AccessPlus: Student Web Services at ISU

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AccessPlus is Iowa State University’s web and kiosk-based front door to real-time enterprise information for students, faculty, and staff. AccessPlus provides a comprehensive array of information services including, but not limited to, student records, financial aid, and university billing. Using TouchNet’s T-Serve Intelligent Gateway as our application server middleware, we are able to deliver instantaneous, secure, and accurate connectivity to those who need it. In this paper we will provide an overview of the AccessPlus environment and highlight three of our recently deployed web applications.

Iowa State University

Iowa State University (ISU) is a comprehensive, land-grant, Carnegie Foundation Research I Institution located in Ames, a progressive community of 50,000 people. ISU has 26,000 students, 1,800 faculty members, 4,300 staff members, and an annual budget exceeding $700 million. The university offers undergraduate, graduate, and professional degrees through its colleges of Agriculture, Business, Design, Education, Engineering, Family and Consumer Sciences, Liberal Arts and Sciences, Veterinary Medicine, and the Graduate College.

Information Technology Services

At ISU, centralized information technology (IT) services are the joint effort of four separate departments. The Administrative Data Processing (ADP) Center focuses on the development, implementation, and support of enterprise-wide information systems. Telecommunications provides the physical network and connection services for data, voice, and video communications. The Computation Center focuses on providing academic IT services including a wide range of computer hardware and software support. In addition, areas within the Instructional Technology Center (ITC) focus to assist faculty with the integration of technology into the classroom.

Key to the continuing success of IT services at ISU are the leadership efforts of the Info Tech group. Members of this group include the Provost, the Vice President for Business and Finance, the Vice President of Student Affairs, the Vice President of External Affairs, and the directors of the IT providers listed above. Working collaboratively to identify critical IT initiatives, set priorities, and secure funding, this group provides a cohesive, decision-making entity that provides direction in the areas of standards, computing infrastructure, and cross functional (or cross-department) IT services.

More about Administrative Computing at ISU

With a professional staff that has stabilized at about 80, the ADP Center works to develop, integrate, maintain, and support information systems that enable university entities to manage data. Services also include office information and desktop computing systems, data access and use, administrative network support, training and education, a help center, and a broad range of technical services. The ADP Center is a cost recovery center, which for the most part means that users of the services pay for the services.
While many higher education organizations have chosen to implement ERP solutions, the ADP Center continues to maintain and develop ISU’s core, enterprise systems (human resources, financials, student systems) in-house. With a long history of strong client partnerships, a commitment to information integration, and an open but cautious view when it comes to “buy vs. build,” we continue to meet and exceed client expectations. Our central operational environment is a solid and responsive IBM central server with DB2 as our database. Additionally, we support over 40 Novell servers, DB2 and Oracle distributed databases, and over 10 specialized, departmental systems running on Unix, NT, and AS-400 platforms.

As expected, given our central operational environment, the majority of ISU’s information systems are developed and delivered using COBOL/CICS. Access to all CICS systems is controlled through the Administrative Information Network (ADIN) that provides a flexible front door for the management of customized system menus. Clients logon to ADIN and are presented with an individualized menu of system choices. Furthermore, access to data within a system can be controlled by pre-defined user profiles.

Within ADIN, systems development occurs using documented structured programming techniques. Placement of function codes and record key information is consistent from application to application, as is F-key functionality and standard error messaging. The development cycle is greatly enhanced by a strict adherence to development standards (I/O limits, programming standards, system reviews, etc.). These standards have allowed for the development of COBOL program generators and our unique Job Procedure Language (JPL) which eliminated the need to code JCL. While we continue to successfully develop and deploy information systems within this environment, we clearly see the need to enhance access to information – and the Internet is our delivery system of choice.
AccessPlus – An Overview

In the mid-1990’s, members of the University Information Systems (UIS) team, the New Technologies team, and the Systems team began to explore options for delivering web services with a strong desire to leverage our investment in existing information systems. The result of this investigation is the ISU/TouchNet partnership. The TouchNet system fits our needs for functionality, experience, and services. It provides a new method of information distribution for students, faculty, and staff while blending existing systems with new technology solutions. Using the TouchNet gateway as our link to the web, we have developed AccessPlus – a suite of services that is truly a work in progress.

In August 1995, ISU first offered students a chance to view their personal information from five kiosks installed across campus. In July and August of 1996, we added seven additional kiosks on campus and also added web access. Since then, we have continued to expand and enhance web access to include a broad range of services available to students, faculty, and staff. The AccessPlus system benefits ISU by allowing students, faculty, and staff access to information at a time that is convenient for them. It has freed administrative office staff of routine requests for information. This in turn allows staff to handle other important duties within the office. As expected, the enhanced services have led to a phenomenal increase in AccessPlus (A+) usage.
AccessPlus – Technical Perspective

With TouchNet’s T-Serve Intelligent Gateway as our application server middleware, we are able to deliver data located in our central system databases to the web. As ADIN is our front door to information for TN3270 connections, AccessPlus has become our front door for secure (SSL) internet access. We have successfully developed a driver module that provides user authentication, builds custom menus, and routes requests to all A+ applications. Applications are written in COBOL/CICS and pull data from our production databases. Data is stored primarily in relational tables (DB2) although a small portion of the data remains in VSAM files. With multiple host listeners defined on the central system (OS/390) to enhance throughput, requests for information are delivered to the driver module, which then routes the requests to the appropriate COBOL module. The business logic executes on the central system and returns to T-Serve a delimited stream of data that can be parsed onto the web page. Following programming and I/O limit standards developed for our TN3270 environment, our web applications continue to be very responsive.

AccessPlus Information Model

![AccessPlus Information Model Diagram]

- **Kiosks**
- **Students**
- **Request/Response**
- **Web Browser**
- **AccessPlus Server: RS6000 AIX(Unix)**
- **TouchNet T-Serve Software**
- **Intelligent Gateway**
- **ADP Central System (Host) Enterprise Systems**
- **Databases (Relational)**
Web Registration

Since October 1988, over 95% of ISU students have used ISU’s Touch-tone Information System to register for classes. With a commitment to continually improving student services, the WebReg system was piloted to new Fall 1999 freshmen during summer orientation in June 1999. During October/November 1999, the WebReg system was available to all students. With no marketing and just one article in the campus newspaper, nearly 40% of students (nearly 70% of freshman) used the new system to register for Spring 2000 classes.

The WebReg development team consisted of dedicated staff from the Registrar’s Office along with application development and technical staff from the ADP Center. In February 1999, during the initial assessment of the functional requirements, we knew we wanted to build on the strength of our Touch-tone system and capitalize on our existing business logic – especially with a pilot implementation deadline of June 1999. Fortunately, the business logic for adds and drops currently used in both the Touch-tone and ADIN systems is a somewhat self-contained COBOL module. Although we did have to revise and rewrite some of the authentication unique to registration, we did not have to rewrite or replicate the add/drop business rules.

Each term, Student Authorization forms (or permits to register) are created for all new and current, non-graduating students and delivered to the academic advisers. Included on this form is a randomly generated Registration Authorization Number (RAN) and a registration start date and time. The RAN is reassigned each term to ensure that students are advised prior to registration. Start date and time assignment is based on classification (year-in-school) and credits earned with Provost defined special population privileges. Prior to the start of registration, students meet with their advisers to discuss their academic progress, review their academic plan, use the on-line Schedule of Classes to pick courses for the next term, and ultimately to pick-up the critical RAN.

To use WebReg, students must first logon to A+ using their Social Security Number (soon to be University ID) and University PIN. Next they select “Register for Classes” and enter their RAN. The software validates start date and time and checks to see if any university holds exist. If everything clears, the student can begin the
actual class scheduling process. Within the system, students can add and drop classes, easily make section changes, and browse real-time course offerings with open seat counts.

While we had offered web services for several years, implementing a high transaction WWW application took us to some uncharted areas. Within our A+ environment, we have no known natural gatekeepers other than server capacity. In our ADIN system, the number of registered users of the system limits the number of concurrent users – far less than our student body population. In the Touch-tone environment, we are limited by telephone line availability, which in our case is 35 lines. Therefore, in addition to extensive application testing, we conducted extensive load testing prior to full-scale implementation.

Implementation to date has been very successful. We have had no known scripted attacks but have chosen to implement a maximum transaction limit. While most students register in 40 transactions or less, we did have over 800 students use more than 100 transactions. Plans for the future include expanded hours of operation (we currently run 7AM to 8PM), time conflict checking, and integration into the schedule of classes and ISU Bulletin (catalog).

### WebReg Transaction Summary - November 30, 1999

<table>
<thead>
<tr>
<th>Students with:</th>
<th>#students</th>
<th>#trans</th>
<th>%students</th>
<th>% trans</th>
<th>avg trans</th>
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<tr>
<td>more than 200 transactions</td>
<td>135</td>
<td>35267</td>
<td>1.63%</td>
<td>12.08%</td>
<td>261</td>
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<tr>
<td>more than 100 transactions</td>
<td>812</td>
<td>126718</td>
<td>8.94%</td>
<td>30.26%</td>
<td>156</td>
</tr>
<tr>
<td>between 5 &amp; 99 transactions</td>
<td>8272</td>
<td>292045</td>
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<td>69.74%</td>
<td>35</td>
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<tr>
<td>Total</td>
<td>9084</td>
<td>418763</td>
<td></td>
<td></td>
<td>46</td>
</tr>
</tbody>
</table>

### Financial Aid Services

As one of the first direct-lending schools, and as a current Access America participant, ISU is a leader in providing innovative financial aid services to students. The Financial Aid Voice Response (FAVR) system was implemented in 1995. It provides students with information about the amount and status of their aid for a designated academic term. In November 1996, the first financial aid web services were unveiled. These services included displays of financial aid hold information, scholarship award information, and loan information. Now students can also check their total student loan indebtedness, the balance due on each loan, and the loan repayment status.

The Financial Aid E-award system went into production in the spring of 1999. Returning students are notified via email that their award package for the academic year is available on AccessPlus. They can accept their aid offer, reduce or cancel the offer, and report outside scholarships on the web, thus reducing paper flow and mailing costs throughout the financial aid office. With the advent of the Master Promissory Note, many students can completely process their financial aid without any ‘paperwork.’ During the 1999 aid year over 8,500 students reviewed their award offer on the web, with 6,300 making adjustments to their offer.

The electronic aid release authorization form is the newest option on the Financial Aid menu. Each term students who have Title IV aid must authorize the release of these aid funds to be applied to their university bill. Students receive either an e-mail or paper letter directing them to AccessPlus to release their aid for the designated term.

Working in close partnership with the Office of Student Financial Aid, the ADP Center continues to enhance and expand financial aid web services. Projects under discussion include a loan eligibility calculator and a loan application option.
Step Inside

The Department of Residence at ISU provides housing for over 7,500 students in 14 high-rise and traditional halls. With a commitment to providing quality services that stimulate, enhance, and extend the total living/learning experience, the Department of Residence has embarked on a master plan to upgrade and renovate existing residence hall facilities, raze several existing structures, and construct new facilities and residential neighborhoods to meet the changing needs and desires of students. While satisfied with the master plan’s focus on the physical facilities, the Department of Residence has also identified specific initiatives for business process improvement. One specific initiative is to deliver information and services to students via AccessPlus.

In Spring 1998 students were first able to view their room and dining contracts, list the names of fellow roommates and housemates (those living on the same dorm floor), and view housing rates through AccessPlus. The following fall term, a cross-functional team including students, Residence Hall staff, and ADP Center staff began weekly meetings to outline the functions of what has become the Step Inside system.

Step Inside is ISU’s unique Residence Hall application that allows students to choose rooms and roommates over the web for the next Fall term. First available to the 6,500 students housed in ISU dormitories during Spring 1999, nearly half of the students chose to use the system to review and renew their housing arrangements. Through Step Inside students have options to stay in their current room, determine which rooms are available, and even pair up with a roommate to select a room. Additionally, students can view a room’s floor plan, see specific room characteristics like single/double occupancy, air-conditioning, open over breaks, etc., and easily link to a room’s specific charge rate.

As with our other AccessPlus web services, Step Inside has been very successful. It provides better service to students and has eased the workload for some administrative and support staff. Future plans to enhance the system include allowing room changes during the semester and allowing new students the opportunity to make their initial room selection on this system.

What’s next

As mentioned earlier, we continue to expand the services available in AccessPlus. We are currently developing pages to show a single semester of grades, accept tuition credit card payments, as well as implement a long list of enhancements to the WebReg system. We are working on cooperative initiatives with the other campus IT providers to integrate administrative information into the academic learning environment. Projects currently under review are a suite of services to deliver electronic class lists including wizards that allow instructors to easily create class mailing lists, download class lists to their desktops, or import the official class list data into instructional teaching tools like WebCT. We are also working to enhance adviser access to information by adding information to existing pages, developing pages to deliver advisers a list of their advisees, and have a long term plan to provide access to degree audits.

While the TouchNet Gateway currently provides a solid and secure path to the enterprise data, we continue to explore new solutions. Currently our efforts are focused on IBM’s WebSphere as the possible long-term future for our e-business web application framework. Using Purchase Requisitioning as our pilot project, we are exploring what IBM, the OS/390 platform, and Java have to offer. Look for an update on our progress at CUMREC 2001.

For more information

Iowa State University - http://www.iastate.edu/
ISU ADP Center - http://adp.iastate.edu/
ISU Office of Student Financial Aid - http://www.public.iastate.edu/~fin_aid_info/
ISU Department of Residence - http://www.iastate.edu/~residence_info/
ISU Office of the Registrar - http://www.iastate.edu/~registrar/