 # 3075: Transaction Processing on the Internet

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The Internet and private network Intranets are rapidly becoming a key way to conduct enterprise business. The World Wide Web provides a communications infrastructure for enterprises inside and outside the corporation — with employees, suppliers, customers and the public. This presentation focuses on the types of solutions available to link enterprises' business to the Web.

Gaining Competitive Advantage

Large enterprises are modernizing their transaction applications to gain competitive advantage. They can do this by improving employee productivity and making desktop tools for development, sales, management and other employees easily accessible. As more and more people use home or business computers to make purchases, gain information and access a vast array of business enterprises, these firms want to create public access to certain applications to gain sales volume or reduce operating costs. They are attempting to do this by creating a more efficient interface between their systems and users.

In their search for productivity gains, enterprises also typically explore client/server solutions. However, many two-tier solutions fail in the large-enterprise/mission-critical context because they are unable to:

- Manage distribution of desktop software to keep thousands of desktops current with new software
- Scale two-tier client/server applications to up the enterprise and maintain performance
- Avoid vendor lock-in if they use proprietary stored procedure languages from RDBMS vendors.

The Web is a good solution for large enterprises because it has the potential to solve these problems. Software distribution problems disappear because every PC needs only a browser. Performance and scalability can be achieved and vendor lock-in eliminated because the Web works well with three-tier client/server systems, where only presentation is on the desktop, and the application and database servers are at the center.

Many believe the browser is the universal desktop client because it offers graphical presentation as good as traditional client/server tools, creates a common environment on every desktop to enable current software throughout the enterprise and is essentially free or very low cost. This model of three-tier architecture to browser clients can meet the requirements of the Fortune 1000 and Global 2000 for scalable, high-performance transaction systems with remote access by modern, user-friendly interfaces.

Internet, Intranet Requirements

There are two similar but different sets of requirements for either Intranets or the Internet and electronic commerce.

Intranets are used primarily for communication applications within the enterprise. When used for OLTP, Intranets usually take advantage of existing transaction applications connected to the Web as a common client. Intranet users typically are familiar with the application and, therefore, do not require easy-to-use interfaces. It is essential for an Intranet to leverage the enterprise's financial investment in existing applications and link to all other Web applications, such as groupware, e-mail and personal productivity tools. An Intranet, unlike two-tier client/server solutions, can eliminate the problem of distributing desktop software and typically reduces costs. With Intranets, remote access is available throughout the enterprise, so users have access to all Web applications. Intranet needs can be met by screen scraper products that automatically translate mainframe 3270 data streams into HyperText Markup Language (HTML) for use on the Web. Even here, though, the Intranet may now expose these legacy applications to new users who are not familiar with the cryptic instructions on the 3270 screen. Graphical interfaces are therefore also useful for Intranet use, in order to make the applications much more intuitive and easy to use.

Because the general public uses the Internet, these requirements differ somewhat from those for Intranets. Ease of user interface is key: Interfaces must be simple and intuitive, and require no

application knowledge. A graphical interface that makes the application look like a typical Web page allows novices to point and click their selections. In addition, scalability and performance are essential. With Internet use, remote access to the application is available from any location, so security is important and can be technically challenging. For the Internet, some enterprises use existing transaction applications; others use this opportunity to modernize and upgrade their systems before offering public access.

In the Internet environment, where the audience is the public in either an electronic commerce or Electronic Data Interchange (EDI) application, priority must be given to building a simple, easy-to-use, attractive and intuitive user interface through native HTML forms or Java. Attention must also be focussed on security through encryption and authentication, and on scalability and performance, with a transaction engine capable of responding rapidly to potentially very high loads. Three solutions have emerged:

- Java applet support via sockets connection to the transaction application
- HTML forms support, also via sockets
- Web client products, a desktop client solution written in Java for electronic commerce or business-to-business EDI applications.

Common Requirements

An effective, efficient bridge from the enterprise OLTP system to Intranets or the Internet requires translation between HTML and 3270 streams. It must minimize the additional expense, time and performance problems associated with the process-forking overhead of the Common Gateway Interface (CGI) on the Web. In addition, it must protect transaction security.

These Internet/Intranet links also must establish a state context because transactions are essentially conversations, while the Web is a stateless message-in/message-out environment. They must also support both persistent sessions and non-persistent sessions.

Solutions available from vendors today encompass many approaches, including screen scraper or automatic translator products, HTML forms or Java, or Java Web clients.

Screen Scrapers/3270 Translators

Screen scrapers provide automatic translation between 3270 data streams and HTML for almost-instant Web access for CICS transactions. The best include a state machine that preserves transaction and supports persistent and non-persistent sessions. Some products include user-programming exits to allow the site to wrap native HTML headers and footers around the translated 3270 screen. These may include a third exit to allow programmers to manipulate the translated data, but this involves complex programming.

Screen scrapers are packaged for front-end CICS transaction systems running on UNIX or for applications remaining on MVS mainframes.

Some products improve performance with an embedded transaction engine to enable scaling to very large transaction workloads on UNIX servers. Some are integrated with Netscape Communications Corp.'s (Mountain View, CA Commerce Server, using the Netscape NSAPI interface and bypassing CGI. Initial performance measurements show CGI involves large overhead, which, although acceptable for small volume use on Intranets, makes it unwieldy for large applications with tens of thousands or hundreds of thousands of users.

Today's screen scrapers are really only suitable for Intranets, where users are familiar with the application. A typical application could be a bank with an employee expense-claim application written originally in CICS for the mainframe. Moving this to two-tier client/server would put much of the application logic on the desktop and create software distribution problems each time expense rules change. A screen scraper keeps the application rules centralized and uses the browser as the common desktop.

HTML Forms Or Java

Some enterprises need to create sophisticated graphical presentations for competitive reasons, particularly firms marketing via some of the highly competitive shopping malls on the Web. In this case, building native applications from scratch to link the Web with their transaction systems can be the best solution.

Connections are available from a transaction system to desktops that run native HTML forms or Java. These connections are through a sockets interface or the External Presentation Interface (EPI). The HTML forms and Java interfaces are primarily for public Internet or electronic commerce use. They allow a simple, easy-to-use interface suitable for users with no knowledge of the application. They typically use drop-down menus or scroll bars and sliders. HTML or Java then captures the data fields and enters these with the transaction request over sockets or EPI to the transaction engine. No changes are required in the CICS OLTP application.

Today there are limited tools to help develop these forms or Java applets and moderately complex programming could be involved. However, this situation is changing rapidly. Most client/server development tools will be linking their development environments to the Web during the next year. These environments are likely to bypass CGI and integrate with the Web server using either Netscape's NSAPI or Microsoft's ISAPI. This integration eliminates the process-forking overhead of CGI and should result in a solution capable of scaling to the volumes needed for electronic commerce. In addition, servers such as Netscape's Commerce Server includes the Secure Sockets Layer, which provides encryption and authentication security services.

Typical applications could be a bank that wants to offer home banking services, a catalog sales company making a transition to on-line sales via the Internet or a financial services firm offering 401 (k) retirement services and moving from a telephone customer interface to home PC access via the Internet. The key success factor here is an appealing Web presence that will lure potential customers to the site, then enable access to the enterprises existing transaction system.

Java Web Clients

The newest products to support Web based OLTP are Web clients written in Java, targeted at the electronic commerce/EDI market. They provide a quick, easy way to develop simple public interfaces to existing CICS applications on UNIX. The Web client is implemented as a Java application on the desktop and automates much of the production of the new Internet front end. Web clients include a graphical editor to prepare the Internet interface and a Java run-time system to link electronic commerce/EDI users to the transaction system. The transaction system indicates which screen format it is sending to a Java applet, which calls up the appropriate Java script. The script may include pull-down list-selection boxes, field context-sensitive help, field masking, slider bars, radio buttons and color options. With this interface, all user choices are made by point and click, ideal for public access or untrained users in business-to-business EDI. A typical application would be a payment card-based electronic purchasing system.

Client/Server And The Internet

As this Internet/Intranet environment changes rapidly, it is expected that client/server and the Internet will merge. This presents opportunities as the proven suites of client/server development tools develop Internet back ends and can be used to improve the development of Internet client interfaces. It also presents risks, since the industry may repeat the failure of two-tier client/server on the Internet for large enterprise applications.

Future Directions

The Internet and Intranets are still very new and tools to use them effectively are evolving rapidly. Firms planning to develop a connection between their transaction system and the Web should base their strategy on the continuity of the browser as the universal client desktop software within a three-tier or multi-tier architecture. In addition, they should expect that Intranet applications will likely grow rapidly, followed by business-to-business and public Internet sales applications, so they should develop their plans accordingly. As new products come to market in these growing areas, they should be evaluated carefully for a long-term strategy fit with the organization.