DATA COMMUNICATIONS MANAGEMENT

HOST INTEGRATION SERVERS

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INTRODUCTION
Research firms and experts estimate that approximately 70 percent of mission-critical data still reside on “legacy” computing systems today. By legacy system, the experts are referring to traditional data processing platforms typically found in data centers and maintained, around the clock, by IT staff. These systems are IBM-style mainframes, IBM midrange systems, and other platforms sold by a variety of vendors (DEC, HP, Bull, Unisys, etc.) that support mission-critical applications.

One of the outcomes of the client/server computing revolution was going to be the elimination of these expensive, proprietary, dated platforms by a new generation of low-cost servers based on industry standards or de facto standards. Client/server never achieved this lofty promise. In large part, this failure was due to the lack of a solid business case for porting the legacy applications to new platforms. The legacy platforms provided fault tolerance and 24x7 operation that were unavailable on new servers. In addition, the cost of the legacy platforms began to fall and the platforms became much more adept at supporting the new open technologies. The cost of the IBM mainframe in terms of dollar per MIP, for example, has fallen drastically in the past decade, and the standard mainframe operating system now includes support for TCP/IP as a no-charge feature.

The applications and the data that still reside on the legacy platforms are truly the lifeblood of many enterprises. This is where customer records, billing, manufacturing re-

PAYOFF IDEA
Host integration servers are a relatively new class of products that allows IT organizations to build new Web-style applications that tap the various and diverse legacy systems without rewriting the applications on these systems. This article defines and lists the characteristics of host integration servers, differentiates them from application servers, and summarizes some of the early host integration servers available on the market.
source planning, and other critical systems are located. The major issue facing IT organizations today is tapping that data and those applications to build new E-commerce capabilities that allow more efficient communication with their trading partners and end customers.

Many legacy applications are built on a character-based interface that assumes that an end user is communicating to it through a display terminal or software emulating a display terminal. In these applications, the business logic is intertwined and interconnected with the user interface. One cannot access the data that is a part of the application (e.g., the customer billing data) without stepping through the transaction-oriented terminal interface. Some legacy applications, however, are batch or programmatic rather than transaction based. The applications are program-to-program, with an “intelligent” client or server communicating with the legacy host. A prime example of this type of interaction is a middle-tier relational database server that supports a newer, client/server-based program that queries data from a legacy mainframe database. Some large enterprises will have a wide variety of different types of legacy applications, each with its own unique interface.

A host integration server is a relatively new category of products that will allow organizations building a Web-to-host environment to easily tap a variety of types of legacy applications without requiring any change to the legacy applications. It differs from other types of Web-to-host solutions in that it is a server-centric solution that is focused on integrating host data into Web-style applications, rather than providing a general-purpose platform and toolkit for Web application development and deployment.

THIN CLIENTS VERSUS SERVER-CENTRIC SOLUTIONS

The Web-to-host market began in 1996 with a few products that were geared to providing access from a Web browser to an IBM mainframe. Early on, there were two camps as to how that access should be provided and therefore two very different types of products. The two basic product types were thin-client emulator applets and server-centric Web-to-host gateways.

Before Web-to-host solutions, users who wanted to access legacy applications usually installed special-purpose terminal emulation software on their desktop PCs. As the name implies, this software emulates the functions of a fixed-function display terminal that provides character-based access to transactional applications on legacy systems. Like so many other PC applications, the emulator software grew in size over time, and enterprise IT staffs spend a lot of money and effort performing the desktop software distribution and maintenance tasks for these emulators.
The thin-client approach to Web-to-host access is based on the premise that these traditional “fat-client” emulators can be replaced with thinner equivalents. Java and ActiveX, Web-oriented technologies that allow for the dynamic download of client software, were the key to eliminating the software distribution and maintenance tasks associated with traditional client-based software. Initially, the thin-client Web-to-host products simply replaced the functions of the fat-client emulator and continued to provide the same, “green-on-black” user interface common to the emulator environment. Over time, however, thin-client Web-to-host products have grown in sophistication. Now, many leading solutions provide one or more means of rejuvenating the user interface so that thin-client solutions can provide users with a more pleasing Web-style interface. The commonality of the thin-client solutions is that an applet is downloaded from a Web server to the client. It is the applet that contains the logic that allows the client to connect to and establish a session with the host.

The second camp for early Web-to-host solutions was established based on the premise that the client software should have a “zero footprint.” In other words, all host access processing should be performed on a middle-tier “gateway” server, and the client should only be required to have a standard Web browser. The communication between the client and this host access server is performed only with standard HTML. It is the server that is responsible for containing the logic to connect to and establish a session with the host. Early forms of server-centric products were 3270-to-HTML converters. This class of server-centric product provides on-the-fly conversion between the standard data stream utilized by IBM mainframes (the 3270 data stream) and HTML. The host and the application are not changed, and the client simply needs a browser. Because the 3270 data stream is converted to HTML, there is automatically some level of rejuvenation of the user interface inherent in these products, even if that rejuvenation simply provides a pleasing background, radio buttons for PF key assignments, or other simple enhancements of the user interface.

Initially, the vendors providing these different solutions each claimed that their approaches were suitable for two very different types of audiences:

1. **Intranet/extranet users:** These users are the traditional users of terminal emulator fat-client software. They typically require regular access to one or more legacy applications, perhaps as a major part of their job. Internal to the organization, these may be data entry or customer service representatives who need to access customer records, billing applications, etc. Extranet users may be dealers or distributors who need access to order entry and order status information. To these
users, Web-to-host solutions are a replacement for their current host access solution.

2. Internet users: These are users who have never before seen or interacted directly with the legacy applications. Examples include consumers doing home banking, Internet-based shopping, and package tracking. Business-to-business examples might include insurance agents who used to have to call into an insurance company's call center, but now gain direct pricing and policy information over the Internet. Web-to-host solutions provide an extension of the traditional legacy host access user base.

However, the needs of these very different user bases are quite different, as is the way in which they access legacy systems. Intranet/extranet users often require many of the features and functions of the traditional emulator because they have built up training, scripts, and tools over the years to accomplish the host access task more efficiently. These users typically have a need to communicate more consistently with the host throughout the workday. And for some of these users (e.g., data entry workers), rejuvenating the application will only impede productivity rather than enhance it. Internet-based users, on the other hand, typically only require a simple, single transaction with the host application. These users do not want to learn how to navigate the legacy application, and therefore rejuvenation of the user interface is a must. These users also count speed and responsiveness as key requirements. Therefore, the time to download even a thin-client applet may diminish the appeal of an applet-based solution.

Because of these differences, the market has more or less naturally segmented itself by user base. The thin-client solutions are more appropriate to the fat-client replacement market, while server-centric solutions are better suited to the extension market, in which new users access the host application. Many vendors now accept and embrace this market segmentation, and currently offer a family of products that includes both thin-client solutions and server-centric solutions. The balance of this article focuses on server-centric solutions in general, and more specifically focus on the class of server-centric solutions known as host integration servers.

HOST INTEGRATION SERVERS
A host integration server is a server-centric Web-to-host integration solution that has the following characteristics:

- It runs on either a middle-tier server or the destination host server and may support one or more different server operating systems, including perhaps NT, UNIX, NetWare, OS/390, OS/400, or Linux.
- It supports “zero-footprint” clients, sending standard HTML (and perhaps XML) to the clients.
- It communicates upstream with a variety of legacy host applications through a variety or transaction, batch, and programmatic interfaces (e.g., 3270 data stream, 5250 data stream, VT, ODBC/JDBC, MQSeries, CICS API(s)).
- It includes the means to utilize a visual development tool to easily integrate the host data and applications into new Web pages; it may or may not provide on-the-fly conversion for host data streams.
- It may include security, scalability, and fault tolerance features such as SSL, load balancing, and hot server standby.
- It interoperates with Web servers and possibly with new application servers.

By this definition, 3270-to-HTML conversion products are very basic host integration servers that only support a single type of host application interface — the 3270 data stream (which, granted, has the largest installed base and therefore the largest target market). The 3270-to-HTML converter products almost always provide an on-the-fly conversion capability, allowing these products to be installed and up and running with no programming, scripting, or customization.

Modern host integration servers offer much more capability than basic 3270-to-HTML converters. One obvious and apparent difference is in the support for different types of host applications and different data sources. With a host integration server, one can build Web pages that integrate data from a variety of different legacy host applications. For example, a home banking Web page may include the customer’s name and address from a mainframe CICS application, current account activity from a Sybase database located on a Tandem system, and special promotions that the customer can take advantage of from an AS/400 back-office system. In contrast, a 3270-to-HTML converter can only communicate with mainframe applications that support the 3270 data stream.

Another difference between the early 3270-to-HTML products and true host integration servers is in the assumed amount of scripting and customization. Modern host integration servers presume that the new user interface will not simply be a one-to-one correlation between the host screen and HTML-based Web page. Therefore, host integration servers are focused on providing customization studios (or interfaces to standard customization studios) that allow programmers to easily design brand-new Web-style interfaces that incorporate host data. On the other hand, 3270-to-HTML products are geared to providing quick and easy access to host applications with some level of rejuvenation. The on-the-fly conversion capability is usually counted on to do the majority of the user interface rejuvenation. Most 3270-to-HTML converters also support some level of scripting or programming to allow more sophisticated rejuvenation,
but the simplicity of the on-the-fly conversion is the real selling point of these products.

So, with its sophisticated user interface redesign capabilities, how does a host integration server compare to a new application server? Application servers have many of the characteristics listed above for host integration servers. The major differences between the two is that the application server:

- is targeted to the development of new business logic rather than the access of existing legacy business logic
- is built upon an object-oriented base, supporting some combination of CORBA, Enterprise JavaBeans, or Microsoft's DCOM
- contains connectors to legacy data and applications, but the list may not be as complete as those provided with host integration servers

An application server (or Web application server) is a platform for the development of new applications. Therefore, host integration servers and application servers are complementary products rather than competing products, particularly if they can communicate and share data. For example, a host integration server may create objects containing legacy application access that can be utilized by an application server.

Host integration servers are the new generation of server-centric products that are focused on integrating the wide variety of legacy applications with the new Web environment. Exhibit 1 offers a list of some commercially available host integration servers, along with some of the salient points about the product.

**A GOOD FIT FOR HOST INTEGRATION SERVERS**

With the plethora of different types of solutions available for providing legacy host system access from Web browsers, it is important for enterprise IT staffs to select only those solutions most appropriate to their specific environments. Host integration servers are a relatively new category of product that can solve some specific needs better than other types of solutions. An enterprise organization that has most or all of the following characteristics should evaluate host integration servers:

- The organization needs to extend current legacy host access to new users who have no experience with the legacy systems.
- The IT department cannot control or dictate the level of browser or type of operating system that the user is running.
- Users need to access data and applications from a variety of different types of host systems.
It is desirable to redesign the way in which users interact with the legacy host, so there is no longer a one-to-one correlation between host screen and Web page.

The organization will move to application servers for new business logic in the future, but are not yet ready to deploy this object-oriented framework at present.

Fault tolerance, security, and scalability are important factors.

An organization whose users are mostly internal users or business partners who are already familiar with the legacy systems may actually find that thin-client solutions are a better fit than host integration solutions, because the thin-client applets are a more complete replacement for their existing desktops. An organization that is more interested in deploying new business logic, with some integration of legacy host data, may find that a full-blown application server (many of which include connectors for legacy data) should be the first step. However, the relatively large number of organizations that fit the characteristics described above are ripe for a host integration server solution.

**CONCLUSION**

Research indicates that 70 percent of the mission-critical data still resides on legacy host systems. However, the applications that reside on these
systems are varied. Early Web-to-host solutions focused on supporting certain types of hosts and certain types of application interfaces. Early solutions also tried to meet the needs of both “expert” host system users and a new population of casual users.

The host integration server is a new category of server-centric solution that excels at allowing IT organizations to build a new interface into a broad base of existing legacy applications. This category of product is a natural fit for organizations that need to extend the vast data locked up in their varied, mission-critical legacy systems to a new population of end users. The host integration server is also a complementary solution to the full-blown application server, which is the modern platform for the development and deployment of new business logic based on object-oriented models.

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