The Computerworld Honors Program

CASE STUDY

ORGANIZATION:

University of Pittsburgh

PROJECT NAME:

Enterprise Exchange

LOCATION:
Pittsburgh, Pennsylvania
United States

YEAR:
2006

STATUS:
Laureate

CATEGORY:
Education and Academia

NOMINATING COMPANY:
Microsoft

Summary

The University of Pittsburgh has provided electronic mail services using a number of solutions over the years including VMS Mail, POP, UNIX, and IMAP solutions. In the late 1990's, these were consolidated into a central IMAP-based e-mail service that continues to meet the basic e-mail needs of many University users, particularly students and academic units that do not offer their own internal solutions. In order to have access to features unavailable through IMAP or its predecessors, however, many University academic and administrative units have chosen to operate their own e-mail services. These features include integrated calendaring and support for synchronizing mail on PDA and other handheld devices.

The implementation of Microsoft Exchange as a University enterprise service frees departments from server administration, patch management, upgrade responsibilities and the costs associated with providing these services. This enterprise solution also allows faculty, staff, and in some cases students, to take advantage of the benefits of a common address book, calendaring, PDA support, and other features available in a Microsoft Exchange environment.

Unlike unit-based e-mail systems, the enterprise service is fully monitored by the University's Network Operations Center and benefits from central backups, redundancy, and support by the significant expertise available through Computing Services and Systems Development (CSSD), the University's central IT organization.

Introductory Overview

Since 1998, CSSD has maintained an Exchange server for the use of its own staff. The introduction of Microsoft Active Directory with Windows Server 2000 resulted in the tying together of unit-based servers to create a single Exchange Organization. This allowed users from different departments to view an address book containing information on all Exchange users, calendar free/busy information, and the ability to collaborate on projects of common interest. Prior to the implementation of the Enterprise Exchange service, this organization was comprised of 60 unit-based servers providing service to more than 8,000 users.

While the demand for Exchange e-mail services across the University is evident, most depart-

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ments running Exchange servers have had difficulty maintaining the servers themselves. The clear disadvantage to this situation is that each Exchange server depends upon all other Exchange Active Directory domain controllers to function properly. Even seemingly inconsequential changes to one Exchange server negatively impacted service for other areas, with support and resolution provided by CSSD. The cost to the University was significant under this model because each unit was responsible for its own set of servers and software. Each department was also responsible for hiring someone with the expertise to maintain its servers. These costs are especially significant to departments with small staffs. The Enterprise Exchange Service is funded centrally to relieve individual units from bearing equipment, software, and support costs and encourage them to move to the new service.

The goal of the Enterprise Exchange project was to establish a true opt-in enterprise service in which CSSD assumes responsibility for operations and costs. Units still have the option of providing their own independent Exchange environments, but will not have access to the University's Global Address Book and central IT support if they choose to do so. CSSD is responsible for the operating and capital costs of the service. Enterprise Exchange users are provided enterprise-class service with maximum availability. Upgrades can be accomplished easily because they no longer need to be coordinated with each of the units operating their own separate, yet interdependent, servers.

Benefits

The implementation of the Enterprise Exchange environment created several benefits for individual departments and the University as a whole. Departments belonging to the original Exchange Environment have noticed significant IT cost savings. These departments have experienced a significant reduction in outages and service interruptions. Additionally, departments that did not have the means to support their own exchange environment due to the high cost of system administration, server, and software costs can take advantage of the advanced functionality provided by the Enterprise Exchange environment.

Enterprise Exchange provides access to a Global Address List for all students, faculty, and staff. This list is linked to the University's Central Directory Service and is constantly up-to-date. Integration with the University's Web portal, my.pitt.edu, is now available as a direct result of the new Exchange environment.

Enterprise Exchange also created noticeable benefits within CSSD. Issues with unit-based Exchange servers consumed considerable time for central and unit support staff. Support staff previously assigned to help other departments troubleshoot Exchange issues could now be assigned to other projects. Additionally, the creation of an Enterprise environment created the opportunity for consistent monitoring of Exchange services for the University's Network Operations Center.

The Importance of Technology

The University currently provides a robust enterprise mail platform using its IMAP-based mail system. The system has the capacity to support all 42,000 potential University users and supports roaming profiles in which all user settings are stored on a server and are available from any location. A Webmail application available to users through the Web portal makes this system

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even more convenient to use.

As robust and feature-rich as the enterprise IMAP system is, most units prefer to have the ability to schedule meetings electronically. The enterprise IMAP environment does not provide this capability, which is inherently available with Exchange. The technology was also chosen because it is one of the most feature rich e-mail applications available. Of great significance to the University community is the Global Address List, which provides the ability to send e-mail to users without knowing their username@pitt.edu e-mail address. Outlook Web Access was also significant as it provides nearly identical functionality, look, and feel as the Outlook client application, but over the Web using any supported browser. Additionally, group calendaring functionality provides for scheduling of resources such as conference rooms and equipment. These benefits are in great demand, not only by units that had already implemented their own Exchange e-mail servers, but by other units that had implemented their own IMAP, IBM/Lotus, and other systems.

Implementing an enterprise-class service required significant attention to developing a hardware architecture that provides highly available service with redundancy to avoid any possible single points of failure. Microsoft Exchange 2003 supports database clustering and can be integrated with the University's network load balancing system. That system, based on technology from Foundry Networks, allows Web server capacity to be increased, or servers to be removed from the cluster for repair, with no observable user impact. Database clustering technology ensures that multiple disk storage paths are available and that automatic failover will ensure no loss of service in the event of disk failures and other storage-related issues. The entire system is managed by the University's Network Operations Center, which provides around-the-clock monitoring, troubleshooting, and expert problem resolution when failures do occur.

Originality

This service was implemented on an opt-in basis, in which units with their own Exchange servers had the ability to move to the hosted Enterprise service or continue to run their own servers without the benefit of central information technology support. Most have elected to convert to the new service. In addition, several units with other e-mail systems, or that had been using the IMAP enterprise e-mail service, elected to convert to the new service.

The originality of this project lies in the process by which 48 units with separate, yet connected, Exchange servers were brought into a single, enterprise Exchange service.

A detailed project plan for migrating units from their existing e-mail services to Enterprise Exchange was developed and implemented to ensure minimal user impact as a result of the change. The new system is completely integrated into the University's existing Central Directory Service and enterprise authentication, network load balancing, network-based firewall, and enterprise application monitoring solutions. Users can conveniently access the system through the University's Web portal.

Success

Cost savings for units in the Enterprise Exchange environment, whose resources are focused on academic or other business support functions, are significant. CSSD benefits from focusing its resources on the management of a single Exchange environment entirely within its control,

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rather than having to coordinate patch management, anti-virus, anti-spam, software upgrades, and other basic functions with 47 other operating units.

One third of the units operating their own Exchange servers asked to move to Enterprise Exchange before the service was announced. The University's graduate and undergraduate business schools, longtime Lotus Domino users, also asked to convert to the new system in order to benefit from the capabilities and expertise in managing large-scale e-mail systems that CSSD can offer to the University community. As demand continues to grow and the majority of University units are migrated into Enterprise Exchange, CSSD expects to support some 42,000 users.

Difficulty

Implementing a second enterprise mail service included resolving some difficult problems. Each University student, faculty member, and employee receives an automatically generated "pitt.edu" e-mail account. Users may choose to forward mail destined for these accounts to other services, including outside e-mail services. By default, unless changed by the user, mail is delivered to the user's account on the IMAP e-mail service.

Units that provide their own e-mail services provide a separate e-mail address for at least their faculty and staff, if not students enrolled in their programs. The user must choose to either read official University mail in one mailbox and other messages in the unit-based mailbox or forward mail from one to the other. Providing an Enterprise Exchange mailbox, however, would result in the possibility of official University messages being sent to both an IMAP and Enterprise Exchange mailbox, confusing the user. Ultimately it was decided to close IMAP accounts and forward mail when Enterprise Exchange accounts are created for those users.

CSSD operates a Central Directory System that serves as the authoritative source of information about all individuals affiliated with the University. Integrated with this system is an automated Computer Accounts Management system that creates, among other accounts, an e-mail account on the IMAP enterprise service. Unlike IMAP, users are not automatically enrolled in Enterprise Exchange. Custom-developed tools were needed to allow the CSSD Help Desk to create Exchange accounts, reset passwords, and set e-mail aliases as needed. Interfaces were also needed to allow users to view their quotas, allow for the creation of public folders, and provide integration for BlackBerry and other mobile devices. The system requires the ability to block availability of personal information for students who have invoked privacy rights under the Family Educational Rights and Privacy Act of 1974.

Migration of users from existing services also presented considerable difficulty that had to be addressed in advance. Users on departmental Exchange servers could have usernames on those systems that conflicted with the usernames assigned by the University. This presents little difficulty in a distributed system but had to be reconciled for the enterprise service implementation. Without effective planning, users could lose track of scheduled meetings, rules for handling e-mail messages, and delegated access to calendars and mailboxes. This complexity required planning, investigation of the availability and functionality of migration tools to minimize impact, and careful consideration of all of the issues facing any one department. Extensive and effective user support was the key to the success of the project.