

ACADEMIC COMPUTING AND INSTRUCTIONAL TECHNOLOGY SERVICES

VISION PLAN

1999-2000

1.0. Executive Summary

Academic Computing and Instructional Technology Services (ACITS) provides information technology services to University students, faculty, and staff (current and retired), to the UT System component institutions and, through interagency contracts, to eligible federal, state, and municipal governmental agencies. In keeping with the mission of The University, ACITS shares the responsibility of providing campus-wide information technology services, with Administrative Computing Services, Communication Services, the General Libraries and the Office of Telecommunication Services. ACITS' mission is to support The University's academic and research programs by providing an information technology-based environment, technological capabilities, and able staff who can assist in computation, communications, and collaboration, yielding enhanced productivity for students, faculty, and staff in their learning, teaching, research, and outreach activities. ACITS provides services and staff to support the rapidly changing capabilities of information technologies in the UT environment through three major divisions: Academic Computing, Instructional Technologies, and Telecommunication and Network Services (see organization chart). This service model aligns services with the needs of students, faculty, and staff. The ACITS' vision plan described here includes projects from each of these three major divisions.

ACITS receives an annual recurring allocation that provides funding for a portion of the costs to operate the Student Microcomputer Facility and the Center for Instructional Technologies (CIT), and to provide some support for the Help Desk and Training Services. That allocation for 1998-99 is \$1,396,274 divided as follows: \$346,860 to replace discontinued 1992-93 course fees, \$300,000 allocated originally in 1993-94 for SMF operating costs; \$58,746 allocated first in 1994-95 to permit 24-hour operation of the SMF; \$40,000 allocated in 1997-98 for fringe benefits; \$250,000 allocated in 1997-98 for CIT support; \$40,668 first allocated in 1998-99 for fringe benefits; and \$360,000 for repayment of a three-year loan to the UT System. For 1998-99, ACITS received a one-time only infrastructure project allocation of \$570,475.

For the 1999-2000 academic year, ACITS requests an increment of \$162,560 to this recurring funding to accommodate increased minimum pay and fringe benefits for SMF proctors, increased costs for operation of the CIT (salaries and fringe benefits), expansion of Help Desk services by adding weekend hours, implementation of a student computer user survey, and implementation of an electronic thesis/dissertation project.

Major initiatives and on-going projects are:

1. continued operation of the Student Microcomputer Facility (\$428,000 annually - an increment of \$30,000);
2. continued operation of the Center for Instructional Technologies (\$320,000 annually - an increment of \$20,000);
3. increased number of Help Desk personnel and extension of operating hours (\$50,000 annually - new project);
4. initiation of the electronic thesis and dissertation project (\$42,560, annually- new project);
5. initiation of an annual student survey on computer usage (\$20,000, annually - new project).

In addition, ACITS requests funding of \$2,974,922 for one-time capital expense project proposals for 1999-2000. Of particular importance is the need to upgrade the network switch for the SMF at \$70,000. These special projects, if funded and implemented, will provide significant enhancements to the campus network, the campus cable system, and the University Mail Box Service and will provide seed money for some investigative efforts in ATM-based technology and Internet multicast technology. Funding is also requested for these other major projects: the Web infrastructure, media streaming, advanced e-mail service, printing services, timesharing and workstation facilities backup services, Windows NT, UTS and CCWF systems upgrades, as well as staff to support departmental architecture and security. CIT enhancements are also included: upgrading the CIT lab with 3D graphics software, a SmartBoard, and 100baseT networking. A CIT courseware production studio and matching funds for the FAST Tex program are also proposed. Finally, we request ITAC support for relocation of the ACITS help desk to the Varsity Center and relocation of the CIT to Flawn Academic Center. These moves have been forced on ACITS due to loss of space in WCH and GSB. To accommodate the networking and space configuration needs of help desk staff and the CIT in the new spaces, ACITS will incur significant costs which cannot be covered from ACITS budget. .

2.0 Vision, Goals and Progress

In keeping with ACITS' mission to support The University's academic and research programs, ACITS provides:

- access to desktop systems, servers, services, and high-performance computing;
- training and consulting services, facilities management, information on standards and practices, instructional technology strategies, and software tools;
- a state-of-the-art, reliable, secure, and ubiquitous telecommunications infrastructure and related networking services.

Over the last year ACITS has made progress in improving and expanding its standard and most visible services:

- A campus-wide high-peed backbone network with interconnections to regional, state, national, and international networks. The backbone network currently comprises 110 buildings and 35,000 computers;
- Computer laboratory facilities, operated under management contracts;
- High performance parallel computing facilities supported by Cray J90 and T3E systems;
- A distributed, campus-wide printing system with 40 printers. Five million pages were printed in academic year 1997-1998;
- E-mail based collaboration (mailing lists) for 1,500 lists, with more than 112,000 subscribers;
- USENET News with 11,000 newsgroups;
- Access to 457 Web servers with 260,000 pages;
- E-mail service for more than 87% of students and 78% of faculty and staff. More than 28 billion bytes of e-mail messages were processed during August, 1997;
- TELESYS dial-in service to the campus network, with over 34,000 subscribers;
- X.500 directory services for the UT Austin population of more than 67,000;
- Central computing servers for general classroom instruction and research.

ACITS services that are expertise-based were also improved and expanded:

- Help Desk services- 127,200 calls answered in academic year 1997-1998;
- Training services - 291 seminars and workshops attended by 2,045 customers for 1997;
- Facilities Management contracts- 9 current contracts to provide management personnel and technical expertise for departments, schools, and colleges;
- Hardware maintenance service - Over 2,200 trouble calls in 1996-97;
- Software distribution program, including negotiating and implementation of the UT System-wide and Microsoft contract, to offer the basic Microsoft products to UT System faculty, students and staff at deeply discounted prices. The Software Distribution program now includes 27 software products, some having many components which offer significant savings to UT Austin and other UT System component institutions;
- The Center for Instructional Technology: A center for production of multimedia and Web-based materials, instructional design services, distance education support and visualization research.
- The Bulk Purchasing program, which allows University departments to buy carefully configured and thoroughly tested microcomputers at significant discounts. This will be a key ingredient in the new retail facility (Campus Computer Store) under the direction of ACITS and operated by a private contractor (Computize).
- Campus Computer Store, which was established under the ownership and management of a local corporation specializing in the distribution of hardware and software products, offering faculty, students and staff current hardware and software at greatly reduced prices.

Future Plans

To provide the academic information resources environment required for the next five years, ACITS will concentrate efforts in the following areas:

- continuing development of an infrastructure to support a state-of-the art information resource environment;
- designing computing and information environments based upon distributed computing and client/server technologies to support increased demand for information sharing, human communications, and collaboration;
- expanding and upgrading student information resource laboratories;
- expanding the services available locally to departments, colleges, and research units;
- coordinating customer services with other infrastructure providers and technical support staff within University departments and organized research units;
- training faculty, staff, and students.

3.0 Facilities and Staffing

Facilities and Services

ACITS offers many different services to the UT Austin computer user community. In this section we cover the Student Microcomputer Facility (SMF), CIT, and training units because these are funded by the student information technology fee. Other ACITS' services and staffing are discussed in Appendix C.

Student Microcomputer Facility (SMF)

All UT Austin students may use the SMF, but its use does require an ACITS individually funded (IF) user number (obtained at the SMF), in order to log in. This 193-seat facility includes:

Hardware	83 Macintosh PowerMac 7300/200 (64MB RAM, 2GB Hard Drive, CD-ROM, Zip Drive), 7 with HP ScanJet 4C Color Scanner and iomega Jaz Drive. 110 Dell Optiplex Pentium Pro 200MHz (64MB RAM, 2GB Hard Drive, CD-ROM, Zip Drive), 7 with HP ScanJet 4C Color Scanner and iomega Jaz Drive.
Software	Including - Microsoft Office, WordPerfect, Canvas, Photoshop, Mathematica, SPSS, PageMaker, and Internet Clients.
Equal Access to Computers	Adaptive hardware and software for the visually impaired is located within the lab (FAC 218) including: 80 cps Interpoint Braille Printer; Bookedge Scanner; Speech Output; Screen Enlargement Software

The lab is also equipped with scanners, laser printers, and color printers. All of the workstations are connected to the campus network and thus provide access to electronic mail, Internet resources, and the UTCAT library catalog. SMF proctors are on-site to answer basic questions whenever the SMF is open, and a consultant is available 40 hours per week to give more in-depth assistance. A training room adjacent to the SMF offers hands-on courses at no charge to students.

Training Programs

Each semester, ACITS offers a series of noncredit short courses lasting from 1 hour to 8 hours, on such subjects as introductions to the various computer systems, electronic mail, using Internet resources, editors and text formatting programs, and special packages such as mathematical and statistical libraries and database management systems. Many of these short courses are taught as hands-on sessions in the training room located in the Student Microcomputer Facility. Short-Course schedules are published in the ACITS newsletter, Current ACITS and online. Regularly offered courses are described online at www.utexas.edu/cc/training/. For some courses, ACITS produces self-paced materials that individuals may use without attending the formal short-course sessions. In conjunction with the Division of Continuing Education, operates the Microcomputer Teaching Facility (MTF) in the Thompson Conference Center. Classrooms there are used for hands-on workshops on various Windows and Macintosh software products and topics. Regularly scheduled workshops include an introduction to microcomputers, desktop publishing, spreadsheets, and a Computer Literacy Certificate program.

Center for Instructional Technologies (CIT)

The CIT provides services and facilities that promote, support and integrate digital-based technologies and instructional media in learning, teaching and research, including: Multimedia Services; Instructional Design and DE Support; Information Design; Technology Support; and a Visualization Lab

The CIT manages Project QUEST, a long-term effort of UT Austin to increase the innovative use of microcomputers in teaching and research. The CIT supports a Faculty Fellows program to foster the building of teams of faculty and students to create multimedia-based instructional technology projects. The CIT also manages FAST-Tex, a program that pairs students who have specialized instructional and computer skills with faculty members to develop innovative instructional technologies for the classroom.

Additionally, The CIT hosts intensive 4-5 day workshops for faculty in developing instructional technology materials, and is The University's representative for the New Media Centers, an international consortium of higher education institutions and digital technology companies.

4.0 Projects with Annual Recurring Operational Costs

On-going projects

1. The Student Microcomputer Facility, operating costs increase of approximately \$30,000 annually;
2. The Center for Instructional Technologies, increased salary costs of approximately \$20,000 annually;

New Initiatives

3. Expanded Help Desk Services hours, \$50,000;
4. annual Student Computer Use Survey, \$20,000;
5. electronic thesis/dissertation project, \$42,560.

4.1 Student Microcomputer Facility Operations

Estimated cost - \$428,000

In 1998-99, to recruit and retain student employees and classified staff, we increased the base pay of student proctors (from \$6.50/hr to \$6.74/hr) and student supervisors (from \$8.02/hr to \$8.55/hr). We discovered that the private information technology industry in Austin is willing to pay student part-time help as much as \$16.00 per hour. Also at risk at being recruited by private enterprises are our professional full-time classified staff. In March of 1998 we increased these staff members' salaries to compete with private industry. Of course, fringe benefits increase with salary increases. Our fringe benefit payment for 1998-99 for SMF staff is estimated to be \$90,000.

4.2 Center for Instructional Technologies Operations

Estimated cost - \$320,000

The mission of the CIT must continue to address the needs expressed by the colleges and schools, as well as those of the UT Austin academic community as a whole, including needs for multimedia, courseware development, technology classroom support and Web design. Use of the Center has grown significantly. Additional staff must be recruited and existing staff must be retained. Salary increases given in March of 1998 have increased the expenses for operation of the Center.

4.3 Expanded Help Desk Services

Estimated cost - \$50,000

The goal of the ACITS' Help Desk is to answer and help solve the questions and problems of all computer users in The University community. To improve customer service, the Help Desk must increase staffing of the main Help Desk, provide additional training, and improve the layout and furniture of the Help Desk area to promote better traffic flow and improve working conditions. The Help Desk is currently closed on weekends, but students and staff frequently work on weekends, and there is a demand for weekend Help Desk services. This need is indicated by the number of unanswered weekend calls to the Help Desk by the demand every Monday from people who had questions over the weekend. To improve the service, we propose a pilot project: opening on Sunday and staffing the main Help Desk with two consultants, and the SMF with one consultant. To add these hours, we would begin with three full-time equivalents (at an average annual salary of \$16,668 each) for Sunday hours. To open on Saturday as well, another three FTE would be required.

4.4 Student Computer Use Survey

Estimated Cost - \$20,000

A task force report to The University administration entitled, "Universal Student Access to Information Technology Services (Fall 1996)", recommended six action items to ensure that students have effective access to core information technology services. In the spring of 1997, the UT Office of Survey Research conducted a comprehensive survey of about 1,600 students from all colleges and levels. That survey revealed significant information about use and access to technology. An annual survey of students to update the information as new students enter The University should be conducted.

4.5 Electronic Thesis/Dissertation Project

Estimated cost - \$42,560

In 1996, the Graduate Assembly passed a resolution that dissertations would be submitted in digital form by 2004. In response to the resolution, the Vice President and Dean of Graduate Studies appointed an ad hoc committee to study the issues involved and provide recommendations for implementing the resolution. The prototype program and the expanded production programs will involve staff and services from Office of Graduate Studies, General Library and ACITS. ACITS' role will focus on the support for the preparation of the electronic theses/dissertations (ETD) and will assist with specifying a submission process.

Table 2

**Summary of Estimated Costs of
Projects with Annual Recurring Costs**

On-going Operations

4.1 Student Microcomputer Facility Operations*	\$428,000
4.2 Center for Instructional Technologies Operations	\$320,000
Total on-going Operations	\$748,000

New Initiatives

4.3 Expanded Help Desk Services	\$50,000
4.4 Student Computer Use Survey	\$20,000
4.5 Electronic/thesis/dissertation project	\$42,560
Total New Initiatives	\$112,560

Total Request for Additional Funding for Annual Recurring Costs \$860,560

5.0. Proposed One-Time Capital Expense Projects for 1999-2000

We have identified \$2,974,922 of funding needed for one-time special projects (see Table 3). Based on past ITAC funding, about one-third of the capital projects will be funded. We will seek other funding for the remainder of the list and unfunded projects will be shifted into future requests for funding. A brief description of each capital project is given below.

5.1 Telecommunications and Networking Individual Projects

Estimated cost - \$800,000

The nine individual projects listed below indicate that the campus is requiring increasing levels of electronic access and bandwidth, a need that has doubled during the past fifteen months.

5.1.1 Upgrade of Campus Cable System Estimated cost - \$70,000

To meet the growing demand for instructional and teleconferencing video programming across the campus, it is proposed that the cable system be upgraded from its existing equal-split configuration operating at 450 MHz of usable bandwidth to a sub-split configuration operating at 550 MHz. This upgrade would effectively triple the capacity of the system from 30 channels to 90 channels.

5.1.2 Network Master Plan Estimated cost - \$250,000

A master plan for the campus telecommunications infrastructure is proposed to serve both as a benchmark and a roadmap for this resource's development, organization, and management.

5.1.3 Core Router/Switch Upgrades Estimated cost - \$250,000

It is proposed that the core routers in the Network Operations Center be upgraded to support the current hardware/software standards for UTnet backbone services and that three additional switching hubs be acquired to replace existing repeater-type concentrators. It is proposed that appropriate spares and memory upgrades be acquired for the remaining core routers.

5.1.4 Mail Server Upgrade. Estimated cost - \$50,000

In anticipation of additional subscription to University Mail Box Service and an observed increase in the use of the service by each subscriber, it is proposed that the system be upgraded with additional processor capacity.

5.1.5 ATM Investigation Estimated cost - \$50,000

We will investigate how ATM-based technology can most effectively be integrated into UTnet by implementing a pilot project with an appropriate department or college.

5.1.6 Multicast Investigation Estimated cost - \$0

We will evaluate how Internet multicast technology can be employed across UTnet in the delivery of multimedia services.

5.1.7 Network Authentication Estimated cost - \$0

It is important to develop hardware/software to enable user authentication across UTnet. This will permit student access from private dormitories and open network connections on campus. This effort will also initiate the essential infrastructure for a University certificate authority.

5.1.8 Docking Facility Investigation Estimated cost - \$30,000

An important infrastructure concern of ACITS is the provision of network connectivity for student-owned portable microcomputers. One way to facilitate student use of laptop computers is to provide a link to the academic campus network for these laptops, UTnet, from various places on campus. Locations equipped with network ports for laptops are called "docking stations." This proposal recommends prototyping various docking station configurations to allow students to connect portable computers to UTnet.

5.1.9 Upgrade of the Switch for the Student Microcomputer Facility Estimated cost - \$70,000

The Student Microcomputer Facility network equipment has exceeded its projected lifespan and is overdue for replacement. The proposed network will bring the facility up to modern security standards and provide for an exponential increase in bandwidth.

5.1.10 Wireless Technology Evaluation Estimated cost - \$30,000

Wireless technology is actually a series of technologies, some of which are quite mature, while others are emerging. The current ones in use include wireless modems via cellular communication, infrared wireless, various spread spectrum schemes, and narrow band microwave. A small pilot project is proposed to evaluate three wireless technologies in typical applications: Wireless cellular modems (28.8 Kb/s), around the city; Spread spectrum (2-6Mb/s), around campus; and Infrared (up to 10Mb/s), in the classroom.

5.2 Academic Computing Individual Projects

Estimated cost - \$1,614,922

5.2.1 Help Desk Furniture and Facilities Estimated cost - \$42,000

The current Help Desk acquired all of its furniture from surplus. As a result it does not have a professional appearance and is not configured optimally for efficient use. To improve the image of the Help Desk and to improve the utilization of the workspace and promote the efficient flow of traffic, new furniture should be purchased.

5.2.2 Upgrade of Web Infrastructure Estimated cost - \$232,000

In just a few years, the World Wide Web has become essential technology for The University. Hundreds of thousands of Web pages are published here. These projects support the necessary infrastructure for the entire University, including student publishers, faculty, staff, and official publishing. Some are pilot or demonstration projects, others improve access speeds. Projects to upgrade the Web infrastructure and services include:

- Web Searching - \$50,000. As the Web grows, the ability to find specific information becomes more difficult. This item is for the purchase of specialized software and hardware to increase the reliability and speed of UT Austin search features.
- Web Central - \$80,000. Increase reliability and speed of Web access to the central server and purchase of a faster file storage device.
- Department Web Services - \$12,500. Create a production Web service (department scaled), offering Front Page publishing, active server pages, and other requested NT functions.

- Media Streaming and Collaboration tools - \$50,000. Applications built upon the Web can assist in information dispersal. They include audio/video streaming, media databases, collaboration tools, support for classroom specific Web tools, and workstations to digitize audio and video data.
- Electronic Commerce - \$10,000. Install and support a Microsoft site server, providing a production server for sales and the authentication of transactions.
- Hardware and Software Development Tools for the Web - \$9,500. Acquire and test and test new hardware and software tools for the Web.
- Instructional Cold Fusion/MS SQL Services - \$20,000. Implement a Windows NT-based service machine using the Cold Fusion Web-to-database gateway and Microsoft SQL Server for segregating transient CF/SQL students from production departmental services.

5.2.3 Additional Distributed Computing Support

Estimated cost - \$411,000

In addition to the Web, technologies such as e-mail, printing, thin client support, operations monitoring, license serving, access from outside utexas.edu, authentication, and authorization all support the individual student, faculty or staff members using PCs or Macs from their offices, homes, labs, or out of town locations. Behind the scenes, ACITS provides enterprise-wide servers and services to support individuals and departments with their local resources. Specific projects in distributed computing include:

- Advanced E-mail - \$200,000. E-mail distribution lists continue to grow and replacing the current disk system with hot swappable disks (\$5,000) will increase reliability. The larger project is to provide an integrated approach for sophisticated and remote e-mail needs beyond those provided in University Mail Box Service: mobile support through IMAP service with user determined disk quotas, mobile support for users not in utexas.edu domain (SMTP relay), virtual host names (mbox.department.utexas.edu), Telnet access for the mobile user, mail aliases (more than one), and other advanced needs. This service must be highly reliable and available and easily accommodate growth. Implement a Microsoft Exchange based service that will provide an enterprise-wide mail service along with calendaring and workflow.
- Printing Service - \$65,000. The distributed print service continues to be one of the most heavily used services on campus: over five million pages last year. Upgrades (\$35,000) are needed to the current five print servers and the authentication server. In addition, a new generation print service must be developed (\$30,000 for hardware) to support the expanding scale and departmental requests. Buy-versus-build strategies will be carefully evaluated for the software. There are standards being developed for network printing that may serve our needs. These standards will provide authenticated printing across different operating systems. This item includes the purchase of such software.
- Thin Clients - \$38,500. The cost of individually administering a single workstation is high. These costs can be reduced by using thin clients (X-stations, network PCs, NCs, zero administration software) or software. This pilot project will implement several models for evaluation. Thin clients are not the answer for all, but in cases where costs must be controlled or administration effort must be reduced, thin clients may prove extremely useful.
- USENET News - \$60,000. The 15,000 newsgroups provide coverage of every subject imaginable and every class on campus can have its own newsgroup for intra-class discussion. Currently over three hundred simultaneous readers can be supported and over 2GB of data are being processed daily. This project will expand the disk service so that more of the newsgroups can be supported and retained for longer periods, as requested by the users. More of our users will be using the new Road Runner cable modem service and other ISPs. These users require authenticated news service. Currently, we can only accommodate local campus users. This item includes the development and deployment of this new service.
- License Serving - \$8,000. An antiquated AIX machine is being used to serve licenses to our timesharing machines and department servers. This project, if funded, will replace this machine with a new and more reliable configuration.
- IRC Chat, for collaboration - \$30,000. Internet Relay Chat, IRC, is one of the most popular pieces of collaboration software today. ACITS used to host chat services and it was one of the world's largest (number three). However, hosting it upon a general purpose timesharing machine became problematic due to frequent security problems. This project will install an independent server to mitigate the security problem. This includes the cost of the server, a part-time person to run the services (which we estimate to be very time-consuming), and staff equipment.
- Hardware and Software Development Tools - \$9,500. This involves the acquisition and testing of new hardware and software tools for use in timesharing facilities and workstation laboratories.

5.2.4 Timesharing and Workstation Facilities

Estimated costs - \$238,500

For the next several years, ACITS will continue to support the more than ten thousand people using specialized workstation facilities and timesharing machines. These platforms include NT, SUN, DEC, and IBM. These platforms also provide personal Web publishers, including those who develop Web pages on their own PC/Mac and then upload the pages to these servers. While subscribers to the traditional timesharing services will continue to decline over time, the services described below still provide an economical platform for network access.

- System backup server - \$60,000. With the increasing capacity of disks, the need for more backup capability is rising rapidly. This project provides a second backup server for timesharing, campus-wide servers, and department subscribers.

- Windows NT client systems - \$25,000. Five (5) multimedia Intel/WNT client machines for use by students, faculty and staff in the Academic Workstation Lab (ACWL) will provide access to Windows NT for people wanting to learn or use this system.
- Windows NT server upgrades - \$9,500. This project implements a 100 Mb network for NT and adds a backup domain controller for the WNT domain authentication. The controller will be located outside of the Computation Center building (COM) machine room for improved reliability (in the event the network fails in COM).
- NT storage upgrades - \$84,000. The purchase of a Netapps box for the WNT domain, DLT tape drives, and a shared file system with VMS for extra reliability boost the data capacity and reliability of NT services. The NT services are available for file storage, printing, and Web publishing as well as productivity applications.
- Increase reliability of UNIX Timesharing Systems (UTS) - \$15,500. Seven thousand people currently use the UTS timesharing for personal Web publishing, network access, compilers and other UNIX work. By providing a separate file server, UTS will have enough nodes to be able to upgrade one while the other keeps running.
- Improve Computation Center Workstation Facility (CCWF) performance and reliability - \$35,000. Over 7,000 users are served by CCWF (up to 200 at a time). This item is to add another compute node to alleviate congestion and increase reliability by adding a separate mail and administration server. The new compute node should more than double available computing cycles. CCWF primarily serves students looking for a highly reliable, well-connected Internet presence. CCWF also provides students with a Web presence for their personal Web pages. Disk storage reliability and performance were enhanced this year..
- Hardware and Software Development Tools - \$9,500. This is for the acquisition and testing of new hardware and software tools for use in timesharing facilities and workstation laboratories.

5.2.5 Database Services Estimated cost - \$73,600

Reliable and available database serving has become critical as a basic underpinning of other services (e.g., claiming IF accounts on the Web, getting updates to Dr. Solomon's anti-virus software). ACITS supports Oracle, NT SQL Server, FileMaker Pro, and Access as the primary technologies, and this project replaces obsolete equipment with modern reliable configurations.

5.2.6 Statistical Services Research Support Project Estimated cost - \$15,822

Research support will be expanded by the ACITS Statistical Services group by providing additional SPSS and SAS statistical analysis modules through the ACITS NT Services. The additional modules for both software programs will expand the analytical and presentational capabilities of UT researchers. In addition, providing this software through ACITS NT services will advance the move toward client/server research computing on campus.

5.2.7 Additional Software for UT Connect Estimated cost - \$29,500

This project provides for additional software from vendors to be included in the UT Connect package, without raising end-user costs.

5.2.8 Departmental Cable Management Estimated cost - \$49,500

Individual departments and colleges are hard-pressed to manage their internal data cable plants. Tasks include knowing where cables are located, to what they are connected, and what is their network address. This pilot project, with several departments, establishes a new service whereby ACITS does the local department cable management.

5.2.9 Computer Architecture Support and Design Estimated Cost -\$120,000

Helping departments allocate their computing resources efficiently and effectively is very important. This item is for two employees to provide expertise to the departments. These positions will provide architecture design and support for their intranets, computing infrastructure so that their services can run on highly reliable, secure, high performance systems. Typical department services include e-mail, Web server, mailing lists, file service, faculty and staff desktops, and labs. These positions will provide for capacity planning to more effectively allocate costs, performance to allow the department to get the most out of their resources and reliability of those services.

5.2.10 Upgrade Student Microcomputer Facility Hardware/Software Estimated cost- \$60,000

The Student Microcomputer Facility went through a much-needed refit of all workstations and servers during the summer of 1997. Although this equipment should remain very useful for at least three years, there will be unscheduled equipment maintenance and software upgrades.

5.2.11 Microcomputer Testing Facility Estimated Cost -\$100,000

In order to meet our obligations for support of the new Campus Computer Store, future bulk purchases and faculty computer initiatives, departmental site tests, as well as being able to provide campus computer configuration recommendations, Departmental Services must enhance its computer testing capabilities. This project requires servers, workstations, testing equipment, and software to ensure that we can accurately quantify testing results for local publications and reports.

5.2.12 Computer Security Support Estimated Cost - \$60,000

Security on this campus is a growing problem. This item is for a security professional and staff equipment. This person would be the point of contact for security incidents and distribution of relevant security documentation.

5.2.13 Mailing List Service Estimated Cost -\$30,000

The campus mailing list service is growing. More departments and organizations are using e-mail to communicate with their constituents. This item funds a faster and more reliable service. We house over 1,500 mailing lists with over 112,000 subscribers. Housing and Food recently created a 5000 member list of dorm residents.

5.2.14 Vanity Domain Service Estimated Cost - \$20,000

Many departments and organizations want top-level Web domain names. They want to have www.kut.org or www.tenet.edu as their Web site. We do this for several organizations. This item is to increase the reliability of this service.

5.2.15 Corporate Database Estimated Cost - \$80,000

Much of the information at this university is decentralized. In order to serve our customers, we have to collect and maintain information about them, their access, and how they use our services. This information is stored in a centralized database. This item is to build a highly

reliable database server, available continuously. This item also includes extending the existing database software license.

5.2.16 Enhanced Printing Clients Estimated Cost- \$20,000

New desktop printing client software needs to be developed to take advantage of the spooling and printing services that are found in NT and UNIX systems. Besides the work that would be required for Windows 95, Windows NT 4.0, and the current Mac OS, we also have to work on Windows 98, Windows NT 5.2.0, and Apple's new Rhapsody operating system. Approximately 25% of a Mac and PC programmer could do the job.

5.2.17 Media-Rich, WEB-based Tutorials and FAQs Estimated Cost - \$33,000

In cooperation with staff and graduate students from Library and Information Sciences, ACITS Training Services staff will design and develop media-rich Web-based tutorials to supplement existing technology training. ACITS Training Staff will serve as content experts, and graduate students from GSLIS will serve as a coding and production crew. This will enable us to make our services more widely available, and it will help more students gain experience in Web production. The resources necessary for this joint project are 3 high-end multimedia development machines, a digital video camera, and funds for graduate students.

5.3 Instructional Technologies Individual Projects Estimated cost- \$200,000

5.3.1 Upgrade CIT Lab with 3D Graphics software Estimated cost -\$10,000

The CIT is developing an introductory course in 3D computer graphics for students which requires specialized software. This software will be the primary mechanism used by the students to create and experiment with three-dimensional graphics.

5.3.2 Upgrade the CIT Lab with 100baseT networking Estimated cost -\$7,500

The digital multimedia in use by students and faculty at the CIT is straining the local 10baseT network. The Visualization system, project server, and streaming media server are particularly affected by the network bandwidth. Upgrading the network to a switched 100baseT network is needed.

5.3.4 Upgrade the CIT Lab microcomputer equipment Estimated cost -\$48,000

The microcomputer systems in the lab used by students and faculty are becoming dated. The eight Macintosh 8500 systems need to be replaced with Macintosh G3 or G4 systems with 256Mb of RAM, and four PC units need to be upgraded to Pentium II dual processors with 256Mb of RAM.

5.3.5 Upgrade the CIT Lab video capture and edit Estimated cost -\$20,000

The Lab needs improved facilities to allow students and faculty to capture and edit video. This will produce higher-quality compressed output as well as a good archiving medium for future re-purposing or re-use, and printing to tape full-screen video. Included is the purchase of a DVCAM format camcorder.

5.3.6 Exploration of e-book use Estimated cost -\$3,000

Electronic books (e-books), are lightweight, tablet-size devices that can store and display books and articles, and they are new to education. The CIT should purchase a small number to test with faculty and students, and to provide a springboard for ideas as faculty prepare materials to publish for use on e-books.

5.3.7 Equip the CIT Lab with a SmartBoard Estimated cost - \$8,000

The SmartBoard is a portable, combination white board and touch-sensitive computer screen allowing control of sophisticated multimedia presentations. A SmartBoard is needed for use in training and workshops for students and faculty in the CIT Lab. Additionally, it could serve as a prototype for other Technology Classrooms campus.

5.3.8 Establish a CIT Courseware Production Studio Estimated cost -\$60,000

A production studio is needed to provide faculty, students and CIT staff dedicated access to high-end Macintosh and PC workstations, rewritable CD-ROM burners, and input and output peripherals for the developing quality courseware materials four use by students.

5.3.9 Funds for FAST-Tex Estimated cost -\$43,500

ITAC funds are requested to support students involved with the "Faculty and Student Teams for Technology" (FAST-Tex) program initiated in 1997. The funds are to be used solely for support of students working with faculty projects geared toward incorporating technology into courses. Funds will be used both for student salaries and for purchasing laptop computers on a vendor-matching 2-for-1 basis. (Many FAST-Tex students have stated they would prefer a laptop computer in lieu of salary.

5.4 Relocation Costs Estimated cost- \$300,000

5.4.1 Relocate Help Desk to Varsity Center (VRC) Estimated cost -\$120,000

Due to expansion of the Natural Sciences Dean's offices in W. C. Hogg building, the relocation of the ACITS help desk is necessary. The University has subsidized \$137,625 of the cost of renovation and networking (total of \$278,000), but the remainder must be paid by ACITS. Therefore, we are requesting \$120,000 from ITAC to defray part of the costs. This new location should provide superior services to student users.

5.4.2 Relocate CIT to Flawn Academic Center (FAC) Estimated cost -\$180,000

Due to the growth of computing efforts in the College of Business, ACITS must relocate the Center for Instructional Technologies (CIT) to FAC. The University will pay for approximately \$100,000 of the total estimated cost of \$350,000. Therefore ACITS is requesting ITAC support in the amount of \$180,000 to help defray the renovation and networking costs. The location of the CIT next to the Student Microcomputer Facility (SMF) should provide many synergies as students begin to increase their use of multimedia tools in their educational endeavors.

Table 3

Estimated Costs of Proposed One Time Capital Expense

Projects for 1999-2000

5.1 Telecommunications and Networking		
5.1.1	Upgrade of Campus Cable Systems	\$70,000
5.1.2	Network Master Plan	\$250,000
5.1.2	Core Router/Switch Upgrades	\$250,000
5.1.4	Mail Server Upgrade	\$50,000
5.1.5	ATM Investigation	\$50,000
5.1.6	Multicast Investigation	
5.1.7	Network Authentication	
5.1.8	Docking Facility Investigation	\$30,000
5.1.9	Upgrade Switch in Student Microcomputer Facility	\$70,000
5.1.9	Wireless Technology Evaluation	\$30,000
	Total for Telecommunications and Networking	\$800,000
5.2 Academic Computing		
5.2.1.	Help Desk Services	\$42,000
5.2.2	Upgrade WEB Infrastructure	\$232,000
5.2.3	Additional Distributed Computing Support	\$411,000
5.2.4	Upgrade Timesharing and Workstation Facilities	\$238,500
5.2.5	Expand Database Services	\$73,600
5.2.6	Stat Service Research Support	\$15,822
5.2.7	Additional Software for UT Connect	\$29,500
5.2.8	Departmental Cable Management	\$49,500
5.2.9	Computer Architecture/Security	\$120,000
5.2.10	Upgrade SMF - Hardware/Software	\$60,000
5.2.11	Microcomputer Testing Facility	\$100,000
5.2.12	Computer Architecture Support and Design	\$120,000
5.2.13	Mailing List Service	\$30,000
5.2.14	Vanity Domain Service	\$20,000
5.2.15	Corporate Database	\$80,000
5.2.16	Enhanced Printing Clients	\$20,000
5.2.17	Media-Rich, Web-Based Tutorials and FAQs	\$33,000
	Total for Academic Computing	\$1,614,922
5.3 Instructional Technologies		
5.3.1.	Upgrade lab with 3D Graphics Software	\$10,000
5.3.2	Upgrade lab with 100baseT networking	\$7,500
5.3.3	Upgrade lab with microcomputer equipment	48000
5.3.4	Upgrade lab with video capture and edit	20000
5.3.5	Exploration of E-book use	3000
5.3.6	Equip the lab with a SmartBoard	8000
5.3.7	Establish a CIT Courseware Production Studio	60000
5.3.8	Funds for FAST Tex	43500
	Total for Center for Instructional Technologies	\$200,000
5.4 Relocations Costs		
5.4.1.	Relocation of the Help Desk to VRC	\$120,000
5.4.2	Relocation of the CIT to Flawn Academic Center	\$180,000
	Total Relocation Costs	\$300,000
	Total Funding Request for One-Time Capital Expense Projects	\$2,974,922

6.0 Technology Funding Overview and Life Cycle Methodology

Technology Funding Overview

Inasmuch as the purpose, mission and vision of ACITS is the provision of information technology services, all expenses incurred in the operation of Academic Computing and Instructional Technology Services are categorized as information technology expenses. There are three major sources of funding for the organization: State funds - AUF; ITAC funds; and income generated from services and sales. In addition, ACITS receives reimbursement from the NSF NPACI grant funds for

expenses incurred in the provision of high performance computing services

Life Cycle Methodology

ACITS has informally established a life cycle for computer equipment and software of three to four years. Replacement of hardware and upgrading software is funded from earned income.

Appendix A

Summary of Information Technology Expenditures

1997-1998

Expense Category	18 - Accounts	19 - Accounts (ITAC)	20 - Accounts	Total
Adm. and Professional Salaries	\$947,530	\$51,444	\$4,346,467	\$5,345,441
Classified Staff Salaries	\$1,182,646	\$163,477		\$1,346,123
Fringe Benefits	\$508,894	\$53,526		\$562,420
Wages	\$682,868	\$15,451		\$698,319
MO&E	\$2,316,279	\$2,190		\$2,318,469
Maintenance Shop - Parts	\$78,011			\$78,011
Travel	\$55,654			\$55,654
Special Equipment - Special Projects	\$143,154	\$541,957		\$685,111
Total IT Expenses	\$5,915,037	\$828,045	\$4,346,467	\$11,089,550

Itemization of Computer Equipment Expenditures

University Object Code/Description

1401/Consumable Office & Computer Supplies	\$125,298			\$125,298
1481/Maintenance & Repair - Computer Hardware	\$27,534			\$27,534
1487/Maintenance & Repair - Computer Software	\$338,783			\$338,783
1830/Furnishings and Equipment - (Capitalized - "e \$1,000		\$22,551		
1836/Furnishings & Equipment - (Not Capitalized "d \$1,000)		\$9,150		
1840/Purchase of Computer Equipment (Capitalized - "e \$1,000)	\$288,711	\$371,830		\$660,540
1841/ Purchase of Computer Software (Capitalized - "e \$1,000)	\$168,159			\$168,159
1842/Computer Software & Manuals (Non Capitalized \$0.00 - \$999.99)	\$236,807	\$56,214		\$293,021
1846/Purchase of Computer Parts, Furnishings, Equipment (Not Inventoried or Capitalized - \$0.00 - \$499.00)	\$104,685	\$42,847		\$147,531
1847/Purchase of Computer Parts, Furnishings, Equipment (Inventoried, not Capitalized - \$500.00 - \$999.00)	\$12,099	\$7,791		\$19,890
1860/Telecommunications Equipment - "e \$1,000	\$15,797			\$15,797
1781/1787/1788 Telecommunications Parts and Supplies		\$3,108		
Annual Line Charges		\$28,467		\$0
TELESYS Lines - SW BELL	\$164,416			\$164,416
CITY of AUSTIN - CABLE	\$4,869			\$4,869
TELESYS LINES - TIME WARNER	\$374,354			\$374,354
Total Hardware, Software, Equipment	\$1,861,510	\$541,957		\$2,340,191

Appendix B

Summary of Information Technology Infrastructure

1997-1998

1.0 Network Status

Established in 1987, the Networking Services group of U.T. Austin's Academic Computing and Instructional Technology Services (ACITS) organization maintains UTNet. UTNet is a campus-wide high speed digital data network available to all computer users on the UT Austin Campus. UTNet also comprises a core set of network-based services which are made available to all of its users. Some additional services are supplied by the U.T. System Office of Telecommunication Services.

UTNet has grown over the last ten years to become what it is today: an information resource that is essential to the academic, research, and business operations of the university. Recently, the UTNet backbone network has been re-engineered, which has resulted in a large increase in network performance. The new Ethernet switching core is the current backbone system to which all new and renovated building networks are attached. The complete UTNet system is actually several systems linked together. While some technologies have been replaced, much of the equipment that has been installed over the years is still in use. As such, the UTNet system includes several generations of equipment reflecting the rapid evolution of networking technology.

UT Austin is the largest university in the United States, and consequently the campus network serves a community of approximately 70,000 people (48,000 students and another 20,000 or so faculty and staff) in over 100 buildings on the main campus and at several other locations in Austin. Ten years ago, UTNet served a mere 400 computers located at about 20 sites. By 1992 the number of connected computers had increased to 4,000. From 1994 on, the combination of the World Wide Web and the widespread adoption of low cost, high performance desktop computers led to an explosion in network access and utilization. Currently there are approximately 30,000 computers on UTNet, a number that is roughly twice as large as the number of telephones on campus. The current population includes some 3,000 computers on the ResNet system, a 6,500 port dormitory network for students who live on campus. More than 40,000 dial-in user accounts are supported by the 2,900 lines of the Telesys dial-in system, and over 55,000 users have e-mail accounts on the mail.utexas.edu system.

There are nearly 500 Web servers on campus, with approximately 300,000 pages of information being indexed on a regular basis. Currently, 75 percent of UTNet traffic is Web-related, with hundreds of Web traffic flows per second (each flow is the result of a "Web-click") being delivered by the backbone routers during the busy part of the day. There has been a 8,663 percent increase in the number of assigned IP addresses ("hosts") from November, 1988 to May, 1998. Traffic moved across the UTNet backbone by routers was measured at 68 billion bits per busiest weekday in April, 1993. That level of traffic has increased by 3,429 percent to 2.4 trillion bits per day in May, 1998.

While everyone depends upon the UTNet system to get their work done, few people ever think about the network and fewer still know how the network functions. Instead, everyone simply assumes that the network will be there when they need it. This level of confidence is an appropriate response, since no one using e-mail or the Web should have to know how the underlying network system operates. This level of confidence is also a powerful indicator of how successful the UTNet system has been in delivering reliable, production quality services 24 hours a day, seven days a week. From the outside, the network appears to most users as something so reliable that they can take it from granted. However, a look "under the hood" at UTNet reveals a complex and dynamic system in a constant state of change.

2.0 Technology Classroom Inventory

Academic Computing and Instructional Technology Services has one technology classroom, construction recently completed. This classroom is located in the Computation Center building, Room 8.

Appendix C

Summary of Facilities, Services and Staffing

1997-1998

UT Microcomputer Teaching Facility

The Microcomputer Teaching Facility (MTF) in the Thompson Conference Center has both PC and Macintosh classrooms. The computers in these classrooms are connected with a local-area network, and each has access to the campus timesharing computers. In each lab, an instructor's workstation is connected to a projector, which displays output from the instructor's computer on a wide screen on the front wall of the room. The projector can also display a video signal from an ordinary VCR player. The MTF is used primarily for Academic Computing and Instructional Technology Services workshops, but is also available to Continuing Education programs, regular academic classes, and other special meetings and seminars.

Output Services

ACITS provides access to medium quality color printing and 600 dpi black and white printing either through a timesharing system or from desktop systems via the Print Relay Services (PRS). Printers are located in several labs on campus including the Student Microcomputer Facility (SMF), the College of Communications microcomputer facility, the College of Engineering, the College of Fine Arts, the Nursing School, the College of Business, the department of Physics and the University residence halls. Any student, faculty or staff member with an ACITS individually funded (IF) user number, validated for a timesharing system or PRS, may have access to the print service.

Consulting

ACITS offers several kinds of consulting. Consulting is available for Web applications, UNIX, VMS, NT, graphics, desktop systems and statistical/mathematical and database applications. Consultants provide guidance for faculty, staff, and students encountering complex applications for the first time. Consulting can be arranged on a cost recovery basis, provided staff members are available, for more in-depth tasks requiring extended periods of effort.

Desktop Computing and LAN Support

In addition to consulting on microcomputer topics, the departmental services group assists with system and network configurations and manages the Student Microcomputer Facility in FAC 212. The Departmental Services division also provides an "on call" and "carry-in service" at reasonable fees to help campus users fix or make better use of their equipment. Contracts with campus units can also be established to run student labs and to offer continuous on-site support. Departmental Services also does in-depth evaluations of computer systems for eventual recommendations as campus standards.

Software Distribution Services

Software Distribution Services (SDS) at ACITS actively pursues quantity licensing agreements with computer software vendors so UT students, faculty, staff, and departments may purchase software for personal computers, workstations, and servers at greatly reduced prices. Since 1988, SDS has negotiated software licenses for UT Austin and for other UT System components. The number of license programs has grown from a few at that time to twenty-seven programs today. Most recently, UT Austin negotiated a comprehensive four year license with Microsoft on behalf of the UT system that provides all faculty, staff and students low-cost

access to their standard software.

In addition to providing software packages, SDS performs a variety of administrative tasks to maintain the license programs. Each program is unique, and SDS must carry out the terms and conditions of each of the vendor's license agreement. SDS keeps complete records for every software product purchased by an individual or department, for UT Austin and for other component institutions in the UT System. Depending upon the license agreement and the software restrictions, distribution is made available for departments, faculty, staff, or students. SDS is working to provide better software discounts and programs, and we are working with other campus units to improve one-stop shopping.

Consulting for SDS software is provided by ACITS' Help Desk staff and expert consulting groups. SDS works with consulting staff to provide informational documents, such as installation instructions, and to review the software before distribution.

Documentation

ACITS publications staff publish newsletters and other materials that describe the services and software supported by ACITS for use by students, faculty, and staff of The University of Texas. ACITS' newsletter, Current ACITS, is published monthly, contains up-to-date information about information technologies, see <http://www.utexas.edu/cc/newsletter/>. ACITS also publishes jointly with other campus IT organizations, IT-Quicknotes, a weekly mailing of timely information technology on events and activities. In addition, this group collaborates to produce online help and, self-paced tutorials, internal staff documentation, and Web publishing services and publications. In 1997-98 ACITS published 62 documents via the World Wide Web in addition to 49 documents on mathematics/statistics applications and 17 self paced tutorials on introductory topics.

Team Web

In cooperation with General Libraries, Administrative Computing Services, and the Ex-Students Association, ACITS participates in TeamWeb, which supports and promotes Web publishing and Web use at The University. TeamWeb coordinates Web publishing activities on campus, provides design services to current publishers, train Web publishers and users, provide consulting to Web users, and maintain the Web central server. All pages signed TeamWeb are maintained by the Team.

Facilities Management for UNIX, VMS and WNT Systems

ACITS assists departments in managing their own computer systems. The service is offered on a cost recovery basis and involves an agreement or appointments between a department/agency and ACITS to manage and or operate their facility. ACITS provides direct management support and capacity planning expertise.

Computer Equipment Maintenance and Development Services

ACITS maintenance staff performs, both preventive and emergency maintenance for most types of computer equipment, including minicomputers, microcomputers, and their peripheral components; some communications devices; and display terminals. Computer equipment purchasers often seek advice about equipment specifications and configurations currently available. The maintenance shop can help install hardware and software for desktop systems.

Data Import/Export and Media Duplication Services

ACITS provides a data import and export service for users who need to move data from off-line media, such as 4 and 8 mm cartridges and CD ROM, to file servers for access.

Telecommunications Infrastructure

ACITS maintains extensive communications networks for user access to The University's computers from desktop computers and workstations and for data communications between computers and with the Internet.

Campus Computer Network

The campus computer network, Utnet, is not a single entity, but a system of networks, equipment, and software that enable information to be sent between campus computers and computer sites all over the world. The network employs both broadband coaxial cable and optical fiber media for inter-building computer communication.

UT Austin is a member of the Greater Austin Area Telecommunication Network (GAATN), which has completed installation of 250 miles of optical fiber to connect educational and government facilities. The Pickle Research Campus and the main campus are connected by optical fiber. UT Austin is connected to the Internet through a common carrier by a 45 Mbps circuit. GAATN is currently chaired by Bill Bard of ACITS.

Within individual buildings, local-area networks (LANs) connect to Utnet by means of routers. These routers perform address filtering to reduce message traffic on the backbone and the individual LANs. The result of this network configuration is that a workstation connected to an Ethernet, Token Ring, or LocalTalk LAN in a particular building has access to the campus-wide network and thence to regional, national, and world-wide networks.

TELESYS High-Speed Modem System

ACITS provides telephone dial-in services on a monthly fee basis (\$7.20 per month) to faculty, staff and students who have a desktop computer and a modem. TELESYS supports multiple communications protocols and includes features for data compression and error detection. Over 3,000 modems are currently in use serving 33,000 subscribers. Most services require a user id and password for authentication. The TELESYS service is also reported in the Office of Telecommunication Services strategic plan. .

Access to National Academic Networks

UT Austin participates in several national networks (vBNS, or very high speed Backbone Network Service) through which its users can exchange mail and files with colleagues at other sites, get access to databases and servers, and remotely log in to other machines. UT Austin is also a member of the University Corporation for Advanced Internet Development (a.k.a.UCAID or Internet 2).

Most of UT Austin's systems are connected to the Internet. Access to the Internet is provided through the Texas Higher Education Network (THEnet). THEnet connects the UT System component institutions, as well as approximately 300 other educational, governmental, and industrial research organizations, to the Energy Sciences Network (ESnet) and to all major Internet backbones operated by commercial Internet providers such as Sprint, ANS, UUNet Technologies, and Performance Systems International.

The University of Texas System Network (UTSN)

The UTSN is an inter-institutional network for carriage, coordination, and integration of voice, video, and computer communications managed and administered

from the network operation center (NOC) located in the Service Building at UT Austin. The UTSN is managed by OTS on behalf of UT System Office of Telecommunications and Information Technology. Management and operational policies for UTSN are established by the OTIT. Policy development is done in collaboration with the UT Clients via the UT System Strategic Leadership Council (SLC) and the UT System Information Technology Management Council (ITMC). Consultation concerning operational procedures, service levels and technical issues is provided to OTS by the UT System Telecommunications Advisory Council (TAC).

Staffing

Retaining and recruiting highly skilled information technology personnel is problematic. In conjunction with the UT administration's efforts to increase staff pay as a result of the Compensation Committee study, ACITS gave many classified IT staff members salary increases. In an effort to keep the student employees who can make as much as \$16.00 per hour (DELL) with no experience, ACITS increased minimum pay across the board for the student employee titles effective 1 September 1998. Currently, ACITS' employs 161 (head count) classified staff, 148.04 FTE and 101 (head count) 47.36 FTE hourly employees. There are also 8 Administrative and Professional staff members (1-Associate Vice President, 2-Deputy Directors, 4-Associate Directors, 1-Research Scientist; 1-Assistant to the Director).

Summary of Classified and Hourly Staff Titles

Classified Staff	FTE
Research Scientist Associate V	1
Technical Staff Assistant V	1
Training Specialist III	1
Executive Assistant	1
Administrative Assistant	4
Senior Administrative Associate	7
Administrative Associate	4
Accounting Technician	1
Manager, Computer Services	13
Senior Systems Analyst	18.72
Systems Analyst	22.75
Computer Programmer	25.75
Computer Programmer/Services Assistant	4
Data Communications Specialist	3
Computer Systems Development Specialist	1
Senior Computer Equipment Maintenance Technician	2
Senior Operating Systems Specialist	15.5
Operating Systems Specialist	4
Documentation Specialist	2
Senior Computer Operations Specialist	4.8
Computer Operations Specialist	3
Network Analyst	2.52
Supervisor, Electronic Data Processing	4
Microcomputer Applications Specialist	1
Senior Procurement Officer	1
Total Classified Staff	148.04

Hourly Staff (students)	FTE
Computer Programmer/Services Assistant	2.85
Computer Operations Specialist	.48
Graduate Research Assistant	1.25
Information Specialist	.48
Senior Student Associate	10.45
Student Associate	30.40
Technical Staff Assistant I	.95
Undergraduate Research Assistant	.50
Total Hourly Staff	47.36