started quickly, yet can grow as your needs and requirements change.

ArcIMS
Internet Map Server

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ArcIMS (Internet Map Server) makes it possible to use maps and GIS (Geographical Information Systems) on websites.

In an article entitled “GIS on the World Wide Web,” (Connect, Summer 1998; www.nyu.edu/its/connect/archives/98summer/lopezgis.html) Antonio Lopez describes GIS as follows:

“A Geographic Information System (GIS) can be defined as a computerized database system for the capture, storage, retrieval, analysis and display of tabular and spatial data. GIS is used by many disciplines, including geography, urban planning, engineering, landscape architecture, environmental sciences and sociology. It provides individuals from varied disciplines with a set of tools to improve the efficiency and effectiveness of working with map information of spatial and non-graphic tabular attributes.”

ArcIMS version 2, from ESRI, will soon be available at NYU, and version 3 is in the works. ITS Academic Computing Services has already installed this web software on a Social Sciences, Statistics and Mapping Group PC server. Soon, researchers will be able to design web-friendly map pages using ArcIMS, and insert links from their own web pages to these applications running on the Group server.

At the most elementary level, ArcIMS allows researchers to store maps and later display them within a digital archive accessed from a website. The maps are displayed independent of the hardware and may be resized without distortion of the fonts and geometry. This is possible because the maps are not stored as simple pictures. The features of the map—streets, lakes, identifying labels—are recognized by the software. A label is recognized as a label, so that if we zoom in and double the size of the map, the label does not become absurdly doubled in size. A line used for a road is a vector not a collection of pixels, and again, as we zoom in, the lines on the map will not increase in size. This functionality

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comes from ArcInfo, a powerful program which has been available at NYU for several years. What ArcIMS does is to make it possible to use ArcInfo functionality on the Web.

There are other applications of IMS that are more complex than the simple display of maps. In order to give you a feel for the usefulness of this new software, two projects will be detailed. They fall within two classes of GIS applications: computational and front-ends to databases.

Computational GIS applications involving spatial analysis have existed for a long time. One example would be a program that could calculate the shortest delivery route given ten addresses. ArcIMS makes it possible to run this type of application on the Internet.

The second class of applications, front-ends to databases, uses a map to connect to a database. We see this all the time when we browse the Web. We are shown a map and, using a mouse, we choose the geographical region we are interested in. A simple example of this is a web page of the campus where the user clicks on a building and information about that building is displayed. The U.S. Bureau of the Census uses this type of portal to facilitate the retrieval of data from their site (see "Front-End to Database" example below).

**Computational Example**

Bill Miller, et al. described the utility of a computational GIS in the Summer '96 Connect, (www.nyu.edu/its/connect/archives/96summer/loprestipipeline.html):

"The problem at hand is to select a route for an oil or gas pipeline—in this case to connect two towns in the mountains of western South Dakota, an area for which a wealth of detailed data is freely available. This is a real-life land-use problem fraught with political snares, roadblocks, and pitfalls. Favoritism becomes an issue as land values are suddenly distorted near the route; economic development has to be weighed against damage to the environment, scenic devastation, and health concerns—the real issues are far-reaching and complex. Anyone from a concerned citizen to a government official to a utility engineer might be involved in such decisions and would be affected by the outcome. Ideally, a tool like this running on a web page will allow infrastructure to develop to the benefit of all."

The power of a modern GIS allows these computations to be calculated and recalculated almost instantly on a relatively inexpensive computer. The power of the Web takes this tool to another level, allowing these important political, economical and environmental decisions to be acted on quickly, perhaps in one evening at a virtual town meeting involving the different factions. At various convenient sites, concerned parties could suggest changes to the pipeline route and the information underlying the map would be used to immediately recalculate the cost of the pipeline. If consensus is possible, it could be recognized at that time; if not, at least everyone involved would know more about the options.

**Front-End to Database Example**

The U.S. Bureau of the Census website has a front-end showing maps of the U.S. These maps are, in fact, the table of contents to collections of data that are stored on large servers and made available to the public. Simply point and click on the maps, and you are selecting regions for data retrieval. The following is from a white paper entitled "Providing Access to Past and Future Data Sets," found at the ArcIMS website (www.esri.com/news/arcnews/summer99articles/18-usbureau.html) within the parent company, ESRI's, site:

"How do you effectively distribute data on 250 million people, 100 million households, and 15 million businesses to the users of that data? For the U.S. Bureau of the Census, the solution to that problem lies in making the census data available through the Internet."

"In 1997, ESRI was part of a team chosen by the U.S. Bureau of the Census to help build the Data Access and Dissemination System (DADS), which will become the Internet site through which users of census data—from school children to state data centers to researchers of demographic data—will gain access to census data. This site has become known as the American Fact-Finder and is now available on the Internet at http://factfinder.census.gov."

"ESRI is partnering with IBM, who is the prime contractor for this multi-year project, which will make census data widely accessible to internal and external users. Other participants in the project include Oracle Corporation, which is providing consulting and software development services in the deployment of the census data warehouse that will serve as the repository"
ArcIMS manages the Census retrieval application which allows the online display of maps to generate the data retrievals. But many other issues have to be managed as well. For instance, as with many information systems, the technical group is not responsible for the content. Corrections in maps and data are common occurrences in managing census data. This system must not only be open to citizens for retrieval but to the very large Census Bureau for editing. Many data retrieval applications are available for viewing at their website: www.esri.com/software/internetmaps/index.html.

ArcIMS contains four applications: Author, Administrator, Designer, and Manager. Each of these can be used sequentially to quickly set up a website. Author creates an AXL file—Arc’s version of HTML—that is used by Administrator to start a Map Service. Advanced functionality allows programmers to fully customize many aspects of IMS. Simple maps with standard interactive web features are much easier to create.

The Social Science, Statistics and Mapping Group plans to make ArcIMS available to the NYU research community by late February. Visit the software developer’s (ESRI) map museum at www.esri.com/mapmuseum/ to view many interesting types of IMS applications, and visit our website, www.nyu.edu/its/soscci/GIS/, for a demonstration of the NYU implementation. Contact Frank LoPresti (212-998-3398) for more information.

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**S-PLUS Statistical Package Adopted by ITS**

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The Social Science, Statistics, and Mapping Group of the ITS Academic Computing Services has recently acquired the S-PLUS statistical package for use in the ITS computer labs. This package is also available via a Telnet dialup connection on the STATS1 Unix computer.

S-PLUS is a very powerful and flexible statistical package that incorporates many of the procedures available in the more common statistical packages. S-PLUS features learning resources that include a tutorial for the novice student, multiple help menus, a dictionary of keywords and phrases, a reference manual, and online help. It has an appearance that is similar to that of SPSS, another popular statistical package, but it operates in an object-oriented environment that is very different from that of SPSS. In addition to the usual basic statistics, S-PLUS features a customizable user interface, and an extensive and powerful exploratory graphical capability (for example, see Figure 1 for a trellis graph of air quality variables in the data set and Figure 2 for an example of a 3-D graph). The package also offers built-in programming capability, the ability to do matrix programming, and a wide array of advanced statistical techniques that make it a very popular statistical package among professors, professional statisticians, econometricians, and mathematicians.

The user interface provides a data spreadsheet in which data can be easily defined, imported, manipulated or exported. S-PLUS features a data-importing capability from flat files (such as, PRN, ASCII or text files); spreadsheets (including Excel, Lotus, and Quattro Pro); databases (e.g., Paradox and Dbase); statistical packages (e.g., SAS, SPSS and SYSTAT); mathematical packages (such as MATHCAD and MATLAB); and graphical packages (like Sigma-Plot). S-PLUS is also versatile in its data manipulation. Entire data sets can be easily selected, and...
individual blocks of data (either rows or columns) can be selected within data sets. These blocks can be copied, moved, appended, packed, transposed, sorted, stacked or unstacked. Variables can be constructed by recoding existing variables, collapsing categories, or generating random numbers from a theoretical distribution. Complete data sets can be selected, subset, split, merged, transposed, and easily saved. After the data sets are saved, they can be exported in various formats. For example, by using the PowerPoint Wizard, resulting output can be converted to MS PowerPoint for presentation.

In the object-oriented environment, data, functions, graphs, scripts, and modeling results are saved as objects. An object-explore displays these objects and allows the analyst to select them for special processing. Double-clicking on the model object shows the default summary for the object. Right-clicking shows methods used for analyzing the object, from which the user may select one or several options. Functions may be used to call portions of the output. For sophisticated analysis, users may avail themselves of the command and analytical history log windows to keep an audit trail of the analysis for debugging, development and reference.

S-PLUS statistical techniques include a wide variety of basic and advanced statistics. The basic statistics include summary statistics, cross-tabulations and correlations. The package includes methods for analyzing statistical power and sample size requirements. Methods for comparing samples with one or more samples, and for counts and proportions, are also part of the package.

Among the more advanced options are the general linear and nonlinear models, which include experimental designs with fixed, random and mixed effects. These may be of orthogonal factorial, repeated measures or split-plot designs. Multiple comparisons with specifiable errors for experiment-wise error corrections are available using the Bonferroni, Dunnett, Fisher LSD, Scheffe, Sidak, Tukey or Simulation options. Plots of the interactions can also be produced.

Parametric, semi-parametric and nonparametric regression models are available to the user. Linear regression approaches (OLS, weighted, and generalized least squares) are also included. Nonlinear regression procedures include parametric nonlinear, logistic and Poisson (log-linear) techniques. S-PLUS, like the new SAS modules, provides robust regression that includes locally estimated sums of squares (loess), least median
squared and least absolute deviation squared procedures, and regression of M-estimators. Generalized additive regression is also available with Gaussian, binominal, Poisson, Gamma, inverse normal and quasi-likelihood link functions.

Some other advanced S-PLUS statistical techniques include tree-based models, cluster, multivariate, survival and time series analysis. The tree-based models build classification and regression tree structures. The display of these top-down structures illustrates the explanation of apex dependent variables by nominal and continuous predictors. Tree-based models may be used as explanatory or classification systems, while S-PLUS cluster analysis can be used to classify objects with K-means, agglomerative hierarchical cluster analysis, and partitioning and fuzzy partitioning, among others.

Other multivariate techniques featured in S-PLUS are principal components analysis and factor analysis for common factor extraction and definition, three types of discriminant analysis along with error rate analysis and cross-validation for formulating functions that maximally discriminate among groups, and a MANOVA procedure.

S-PLUS offers survival analysis for those who wish to study the individual or comparative duration or reliability of phenomena. Its procedures include Kaplan-Meier analysis with both left and right censoring. There is median and median survival computation and the comparison of stratified survival curves. Cox regression and penalized Cox regression models are available with a wide array of distributions—including the Weibull, smallest extreme value, logistic, log-logistic, normal, log-normal, exponential, log-exponential, Rayleigh, or log-Rayleigh—that can be used for fitting. Both individual and cohort expected survival analyses are available. Cohort analysis can use exact, Hakulinen and conditional methods. Hazard rate tables and Cox models can be used along with tests for significance.

Time series analysis can be done in the time or frequency domain. Models of univariate time series may be developed with ARIMA, autoregression, and spectral analysis. The ARIMA models include simple models, seasonal models, ARIMA with regression variables, simulations and forecasting.

The autoregression models include univariate autoregression models, multivariate autoregression models and procedures for finding the roots of a polynomial equation. These procedures lend themselves to univariate and multivariate modeling of time series, as well as intervention and transfer function analysis.

Figure 2. Income Level by Age and Education Level in Market Survey Data
There are also procedures for long memory time series models, including fractionally differenced ARIMA models and their simulation. Robust methods for smoothing time series with outliers are available, including generalized M-estimates, robust filters, and robust smoothers.

For those interested in studying more or less continuous series in the frequency domain, S-PLUS provides a spectral analysis toolkit, including such tools as the usual spectrum estimation with periodogram or with auto-regression analysis, along with convolution or recursive filters for modeling univariate or causal processes, and band-pass filters for complex demodulation of nonstationary series.

For analysts interested in estimating and forecasting risk, particularly in financial applications, S-PLUS at NYU also has a GARCH module. This module provides the analyst with a whole family of ARCH (autoregressive conditional heteroskedastic models) and GARCH (generalized ARCH) models respectively proposed by Robert Engle in 1982 and Tim Bollerslev in 1986 to use in their analyses. They include the extended GARCH, power GARCH, exponential GARCH, threshold GARCH, GARCH in mean and multi-component GARCH models, along with an array of multivariate GARCH models.

For analysts whose data are rooted in space or area, S-PLUS also contains a module for spatial analysis. Epidemiologists studying disease clusters, environmental scientists studying pollution diffusion, or criminologists studying crime clusters might use exploratory spatial techniques, including contour plots and variogram clouds. They might also make use of empirical and model variograms, as well as the spatial correlation and regression procedures provided by this module. Other features include resampling techniques (bootstrapping and jackknifing) as well as a number of quality control procedures (control and Shewart charts, plus procedures for process and capability analysis).

S-PLUS, STATA and SAS all stand out in power, capability and flexibility among general purpose statistical packages for professional statisticians and serious graduate students who have need of advanced modeling procedures. For specialized applications in limited dependent variable and panel data analysis, LIMDEP is very popular. For specialized applications in time series analysis and forecasting, noteworthy packages are FORECAST PRO, THETA, AUTOBOX, EVIEWS, STAMP, PCGIVE, PCFIML, RATS, and SHAZAM.

For faculty members who can not afford to spend a lot of time counseling their students on the proper applications of the statistical techniques they employ, both SPSS and STATA have a well-deserved reputation for being versatile and user-friendly general purpose statistical packages. For more information on using S-PLUS or other statistical packages at NYU, please contact either Bob Yaffee (212-998-3402) or Frank LoPresti (212-998-3398).

ITS News Briefs

- On February 1st, the ITS Client Services Center moved from 251 Mercer Street to its new permanent location at 10 Astor Place, 4th Floor. The Center can be reached by telephone at 998-3333 from 8:00 a.m. - 8:00 p.m., Monday through Friday. In-person help is available from 9:00 a.m. - 6:00 p.m., Monday through Friday (appointment recommended).

- The deadline for submitting nominations for the George Sadowsky award is March 30, 2001. Please see page 2 or www.nyu.edu/its/ for more details.

- The ACH/ALLC Conference will be hosted at NYU on June 13th - 17th. Registration begins in early February. See page 3 for more information.
Welcome Doug Carlson!

It is wonderful to have the opportunity to announce the addition of Douglas S. Carlson to NYU and the ITS Leadership Team as our new Director of Network Services! Among a large and strong pool of candidates, Doug stood out with the broadest range of directly applicable accomplishments in an environment as complex as ours. He has been actively involved in statewide and national bodies associated with networking in higher education. He's a veteran at the kinds of organization and service transformations we're undertaking in ITS. We're so glad he chose to join us!

Doug comes to NYU from Cornell University, where he has held technology leadership roles for nearly a decade. For the past three years, Doug has been the Associate Director for Systems and Engineering in Cornell Information Technologies (CIT). In this role, he directed the design, deployment and ongoing support of the University's data and voice networks, as well as its physical communications infrastructure, in-building and underground. Earlier, Doug headed Systems and Operations at the Cornell Theory Center, leading the staff in all aspects of the design, installation and support of Cornell's NSF-funded supercomputing center. Doug also has substantial experience in technology services leadership and management in industry.

Doug's office is in Warren Weaver Hall (251 Mercer St.), room 323. His phone number is 998-3445, and his e-mail address is doug.carlson@nyu.edu.

---Marilyn McMillan, CITO

About Connect

Connect: Information Technology at NYU is edited and published by New York University's Information Technology Services (ITS). Its scope includes information about computing, networking and telecommunications across NYU's various schools, departments and administrative units, as well as developments in information technology outside the University.

Copies of Connect are available at the ITS Faculty Technology Center, the ITS computer labs, the NYU Information Center and most graduate school offices. Copies are mailed to full-time University faculty, staff and researchers, based on mailing lists administered by the Human Resources Division.

If you are a full-time faculty member and do not receive a copy, please notify your dean's office; full-time staff should notify their human resources representative. If you are not among these groups but would like a free subscription, please send e-mail to its.connect@nyu.edu.

You can also read Connect online at: www.nyu.edu/its/connect/.

We welcome your comments about the articles in this issue, as well as suggestions for future issues. Contributions are invited for consideration by the editor.

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