UB Information Technology Environment

The University at Buffalo's information technology (IT) environment supports a rich array of technologies and information resources for academic, research, and administrative use. UB IT services are provided by many different organizations working together to provide shared common services, with specialized services that meet unique needs provided in local units.

Research Computing

UB's Center for Computational Research (CCR) provides cyberinfrastructure for UB researchers who need high performance computing, large-scale data storage and management, and scientific visualization services. CCR support staff includes computational scientists, programmers, and database administrators.

Bioinformatics Resources: The CCR provides extensive scientific and programming support to the Bioinformatics community, providing users with access to enterprise level genomics packages and software for DNA and protein sequence analysis, database search, gene expression analysis, biological pathway analysis, statistical computing, and inferring phylogenies. In addition to access to software packages, CCR staff, who have extensive expertise in bioinformatics, provide researchers with detailed data analysis support as well as custom software design.

Grid Computing: CCR staff focuses on enabling faculty-led research groups to take full advantage of the resources available on the grid. In addition to maintaining the underlying grid infrastructure at CCR, this typically involves educating users on using the grid and assisting them with the modification of their applications to make use of the grid, and the development of grid enabled portals for various applications. CCR also serves as the OSG support center for the NYSGRID Virtual Organization supporting science and engineering applications.

CCR staff members actively participate in several prominent grids including the Open Science Grid (OSG) and the New York State Grid (NYSGRID). As part of their ongoing efforts to enable scientific discovery and foster collaborations, CCR staff members focus on making the grid easy for users to access. They actively participate in the investigation of grid resource discovery tools as well as collaborate with the Cyberinfrastructure Laboratory at UB, the Open Science Grid, and New York State Grid. CCR staff members also assist other institutions with the task of grid-enabling their resources.

Simulation and Scientific and Medical Visualization: CCR has a diverse and extensive capability in scientific, medical, and urban visualization that is available to support faculty-led research projects. This includes development of custom, easy to use 2D and 3D visualization applications complete with graphical user interfaces (GUI's) for faculty-based scientific and medical visualization applications. Expertise in widely used visualization tool kits such as VTK, FLTK, OpenSceneGraph, and OpenGL, as well as extensive experience in the 3D reconstruction of 2D medical imaging data, including CT, MRI, PET and SPECT imaging. CCR staff are capable of developing visualizations of many time varying scientific data sets, including but not limited to: molecular simulations, chemical reactions, and other complex systems.

CCR's Urban Simulation and Visualization Team is widely recognized as an innovator in the field of Urban Simulation and Visualization for the development of custom software packages and development tools for real-time visualization. Most noteworthy is a real-time run engine (TrafficSim3D), written in OpenSceneGraph, that takes the output of traditional traffic simulation packages such as VISSIM and displays the traffic in an existing 3-D environment.

Detailed information on CCR infrastructure and services are provided on the CCR web site.

Other Research Computing Services

Research computing support services are also provided by the central IT organization, local units: schools and departments, and research centers.

Central IT Research Computing Services

Current central IT research resources include the following:

- Compute Cycles: The Condor implementation, a collaborative project of central IT and the CCR, provides unused public site compute cycles to researchers needing capacity; this project currently makes approximately 1.2 TFLOPs of computing capacity available to researchers.
- High availability file storage for researchers
- Research software and software licensing services
- Help Desk: Central IT provides client support to faculty and staff in the NYS Center for Excellence in Bioinformatics in partnership with the CCR and IT staff in local computing units in the schools and research centers.
- Research Collaborations: Web conferencing services (WebEx)
- Research wiki services

Instructional Technology Support and Services

UB's Teaching and Learning Center provides information for faculty on how to use the latest IT and media to enrich course content, presentation, and student educational experiences. UBlearns (Blackboard) provides course management, assessment, communication, and collaboration tools for courses. The WebEx conferencing system enables faculty, staff and students to tap the power of the Internet to hold meetings and virtual classes with people across UB campuses, Western New York, and around the world. High resolution videos from the Instructional Technology Services Media Library can be streamed to classrooms over the UB network.

More than 85% of UB's centrally-scheduled classrooms are state-of-the-art, high-tech, multimedia classrooms. The instructors' podiums provide touch screen control of video and sound systems, and contain computers, VCR/DVD and projections facilities. Many departmentally-scheduled classrooms are similarly equipped. In addition, all of UB's centrally-scheduled classrooms are wired for Internet access. The Instructional Technology Services Technology Classrooms web page provides information on the technology equipment found in classrooms on the North and South campuses. (See the "Classroom Attributes" link for specific information on a classroom.) Many classrooms provide Clicker technology/audience response systems.

UB is a leader in state-of-the-art digital course capture infrastructure and course-casting/streaming, providing students with audio- and video-recordings of lectures that can be accessed from student mobile devices, including iPods and other MP3 players and laptops, as well as from desktop systems. Students access the recordings through our course management system, UBlearns, and through a UB-branded iTunes U web site.

UB also has an active distance learning program with classrooms (Baldy, Bell, Abbott) equipped with real-time distance learning and videoconferencing.

The Central Computing Organization

The central IT organization provides the UB community with a broad range of common computing, telephone, and state-of-the-art networking services, and works with distributed IT partners across campus to coordinate the planning and delivery of campus IT resources and services. Geographically distributed IT staff provide direct support to faculty and staff using technology in their instructional, research and administrative activities. For more information about central computing services, please see the http://ubit.buffalo.edu web site.

Campus Network Infrastructure

The University at Buffalo's campus network is supported by an extensive fiber optic infrastructure which extends to all campus buildings across three campuses.

Current campus network infrastructure includes a 10 Gigabit Ethernet backbone in the core with 1 Gigabit Ethernet dual-attached links to every building. A recently completed UBNet edge switch replacement project upgraded communication closets and resulted in gigabit desktop connection speeds, an increase from the standard switched 100-Mbps Ethernet.

The network includes interconnections with several local, regional, and national networks including the Western New York Health Science Consortium, NYSERNet, SUNYNet, the Commodity Internet and Internet 2 via Abilene. The campus Internet (I1) and Internet2 (I2) links have been upgraded to 1 Gbps and 200 Mbps respectively. The next I1 link upgrade will be to 2 Gbps.

The University has played a leadership role in the community by bringing together city, county, and state agencies in the development of a "dark fiber" (fiber optic) broadband network infrastructure that faculty, students, and professional staff use in collaborations with local higher education and K-12 institutions, health care institutions (hospitals and research institutions), and government organizations. This regional fiber optic infrastructure connects the campus to remote research facilities, our regional partners, and commercial points of presence, providing gigabit connections to our research partners and a backbone for local not-for-profits.

Wireless Access

The University wireless network has become a critical resource for the UB community, as more and more of our faculty, staff, and students own and rely on multiple mobile devices, including WiFi-enabled cell phones, PDAs, laptops, and MP3 players, for a multitude of services. UB provides secure wireless network access for these devices.

CIT continues to expand wireless network access. At the end of 2009 there were approximately 1157 wireless access points deployed throughout the campus and the wireless build-out was 50% complete. More than 10,000 simultaneous users can be accommodated by our wireless network. The UB Wi-Fi expansion upgraded all existing wireless access points to current code levels to support both the Wireless "G" and "A" standards. In addition, the wireless infrastructure was recently converted to a centrally-managed system, allowing for more efficient maintenance of the large number of access points deployed. 802.1x support was added to provide secure encrypted authentication and data transmission.

Residence Halls Network

All residence halls and UB apartments are wired with Ethernet for Internet connectivity, providing one data connection or port per resident. Most residence halls and UB-owned apartments provide 100 Mbps desktop connectivity.

Telephones

As noted above, a new IP-based voice system (VoIP) is now being deployed. UB is also partnering with a vendor to reinforce the campus cellular network to provide better coverage for cell phones.

Enterprise Hardware Platforms

CIT maintains more than 200 SUN servers providing the following campus services:

- directory and authentication
- timesharing
- administrative applications for University business and student service systems
- nameservice
- web hosting
- email
- news
- file storage
- tape backup

An IBM mainframe running the OS/390 operating system also hosts University business and other administrative applications.

Campus Computing Labs

At present there are more than 2400 personal computers and high performance workstations in campus labs for students. General access facilities, open to all students, feature more than 400 Dell OptiPlex 745 Minitower: Intel Core 2 Duo Processor (2.13 GHz, 2M, 1066 MHz FSB) running Windows. Two of these public sites are configured as dual boot Linux/Windows systems. Many departmental labs offer specialty software for course work and are open 24 hours/day.

UB2020 IT Transformation

In 2004 the University at Buffalo began the IT transformation as part of its UB2020 strategic plan to achieve academic excellence. Quality metrics for the IT transformation included lowered costs, streamlining of critical processes, and improved performance.

IT Transformation projects underway include the following:

- Rollout of a single consolidated VoIP telephone system across campus, consolidating 80 disparate telephone systems
  - Annual cost savings to the campus are projected to be approximately $750,000 when the project is completed.
- Workstation Standardization
  - This initiative has produced cost reductions in hardware and software procurement and standardization of $2.5M annually
- Server and Services Consolidation projects, including consolidation of:
  - Email services
  - File/print services
  - Database services
  - Managed workstation services (antivirus, patch management)

  At the start of the consolidation, there were approximately 1350 servers distributed in locations across our campuses. Consolidation of servers in shared service data centers produces cost reductions, frees up valuable unit space, and provides secure, high-availability services.
- Campus IT Shared Service Desk (Help Desk) Initiative, currently being piloted by the central IT organization and the Schools of Management and Social Work

- Strategic Information Reporting/business intelligence and analysis initiative
- Student Systems ERP Transformation
- New business systems for procurement (eReq), e-commerce (ePay), and human resources (ePTF)

A new campus IT governance/advisory committee structure was established in the 2006-07 academic year.