### Biostatistics Collaboration Core - MAJOR EQUIPMENT

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**Updated: 1 September 2020**

Major Equipment for Biostatistics and Collaboration Core (BCC) Users

**BIOSTATISTICS AND COLLABORATION CORE (BCC)**

**RSPH High Performance Computing Services (HPC):**

RSPH HPC Cluster Systems: RSPH is host to a Beowulf-style HPC cluster. In total, this cluster has 664 cores (providing over 1,300 threads) with over 4TB of aggregated system memory. Users of the cluster access Emory Isilon high-speed storage partitions over direct-connected fiber links. The cluster runs on 64-bit Red Hat Enterprise Linux and utilizes the Grid Engine distributed resource manager for allocating runtime and memory consumption on the system. Licensed software such as SAS and MATLAB are installed for general use on the cluster, as well as a large number of open-source software packages and programming environments, including R, Python, Fortran, and C/C++. Environment autonomy for specific and reproducible execution on nodes is supported through Anaconda. Shared code interaction is supported through Jupiter Notebook.

**RSPH Server Services:**

Virtual Server Services: RSPH server platforms are provided by both standalone systems and virtual servers through a VMware system. The RSPH VM platforms provide over 100 virtual servers that are used for administrative, teaching, database, and research needs. RSPH IT deploys both Windows and UNIX environments. Cloud server services are growing as part of the infrastructure as well, spanning SAAS, PAAS, and IAAS systems hybridized back to the campus and local systems. These servers are divided to be open or highly secure to comply with HIPAA and FISMA Moderate-defined controls. Some specific physical server platforms are deployed for performance and compatibility requirements for some application systems.  An example is our database platform.

Internet/Web Services: RSPH uses a central IT services resource, Microsoft Office365, for our email and is a secured, sensitive data system. RSPH uses the Cascade content management system to update and generate content for our main school website.  All Rollins web content is served up through local RSPH web servers, which also support center, program, administrative, and personal faculty research websites.  RSPH IT offers a number of application environments to support administrative and research endeavors such as Cold Fusion development and support for JAVA-based applications. RSPH has an intranet system that focuses on providing online information and access to the various services at RSPH. This is done through a dedicated platform using the product Noodle.

Data Storage: Data storage is provided across a number of layers and services that use local network accessed systems, central IT network storage systems, and cloud-based storage. We provide over a petabyte of central IT storage for research needs and back-up services. Additional on-demand storage for research or server systems support can be acquired through central IT. All storage services are HIPAA secure. Collaborative storage areas for file sharing are provided through products like Box and OneDrive. These storage areas are HIPAA secure and can be set up for external collaborations.

Database Services: RSPH IT provides primary secure database services utilizing Microsoft SQL Server. These databases are used for application systems across our administrative and research needs. Database accounts are available to faculty members upon request.

**Network Environments:**

RSPH Network: The RSPH network is connected to the Emory Campus backbone via a 10 Gigabit Ethernet connection, making campus services and wide area network services readily available.  RSPH also has an extensive wireless network providing “N” class connections and speeds that cover all of the school’s buildings and nearby external areas.  This network offers guest services as well as secure services for students, faculty and staff.  All of the secured services inside the school’s firewalls—including network storage and other services—can be access through the Emory VPN using two-factor authentication. Integrated printing, faxing, and scanning services are provided throughout RSPH buildings and are integrated with our network storage systems.

**Applications, Informatics, and Application Development Systems:**

Over 40 applications, statistical platforms (SAS, R, STATA, SPSS), and various programming and research analytics (quantitative and qualitative) applications are provided to integrate full lifecycle research informatics needs.  Examples of these are survey instruments such as Redcap and Qualtrics and various form-based data entry systems. Laboratory informatics support is available through a Thermo Laboratory Information Management system and specimen tracking system, Open Specimen. Integration with external mail and CRM systems such as Mailchimp and Salesforce are provided. Cloud-based services for potential student interaction are provided through systems such as Slate.  HIPAA secured data visualization and dimensional manipulation platforms include Tableau, PowerBI, and Business Objects. GIS application platforms such as ARCGIS are supplied on an enterprise license. Application development platforms provided include: Rstudio, Cold Fusion, database management tools, and others. Many of these general application systems are centrally funded through RSPH IT and supported. Specific applications that a researcher may need are supported and installed upon request. The Central IT Research IT group provides a number of tools such as the data warehouse I2B2 which lets you query Emory Healthcare electronic health record data for patient counts and aggregate information.

**End-Node Computing:**

Desktop Computing: RSPH provides a set of standard laptop and desktop systems to choose from for our faculty and staff. Recommendations for standard computing configurations for student computing success is provided. The higher-end analytic systems have at least a I7 CPU configuration with a minimum of 16GB of RAM memory, 21 inches or higher flat panel monitors standard with 500 gigs local disk space, and 64 bit Windows. RSPH’s Apple environments are generally iMac configurations or MacBook laptops with at least 16 gigs of memory. In many cases, multiple monitors are deployed well. A number of our researchers have expanded the computational desktop resources for their systems to drive high performance computation with extensive memory, specialty CPU/GPUs, and extended local storage.

Many RSPH staff and faculty have multiple systems that include docking laptops and other mobile devices such as tablets. All of our desktop and laptop systems are connected to our network storage that provides both highly secure and access controlled, sharable folders. RSPH provides support for all types of mobile devices such as tablets and smartphones. These mobile devices are often used in RSPH research as field data collection devices.

Virtual Desktop Computing: Our virtual computing environments for students, staff, and faculty are provided through our RSPH Citrix environment. This virtual desktop environment provides more than 40 applications and is accessible from any place one can get on a network and open a browser. The Citrix environment is also set up to be a highly secure environment where data does not leave the Emory systems. These virtual desktops are integrated into all the other services such as the shared storage systems. The current platform is designed to extend the on-premise capacity through virtual desktop provisions on cloud services such as AWS.

Student Kiosk Computing: Students have access to 62 additional computers in an open lab area so they can get to their email, the RSPHCitrix system, Microsoft Office products, and other campus computing resources. These computers and the lab computers are all connected to a student printing system that they can use for printing their documents. The printers are business hubs providing scanning, copying, and printing and are located across various floors and in both buildings and through the wireless network.

**Information Security:**

RSPH’s IT environment is a HIPAA-covered entity and complies with HIPAA and Emory information security and privacy policies and practices. In compliance with these policies and practices, RSPH aligns with the National Institute of Standards and Technology special publications (800 series) for identifying, assessing, and managing information security risk within a technology environment. Drawing on federal and industry best practices, RSPH has implemented a series of multi-layered security controls to protect the integrity, reliability, and confidentiality of data. All systems that access our infrastructure are scanned for vulnerabilities and any identified vulnerabilities are assessed and managed. Security policies are created and reviewed through the Woodruff Health Sciences Center HIPAA committee, the Emory University Technology Infrastructure and Policy committee, and local policies through the Rollins Information Technology Advisory committee.