The UNC Office of Information Technology Services (ITS) handles everything from email and individual desktop/laptops to large research projects, administrative offices, electronic medical records, and communications services that include a campus data network, fiber and microwave technology, and support for smartphones, mobile and wireless devices. They strive to provide a state-of-the-art environment that will support the highest level of multidisciplinary research and help UNC-Chapel Hill become the premier research university in the U.S.

ITS has major computing equipment that is available to researchers through the University’s central services. These include: a large multi-processor workstation cluster running the Unix operating system with access to terabytes of storage; a robotic tape cartridge system with multiple drives used by a variety of centrally-provided machines for backup and archival; an IBM 3090 computer running MVS/ESA with JES2 and VM/CMS both under VM/XA (a large water-cooled mainframe with a vector (supercomputer) facility); 52 IBM 3380-type disk drives (at least 80 billion bytes); 1 STK 4400 automated cartridge system that is a robotic retrieval system capable of storing 6,000 high-density tapes and delivering them to users within 30 seconds; several local 3174/3274 controllers; 9 STC 3670 tape drives (6250bpi); computer tape backup in separate buildings. Also, UNC has 10 megabit per second switched ethernet to the desktop, 100 megabit connections to all campus buildings, and gigabit connections to the larger Internet as an early adopter of Internet II. The North Carolina Supercomputer Center is located in the Research Triangle Park between Chapel Hill, Raleigh, and Durham. The Supercomputer Center has a Cray Y-MP/432 with associated equipment. The UNC-Chapel Hill data network currently supports more than 40,000 users with approximately 90,000 connected devices in more than 300 buildings with high-speed interconnectivity between buildings. The core routing architecture consists of a redundant infrastructure with 40 Gbps inter-switch connectivity and multiple 10 Gbps links to redundant border routers. The campus network has more than 4000 Ethernet switches and more than 5000 Wi-Fi access points.

UNC connects to the statewide network, NCREN (North Carolina Research and Education Network), that provides connectivity to all schools in the UNC system, all K-12 schools in the state of North Carolina, many private colleges and universities, community colleges, state government, and the North Carolina TeleHealth Network (NCTN). Through NCREN, UNC-Chapel Hill connects via IPv4 and IPv6 to Internet2 for connectivity to other universities across the country and to multiple ISPs for commodity Internet services.

An extensive library of software is available on the UNC campus via site licenses or volume purchase agreements. The collection includes all the common statistical analysis languages and packages (SAS, Stata, S-Plus, SPSS-X, BMDP, SUDAAN, etc.); development languages (C++, C, Java, PL/1, Fortran, etc.) Packages such as SAS are available on multiple platforms. An analysis can scale from the smaller capacities of a personal computer, then on to the larger capacities of a departmental Unix workstation and finally to the multiple-processor workstations and clusters provided centrally by the campus information technology organization.

Client Services, a group within the UNC School of Medicine Office of Information Systems, provides computer support and problem resolution to all members of the School of Medicine. Computer support consists of telephone triage and ad-hoc solutions for walk-in and deskside support as well as student and faculty laptop support. Client Services provides several free services including LDAP email accounts with 20 megabytes of server storage space, Lyris lists, installation & upgrade of supported medical school software, access to the Internet and network connectivity.

Educational Technology Group (ETG) provides web, digital media, and video conferencing services. Their staff includes professional web designers, web application developers, video producers, and video engineers. ETG works with faculty to develop curricular materials for the online curriculum. ETG also develops non-curricular projects including websites, database applications, and videos/digital media on a fee-for-service basis. The Network Services staff provides the technical support for the School of Medicine network. They configure, install and monitor the electronic switches that make up the School of Medicine network backbone in concert with ITS Networking. They also install and activate new network ports throughout the School of Medicine. The Systems Group provides support for centralized computing resources for the School of Medicine in support of the School’s mission. The Systems Group manages School wide resources including host name registration, web services, and electronic mail; and local resources such as departmental file and print services. The Systems group consists of two sub-units that include Microsoft Systems Administration and Unix Systems Administration.

The Research Computing division of UNC-Chapel Hill provides expert scientific and information technology consultants and cyberinfrastructure to the scholarly and research community of the university. The consultation staff includes nine scientists and scholars who have experience across a wide range of disciplinary communities from the physical sciences to the life sciences, from the computational sciences to clinical research, from social/behavioral sciences to the humanities. Cyberinfrastructure includes two large computational clusters. One cluster is designed specifically for high-performance computing needs with more than 11000 conventional cores where each node has 512-GB memory (8052 at 2.4GHz, 2000 Skylake core) and 1440 Knights Landing cores, parallel scratch filesystem, and low-latency interconnect fabric (Infiniband EDR). The second cluster is designed specifically for high-throughput and data-intensive processing needs: it contains more than 6000 cores (each node minimum of 256-GB memory), including five (5) large 3-TB memory nodes, thirty (30) Skylake nodes each with 750-GB memory, and nodes for “Big Data” workloads, accessing 3-PB of shared high performance storage. With respect to GPUs, Longleaf includes both consumer-grade and enterprise-grade cards. For consumer-grade GPUs, Longleaf includes five (5) nodes each with 8 Nvidia 1080GTX cards, comprising over 100,000 CUDA cores). Longleaf includes sixteen (16) nodes each with four (4) Nvidia Volta GPUs with NVLink—totaling 480 double precision TFLOP/s; or 960 single precision TFLOP/s; or 7680 Tensor TFLOP/s). In their own special purpose cluster, there are three Nvidia DGX-1 boxes (each has 8 Voltas with NVlink) and a DGX workstation (having 4 Voltas with NVlink)—adding 210 double precision TFLOP/s; or 420 single precision TFLOP/s; or 3360 Tensor TFLOP/s. For permanent storage, Research Computing offers more than 5-PB cluster mounted via NFS and 11-PB of active archive. For smaller scale needs Research Computing provides two virtual desktop solutions: (i) VCL, a self-service private cloud for virtual scientific workstations; (ii) SRW, a Secure Research Workstation enclave for computing on sensitive and regulated data per NIST-800 controls (with secure file transfer solutions). Cyberinfrastructure administration (i.e., nine systems administrators) and consultation is available at no cost to researchers. With respect to cyberinfrastructure, Research Computing provides an institutional allocation for each element and incremental charges for resources above that allocation. The division’s aim is to ensure that research efforts have a stable, consistent, available, and expert, resource for all phases of the research lifecycle.

Two recent major implementations within the IT network at UNC are 1) the Epic electronic medical record system within UNC Health Care, and 2) ConnectCarolina, a multi-phased project to develop and implement a fully integrated administrative infrastructure for the University. Both systems are now live, and clearly demonstrate UNC’s commitment to excellence in information technology support of the many missions of the University.

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