From Static Web Site to Portal

Villanova University provides a case study for integrating a dynamic and individualized Web system

by Christopher G. Connolly

When the concept of portal Web sites emerged, Pennsylvania’s Villanova University realized this concept accurately described many of its objectives. Portals—sites that serve as a starting point for people when they connect to the Web or that they tend to visit as an anchor site—offer the potential to organize and customize information. Villanova wanted to create a Web system that informed people of the latest news and events, could be customized, and took advantage of information stored in the university’s records system. Given these objectives, we have spent more than 18 months overhauling our static Web site to a dynamic and individualized Web system.

Before we look at preliminary steps for developing and integrating portal technology and enabling Web-based solutions, it is important to understand the differences between Internet Web sites, intranets, and portals.

An Internet Web site is the most basic manifestation of Web technology, providing information through hypertext markup language (HTML) that allows for cross-referencing with hyperlinks. Consumers worldwide can access the Internet, thus the information presented on an Internet Web site is intended for public consumption without restriction.

An intranet Web site is one that is contained within an organization. Its purpose is to provide more relevant, useful Web-based solutions to an internal community. People have access to an intranet through an authentication process, usually involving usernames and passwords that they must remember. Intranets afford a way to present information to a restricted audience.

For Web-based application developers, the dichotomy between Internet Web sites for presenting public information and intranet Web sites for presenting restricted information creates a development burden. Several Web sites must be maintained to provide security and confidentiality for certain kinds of information, possibly even duplicating some information on more than one site.

A portal, on the other hand, is a gateway to the Web that allows the plethora of information available on Internet and intranet Web sites to be organized and customized through a single entry point. A good portal provides seamless access for nonauthenticated users until sensitive information is requested, when it then prompts for a username and password. Authenticated visitors or those known to the site by cookies (textual information passed to the client to be stored on the client’s system) are presented with a more individualized view of the organization’s Web site.

There are, however, many products on the market that are simply advanced intranet Web sites that take better advantage of information known about the user. These portals can fail developers by requiring them to maintain an Internet Web site for nonauthenticated visitors and a portal for those with authentication. Storing a university’s student campus activities schedule in a password-protected portal prevents prospective students from viewing the university’s activities, but placing the schedule on the public Internet site prevents campus Web designers from personalizing the information. For example, designers could place sophomore activities at the top of the schedule when those students view the content.

Unlike Internet and intranet sites, most portals are proprietary and thus often do not conform to any standards. Although they may provide application programming interfaces (APIs), each provides a different set of APIs. Portals are meant to be a solution for multiple intranet username/password systems, which are based on many open standards; however, more vendors are offering portal solutions for different functional needs such as athletics or the student record system. What is the solution once an organization has several different vendor-based portals?

In-House Versus Commercial

One of the challenges an organization faces when considering a portal approach is determining whether to develop an in-house software solution, outsource such development, or purchase a commercial solution. The organization must assess the need for a competitive advantage in the technology arena, the ability of an off-the-shelf product to meet those unique needs, and the resources necessary to develop an in-house solution. The Netscape browser is a good example of a technology that meets almost any organization’s unique needs. Most organizations, with the exception of competing browser vendors, gain little to no competitive edge by developing their own custom-built browser. Advanced, underlying technologies such as Web browsers, Java, and e-mail are examples of open standard solutions that generally should not be developed by organizations that are not
API—Application Program Interface; the way in which software communicates with other software
ASP—Active Server Pages; Microsoft’s Web server-scripting language that provides dynamic content
Cookies—Textual information passed to the client to be stored on the client’s system. Cookies allow Web servers to identify clients.
HTTP—Hypertext Markup Language; a formatting language that allows programmers to communicate with Web servers and browsers
Java—A high-level, object-oriented programming language developed by Sun Microsystems
Java servlet—A Web server application, usually intended to provide dynamic content, that is written in Java and conforms to Sun Microsystems’ specifications
Java tag library—An HTML tag that can be placed in a Web page to access a Java Servlet before being served to the client
JavaScript—A scripting language developed by Netscape based on Java that can embed in Web pages to add dynamic functions to the page
LDAP—Lightweight Directory Access Protocol; Netscape’s strategic directory protocol. It defines a simple mechanism for Internet clients to query and manage a database. LDAP is compatible with many commercial and freeware products.
Object-oriented—A style of design in which systems and information are viewed as objects that interact with each other
SQL—Structured Query Language; the international standard language for defining and accessing relational databases.
Tags—Short commands that are the “words” of the HTML programming language

specialized in these technologies. However, Java servers (Web applications that run on a server) and active server pages are programming interfaces developed to allow organizations to create custom applications. Writing a Java servlet that displays the photographs of the students enrolled in a course by bringing together information from vendor A’s student record system and vendor B’s picture ID card system is a good example of an in-house application.

An portals are an applied technology based on existing technologies. Currently, most portals are an applied one based on existing technology such as e-mail or an intranet application. An intranet application is a good example of an in-house application.

For a portal to communicate effec-tively and interactively with students, faculty, staff, and alumni, it must know as much as possible about each individual. If a university operates different systems for payroll, students, and alumni, it becomes a difficult hurdle for a portal to overcome.

Villanova centralized its operations into a single database system. The university installed SCT’s Banner system five years ago, and most departments are now integrated. The information technology (IT) department’s helpdesk system, university card system, and telecommunications billing systems are examples of departments using data bases that are not yet fully integrated into the central record system because the vendor did not offer the needed functions. The helpdesk and university card systems have been linked with the LDAP system so information can be retrieved with minimal effort.

CENTRALIZED INFORMATION
Although an university may have a cen-tralized customer records system, it is often too complicated to develop Web content from these data. A university’s record system might have a customer’s information stored in more than 20 different locations (called tables in database terms). Filtering through these tables when attempting to customize the look and feel of a Web page can be time consuming both to develop and execute. In addition, it is likely that the university will need to assess whether to use a low-cost ad-driven portal, a higher-cost non-ad-driven portal, or a portal developed in-house.

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method, provides an interface to the information that is much easier to use and more accessible. Although the APIs may use standard programming structures such as Java Naming and Directory Interface or Java Database Connectivity, the methods provided for each are not standard across portals. Case in point, vendor A's portal may have a getUserID method while vendor B's portal may use a getUserName method. These discrepancies can be a major hindrance and cause portals to become more than high-endtranient products. For in-house developed portals, documentation for the API and the underlying code itself are required.

Because Villanova developed its own repository using LDAP, it had to develop its own API and documentation. The API, written for the Java programming language, and documentation are made available to any department or college within the university that wishes to use the information. Often the API is used for non-Web-related projects, such as configuring people's Windows machines to reflect their username, location, and workgroup. The API is currently in its second generation, it is easier to use and more object oriented, which makes it more resilient to change.

INFRASTRUCTURE INTEGRATION

The above steps, including developing or purchasing the portal software, require a significant investment of time and money. Existing and new systems integrate into and take advantage of the new infrastructure and that provides the true cost savings and benefits. There is more to most universities than their Web sites. Combining resources such as the Web, e-mail, e-commerce, and classroom instruction to take advantage of the same individualized repository of information reduces administrative and maintenance costs and presents a seamless environment for the customer.

For commercial portals there are both specialized and generic portals for integration. A specialized portal is a one that is supplied for a specific target market or extends an existing product. For example, a vendor may enhance its athletic recruitment database system by offering a portal that immediately integrates with its existing database product. However, a registrar's office will have difficulty using an athletic office's portal for its own needs. A generic portal is one that is intended to be flexible enough for any organization's needs. A generic portal, however, usually exists outside of an organization's present systems. This case requires an in-house or outsourced integration between the existing system and the portal.

Villanova has integrated many existing and new systems into its IT infrastructure. The integration with our e-mail system now allows our faculty and staff to target their specific student audiences using college, major, year, college year, and major year distribution lists. In addition, every course taught at Villanova is supplemented with its own e-mail distribution list and bulletin board. Integrating our Apache Web server and Microsoft FrontPage extensions has provided several benefits. Every faculty member, staff member, and student is automatically provided with a personalized Web site. Staff members are automatically granted or revoked rights to edit a department's Web site when they begin or end employment with that department.

Individualized Solutions

After the infrastructure is in place and a portal has been developed or purchased, it is important not to lose sight of the advantage of the portal's customer needs. Many IT departments spend so much time and effort designing the underlying infrastructure that they believe the dynamic Web sites are only extensions of their infrastructure. However, the opposite is true. The dynamic Web sites provide the information and tools the customer needs while the infrastructure exists only as a means to support such a rich system. A common feature of a portal's MyHomepage is sports updates. From a student's point of view, the idea of a sports section seems quite trivial and irrelevant. From a student's point of view, customized sports updates are a useful resource for the university Web to provide. Universities that make sports updates available will not only increase customer satisfaction and portal use, but will also enable the university to place its own news and events around the sports section, increasing student awareness of campus activities and opportunities.

Villanova's most successful portal tool has been its MyClassrooms feature. MyClassrooms provides a common link to classroom material and resources that are available on the Internet. All university courses include an e-mail class distribution list and a class bulletin board for faculty and students to collaborate throughout the semester. The key feature of MyClassrooms is the ability to view the photo ID of all the students enrolled in a course. This has been extremely well received by students and faculty members.

Developing and implementing the customer-needed features of a portal are the first only steps of a properly deployed portal system. Typically an IT department represents only a small portion of a university's workforce. Therefore, it is essential that non-technical users outside the IT department can take advantage of the portal's advanced capabilities. Portal technology offers departments the ability to incorporate secure access and dynamic features easily using customized HTML tags. A good portal also should be able to work with existing Web servers. It is rare that an entire university operates on a single Web server. Therefore, the portal solution should be extensible enough for other departmental Web servers to take advantage of the technology.

Villanova University has taken advantage of Java tags, which provide a way to implement customized HTML tags to interact with Java servlets. This allows HTML developers to add security or dynamic content to their pages with simple HTML tags. It also provides a method to repeat dynamic information efficiently across different pages. For example, the university library system can display the same dynamic library news module on the university home page as well as in the library homepage.

Dynamic and individualized Web systems will become essential for organizations in the next several years as customer expectations grow and organizations further develop their Web-based technologies to distinguish themselves from their competition. It is important not to lose sight of the original goals of the Web, which are to provide a seamless, heterogeneous environment to access information and avoid the bells and whistles of a proprietary portal solution. Villanova University has successfully integrated portal technology by constructing and using a solid IT infrastructure.

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