

# ITS Technology Infrastructure Plan

## 3/7/2013

The following framework describes the technology infrastructure plan of the University of North Carolina at Greensboro (UNCG). As such, it is a continuously evolving document and will always be in a state of flux. This **framework and its supporting documents** address the need to both formalize a technology infrastructure plan and to articulate technology standards that guide campus management in decisions that best support University goals. UNCG's overarching strategic plan 2009-2014 was approved by Chancellor Linda P. Brady on May 4<sup>th</sup>, 2009.<sup>1</sup> Implementation reports for the first tranche of activated goals were approved in the spring of 2010.<sup>2</sup> Information Technology Services is represented on the Implementation Resource Support Team, which consults with implementation teams in development of their reports. This technology infrastructure plan was developed to broadly support the goals of UNCG's Strategic Plan as well as existing services in support of the University's mission.<sup>3</sup> The University of North Carolina is currently developing an overarching strategic initiative that will inform future UNCG strategic planning.<sup>4</sup>

- **Data Center**
  - Physical Infrastructure
    - Strategy
      - public cloud
        - In 2008, UNCG outsourced student email, and completed Faculty/Staff email outsourcing in 2011. We will continue to evaluate such opportunities in other areas, balancing cost, convenience and security. We use Blackboard Collaborate in a "Software as a Service" offering, and are evaluating the efficacy of cloud-based storage for general-purpose user and departmental shared space.
      - private cloud
        - As a part of UNCG's efforts to leverage virtualization of compute and storage services, we will continue to evaluate tools that manage dynamic provisioning of resources in our own data centers.
      - physical
        - Virtualization is having a positive impact on the need for space and for fitting compute needs into the space, power and cooling budgets available.
    - Planned implementation
      - UNCG has on its capital priorities list a significant expansion of the library, which will contain a new data center, which will become the primary data center, allowing McNutt to replace Bryan for redundancy and failover of critical systems.
  - Server
    - Strategy
      - UNCG will continue its efforts to reduce the number of server platforms. Long-term plans are to continue movement from Solaris to Linux for enterprise systems. Strategic platforms are Microsoft Windows Server and

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<sup>1</sup> <http://uncgtomorrow.uncg.edu/plan/>

<sup>2</sup> <http://uncgtomorrow.uncg.edu/report/implementation/>

<sup>3</sup> The ITS annual report for FY09-10 is located at [http://its.uncg.edu/About/ITS\\_Annual\\_Report\\_09-10.pdf](http://its.uncg.edu/About/ITS_Annual_Report_09-10.pdf)

<sup>4</sup> [http://www.northcarolina.edu/strategic\\_direction/Overview.htm](http://www.northcarolina.edu/strategic_direction/Overview.htm)

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Linux. Solaris and will be used through 2014, at a minimum.

- Planned implementation
  - 3/2013 - additional virtual server host refresh
  - 7/2014 - move Solaris database servers into virtual environment
- Storage
  - Strategy
    - UNCG will maintain locally hosted enterprise and departmental storage for structured data. For unstructured (file system) data, UNCG will maintain enterprise storage and special storage areas for certain restricted data, as well as for certain research and instructional data. Provisioning of unstructured user and general purpose departmental space will be evaluated considering current and emerging use cases. Some of these offerings will likely be provided through structured relationships with cloud service providers. For locally hosted storage, UNCG will offer a variety of backup strategies that balance cost, performance and recovery time objectives. Critical enterprise systems will receive the highest level of backup. UNCG will work with cloud storage partners to articulate backup strategies available for general purpose departmental space and user space where appropriate.
  - Primary
    - Structured
      - Enterprise
        - Oracle is the strategic enterprise database solution
      - Departmental
        - Microsoft SQL server database services are available to campus departments as part of the Application Hosting service described later in this document.
      - Planned implementation
        - We are currently offering LAMP services, including MySQL, but this service is undergoing some level of restructuring. We recognize that MySQL is a commonly desired database platform.
    - Unstructured (file system)
      - Currently, UNCG provisions file space for departmental and home directories using a Microsoft Active Directory implementation, with SMB access provided for non-Microsoft platforms. Evaluation of alternative sources for general purpose (unrestricted data) file space are underway.
    - Planned implementation
      - 6/2013 - Implementation of private cloud enterprise converged Storage Area Network (SAN) architecture and transition to Fiber Channel over Ethernet (FCoE)

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- Backup
  - Enterprise
    - Daily backup
  - Mid-level
    - Weekly backup
  - Basic
    - Monthly backup
  - Research Data
    - Less frequent, lower cost
  - Planned implementation
    - 7/2013 – Project launch to evaluate enterprise backup strategies and ensure alignment with University data retention requirements
    - 10/2013 – Research project to evaluate enterprise backup technologies develop implementation recommendations that meet the strategic objectives defined in prior project
    - 6/2014 – Deployment of recommended enterprise backup solution.
- **Network**
  - Physical
    - Strategy
      - The campus network is a fiber-based infrastructure with redundant high-speed connections to NCREN. UNCG maintains access-controlled communications closets across campus to secure the active electronics supporting campus buildings. In its data centers, UNCG maintains specialized high-performance networking configurations for both intra data center communications and communications between the two on-campus facilities for high availability services.
    - Planned implementation
      - Throughout the 2013 – 2014 FY ITS will continue to closely monitor sharp increases in network traffic (for wired + wireless) due to many factors, such as online learning, increased use of audio/video, the growth of cloud computing (that drives more traffic across the network), streaming technologies to deliver desktop computing environment & software applications, and IP-based access control/security cameras/laundry vending. Network uplifts to increase available bandwidth will be deployed commensurate with demand.
  - Logical
    - Strategy
      - UNCG's network has been designed to support multiple logical network infrastructures using virtual local area networks (VLAN's), conceptually implementing the MORPHNet model.<sup>5</sup> UNCG strategy is to offer a standard "ISP-style" network, a managed network with private addressing and security controls (currently the General Computing Network), and other specialty

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<sup>5</sup> <http://www.anl.gov/ECT/Public/research/morphnet.html>

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networks such as those for access control and public safety.

- Planned implementation
  - 6/2011 – General Computing Network (GCN) migration complete
  - 6/2013 – Enhanced security environment (ESE)
- **Voice communication**
  - VoIP
  - Strategy
    - UNCG migrated to a VoIP-based voice communications system in 2008. This affords greater technical and fiscal flexibility than the Centrex-based system. This system will be refreshed based on expected hardware lifecycles.
  - Planned implementation
    - Throughout FY 2013 – 2014, ITS will continue to closely monitor emerging UNC System as well as Internet2 Higher Ed service offerings that may provide the opportunity to deliver voice services to UNCG faculty and staff via a more cost effective model than either traditional VoIP or Centrex services offer.
- **End user devices**
  - Strategy
    - UNCG currently uses traditional workstation (desktop and laptop) devices to access its compute resources. However, active research is looking at use of thin client technologies and use of mobile devices to access enterprise resources. Supported software for traditional workstation devices can be found at the ITS software page.<sup>6</sup> ITS provides full support for workstations running Microsoft Windows. Support for Mac OS X workstations is available, but not all services are offered.
    - Stationary (includes traditional laptop computers)
      - Thin client (Hardware device or Browser session)
        - Planned implementation
          - 6/2013 – Activation of new generation Citrix-based “Administrative Environment” in pilot mode
          - 6/2014 – Full production deployment of Citrix-based “Administrative Environment” for access to restricted data.
    - Workstation
      - UNCG will maintain its current managed workstation environment for those use cases where managed devices in a privately-addressed network provides the best solution. Over time, more workstations will be installed in or will migrate to the unmanaged ISP network unless special requirements dictate otherwise.
  - Mobile (includes smartphones and tablets)
    - UNCG ITS is no longer serving as a reseller of mobile devices or providing hardware support. The mobile device market is moving very quickly and the legacy model of providing device

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<sup>6</sup> <http://its.uncg.edu/Software/>

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support is not sustainable. In response, ITS changed its mobile communication device support effective January 1, 2011.<sup>7</sup> ITS will provide support for selected mobile operating systems<sup>8</sup> applications, as documented. This support will include traditional form factor smartphones as well as tablet computers. UNCG has implemented the Mobile Communications Device allowance as permitted by the State.<sup>9</sup> Access to restricted data from such personally owned devices will be through Citrix receivers on the mobile device, or other similar specially managed applications.

- **Enterprise software**
  - Identity Management
    - Strategy
      - UNCG has a custom-developed system named CSAM (Computer Systems Account Management). A cross-functional client and technical team abstracted requirements for updates. This system will be developed and maintained as the central Identity Management system at UNCG
    - Planned implementation
      -
  - ERP system
    - Strategy
      - UNCG has a mature implementation of SunGardHE Banner, with all major modules installed. This is hosted locally with data replication for high availability.<sup>10</sup> Some additional complementary systems such as SciQuest eMarketplace are remotely hosted and integrated with Banner, while others such as Blackboard Transaction System have locally hosted components.
    - Planned implementation
      - Twice-yearly update schedule for Banner with updates in the fall and spring maintenance windows. Other systems are maintained according to the schedule of updates released by their respective vendors.
  - Collaboration and Communication
    - Strategy
      - UNCG uses Google Apps for Education for a collaboration and communication environment for faculty, staff and students. This provides an integrated environment for email, instant messaging, ad hoc videoconferences as well as collaborative editing on documents and websites. Message archives for email retention are managed through a related Google product. UNCG also has an enterprise license for Blackboard Collaborate (Elluminate) for real-time web conferencing.

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<sup>7</sup> <http://its.uncg.edu/Telephone/MCD/About/>

<sup>8</sup> Currently iOS and Android devices are supported

<sup>9</sup> See [http://fsv.uncg.edu/policiesandprocedures\\_financialservices/policiesandprocedures\\_financeprocedure14.html](http://fsv.uncg.edu/policiesandprocedures_financialservices/policiesandprocedures_financeprocedure14.html)

<sup>10</sup> As a part of its strategy on high availability, ERP data is replicated between the data centers for high availability, and is also replicated across NCREN to a secondary backup in the Appalachian State University data center.

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- Planned implementation
  - UNCG will continue to evolve and utilize the Google Apps for Education environment in a continuous fashion, reflecting the philosophy of code management and release from Google.
- Learning Management System
  - Strategy
    - UNCG has evaluated open-source options to the Blackboard Learning Management System (LMS), including those in use at other UNC System schools, such as Moodle and Sakai. We have a small number of departments that plan to use and support Moodle. The enterprise LMS will continue to be Blackboard through at least the 2015-2016 academic year.
  - Planned implementation
    - UNCG is engaged in a study of LMS systems. The cross-institutional team that is engaged in this initiative will return a recommendation in time to make an orderly switch if Blackboard is to be deprecated.
- **Auxillary systems**
  - Card systems
    - Strategy
      - Business Affairs has selected the Blackboard Transaction System as the University's enterprise ID card system (SpartanCard). ITS provides integration services that allow the SpartanCard system to interface with the University's locally hosted Blackboard portal.
  - Access management systems
    - Strategy
      - Blackboard Transact / Access Control has been selected as the enterprise access management system. It will be deployed incrementally, first with new construction and with renovations.
- **Research**
  - Strategy
    - ITS provides support for a variety of software packages and services used by researchers, and uses volume purchasing power to keep overall costs low. "Desktop" software packages are available over the University network for on campus and (often) remote use, while some services (e.g., Qualtrics for web surveys) are remotely hosted with local University support for user training and account integration. For services where UNCG does not have sufficient demand to achieve economies of scale in isolation, ITS partners with other institutions or outside vendors to provide these services. For High Performance Computing (HPC) services, ITS has partnered with North Carolina State University for access to an HPC Linux cluster. ITS also assists University departments with managing their own local computational equipment by providing data center hosting services.
  - Planned implementation
    - The MoU for support services with NCSU is being renewed

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- In FY 2013 – 2014, ITS will launch a project to engage research faculty across campus in developing specifications for a new research storage service. Once specifications are developed, an implementation project will follow.
- **Departmental computing**
  - Server hosting
    - Strategy
      - UNCG ITS provides machine rooms that afford high availability and reliability to departmental server resources as well as appropriate network security for these resources. These facilities are available for use by UNCG departments. Additionally, if an application fits the criteria for an Enterprise System<sup>11</sup> it should be housed in ITS facilities.
    - Planned implementation
      - UNCG is currently working with campus departments that host their own servers to support and encourage movement of those servers to an ITS Data Center.
  - Application hosting
    - Strategy
      - UNCG ITS is developing a stack of common open-source application components that will facilitate departmental support of web-based applications without requiring a separate physical or logical server and the associated complexity.
    - Planned implementation
      - The application hosting service uses the so-called LAMP (Linux, Apache, MySQL, PHP) suite of tools, configured through cPanel. We are currently developing plans for a managed WordPress environment.

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<sup>11</sup> [http://policy.uncg.edu/enterprise\\_systems/](http://policy.uncg.edu/enterprise_systems/)

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Attachments and end notes:

- For information on technology standards for purchase of end user devices (currently desktops and laptops) see documentation about the Campus-wide Hardware Procurement Program.<sup>12</sup>

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<sup>12</sup> [http://its.uncg.edu/Technology\\_Purchases/CHP/](http://its.uncg.edu/Technology_Purchases/CHP/)