

# Administrative Information Services Annual Report July 2006 – June 2007

<http://ais.its.psu.edu>

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*Administrative Information Services (AIS) serves as the central University resource responsible for supporting Penn State’s administrative information systems. As a unit of Information Technology Services (ITS), AIS participates in the development, maintenance, and secure operation of the state-of-the-art enterprise applications using centralized student, business, and alumni databases.*

Administrative Information Services  
*Senior Management Team*

**Senior Director and Director, Systems Development & Maintenance, Ron Rash**

**Deputy Director and Director, Infrastructure & Operations, Scott Smith**

**Director, Project Management Office, Kathy Plavko**

### Snapshot

*The numbers*

***Angel, Spring 2007***

Course Sections .....	8,362
Faculty .....	5,144
Students .....	68,264

***eCommerce (Annual)***

Transactions.....	over 441,000
Amount .....	\$92 million

***eDocument Distribution System (eDDS)***

User Accounts.....	2196
Reports.....	over 1 million
Pages.....	25 million

***Data Warehouse***

User Accounts.....	1600
Records .....	300 million

***Enterprise Server (Annual)***

Printed Pages (down 10%)....	5.2 million
Batch Jobs.....	765,000

***eLion Student Usage (Monthly)***

Avg. trans.....	1,325,866
Max. trans (Dec 2006). .....	2,287,698
Avg. users .....	72,222
Max users (Aug 2007) .....	80,442

***Production Servers***

Mainframe.....	2
Windows.....	123

# Annual Report 2006 -- 2007

## Administrative Information Services

### Introduction

In FY 2006-2007, Administrative Information Services (AIS) continued to make significant progress in redefining the IT environment with which future administrative systems and services will be developed and deployed across the University. A *Master Plan for Administrative Information Systems at the Pennsylvania State University* was developed at the request of the AIS Strategic Planning Committee and provided to the University Provost. This Master Plan provides the framework for how future administrative systems will be identified, prioritized, funded, developed, and managed.

FY 2006-2007 also experienced the continued progress of many key projects and initiatives such as Disaster Recovery, Workflow, Systems Development Modernization, and Business Intelligence. In addition, a new major project was started – the EASY Re-engineering Project.

The following report highlights the progress made on the items mentioned above, as well as the many additional significant accomplishments of AIS over the past year.

### AIS Production Services

#### **AIS Web & Communication Services**

##### **AIS Web Site:**

Two new sections were added to the AIS Web site: eSteward and DBA-ES.

- The on-line AIS Newsletter was redesigned to have a more appealing presentation, additional content, and better navigation within the newsletter. The newsletter archive was also redesigned to be more user-friendly.
- A repository of Writing Tips has been created, to which monthly additions are made. Although not a replacement for the services of our Writer/Editor, these tips offer assistance to anyone needing to prepare a business document.

##### **Marketing:**

We have begun submitting 'Unit Spotlights' to the ITS Newsletter. The purpose is to give all ITS staff members an opportunity to become more familiar with the people and the services of our organization.

##### **AIS Web & Communication Services Team:**

- Two of the four staff members of W&CS were replaced during 2006/2007, which required a focus on team building and training throughout the year.
- The W&CS Team now has the methods and software in place to conduct usability testing on web pages and applications.
- All members of the W&CS Team have become instrumental, some significantly, in the university-wide Workflow project.
- In offering design and usability testing services to the eLion project, the W&CS Team has begun to offer its services externally.

## A New Global Environment for Learning (ANGEL)

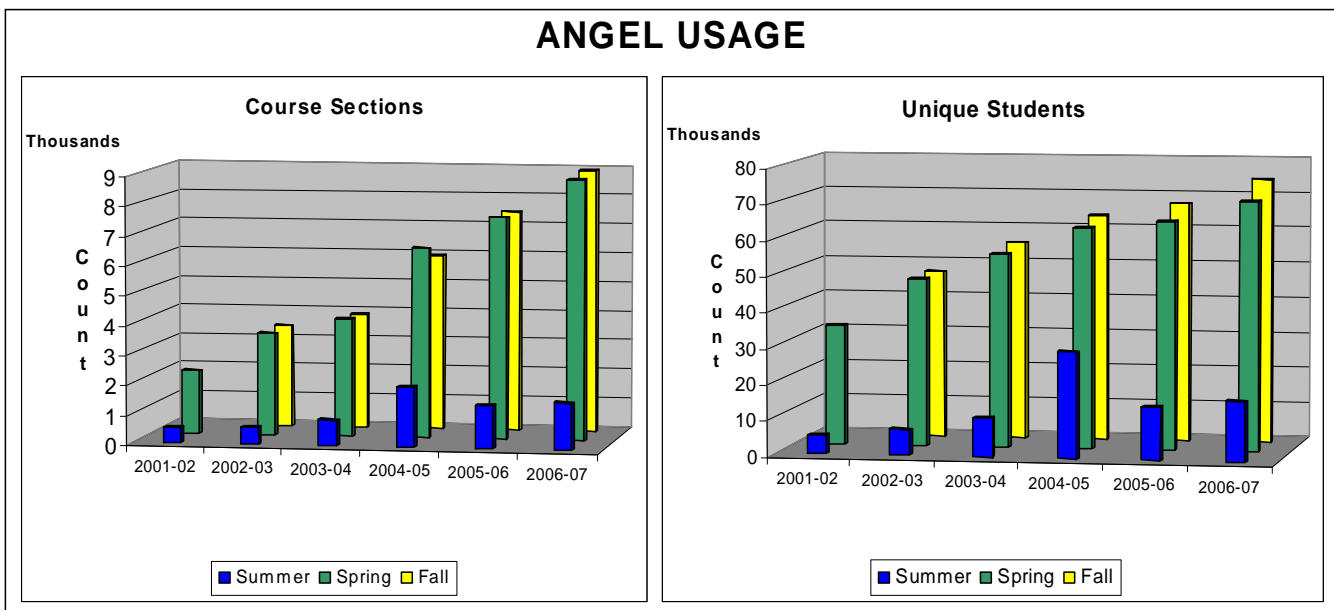
ANGEL Version 7.1 was implemented at Penn State in May 2007. This new release continues to improve on the already robust course management system. ANGEL now has an updated interface, as well as features such as enhanced customization of content and layout, expanded role based security, centralized reporting, context sensitive design help, and many other new or improved features. We've enhanced ANGEL's eTesting functionality in partnership with the Smeal College of Business for their proctored Junior Core exams, as well as provided numerous other enhancements.

We've implemented a new knowledgebase from Talisma. Teaching and Learning Technologies uses this product to provide ANGEL documentation which they have developed for the user community. This self-service option allows faculty and students to search the knowledgebase or optionally drill down through topic-centric folders to gain knowledge on how to more effectively use ANGEL.

In partnership with the Faculty Senate Office and Senate Committee on Curricular Affairs, we've also made major enhancements to the Course Submission and Consultation System, which automates the course proposal forms as well as the consultation process. We anticipate full university rollout during the fall of 2007.

Some ANGEL Statistics for 2006-2007 include:

- For Spring 2006/2007
  - 69,881 students had at least one course in ANGEL
  - There were 8,712 active course sections in ANGEL
  - There were 211,683 student-course-section enrollments
  - There were 5,144 distinct faculty
- At peak usage during the Fall 2006/2007 semester, there were 72,814 students with at least one course in ANGEL
  - There were 8,598 active course sections in ANGEL
  - There were 222,885 student-course-section enrollments
  - There were 5,156 distinct faculty



## **Business Continuity Services**

As higher education institutions realize the importance of maintaining the continuity of critical business functions during any event which may cause an outage, AIS continues to provide services to assist Penn State departments and campuses with their recovery planning efforts. These services assist in the coordination of efforts from both the IT recovery (disaster recovery) and the business service recovery (business continuity) standpoint. These services provide standards and guidelines for departments and campuses to follow, and provide compatibility and standardization of planning efforts across the University. As departments see the need or are regulated to maintain business continuity plans, they can utilize these services in their recovery strategies.

Our services include Business Continuity Consultant, Local Server Recovery Center, Offsite Data Storage, Living Disaster Recovery Planning System (LDRPS) software, Business Impact Analysis (BIA) software, and the Business Continuity Training curriculum.

Within the last year, our services have continued to grow and mature as we bring on new customers. These customers include: Administrative Information Services (AIS), Office of Student Aid, Hershey Medical Center (HMC), Digital Library Technologies (DLT), Consulting & Support Services (CSS), Teaching and Learning with Technology (TLT), Graduate School, Office of the Bursar, Auxiliary Business Services, Penn State Harrisburg, and Penn State Abington.

Our Offsite Data Storage service is growing quickly as more customers use this service to store catastrophic data at a non-University Park location. Our customers utilizing the Business Continuity Training curriculum are in the stage where they are developing recovery plans for their critical services. These critical services were identified using the Business Impact Analysis (BIA) tool and they will use LDRPS to create these plans.

Other departments and campuses have expressed interest in using some of the Business Continuity services and have met with the Business Continuity Consultant to discuss their needs. These include College of Education, Office of Physical Plant (OPP), Outreach, Office of VP for Educational Equity, Office of Human Resources, Penn State Shenango, Penn State Berks, College of Engineering, Penn State Mont Alto, Corporate Controller, College of IST, College of Health & Human Development Student Affairs, Office of Research Information Services, and ITS Multimedia Technology.

For the upcoming year, we will work with these Penn State units and assist them with the services they need and we will continue to work with the current customers. We will focus on bringing pilot groups into the Local Server Recovery Center and allow this service to mature. We anticipate that the business continuity services will continue to evolve so that they will fill the needs of the Penn State community as they increase their efforts to develop recovery plans for critical business functions.

## **Data Warehouse**

The data warehouse continues to grow and strives to be a better tool for its users. Listed below are some of the actions taken in FY-2006-2007 to help us achieve this goal:

- A Data Modeling Tool was purchased for the Data Warehouse (Power Designer). This tool will assist us in designing better data flow, understand relationships between tables and reduce redundancy.
- The transcript table in the student database is now being updated daily using Treehouse software. Treehouse reads the ADABAS log files on the mainframe and sends changes, deletions, and new records to the warehouse.
- Testing is currently underway for the migration of the data warehouse to SQL 2005. The migration to SQL 2005 will allow us to better manage user accounts and enhance security, as well as automate required password changes.

- SQL Logging has been enhanced to capture log information on the data warehouse. Logging has increased from 8AM-5PM, to 5AM-9PM.
- Three new VM servers have been configured: BI 2005 Test Server, Power Designer Repository Server, and a web server.
- Statistics:
  - Average number of queries per day: 1,000
  - Number of DW Users: 1,600
  - Number of records on the Warehouse: 300 million
  - Student Database accounts for 57% of all queries

## **Document Imaging**

Document Imaging technology is expanding to many areas of Penn State to improve efficiency and daily processes, as well as to reduce the volume of paper that is processed and stored. In all cases, the use of imaging software cuts down on storage space, allows for Web based retrieval of documents, and makes sharing of documents possible.

Penn State is committed to making excellent use of its site-license from Optical Image Technology, Inc. (OIT), which includes Imaging, Email Manager, Web-based Intraviewer, Barcoding, Print/Fax server, and Workflow.

In September of 2006, AIS launched a new service to the University community – a Centralized Image Hosting Service. This service has been created to enable departments without the necessary resources (both human and financial) to take advantage of the University's site license of the software suite provided by OIT. AIS is responsible for providing and maintaining the infrastructure and storage space required to support this service. Also provided with this service is the client software installation, retention scheduling, training, and ongoing support. We currently have 18 departments in production with over 300 users, and another 17 departments in our test phase. We also have many other areas that are interested in using our service. Departments are storing anything from purchasing card reconciliations to personnel files, as well as many other types of files. We can pull data from IBIS, ISIS, or other data sources to help streamline the data input process.

## **eCommerce**

AIS eCommerce services provide an easy and secure method for collecting payment via credit cards. Our customers use this service because it is easy and integrates into their current business process. eCommerce services allow University department to eliminate storage of credit card numbers and reduce the workload associated with other forms of payment. In short, eCommerce saves time and money.

AIS eCommerce experienced more growth in 2006. The totals were \$92 million on over 441,000 authorizations. This represents a 24% increase in authorization amount and a 16% increase in authorizations. The growth mirrors the credit card industry, as more people are using online payment services, especially for high dollar amount purchases. The 16% growth is consistent, as PSU did not add any significant new departments. The amount was increased by a growth in World Campus online courses.

AIS eCommerce is closely involved with the Payment Card Industry (PCI) standards, and works to understand the regulations and implement the necessary changes. The most significant of these changes is to eliminate storage of credit card numbers. This will make eCommerce a more secure and stable method to process payments. We also continue to work with the IPAS team and the Controller's Office to ensure PSU is operating with PCI best practices in mind.

The GUI interface of eCommerce was overhauled to give the user a more logical and easy-to-use application. This interface will save AIS time, as training should be minimal. It also supports a more robust Support Center interface so they can diagnose user issues without contacting eCommerce. The new interface also contains the framework to allow the department to change users and permission levels. These are two common support requests which can be eliminated in the future.

AIS developed a new service called PSU Checkout. This service will allow areas to host conferences, stores, or applications locally and then send the customer to PSU Checkout when it is time to pay. The area must reconcile transactions on both sites and manually indicate (through a GUI) which payments should be collected. This application is directed at small volume events for areas which have little or no programming support. This service will be production ready in 2007.

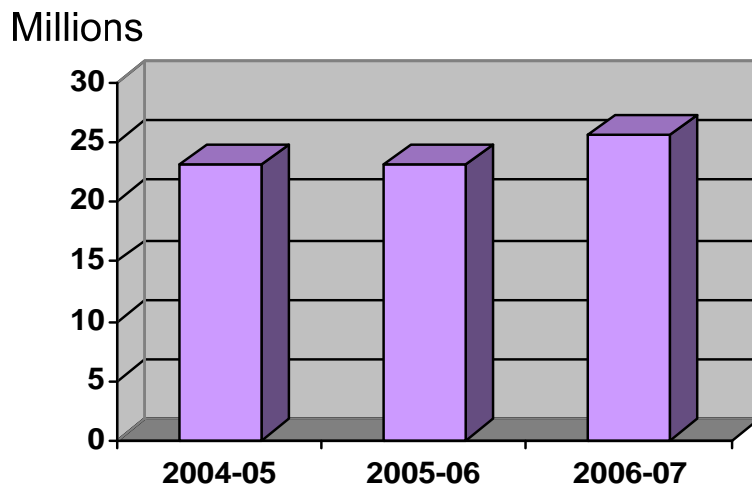
The eStore added several new areas selling different types of merchandise. After a few years, interest in this service is finally increasing. We now have many new prospects and expect the Children's Miracle Network to be brought online very soon. The online Creamery store is still our leader in sales, but the Better Kid Care store may surpass it this year.

### **eDocument Distribution System (eDDS)**

The eDocument Distribution System (eDDS) is a Web-based system for the distribution of reports. It continues to grow, both in the number of users and the reports it houses. There are currently a total of 2196 users (a 6% increase over the previous fiscal year) accessing over 1 million reports, and 10,125 distinct reports housed on the eDDS server. Over 25 millions pages were directed to eDDS in FY 2006-2007, a 7.5% increase over the previous fiscal year.

A cleanup process of expired reports using retention periods was re-introduced. A pilot of PDF reports distribution was implemented for the Alumni/Development Office. Ongoing software upgrades were performed on both production and failover servers to stay current with new software releases by the vendor.

### **Report Pages Produced**

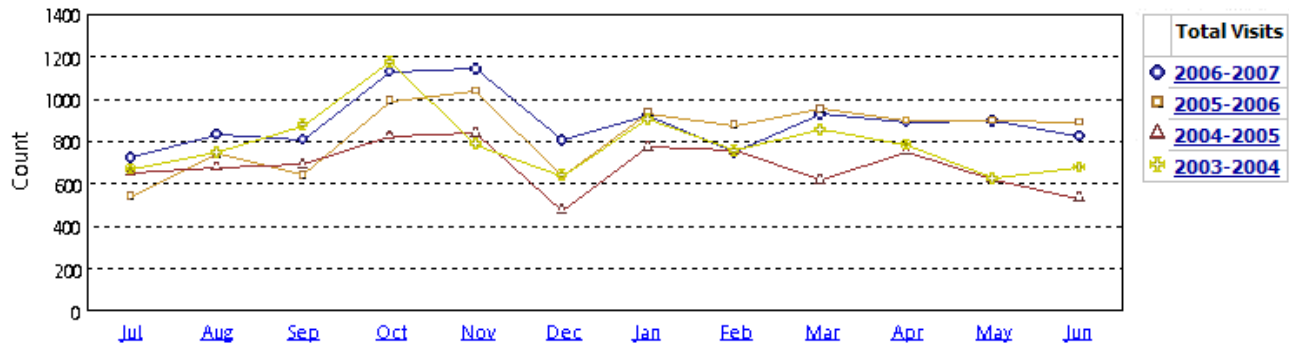


### **Enterprise Information System (EIS)**

The Enterprise Information System (EIS) provides a Web-based information and reporting service. It continues to grow in the number of users and ease of use. During the past year, the number of authorized users went up by approximately 3%. The number of cubes/reports available increased by 84%. EIS offers 20 development units a reporting infrastructure that has five web services: PowerPlay Modeling (compressed cubes with slicing and dicing capabilities presented in a cross tab format),

Impromptu Web Reports (standard reporting via the web), Cognos Query (web query tool), Visualizer (advanced graphics tool), and NoticeCast (an alert detection service enabling information to be pushed or delivered to the customer based on a predefined event). Customer visits to the system increased by 6% for the year.

### Enterprise Information System Four-Year Comparison



Count as values		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Month
Total Visits	2006-2007	723	832	807	1126	1142	804	921	747	928	890	895	825	10640
	2005-2006	541	739	641	992	1037	634	933	876	953	899	897	890	10032
	2004-2005	651	678	689	824	837	475	773	756	615	753	621	531	8203
	2003-2004	670	748	877	1173	786	638	904	756	853	783	625	676	9489

Single sign-on continues to provide for a seamless integration between EIS and two University offices websites. The University Budget Office (UBO) and the Office of Planning and Institutional Assessment (OPIA) utilize EIS by integrating reports from their websites with reports on EIS. Users of UBO and OPIA information unknowingly move between sites. The year involved the configuration of new servers and an upgrade to Cognos Series 7 version 4. The new features enhanced the graphical capabilities of the system by adding three new chart types (simple line, scatter, and correlation) making for a total of nine, along with new options for controlling the appearance of the charts. Report capabilities improved by adding new text formatting options for custom exception highlighting; options for zero suppression (divide by zero, missing and overflow values); and options for controlling the appearance of reports exported as PDF files. Five new calculation types (average, median, minimum, maximum, and percentile) were added, providing the users with a total of seventeen. Due to the increased system functionality, the training course was split into basic and enhanced levels.

The Corporate Controller’s Office, UBO, and Outreach continue to be areas adding the higher number of reports to the system. The Graduate School, Office of Human Resources, the University Learning Center, OPIA, and Administrative Information Services are also continuing to develop new reports for our user base.

### Financial Information Tool (FIT)

This past winter and spring, the Financial Information Tool (FIT) underwent the Hydra to GI conversion. This conversion impacted the entire communication and security infrastructure which FIT uses for data retrieval. During this conversion, over 50 Natural programs were changed or modified and 29 new services were created for the Generalized Interface (GI). The FIT client itself underwent extensive infrastructure changes which were transparent to the users. On June 4<sup>th</sup>, all Hydra versions

of FIT were disabled and phased out. With the creation of 29 new services on the GI, detailed FIT usage entries are made for each specific service in the GI logs.

FIT continues to be a valuable resource used by the Penn State financial community to monitor the status of their accounts. An average of just over 600 users access FIT on a monthly basis, retrieving financial data from IBIS via 63,000+ calls to the Enterprise Server per month. The “top 3” FIT functions based on monthly usage are:

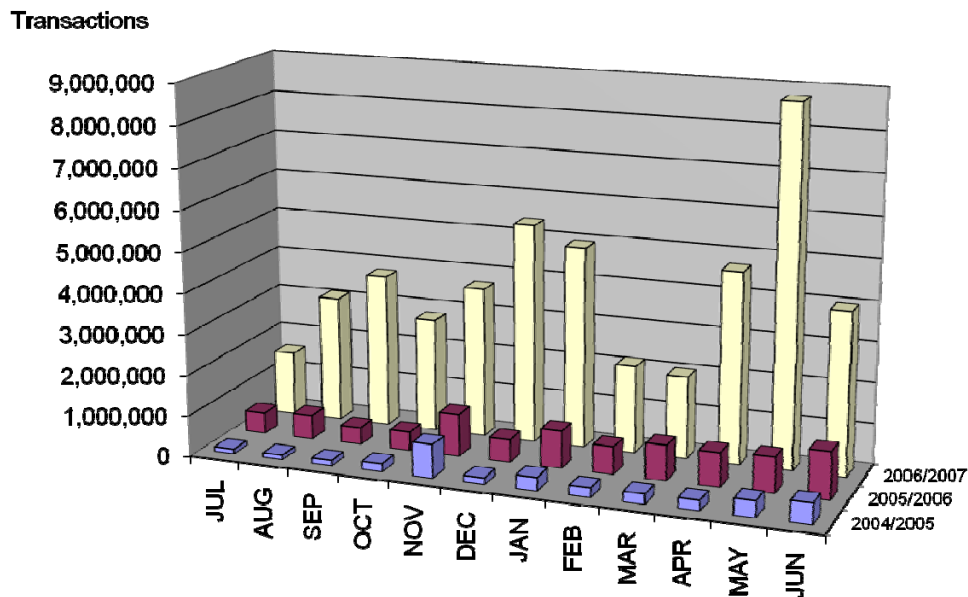
1. Detail extract used to view financial details.
2. Account extract used to display a detailed view of an account.
3. Summary object extract used to view summary totals for a mnemonic or account.

## Generalized Interface (GI)

The 2006-2007 fiscal year represented the greatest period of growth for the Generalized Interface (GI) since its inception by almost every measure. There were 150 new production services added, bringing the total number to 347. The most prominent GI project for the year was the Hydra to GI conversion, a process that made the GI the most prominent piece of middleware for web applications that access the AIS Mainframe.

The GI handled 46,931,122 transactions from 125,331 unique users. Overall the GI handled 524% more traffic in the 2006-2007 fiscal year than in 2005-2006 and the largest monthly increase in traffic was an astounding 991%. Even with the large growth of last year, the GI is prepared for the additional load expected in the years to come. This readiness is due to improvements in the GI infrastructure and better management tools, which were implemented in 2006-2007.

**GI Transactions for Fiscal Year by Month**



## **Integrated Business Information System (IBIS)**

This past year the main focus for the Integrated Business Information Systems has been the elimination of the 1960 accounting system known as “Central Accounting.” This installment is the final major development project for finishing IBIS. The major components were Accounting Controls, Single Integrated Vendor System, Accounts Payable Payment Request, Accounts Payable Payment Process, and Closing and Reporting.

As of July 9, 2007, IBIS Financial became the audit-able accounting system for The Pennsylvania State University. The Central Accounting System will only be used for fiscal years prior to 2007/2008.

Following is a brief description of the major components that made up this effort.

### **Accounting Controls**

The process re-posts the daily details on a nightly basis to a second set of supporting detail totals in the IBIS Financial System at the fund, budget/fund (account), and the account’s object code levels. Reports are created at each level to provide daily verification that posted details support the University’s income and expense totals reported at the account and fund levels, as well as to verify that posted debits equal posted credits.

### **Single Integrated Vendor System**

This system maintains a single data repository for vendors. This includes both temporary and permanent vendors. The information within this repository is maintained by the University’s main purchasing agents. The process maintains both “order form” and “pay to” information. On a yearly basis, vendor information is extracted then forwarded to an outside vendor to collect certain vendor characteristics that will be used for vendor reporting.

### **Accounts Payable Payment Request**

This process manages both pre-approved vouchers and vouchers that need approval. The pre-approved voucher data include DBAF (Authorization to Direct Bill – Air & Rail Transportation), Flex Benefits, Student Refunds, Wage Tax, University Libraries, ERS (Employee Reimbursement System), and SRFC (Special Request for Check). Once collected, this data will reside in a data repository awaiting the actual payment process. Vouchers that require approval are sent by Central Purchasing, Housing and Food Services, Hershey, and ARL. This data resides in a data repository awaiting approval from Accounting Operations via an on-line approval process. Once approved, this data is sent to the actual payment process.

### **Accounts Payable Payment Process**

The input to the actual payment process comes from the pre-approved and approved payment requests that were described earlier. The payment process is exactly that, produces payments. Payments can be made multiple ways, such as checks or direct deposits. There are different means for viewing payment information. They are reports, data warehouse, and on-line browse capabilities. This data then posts payment details to IBIS Financial.

### **Closing and Reporting**

This portion of the processes will not be implemented until the first monthly closing for July 2007.

### **Payroll**

A service was created, and implemented, that will give university employees the ability to have Lion Cash+ deducted from their pay check (via a payroll deduction) and automatically placed on their Penn State Id+ cards.

## **Integrated Student Information System (ISIS)**

### **Dickinson School of Law**

With the new University Park Campus of the Dickinson School of Law, there were several processes in the Bursar and Registrar areas that needed to be changed to recognize Law students at a campus other than Carlisle. There were also changes in the full-time credit classification along with changes to the activity fee. For SP07, eLion was used for registration and faculty grade entry; there were also modifications to the ranking process.

### **eSteward**

In support of the eSteward project, major changes to the ISIS format of the budget, fund, and object codes were done in October 2006. Since ISIS was designed before the IBIS FANS was implemented, there needed to be increases in the field sizes of the data base elements for the budget, fund, and object codes. This required changes to over 200 programs.

### **eLion**

For the start of Fall semester, the Home Page of eLion was changed to have a more modern look and enhanced functionality. The header and footer were altered, and a cascading style sheet is now being used to provide consistency in the look of the application pages. The process of logging in is now much more user friendly, and there is an “Alerts” box which will be used to notify users of new functions, changes to applications, and anything else that is essential news. Several of the documents (like the project request form and the eLion Organization and Governance document, which are used to support the application) have been removed from the eLion web site, and were put on the eLion page of the AIS web site. The Demo version was also changed to use another cascading style sheet, and there is now a watermark in the background of the demo pages so that they are easily distinguished from the regular application pages.

Here are some eLion Student Usage (monthly)

Avg trans	1,325,866
Max trans (Dec 2006)	2,287,698
Avg users	72,222
Max users (Jan 2007)	80,442

### **Hydra Replacement**

We are finishing up changes to replace the custom developed security solution (Hydra) with the Generalized Interface (GI) in eLion, eISIS, and CIDR. The deadline to have all of the functions completed is summer 2007. There are over 200 functions that need to be converted by AIS and our partner offices. In order to do this, there needs to be extensive coordination between the application areas and the GI team. Although some re-engineering will be done, the bulk of the changes will be straight conversions. This project also gives us an opportunity to clean-up and delete obsolete functions.

### **Cobol/PL1/Assembler Rewrite**

The Student Area has over 100 programs that were not written in Natural for efficiency and technical reasons; however, those limitations are no longer an issue. Since our expertise in those languages is very quickly being lost, we need to re-write these programs in a language that we can maintain. So we are working on re-writing these programs in Natural. Some of the programs are simple to re-write, but as they are used in several hundred programs, it will take some time to convert the call statements to use a Natural subprogram. Good progress is being made on this project, and although we don't have a hard deadline, we have most of the programs re-written.

## **World Campus Billing**

The goal of this project is to provide full integration of World Campus courses and students into the mainstream Resident Instructional world. Phase 1 integrated semester-based World Campus Credit courses into the credit system for registration which includes using eLion, billing, tuition, and fee allocation of income and financial aid. This is a joint project, with Outreach, Registrar, Bursar, and Student Aid. Phase 2 will allocate income to the World Campus, the Budget, and the Bursar Offices through the new World Campus RI/CE Report. This report will be run after the end of a semester. We will also be creating a new screen and procedure to recover loss of bad debt. Phase 2 will be completed this summer.

## **Penn State Stewardship Program (eSteward)**

The Penn State Stewardship Program (eSteward) was established at the request of the Provost to improve donor stewardship and the management of endowments and gifts. This system has been in a production pilot the past year, and is being rolled out university-wide in July & August, with a Stewardship retreat & training conference scheduled for 8/20 -8/21 . The System uses a web-based interface to integrate information from multiple data sources to offer 'one-stop shopping' functionality. Final project completion and wrap-up is scheduled for Fall 2007.

## **Special Projects**

### **Business Intelligence**

Business Intelligence is a multi-year initiative with the goal of working cooperatively with the University community to plan, design, develop, and implement an infrastructure that will transform administrative data into information. Business Intelligence will make the right information available to the right Penn State stakeholder at the right time, and in the right delivery media.

A twenty-five member Business Intelligence Advisory Committee has been created. The goal of the committee is to ensure alignment between the Business Intelligence Strategy and Implementation Plan and Penn State's administrative information needs, as well as advise AIS throughout the requirements analysis, strategy definition, and implementation planning phases of the Business Intelligence Initiative.

Within the past year, with the help of the Business Intelligence Advisory Committee, we have selected four vendors to be invited back to Penn State for a proof of concept of their Information Access and Analysis tool set. These vendors are: Cognos, Oracle, SAS, and Business Objects. The proof of concept process will start once there is a well defined strategic direction for Business Intelligence at Penn State.

After interviewing over 160 Penn State information users, the Business Intelligence team has compiled the feedback from the interviews to create a draft strategic plan for Business Intelligence at Penn State. Once there is concurrence on the strategic direction, we will move towards the implementation of the first iteration of Business Intelligence. Meanwhile, there has been continuous improvement to the Data Warehouse and the Enterprise Information System to address the issues identified through the interview process.

### **System Development Modernization**

The System Development Modernization project began in 2005 as a multi-year effort to rebuild the environment within which Penn State creates and delivers administrative systems and related services. Two key areas were the focus of this year's achievements and they created the foundation for our

direction. They are the enterprise server and enterprise application services upon which new Java applications will be built.

On the enterprise server, the design and implementation of a stable Java enterprise environment was achieved, including:

- A new Java enterprise architecture on the IBM zSeries mainframes in AIS based on open standards such as the eXtensible Markup Language (XML), Simple Object Access Protocol (SOAP), and Web Services. The use of these open standards permits applications written in different languages or frameworks like Java and .NET to communicate with each other and access shared programming (objects). A more consistent use of shared programming objects across the University can save application development time and associated costs. This is particularly important in an environment where changing business requirements need to be more readily converted to new or changed application services.
- The first set of system management tools has been installed to allow effective monitoring and problem determination in the new environment.
- The environment is now ready for initial Workflow applications to be deployed so that performance can be evaluated and tuned where necessary.

The enterprise application services are also a key part of the foundation and significant progress was made in creating these, including:

- The creation of an administrative application framework and Penn State Administrative Web Suite (PAWS) in Java to house future Web-based administrative applications. This framework saves application development time and costs by providing built in logging, search, error handling, messaging, and a consistent look and feel to functions integrated within it. New standards and procedures for using the framework will be published as the first release is tuned. The PAWS web suite is designed to be the launch point for a variety of administrative functions, saving staff time which would otherwise be spent locating these from individual web sites.

Training and retooling developers to create applications for the new environment is the next large phase of the project. The training phase is currently slated to begin in late 2007 or early 2008, pending reinstatement of the funding.

## **Penn State Workflow – Enhancing the Way We Do Business**

The past 12 months of the Workflow Project continued to focus on building the foundational elements of a system that will likely grow exponentially over the next several years. The remainder of this calendar year is focused on developing the Workflow system, and forms that will automate, streamline, and enhance the way we do business. A separate but very important focus also underway is identifying and establishing a training program.

In addition to the Workflow system and forms, the AIS Open Standards Development Team is collaborating with the AIS Systems Architecture Office in the design and integration of the administrative application framework, Penn State Administrative Web Suite (PAWS) and the Workflow system. The technical design phase has been completed and developers are currently building the first release of PAWS and Workflow. The framework will host PAWS, Workflow, and other administrative applications.

## Summary of high-level accomplishments and activities:

- A **Penn State Workflow Policy** has been finalized and is available on Guru as AD63. This policy is a result of the Workflow Policy Committee and will undergo revisions as the Workflow system and role based management matures.

In addition to policy, the financial subset of the Workflow Policy Committee has identified the financial roles and attributes that will be used in Workflow's role-based approval. Several members are also participating on the Workflow Role Authorization process design team. This model will most likely be used as focus migrates to roles and attributes required for academic, administrative, human resource and research Workflow processes.

- **Workflow Standards Committee** has completed its work and is finalizing the report for visual design, labeling, data entry and data display standards. The initial visual design elements have been delivered to the developers to be incorporated into PAWS and Workflow, and will be included as part of usability testing.
- A **Digital Departmental Identity Implementation Group** is being formed to proceed with implementing the capability to identify the proper department or unit to which a form should be routed, based on the attributes in that form such as: major or minor, home budget of employee, accounts being charged or academic home of principal investigator. A proposal for utilizing the edu.org schema, which is in alignment with the scope of identity management, has been submitted to and approved by the ITS Vice Provost and AIS Senior Director.
- **WebRAT** (role assignment tool) was moved into production and is being used by eBuy system for email notification. This Web-based application was built by Academic Services and Emerging Technologies (ASET) in collaboration with members from several Workflow Committees. When roles that require authorization are assigned, WebRAT will initiate the Workflow Role Authorization form to obtain approval using the role-based approval process.
- The **Workflow application development staff** has changed a bit and now consists of the following Open Standards Development team members: Kathy DeMartino (Group Manager), Jerry Orr, Howard Wang, Ben Homan, Niraja Ramesh and Brian Hoffman. As stated above, their current focus is developing the administrative application framework, PAWS and the Workflow system and forms.
- Three **Business Process Analysts** (BPA) have been identified within AIS: Judy Everly, Joe Hayes and Marylou Houck. They have attended training on Business Analysis and Gathering User Requirements for Application Development, and are charged with establishing a methodology for collecting and documenting requirements to include process modeling. The BPAs will facilitate process design teams for enterprise Workflow forms. They are currently involved in several process design teams and are resources for the EASY Re-engineering Project.
- **Workflow Process Design activities – requirements gathering and documenting use cases:**

- WebRCT – Web Role Creation Tool. This will become part of the WebRAT application suite and will enable Role Stewards to (1) view existing roles, and (2) request roles.
  - Workflow Role Authorization
  - Undergraduate Education Travel Request form
  - Sabbatical form
  - Browse and Inquiry (simple searches)
  - FANS (IBIS Financial Account Number System) – a core functionality for financial forms
  - Budget Amendment for HR processes
- **Workflow Application Development -- Release 1 will include:**
    - PAWS – administrative application framework
    - Workflow base system – submit, review, approve and search forms
    - Workflow Role Authorization – replaces paper signature card and authorizes assignment of designated roles
    - Undergraduate Education Travel Request Form – used by academic areas for requesting funding for student travel to conferences.
    - Workflow User Guide – Web-based user guides will be available for systems and forms.
    - Attachments – the Workflow system will be integrated with a document repository for secure storage of form attachments.

#### **Recognition opportunities have come to the Penn State Workflow Project:**

- Software AG, long-term software and strategic partner of AIS, prepared a [case report on the Penn State Workflow Project](#).
- [Computerworld interviewed](#) Ron Rash, AIS Sr. Director, and Beth Hayes, Workflow Project Manager to learn more about the project, the technology being used, but more importantly, about the objectives, challenges and experiences the project has offered.

#### **Penn State EASY Re-engineering – Transforming the Way We Do Business**

**The Penn State EASY Re-engineering project** was launched May 15, with a meeting of all stakeholders and participants. Rich Dumm is serving as the Project Manager.

EASY re-engineering is an initiative to improve the management of business processes by replacing the current EASY forms and approval paths with Web-based forms and streamlined role management. The multi-year effort will move Penn State from the current EASY Forms (which utilize a user-based routing mechanism and a mainframe 3270 screen for collecting business information for processing) to Web-Based Workflow Business Processes (role-based routing mechanism and Web-based interface for collecting business information for processing).

EASY re-engineering will transform the University's business environment by matching new technologies with re-engineered business processes. The ultimate goal is increased efficiency and effectiveness in the processing of financial and human resource information.

**An EASY Re-engineering Web Site** has been created: [http://ais.its.psu.edu/easy\\_re-engineering](http://ais.its.psu.edu/easy_re-engineering)

### **Computer Operations and Facilities**

One of the biggest changes to our architecture has been the implementation of a new, highly secure network segment to help the University meet new industry requirements for processing credit cards. This effort was part of the University's ongoing Information Privacy and Security (IPAS) project. AIS was involved very early on because our central systems touch nearly everything credit card related, and thus we had to be compliant first. The project involved analyzing almost every piece of communication to and from our central eCommerce systems, developing logic for allowing that communication to continue on a new network, and developing response mechanisms for any traffic that was not authorized.

Part of our job in Infrastructure and Operations is to increase availability of our systems and reduce risks of downtime. To this end, a second physical fiber path has recently been established to/from Shields building that will allow IP traffic to continue even after traffic through our primary path is disrupted. This project was done in partnership with TNS, and ties in with our work to develop enhanced Disaster Recovery capabilities between Shields and the Computer Building.

### **Production Control and Scheduling**

**Change Control:** Production Control and Scheduling coordinated the implementation of 175 new batch jobs and changes to over 679 existing batch jobs that execute on the Enterprise Server.

**Batch Job Processing:** To meet the needs of the AIS user community, Production Control monitored the processing of approximately 266,000 production batch jobs on the Enterprise Server and over 30,000 batch jobs on various open systems platforms (Windows, Oracle). 99.65% of the total production batch workload ran to completion without intervention.

**Laser Output:** On February 1, 2007 we completed the transfer of our mainframe laser printing to Multimedia and Print Center (MPC). The transfer of laser printing to IP based printers in MPC, required changes to more than one-half of our batch jobs, as well as individually testing hundreds of special reports. Because of the close proximity of MPC's printers to Mail Services, many of the reports are placed in interoffice mail shortly after printing, thus speeding up the distribution of reports to our customers. We estimate that by completing this project, the University will save over \$23,000 a year. In addition, we are no longer dependent on unique laser printers if a disaster or catastrophic event occurs. With little or no effort, we can use any postscript laser printer on any IP network.

### **Enterprise Server Operations**

**Batch Workload:** Over 765,000 batch jobs executed, of which 280,704 were information requests by or sent to students via email. Over 5,600 jobs were executed to satisfy customers requesting labels or general reports. It should be noted that the number of batch jobs decreased over the previous fiscal year by 190,000 jobs. This is due to the transfer of the degree audit system from the enterprise server to a Windows based server in November of 2005.

**Report Workload:** Over 8.4 million pages of output were produced, with 5.2 million pages printed on printers within AIS and at MPC. Another 3.2 million pages were routed to printers in user offices. This represents a decrease in printed output of .5 million pages over the previous fiscal year. An additional 25.4 million pages of output was sent to the eDDS system during the fiscal year, an increase

of 1 million pages over the previous fiscal year. Over 75% of all reports produced were sent to eDDS during the fiscal year.

## **CIDR**

**Duplicate PSU ids:** Completed processing of over 760 Web Forms requesting the elimination of duplicate PSU ids. An additional 1,800 duplicate PSU ids that existed on January 1, 2005 were eliminated. In those instances where a student has more than one PSU id, detailed analysis is performed to assure that all the appropriate information either exists within or is transferred to the PSU id that is retained.

## **Infrastructure**

### **Enterprise Infrastructure**

#### **Product Upgrades**

AIS installed upgrades to a number of our core products supporting the ISIS, IBIS and ADIS database systems. These upgrades include:

- Natural 4.1.4
- ADABAS 7.4.4
- Natural Development Server 2.1.4
- EntireX Communicator 7.2.1.50
- Natural Single Point of Development (SPoD) 6.1.1.17
- Natural Single Point of Development (SPoD) 6.2.4.0 (test only)
- ADABAS for Windows 5.1.4.01 (test only)
- Natural Engineer for Windows 5.4.1.2 (test only)

#### **Daily Updates of Data Warehouse Transcripts**

AIS placed into production daily updates to the Transcripts table in the data warehouse. The tRelational and DPS products from Treehouse Software quickly transfer transcript data in ADABAS to the data warehouse on a daily rather than weekly basis. This process improved the timeliness and therefore, the accuracy of transcript data for all data warehouse users.

#### **DCE Middleware Removal From Web Applications**

AIS worked with staff from several University offices to convert all code supporting eLion and other web-based applications, eliminating its dependence on the DCE middleware product. The DCE middleware was replaced with two products from Software AG, EntireX Broker and Natural RPC servers. The conversion, which is approximately 90% complete and will be finished shortly, produced excellent performance and reliability in its first major production road test, supporting Spring semester grade reporting.

#### **IBIS Accounts Payable Project**

AIS executed a project to implement IBIS Accounts Payable, thereby removing the tape-based Central Accounting system. Developers coded and tested programs for this project in a new test ADABAS database containing existing files along with six new ADABAS files. This database aided rapid code development and deployment of new files while it also isolated testing of the Accounts Payable system from ongoing testing of existing systems.

## **Capital Campaign**

AIS provided support for the new Penn State capital campaign by supplying developers with rapid implementation of new ADABAS file requirements. This effort helped Penn State successfully kick off the new campaign on its targeted start date.

## **Audits**

AIS devoted a great deal of effort and time addressing open findings documented in three separate audits: (1) Grades, (2) Natural Security and (3) CIDR. All three audits contain a heavy focus on Natural Security. At this time, the Grades audit has been successfully addressed and closed. Nearly all high priority findings have been addressed and closed in the Natural Security audit. AIS has placed a very high priority on resolving all remaining open findings in both the Natural Security and the CIDR audits.

## **DBA-ES Request For Service System**

AIS' DBA-ES group built and implemented a new request for service system. DBA-ES designed the system in FileMakerPro and it provides customers web-based request-specific forms for requesting service. All data from each request are deposited into a FileMakerPro database, which permits easier management and tracking of requests. This system ensures that developers can provide all required information needed to implement various requests. This system replaces a generic web form system.

## **Single Point of Development (SPoD)**

AIS released into production Software AG's Single Point of Development (SPoD) coding environment. SPoD offers Natural developers a Windows-based coding studio. SPoD replaces or shares the development environment with SAG's 3270 editor.

## **Expanded Hours of Operations**

AIS expanded its hours of operations and access to the ISIS, IBIS and ADIS databases and related systems to the new hours of 7:00 AM – 3:00 AM daily. This represents one more step towards AIS' goal of providing 24x7 availability of systems.

## **Data Administration**

AIS continues to build applications based on the ADABAS database system. In the past year, the DBA-ES group processed 135 unique requests for database additions and modifications. AIS added 11 new files containing several hundred new fields in support of Accounts Payable, Payroll and the Capital Campaign. Once added to test databases and tested by developers, these changes were then propagated to the production database.

**VM and z/Linux Development:** Over the past year, AIS has continued to work on developing a production Linux environment that would take advantage of the same IBM - z/Series hardware platform we use for our production mainframe systems. Although we have been running specific applications within a single z/Series Linux instance for the past year, in March we met our goal of creating both an acceptance and a production environment for the WorkFlow project on our IBM z/890 servers. This new environment consists of multiple Linux instances transferring data between each other and while also being able to access data directly from our production z/OS environment. The new Linux instances support WebSphere, DB2, EntireX and our iBMP WorkFlow images that are internally connected using VLANs and HyperSockets. One of the biggest advantages of this approach is that we are able to securely communicate between images by transferring data between systems in memory. As the Linux instances are virtualized within the same VM environment, we were able to implement a "shared read only root" approach for our system files. This approach enables us to share

Linux operating system images across most of our Linux instances. This approach has the advantage of using less disk storage and it reduces the time it takes to create new images and perform system updates. In addition to implementing an appropriate architecture for Workflow, we also investigated a number of approaches for disk storage. Using a number of different techniques, we were able to connect our Linux images to our Storage Area Network (SAN), our SAN Volume Controller (SVC) disks and to mainframe volumes mounted through VM. This additional disk options will improve our ability to attach to different disk storage environments in the future and the SVC attached storage will also allow us to grow volumes, move them, and easily delete them when done.

Although extensive work has been done to create this environment, there is still a great deal of work to be done to make it as robust an environment as our z/OS production environment. We continue to work on system performance and capacity issues and have installed IBM's Omegamon performance monitoring environment to help in this area.

**Linux Application Environment:** While there has been a lot of work done building the operating system infrastructure, we have also focused on deploying an appropriate application environment. The focus on application integration has been to integrate a wide range of components into a secure architecture in a manner where they can perform optimally and be properly maintained. To meet this charge, the Enterprise Systems Integration team (ESI) has been working with the Academic Services and Emerging Technologies group (ASET) to implement user security for the environment with Kerberos and WebAccess for authentication and LDAP (Lightweight Direct Access Protocol) for authorization. The two groups worked to implement an approach for administrative access to iBMP using the LDAP DN of "uid" instead of what has been the default "psdiridn". This approach will allow iBPM to use the standard base code to load the administrative user registry and roles from a common centralized repository and will help to standardize our approach for secure administrative access for other services.

The ESI team also worked with IBM to implement an approach for sharing the "binaries" of a master install for WebSphere. This approach was similar to one developed for the Linux operating system and will allow us to easily clone additional images of WebSphere as our workload grows. At the current time, we are sharing binary images between Websphere Network Deployment Manager and three main Websphere application servers in a clustered environment. This approach will allow us to install the maintenance onto a copy of the master image and then easily migrate the patches or a new version of Websphere on the other images. The Websphere environment is also taking advantage of the changes to the LDAP "uid" DN for administrative access. All developers within the group "configurators" are now allowed system administrator access under the administrators group on our test environment.

The ESI group has also installed a DB2 environment (primarily used by the WorkFlow project), EntireX (access to mainframe data) and Tamino (which will be used to maintain XML schemas and data) for new requirements set forth by PELL.

**Printing migration to MPC:** Although our dependency on hardcopy printing has diminished over the last few years, we continue to have a substantial mainframe hardcopy printing requirement. In the past, this demand was met with a solution built on mainframe hardware technologies and related protocols. For the past 15 years the need was met with a Xerox based mainframe printing solution and high volume printers connected directly to our mainframes. As this environment evolved over many years, we knew it would be very difficult to migrate all the various printing requirements that had been developed to other options. Complicating the issue was the age of our Xerox printers and as they were approaching the end of their life cycle we decided it was time to review our options. After a number of discussions, we worked out a proof of concept project with the Media and Print Center (MPC) to

develop a solution where we would transmit all of our mainframe hardcopy print requests to their Xerox printing environment. After working on the problem for months we determined it was going to be necessary to make slight modifications to most of our output to implement an TCP/IP solution. In order to accomplish this migration, each type of output was tested and the JCL adjusted for the jobs to print correctly. Since February all of our mainframe system generated output has been printed at MPC.

**Storage Related Projects:** One of the largest changes to our storage environment over the last ten years is tape virtualization. Using Computer Associates VTape product we are now able to virtualizes our older tape hardware technologies by simulating the drives on disk storage. The package allows the tape datasets to be collected on disk before being externalized (written) into our tape libraries where hundreds of files can be stacked on a single tape. This approach will allow us to move away from our old 3420 round tape and 3480 cartridge technology to 'virtual tapes" while also providing a much better medium for maintaining data in the future and the approach has the added advantage of being able to maintain copies of the data in both Shields and the Computer Building. As the cache for virtual tapes is actually on spinning disk, it is also a faster way to write tape datasets and it removes the need to mount tapes. We are currently working on migrating the remaining "mounted tape" inventory into this environment which when completed should completely remove the need for our operators to mount tapes.

The storage group also improved the methodology used for auditing and verifying our backup strategy with the installation of the "DASDi Backup Supervisor" (DBS) project. This product bringing a higher level of reliability to our Enterprise Server's z/OS disk backups. The same backup utility that we have relied on for many years is still used, however DBS monitors the system for disk volumes that have been added or removed and automatically adjusts the backup procedures accordingly. As we move toward a more robust catastrophe recovery environment, other features of DBS will allow us to be better prepared for faster systematic recovery. The latest version of DBS is being implemented, which will provide the ability to back up VM volumes with DBS as well. In addition, we are now producing duplicate backups of our z/OS environment and therefore able to take one copy of the newest version offsite rather than the week-old version.

**HSM Duplex Tapes** - For many years our HSM (Heirarchical Storage Manager) environment has been running with just a single copy of migrated or backed up datasets. Last years tape library upgrade has allowed us to begin duplexing our our HSM environment and we now have two tape copies of our both our migrated and backup data. The new tape libraries also afford us much better protection from a tape failure.

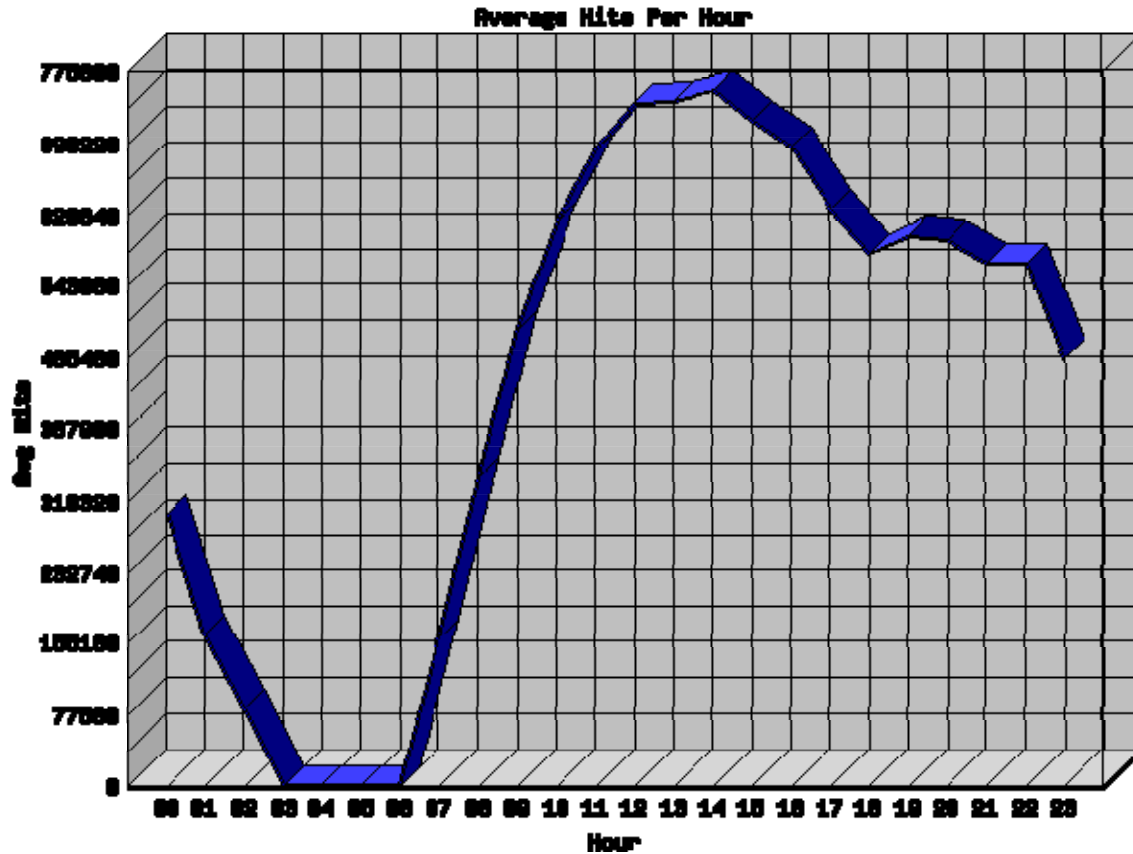
**VMWare upstairs** - We provided storage and SAN connections for Enrollment Management and Administration in Shields building to test their VMWare environment. Four offices' servers were connected and given temporary storage on which to test a proof of concept. The test was successful and a more permanent storage environment is being developed. Resulting will be enterprise-class storage as well as disk subsystem mirroring.

**Hydra to GI migration:** One of the biggest projects the Enterprise Infrastructure group has been involved in over the last 5-10 years is our Hyrda/eLion environment. As most everyone knows, this next generation of eLion – which uses the GI is handling 95% of the eLion calls and the environment worked very well for our Spring 2007 Grades period. The next big test for the new environment will be the Fall 2007 Registration/Drop/Add period in late August and we plan to completely dismantle our Hydra/DCE environment during the fall.

## Mid-Tier Infrastructure

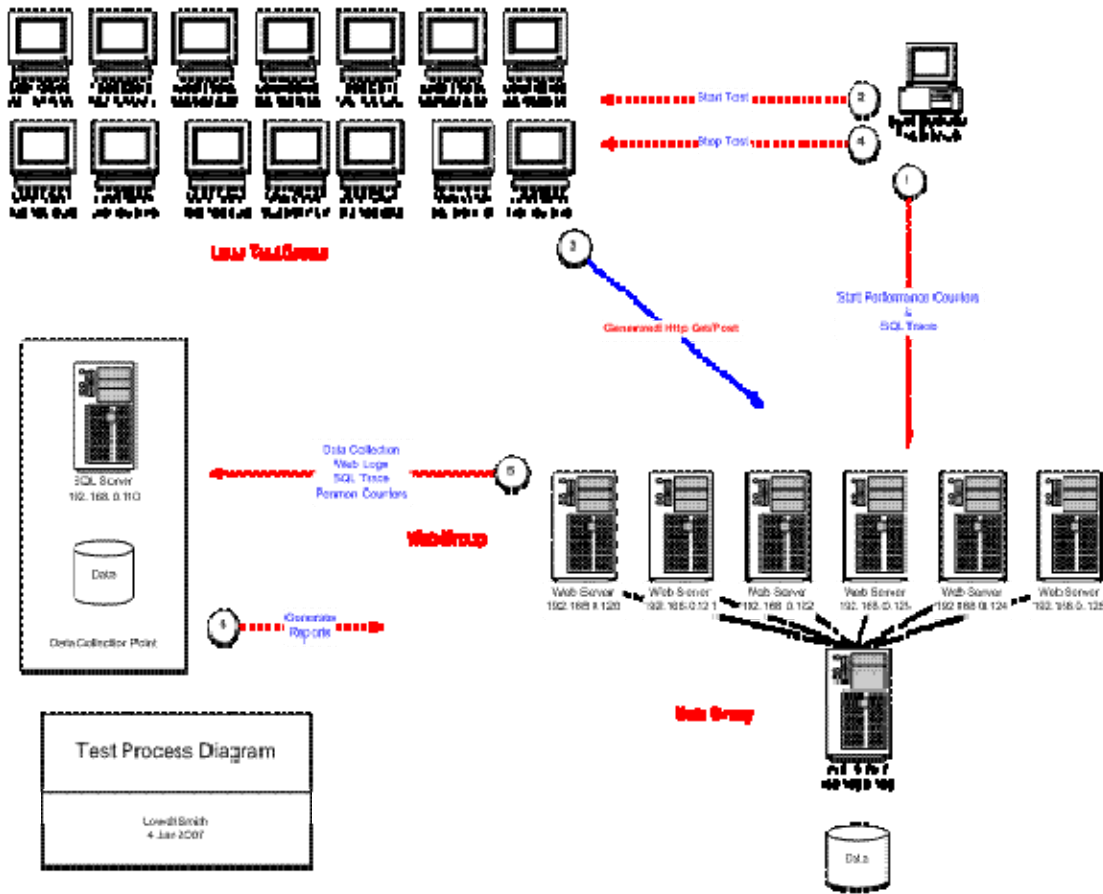
**ANGEL** – Angel has been operating smoothly under a new infrastructure that was implemented in the Fall of 2006. The University’s course management system continues to grow both in size and usage as it responds to its growing popularity. This past Spring semester 2007, ANGEL serviced 69,881 students (+12% over Spring 2006) participating in 8,712 course sections (+20% over Spring 2006). Peak usage reached over 1.4 million web transactions during a one hour period in August 2006 (+133% over the previous peak usage seen in August 2005).

**Average Daily Access to ANGEL in Feb. 2007 by Hour of the Day**



**Load Testing** – Using an open source product, OpenSTA, MTI continues to refine its load testing platform. Used in testing and evaluating the major upgrades to ANGEL, the load system consists of four parts (fig. 1):

1. a web group (six IIS 6.0 web servers),
2. a data group (one SQL Server),
3. a data collection point, and
4. a load test group (14 load clients and one load controller).



**ACS Upgrade** - A significant upgrade for the Alumni Development office was recently completed in anticipation of the University’s new campaign that involved a new server platform, migration to the Oracle 10g database, and an update to the ACS software. Midtier DBAs invested months of long hours and weekends testing and tuning this critical application in preparation for the new University fund raising endeavors.

**eSteward implementation** – A new system this year, eSteward provides authorized Penn State faculty and/or staff a Web tool to bring necessary data together for the effective management and stewardship of our donors' gifts, as well as the scholarship, faculty, and program endowments/accounts that their gifts support. Midtier DBAs managed the database portion of the project, attended the design meetings, installed system software, and created the database maintenance procedures.

**The Data Warehouse** – As part of catastrophe planning, an Emergency Information Repository (EIR) is now sited at a non-University Park location, and houses information that would be vital in accounting for students and staff at the University, as well as for immediate operational needs in the first few hours of a catastrophe at University Park.

**The Midtier Infrastructure group** - in conjunction with the Network group and the eCommerce applications team, Midtier helped to move the associated DB2 databases behind an additional firewall to come into compliance with VISA credit card regulations. Security was further increased by separating accounts based on function and by using encryption for authentication.

**New utilities & enhancements** – A lot of work has gone into supporting utilities this past year including the MDA utility for accessing data on production servers that has replaced the File Upload process used previously. New updates to the Request for Service (RFS) utility now allow for queuing requests after 5 P.M. and better communications through the RFS system. There are currently 16 distinct service categories within AIS now using the RFS system. Over 3,600 requests for Midtier

service were processed in 2006. Over 10,000 total service requests have been processed through the system since 2005.

**Virtual Machine technology** – Midtier has moved most test systems to virtual machine (VM) hosts, thereby consolidating infrastructure and conserving physical plant resources. This year Midtier will begin moving production services to VM hosts and in doing so will gain the same consolidation and conservation advantages seen in test but it will also mean higher availability and easier recovery of many production services.

Midtier is currently planning and designing new storage for the Windows environment that will be separately administered from the storage of the enterprise services. Initial specifications are complete and Midtier will be engaged in SAN testing and analysis in the coming weeks.

## Training & Education Program

### Training for Penn State Community on AIS Systems

#### Data Warehouse Data Training Sessions

Monthly data warehouse data training sessions continued to be offered at University Park serving 125 attendees at UP and another 15 at Commonwealth and Special Mission Campuses. Six different campuses participated via videoconferencing throughout the year. Topics included:

- Official
- Human Resources
- Student
- Undergraduate Applicant
- Graduate Applicant
- Facilities
- IBISFIN

#### ITS Training Services Administrative Computing Offerings

A total of 79 courses were offered through ITS Training Services, of which, 71 (90%) ran serving 634 attendees and totaling 431.5 instructor hours. Courses included:

- Unlocking the Data: EIS & the Data Warehouse
- Enterprise Information System: EIS
- Data Warehouse 1
- Data Warehouse 2
- Data Warehouse 3
- Introduction to eDDs
- Introduction to Electronic Forms Processing (IBIS)
- IBIS Financial on the Mainframe (CCOM)
- Financial Information Tool (FIT)
- Turn Your Applications Into Gold With eCommerce
- Introduction to Disaster Recovery Planning

#### Training on Demand Offerings

A total of 4 courses were offered through the Training On Demand service, of which, 4 (100%) ran serving 47 attendees and totaling 21 instructor hours. 4 different campuses utilized the Training On Demand Service in 2006-2007. Courses included:

- Unlocking the Data: EIS and the Data Warehouse
- Data Warehouse 1
- Data Warehouse 2
- Data Warehouse 3

### **Business Continuity Planning**

8 BCP courses ran serving 76 UP and 4 non-UP attendees from 6 different campuses/departments. Courses included:

- Business Impact Analysis (BIA)
- BCP 101 for Plan Development Teams: Part 1 & 2

### **Training for AIS Staff**

A total of 17 different courses in IT, project management, business analysis, developing user requirements, customer service, and financial skills equaling 310.5 training hours and serving 142 attendees were offered internally to AIS.

IT courses included:

- Building XML Queries with Xquery
- Developing Web Applications w/ASP.Net and Visual Studio
- Intro to OO Java Development for Procedural Developers Using Eclipse
- DB2 Family Fundamentals
- DB2 SQL Workshop
- Intro to CrossVision Business Process Manager
- Servlet and JSP Development with Rational Application Developer V. 6.0

Management Development courses included:

- Managing Difficult Employees
- Management Retreat on Internal Communications

Other courses offered were:

- Zire31 Palm Training
- Microsoft Project Introduction: Structuring Projects to Ensure Success
- MS Project Server
- Intro to Electronic Forms Processing: IBIS
- FISH! Philosophy
- MS Office 2007 Overview
- Introduction to Business Analysis: Defining Successful Projects
- User and System Requirements for Successful Software Development

### **Training Room Usage**

The internal AIS training room was used heavily for hands-on training, equipment use, training meetings and testing. Out of a total of 1720 possible hours, the training room was utilized 1515 hours (88.08%).

### **Training Room Materials**

Training room materials and equipment were heavily used/borrowed in 2006-2007. There were 81 unique instances of used/borrowed items including books, videos, laptops, training manuals, DVDs, projectors, other equipment, furniture, digital camera, TV, CDs, books and web-based training.