Connect
Information Technology at NYU
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Animating Virtual Reality

Copyright Issues for the Digital Age

Interactive Art: Giving Up Control

Y2K: Time is Still on Your Side
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 Innovation 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 Personnel.

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 personnel representative. If you are not among these groups but would like a free subscription, send e-mail to its.connect@nyu.edu.

You can also read Connect online, through NYU Web, at the URL 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.

Opinions expressed in the articles in this publication are those of the authors and not necessarily those of Information Technology Services or of New York University.
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**Connect: Information Technology at NYU**
Introducing ITS
(Nice to see you again!)

With this issue, Connect starts a new chapter as the magazine of Information Technology Services at New York University. ITS is NYU’s central organization for information- and technology-based services for University faculty, students and staff. We provide computer services, Internet resources and much more.

Information Technology Services is a new division, but one with strong and long-standing roots at NYU. We bring together the services of three, formerly separate departments — Academic Computing Facility (ACF), Telecommunications, and the University Computer Center (UCC). ITS connects people — to people, to their work and studies, and to the information, training and technical resources they need to achieve their goals.

Our seven groups work together in support of the broad spectrum of University activities. Service is our central focus and concern. Take a look at who we are and what we do, and find out how we can serve you.

Academic Computing Services
Discipline-based, teaching- and learning-focused services and training for faculty and students; the Innovation Center; student computer labs, and ResNet services.

Administrative Computing Services
Application development, database and security services for NYU’s business systems — HRIS, fame, and others.

Client Services
The ITS “front door” — help desk services, accounts, publications, telephone operator services, and general training in computer, network and phone system use.

eServices
Development and applications of Web, e-mail and portal services for University communication and collaboration.

Network Services
Management, evolution, security of NYU’s vast infrastructure and systems underlying e-mail, Web and other network services.

Operations and Production Services
Management of major University-wide computing environments, such as SIS, HRIS and fame.

Telecommunications Services
Digital telephone, voice mail, interactive voice response, advanced call center systems, and video teleconferencing.

— Joan Charlotte Matelli
Editor
About ITS

ITS — We’re At Your Service

Marilyn McMillan
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All of us in Information Technology Services (ITS) at NYU have come together — from the groups formerly known as ACE, UCC and Telecom — with a common purpose: service to you.

Our service is connectivity — linking you with resources you need to do your work. We manage a diverse set of technologies that enable this connectivity, including the University’s telephone system, the computer network, and access to phones and computer networks worldwide. We operate the network applications, like e-mail and websites, that are available broadly throughout the NYU community. We provide facilities that are specialized to meet connectivity needs you have in your role as a student, a faculty member or an administrator. Student labs, computing classrooms, video conferencing, and administrative systems are a few examples.

The technologies we manage are an essential part of our service, but are not the whole story. We offer training, troubleshooting, documentation and other information. We coordinate with other providers of similar or related services around campus in the Schools and the Libraries. We work collaboratively on projects to explore the use of new technologies in instruction and research. And there’s more.

All this still doesn’t capture the essence of our commitment to serving you. The basic element of any service is the moment of interaction, the instant when you come in contact with any aspect of ITS. As a result of that contact, we know that you form an opinion about the quality of our service. In fact, you may very well rely on several of our offerings to get your work done. This means you have any number of contacts with elements of ITS on a regular basis. Chances are, you’ve built up quite a log of moments of contact — and opinions about them — with one or more ITS groups, under our former names, over the years.

These points of contact you have with ITS — or any other service provider, for that matter — are really Moments of Truth. That’s what Jan Carlzon, the former president of Scandinavian Airline Systems, calls them in his 1987 book of the same name. “Anytime a customer comes into contact with any aspect of a business, however remote,” he writes, “is an opportunity to form an impression.” Examples of Moments of Truth in Carlzon’s business occur, for example, when you call to make a reservation, arrive at the airport and check your bags at curbside, go inside and pick up your ticket, are taken care of onboard the aircraft, or arrive at your destination.

As you can see, many Moments of Truth involve you in direct contact with people. Others do not, such as reading an issue of Connect or getting a dial tone when you pick up an NYU phone. Moments of

Marilyn McMillan is New York University’s first Chief Information Technology Officer. She oversees NYU’s data and telecommunications operations as head of Information Technology Services.
Truth occur at your entry into a service situation, during the course of experiencing the service, and when you exit the encounter. There are big moments and small ones; good, bad and average moments. They all add up.

Moment of Truth. It’s a straightforward concept, but one that terrifies providers of connectivity and similar services in high demand. Give everything to everybody the moment they want it? Impossible! What about unrealistic expectations? What about priorities? Budget limits? It can’t possibly scale in a community as big and diverse as ours. However, the provider doesn’t get to choose the metric. You do. The sum of your Moments of Truth sets your expectations about a service and your satisfaction with it.

At ITS this year, we’re paying particular attention to improving our track record in Moments of Truth with you. We will not be able to act immediately on everyone’s needs and expectations. We don’t yet have a full inventory of all the possible ITS Moments of Truth and your impressions of them. Nevertheless, we are launching a concerted effort to ensure that your encounters with any aspect of ITS are consistently satisfactory. For us, this means staying mindful of the fundamentals: being prompt, courteous and reliable; understanding what you want; providing effective help. It also involves managing change.

Over the last several months, based on feedback already available, we’ve taken steps we hope will make a visible difference in the quality of your contacts with us. A few examples illustrate the changes thus far:

New terminology, for starters.
We’re choosing to call you our client. The term implies a longer term, peer-to-peer, recurring relationship that’s qualitatively different from the one we’d have with a user, end-user, or even a customer. This client relationship also entails shared responsibility and joint participation in solving problems. It’s been some time since the days when only a few gurus had a working knowledge of computers and related technologies. We’re in this together.

New Presentations of ITS Offerings.
With this issue, Connect inaugurates a broadened scope beyond academic computing. From now on, Connect will cover the full range of technology initiatives at NYU, both within ITS and across the University. Check out our new ITS website (www.nyu.edu/its), which includes information about ITS facilities and services and how to access them. At ITS computer labs, look for the new publication we’ve prepared jointly with the Libraries. “Students’ Guide to Library and Technology Services” is a ready reference to resources you may need across our organizations.

A New ITS Structure
We’ve responded to complaints about difficulties finding and integrating our services by establishing a new “front door” — the Client Services Center. Bringing together staff and functions from our three former groups, we are striving to simplify your encounters with ITS in search of help and access to our offerings. Working with Client Services in the overall effort to coordinate our processes and orient them more strongly toward our clients, the other ITS groups are:

- Academic Computing Services
- Administrative Computing Services
- eServices
- Network Services
- Operations and Production Services
- Telecommunications Services

Expansion of Key Services
In response to expressed demand, we’ve increased the availability of Albert for Student Information System inquiry to 22 hours everyday, with only an hour out at 8 p.m. and again at 7 a.m. for backups. We’ve added to our e-mail directory the e-mail addresses and phone information for students who choose to be included. We’ve solidified our link to Internet2.

In the months ahead, we’ll continue listening and introducing changes aimed at improving the quality of the Moments of Truth you experience with ITS. The pace of change may be slower than we hope. Any number of factors are poised to interfere — the learning curves we’re climbing, the surprise events of daily business, and the effort to ensure a smooth passage into the year 2000, to name a few.

But we intend to keep moving forward, at your service. Your satisfaction is very important to us. We count on your continuing feedback to help us get it right.
ADCOM Services
Administrative Computing at NYU

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Administrative Computing Services, or ADCOM Services, is part of the new Information Technology Services (ITS) organization headed by Marilyn McMillan, NYU’s first Chief Information Technology Officer. ADCOM Services, formerly the UCC Systems Development Group, is chiefly responsible for developing and maintaining the business applications that support NYU’s business functions such as Human Resources, Payroll, Financial Administration and Fundraising. This means we’re the behind-the-scenes people who do everything from making sure you get an accurate paycheck, to generating stipend payments for students, to processing annual merit increases for administrators, and more.

What ADCOM Services Offers
Whether directly or indirectly, ADCOM Services affects just about everyone who works at the University or attends classes here, as well as some people outside our University family.

We provide administrators in schools and central offices with application services that allow them to effectively manage their budgets and their employees, so that they can, in turn, provide services to students and staff. We develop and maintain applications that track activity for the sponsored research projects managed by our faculty, and we provide application services to the Development and Treasurer’s offices in their fundraising efforts for the University. Last year, the Development Office raised over $168 million! These are just a few examples of the services we provide.

Our chief responsibility is to work with the schools and central organizations in the University to assist them in meeting their business needs. Since we’re in the business of application software development and maintenance, we work closely with our clients to develop new applications, replace old ones, or enhance existing systems. We assess requirements, develop specifications, and build and test applications. We also train users in a variety of disciplines and provide other services, like creating and maintaining databases and developing and implementing online reports.

ADCOM Services is organized into four service groups that support an array of University business functions:
- Our Human Resources Group manages the Human Resources Information System (HRIS), which includes online payroll and benefits functions.
- The Fundraising Group is responsible for the BSR Advance System, which includes prospect/donor processing and gift processing functionality.
- The End-User Computing Group provides a variety of support services, like reporting, application installation...
and support, and interface development and implementation. They also provide training and specialized report development for many application reporting functions.

- The Database Administration/Security Group installs and maintains all the databases that contain data processed by the SIS (Student Information System), HRIS, sfa/me and BSR Advance systems. This group also processes security requests and maintains security for the sfa/me, HRIS, BSR Advance and SIS systems.

As you might have guessed, ADCOM is heavily involved in Year 2000 compliance work, in addition to the regular roster of services we provide. This means reviewing and testing each application we interface with or are responsible for, to ensure that it will function properly when the clock strikes midnight on January 1, 2000.

We are working closely with all our business areas and our Internal Auditing Department to test and make changes in existing applications, and to implement new applications where necessary. In addition, we are part of the University’s Y2K Oversight Team, along with other departments and divisions. This Team meets regularly to review the University’s readiness for Y2K, prepare for contingencies, and plan for a seamless transition to the new millennium.

ADCOM’s Computing Environment

ADCOM utilizes a variety of hardware and software, from various multi-user systems to desktop PCs.

Supported Systems

The Human Resources, Payroll and Fundraising system currently run on an IBM Mainframe. The operating system is OS/390.

Currently, our client server applications — sfa/me, and a portion of the Fundraising System (BSR Advance C/S) — run on an IBM SP2 UNIX machine. By the fall, we expect that the Fundraising System will be fully converted to run under UNIX as well.

We use multiple servers for development and production applications running under Novell.

Databases Supported

- Oracle version 7.3.4
- DB2 version 3.1
- IDMS version 14.0
- RAMIS (MVS) version 7.4
- Focus (MVS) version 7.08

Software and Tools

We use several application software packages and development tools, including Integral, Peoplesoft, BSR Advance (IDMS and C/S), CSP and Powerbuilder. Our Microsoft products include Visual Basic, Access and Excel. We run COBOL for both IBM and Microfocus.

Reporting tools include Crystal, PC Focus, SQR, PC Ramis, Infomaker and PL/SQL.

Our web tools are WebDB, Oracle Reports and Web390.

Who Works at ADCOM Services

ADCOM’s most important asset is its staff. This talented group of IT professionals includes programmers and systems analysts, database administrators, client/server specialists, mainframe experts and project leaders.

They are a diverse group who offer a wide range of skills, often above and beyond their specific job responsibilities. Several of these individuals have been in the IT field for many years, and all are dedicated and committed to providing quality service.

What’s in ADCOM’s Future

We are a dynamic, evolving service organization, constantly changing and reinventing itself in an effort to meet the needs of our University family. As both the technology and the needs of the University change, we try to identify better, faster and more cost-effective methods of getting things done. And, as business units and the university public become more sophisticated consumers, we have to keep pace in order to meet their needs and demands.

We are already in the preliminary stages of developing web applications that will be more accessible and cost effective in delivering the services we provide. We have also started working on building a data warehouse that will be a repository for cross-organizational information, accessible through the Web.

Our success will lie in our continued ability to deliver a high level of service to the University community. By understanding your needs through the relationships and partnerships we have built with our clients, we know that we can do so.
Change Affecting the Workplace

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Change is a word that often instills fear in the minds and hearts of people. If we believe that humans are creatures of habit, then it is easy to see why folks would react negatively to change. And while change seems to be present everywhere these days, it can have a particularly unsettling effect in the workplace.

History provides many examples in which change disrupted work covenants between employers and employees. The industrial revolution of the 1800s displaced farm workers with modern machinery. In the early 1900s, the assembly line affected the developing transportation industry. More recently, we have been dealing with the technology explosion sparked by the advent of computers and related peripherals. The impact of this blast has not only affected many aspects of our everyday live, but has also transformed the workplace as we once knew it.

As employees and employers learn from change, however, new attitudes and expectations are replacing the old, ineffective ones. In a January 1998 Management Review article, Luisa Wah explained that the traditional compensation package has been replaced “...by a broad range of rewards including skill development, lateral career movement and incentive compensation.”

The idea of movement, fluidity and flexibility in both employers' organizations and employees' work habits, to allow for fast responses to changes, might sound as if it appeared overnight. But in a 1994 Harvard Business Review article, this trend was identified and highlighted in Silicon Valley companies like Apple, Sun Microsystems and Raychem. The latter, a manufacturer of specialized industrial products, went from merely supporting each employee's need for lifelong learning to mandating that each employee have a learning and developing plan. The underlying idea supported by these companies is that the relationship between employer and employee should be between adults, and not follow the parent-child model.

These companies viewed this as a smart business practice since it benefits both the companies and the employees. As part of this philosophy adjustment, a comprehensive approach recommended by the article is that companies must keep employees fully informed of the direction of the business, help employees understand that they bear the responsibility to ensure that their skills remain competitive, and abide by the employee's right to be a free agent.

In this way, a company that recognizes the changes it is experiencing will be at an advantage. Such companies can react swiftly but fairly to new conditions. But more important, encouraging workers to grow, change and learn can result in a resilient workforce. And that is in everyone's best interest.

As we look at how change has affected us since the 1800s, three facts seem to be present at any point in time. One, change is constant. Two, change is occurring at an increasing rate of speed. Three, humans are resilient beings. If we are to accept these facts, then the spirit of the third will be the one helping us overcome our fears of change, no matter how fast change may occur in our lives.
Let's Continue This After Class...
Web-Based Instructional Tools

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Computer-related curricula have been around for a long time in the guise of computer science and electrical engineering. Other academic studies have long used computer applications related to mathematics and statistics, as both the object of instruction and as tools for learning core subject matter. The latter trend has expanded its influence upon curricula in more study areas such as filmmaking, teacher education and expository writing. Yet in general, the promise of effective, widespread computer-aided instruction has been elusive.

In recent times, advancements in computer network technologies have altered the landscape for interconnecting people and providing collaborative communication tools using a universal interface called a Web browser. The significance of this technology for teaching and learning needs to be examined.

Presently, much of the use of web-based technology in enriching the quality and experience of education at New York University has come about through the pioneering efforts of creative and highly motivated faculty. These faculty pioneers have created course-related websites that mimic the traditional classroom by providing students with online syllabi, schedules, assignments and discussion groups. Students also have the opportunity to communicate with their instructor or other students through the use of electronic mail and other collaborative tools. Additional features such as online course materials, exams, simulations, multimedia and links to external resources provide further ways to augment classroom learning. The use of web-based instructional tools appears to provide interesting advantages over lecture-only classes.

The implications of this new force in education are many. How does the institution view the strategic value of web-based instruction? How does it fit with traditional classroom-based teaching? How is the institution to evaluate the return on its investment in technology? Should the institution build its own course development tools, or will they be supplied by industry? How can resources be scaled to support such initiatives? What are peer institutions doing?

Reasons for Adopting Web-Based Education

Among higher education institutions, several justifications for developing and delivering web-based courses have emerged.

Interaction

Expanding opportunities for learning and interaction among faculty, students and administrators can further the quality of the educational experience for campus-based students. Investments in campus networks and web-based tools extend the opportunities for course-related learning and communication beyond traditional classroom meetings and faculty office hours.

A virtual class can now be in session at any time — 24 hours a day, seven days a week. The inefficiencies of classroom sessions, such as absences from class, can now be remediated through course websites and collaborative tools.

Accessibility

Distance education expands the student population by reaching out to off-campus specialty markets. It is particularly attractive to workplace and at-home learners. Since a student does not have to physically
attend a classroom, and in many cases can work independently at his or her own pace, web-based classes offer a high degree of convenience.

Business and technical courses already make up a majority of online course offerings, probably because of the market demographics, and possibly because technical disciplines have standards and licensing tests, for which one can prepare through non-classroom learning.

**Competition**

Higher education institutions compete for quality applicants. An institution's use of technology and its availability for administrative and instructional functions is a factor for more and more students when choosing an institution.

**Cost**

The decreasing cost of technology and new developments in software provide economic advantages over the rising expense of real estate and construction. Institutions can trade costly investment in classroom-based teaching and its associated facilities for the anticipated lower costs of developing and delivering online courses.

**Web-Based Course Development and Delivery**

While higher education institutions are determining which market justifications apply to their institutional strategies, all will make decisions about what strategies to follow in developing web-based courses.

During the past few years, the predominant model for creating course websites at most higher education institutions has been an informal one. In this model, enterprising teachers have been the early adopters, developers and innovators of web-based instruction. Through individual effort, faculty members have created course-related websites that range from fair to excellent — using University resources, student employees and various software applications.

At present, three institutional strategies for the development and delivery of web-based teaching and learning have emerged.

The most prevalent strategy provides faculty with organized support and University resources for the development of customized website development and delivery, using various software tools and dedicated web servers. Often development utilizes a website template to facilitate planning and design layout.

**Software tools include:**
- Asynchronous collaborative tools, such as electronic mail, threaded discussion groups or web boards. Students can share content with attachments and links.
- Synchronous collaborative tools, such as audio conferencing, video conferencing, text chat or a shared white board.
- Multimedia tools, such as Adobe Photoshop, Adobe Premiere and Macromedia Director, for creating static and highly interactive content.
- Web authoring tools or HTML editors, such as MS Word, Macromedia DreamWeaver and Netscape Composer.

The next strategy involves the adoption of a commercially available course development and management system — an application that is resident on a web server. Principal features of commercial products include web browser compatibility, instructor-created sample courses, course templates, use of multimedia, student home pages, threaded discussions, file sharing, whiteboards, test authoring, timed quizzes, assessment tools, access control, and class rosters.

Under a third strategy, some universities are creating their own systems, which also bundle several synchronous and asynchronous communications tools.

Today, most universities have adopted some institutional strategy for supplying collaboration tools, authoring software and support resources — with or without commercial instructional management system software — for the development of web-based courses.

**Pedagogical Considerations**

Many of the university courses that currently exist on the Web are basically lecture notes from college courses that have been transferred to the Web. However, the more successful courses promote rich interaction among students and faculty, rather than just transferring content to the Web.

Overall, if technology is to have an important role in teaching and learning, faculty will have to adopt a new, different pedagogy. In a very basic sense, web-based instruction poses challenges to teaching styles and compels instructors to re-evaluate what they want their students to know and how they want to get students to learn it. It also requires faculty to keep up with technology, to share control over the teaching process with students, and to cope with dif-
difficult copyright issues related to content. Teaching may even include preparing students to use technology in learning.

Design and planning are the initial issues in web-based teaching and learning. Not all courses will benefit from being put on the Web. When designing learning courses, careful attention must be paid to choosing the right technology to meet an instructor’s goals. Instructional designers recommend starting with the educational problem that the instructor is attempting to solve and, from that standpoint, deciding which technology works best.

An instructor must consider who the students are, how they will use the online component of a course, and what the expectations for learning are. Also to be considered is how the quality of interaction among faculty and students will be affected by enrollment size. These are open questions, especially in the case of a class that only meets online, but each of these questions must affect the design of any effective web-based learning environment.

The Internet can be a very effective communications tool, and should be used to foster interactions among students so that they can learn from each other. Some even equate the relationship between instructor and student as analogous to an apprenticeship, and recommend that courses should be structured to encourage students to learn by doing. This creates a different working relationship between student and professor, which goes beyond simple information transferal from an authoritative teacher to a learner.

To develop pedagogically effective learning materials, instructional design principles must be applied. Well-designed courses include rich interactions that motivate the student, specify what is to be learned, prompt the learner to recall and apply previous knowledge, and provide new information. Instructors should be able to offer guidance and immediate feedback, test comprehension, and supply enrichment or remediation. Web-based instruction may even offer opportunities to design courses to meet individual learning styles. All of these goals will only be accomplished by selecting technologies that best serve the learning process.

### Toward the Future

While increased personal ownership of cheaper, more powerful desktop computers will increase the impact of mediated learning, three other developments may be influential in facilitating computer-based learning.

First, the collective initiatives by government, industry, and the higher education community in developing next-generation networking technologies will create huge pipelines supportive of robust interactive learning environments. More information on some of these initiatives can be found at [www.internet2.edu](http://www.internet2.edu), [www.ngi.gov](http://www.ngi.gov) and [www.ucaid.edu/abilene](http://www.ucaid.edu/abilene).

Second, the trend in technology toward the development of standards will facilitate the wide use of collaborative tools and courseware. One example is the project sponsored by the higher education consortium EDUCAUSE to develop and promote open specifications for facilitating online activities, such as locating and using educational content, tracking learner progress, reporting learner performance and exchanging student records among administrative systems. The goal of the project is the widespread adoption of specifications that will allow distributed learning environments and content from multiple authors to work together.

Third, the viability of optical storage devices for containing training and learning materials has been demonstrated by the ubiquitous presence of CD-ROM drives in desktop computers, and of CDs on the inside covers of technology-related trade books. Even CD-ROM recording devices have become competitively priced in the consumer market. The evolution of this technology to a new standard, DVD, for the delivery of 8.5 GB of data, offers further opportunities for learning using rich content with Internet links.

Web-based learning is clearly a rapidly expanding field. Certainly, the current state of the art will most likely not apply in a few years. Involvement requires committed investment and new thinking. Incentives, organization, resources and expertise are necessary for creating web-based courses. Of course, pivotal to the development and growth of this market is the planning, design and development of effective instructional courses. Finally and most important, good online classes require dedicated, hard-working professors and students.
Who's in Control?
Issues in Interactive Media Art

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Issues of control figure strongly in discussions of interactive digital artworks. What choices are offered to the user? Is the response reliable? Is the interface intuitive and quickly learned, and does it offer a sense of mastery? Conversely, interactive works with a critical focus might evoke and comment on the powerlessness possibly experienced by citizens of a digital culture, in the face of dysfunctional and dehumanizing technology. The work then critiques technology's control over its users.

But my experience of any art form is grounded neither in feeling a sense of control nor in critical awareness of its opposite. Rather, the work's impact seems to lie just in that area beyond what I know, beyond my sense of control and mastery, beyond grasping how it works. Interactive art may achieve its meaning not in giving its user a sense of mastery, nor in making the user feel out of control. Instead, the interaction may invite the user to remain open to whatever will happen, within or outside of the user's intentional control.

This article looks at interaction designed not to confirm or deny the sense of control, but to allow the user to give up control and to become a wholly engaged listener. My point of reference is my ongoing project, "The Listening Microphone," in which I am working with aspects of being in control, being out of control and voluntarily giving up control without losing it. Here, the song is a model to explore some of the elements at work in interactive art projects.

The Metaphor of the Song

Using the song as a metaphor for a discussion of control in interaction points to that moment in complex, multi-part, multi-rhythmic singing when you are both holding your own harmonic line and listening to every other part, listening to the whole. There is a paradox in maintaining your own role (output) against all the other dynamic pulls and influences while listening to those same influences (input), in their support of your line and their tension against it. It is the paradox of simultaneous singing and hearing. This heightened experience of listening might be reached any number of ways. It is both simultaneous input and output, and simultaneous awareness of separateness and the whole: to be in my part so completely that I can let it go, without dropping it, so as to be open to the multiplicity of all parts.

Logical structures — whether they be structures of language, of identity, of social interaction, of meaning, of material reality — confirm the already known, practical conventions and illusions of daily interaction. When multiple processes occur simultaneously, like listening and singing, like input and output, linear logic may be inadequate in the attempt to grasp the experience. The only way to comprehend what is going on is to accept not knowing—that is, comprehension not based on matching knowledge retrieved from storage, but rather on a state of moment-to-moment listening.

Sarah Drury is a digital video and audio specialist in Academic Computing Services at ITS.
I am researching this paradigm of listening in ongoing work on my sound and video installation project, the Listening Microphone.

**Technical Description**

The Listening Microphone uses Opcode's Max interactive MIDI (Musical Instrument Digital Interface) sequencing software. Max receives MIDI input from the voice of a user or performer vocalizing into a microphone. The voice signal is first translated to MIDI by one or more analog-to-MIDI converters, for example a pitch-to-MIDI converter or a drum module with a MIDI Translator.

Max has been programmed to receive and sort the MIDI input in various ways, initially based on the rate and continuity of the input. The MIDI data coming into Max is channelled in variously patterned and random ways to trigger output from a SampleCell synthesizer card located in the CPU. Concurrently, input signals also cause jump cuts to different places in a Quicktime movie and variations in the playback rate of the movie.

SampleCell holds 32 MB worth of sound samples — in this case, samples of voices taken from conversations, stories and songs, recorded live with friends and acquaintances. These samples are played back in a manner that has both organized and random elements. The way the user vocalizes determines the output. For example, continuous input will be read as singing and will play back “singing” samples, while staccato input will be read as talking, causing samples of speech to play.

Talking samples of short phrases or words play back in an order that follows the structure of a sentence. At some points the playback may be fragmented, better heard as sound or music, despite being made up of spoken words. The thread of a narrative begins to take shape. Sound playback is accompanied by a video image of a face animatedly telling the story.

In this way, the user's voice elicits a story from the Listening Microphone. In order to hear more of the story, the user must continue to vocalize. His or her voice mingles with the machine's recorded voices. A sense of verbal dialogue and musical duet ensues, the video image cutting to associative images.

Samples are output through small, amplified speakers. The speakers are placed so as to create audio zones (a certain voice will predominate in that area of the room), and to blend voices in overlapping zones.

**Re-Thinking Control**

Being in control is generally a desirable aspect of any communication. From a technical standpoint, it is a primary goal for any functional telecommunications application. However, an interaction operating within the metaphor of the song may be geared toward a different goal: the parallel experience of being in control (singing my part) and being able to give up control to something bigger (hearing the whole song).

With the Listening Microphone, the user experiences a great deal of response to her or his voice, something like being talked back to or being sung with; but without the intention of a linear dialogue, as with speech recognition software. The participant uses her or his voice to play the computer like an instrument, with unexpected twists and turns in the progress of events. There is only one reliable expectation: the user's voice elicits other voices.

In order to listen to these voices, the user has to keep on engaging breath, vocal vibration or possibly words, bringing her own voice into
play, supported, contradicted, amplified, multiplied by the computer-controlled response.

**Giving Up Control as a Creator**

One aspect of composer John Cage’s profound influence on contemporary art is his work with “indeterminacy,” the pursuit of music beyond the shaping forces of conscious intention. He cultivated an art practice based on not knowing what he would get, with the intention of changing, rather than reinforcing, his role as creator.

“So I want to give up the traditional view that art is a means of self-expression for the view that art is a means of self-alteration, and what it alters is mind, and mind is in the world and is a social fact.... We will change beautifully if we accept uncertainties of change; and this should affect any planning. This is a value.” (Conversations with Cage, p. 1972)

The determinate speaks to the human tendency to limit, define, name, measure, calculate or predict in an effort to control, to ensure that we know and like the results. The challenge of creating interactive works is that of creating conditions in which the user’s interaction shapes the work. Cage’s method of indeterminacy puts both artist and audience into the role of listeners, open to the particular form the work takes in a given interaction with a given user.

**Giving Up Control: Speaking, Writing and Sound**

An important aspect of the song metaphor is the element of sound as a sense channel that connotes presence. Communications historian Walter Ong correlates aspects of the different sense channels in communications to structures of social and economic control. He distinguishes the pre-literate sensorium of sound from the visual or spatial sensorium that evolved with the advent of writing. The sound sensorium is one of present time, while the visual/spatial sensorium allows the recording of the present for use in the future.

In this way, the development of political and economic institutions based on recorded information came to replace social structures based on face-to-face communication. Larger and more powerful institutions developed based on the predominance of the visually-recorded and transmitted word over the ephemeral spoken word.

Digital media represents the highest evolution of the impulse to record, transmit and control communication, even as it strives to return to the sense of presence in ever more “real” applications. The voice itself, whether recorded or broadcast live, signifies presence, however illusory. The challenge is the use of this complex mesh of controlled information, the mediated ground of daily life, to arrive at communication that touches on the spontaneous, unpredictable, vibrant experience of a surprising conversation.

**Giving Up Control: Who’s Telling the Story?**

New Media theorist Sherry Turkle discusses how orality in the world of multimedia and telecommunication simulations can achieve a full double-bind of simulated presence: the computer becomes not just a medium of communication, but a presence itself, a speaker and a listener. Citing various postmodernist theorists, she argues that we are able to perceive the computer as a presence because we are fundamentally resigned to mediation, even in face-to-face communication. Language itself is as predetermined by structures of social and psychological control as the technologies that convey it.

The computer-inspired genre of hypertext reflects the structure and intentions of deconstruction, the postmodernist strategy for freeing language from structures of control. As a literary form based on hyperlinking, a hypertextual narrative offers variable choices, breaking up the linearity of a story into multiple, possibly contradictory narratives. The reader traces their own branching version of the narrative, thus sharing authorship with the story’s creator. Multiple viewpoints can be encountered in a constantly changing order. The user ends up as a wanderer who, freed from the determinism of a single story with a single ending, may also become quite lost.

The Listening Microphone reflects the premises of deconstruction and hypertext. The participant experiences the paradoxical sense of being both in control and lost, which is implicit to reading hypertext. The participant’s intentional use of her voice results in the unpredictable sound of many different voices. Participants have spoken of a sense of disorientation in the experience of the simulated voices almost seeming to emit from one’s own voice. One’s physical expectations are upset.

There is an excerpt of one participant’s interactions with the Listening Microphone in the online...
The song metaphor presents an intensely connected and dynamic social space, in which the difference between self and others is in constant motion. Rather than a unity, it is a whole comprised of difference, where allowing difference (between my part and other parts) and allowing merging (hearing all parts together at once) happens in active, paradoxical play. I am able to know this complex space through hearing it moment by moment. With the Listening Microphone, this play of self and other involves speaking, singing and playback generated by the responsive computer. It similarly engages the participant in the paradoxical experience of speaking and hearing at the same time. This strange experience raises the questions: Who is speaking, and to whom? What is the difference between my own voice and the voices I am hearing?

Intimacy with an Uncontrollable Other

Donna Haraway sees dualism as the belief system at the basis of alienation in human culture: self versus other; male versus female; black versus white; friend versus enemy; life versus death; human versus machine. For her, the philosophical resolution of this dualism is the cyborg: “a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction.” Haraway characterizes the cyborg as the potentially liberating relationship between human and technology, one in which dualism is transcended, offering a model based on affinity rather than on dualism.

Haraway’s cyborg is a capricious and unpredictable, yet loyal entity—a machine that resists control and refuses to control others. Artificial, like Frankenstein, it is a scientific product that overcomes death. Free of desires, unlike Frankenstein, the cyborg is not envious of humans, happy to be a hybrid of living and dead parts, forcing us to acknowledge our constructed natures.

The Listening Microphone attempts to instill a sense of intimacy between user and machine, between live voice and recorded voices. It engages the play of presence and absence—the user’s live voice, the live quality of voices played back and the obvious absence of those disembodied voices.

Live and Captured Voices

Thomas Edison’s early experiments with recording earned him fame as an authority on the afterlife. His invention seemed to capture the presence of those whose voices it recorded. Being able to record the voices of the living seemed just one step away from being able to communicate with the dead.

Edison planned the invention of a device that would allow the communications of the dead to traverse the energy fields between living and dead. This “spirit catcher” would be like an extremely delicate microphone, able to pick up the subtleties of the voices of the dead and then to muster the powers of science to magnify these signals to frequency levels audible to the living. Here the rational authority of science mingles with the desire to offset the finality of death.

I am attached to my sound samples, utterances that seem to become present again and again. Some are voices of familiar people, including my grandmother who has since died. Some are brief acquaintances. They play simultaneously with my own voice, but not as accompaniment (like karaoke) nor as conversation (like speech recognition software). They are human sound, evoked by my own human sound and evoking more sounds in return.

The Listening Microphone is an effort to make a whole vocal space, a responsive field of sound. Being in this space is being on an edge, somewhere in between the Edisionian desire to capture spirits, to make present in spite of absence, and Cage’s space of “the void that is not nothing,” present to silence as well as sound.

Along with its deafening distractions, interactive digital media offers rich opportunities for hearing this uncontrolled edge between the celebration of presence and the acceptance of absence.
Q: What is a proxy server? When and how do I use it?

A: Don't worry. Using a proxy server doesn't mean that someone else is having all the online fun in your stead. Here on NYU-NET, our proxy server protects the integrity and efficiency of NYU's computer network. There is a computer, referred to as the proxy server, that acts on behalf of your request for a particular web page. It creates an association that allows authentication for Internet traffic, both from public on-campus computers to the outside world and from outside Internet Service Providers connecting into NYU-only sites.

When browsing the Web through an ISP connection, you may find that you cannot get to some NYU websites that are easily accessible from a campus machine. Simply put, when connecting to the Internet from an ISP, you are not working on an NYU-NET connected computer. Why would this matter? NYU has licensed many online services for the NYU community only, such as many of the databases now available on BobCatPlus (www.bobcat.nyu.edu/). These electronic databases are examples of Intranet services (for more on Intranet versus Internet, see the Spring 1998 issue of Connect, or check out the version on the Web at www.nyu.edu/its/connect). Almost by definition, your association with NYU is clear when you are using a computer found on NYU's campus or when you connect remotely through the NYU DIAL service.

However, if you are connecting to the Internet through a commercial ISP, your association with NYU is not as obvious. (Many members of the NYU-NET community who live outside NYC use commercial ISPs to avoid long distance phone bills.) So, if you're connecting to the Internet with an ISP, be sure to configure the proxy settings within your browser (see sidebar on next page). This way, your NYU affiliation will be recognized by the proxy server — giving you access to these NYU-only licensed or NYU Intranet based services.

The proxy server also helps out web traffic going in the other direction — from public computers, such as those in NYU-Internet stations or ITS computer labs, to web pages located somewhere else on the Internet.

This is a completely different use of the proxy server. All web-based traffic from public machines is directed to the proxy server first, before being sent over the Internet. The proxy server is a repository of frequently accessed web pages. Therefore, many pages will theoretically load faster because the browser can recall a local copy of the file, instead of having to traverse the Internet to pick up the information.

Please note that office computers directly connected to NYU-NET do not pass through the proxy. An office computer is registered to the specific person who is using it in the context of his or her work. The public use machines, on the other hand, are meant to be shared. Therefore, there are different network security concerns for activity generated from labs and other such locations.

Sometimes being behind the proxy can slow down the retrieval of the requested pages. But the proxy server is necessary to ensure the integrity of NYU-NET and NYU-exclusive services found there.
NYU-NET Proxy Server Configuration

Information Technology Services is pleased to offer additional capabilities to enhance access to research data available over the Internet. Certain information sources, such as the RLIN and OCLC catalog databases, are available to students and researchers at NYU only if access is made from a computer system attached to NYU’s network, NYU-NET. This restriction presents a problem for people traveling, or who work from home and use an Internet Service Provider (ISP) other than NYU itself.

It is possible to configure your Internet browser, such as Netscape or Internet Explorer, to access NYU-NET from afar so as to permit full access to such information sources. Using this method, outlined below, your browser will use a computer system here at the University as a helper in accessing your remote destination.

When accessing NYU-NET in this way, you will be prompted for your NYU NetID and password.

Each member of the NYU community is assigned a NetID, which is printed on his or her NYUCard. This NetID, in combination with a secret password, is used to access ITS e-mail accounts and dial-up services. Students who have not set their password can go to an ITS lab for assistance; faculty and staff should go to the ITS Accounts Office, Room 305, Warren Weaver Hall. An online procedure is available at the ITS Intranet Start page, at www.nyu.edu/its/start.

**Assistance**
Questions and problem reports should be directed to the ITS Client Services Center at 998-3333.

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**For Netscape 3.x:**
- Select “Network Preferences” from the “Options” menu
- Next select the “Proxies” tab
- Next select “Automatic Proxy Configuration”
- Enter the URL: “http://proxy.nyu.edu/proxy.pac”

**For Netscape 4.x:**
- Select “Preferences” from the “Edit” menu
- Next select the “Advanced” category
- Next select the “Proxies” option
- Next select “Automatic Proxy Configuration”
- Enter the URL: “http://proxy.nyu.edu/proxy.pac”

**For Internet Explorer 4.x [Windows 95/98/NT]:**
- Select “Internet Options” from the “View” menu
- Next select the “Connection” category
- Next select “Configure” within the “Automatic Configuration” window
- Enter the URL address: “http://proxy.nyu.edu/proxy.pac”
- Finally, select “OK,” “Apply” and “OK”

**For AOL subscribers:**
AOL’s internal browser does not support proxy configuration. Follow these steps to use proxy services via AOL.
- Download and install either Netscape 4 or Internet Explorer 4 (Macintosh users should use Netscape)
- Log on to AOL
- Do not open the AOL Web browser
- Open the additional browser; do not log off AOL
- Follow the instructions to the left for setting the proxy on your browser

Note: Do not log off AOL until you are ready to leave the proxy services. AOL is providing your new browser with Internet access.

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Gary Chapman
How many times have you gone to a website to look for some useful information, only to be disappointed to find that it is totally out of date? Many of the older websites have done a poor job of keeping their content current. The result is that, after finding several dead links or inaccurate data, a visitor will not return.

The website of NYU's Office of Student Activities (OSA) experienced this very problem. OSA used to keep a list of student clubs on its website, but it had not been updated in years, and there was little or no information about the hundreds of active clubs. Working with Jonathan Vafai, OSA recognized that they could use their existing database to create a solution.

Besides the listing of clubs on their website, OSA kept a FileMaker Pro database of clubs on a Macintosh, and they wanted to periodically export that data onto their site. At the same time, staff across the University needed to access the information from PCs, and the only practical way for staff across campus to get current club information was to call the office at 21 Washington Place.

While the most recent version of FileMaker Pro includes Internet features, it is not very scalable for more sophisticated applications. Though it is a simple desktop database package with a neat graphical interface, it will not easily scale to meet OSA's growing needs. More importantly, it did not adhere to the Open Database Connectivity (ODBC) protocol, and did not support Structured Query Language (SQL), thus limiting its ability to communicate with other applications.

After a bit of research, Jonathan and OSA decided that the most sensible alternative was to use the ODBC-compliant Microsoft Access database, which they ran on a Windows NT operating system.

In addition, they used a product called Cold Fusion from Allaire (www.allaire.com), which would allow OSA to connect its database to the website. By installing Cold Fusion software on the NT web server, OSA would be able to build a website whose pages would be generated directly from the data in the Access database. The site would become dynamic!

Typically, when you want to build a dynamic website backed by a database, you need to write complicated scripts with Perl or some other programming language. Cold Fusion accomplishes this magic by supplying a programmer with HTML-like tags that can be used to manipulate records in the underlying database. It also allows you to parse information from web forms to generate e-mail, without needing to know CGI or Perl.

The simplicity of Cold Fusion's language allowed Jonathan to duplicate the entire...
The World Wide Web Resources for Social Workers website, at www.nyu.edu/socialwork/wwwrsw, is new and improved. In a sense, it is a portal for social workers, an organized collection of pointers to websites of interest to them.

The site has been developed over the past six years to help social workers obtain the web-based information they need. Until January of this year, the site consisted of a single, extremely large listing of URLs. Though it was organized by topic, downloading the entire page was time-consuming, especially for users with slow connections. Furthermore, there was no way to search or navigate the links by category. One always had to view the entire listing, or perhaps use the browser's Find command to search for particular text within the page. The graphics were not professional and only marginally appealing. Also, maintaining the page was labor-intensive. Adding and deleting links entailed working with the entire file, and proved to be an error-prone process.

The new site fixes these flaws and adds some features. There are several changes worth mentioning regarding sponsorship, personnel, technical aspects and content.

First, NYU's Ehrenkranz School of Social Work (ESSW) and the Mount Sinai-NYU Medical Center and Health System have signed on as site sponsors. In addition, the site is no longer a one-person operation.

Whereas Gary Holden used to single-handedly manage the site, maintenance responsibilities have now been partitioned to many teams. Dr. Thomas Meenaghan (Dean of ESSW) and Dr. Gary Rosenberg (Edith J. Baerwald Professor & Senior Vice President of Mount Sinai-NYU Medical Center and Health System) form the new editorial advisory board. Drew Hahn and Adam Donahue have taken over database and graphics design. Pei Chen (NYU class of '02) is responsible for programming, and Will Johnston, NYU Masters in Social Work candidate, is the research assistant. These changes ensure that the site will continue to offer very broad and reliable coverage of the Web.

Second, the site is no longer a single, slow-loading page. It is now a database that allows users to browse separate categories as well as search all of the pages on the site. Site access is much faster and site navigation is easier. The navigation interface is somewhat like Yahoo's: the links are arranged in a hierarchical structure by topic area. Users can narrow their search by digging deeper into the tree, and the searching mechanism allows users to locate sites in the database by keyword or title.

Internet-wide portals such as Excite often have many broken links that point to nonexistent documents. This is rarely a problem on a site like ours, with a relatively small number of links. Nevertheless, to ensure the integrity of the URLs, an automated program periodically checks that each link is valid, meaning fewer “404 Not Found” errors.

Third, the site has expanded substantially. Coverage of the entire globe has improved within pre-existing categories and in newly created ones (e.g., new countries ranging from Albania to Yugoslavia added under the Government category). Sub-categories have been reorganized and new sub-categories have been added. The website has increased in size by more than 50 percent, to approximately 12,000 links.

We hope that the site actually improves social work practice by placing high quality information at the practitioner's fingertips.
NYU is a busy place. During any given week, the University is host to tens or even hundreds of events. From book readings to mathematical seminars, from plays to movies, NYU is rich in extracurricular activities. The problem is managing the listings.

For the University denizen, this means finding out what’s going on. If a student wishes to see what is happening tomorrow afternoon, he or she may have to wade through the choices on six or seven departmental websites, and still might not find every event.

For the various NYU departments and individuals who host the events, it means coordinating with one another. And figuring out the various formats in which the events are listed is itself no easy chore. For example, the politics department may maintain an event schedule on its departmental home page using a series of tables. The physics department might have a listing that uses a series of CGI script cells. And where should an event of University-wide interest be listed?

NYU Calendar is a new addition to our effort to provide a single point of contact for the University’s many information services. In this case, we wanted to give the University community an easy way to sort through NYU’s myriad events.

Prior to NYU Calendar, it was a tough task to search out and find information about these scattered happenings. There existed a central events page, www.nyu.edu/events, but it often lacked data from many departments. When a department wished to announce a new event, it would send a note to the maintainer of the NYU Events calendar. This person then had to update the calendar to reflect the incoming announcement. This centralized procedure was a high-maintenance way of handling things, and became more so as more departments entered the event listing game. The model didn’t scale well.

We realized there had to be a better way. After looking at some outside event management applications, we decided that NYU’s situation was specific enough to merit developing a custom solution. We had to allow for both centralized retrieval of events (which is helpful for the end user), and distributed submission of events (which simplifies things from the departmental perspective). Also, in keeping with our desire to let each department maintain the look and feel of its web space, we needed to build into the system the ability to customize an individual department’s events listing.

We wanted to allow individual departments to administer their own calendars independently, and to have these calendar listings automatically merged into the main NYU Calendar. On top of this, we wanted the end-user to have a familiar interface across calendars so that a user would find the same familiar and intuitive interface at the physics
department's event listing as on ITS's calendar. We also wanted the calendar administrators to be able to administer the calendars strictly on the Web, avoiding error-prone and tedious e-mail submissions.

After much labor, we succeeded in creating NYU Calendar, a completely web-based event listing system for New York University now available at calendar.nyu.edu. You can view and navigate the calendar using any web browser, and can count on having the same interface across departments. These departmental calendars, maintained independent of each other, are automatically merged into a main NYU calendar that provides what is essentially a full listing of NYU events.

With NYU Calendar, you can list events on a monthly basis, and zoom in on an individual event for more specific information such as a contact person, the event's location, or the exact start and end times. The interface is entirely point-and-click.

An administrator can customize the look and feel of his calendar by creating header and footer pages in HTML. Perhaps the new process of adding, deleting and editing events is even more useful. Part of the calendar software is Brewster, an event editor that lets calendar administrators create several sub-calendars for their departments, and choose which events are listed in the different sub-categories. For example, the physics department might wish to have a calendar for general events for both employees and students, and another focusing on events of interest to staff only.

Once these sub-calendars are defined, an event administrator can add a new event to any or all of them using a web form to specify the event's information. This information normally includes the title, date, start and end times, and description. Administrators can optionally include a URL to an external site listing more information on the event, letting them break out of our framework when desired.

The main calendar is open to all and is intended to display a comprehensive list of public events, but not all events fit this category. A department staff-only event probably doesn't belong on the University-wide listing. Brewster lets the administrator choose whether the event is included in the main NYU calendar.

Brewster checks for syntactic errors, such as incorrectly entered dates and times, or invalid URL formats. The editing function lets administrators change an entry after the initial submission, or delete an event from the calendar.

With Brewster, each group can have an associated mailing list, or listserv, that receives an announcement when an event is added. The administrator has the option of specifying whether the announcement is sent immediately, at some specified point in the future, or not at all. This feature is nice for pushing event information out to the target community.

Overall, NYU Calendar has greatly simplified event management for departmental webmasters, and has made events easier to look up for users. We urge you to bookmark calendar.nyu.edu, and take part in the many opportunities NYU offers.

If you're a departmental webmaster and have not yet applied for a calendar, send e-mail to brewster@nyu.edu. We'll have you set up and running within a matter of days.

Database continued from p. 17

functionality of the FileMaker database within an hour or two. He was also able to include some new features, such as authentication, so that only specific staff can see certain information in the system, or edit it. Finally, he built an interface for the public to use so that anyone can browse the database to look for interesting clubs. Check out the database at www.osa.nyu.edu/ clubs.

Looking to the Future

OSA accomplished their basic mission. Now, staff in separate offices can access OSA information instantly on any web-accessible computer, and students have live access to current information about student organizations.

We look ahead to more elaborate improvements to the OSA website, such as live statistical information based on the composition of student leaders and a weekly calendar of events based on club meeting times. There is also the potential to integrate the OSA database with the budget allocation committee's budget management system.

ITS has taken over maintenance of the database server, so expect to see more of these dynamic and interactive websites, as eServices makes this technology available to more members of the University community.
## Fall ’99 Schedule

### Alphabetical Listing

<table>
<thead>
<tr>
<th>Category</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Mac: Using a Mac at ITS C-3</td>
</tr>
<tr>
<td></td>
<td>Multimedia C-6</td>
</tr>
<tr>
<td>B</td>
<td>Non-Linear Video Editing C-6</td>
</tr>
<tr>
<td></td>
<td>NUD*IST and TextSmart C-7</td>
</tr>
<tr>
<td></td>
<td>NYU-NET Software C-4</td>
</tr>
<tr>
<td>C</td>
<td>PC: Understanding Your PC C-3</td>
</tr>
<tr>
<td></td>
<td>PC: Using a PC at ITS C-3</td>
</tr>
<tr>
<td></td>
<td>Powerpoint C-6</td>
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<tr>
<td>D</td>
<td>Qualitative Analysis Tools C-7</td>
</tr>
<tr>
<td>E</td>
<td>Research Strategies C-6</td>
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<tr>
<td></td>
<td>ResNet C-4</td>
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<tr>
<td>F</td>
<td>SAS C-7</td>
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<tr>
<td></td>
<td>Scientific Computing &amp; Visualization C-7</td>
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<td></td>
<td>Scientific Visualization C-7</td>
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<td></td>
<td>Security in Computing C-5</td>
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<td>SPSS C-7</td>
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<td></td>
<td>Statistics and Data Analysis C-7</td>
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<tr>
<td>G</td>
<td>Understanding Your Computer C-3</td>
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<tr>
<td></td>
<td>UNIX: Using UNIX at ITS C-3</td>
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<td>H</td>
<td>Virus Protection &amp; Backup C-4</td>
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<td></td>
<td>Video Editing C-6</td>
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<tr>
<td>I</td>
<td>Web Page Creation (Basic) C-6</td>
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<td></td>
<td>Web Page Creation (Advanced) C-6</td>
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<tr>
<td></td>
<td>World Wide Web (Intro) C-5</td>
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<tr>
<td>J</td>
<td>World Wide Web and Academic Research C-5</td>
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<tr>
<td>K</td>
<td>World Wide Web Browsing &amp; Publishing Series C-5</td>
</tr>
<tr>
<td></td>
<td>World Wide Web Graphics C-5</td>
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</tbody>
</table>

### About Classes & Talks

This fall we have added new and exciting talks on security, statistics and instructional technology. We are also now including Bobst Library offerings.

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

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

**Classes by arrangement:** Faculty members may arrange special ITS classes for a specific course or research group. These do not have to be given at an ITS site. For classes in statistics, call Frank LoPresti (998-3398); for other applications, call the ITS Innovation Center (998-3044). For specialized Library classes, see Advanced Research Classes, p. C-7.

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

— Vincent Doogan

Academic Computing Services

vincent.doogan@nyu.edu

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ITS Classes and Talks Fall 1999 C-1
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday, September 9</td>
<td>Using a PC at an ITS Lab</td>
</tr>
<tr>
<td>Friday, September 10</td>
<td>Using UNIX at an ITS Lab</td>
</tr>
<tr>
<td>Saturday, September 11</td>
<td>Using UNIX at an ITS Lab</td>
</tr>
<tr>
<td>Tuesday, September 14</td>
<td>Using a Mac at an ITS Lab</td>
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<tr>
<td>Wednesday, September 15</td>
<td>Intro to Internet and E-mail</td>
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<td>Using a Mac at an ITS Lab</td>
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<td>Using a PC at an ITS Lab</td>
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<tr>
<td>Thursday, September 16</td>
<td>Using a PC at an ITS Lab</td>
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<tr>
<td>Friday, September 17</td>
<td>Using a PC at an ITS Lab</td>
</tr>
<tr>
<td>Saturday, September 18</td>
<td>Using a PC at an ITS Lab</td>
</tr>
<tr>
<td>Monday, September 20</td>
<td>Intro to Internet and E-mail</td>
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<tr>
<td>Tuesday, September 21</td>
<td>Introduction to SPSS</td>
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<tr>
<td></td>
<td>Intro to Scientific Computing</td>
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<tr>
<td>Wednesday, September 22</td>
<td>Introduction to SAS</td>
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<tr>
<td></td>
<td>Intro to Internet and E-mail</td>
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<tr>
<td></td>
<td>NYU-NET Software (PC)</td>
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<tr>
<td>Thursday, September 23</td>
<td>Introduction to SAS</td>
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<td>Using a Mac at an ITS Lab</td>
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<td>Using a PC at an ITS Lab</td>
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<tr>
<td>Friday, September 24</td>
<td>Using a Mac at an ITS Lab</td>
</tr>
<tr>
<td></td>
<td>Intro to the World Wide Web</td>
</tr>
<tr>
<td>Saturday, September 25</td>
<td>Using a Mac at an ITS Lab</td>
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<td>Tuesday, September 28</td>
<td>Intermediate Topics in SPSS</td>
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<td>Wednesday, September 29</td>
<td>Introduction to SPSS</td>
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<td>Computing for the Humanities</td>
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<td>Intro to Internet and E-mail</td>
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<td>Thursday, September 30</td>
<td>Intermediate SAS</td>
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<td>Research on the Web</td>
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<td>Friday, October 1</td>
<td>Choosing a Computer</td>
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<td>Electronic Library Resources</td>
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<td>Discussion Group Software</td>
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<td>Tuesday, October 5</td>
<td>Using a Mac at an ITS Lab</td>
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<td>Basic Computer Security</td>
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<td>Wednesday, October 6</td>
<td>Intermediate Topics in SPSS</td>
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<td>NYU-NET Software (Mac)</td>
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<td>Thursday, October 7</td>
<td>Advanced SAS</td>
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<td>Non-Linear Video Editing</td>
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<td>Using a Mac at an ITS Lab</td>
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<td>Friday, October 8</td>
<td>Understanding Your Mac</td>
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<td>Intro to the World Wide Web</td>
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<td>Saturday, October 9</td>
<td>Using a Mac at an ITS Lab</td>
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<td>Tuesday, October 12</td>
<td>Qualitative Analysis Tools</td>
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<td>Using a Mac at an ITS Lab</td>
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<td>Electronic Library Resources</td>
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<td>Introduction to GIS Packages</td>
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<td>Wednesday, October 13</td>
<td>Advanced Topics in SPSS</td>
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<td>Research on the Web</td>
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<td>Intro to Internet and E-mail</td>
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<td>Thursday, October 14</td>
<td>Introduction to Powerpoint</td>
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<td>Introduction to SPSS</td>
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<td>Using a PC at an ITS Lab</td>
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<td>Friday, October 15</td>
<td>Basic Course Website Design</td>
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<td>Tuesday, October 19</td>
<td>High Performance Computing</td>
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<td>Wednesday, October 20</td>
<td>Electronic Library Resources</td>
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<tr>
<td>Thursday, October 21</td>
<td>Using a Mac at an ITS Lab</td>
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<td>Friday, October 22</td>
<td>Class Websites (Advanced)</td>
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<td>Understanding Your PC</td>
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<td>Saturday, October 23</td>
<td>Using a Mac at an ITS Lab</td>
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<td>Tuesday, October 26</td>
<td>Research on the Web</td>
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<td>Wednesday, October 27</td>
<td>Intro to Internet and E-mail</td>
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<td>Thursday, October 28</td>
<td>Electronic Library Resources</td>
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<td>Friday, October 29</td>
<td>Introduction to HTML</td>
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<td>Wednesday, November 3</td>
<td>NYU-NET Software (PC)</td>
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<td>Thursday, November 4</td>
<td>Electronic Library Resources</td>
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<tr>
<td>Friday, November 5</td>
<td>Understanding Your Mac</td>
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<td>Wednesday, November 10</td>
<td>Intro to Internet and E-mail</td>
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<td>Electronic Library Resources</td>
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<td>Thursday, November 11</td>
<td>Research on the Web</td>
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<tr>
<td>Friday, November 12</td>
<td>Understanding Your PC</td>
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<tr>
<td>Wednesday, November 17</td>
<td>NYU-NET Software (Mac)</td>
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Choosing Your Computer (Mac and PC)
This talk is intended to help you select the best personal computer for your needs. It will cover the basic components of a computer, as well as the other hardware required for various tasks. We will also discuss how you can assess your particular needs to establish criteria for selecting computer tools.
NYU Computer Store Staff.
Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Fridays 12:00-1:30
September 24; Oct. 1

Understanding Your Computer (Mac and PC)
This introductory talk will help you learn about your computing equipment. It will focus on such basic operations as setting up your computer, setting up a printer, and configuring your operating system with the fonts and tools you need. Discussion will include troubleshooting techniques and other strategies for dealing with problems you might encounter while using your computer. NYU Computer Store Staff.
Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.

1. For Mac Owners
   Fridays 12:00-1:30
   October 8; November 5

2. For PC Owners
   Fridays 12:00-1:30
   October 22; November 12

Using a Mac at an ITS Computer Lab
A hands-on introduction to the Macintosh computer. Topics include working with the graphical user interface, understanding the file system, launching software applications, and choosing printers, file servers and other devices, as well as the ergonomics of proper computer use. ITS staff.
Education Building, 2nd floor
Seating capacity: 15; first come, first served; hands-on class.

   Thursdays 6:00-7:00
   September 23; October 7, 21

   Saturdays 11:00-12:00
   September 25; October 9, 23

3rd Avenue North Residence Hall, level C-3
Seating capacity: 15; first come, first served; hands-on class.

   Wednesdays 11:00-12:00
   September 15, 29; October 6, 13

   Thursdays 5:00-6:00
   September 9, 30; October 7, 14

Using a PC at an ITS Computer Lab
A hands-on introduction to the PC running Microsoft Windows. Topics include working with MS-Windows in the labs, understanding the file system, choosing printers and file servers, and launching software applications, as well as the ergonomics of proper computer use. ITS staff.
Tisch Hall, room LC8
Seating capacity: 15; first come, first served; hands-on class.

   Saturdays 11:00-12:00
   September 18, 25

Using UNIX at ITS Academic Computing Services
An introductory class on using the UNIX operating system, variants of which run on several different types of computers at ITS/ACS. Most are accessed at ITS Academic Computing Services labs through PCs, Macs and terminals, but the SGI workstations also use UNIX. The basics will be covered: logging onto the host machines, organizing files, editing text, printing files and using applications. ITS staff. ITS UNIX account required.

   Tisch Hall, room LC8
   Seating capacity: 15; first come, first served; hands-on class.
   Saturday 11:00-12:00
   September 11

   14 Washington Place, basement
   Seating capacity: 15; first come, first served; hands-on class.
   Friday 1:00-2:00
   September 10
Protecting Your Files: Anti-Virus and Backup Strategies
(Mac and PC)
This talk will focus on strategies to protect classwork, research project data and other documents. Viruses will be explained and use of virus protection will be demonstrated. Various backup strategies will be outlined.
Howard Fink.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk/demonstration.
Wednesday 12:00-1:30
October 6

Arts Technology
www.nyu.edu/its/atg
Digital Resources for Fine Artists
Oriented towards arts faculty and graduate students, this session will provide a broad state-of-the-digital-arts overview and update, as well as a focused presentation of ITS/ACS and other University resources available to artists working with digital media. Topics will include high-resolution film input and output, color management, tools for video and audio production and installation, alternatives for digital print output, electronic painting, 2-D and 3-D animation, and art on the World Wide Web. Shelly J. Smith, Philip Galanter.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 6:00-7:30
October 12

Humanities Computing
www.nyu.edu/its/humanities
Computing Resources for the Humanities
An introductory overview of computing applications in the humanities, with demonstrations of software and projects. No computer experience is necessary, and after the presentation there will be time to discuss how the techniques presented could be applied to personal research and teaching.
Lorna Hughes.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk/demonstration.
Wednesday 2:00-3:30
September 29

Geographic Information Systems
www.nyu.edu/its/socsci
Introduction to GIS Packages Available at ITS Academic Computing Services
(UNIX, Windows)
An introductory discussion describing and comparing the four Geographical Information Systems (GIS) packages available at ITS Academic Computing Services. These are ArcInfo, MapInfo, Atlas GIS and GRASS. The use of these tools for research will also be covered. Frank LoPresti.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Wednesday 2:00-3:30
October 12

Internet and NYU-NET Services
Introduction to the Internet and your NYU Internet Account
(NYU-NET, UNIX)
This talk/demonstration will introduce new and prospective holders of NYU-Internet Accounts to the many ways connections can be made to NYU-NET from campus locations (such as office, computer lab, NYU ResNet or Bobst Library connections) and via off-campus methods (e.g., NYU DIAL, commercial ISP or NYU ICE). Popular Internet services available through this account, such as e-mail, web browsing, newsgroups, connecting to other computers and file transfer, will be explained and demonstrated. Tracey Losco.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk/demonstration.
Monday 12:30-2:00
September 20

Wednesdays 12:30-2:00
September 15, 22, 29; October 13, 27; November 10

NYU-NET Software
This talk is intended for those who have an NYU-NET office connection or NYU ResNet connection, or who use NYU DIAL from home or while traveling. Four popular Internet applications for use with these connections will be explained and demonstrated. The software to be discussed includes Netscape, Eudora and Fetch/WS-FTP. Sana Odeh.
World Wide Web Browsing and Publishing

The World Wide Web is a hypertext interface system for publishing documents containing text, sounds and images, to browse with software such as Netscape and Lynx. Hypertext Markup Language (HTML) is the mechanism for preparing home pages and other Web creations. Vincent Doogan, Jeffrey Lane and Marybeth McCartin.

1. Introduction to the World Wide Web

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

Warren Weaver Hall, room 313
Seating capacity: 25; first come, first served; talk.
Fridays 2:00-3:30
September 24; October 8

2. Using the Web for Academic Research

An incredible amount of information is available on the World Wide Web whenever and wherever there is a computer and Internet connection. But how much of this information is useful for academic research? This class will review how to search for information on the Web using directories, search engines, metasearch engines and other services. We will focus on strategies for tracking down and evaluating information that is appropriate for academic research.

Electronic Resources Center (ERC), Bobst Library B level.
Seating capacity: 18; call 998-2513 to register. Hands-on Session.
Tuesday 10:00-11:30
October 26
Wednesday 6:30-8:00
October 13
Thursday 10:00-11:30
September 30
Thursday 6:30-8:00
November 11

3. Introduction to HTML

Beginning with the basics of what an HTML file looks like, the speaker will explain the structure of a document and its HTML elements. Sample pages will be analyzed and constructed. Topics will include tags, links, URLs and embedded graphics. Other concepts such as image maps, frames, CGI, Java and plugins will be explained.

Warren Weaver Hall, room 313
Seating capacity: 25; first come, first served; talk.
Friday 2:00-3:30
October 29

Basic Computer Security for Students, Faculty and Staff

With ResNet, DIAL accounts, public terminals and roaming laptop hookups in Bobst, students have more connectivity options than ever before. These options bring vulnerabilities, many of which can be lessened or avoided with the proper precautions. This class will cover why thinking about security is important, what to look out for, and some simple tips to make your use more secure.

Jane DelFavero, William Spears.

Warren Weaver Hall, room 313
Seating capacity: 30; first come, first served; talk.
Tuesday 2:00-3:30
October 5

Instructional Technologies

www.nyu.edu/its/lists
www.nyu.edu/its/ic
classes.nyu.edu

Introduction to Instructional Technology Tools

New, powerful web-based software applications provide opportunities for teaching and learning to extend beyond the time and space boundaries of the traditional classroom. Developed for faculty, this series will focus on strategies for effective use of online discussion, and for the creation and delivery of web-based course content. Pedagogical issues will be discussed. Vincent Doogan, Joseph Hargitai and Jeffrey Lane.

1. Discussion Group Software (Lyris)

An introductory talk on the use and value of discussion in the educational process, and the software available at
NYU to support online discussion among students and faculty.

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

Friday 2:00-3:30
October 1

2. Designing and Creating a Basic Course Website
An introductory talk on the use and value of traditional class handouts including syllabi, reading lists and assignments, and the use of the Web to publish and disseminate these materials. Online materials often include: course description, linked or embedded documents, reading lists, assignments, class requirements, class session notes and summaries, links to other technology tools and multimedia elements.

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

Friday 2:00-3:30
October 22

3. Software for Creating Advanced Websites for Classes
A discussion of web-based instructional management software and strategies for its use. These applications can be used as ancillary to classroom instruction. The features of this software include: restricted access, threaded discussions, chat, e-mail, file sharing, whiteboards, test authoring by instructor, online tests, assessment tools, use of multimedia formats, search tools, students home pages, class rosters and course administrative tools. Discussion will also include planning and development of a course website.

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

Research Strategies
www.nyu.edu/library/bobst/database.htm

Using Electronic Library Resources at NYU
Finding the information you need in today’s electronic library requires important computer-based search skills and an ability to critically evaluate information. This hands-on class will suggest strategies for selecting the most appropriate electronic resources for your research topic, and for evaluating the information you find. We will review Boolean keyword searching -- the most effective method of searching online catalogs, research databases and the Web -- and explain how to access library resources from remote locations.

Library staff.
Electronic Resources Center (ERC), Bobst Library B level.
Seating capacity: 18; 998-2513 to register.

Tuesday 10:00-11:30
October 12

Wednesday 10:00-11:30
October 10

Wednesday 6:30-8:00
October 6, 20

Thursday 10:00-11:30
October 28

Thursday 6:30-8:00
September 23; November 4

Friday 10:00-11:30
October 1

Using the Web for Academic Research
See entry under World Wide Web Browsing
**Advanced Research Classes**

Bobst Library has subject specialists in 56 areas of study that support the University’s curriculum. NYU faculty can make arrangements for advanced and subject-specific classes by contacting the appropriate specialist. Advanced students needing in-depth reference assistance with primary sources, unpublished, archival and foreign materials, or doctoral research can also make appointments. For contact information, visit [www.nyu.edu/library/bobst/info/instruct/liaisons.htm](http://www.nyu.edu/library/bobst/info/instruct/liaisons.htm)

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**Scientific Computing and Visualization**

[www.nyu.edu/its/science](http://www.nyu.edu/its/science)

**Introduction to Scientific Computing & Visualization**

An overview of local and remote computing and visualization resources. Presentation will include available software, workstations, color printing and videographics devices. Frances Bauer.

Warren Weaver Hall, room 313
**Seating capacity:** 30; first come, first served; talk.
**Tuesday 2:00-3:30**
**September 21**

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**High-Performance Computing Resources (NYU multiprocessors; NSF supercomputers)**

An introduction to high-performance computing at NYU and elsewhere. The speaker will discuss the uni- and multi-processor systems at NYU, and the various systems available at the NSF supercomputing centers. Frances Bauer.

Warren Weaver Hall, room 313
**Seating capacity:** 30; first come, first served; talk.
**Tuesday 2:00-3:30**
**October 19**

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**Statistics and Data Analysis**

[www.nyu.edu/its/socsci](http://www.nyu.edu/its/socsci)

**SAS (Windows, UNIX)**

This series will progress from the basic description and operation of this statistical package to advanced concepts and usage. Robert Yaffee.

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

1. **Introduction to SAS**
   - **Wednesday 6:00-7:30**
   - September 22
   - **Thursday 6:00-7:30**
   - September 23

2. **Intermediate SAS**
   - **Tuesday 6:00-7:30**
   - September 28
   - **Wednesday 6:00-7:30**
   - October 6

3. **Advanced SAS**
   - **Wednesday 6:00-7:30**
   - October 13

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**SPSS (Windows, UNIX)**

Statistical Package for the Social Sciences (SPSS) is a comprehensive, integrated system for statistical data analysis. These presentations will use either the Windows or the newer UNIX version, but the programming concepts are applicable to all versions of SPSS. Frank LoPresti, Robert Yaffee.

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

1. **Introduction to SPSS**
   - **Tuesday 6:00-7:30**
   - September 21
   - **Wednesday 6:00-7:30**
   - September 29
   - **Thursday 6:00-7:30**
   - October 14

2. **Intermediate Topics**
   - **Tuesday 6:00-7:30**
   - September 28
   - **Wednesday 6:00-7:30**
   - October 6

3. **Advanced Topics**
   - **Wednesday 6:00-7:30**
   - October 13

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**Qualitative Analysis Tools (NUD*IST and TextSmart)**

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

Warren Weaver Hall, room 313
**Seating capacity:** 30; first come, first served; talk.
**Tuesday 2:00-3:30**
**October 12**
Important Dates for Users of ITS Services
(For updates to this list, please check NYU Web at www.nyu.edu/its/notices/.)

September 4-5 — Labor Day weekend**
September 1-9 — 1999 Class Accounts distributed to instructors.
September 6 — Labor Day*
September 7 — Fall ’99 semester begins; ITS labs’ regular hours begin.**

October 1 — New Individual Accounts and renewals begin.

November 22 — Instructors may begin applying for Spring ’00 class accounts.

November 25-26 — Thanksgiving Holiday*

November 27-28 — Thanksgiving weekend; regular hours.

December 1-12 — Students expecting incompletes in courses should apply for account extensions. Instructor’s signature required.

December 13 — Last day of classes.

December 15-22 — Fall ’99 Semester Finals.

December 20 — Students with class accounts should store files they wish to keep after their accounts expire.

December 23-Dec. 31 — NYU Holiday*
December 23-Jan 15 — Winter Recess**

January 4 — Fall ’99 Class Accounts expire.

*NYU holiday: Labs & offices closed.
**Please check at labs and at above web address for updates on ITS hours.

Additional Information

Class Locations
www.nyu.edu/its/classes/
The following are the street addresses of the locations referred to in the course descriptions.
Warren Weaver Hall, 251 Mercer Street
Bobst Library, 70 Washington Square South, B Level
14 Washington Place, lower level
Education Building, 35 West 4th Street, 2nd floor
Third Avenue North Residence Hall, 75 Third Avenue, C-3
Tisch Hall, 40 West 4th Street, lower concourse

Client Services Center
www.nyu.edu/its/help/
251 Mercer Street, 2nd floor 998-3333
Troubleshooting; software distribution; information about ITS services and academic support.

Accounts Office
www.nyu.edu/its/accounts/
251 Mercer Street, 3rd floor 998-3035
Special, individual and coursework (class) accounts.

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

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

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

News and Announcements
www.nyu.edu/its/notices/
Updates on hours and services; special events and other notices of interest.
Getting Ready for the Millennium
Y2K at NYU

Jill Hochberg
jill.hochberg@nyu.edu

At NYU and elsewhere, a great deal of planning and work have been directed toward preventing possible disruptions stemming from what has come to be known as the Year 2000 problem, or Y2K. Much has been accomplished, and further efforts scheduled for the remainder of the year are expected to bring the University into the new millennium with minimal disruption.

The Year 2000 Problem, In Brief

Briefly, Y2K stems from the early days of computers, when, to economize on system storage and memory, programmers adopted a two-digit shorthand to represent years — “64” rather than 1964, and “99” for 1999 — yielding dates that become ambiguous as we move into the next century. While many of today’s applications and systems have used four-digit years from the start, or have already been corrected to do so, others still employ two-digit years and will need to be re-programmed or replaced, if they are to continue to work properly and provide correct information.

Y2K issues are of interest to all members of the NYU community, although they are certainly not a reason for exaggerated fear. The potential impacts of leaving a program uncorrected for Y2K issues may range from serious disruption to minor inconvenience. There is cause for responsible concern and reasoned action, and there are methods and tools that both organizations and individuals can use to help ensure Y2K compliance and minimize the possibility of disruption or inconvenience.

The Year 2000 Project at NYU

While work on Y2K issues has been ongoing at the University for quite some time, NYU’s Year 2000 Project had its formal beginning in 1995. It continues as a University-wide effort led by the Y2K Oversight Team and the Y2K Roundtable.

The Y2K Oversight Team holds overall responsibility for coordinating NYU’s readiness for Y2K. It has orchestrated the assessment, compliance upgrades, and testing of NYU’s central systems and services. It is facilitating Y2K-related initiatives in the Schools, and promotes Y2K awareness throughout the University community.

Chaired by Chief Financial Officer Harold Read, the six-member Oversight Team includes University Controller Albert Horvath, who serves as Y2K Project Manager; Chief Information Technology Officer Marilyn McMillan, who is managing the remediation of central computer applications and technical infrastructure; NYU’s Internal Audit Director Eugene Pawlowski; Internal Audit Manager John Widmer; Marie Gayle, who leads ITS Administrative Computing
Points of Contact for Faculty and Staff Members

Be sure to check with your department or school for information on its Y2K readiness preparations and for its recommendations on what you should do. Faculty and staff members within the individual schools listed below may use these key points of phone or electronic contact to obtain information and assistance, and to report problems, on Y2K-related issues. Faculty, staff and students in all NYU schools and departments should check the NYU Y2K website — www.nyu.edu/y2k — routinely, and may send their Y2K-related questions and problem reports to y2k-questions@nyu.edu.

Ehrenkranz School of Social Work
socialwork.y2k@nyu.edu, 998-5952

Faculty of Arts and Science
fas.y2k@nyu.edu

Kriser Dental Center
Y2K@nyudent2.dental.nyu.edu, 998-9814

School of Continuing and Professional Studies
scps.y2k@nyu.edu

School of Education
education.y2k@nyu.edu

School of Law*
law.y2k@nyu.edu

School of Medicine*
med.y2k@nyu.edu, 263-5744

Stern School of Business
stern.y2k@nyu.edu

Tisch School of the Arts
tisch.y2k@nyu.edu, 998-1555

Wagner Graduate School of Public Service
wagner.y2k@nyu.edu

*Check www.nyu.edu/y2k for links to the Law and Medical Schools’ Y2K web sites.

What's Been Done, What's to Come

The University has made substantial progress toward timely and effective management of Y2K issues. To date, NYU’s central administrative systems and technical infrastructure have undergone evaluation, remediation, and integrated testing. A central network testbed was established in May, substantial testing and upgrade of the University’s major data communications networks were completed in June, with the remaining upgrades slated for completion by the end of August. A contingency planning phase, begun in June, is also well under way. The University will begin to post contingency plans to the general NYU community in October.

A University task force has developed a set of recommended services to suggest the scope of the Roundtable membership and participation in NYU’s Year 2000 Project: the Courant Institute of Mathematical Sciences, the Faculty of Arts and Science, the Gallatin School of Individualized Study, the Kriser Dental Center, the Leonard N. Stern School of Business, the Robert F. Wagner Graduate School of Public Service, the School of Continuing and Professional Studies, the School of Education, the School of Law, the School of Medicine, Shirley M. Ehrenkranz School of Social Work, the Tisch School of the Arts, the NYU Libraries, the Finance Division, the Human Resources Division, Information Technology Services, the Office of the Registrar and Student Information System, and the Purchasing Services Division.
Y2K-compliant desktop configurations for departments and individuals who plan to update or replace equipment. In addition, NYU has purchased a license for ClickNet Y2K to assist in central, school-, and department-based assessments of Windows95, 98, and NT computers used by faculty and staff members. ClickNet Y2K is a server-based system for assessing desktop hardware and software for Year 2000 compliance (see sidebar for more).

In the schools, departments and administrative units represented by the Roundtable, both assessment and remediation of their decentralized, unit-based systems and hardware are well underway. In addition, each school has undertaken responsibility for evaluating and resolving Y2K issues associated with its scientific equipment and software.

The elevators and fire alarm systems in student residence halls, faculty and staff housing, and all other University buildings have been evaluated and found to be ready for Y2K. Where University elevators have computerized components, these are not date-sensitive, and every fire alarm system in the University's academic facilities and residential buildings has been certified as Y2K compliant by its manufacturer.

Similarly, most of the automated heating and ventilating systems in University buildings are already fully Y2K compliant. In any event, the heating and ventilation systems in University buildings can all be operated manually.

Other specifically focused efforts are in progress with respect to ensuring that key vendors of services and equipment to the University are on target with their own remediation work.

What You Should Do Now

Be calm, but not complacent. As the year progresses, Y2K will likely become the subject of increased media exposure and hype. Y2K issues potentially affect all of us, but their impacts need not be serious. Throughout NYU, faculty and staff members are working to see that every possible measure is taken to ensure the proper provision of University equipment, facilities and services into the year 2000 — indeed, well into the next millennium. We're counting on you to do your part!

Here's what you can do to help ensure your personal Y2K compliance and the Y2K-preparedness of any equipment, data or resources that you use or produce in connection with your NYU responsibilities — when in your office, in your home, or on the road.

- First, check with your department for information on its Y2K readiness preparations and its recommendations on what you should do.
- Go through the Year 2000 Faculty/Staff Risk-Assessment Checklist — whether or not you use a personal computer in your work. It won't take much time, but it will help you identify potential issues and determine whether you need to request assistance. Download a copy from the NYU Y2K web site, www.nyu.edu/y2k, or if you prefer, request a printed copy from the Y2K point of contact for your school or unit (see sidebar on next page).
Follow through on the Checklist recommendations. Inventory and assess your individual Y2K preparedness, using the tools provided on our website and by your department. Upgrade and replace your software and data as required, using the resources suggested at our site. Make careful backups of your current software and data before you begin, and continue to back up as you proceed.

If you’re a researcher, pay special attention to the Checklist sections relating to research applications, equipment and data. Check our website for pointers on updating SPSS, SAS and similar software available under NYU site licenses.

Stay connected and keep informed, even if you think you’re Y2K-ready. Manufacturers and others continue to discover new issues to correct or prepare for. Check the NYU Y2K website, www.nyu.edu/y2k, regularly for Y2K readiness updates, alerts, useful tips and tools.

Keep in touch. Ask questions and share your concerns. Send your Y2K-related questions and problem reports to y2k-questions@nyu.edu, or to the appropriate school-based point of contact listed in the sidebar. We will be happy to help you, and we hope you will help us in our Y2K planning and preparations.

Some Y2K Reminders

Here are some important things to remember, as you review information on these pages and elsewhere and begin to think about your own desktop Y2K compliance.

Check with your department first.

If you are a faculty or staff member, be sure to check for department- or school-specific recommendations, guidelines or resources — particularly for standardized hardware, software and data systems in use in your office.

Go through the Y2K Faculty/Staff Risk-Assessment Checklist.

It will help you assess the exposure of your day-to-day work, teaching, and research activities to problems resulting from Y2K issues. It will point you toward responsible actions that you can take to correct these problems, either on your own or by seeking help. And, while the checklist focuses on your NYU activities and responsibilities, you may also wish to use it to help evaluate the Y2K readiness of your personal desktop equipment and data. It’s available on the NYU Y2K website, or from the Y2K point-of-contact for your school.

Make backups before you upgrade, convert or patch.

Before installing a software update or trying a suggested fix or workaround, remember to make backup copies of your software and data files. (This is a sensible precaution whenever you install new or updated software or alter your data files.) If possible, make two backup copies, and test out your fixes on the second copy, before applying them to the original — or use a duplicate machine or system if one is available.

Information and verifications are still coming in, so use your discretion.

Much of the information on Y2K compliance is still incomplete and unverified. Contact the appropriate vendors for more detailed information on the Y2K status of your hardware, operating system, application software and data sets — and make a point of checking back for updates from time to time.

For your convenience, the NYU Y2K website provides links to the Y2K information of many vendors of computer products used at NYU. It’s the responsibility of the vendors to render accurate and up-to-date information on the compliance of their products, and to offer fixes where possible. Unfortunately, it’s not possible for the NYU Y2K Project or the University to endorse or guarantee their information or suggested fixes.

Keep informed.

Remember to check the NYU Y2K web site at www.nyu.edu/y2k and to send your Y2K-related questions, concerns or problem reports to y2k-questions@nyu.edu.
I’m thinking about sending Wile E. Coyote a letter. I’ve watched him for years, and felt his pain over his failure to catch that darn RoadRunner. My message? Wile E., buddy, maybe it’s time to become a vegetarian! And is that ACME brand loyalty really working for you?

The fact is, we relate to fictional characters even though we know they aren’t real. Anyone who doubts this should sit through the movie Lion King with a few children (aged six to sixty). They know the characters, recognize them by sight and sound, and have certain expectations (demands, even) of consistent behavior.

Such characters satisfy a basic human need, filled over time with storytelling, music, art — and, soon after the inception of film, animation. The characters come from myriad cultural reference points, such as mythology, religion or history. As a Jungian might say, they represent archetypal images from the collective unconscious, universal themes recognized by all humans. They play out the dramas of life, from comedy to tragedy, in ways that entertain and create parables in an Aesop-like manner. We are free to take lessons or just live vicariously through them.

The process of animation is of particular interest. How do these characters become real to us? Walt Disney had a pretty good feel for it. Works such as Steamboat Willie and Mickey Mouse in Fantasia have stood the test of time and are recognized as classics. What is remarkable, given the staggering amount of effort to produce animated works, is that they were ever done at all.

The crux of the problem is the labor-intensive nature of cel-by-cel or frame-by-frame generation of animated characters. The original production techniques of cartoons and early special effects in films are no longer used, as they are considered time-consuming and horribly uneconomical. The old animation cells are now seen as works of collectible art, framed and hung in homes and galleries.

With the advent of computers and the recent surge in both their power and sophistication, computer animation and the construction of virtual worlds seemed to offer a powerful new alternative. However, early computer-generated environments required maddening amounts of time (and computing) to get the job done, and the results were often disappointing, with repetitive, unrealistic locomotion and images that compared poorly to classically animated characters.

One of the most famous examples of computer animation is the movie Toy Story. While the characters were impressively rendered, the movie exemplified the problem of high production costs and time: 200 people working over the course of four years were needed to produce the movie!

Michael W. Lewis is a research scientist at the Center for Advanced Technologies, and is an adjunct professor and Ph. D. candidate in the Department of Computer Science in the Courant Institute of Mathematical Sciences at NYU.
And the final outcome was "fixed": the process resulted in 87 minutes of film, with little chance of substantial editing. It was readily apparent that such a Herculean undertaking could not be the paradigm for creating interactive animations.

The problem of making computer generated images look real was what first caught the attention of Professor Ken Perlin. Professor Perlin received an Academy Award in 1997 for developing the algorithms behind what is now known as "Perlin Noise." At NYU, Ken is better known as a member of the NYU Computer Science faculty and as the Director of the Center for Advanced Technology and the NYU Media Research Lab.

Loosely, Perlin Noise can be described as a means to roughen up the smooth edges and make a computer generated surface look more realistic. This "texture mapping" technique was quickly adopted for use in the film industry; you've probably seen the results in movies such as Jurassic Park, Terminator 2, The Lion King and, yes, Toy Story.

The Perlin Noise technique is now routinely used in major software systems ranging from 3-D rendering software such as Softimage and Renderman to image processing in Photoshop, and even appears as a hardware instruction on the Intel Pentium MMX chip. While the innovation brought him some degree of fame, it brought little by way of fortune. "I probably should have patented that one," muses Ken, looking back, but conversely if patented the approach might not have become so widely adopted.

Ken soon turned his attention from surface texturing to the generation of virtual lives and settings of the characters themselves, an effort which brought forth a 3-D environment wherein characters (and humans) can interact in real time. The system now known as Improv, named to acknowledge its improvisational nature, was developed by Ken Perlin and Athomas Goldberg, a research scientist at the Media Research Lab.

Improv is a non-linear production environment for animation, special effects, and electronic entertainment. Improv characters are crafted and stylized by designers and then provided with a range of realistic motion, constrained for example by the "natural" limits on the movement of an elbow or a knee. Transitions from one position to another are smooth, flowing gracefully from one position to the next by averaging out the distance to be moved over the time available.

So how is the Improv system different from others? The motions of Improv characters can be adjusted "on the fly" via commands issued locally or across the network. The facility to transmit control information, as compared to a continuous stream of video graphic imagery, is critical to Internet applications with significant creature and setting-based graphics, resulting in diminished bandwidth requirements and substantial improvements in system performance.

The key observation is that Improv characters are not fixed in place. Earlier animation systems required explicit crafting of each movement, frame by frame. Improv characters move freely, within established parameters, and can be given instructions such as "Walk across the stage." The motion is generated by the system in a lifelike, non-repeating manner. A scene can be rapidly fine-tuned, changing the pace or direction of a character, working through dozens of variations.

The approach is engaging, offering immediate advantages such as rapid development and easy scene and character editing. And it gets even more interesting — characters also can be programmed with behaviors that allow environmental influences on their attitude and movement. For example, when the character is waiting for something to happen, it can employ typical time-killing activities such as smoking a cigarette or pacing, expressing frustration through facial expressions and body language. The behaviors can be used to generate unique personalities that change over time, based upon circumstances and provocations.

Consider a situation where the character encounters a sad event:
the character frowns, slumps a bit, and walks slowly and ponderously. Then the character discovers that the sad news was inaccurate: the character smiles, stands tall, walks with power and confidence, perhaps even does a little jiggy dance of joy.

This feature of “emotive profiling” makes the Improv system especially exciting, as it substantially enriches the capacity for improvisation in virtual reality settings ranging from the world of gaming to the production of film and video. Beyond the immediate use for scripted stories and choreographed motion, it is possible to generate characters and settings whereby the story could be played out multiple times, and never the same way twice. Character traits, plot features, settings — all could change in endless variety, either by chance or design, and eventually through interactive controls which allow the viewer to become an active participant in the action.

Several Improv characters have earned a certain degree of fame and recognition through their appearances at the annual computer graphics conference, ACM SIGGRAPH (Association for Computing Machinery Special Interest Group in GRAPHics), and through their online presence. Sid and the Penguins dance around an igloo, to the delight of their fans. Wendy has gained such a following that she is now the official Improv mascot. And in the coming year, Ken and Athomas have been asked to host the SIGGRAPH '99 Electronic Theatre, but their Improv character Leon is poised to step in and give the talk, despite being nervous and a bit harried. Ken is now working with a group of graduate students on the design and implementation of intuitive interfaces to modify character movement and personality. “It’s not directly a part of Improv, but it is typical of the way I work: I come up with an idea, and then sort of hack something out to see if it is viable. In the case of the dancer, it was an experiment to encourage the rapid development of virtual reality content. Someone who is not a programmer could sit down and work through a series of movements until the settings are right, and preserve as many as needed.”

This “hacking” process is itself as interesting as the results. The dancer character is a prototype designed to refine problems such as inflection points and “degrees of freedom,” so as to allow characters to move in a realistic manner. It is also being used as a testbed for the interface design for character modification. What should these intuitive interfaces look like? Sliders? Buttons? Rapid Mouse Movements (RMMs)? The search continues.

As part of this “hacking” and rapid prototyping process, the group is investigating the emotive profiling of characters through music. The system could analyze music for its emotional content and then map the mood of the music to particular motions, with graceful on-beat transitions as the music changes. The dancer could move to the music as improvisational or interpretive dance. A different character in the context of a story could be responding to the songs coming from a radio or a band performing in the virtual environment.

What factors are involved in this kind of testing? It begins by designing a character and establishing a basic repertoire of movement. Then there is the process of analyzing the music and associating musical attributes with mood, body language, and movement.

When analyzing the music, should it be done in advance, offline? Or buffered and analyzed along the way? Is it possible to do it in real time?

As it happens, it is more natural for characters to respond shortly...
The Improv character, Sid, from the famous Improv short demo, “Sid and the Penguins.”

There is a great deal of research within the fields of music and psychology that offers elaborate models for this type of analysis, but as Clilly Castiglia, a research scientist at the Media Research Lab, notes: “In the spirit of keeping it simple, we found that fundamental structures such as rhythm and tempo work best and make the strongest connection between the characters and people.”

When asked what he expects in the near future, Ken said, “I think that what we are seeing, and the work we are doing here, is a convergence of storytelling and media. But instead of passively consuming the same stories over and over, we will see dynamic stories, filled with virtual reality characters with personality and a certain freedom of movement, with whom we can interact and communicate.”

It is likely that the field of entertainment will drive the markets for this technology in the beginning, but applications in education will be right behind. The possibilities for instruction and self-paced learning within interactive environments is enormous, and there is certainly substantial room for improvement in educational software.

The potential applications for the system are so wide-ranging and present such immediate benefits that Athomas Goldberg is now shepherding the Improv system through the perilous process of moving from an Alpha-level research project to the more robust requirements of a commercial system. “Improv Technologies Inc.” is a spin-off start-up company which is charged with the ongoing development, marketing and support of the Improv system. “It is an all-consuming process”, sighed Athomas “I even had to delay my honeymoon!”

What comes next? Ken pondered the question for a moment. “We’re working on a couple of projects that could be seen as related. One is a 3-D imaging system which tracks the observer’s position in the room and distance from the screen, and uses the data to create a true three-dimensional image, without the observer needing to wear those awkward 3-D glasses.

“I think that the technology is almost there for widespread commerical use. The device could attach to any high-end home computer at a cost of a few hundred dollars. It could really break out in the next couple of years.

“Another cool project is the foveated vision system, which uses gaze-tracking of the observer to deliver really high-resolution images where the person is looking, but lower resolution in the periphery. This is the way that the eye really works, and it makes it much easier to manage the enormous amounts of data required to build comprehensive visual environments. It could be a neat addition to all of these virtual reality and simulation environments.”

It is unlikely that life in the Media Research Lab will slow down anytime soon. The research facilities on Broadway have just undergone a major renovation, with support from the National Science Foundation. They now house a black-box immersion space along with advanced digital media production and editing facilities.

The lab is setting up one of the most powerful computational environments at the University, with an IBM RISC/6000 SP2 at its center. The SP2, with accompanying interface machines, is part of a grant from IBM to support the lab’s research activities. It comes with a “license to speed” and a challenge from IBM to explore potential applications for the SP2’s supercomputing power and parallel architecture.

Web-based prototypes of these projects, and many others, can be seen online. Improv examples can be found at www.mrl.nyu.edu/improv. Examples from the foveated vision and 3-D projects can be found on Ken Perlin’s page at www.mrl.nyu.edu/perlin.
Electronic journals have had a significant impact on scientific communication. With hundreds of journals now in electronic form, that impact will continue to grow. Not surprisingly, reference staff in the Coles Science Center, on the ninth floor of Bobst Library, are frequently challenged by users’ expectations of an electronic solution for every research need.

Many science researchers would like instant access to comprehensive integrated digital collections, including full text journal literature linked to electronic indices and abstracts. They want to browse journal text, search by keyword, and access other texts — or at the very least, a catalog indicating availability in the library — with electronic bibliographies. Add a desktop document delivery option for instant access to journal articles not owned by the library, and most users would be satisfied.

Tracy Lay is the Life Sciences Librarian for Coles Science Center in Bobst Library.

While demand is high and the number of e-journals offered by publishers is growing, several thorny issues must be resolved when building an electronic library. Electronic resources are governed by licensing agreements, which often restrict use. Other issues include technology requirements, subscription arrangements, cataloging and user access. For example, many users are surprised that we do not offer Nature or Cell online, and that journal literature from Academic Press is not yet available electronically at NYU. Nature’s publisher is aware that many of our users subscribe individually, and that they would lose revenue if current issues were made available on a network as large as NYU-NET.

Academic Press, by contrast, has taken another tack. All their journals are available electronically, but libraries must connect to IDEAL, the publisher’s complete journal list, and pay a surcharge for electronic access. Bobst Library selects e-journals on a title-by-title basis, choosing those that support the curriculum and research needs of the University. It does not routinely subscribe to every journal available from a publisher, and is reluctant to commit to the demands and costs of the entire IDEAL package. Finally, Cell Press offered very favorable pricing for a Washington Square Campus site license, but technical issues surrounding Internet access restrictions derailed the deal.

Another challenge faced by librarians today is helping users find our offerings. The path to full text journal literature generally follows one of two routes in Coles. Questions such as, “Can I read Science online?” will take a user to the library’s catalog or electronic journal website.

Searching journals for a particular topic is more complicated and often takes a user to electronic indices and abstracts, some linked to full text, some not. As always, a good research strategy is the key to success. Thorough research requires a rigorous and comprehensive search of all appropriate periodicals for the best journal literature, and not just those available electronically (convenient though they may be).

It’s not easy to find full text. Variable and sometimes complicated pricing and licensing schemes, as well as unresolved technical issues, can hamper its purchase. Libraries are grappling with issues of access, organization, archiving and cataloging. For some users, the location and
retrieval of available journals may initially be confusing. But the valuable ability to rapidly transmit information, so critical to scientific research, far outweighs its complexities.

Paths for Locating Electronic Journals

Here are some tips for locating full text science, health and technology literature in Bobst, including the path to get to these resources from BobstWeb (www.nyu.edu/library/bobst).

BobCatPlus

www.bobcat.nyu.edu
Path: Select “Catalogs.”
BobCatPlus, the Library’s web-based online catalog, includes records for electronic journals. If a title is available electronically to NYU users, BobCatPlus will provide a direct link to the site. It is not an exhaustive source for all electronic science, health and technology journal literature available to Bobst users, however, so please continue ...

Electronic Journals in Science, Health and Technology

www.nyu.edu/library/bobst/research/sci/ejournals.htm
Path: Select “E-Journals and Texts.”

This new addition to the Coles Science Center website provides a title list with links to all of Bobst’s full text electronic journals in health, technology and the sciences. The list is now primarily limited to journals for which we maintain subscriptions, but watch for additional journal titles coming soon, including titles available through Journals@Ovid (below) and other bibliographic databases. Currency and completeness of full text are specified for each title.

Journals@Ovid
gateway.ovid.com/autologin.html
Path: Select “Databases,” then use the Quick Jump to Web Databases to select “Medline via Ovid.”
Journals@Ovid provides access to 30 full text journals in the fields of nursing and allied health. This database allows the user to perform various types of searches and supports convenient browsing of journal issues as well. Citations for articles from these 30 journals are indexed in other databases within the Ovid system, such as CINAHL and Medline, and are also linked to full text.

Periodical Abstracts
Path: Select “Databases,” then choose “Periodical Abstracts” from the Quick Jump to Web Databases.
Citations from many of the periodicals in this multi-disciplinary database are connected to full text articles. Some journals offer current and archived issues in full text, while others provide archived full text only. Perform searches to retrieve citations, or search by publication title and browse the resulting list of issues.

Science/Social Science Citation Index
webofscience.com
Path: Select “Databases,” then jump to “Sci. Citation Ind.”
Over the coming months, source citations in journals from nine participating publishers including Springer-Verlag and Wiley Interscience will be linked to full text articles. Links to American Institute of Physics journals are already live. Years of coverage of full text vary by title.

Health Reference Center
info.trac.galegroup.com/itweb/nysl_me_nyuniv
Path: Select “Databases,” then jump to “Health Ref. Center Academic.”
A recent addition to the Bobst collection, this database indexes refereed and professional journals as well as consumer-oriented and reference publications. Find reference materials, the New England Journal of Medicine, and much more in full text. Perform searches and retrieve citations with full text from 125 journals.

General Science Abstracts
firstsearch.oclc.org/dbname=Wilsonelect;FSIP
Path: Select “Databases,” then jump to “Gen. Science Abs.”
A bibliographic database with all citations linked to full text. Includes selected journals from the original print General Science Index, covering a wide range of subject areas within the sciences and technology.

Biomedical Collection
Path: Start at the Ehrman Medical Library (mc.lib91.med.nyu.edu:80/library/), and from there select “Friends Databases.”
NYU’s Ehrman Medical Library offers access to Biomedical Collections to all NYU community members. These four full text bibliographic databases include over 80 journals. Search by topic, author and more. This database also supports browsing of individual journal issues.
New Issues in Digital Copyright

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In the modern era, the traditional balance of power between the copyright owner and the user has shifted in subtle, but important, ways. In the past, copyright laws have been written to protect individual authors as the less powerful partner in a contract, to give them valuable rights that they could use to profit from their originality and creativity. In the late 20th century, however, copyright ownership has fallen more and more into corporate hands. These corporations’ motives for protecting works and relative power in negotiations are very different from those of a single author.

As a result, there are at least two conflicting worldviews at stake. One, typified by the Association of Computing Machinery, holds that technology works with copyright in service of the public good, which they see as the largest number of people having access to the most information (see ACM’s official statement on copyright at www.acm.org/usacm/copyright/). The other view, summarized in the 1995 white paper produced by the National Information Infrastructure (NII) Task Force (at www.uspto.gov/web/offices/com/doc/ipnii/), is that copyright in the era of technology should work in the service of commerce.

Recently, corporate copyright owners have sought to expand the rights of owners to control all potential uses of their work. For a thorough analysis of the NII white paper and its implications, see Pamela Samuelson’s “The Copyright Grab” in Wired 4.01, January 1996, or at www.wired.com/wired/archive/4.01/white.paper_pr.html.

Considering the changing landscape, it is worthwhile to review the recent revisions to copyright law that have resulted from this debate.

Digital Millennium Copyright Act

The Digital Millennium Copyright Act (P.L. 105-304) took its original form from the NII white paper, but was significantly changed by advocates for fair use before it was signed into law in November 1998.

Title I of the Act is intended to bring U.S. law into compliance with the latest provisions of the World Intellectual Property Organization treaty, through increased liability for circumvention of “copyright protection mechanisms” [17 U.S.C. §1201(a)]. What those mechanisms might be, and how a rogue miscreant might choose to circumvent them, are unclear, which led to much speculation during the debate of the bill. For example, if the mechanism was some form of encryption, would academic research about that encryption be a violation of the law? What about reverse engineering to ensure Year 2000 compliance? If the protection mechanism prevented a user from making any copies, would it be okay to circumvent it just for the purpose of making one backup copy, which had been legal before?

This uncertainty about what constitutes legal behavior highlights a major weakness in laws covering modern technology. The technology landscape is changing daily, and any law meant to govern it must be flexible enough to handle new situations as they arise. The practical
The upshot of this, however, is that the law appears vague and open-ended, so those affected by it are unsure of what constitutes appropriate behavior.

The Act attempts to counteract this uncertainty in two ways. For concerns that were well documented in the debate period, there are specific provisions in the final version of the Act that were not included in earlier revisions. See, for example, §1201(g) dealing with permissible types of encryption research, §1201(f) on reverse engineering, §1201(i) on protection of personally identifying information and §1201(j) on security testing. That these exemptions exist at all is testimony to the strong lobbying of the groups concerned with preserving fair use as much as possible.

The law in its final form also contains provisions for a series of rulemaking sessions, headed by the Librarian of Congress, upon the recommendation of Register of Copyrights, to determine whether the provisions on copyright management adversely affect the otherwise lawful use of copyrighted works. In particular, the Register should look at:

- the availability for use of copyrighted works,
- the availability for use of works for nonprofit archival, preservation and educational purposes,
- the impact on criticism, comment, news reporting, teaching and research,
- the impact of circumvention on the value of works,
- other factors the Register considers appropriate.

If the Librarian determines that the liability provisions adversely affect noninfringing uses of certain classes of works, he can publish a list of those classes of works. The prohibitions of §1201(a) will not apply to those classes of works for the following three years, when there will be another round of inquiry and rulemaking.

The Act also contains a series of exemptions for specific situations unique to new technologies.

**ISPs**

Title II of the Act, officially titled “Online Copyright Infringement Liability Limitation Act” (17 U.S.C. §512), sets limitations on liability related to material online. There had been some concern that the transitory storage and retransmission of data, a necessary part of communication over networks, would be considered copyright infringement because it entails making digital copies of the work without the permission of the author. The final version makes it clear that the mere retransmission or caching of an infringing work through an ISP does not make that provider liable as long as the process of retransmission is automatic and the ISP does not alter the content of the material or direct its delivery.

There are also provisions, in §512(c)(1), that limit an ISP’s liability for the storage of infringing material by its users if the ISP

- does not have actual knowledge that the material is on the system
- is not aware of facts that would make the infringing activities apparent, and
- “acts expeditiously to remove, or disable access to the material.”

In the case of Internet service provided by nonprofit educational institutions, infringement by faculty or graduate students will not be imputed to the institution if:

- the infringing materials are not required course materials,
- the institution has not received more than two notices of infringement regarding the same infringers, and
- the institution provides materials that describe and promote compliance with copyright laws §512(e) to its network users.

The ISP is not liable for claims against it for removal of access to potentially infringing material if they take reasonable steps to notify the infringer and give them a chance to respond with a formal denial of infringement.

**Distance Learning**

The Act also makes provisions for the Register of Copyright to submit recommendations on the use of digital technologies to promote distance learning (§403). The Register should consult with representatives of copyright owners, nonprofit educational institutions and nonprofit libraries and archives. Specifically, they should consider the following factors in assessing whether the exemption is appropriate:

- what rights and type of works would be included,
- appropriate quantitative limitations of use,
- who should benefit,
- whether, as a prerequisite for obtaining the exemption, technological measures can and should be used to prevent unauthorized use and retention of copyrighted works,
- if so, what type of technological measures should be used.
• the extent to which the availability of licenses for the material should be considered.

Hearings were held in June of this year. The Register’s report is available at lcweb.loc.gov/copyright/cypub/de_rprt.pdf.

Digital Archives

Section 404 amends §108 of the Copyright Act to ease some restrictions on digital technology in archives. Copyright notice is not required on archive copy if there is no notice on the original item being archived. The library or archive can make up to three copies (including digital copies) of a work for archival or security purposes. However, those copies cannot be distributed or otherwise be made available to the public outside the premises of the library or archive.

In many ways, the final version of the Act is a failure for copyright expansionists like the drafters of the NII white paper. While digital reproduction has been included in the definition of “copying,” the transient form of that reproduction has been explicitly excluded. Specific exemptions were added and the potential for even more exists with the review process of §1201(a)(1)(C). Draft versions of the Act included some highly controversial provisions, later cut out, that would have provided protection for databases as a function of their economic value. The Collections of Information Antipiracy Act (H.R. 2652) would have made liable for infringement:

Any person who extracts, or uses in commerce, all or a substantial part of a collection of information gathered, organized, or maintained by another person through the investment of substantial monetary or other resources, so as to harm that other person’s actual or potential market for a product or service that incorporates that collection of information.

There was no exemption for scientific or non-profit use which would have impacted the commercial use of the database. This proposal undermined a basic rule of copyright law — that facts and data are not protected. In the view of expansionists, however, anything that is valuable should also be protected, so expect this proposal to resurface in the future.

No Electronic Theft Act

The broad economic view of copyright also influenced Public Law 105-147, the No Electronic Theft Act, which extends the definition of “criminal” in the context of copyright infringement to willful action:

• for the purpose of commercial advantage or private financial gain,
• by means of reproduction or distribution of one or more copies of a copyrighted work within 180 days that have a total retail value in excess of $1000

The definition of financial gain “includes receipt, or expectation of receipt of anything of value, including the receipt of other copyrighted work.” The Act also extends the definition of reproduction to specifically include electronic reproduction. The practical result of this new legislation is that a student running a small MP3 server, who does not charge for downloads but just trades them, would be receiving “financial gain” and could, if convicted, serve jail time.

The penalties for these actions are: up to a year in prison for one or more copies with a total value greater than $1,000; up to three years in prison and/or a fine for 10 or more copies with a total value greater than $2,500; or up to six years for a second offense.

Unlike traditional copyright law, this Act places emphasis on the retail value of the works taken, rather than on the scope of copying or the intent of the infringer. It even allows producers and sellers of affected works, as well as holders of the intellectual property rights in those works, to file a “victim impact statement” for the court to use in determining the financial benefit the infringer derived.

The Sonny Bono Copyright Extension Act

The Sonny Bono Copyright Extension Act — so named because his wife introduced it in his honor, not because his estate benefited from it (at least not immediately) — extends protection an additional 20 years for works in all periods of copyright life. This means that many famous works whose copyright protection was about to expire were kept out of the public domain, and nothing will fall into the public domain until 2018.

Why should the extension of protection for copyright owners matter to the average person? The framers of the Constitution understood that the benefits of copyright protection for creators should be balanced against the public’s right to free access to creative works. In fact, the original constitutional grant specifically required that works be protected
for a limited period of time," after which, the public could collectively share the benefit of additional knowledge, inspiration for future works, and material for research. Many people have taken works in the public domain and made them available on the Internet to interested people all over the world.

One of those site owners is already challenging this Act. In the recently filed case of Eldred v. Reno, the plaintiff is an online publisher of hypertext versions of text works in the public domain, suing the Attorney General as chief enforcer of the law. For a fuller discussion of this case, see the Berkman Center for Internet and Society’s website at cyber.law.harvard.edu/eldredvreno/index.html.

What’s Next

Ironically, as copyright owners are rushing to protect their works, general users have more access to and less regard for copyrighted material. This can cause a downward spiral of concerned owners fighting for stricter standards, triggering resentful users to misappropriate more, angering owners yet again, and on and on.

Projects such as the Copyright’s Commons project at Harvard (cyber.law.harvard.edu/cc) and the Free Software Foundation (www.fsf.org) are proposing radical alternatives to traditional copyright. They provide information free for use and comment by others, with only the caveat that commentators must also leave the information free. Meanwhile, corporate owners of intellectual property are looking for even more ways to protect their valuable products through alternative methods, such as the proposed Computer Information Transaction Act, which seeks to codify controls on use through shrinkwrap licensing.

While it would appear that the balance of power belongs to the wealthy corporate copyright holders, the voice of the common user is being represented all over the Internet. In fact, with the final passing of a Digital Millennium Copyright Act that was nowhere near as Draconian as originally proposed, the sheer magnitude of the online fair-use defense has proven to be a serious challenge to corporate money.

Copyright Resources on the Web

There are plenty of places to find information about copyright on the Web. Here are a few.

www.law.cornell.edu/topics/copyright.html
An overview of the current state of copyright law, including both recent case law decisions and the full text of the Copyright Law.

lcweb.loc.gov/copyright/
You want information? Go to the source, the Copyright Office main page.

www.lawnewsnetwork.com/practice/techlaw/
News stories and brief memoranda on technology law topics, including copyright, trademark and patent.

www.law.berkeley.edu/journals/btlj/index.html
The Berkeley Technology Law Journal — abstracts of recent articles and full text versions of older ones.

www-ninch.cn.org/ISSUES/COPYRIGHT/PRINCIPLES/NHA_Complete.html
The National Humanities Alliance’s statement of basic principles for managing intellectual property in the digital environment.

Really two sites in one: an introductory course in copyright law for non-lawyers, and a database of abstracts on current topics in the law of cyberspace.

www.utsystem.edu/OGC/IntellectualProperty/cprtnindx.htm
“A Crash Course in Copyright” that is both amusing and informative from the University of Texas.

www.copyright.com/
The Copyright Clearance Center — an organization set up to centralize licensing and royalties. (Note that registration for the Academic Permissions service costs $120 per year).
High-Volume Call Centers at NYU

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What received over eight million calls last year? Believe it or not, the call centers at NYU and the automated attendants that precede many of them got that many calls in the last 12 months. A call center is usually defined as a group of people (often called agents) to whom a business’s most client-intensive telephone calls are routed in a round-robin fashion. For most of us our principal contact with a call center agent is when we order from a catalog or call to book an airline flight. Calls are normally routed to the least busy agent on a first-come, first-served basis. Typically, the agents treat all calls in the same way. This definition, however, is rapidly changing.

Call center technology is widely used at NYU, with over 80 call centers and over 600 agents answering the calls. Perhaps the busiest call center is that of our switchboard operators; they received over 500,000 calls in the last 12 months. Enrollment Services areas also use call center technologies extensively. In the last 12 months, Admissions received over 250,000 calls; Financial Aid received over 140,000 calls, the Information Center received over 85,000 calls, and the Registrar’s agents received over 65,000 calls.

Not all call center programming routes calls to people. We also use call center routing functions for services such as TorchTone, which received almost 1.2 million calls in the last 12 months, and our voice mail systems, which handled 16 million calls.

Call Center Technologies

Like most technologies these days, call centers are described by a dizzying array of acronyms like AA, ACD, ANI, CMS, DNIS and VDN. All those letters are very meaningful for routing and sequencing massive numbers of calls and providing the means for supplying information to thousands of callers.

Most of our call centers use a combination of automated attendants (AAs) [the “Press 1 to do this, press 2 to do that” menus provided by our voice mail systems] and automatic call distribution (ACD) to live agents, which is done by our telephone system. The School of Continuing and Professional Studies’s public information line, extension 87080, which received over 87,000 calls in the last 12 months, is a good example. At its entry point, extension 87080 has an automated attendant working 24 hours a day, 365 days a year, offering callers the choice of getting a catalogue, signing up for an open house, or, during business hours, speaking with a person. This ability to offer the caller useful options is at the heart of the idea of an automated attendant. Information can be obtained at the caller’s discretion.

When the caller opts to speak with a person, automatic call distribution (ACD) takes over. Once a caller opts to speak to a live agent, whether by dialing directly or through an automated attendant option, a set of if/then steps, called vector steps, takes over. These vector steps check various agent status and routing options to determine the appropriate treatment for the call. The system checks if an agent is available to answer the call immediately. If not, it considers how many other callers are waiting, and how long they have been waiting, before deciding whether to queue the call to wait for an available agent.
Staffing the Call Center

Determining necessary staffing levels to handle these large call volumes is a significant challenge to call center managers. The ability to properly staff and effectively manage a call center depends on the capacity to track the number of calls, when they arrive, and how they are routed.

This type of tracking is done by our Call Management System (CMS). CMS is an adjunct server that is fed call transaction statistics by the telephone system. It allows us to view various statistics about call volumes over time-frames ranging from half an hour to a whole year. CMS can tell us how many calls were offered but not answered, how many agents were answering calls at the time, and how long the callers held on before hanging up, as well as other information. With a new application, called CentreVu Supervisor, the call center managers can monitor and get reports on all this data themselves. CentreVu provides a graphical interface to 40 standard real-time and 156 standard historical reports. Real-time thresholds can be set to alert the manager of traffic overloads while they are working on something else.

For most call centers, as is true of most departments on campus, the start of each term is the busiest time. The number of calls received at this time overtaxes the ability of most of our call centers to answer them, and that taxes the patience of our callers. The inability to answer all of these calls is due in large part to the tremendous numbers received, but it is also due to the segmentation of many of our call centers into small groups of agents, even within the same department. A group of fewer than ten agents is either too small for advanced call center programming or is, at times, simply throwing delay announcements in front of too few people to answer the calls.

Much of the segmentation results from the perception that the callers’ questions require specific knowledge, and can only be answered by a few highly trained people. While it may be true that fairly specific knowledge is required in certain instances, perhaps sufficient cross-training and efficient computer system support could help address the issue, thereby allowing for larger, more effective call centers.

Computer-Telephony Integration

Computer-Telephony Integration (CTI), Interactive Voice Response (IVR) and the Web are changing the basic definition of a call center. Some call centers are now being called “contact centers,” since they are also handling faxes, e-mail, and website hits. Call centers are now challenged to find a way to answer this variety of communication types in a timely manner.

For years, TorchTone has used Interactive Voice Response (IVR) to great effect. After authentication, students can use the touch-tone keypad to register or to get their grades, among other things. With the Bookstore’s IVR application, students can determine what books they need for their courses.

Call center technology can also allow a call to be transferred from IVR to an agent without having to re-authenticate the caller. The person’s identity and perhaps where they were in the IVR tree are carried to the call center agent’s computer screen with what is called a “screen pop.” This integration allows for the interaction of the telephone system and host computer system such that the redirected call and the relevant data are transferred to the agent simultaneously. A screen pop can also be generated by virtue of the telephone system passing the dialed number (DNIS-Dialed Number Identification Service) and/or the dialing number (ANI-Automatic Number Identification) to a computer system. When the call and the screen are presented to the agent, information about the caller is provided based on a database match with either the calling or the called number. This computer-telephony integration is not cheap, but the cost may easily be justified when we are receiving such high call volumes.

The idea of routing calls by the number dialed also leads to consideration of a feature called...
Expert Agent. Expert Agent matches a caller’s needs with an agent’s skills. For instance, if the Kriser Dental Center advertises a separate phone number within the Chinese community, calls to that number can be routed to Chinese-speaking agents, and can even be routed among the agents based on language proficiency. When no Chinese speakers are calling, these same agents can receive calls from English speakers. An automated attendant can also be used to differentiate callers’ choices and route them accordingly.

The Web-Enabled Call Center
With more than 20 million hits per month on NYU’s Web servers, the idea of interactions between the Web and a call center holds some real, if daunting, possibilities. Certainly, a vast variety of information can be found on the Web, but when a person needs to speak with an agent, how can the Web help? A web-enabled call center could receive calls from a surfer with access to IP Telephony software such as Microsoft’s Net Meeting. In some implementations the receiving agent could actually see what page on the website the caller was viewing. If the web surfer doesn’t have a multimedia computer capable of making a web-based call, he or she could enter a callback number at the website, and that number could be routed to an agent for immediate callback. A third option is to initiate a chat session with an agent. In what is called a blended call center, faxes and e-mail messages can also be routed to an agent for response, just as a call is now. When the Web calls, someone can answer.

The profile of call centers is changing. With advanced call center technology, the Web, and computer-telephony integration, we can work to meet the challenge. For further information on these services, please contact Audrey Franklin at extension 81227 or send an e-mail to telecom.admin@nyu.edu.

News from Telecommunications Services

Y2K and Your Phone Service
Phone service for faculty, staff and students at NYU is supplied by a current generation, current release Lucent private digital telephone system. Lucent (formerly the equipment arm of AT&T) has certified NYU’s system and all of its support computers to be free of the millennium bug. Phone calls to the world beyond campus are handled by major telecommunications carriers such as AT&T, MCI, Telelobe and Bell Atlantic, all of whom have extensively tested their systems for a clean and trouble-free transition into the year 2000. In the event something unexpected occurs, Telecommunications Services has automated procedures in place to take a troubled carrier offline, and to route calls over alternative paths to the public network. In addition, all NYU Telecommunications Services equipment is protected with battery-backed power supplies in the event of brief power outages. Both NYU staff and Lucent technical support will be standing by on New Year’s Eve to ensure that your calls will go through the next day and every day thereafter.

Calling Number Identification
Over the past year, more and more incoming calls to NYU have shown the caller’s phone number on digital display phones. New inbound digital circuits to the University, called primary rate interface lines, make this number identification possible. Although similar to residential CallerID, this feature is technically different than the residential service provided by Bell Atlantic and other local phone companies. Consequently, local phone company features such as *69 for automatic call return and *77 for anonymous call rejection do not work on phones supported by NYU Telecommunications Services.

In the coming months, the caller’s number will also be made available to University voice mail boxes. The caller’s number will be announced by the voice mail system as, “Call received from extension 201-999-5555.” When a ten-digit number or longer is announced in this fashion, the call is not from an internal NYU extension, but rather from an outside number. All internal voice mail messages announce a five-digit number.

In most cases, calls placed from University phones already show the caller’s extension on display phones.

— Chuck Kuhlman
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During the summer of 1997, Jimmy Kyriannis (ITS's Associate Network Manager) and I visited the La Pietra estate in Florence, Italy, to provide Internet connectivity for the students and staff. Well, we've gone back, to replace a two-Mbit wireless link and basic machine-to-hub infrastructure with a fiber-optic network and switched ethernet technology.

When first established, the modest La Pietra network was composed of a handful of PCs located in Villa La Pietra, and six PCs in a lab about 500 meters across the estate in Villa Natalia. In both villas, the systems were connected to the network with Asante intelligent hubs. The most high-tech element of our network was the two-Mbit wireless link that connected Villa Natalia and Villa La Pietra, thus providing students Internet access even though a physical link between the two villas didn't exist.

Our network linked up to the Internet via a dedicated E1 circuit (two Mbit) to the University of Florence (Università degli Studi di Firenze). At l'Università, we hopped onto the GARR network (www.garr.it/garr-b-home-engl.shtml). GARR is a nationwide network that interconnects institutions of higher learning and scientific research in 16 Italian cities, via an ATM backbone.

Four of the five villas on the estate are currently interconnected with both single and multimode fiber. Villa Colletta is the focal point of our network. That's where you'll find our network communications rack. Just about every inch of its seven-foot-high frame is loaded with equipment. It houses four fiber optic patch bays, a Cisco Systems Catalyst 5002 switch, a Cisco Systems 2504 router, a Sun Ultra1 system (named la Pietra), a Digital AlphaStation system (acton), an uninterruptible power supply (or UPS), a Nortel MicroAnnex terminal server, and six modems.

The fiber optic patch bays contain the terminations for 48 fiber optic pairs — 24 single mode, 24 multimode. Each of the villas on the estate has been provisioned with six pairs of single and multimode fiber. We're utilizing multimode fiber to provide the 100 Mbit backbone transport between the villas.

At the heart of the fiber backbone is a Cisco Systems Catalyst 5002 switch. The 5002's current configuration can handle up to 12 fiber pairs and is easily expandable to handle more if needed. At the other end of the fiber links are Cisco Systems Catalyst 1924EC switches. These switches can handle up to 24 devices, each on its own ethernet switched port.

The original La Pietra network was comprised of 16 systems and network infrastructure devices. Today there are 90 such devices,
with more to come. The network is scalable and can handle any foreseeable expansions.

The network services systems La Pietra and Acton currently provide Domain Name Service, DHCP/bootp and e-mail. They are expected to provide additional services in the future, as web-based and potentially multicasting video applications will begin to play a greater role in networking life on the estate.

Our terminal server and modems provide us with a way to access critical network devices and systems in the event of a major problem or network outage. We have the ability to connect to the La Pietra network by modem to access any one of the several serial ports on the terminal server. This allows us to connect directly to the console port of any one of our most critical network devices (router, switch and network services machines). In short, it's just like being there. We'll also be providing faculty, who all live off the estate, with dial-up access to the network by way of four modems. The connections will support PPP and be password-secured.

Investing in the American Power Conversion (APC) UPS was money well spent. We'd purchased and installed an identical unit in our facility in Prague and knew it would be invaluable in Florence, especially since summer power outages are frequent. The UPS not only protects our critical networking gear from power problems, but it can also notify us, via e-mail, of problems such as power outages, power restoration, self test results, and more. Also, in the event of a power outage, the UPS kicks in and supplies power to our entire communications rack. If the power outage is long enough for the UPS's battery to be almost drained (about 40 minutes), it will shut down our systems in an orderly fashion. Once power is restored, the systems will come back on line. The UPS provides a very clean, invaluable operation that does not require someone to be present to intervene.

Another issue we had to address on our return visit concerned the PCs running in the student lab at Villa Natalia, as well as the newly installed systems at Villa Ulivi. Specifically, the students were modifying, or perhaps "customizing," the Windows95 systems. Needless to say, no two machines were configured identically. To address this problem, Eray Ekici (an ITS network engineer) joined us on this trip. It was Eray's job to install the Windows NT operating system on all the PC lab machines. Properly installed, NT provides a stable, secure system environment. The installed NT system provides both a user and an administrator environment. In the user mode, students have access to all pre-specified applications (such as Eudora Lite, Netscape and telnet), but no system modifications can be made. In the administrator mode, the system can be modified by support staff. Along with improved network printing, virus protection software and memory upgrades, the lab is now also more stable and secure than before.

Recently the Villa Natalia lab was shut down and systems were relocated to Villa Ulivi. This is because Villa Natalia will be undergoing an extensive two-year renovation.

The staff and students at La Pietra are now enjoying enhanced Internet connectivity, since the GARR network changed its own service provider. Our traffic now runs from Florence, through Bologna, to Milan — all on the GARR network — before hitting a 45 Mbit dedicated circuit, provided by ALTER.NET, back to New York. Performance is exceptional and represents a quantum leap in responsiveness over the previous Internet provisioning. It should be noted that we are especially excited about this improvement, because it opens up the possibility of testing and deploying new technologies and applications that rely on responsive network environments.

No trip abroad is complete without a story to tell the folks back home. Thanks to the UPS, we always know when the weather's cold in Florence, even though we're back here in New York. You see, there's a building adjacent to the estate that shares a common electrical feed to Villa Colletta. Whenever it's cold, a woman who lives there cranks up her electric heaters and blows away our power! The UPS dutifully e-mails us that a blackout has occurred and the communications rack is running on battery power. Minutes later, we get the inevitable message that power has been restored.

As always we'd like to thank the entire La Pietra staff for their efforts and hospitality, including La Pietra's executive director Juan Corradi and his wife Christina Spellman. Jimmy and I would also like to particularly thank Professor Corradi's Special Assistant Barbara Bonciani, whose dedicated hard work has been most valuable to our efforts in Florence. Grazie, Barbara!
Windows NT (In)Security

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As a desktop platform, NT can definitely be deployed fairly securely. But as a server in high-risk contexts, it may not be the right choice.

Inherent Network OS Vulnerabilities

A certain type of data is sent between an NT server and a client station to enable both to communicate with each other. Server Message Block (SMB) Protocol is the mechanism that sends most packets of network data between the server and client. These packets of data allow the clients to connect to shared resources on a server, access files, print to a printer or look at a print queue. Generally, they allow applications to communicate with the client.

Several versions, or dialects, of SMB exist for backward compatibility between older operating systems and clients, such as DOS, Windows for Workgroups, or IBM LAN Server. These older dialects are supported by Windows NT, and are actually the reason for one of the biggest security holes in the NT operating system.

For SMB-based access between a client (such as an NT workstation) and a server, several intermediary steps must take place.
1. A client must tell a server it wants to talk to it by sending a session request with the client and server NetBios names. No IP address is needed by the server, and no authentication is necessary at this point.
2. Negotiation of a dialect then takes place. Basically, the goal is to find the highest (i.e., the most secure) dialect common to the server and client. If the client is an NT workstation with the latest service pack, the highest dialect will be used. However, a DOS-to-NT connection would use an older and far less secure dialect. Essentially, the client determines the security level of the connection, and as long as the server is using default settings, it happily complies.
3. The client then sends a session setup request, in which it passes several bits of important information to the server, including username and password (cleartext or encrypted). The server sends back a token that proves it is an authentic server. This token contains the user’s access rights in the form of a user ID number. Here again, the burden of proper authentication rests with the server, rather than the client.
4. After the session is established, “share access” is granted when the client sends the server an SMB packet with a tree ID number (TID), which tells the server where such access is allowed in the hierarchical directory tree structure. At this point, to keep the share connection from timing out, an SMB echo mechanism keeps the share active. This service can keep going on after a user has logged off.

Several weaknesses in this process can be exploited. In step 1, an incorrect IP address can be sent along with a correct computer name, allowing access at this point. In step 2, a program can be used to set the client dialog to an insecure one. A malicious user can then exploit any security holes available at that point. In step 3, forged SMB request packets sent to the server will not be challenged, since the workstation never has to authenticate itself. In step 4,
shares that currently exist, or have recently existed, can be accessed through the SMB echo mechanism.

An additional exploitable security concern occurs at the system level when the OS SYSTEM process creates null sessions to interact with a remote server. SYSTEM has no password, and you cannot log into it, but it has almost unlimited privileges. Since it has no password, it can only connect to other machines through null sessions, which also need no password. These sessions were set up for use by the system, but in reality can be accessed by the default group “Everyone” on the remote machine. This is a serious lack of protection of the servers’ remote resources.

One way to address these weaknesses is by deploying a firewall. A secure firewall can prohibit outside rogue machines from exploiting certain TCP/IP services and ports. Thus, many of these potential attacks can be avoided.

Specific Weaknesses Addressed

There are several procedures in addition to deploying a firewall that can make an NT server more secure. Many require third-party solutions, but some can be applied with little added expense.

To keep hackers from attacking or gathering information from your servers:
- Use a protocol analyzer — to detect certain types of attacks as they happen, and to alert you with e-mail or pager notifications.
- To limit the information hackers can gather about your machines, do not use WINS servers. NYU-NET currently does not support or allow WINS server operation.
- Make sure that private company or department directories, whether electronic or printed, remain internal.
- Do not use RAS servers. They are not allowed on NYU-NET, anyway.
- Advise users to limit the information they give to seemingly legitimate callers from outside the department.

Security Configuration Manager

The SCM, or Security Configuration Manager, is a great little utility from Microsoft (and it’s free, too!) that can check a server or workstation’s security configuration. It is comprised of many registry, policy, NTFS file system, and other types of settings. Once the SCM is loaded and configured, these settings can be loaded from the source NT machine, and compared to templates, conveniently supplied by Microsoft, that match a particular level of security.

For instance, say your machine is an NT workstation. You can load up your machine settings, and then compare those settings against basic, compatible, secure or high security templates for NT workstation modes. The SCM runs an analysis and produces a table with the system settings compared against the template’s settings. Convenient markers at the beginning of each table row tell the user which system settings conform to the template, which do not, and which are not applicable.

After the analysis is run, you can make changes to the settings in the template before you apply it to your NT system, enabling you to customize your workstation configuration. Also, you can save your customized settings, to be used at a later date, or to be applied to another machine.

It is always a good idea to set an NT server that is functioning as a domain controller to the high security template. However, things may break, so use the SCM carefully. For example, once, having set a server’s configuration to high security, we later found that this made access to the web server impossible. The reason, we found after looking at the file permissions, was that as a result of our having selected the high security setting, the SCM had removed the group Everyone from of the User Rights Policy list. This list grants rights to access the server from the network. In essence, each user account that is used to access the server externally gets its right of access from this group. We solved the problem by adding only the default user for the web server to this Rights list. It is generally more secure to grant rights on an individual basis than on a group level.

NT is complex, and inexperienced users will quickly get buried by mistakes if they do not realize that the NT default configuration is relatively insecure. The proper precautions should be taken to make a more secure environment. The only way to do that is to read about NT networking so as to get a good idea of what is under the hood, apply effective administrative techniques such as those elaborated here, and always watch for updates, fixes, service packs and other utilities from Microsoft.