IAS | INSTITUTE FOR ADVANCED STUDY

Computing Annual Report

2023-2024 Academic Year

October 20, 2023

https://www.ias.edu/campus/computing/

Introduction

The mission of the IAS Computing department is to deliver exceptional technology services and support to the IAS community. As information technology plays an increasingly more pivotal role in the life all scholars and staff, continuing to meet this mission requires constant evaluation and adjustment of the campus infrastructure, as well as careful curation of our technology service catalog. This annual report will cover the many such changes that were introduced to the campus this past year, as well as outline the plans for projects that will be completed in the near future. Thank you for taking a few moments to review this report. As always, your input and feedback are welcomed.

The work that is outlined below, past and future, is the product of the ongoing IT strategic planning effort at the Institute. The primary vehicle for this discussion is the Strategic Planning Committee for Computing (SPC). The SPC also solicits regular input from the Faculty Committee on IT, the Director's Office, school Administrative Officers and individual Faculty, Members and staff. All of this input is then synthesized, prioritized and organized into projects, such as those listed herein. Beyond the campus, Computing staff also regularly interact with industry experts, peers, vendors and others to most completely understand the evolving technological landscape, and to best predict and prepare for the continued evolution on our own campus.

Although this report touches on many of the initiatives that are underway or recently completed, IAS Computing offers a full range of IT services and support. All campus technology consumers are encouraged to review the full catalog online and familiarize themselves with all of the resources and services available to aid their research and enrich their time on campus. Please visit:

- https://www.ias.edu/computing/services

2022-2023 Year in Review

Information Security, Business Continuity and Disaster Recovery

- **VPN Upgrade.** In support of increased hybrid work activity, and a return to more normal travel for scholars, the Institute's secure remote access system, OpenVPN, was upgraded this past year. The updated system is faster and compatible with a wider array of operating systems and devices, while also employing industry standard data encryption protocols.

- **Email Security.** Another area of continued focus this past year was email security. Updates were made to the email security infrastructure to better position IAS to comply with changing standards and norms evolving industry-wide. In addition, the Institute's primary email platform, Zimbra Webmail, was moved behind the Duo single sign-on/Multifactor authentication system.

- **Single Sign-on (SSO)/Multifactor Authentication (MFA).** Beyond Zimbra, many additional systems were also configured to benefit from SSO and MFA this past year including StarRez,

Navex and Paylocity. Users not currently enrolled in Duo MFA are encouraged to do so as soon as possible, to begin benefiting from the enhanced security it offers, as well as the convenience of the single sign-on functionality.

Infrastructure

- **Directory Services Migration.** Computing's top project priority this past year was the completion of the migration of our campus directory services to the Active Directory platform. It is gratifying to report that this project was completed as expected, with all campus systems now using the new Active Directory infrastructure for authentication and authorization. This effort involved many significant steps, including building the new systems, migrating the existing data, updating policies and workflows, and reconfiguring nearly all services within the Computing service catalog to use the new directory. This was all done to ensure that Computing has the tools needed to continue to provide safe and secure access to our users, while also maintaining the controls necessary to protect the integrity and availability of campus data. In addition, the new directory infrastructure will remove existing obstacles blocking other progress in important areas, including a modernized passphrase policy, further SSO expansion and improvements to email mailing lists.

- **Network Upgrades.** As in all years, lifecycle management and equipment refresh of a portion of the campus network was completed. This past year's work focused mainly on the connectivity between the campus' primary datacenter in Bloomberg Hall, and the rest of the network, with these critical connections being upgraded to support higher bandwidth and greater resiliency. Improvements were also made to the campus firewall systems and the Princeton University Library gateway system. The campus wireless network was also upgraded this year, with the move to new network controllers that offer greater compatibility and control.

- **Enterprise Storage Upgrade.** Similar to the network upgrades noted above, all components of the campus enterprise storage platform were also upgraded this past year. This includes the systems located in Bloomberg Hall, the Lights-out Datacenter and our offsite, private cloud facility in Valley Forge, PA. These upgrades ensure we have the latest features and most efficient processing for this critical platform.

- **Data Center Expansion Planning.** Another major area of focus this past year has been on planning for upgrades and possible expansion of the C4 Datacenter in Bloomberg Hall, as well as for the installation of an emergency power generator for the space. Discussion of planned next steps in this process will be outlined in the following section of this report.

- **Digital Signage.** Digital signage displays were installed throughout the Rubenstein Commons building, as well as Simonyi Hall this past year. These new displays are providing real-time information for the campus community, as well as improved way-finding and timely announcements. For additional digital signage plans, please see the next section of this report.

World Wide Web, Campus Databases and Data Integration

- **StarRez Housing Management.** The implementation of the StarRez Housing Management platform was completed this past year. This system provides improved controls to the Housing

Office, as well as real-time information for school administrators to utilize when planning campus events or in their discussions with incoming scholars.

- **Declining Balance Account System Implementation.** Another administrative change that will take place early next academic year is the shift to using "declining balance" accounts for campus purchases, rather than directly billing individuals. To facilitate this change, the CBORD Get system is presently being implemented. This system will connect a scholar or staff member's preferred payment account with their new IAS Plan, allowing them to allocate money on a regular basis to pay for their use of the Dining Hall, Rubenstein Commons, Housing Laundry facility or Mailroom services. The full details about the IAS Plan and its rollout will be discussed in the 2023-2024 Section of the report.

- **Video Findability.** Working closely with scholars and administrators in the School of Mathematics, several improvements were made to the searching and filtering tools available on the Video section of the IAS website to improve the findability of IAS video assets. These changes now allow for greater control, filtering the over 5000 videos by speaker, year, topic and more. Please see:

  - https://www.ias.edu/video

- **Zuppler Web-based Catering System.** In concert with the staff from IAS Dining Services, this past year the Zuppler web-based catering system was implemented. Similar to a traditional online ordering platform, Zuppler allows event planners to customize the catering order for their events, giving them access to full details of their order, as well as up-to-date pricing and item availability. To begin a new catering order, please visit:

  - https://www.ias.edu/dining/catering

- **P3 Database Updates and Integrations.** As in all years, the P3 Database remained a key platform, receiving many updates and feature improvements, as well as new integrations to other platforms. Improvements were made to the process for finding and entering scholars, in standardizing reporting and information extraction, and to application and data security. In addition, interfaces were built or updated between P3 and several external systems including StarRez, CBORD Get, Netsuite, Navex and more.

High Performance Computing (HPC)

Parallel File System Replacement. This past summer saw the replacement of the high-performance parallel file system that is part of our on-premises HPC environment. The new system is an HPE Cray ClusterStor offering 1.3 Petabytes of storage, including over 7 Terabytes of NVMe memory. This new system is now online and available for use. For more information on taking advantage of this new resource, see:

- https://www.ias.edu/sns/computing/hpfs

All of the Institute's HPC systems are available for all IAS scholars to utilize. Full documentation on

leveraging these new systems is available on the SNS Computing website, at:

- https://www.ias.edu/sns/computing/advanced

Digital Scholarship at IAS (DS)

Support for scholars working in the field of digital scholarship, and efforts to grow awareness of these activities, also continued in the 2021-2022 academic year. Some of those highlights include:

- **Albert Open-Access Repository Upgrade.** After much delay, the long-planned upgrade of the Albert repository to DSpace-CRIS v7.3 was completed. More work will be done on the system to begin to take better advantage of the new features offered by the upgrade throughout the year. Those scholars interested in publishing their works in Albert are welcome to contact the Albert Administrators via email to albertadmins@ias.edu.

- **Lyrasis ORCID-US Community Membership.** In order to gain access to new features and tools, IAS shifted its ORCID membership to the Lyrasis ORCID-US Community. We remain full members of the ORCID community, but also have access to additional tools and integrations developed by Lyrasis. This move also aligns with our membership in the Lyrasis DataCite community, used for minting digital object identifiers needed by the IAS community.

- **DS Conversations.** The DS@IAS group also completed curation of another year of compelling webinars highlighting unique DS-based projects, and surfacing topical discussions relevant to digital scholars working today. For a complete list of events, please see:

  - https://www.ias.edu/digital-scholarship/events_ias

Media Technology Services (MTS)

- **Rubenstein Commons.** Based on initial feedback, several improvements have already been implemented to the audio/visual infrastructure in the Rubenstein Commons. Most notably, this included the addition of two larger screens, improved amplification and a second camera position in Meeting Room 5. Additionally, better audio capture devices combined with the installation of sound-dampening panels have reduced the echoing in rooms 1 and 3. Meeting Room 6, on the 2nd floor, was also equipped with full hybrid meeting capabilities. In the Café space, audio amplification and a large display were also added.

- **Wolfensohn Hall Updates.** The lecture capture system in Wolfensohn Hall was also upgraded this past summer. Three new 4k-capable cameras were installed, allowing the capture of multi-camera video for events in this space.

- **Hybrid Conferencing Updates.** In order to continue delivering hybrid events at the highest quality, updates were made to the conferencing systems in Simonyi Hall 101, the Bloomberg Hall Lecture Hall, Wolfensohn Hall and Fuld 3rd floor this past summer. An additional hybrid setup was also installed in the Director's Office. These improvements are in addition to the

updates noted just above in Rubenstein Commons.

- **Zoom Administration.** The Media Technology Services group also continued administering the communities considerable use of Zoom conferencing this past year. This administration includes provisioning accounts for users, setting up and monitoring regular meetings and seminars, recording events, and working with presenters on their presentation needs. For those interested in leveraging their Institute-provided Zoom account, please see:

    - https://theias.zoom.us

Training Highlights

Computing works with both internal and external partners to curate information technology-based training opportunities for the community throughout the year. Some highlights from last year included:

- **Event and Meeting Planning.** Earlier this year, several training sessions were held for staff to outline and reinforce the many processes that are involved in planning meetings and events on the campus. These training are also summarized in a new set of webpages, available at:

    - https://www.ias.edu/campus-resources/working-ias/event-and-meeting-planning

- **Information Security Awareness.** Brian Epstein, the Institute's Chief Information Security Officer, again curated a rich curriculum of information security trainings for the IAS community throughout the year. This included the traditional training sessions held each October for scholars and staff, as well as members of our extended community. In addition, throughout the year, helpful training and blog postings are published on current events on the IAS Security website:

    - https://security.ias.edu

- **LinkedIn Learning.** Through an enterprise licensing agreement, the Institute offers all users access to the full library of online training courses available on LinkedIn Learning (formerly Lynda.com). For access, please visit:

    - https://www.linkedin.com/learning/login-ent

The Computing team is committed to providing a complete set of IT services and high-quality support to the Institute's scholars and staff. The work described above represents our best efforts to meet this commitment in the 2022-2023 academic year. As in past years, the entire IAS community also benefitted from the hard work of several contractors, interns and summer students that assisted the Computing team. This past year, we are grateful for the contributions made by Sylvester Boateng, Gavin Dawson, Brandon Martinez, Faiz Mazhjar, Colin McCafferty, Colby Moran and Owen Ristic in service to the efforts described above.

2023-2024 Goals and Objectives

This section will outline our plans and priorities for the 2023-2024 academic year. Many of these efforts build on or continue work that was discussed earlier. Others are new projects aimed at further improving the quality and reliability of existing IT services offered to the community, or enhancing our service catalog with new capabilities. In all cases, these projects are carefully planned and scheduled to address current and future needs as quickly as possible, while balancing our commitment to preserving your privacy and ensuring the safety of your data.

Information Security, Business Continuity and Disaster Recovery

- **Passphrase Management System/Passphrase Change Required.** With the completion of the directory migration noted earlier, many campus users will be required to upgrade their current password to a passphrase that is compliant with the campus passphrase policy. To aide in this effort, Computing will be introducing a new tool for self-service management of passphrases, including those forgotten or lost. To set a new passphrase, please refer to the communication you will receive from your IT helpdesk in early 2024.

- **Improved Access to Home Directories.** Following on the enterprise storage upgrades completed last year, Computing will be exploring ways to better protect the availability of user home directories/I: Drives. Today, these directories are dependent upon the availability of the Bloomberg C4 datacenter. A project will be undertaken this year to allow for these directories to also be available through our private cloud link to Valley Forge, should this ever be required due to circumstances that might impact the main datacenter.

- **Migration to Bitwarden.** Following a series of concerning data breaches that impacted LastPass, Computing has selected Bitwarden as our new enterprise password management utility. A team from Computing will be migrating our existing LastPass accounts to Bitwarden later this year.

Infrastructure

- **Power Generator for C4 Datacenter.** Though timing is uncertain due to "supply chain challenges", a project is underway to install an emergency power generator to provide backup power to the main campus datacenter, as well as to key network infrastructure space in Fuld Hall. This work is being done in partnership with IAS Facilities and external engineering experts. The new generator will provide continuity for additional IT services during power outages, ensuring access to file storage and academic computing resources. Any service disruptions that may be required as part of this project will be announced to the campus in a timely manner.

- **Network Improvements.** As in all years, a portion of the IAS network will be upgraded. The main focus of this year's work will be on replacing and upgrading the infrastructure that supports the Institute's "wide-area connectivity", or our campus connection to our upstream Internet service provider. This replacement will involve replacing hardware and software, as well as logical reconfiguration of some network segments in order to simplify management and

provide the most efficient routes for Internet traffic.

- **Internet Bandwidth Upgrade.** In concert with the above hardware and software changes, the Network Administration team will also be working with our Internet provider, NJEDge, to increase the capacity of our two redundant Internet connections. This work is intended to double our current capacity, while providing additional headroom for occasional "bursts" and simplify future growth.

- **Faculty Housing Expansion.** Computing staff will be working with IAS Facilities and their contractors to connect the next set of Faculty Housing townhouses to the campus network, once the construction is completed. These homes, similar to the existing units, will have high-speed connectivity to the campus wired and wireless networks.

- **Virtual Infrastructure Upgrade.** To facilitate much of the work described in this report, system administrators will also be upgrading the servers which host Computing's virtual server infrastructure this year. These servers play a critical role in the timely provisioning of IT services, as well as the resiliency of those services for campus consumers. This work will largely be taking place within the datacenter, and should not require service downtime to complete.

High Performance Computing

- **Datacenter Capacity Planning.** In preparation for future generations of the HPC project, work is planned this year to guarantee that sufficient power and cooling resources are available within the campus datacenter, and to further ensure that these resources are being used as efficiently as possible. This work coincides with the power generator project described earlier, as well as future planning being done with HPC users on campus.

- **Continued Exploration of Cloud Computing.** Computing will be working with faculty and members to continue exploring the opportunities offered by cloud-based HPC resources.

- **Expanded On-Premises GPUs.** SNS Computing staff will also be expanding the number of GPU processors available through Apollo, our on-campus GPU resource. More details about this expansion will be shared as they become available later this summer.

Administrative Computing Environment

Providing the best support for our scholars across the Institute, not just within IT, requires an investment in designing and managing efficient business processes and information workflows. To this end, Computing has invested a significant amount of time into modernizing and supporting the Institute's administrative computing environment. As with all IT work, this is an ongoing task. The projects planned for this year include:

- **Declining Balance "IAS Plan" Accounts.** This coming year the move to declining balance

IAS Plan accounts will be rolled out. This will allow the campus community to use their ID cards to easily purchase services such as food and beverages, laundry, mailroom services and merchandise from the IAS Store, without the need for individual billing. Scholars looking to setup their IAS Plan can visit:

- https://www.ias.edu/using-your-ias-id-card-purchase-campus

- **New HR/Payroll System.** Beginning in January 2024, IAS will also be moving to a new system to manage the administrative aspects of our Human Resources and payroll processes. The new system, Paylocity, will replace the existing SyncHR system. Much more information about this change will be made available as the cutover approaches in the new year.

World Wide Web, Campus Databases and Data Integration

- **Drupal 10.** Working with our web development partners at Zivtech, the Software Engineering team will be upgrading the IAS website to version 10 of the Drupal content management system. This upgrade is necessary to ensure we continue to receive timely security updates and support for Drupal. The upgrade is not expected to change the aesthetic aspects of the site or its user experience.

- **P3 Updates.** Software Engineering will also be continuing to upgrade and evolve the P3 system this year. These updates include continuing to transform the system and its underlying data structures to better align with modern best practices, and to facilitate more agility in responding to evolving administrative needs. An update to the P3 API will also be released this year, to help integrated systems evolve seamlessly with these changes as they occur.

- **Member Onboarding.** Computing will also be working with school administrators and campus service providers on the next set of updates to the Member Onboarding process. These changes include updates to the front-end form, the introduction of a deadline for receiving completed submissions, and improvements to back-end data integration.

Digital Scholarship at IAS

- **Albert, the IAS Digital Repository.** More work on the Albert repository is also planned for the coming year. A minor version upgrade is expected in early 2024, as is a renewed focus on automating the import of scholar works into the system. Those interested in participating in the Albert project can contact the Albert Admin team. Albert can be found online at:

- https://albert.ias.edu

- **Digital Scholarship Conversations Series.** The Digital Scholarship Conversations seminar series will continue again this academic year, in a virtual fashion. The curriculum will include both training sessions related to DS-concepts and tools, as well as the typical presentation of DS projects by faculty and visiting scholars. The schedule for this year's talks can be found online, at:

- https://www.ias.edu/digital-scholarship/events_ias

Media Technology Services

- **Evolving Content Capture.** Building on the infrastructure work that was described earlier, this year MTS will be focused on continuing to improve the quality and accessibility of our captured content. This includes multi-camera capture, higher resolution video, improved graphics and more. It is anticipated that these improvements will be rolled into the finished product over time.

- **Digital Signage.** MTS will also be focused on expanding the breadth of digital signage across the campus, building on the successful rollout that began last year.

- **Hybrid Conferencing Spaces.** Building spaces to best support hybrid events will continue to the be a key focus of the MTS team's projects this coming year.

Conclusion

The previous two sections of this report have outlined the work completed in the prior academic year, and the planned work for the current year. Each of these projects is carefully planned and executed to minimize impact on campus IT users, while maximizing benefits and new features.

This annual report is published each year to document the changes to our IT environment over time, as well as to enumerate the current thinking from campus experts on the trends and changes that will most benefit the Institute's scholars and staff. This process always works best in a collaborative manner. As such, it is our goal to encourage conversation about technology at the Institute. If there are projects or services that are not mentioned in this report, but which you feel should be a focus of the Computing group this coming year, please make your voice heard and speak with a member of the Computing staff about your concern.

IAS Computing

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