



## Overview

### Goals:

- Give Penn State students, faculty and staff access to its information storehouse
- Ensure scalability to match growth of web-based applications
- Leverage investments in existing mainframe storage

### Challenges:

Provide a development environment that:

- Accommodated periods of extremely heavy usage without system crashes
- Ensured security of administrative and instructional data
- Allowed for expansion as needed without downtimes

### Solution:

Cincom Smalltalk™

### Key Results:

- Cincom Smalltalk enabled Penn State to put client-server applications on the web with very little effort.
- Cincom Smalltalk streamlined the creation of the user interface and the web-to-database access mechanisms.
- The end product significantly eased processing requirements for the university's legacy system, while preserving the substantial investment in mainframe technology.

Profile in Success: [Penn State University](#)

# Cincom Smalltalk™ Lets Penn State Roll Out Web-Based Access Without Losing Legacy System Investments



## Situation:

Penn State University, with 24 campuses and 80,000 students, wanted to make its huge storehouse of information readily available to students, faculty, and staff. First-generation web applications were mainly designed as stand-alone systems, and simply combining legacy mainframe systems with client-server functions quickly crashed key business applications during heavy usage.

Penn State undertook a massive internet development project designed to give students and staff direct access to its wealth of institutional information. Dubbed eLion, the new system would deliver a custom search engine, a hypertext listing of suggested academic and advising references, open access to student information systems, an artificial intelligence-based advising service, and a variety of support services for faculty, staff and students.

## The Project: Access Mainframe Data from the Web

"Accommodating the web is meaningless if you can't preserve existing application and database investments," said Peter deVries, director of advanced technology. "We had been building mainframe systems for 20 years. As we create client-server and intranet applications, our philosophy is to transition and improve the capabilities of those mainframe systems, not replace them."

Unfortunately, PSU's first solution, a two-tiered system, was unsuccessful. The mainframe was so overburdened that key business applications halted during heavy usage. PSU's IT professionals realized they needed to off-load much of the processing requirements from the legacy system if things were to get back on track. Many of the data requests were being made by students on their own behalf, such as course information, grades, and transcripts. Ken Blythe, Penn State's senior director for administrative systems, recalled the staff's deliberations:

"So we wondered, what if the university could set up a system that would let the students help themselves to this information in a secure fashion? It would save on administrative expenses, speed information response and take a tremendous load off the university staff."

A three-tiered system thus began to take shape. The mainframe would remain as the data server. Web servers would host the primary application logic. And the presentation layer would be a combination of traditional desktop clients and thin clients running web browsers.

## The Process: Selecting the Tools -- Cincom Smalltalk

Cincom Smalltalk's object-oriented design is inherently suited to the web's distributed makeup. Rather than storing data and business functions separately, Smalltalk objects comprise both procedures and data, so that they

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can be combined more flexibly than data or procedures taken separately, and objects can be readily shared among applications.

"Cincom Smalltalk is the first product that puts a full-blown, object-oriented development environment behind the web page. It enabled us to put our client-server application on the web with very little effort," Blythe said. DeVries punctuated that thought: "Cincom Smalltalk's object-oriented architecture enabled rapid development and provided us with the opportunity to continually expand the system through component reuse."

**Flexible and scalable.** Having once created the business logic, PSU developers could endlessly expand and modify the interface connections without having to significantly alter the core system. Cincom Smalltalk allowed them to rapidly build a complete client-server-web system, enabling both web access and access through such typical client computers as Apple and Windows. It linked to legacy systems for data access and with a security system for password protection and authentication. Cincom Smalltalk streamlined the creation of the user interface and the web-to-database access mechanisms.

"[Cincom Smalltalk] allowed us to create an application in one complete graphical environment that is automatically deployable on the web," deVries said. "Furthermore, the three-tier applications we developed are easier to adapt to the web's distributed makeup because of their distinct separation between business logic, presentation, and data. Client browsers present the application, while web servers funnel queries and transactions to an intermediate tier of database and application servers."

**Preventing bottlenecks.** Web sites run into bottlenecks that can be traced to a single point of threading between the web server and the mainframe. Cincom Smalltalk addresses this issue with a multi-threaded Common Gateway Interface (CGI), which is used whenever a browser needs to call a service that is external to the web server. With Cincom Smalltalk, developers can deploy interactive, multiscreen client-server applications that enable a true two-way dialog between the user and the application.

"Many web applications show their limitations as traffic increases," deVries said. "We've used Cincom Smalltalk to scale the middle tier as the system became more popular."

With Cincom Smalltalk, PSU developers rapidly created a three-tiered system that reused components. Functions could be written once and placed on servers accessible by all applications, thus saving labor and equipment costs. It also meant that the system could be readily expanded, legacy mainframes linked for data access, and passwords protected and authenticated.