2011-2012 Year in Review

Following the close of the 2011-2012 Academic year, this section will review the major projects and accomplishments of the Computing department during this past year. Our focus in recent years has been on both large and small-scale changes, with this year being no exception. This report will describe the continuing progress that has been made, building on the goals enumerated in last year’s annual report. Those goals were identified through the now well-defined strategic planning process for Computing, taking input from many sources, including the Faculty Committee on IT, the Strategic Planning Committee for Computing, the Decadal Review, and most importantly, from faculty, members and staff directly.

As was also the case in the most previous years, the focus of our efforts has been aimed largely at improving the quality of our service catalog by ensuring the highest availability possible for these services. Given this, much of the focus of our effort has taken place within the traditional “back office”, and in many cases may not have tangible effects on the day-to-day use of our systems, or require awareness on the part of our scholars to reap the benefits of this work. For that reason, this report will attempt to demonstrate both the immediate impacts of these projects, as well as describe the broader, strategic vision which underlies them. With that said, the report will also focus on a number of tangible improvements that have been made in the past 12 months as well.

Organizational Structure, Personnel and External Resources

Without question, the most important work done in 2011-2012 was related to the make-up of the Computing team itself. Enabled by the high caliber of our team, and our commitment to staff development, we were extremely pleased to promote four staff members this past year to fill vacancies that became available, easing the burden of transition, preventing critical projects from being delayed, and ensuring that vital institutional knowledge remained intact. These promotions included:

- Christopher McCafferty, formerly of Natural Science Computing, named the Web Programmer in the Databases and Integration group in May.
- Sarah Zantua-Torres, formerly of the Information Technology Group, named Windows/OS X Administrator in the School of Natural Science in June.
- Lee Colbert, formerly of the Network Administration group, promoted to Linux System Administrator/Software Support Specialist in the School of Natural Science in August.
- Paul Richardson, formerly an intern in the Information Technology Group, promoted to Computing Support Specialist within the same team in September.

In addition to these changes, we also welcomed three new members to the team this year. Andrew Westfall joined the Network Administration group as a Jr. System/Security Administrator. Gabrilius Banevicius joined the Mathematics Computing group as an intern, and James Bernier filled the internship in ITG vacated by Paul Richardson.

Although it was a busy year for personnel changes, the group has emerged from this challenging
period stronger, energized and more diverse in our skills than before. This will be demonstrated throughout the rest of this report, in both the number and nature of the projects underway.

Within the area of Organizational Structure, Personnel and External Resources we implemented:

- **Unified Call-Tracking System.** This past spring, all of the teams within Computing adopted a single tool for tracking and documenting our projects and support interactions. In addition to those groups already utilizing such a tool migrating to a single database, the system was further extended to the remaining teams, including Audio/Visual and Telecommunications. The new tool enables maximum interoperability between the teams, improves information flow between Computing’s various subject matter experts, and allows for easier identification and analysis of campus-wide problems in need of systematic solutions, while providing a single, central repository for institutional IT knowledge.

**Infrastructure**

- **Expanded and Improved Internet Connectivity.** Following the completion of a project this past spring, the Institute’s connectivity to the Internet has been expanded, both in terms of bandwidth and reliability. Replacing an outdated 45Mbps DS-3 circuit with a new 100Mbps fiber-optic link has now given the campus a pair of 100Mbps links to the Internet and Internet2, doubling our available bandwidth, improving the reliability of our connectivity, and saving us substantially in annual licensing costs. In addition to the new Internet link, the project also included an additional 100Mbps of fiber-optic connectivity to our strategic partners throughout the state, including Montclair State University (business continuity) and Princeton University (high performance computing), ensuring that these critical links are sufficiently equipped while simultaneously removing the overhead of these connections from the bandwidth available to campus users. The two 100Mbps Internet links provide full redundancy for one another, as they are provisioned by two separate Tier-1 ISPs using diverse connection modalities and independent cable paths, and terminate in geographically dispersed locations on their remote ends as well.

- **Wireless Network Upgrade/Expansion.** This past year also saw the completion of a major expansion and upgrade of the campus wireless network. The expansion included the installation of over 120 additional access points, the upgrade of the existing access points, as well as a new management system and better troubleshooting technologies. The coverage of the wireless signal was expanded to include the outdoor area behind Fuld Hall, and the new Short-Term Academic Housing campus.

- **Short-Term Academic Housing.** In addition to providing the new housing area with ubiquitous wireless coverage, Network and Audio-Visual staff have also equipped each new unit with wired networking ports, access to cellular signal, cable TV and DVD players. The new space is also serving as a pilot project for new wireless door locks which are being used to provide access control.

- **Email Infrastructure Simplification.** As the Institute’s various email systems have matured, and the need to address email-borne threats has risen in importance, the path to deliver email to or from the Institute required traversing 8 servers. Simplification of this path has reduced the server count to just one pair of redundant appliances, reducing the time needed to deliver an
email to its destination without impacting the quality of the threat identification or mitigation. In perhaps the most obvious example of the type of “back office” work described earlier, this project, completed this past year, significantly simplified the setup of our campus email infrastructure by eliminating unneeded complexity and lowering management time, while improving the reliability and portability of the system.

- **DNS/DHCP/IP Address Management.** In a similar project to the email initiative described above, this past year Computing also selected a new platform on which to provide commodity network services including DNS, DHCP and IP Address Management. After a long evaluation, Infoblox was chosen as the best fit for our needs, and is currently in testing for production deployment. In addition, significant work has been done to understand and document the current and future needs in these areas. This coming year, we anticipate completing the rollout of the new system, and beginning to announce and make use of its new features, including dynamic DNS for member housing and DNSSEC.

- **Additional Installations/Upgrades.** Beyond the major projects identified, Computing staff completed work on a host of additional projects and upgrades this past year. These included:
  - **Connect-Ed Upgrade.** The Connect-Ed (now Blackboard Connect) emergency notification service was upgraded from version 4 to version 5.
  - **Adobe Flash Media Server.** The Adobe FMS Server, which provides for the streaming video component of video.ias.edu was upgraded from version 4 to version 4.5. This latest version adds the capability to deploy video using HTML5, a necessity in satisfying the demand for mobile video.
  - **Juniper Secure Meeting.** Building on the success of an earlier trial, we have increased our capability to support up to 50 concurrent secure meetings via the Juniper VPN system.
  - **Access Control.** Working with Administrative Services, Computing staff helped to identify and install a new platform for managing ID card-access requests. The new platform, CBORD CSGold, was installed this past summer, and is currently in production in the Short-Term Academic Housing campus, with a wider roll-out anticipated this coming year.
  - **Dining Services Facilities Monitoring.** Computing staff worked with Dining Services and external vendors to install new hardware and software to monitor the temperature of critical Dining Services facilities and provide notifications when needed.

**High Performance Computing (HPC)**

- **HPC Consortium with Princeton University, Princeton Plasma Physics Laboratory and University of Munich.** Work continued this past year on the implementation of the new HPC consortium that IAS has joined. Several members from the School of Natural Science have been given access to the consortium-funded cluster. Through their initial use of the system they are helping to evaluate the new equipment, as well as helping Computing staff in evolving the
appropriate support model for the relationship moving forward.

- **Increased Interest in HPC Resources.** Marking a milestone in the evolution of the high-performance computing project here at IAS, this past year Computing staff worked with scholars from each of the Institute’s four schools on HPC-related matters. These included providing access to local and consortia HPC resources, as well as planning and training for upcoming projects that would benefit from large-scale computation.

### World Wide Web, Campus Databases and Data Integration (D&I)

- **Community of Scholars (CoS).** The Community of Scholars system continues to be a central focus of the Database and Integration group. This past year saw the addition of current member profiles to the CoS project, expanding the data provided in a typical CoS entry to include the information typically found in the Faculty and Member publication. In addition, this past year profiles were enhanced with “permanent links”, friendly URLs that can be used by scholars to include their CoS listing in other online biographies such as their personal websites, curriculum vitae or social networking profiles. Lastly, Computing staff worked with Public Affairs to produce a published snapshot of the CoS database that was provided to the Board of Trustees in May.

- **Online Timecards.** Working with the Comptroller’s Office staff, this past year a system was designed and implemented to replace the bi-weekly salaried and hourly timecards. The system has been thoroughly tested and has begun being used in production in targeted areas. It is the goal of the project to be in full production by the beginning of fiscal year 2014.

- **Event Registration.** The D&I team provided support to the Public Affairs office, as they worked to move the registration for many Institute events which require ticketing online, to the EventBrite service. This 3rd-party system allows for professional registration and ticketing, as well as improving the on-site capabilities of event staff and providing comprehensive reports on ticket usage.

- **“P4” Database.** Significant work has gone into the planning and preparation for the next version of the People Database. Planning work is expected to continue through 2012 and into 2013, including meetings with school administrators and others.

- **IAS YouTube Channel Created.** Working with Public Affairs, D&I and A/V staff have helped to establish a new Institute-related channel on YouTube. The new channel features videos recorded on the IAS campus, and provides for greater access than can be achieved using the video.ias.edu service.

### Data Security, Business Continuity and Disaster Recovery

- **Server Co-Location.** This past year saw four instances which required the “failover” of the IAS website to our remote location at Montclair State University. While in its failed-over state, the website has been used to provide updates and coordination during campus emergencies, such as power outages and weather closers. Computing staff have worked this past year to continue to build our infrastructure at Montclair, including new dedicated network connectivity mentioned earlier, and to further automate the transfer of services between Princeton and Montclair when necessary.
• **Battery Backup and Reserve Power.** This past year improvements were made to battery backup systems in Bloomberg, Fuld and Simonyi Halls, provided improved capability to withstand brief power outages. In addition, planning work has continued on renovation of the Bloomberg Hall C3 datacenter space, anticipated to be completed this coming spring.

**Audio/Visual**

• **A/V Infrastructure Improvements.** Work continued on modernizing the Audio/Visual infrastructure this past year. Work focused heavily on the lecture hall in Bloomberg Hall. This space was outfitted with a new projector, new digital video switching infrastructure, improved audio amplification, and new control system. In addition, the space has a new computer at the lectern, and now supports the use of “AirPlay”, wireless video mirroring for Apple iOS devices.

• **FinalCut Pro X.** A/V staff completed training this past year on Final Cut Pro X, the new software which will be used to edit and encode our online videos. The new system provides advanced editing features and many enhancements beyond the current toolset.

• **Recording Campus Events.** The A/V team has been diligent in video recording public events on the campus and making them available on the IAS Video website. All Institute-wide lecture series, several seminar series within the School of Mathematics, and the Prospects in Theoretical Physics are just some of the events that have been recorded this past year. The IAS Video website now boasts over 2000 videos for viewing, and the IAS website and e-newsletter regularly highlights prominent videos on its homepage.

**School-Specific Projects**

• **School of Natural Sciences.** Within SNS this year, several changes took place. Notably, the team replaced two staff members. In addition, new email and web servers were installed, modernizing these two core services. Work also continued on developing and refining new desktop images and selecting and installing new hardware for scholars.

• **School of Mathematics.** Math Computing also performed an email server upgrade this past year. In addition, the school purchased and began implementing a new storage array for hosting its virtual infrastructure.

• **Information Technology Group.** While also dealing with the shifting of Computing staff, ITG has been focused on two important roll-outs this past year. The first has been the move to Windows 7 machines for scholars and administrators. The second has been the migration to the Zimbra email system. Both are expected to be completed later this year.

Although it is by no means an exhaustive accounting of all projects completed, the above list represents the important strategic areas on which the Computing staff has focused the majority of their efforts in the past year. It is these areas that we feel are most beneficial as we endeavor to continue to provide the service and support necessary to ensure satisfaction by our members and faculty.

**2012-2013 Goals and Objectives**
Much like last several years, the majority of projects planned for the 2012-2013 academic year will also be focused on “back-end” computing, and may not all be visible to our users. The central theme for projects in the upcoming year is the continuity of our services. Staff will be working to further ensure that our systems are resilient to outages and are available to meet the demands placed on them by our community. This section provides a detailed list of these major initiatives and explains why we feel it is important to focus on these areas at this time.

**Infrastructure**

- **Datacenter Network Upgrade.** Computing staff will continue to improve the capability of our core systems and networks. To this end, a major upgrade is planned in the Bloomberg Hall C4 datacenter, moving to a next-generation network platform, as well as allowing the convergence of several parallel networks under one management umbrella. At the same time, the new platform will be best positioned to continue growing both our physical and virtual server infrastructures, and supporting our efforts towards service continuity and portability.

- **Updated Power and Cooling Facility in Bloomberg Hall C3.** Continuing with the focus on continuity, this year will see the completion of an expanded renovation of Bloomberg Hall C3 datacenter, intended to provide an additional space on campus from which Computing can operate its core services. This space will be designed to operate independent of the major campus cooling system, eliminating the risk that a cooling outage might disrupt the viability of both main server rooms. The expansion will also include new battery backup, new power distribution systems and improved network connectivity and integration.

- **Housing Wired Network Upgrade.** In addition to the datacenter network, this year will also see the beginning of a 2-year replacement of the wired network in Member Housing. New network hardware will be installed throughout the complex, improving connectivity to 1Gb/s for wired connections.

- **DNS/DHCP/IP Address Management.** Earlier in the report it was described that Computing had selected Infoblox as a new vendor for providing a management platform for these critical network services. This coming year we will complete the implementation of the Infoblox platform, including new dynamic DNS capability for members in housing, improved wireless network registration, enhanced security and, as with most of our projects, support for the improved availability and continuity of our services.

- **Campus Firewall Upgrade.** Although delayed from last year’s goals, this year will indeed see the upgrade of the campus firewall system completed. The delay proved beneficial though, as we anticipate being able to consolidate our intrusion prevention system into the upgraded firewall, providing improved visibility to network threats and easing the administration of these currently distributed systems.

- **JAMF CasperSuite for Macintosh Management.** Computing teams throughout the Institute will be moving the management and provisioning of their Macintosh-based systems to
CasperSuite, an industry-leading tool for this function. This platform will improve our speed and flexibility in addressing the management of the fast-paced and rapidly-growing Macintosh environment here at IAS.

High Performance Computing

- **Aurora Cluster Upgrade/Expansion.** As we approach the end of the anticipated lifecycle of the current cluster, this year will involve identification, selection and initial installation of new cluster nodes for our in-house system.

- **Parallel File System for Aurora Cluster.** The next step in the continuing evolution of our in-house cluster resource is anticipated to be the introduction of a parallel file system, which would provide access to data storage from all of the cluster nodes in an optimized way.

- **High-Performance Computing Consortium.** In addition to continuing the evolution of our own resources, Computing will also be working to further develop access to the resources provided through consortial arrangements, including the expansion of the use of these resources for scholars in all of the four schools at IAS.

World Wide Web, Campus Databases and Data Integration

- **Support for Mobile Computing.** A major strategic effort will be underway this coming year to better position our current and future websites and applications for effective use on mobile devices, such as smartphones and tablets. The effort will include redesigning certain aspects of our site to incorporate the principles of responsive design, technology that allows sites to automatically transform themselves to the appropriate dimensions for the device from which they are being accessed.

- **“P4” Database.** As part of an ongoing effort to improve campus information workflow, and data-driven decision making, the Databases and Integration team will work this year to produce the latest version of the People Database. This system is the primary authoritative system for information about IAS people, past and present. It is utilized by dozens of existing operational procedures across nearly every administrative department, as well as feeding information to other critical campus databases and publications, including the online Community of Scholars system. The upgraded version will aim to address growing challenges the current system has with addressing the evolution of roles and relationships that various people have with IAS. In addition, the latest version will allow for easier interfacing with other authoritative databases across the campus, such as the Raiser’s Edge database in Development. Although significant planning took place last year, we anticipate an increase in the pace of the current planning effort, and the onset of the actual development of the new system in the coming year.

- **Campaign Website/Online Giving.** Working in collaboration with the Office of Development, D&I staff will be developing a new website related to the Campaign for the Institute. Included in this new site will be an improved and streamlined mechanism for
accepting online donations to the Campaign.

- **Community of Scholars.** Work is expected to continue on the Community of Scholars. In the coming year, the goals will include the addition of advanced searching and sorting of the master list. Work will also be done to integrate assets from the Institute’s Digital Archive into CoS profiles where possible.

- **Drupal 7.** Building on the success of the current Drupal 6 platform for our websites and online applications, the D&I team will be upgrading our infrastructure to Drupal 7 throughout the year. The new version of the system provides additional features and greater integration tools, including several to benefit our mobile initiative described above.

- **CBORD CSGold Access Control.** In support of the Administrative Services group, Computing will be developing new data integration tools to automate the workflows related to the installation and setup of the new access control platform in use on the campus.

**Data Security, Business Continuity and Disaster Recovery**

- **Email Co-Location.** The foremost project that Computing will undertake this year is to establish continuity for campus email, in the event of an outage on the Princeton campus. Similar to the successful design in use currently for the IAS website, the aim of the project is to provide a mechanism for sending, receiving and accessing email messages even when the main campus is offline for any reason. To this end, the Computing staff has developed several strategies for achieving this goal, which will be discussed in detail at the Strategic Planning Committee for Computing and the Faculty Committee on IT. Following a decision on the best path forward, the solution will be implemented, with notices to the community throughout the project keeping everyone aware of our progress.

- **DNSSEC.** As part of the Infoblox system described earlier, this year we will introduce the use of DNSSEC for our Domain Name System servers. This technology ensures data integrity across this critical resource, which is often used as a vector for online attacks.

- **Battery Backup and Reserve Power.** In addition to developing protocols for moving our services off-campus in the event of a failure on the main site, as described above, we will also continue to focus on improving the resiliency of our on-campus systems, to better handle the loss of power or cooling. These improvements will include the replacement of old UPS systems with more efficient, modern technology and the continued upgrading of battery capacity for critical areas.

**Audio/Visual**

- **Broadcast Center.** It continues to be a goal for Computing, working with Public Affairs and
the Director’s Office, to provide to members of the IAS community a convenient way to participate in broadcast TV interviews. This year, we aim to address this need either through an agreement to use a nearby facility as we have in the past, or by developing the capability to reach the broadcast networks directly from the IAS campus.

School-Specific Projects

- **School of Natural Science.** SNS Computing will be participating in many of the projects identified above, including CasperSuite, Drupal 7 and virtualization. Beyond these, the school will also be working on improving password synchronization, and transitioning their configuration management repository from Subversion to git.

- **School of Mathematics.** This year, Math Computing will also be concentrating on implementing several new servers. These include a new webmail server running an upgraded version of Horde; a new Terminal server for remote connectivity and a new virtual machine cluster. They will also be continuing to implement new workstations for members and staff.

- **Information Technology Group.** ITG will complete their transition to the Zimbra mail system and continue replacing desktop systems. ITG also plans to virtualize many more of its back-end systems, leverage CasperSuite and improve password management. While working closely with several administrative groups on software projects including the Comptroller’s Office, Investment Office, Administrative Services, ITG looks forward to continuing its role in facilitating improvements to services.

Conclusion

The projects outlined in this report are strategic, targeted improvements to our infrastructure and service catalog designed to improve availability, simplify usage, increase efficiency and reduce costs. As in all years, it is strongly encouraged that any members of the community with unmet IT needs or suggestions for how we might further improve our services please contact their helpdesk and let us know.

The efforts described above are all being undertaken to ensure that we have the tools and processes in place to continue to meet our primary goal, that of providing excellent service to the Institute community.