white paper

HEWLETT® PACKARD

HP | e3000 Business Servers | Web-enablement

Web Enabling Your HP e3000 Applications and Data Access

HP e3000

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Introduction

The purpose of this paper is to explain the technology and tools available to access data via an HP e3000, HP 9000 or NT web server and integrate existing or create new HP e3000 applications with these web servers.

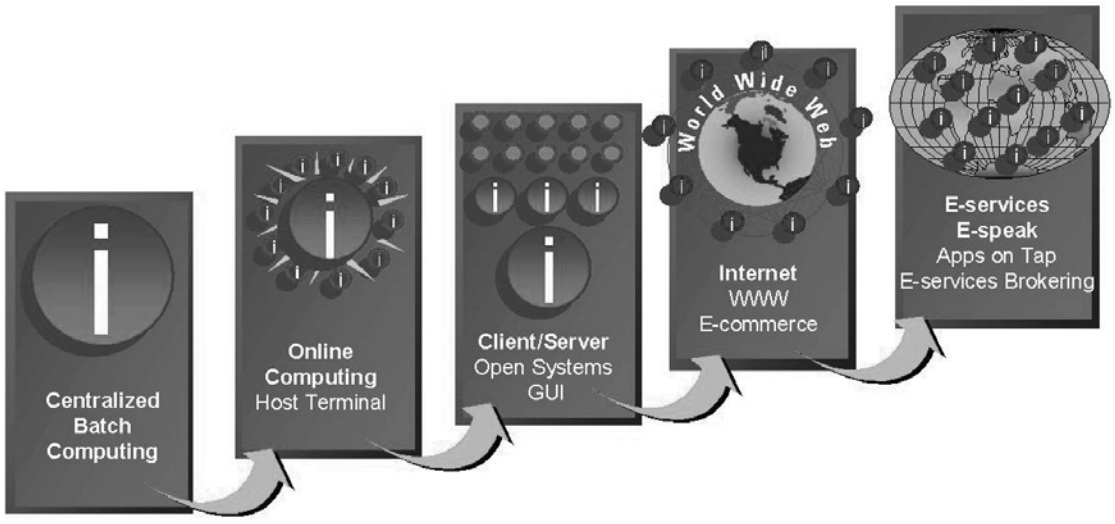
First, let's take a brief look at the evolution of HP e3000 toward today's world of e-services. The first HP e3000 with its operating system MPE was released in 1972. The HP e3000 has always provided a superior and reliable platform in the computer industry. In the 70's, it evolved from a system for centralized batch computing to online host/terminal based environment.

In the 80's, HP introduced a new PA-RISC hardware architecture running the MPE/XL operating system. The HP e3000 continued its upward expansion by providing terabytes of disk storage, supporting hundreds of terminals and PCs, and revitalizing the Image database to the high performance TurboIMAGE product.

In the early 90s, the open systems movement shifted the computer industry into a heterogeneous client/server computing environment. POSIX was integrated in the MPE operating system along with bundled networking functionality, SQL and ODBC for database access. MPE/iX provides interoperability with other systems such as Unix, NT and IBM with reliability, stability and the strength of high-speed online transaction processing.

With the recent explosion of the Internet and the World Wide Web, the HP e3000 again evolves by embracing new key web-enabling technologies (Apache, LDAP, JDBC, and SSL). HP e3000 users now can do business over the Internet. We will continue to monitor new industry trends and activities in these rapidly changing environments and to refresh the platform with new technologies. We are committed to lead our customers to the evolving future —the new paradigm of e-services.

HP e3000 evolves ... e-services



In order to help our customers understand how to evolve their current business to the Internet and e-service world, we categorize our customers into four scenarios.

1. ***"Webify" existing applications***. These are the customers including independent single shops wanting to bring their business to web-based computing. They want a friendly development environment to quickly deploy their applications with a common easily maintained browser interface, and to leverage their core HP e3000 applications with little or no effort.
2. ***E-commerce applications***. These are e-commerce vendors that want to quickly build and deploy their applications while the critical information and business logic resides on the HP e3000. Time to production of these applications is critical, and code modifications must be made quickly enough to respond to the changing business demands. These customers need comprehensive packaged tools that enable rapid development and deployment of their applications, while providing high performance and secure access. They also need the ability to handle a large number of simultaneous users as well as the capacity to incorporate multiple systems and resources.
3. ***Enterprise solutions***. These are the customers who want their mission critical HP e3000 applications to fit into the evolving Internet and web-centric enterprise environment. The enterprise environment is comprised of information systems with distributed databases, automated business processes and business practices that are tightly integrated with web-based applications. These applications use many emerging industry standards, protocols and middleware technologies in the networking, security and distributed OLTP areas.
4. ***E-services solutions***. These are the customers that develop business applications running on the HP e3000 and deliver pay-as-you-go services on the Internet. These services are built on the transaction-based fee usage model. This new business model enables companies to drive down their overall IT costs by allowing them to focus on building and deploying applications that are uniquely strategic to their business and rent virtually everything else — such as hardware, storage and middleware — as needed for a complete solution.

	Webify Apps	E-commerce Apps	Enterprise Solutions	E-services Solutions
Who	Independent single application shops	E-commerce vendors	Enterprise customers	Futures masses Transaction-based e-services
Needs	Connect existing applications to Internet with little or no effort Easy development environment Leverage MS	Rapid development environment Scalability Performance	Fit applications into enterprise environment Internet connectivity Follow industry trends & standards Scalability Performance	Reduce IT costs Build & deploy unique strategic applications Apps on Tap Brokering Next generation portals
Tools	CGI, Servlets ODBC, JDBC FE development tools	4GL & GUI Integrated packaged tools ODBC, JDBC	DCE LDAP SSL, X.509, PKI ODBC, JDBC MQSeries MSMQ etc.	CGI, Servlets FE tools Integrated packaged tools LDAP SSL, X.509, PKI ODBC, JDBC E"speak

"Webify" Existing Applications

In earlier days, a well-designed web site using multimedia elements and having visual appeal impressed people. Today's businesses expect interactive, instant, bi-directional access to information, and full Web-based applications that directly support key business processes. These web applications transform Web sites from collections of static HTML pages into strategic applications capable of exploiting underlying data base capabilities. These applications will include both Intranet and Internet dynamic database connectivity.

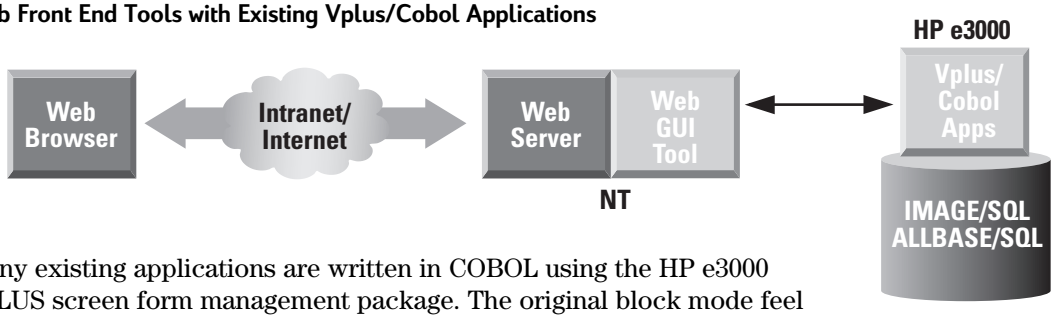
The HP e3000 has long enabled customers to take advantage of Web technologies without having to throw away their investments. This section will discuss how to leverage your existing applications accessing databases on the HP e3000, and make them available to the web.

Front-end Tools and Graphical User Interface Tools

While wanting to "webify" their existing 3000 applications, many customers are accustomed to the GUI and the information access tools available in the Windows environment. Various tools have emerged to address the need for quicker and easier software development.

- HP Samba/iX is a suite of programs that allow the HP e3000 to provide services using the Microsoft Networking protocol SMB. Samba/iX allows MPE to act as a file and print server to PC client running on the Windows environments. The byte stream files and printers on MPE can be accessed directly from Windows and NT. The remote file system becomes transparent to the user. Samba/iX is available since 6.0 release.
- ***GUI3000*** from OmniSolutions, Inc is a graphical front end for HP e3000, which is similar to the Windows "Explorer" or "File Manager" products. GUI3000 manages files, groups and accounts, provides information about your Turbo/IMAGE databases, and establishes an interface to the HP e3000 for carrying out commands.
- ***Qedit*** for Windows from Robelle is a client/server editor, which edits host HP files from a Windows-based GUI environment.
- The ***MPE Command Center*** is a powerful Windows-based graphical user interface that provides IT Administrators a true Windows look and feel. Terminals or terminal emulation programs are no longer required to open the MPE file system, and manage accounts, groups, users and files under MPE on the HP e3000 system.

Web Front End Tools with Existing Vplus/Cobol Applications



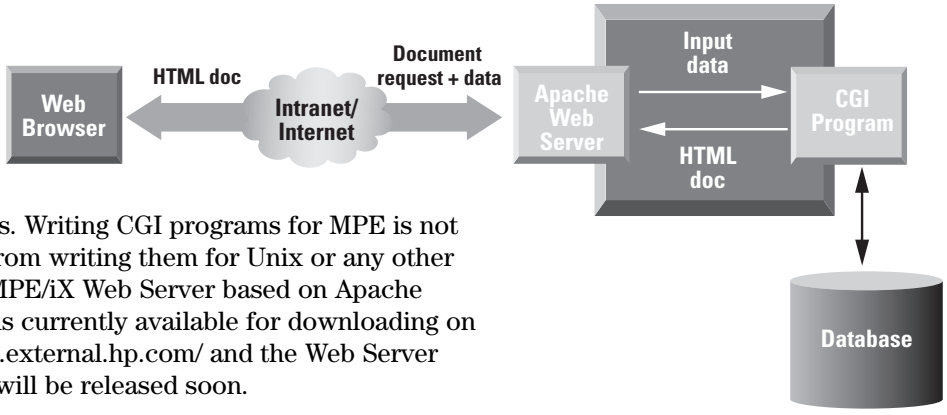
Many existing applications are written in COBOL using the HP e3000 VPLUS screen form management package. The original block mode feel and look of VPLUS is certainly the area where the newer web-based GUI can make many improvements. Several third parties provide tools for web enabling these applications with new GUI interfaces.

- ***Javelin*** from MiniSoft is a connectivity tool that delivers legacy host information to the desktop via the point-and-click interface of Internet browsers.
- ***PERCobol*** from Synkronix (LegacyJ) is a COBOL compiler allowing programmers to make use of existing skills and existing business logic to build features and functions present in Java.
- ***Remote VPlus Client*** from Synkronix (LegacyJ) supports a variety different graphical client. It intercepts native VPlus intrinsic allowing existing and graphical clients to work together.
- ***StarMan*** from Bradmark, utilizing PC-GUI technology to replace terminal screens providing users a faster, more intuitive interface. With StarMan, a point-and-click environment makes MANMAN systems more user-friendly and improves productivity. In most cases, StarMan is plug-and-play. Existing MANMAN terminal screens may still be used for workstations without PCs.
- ***VPLUS+*** from Advanced Network Systems converts existing VPLUS forms into JAVA Clients. These Clients launch VPLUS applications on the HP e3000, and communicate with the application via VPLUS+ Java API.
- ***RUMBA's Web-to-Host*** products from Walldata allow deployment of host access to hundreds of employees within minutes over an intranet. The product allows the ability to securely extend valuable information to your over an extranet. You can confidently give your customers the service and convenience they've been waiting for over the Internet.

CGI

CGI (Common Gateway Interface) an integral part of the Web server, is a standard protocol for interfacing external programs with Web servers. When a browser makes a request to a CGI program to be executed by the Web server, the output of that program is dynamically passed back to the browser. CGI provides an easy way to put a graphical front end on legacy applications. A CGI program can access files and databases on the server. Therefore, CGI is the most common method to create the link between the Web server and the database.

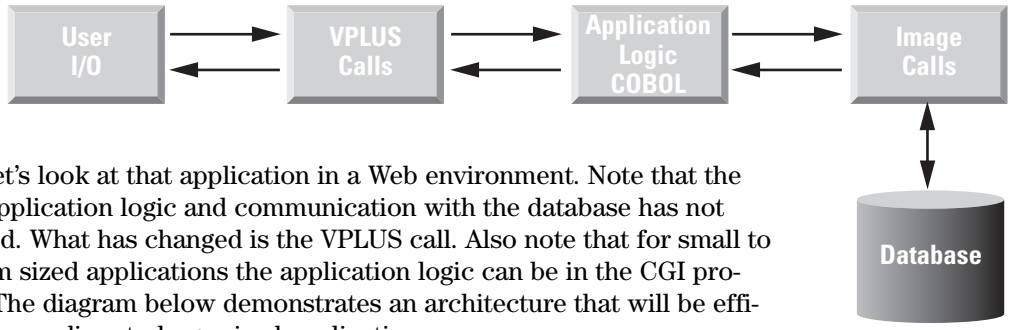
The MPE/iX Web Server based on Apache provides a powerful way to web-enable your HP e3000 applications. Since MPE/iX supports POSIX, it is quite easy to write CGI programs. You can write a CGI program in different languages such as COBOL, C, PASCAL, JAVA, PERL



and shell scripts. Writing CGI programs for MPE is not very different from writing them for Unix or any other platform. The MPE/iX Web Server based on Apache running on 6.0 is currently available for downloading on JAZZ http://jazz.external.hp.com/ and the Web Server running on 6.5 will be released soon.

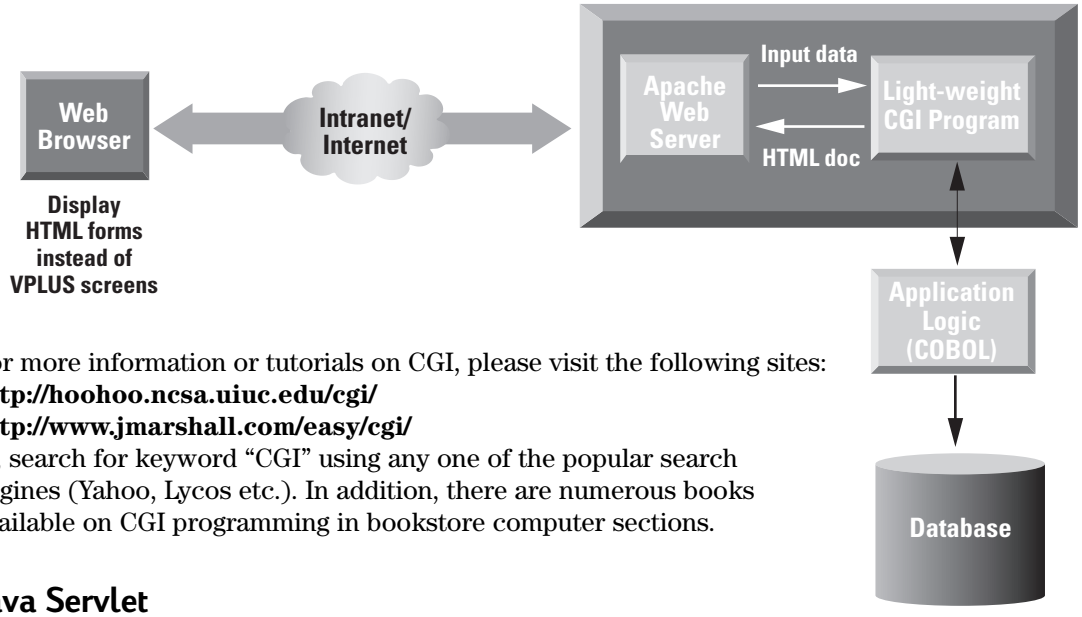
Let's take a look at a "traditional" HP e3000 application. A traditional HP e3000 application is usually a host/terminal-based COBOL application, using VPLUS to handle the communication with the user and Image/SQL intrinsic to read/write data from and to the database.

"Traditional" VPLUS/COBOL Application



Now, let's look at that application in a Web environment. Note that the main application logic and communication with the database has not changed. What has changed is the VPLUS call. Also note that for small to medium sized applications the application logic can be in the CGI program. The diagram below demonstrates an architecture that will be efficient for medium to large sized applications.

Web-enabled VPLUS/COBOL Application



For more information or tutorials on CGI, please visit the following sites:
http://hoohoo.ncsa.uiuc.edu/cgi/
http://www.jmarshall.com/easy/cgi/
or, search for keyword "CGI" using any one of the popular search engines (Yahoo, Lycos etc.). In addition, there are numerous books available on CGI programming in bookstore computer sections.

Java Servlet

As we mentioned before, the most common way to create the link between the Web server and the database is through CGI. Unfortunately, CGI has some deficiencies, such as slow performance and the lack of ability to maintain state between the server and the browser. Faster non-CGI technologies have developed. Many of these technologies execute on the server-side. The server-side code connects to a database, retrieves results, and dynamically generates HTML pages. The generated HTML pages are then sent back to the browser via the Web server. One of these technologies is the Java Servlet, and is being rapidly adopted by Web developers.

A servlet is a user-supplied extension of the web server. Servlets are to Web servers as applets are to Web browsers. The servlet API provides web application developers with a mechanism for extending the functionality of a web server. Servlets are an effective substitute for CGI programs. They provide a way to generate dynamic documents that are both easier to write and faster to run.

The next phase of MPE/iX Web Server will support Servlets.

For more information or tutorials on Java Servlets, please visit the following sites:
http://java.sun.com/docs/books/tutorial/servlets/index.html
http://jazz.external.hp.com/papers/java/index.html

ODBC

ODBC is an application-programming interface (API) that is defined by Microsoft. ODBC provides a standard interface for accessing a variety of databases using SQL such as IMAGE/SQL and ALLBASE/SQL. An application that uses the ODBC interface can connect to any database over the network that has an ODBC driver, usually with no changes to the application. The most popular web development middleware that provide database connectivity are using ODBC.

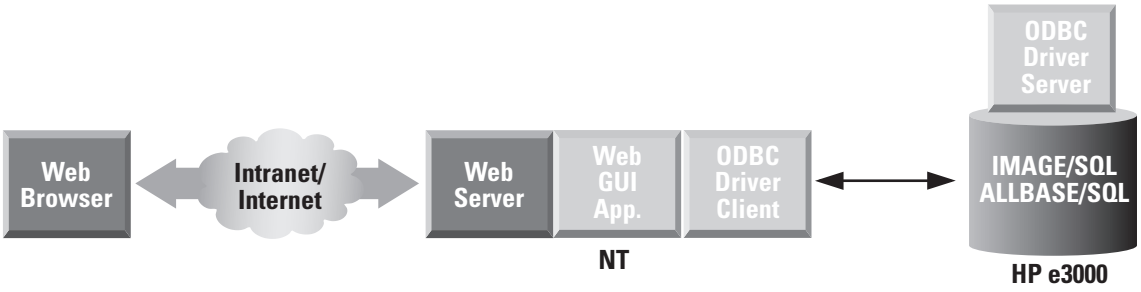
HP has provided a 32-bit ODBC driver with ODBC Link/SE from M.B. Foster Associates Ltd. since MPE/iX 5.5 Express 3. ODBCLink/SE connects the client to the server with a collection of dynamic link libraries (DLLs) on the client and runs under NT. Client application requests are routed over the network to an ALLBASE/SQL or IMAGE/SQL database server, and replies are returned to the client application. A server listener process establishes the connection between the client application and the target HP e3000 database server. With ODBCLink/SE, you can develop web-based applications, generate reports, and query ALLBASE/SQL or IMAGE/SQL on the server.

Other ODBC drivers are also available on the HP e3000:

- ***LinkWay*** from CSL Business Solutions provides an ODBC interface to IMAGE/SQL and ALLBASE/SQL databases on HP e3000s, and allows a PC user with Lotus 1-2-3 or Microsoft Excel to use the remote data as though on a local PC.
- ***ODBC/32*** from MiniSoft provides direct access to Image and TurboIMAGE databases bypassing ALLBASE or IMAGE/SQL. ODBC/32 supports features such as linking to multiple databases, KSAM, and MPE files.
- ***DataExpress for Client-Server*** from M. B. Foster Associates moves the responsibility for data access and updates to today's popular Web server applications using a thin client model. The product provides secure, reliable access to data through browser clients and multi-threaded access to host-based data, ensuring fast and reliable data access useable in MTS/IIS environments.

The following diagram shows a three-tier architecture of a Web-Database ODBC model, Web browser, Web server, and database server. The Web browser is on any PC or workstation client. The Web server includes an HTTP server and a Web GUI tools application running on NT. The database server has ALLBASE/SQL or IMAGE/SQL running on the HP e3000. When a Web browser requests a data page from the Web server, the Web server uses an application program to access databases via an ODBC driver, generates an HTML-data page on-the-fly, then passes the page to the Web browser. The integration of database occurs between the Web server and database server, and is transparent to the browser.

Three-tier Web-Database ODBC Architecture



JDBC

Java Database Connectivity (JDBC) is the industry standard open interface API for database access using Java. It allows Java programmers to issue SQL statements and process the results.

JDBC can be divided into four components:

- JDBC Driver Manger.
- JDBC Driver Interfaces.
- JDBC Exception Classes.
- Vendor specific JDBC Driver.

The first three components are included as part of ***JavaSoft JDBC*** package. The fourth part, the JDBC Driver, is obtained separately from the driver vendors. With the JDBC API, JDBC applications call the JDBC Driver Manager to bind JDBC driver. The JDBC driver then establishes a network connection with a database server, sends SQL statements, and processes the results.

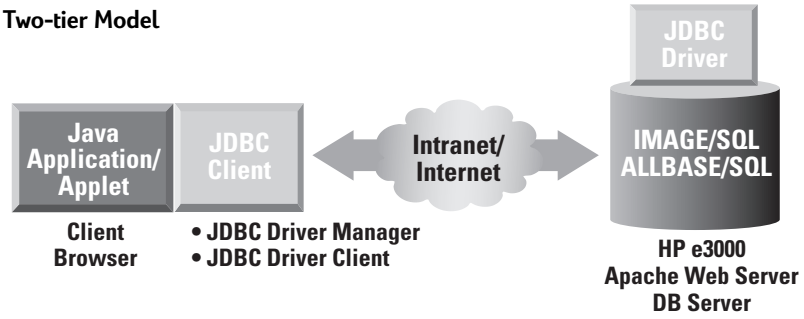
HP has selected the network-protocol, all-Java driver type for the JDBC driver implementation. It is a thin-client implementation written in pure Java. HP JDBC driver executes on the client machine and is best suited for Internet/ intranet-based concurrent data access applications. The HP JDBC driver allows Java applications to access data stored in IMAGE/SQL and ALLBASE/SQL on the HP e3000. The HP JDBC driver is bundled in MPE/iX 6.0 Express 1.

HP's JDBC driver can be deployed in three different architectural models: two-tier, three-tier thin client, and three-tier ultra-thin client.

Two-tier Model

In the two-tier architecture, the database and Web server are placed on the same machine as the JDBC applet. The JDBC applet, JDBC API, and JDBC driver client either are preinstalled on the client systems or downloaded from the Web server. Applications can run as an applet or as a program on another machine. The most common use would be for applets that are served from a HP e3000 web server.

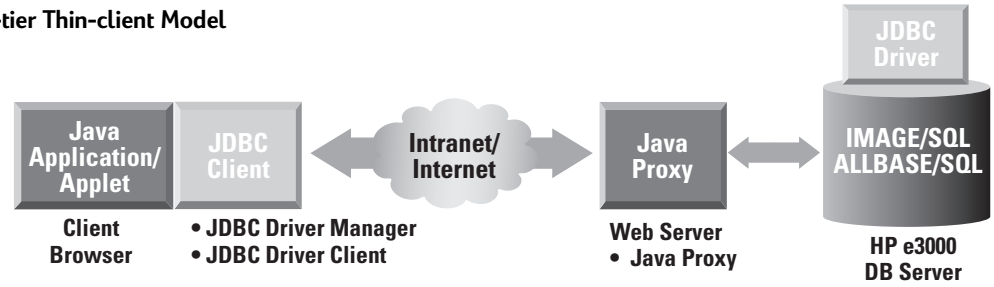
Two-tier Model



Three-tier thin-client Model

It is often undesirable to have the database and the Web server on the same machine. The three-tier thin-client model allows for physical separation of the database and Web server. A thin Java proxy, installed on the Web server, routes the IP address to the database server. The JDBC API and JDBC client are downloaded along with the JDBC applet from the Web server, or middle tier. This architecture allows developers to make use of downloadable applets, access data, and separate data processing from a heavily loaded Web server.

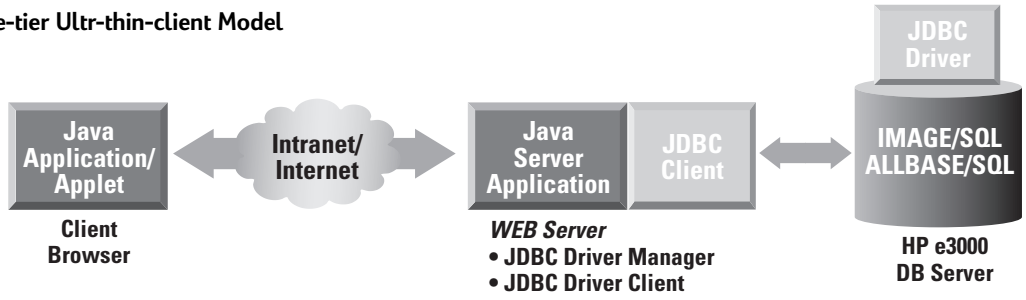
Three-tier Thin-client Model



Three-tier ultra-thin client model

If high performance is critical, the ultra-thin client offers an attractive option. In this model, business logic is moved up from the client to the application server on the Web server, and the JDBC client is run from the Web server to the back-end database. The Web application server or servlet appears as the client to the JDBC driver client and connects to the enterprise database via the JDBC server on the database server.

Three-tier Ultr-thin-client Model



Other JDBC drivers are also available on the HP e3000:

- ***JDBC driver*** from MiniSoft lets any programmer write applications in Java to access MPE flat files, KSAM files, Image, and TurboIMAGE databases using standard SQL statements.
- Advanced Network Systems ***ADBC Developer's Kit*** links browser applets and server applications written for the MPE/iX Java Virtual Machine directly to TurboIMAGE databases. This tool gives HP e3000 developers a way to make existing HP e3000 applications Internet-ready using native IMAGE intrinsic calls.

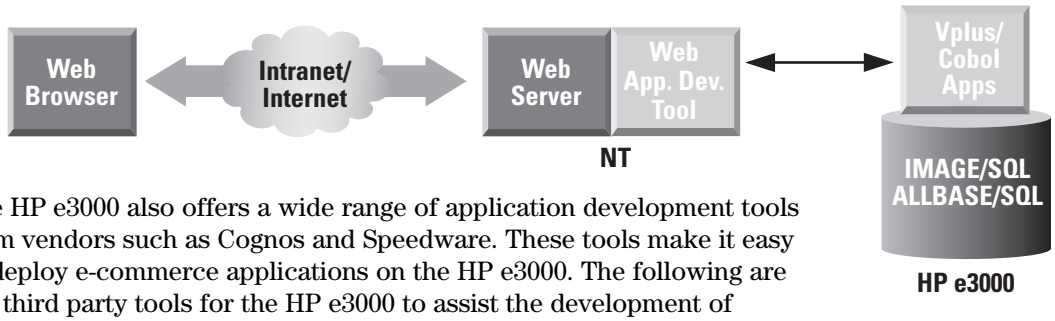
With the support of Apache Web server and Java (part of FOS beginning with MPE/iX 6.0) on the HP e3000, JDBC will increase the new applications development on the HP e3000. Businesses can easily continue to use HP e3000 databases and access information on the web.

E-Commerce Applications

In the e-commerce world, the HP e3000 brings customers, both new and existing, the capabilities to establish and maintain their Web presence quickly, easily and reliably, and to provide the kind of e-commerce solutions their customers are looking for. From the HP perspective, we recognize that seamless, reliable network computing is essential for e-commerce. Because the HP e3000 is so highly interoperable with virtually all platforms (UNIX, Windows NT, etc.), it is well positioned for this new "e-world."

When web enabling for e-commerce applications, rapid deployment to take advantage of changing business opportunities are key, as well as the ability to take advantage of new web technologies to provide the best solutions for conducting business over the Internet. Leveraging the mission critical applications on the HP e3000 allows customers to react to business opportunities and the needs of their customers. By extending their existing HP e3000 solutions to provide e-commerce solutions, customers are able to utilize the full functionality and data already on the HP e3000 without having to duplicate or "reinvent the wheel".

The HP e3000 is so successful in bringing real world applications to the Internet because it has been running mission-critical applications for so many years. And these are exactly the kinds of applications customers need. Customers are able to leverage the best strengths of the HP e3000 with the best web-enabling technologies, products and middleware for extremely capable and proficient e-commerce solutions.

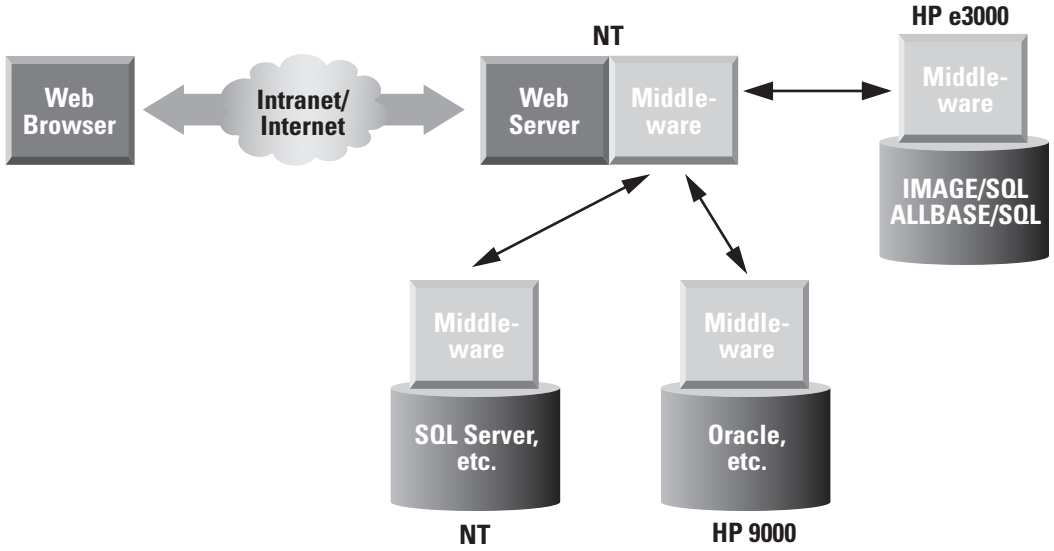


The HP e3000 also offers a wide range of application development tools from vendors such as Cognos and Speedware. These tools make it easy to deploy e-commerce applications on the HP e3000. The following are the third party tools for the HP e3000 to assist the development of web-based applications and e-commerce solutions.

- ***CGIgnite***, using powerful CGI technology in the familiar HP 3000 environment, will give you the power to do what you once may have thought impossible: create Internet applications without having to relearn the laws of the known universe and without sacrificing the superior reliability of the HP 3000.
- Cognos PowerHouse family of application development tools consists of ***PowerHouse 4GL, Axiant® 4GL*** and ***PowerHouse Web***.
- ***Leetech/CSF*** meets the requirements for a robust, easy to implement middleware product for large enterprise client/server systems development. It offers a complete set of tools for developers, database administrators, network administrators and computer operators.
- ***Speedware Autobahn*** is a development tool that extends the processing of your HP e3000 to the web. Speedware Autobahn helps you create new Web applications.
- ***Premier Software OSCAR*** is a new multi-platform software interface development tool that automates the production of middleware code for server and client developers. OSCAR generates server code to wrap and encapsulate application business and data access logic.

Enterprise Solutions

Data interoperability in a web-centric enterprise-computing environment is not only between the HP e3000 and other HP e3000s or NT and the HP e3000, but also with other platforms such as UNIX, IBM, and Solaris. In addition to the technologies and tools that are mentioned in the previous sections, many new emerging protocols, standards, and middleware are also used to pull these heterogeneous data repositories together in a seamless fashion without burdening the user with knowledge of the access methods for each platform. The HP e3000 continues to embrace new technologies to provide interoperability and Web enablement in the evolving enterprise computing environment.



DCE Remote Procedure Call (RPC)

DCE RPC is the software to implement the communication between the client and server of an application through the Remote Procedure call (RPC). RPC gives the users the ability to express an interaction between client and server of a distributed application as if it were a procedure call. RPC provides a high level programming model to the distributed applications and hides networking communication details from the users.

DCE RPC has begun bundled with MPE/iX since release 6.0. A new version of DCE RPC1.2.1 in is beta testing and will be soon released.

Lightweight Directory Access Protocol (LDAP)

Internet directory services in the enterprise environment have become increasingly important. Directory services are no longer a point solution for address look-up, but has become one of the enablers of various distributed computing and network services such as:

- Electronic Commerce
- Secure communication and transactions including authentication, authorization, digital signatures and encryption
- Advanced information search and retrieval
- Centralized network and systems management
- Common authentication for users and applications across the enterprise
- Network, IT, and Web Quality of Service

Enterprise directories include directories based on X.500, LDAP and proprietary protocols. LDAP is a protocol that runs over TCP/IP. It was initially used as a front-end to X.500 directories, but it can also be used with stand-alone and other kinds of directory servers. Since LDAP does not require the upper layers of OSI stack, it is a simple protocol to implement. Because of its many advantages, LDAP has emerged as de-facto Internet standard for directory access. LDAP directories have become a key infrastructure component in the enterprise-computing environment.

The HP e3000 supports LDAP C-SDK/iX, an API in C for LDAP clients to connect to LDAP servers to access network directories. LDAP C-SDK/iX enables Internet directory access from the HP e3000, cross-platform connectivity to any LDAP server, provides generic APIs for application portability and free client applications from considerations of directory organization and location. LDAP C-SDK/iX will be bundled in release 6.5 and is available on jazz now.

Message-Oriented Middleware (MOM)

Message-Oriented Middleware lets applications on different computing platforms and networks exchange data reliably and securely. For example, message-oriented middleware lets mainframe, Unix or Windows NT applications communicate by sending data messages to message queues. Those queues hold the message securely until another application comes looking for that data. There doesn't have to be a direct connection between the different applications, and the sender doesn't even have to know which application or applications will be retrieving the data message for the queue.

Many developers are finding solutions in Message-Oriented Middleware products. These are emerging from several major vendors including Active Software's ActiveWeb, Microsoft's Microsoft Message Queue Server (MSMQ) and IBM's MQSeries.

Active Software's ActiveWeb Information Broker

ActiveWeb simplifies the complexities of today's corporate computing environments by seamlessly integrating disparate computer systems with enterprise-wide and Internet-styled applications. The Information Broker is the core product and acts as the central control and storage point. The broker resides on a server and mediates requests to and from networked clients, automatically queuing, filtering and routing events and guaranteeing delivery of information. ActiveWeb for MPE/iX is available from Premier Software.

IBM's MQSeries

IBM's MQSeries enables users to exchange information between applications across different platforms, from mainframes to PCs. MQSeries client from Willow Technology enables HP e3000 applications to communicate with one or more MQSeries Queue Managers running on any supported platform.

Microsoft's Message Queuing Service

Microsoft's Message Queuing Server (MSMQ) is bundled with Windows NT Server; it delivers messages between different Windows NT or Windows 95 applications.

Geneva Message Queuing (GMQ) from Level 8 System provides the linking of HP e3000 applications with Windows and Windows NT applications via Microsoft Message Queuing Service (MSMQ)

E-services Solutions

While the Web has allowed companies so far to sell products and services online and to improve their business processes, a new wave of services is rising up. HP e-services strategy shifts the Internet from a being a collection of Web sites to a network of nimble interconnected e-services.

E-services are resources that businesses and consumers can tap into through the Internet. While some of these resources will still be available on web sites, most will work behind the scenes, automatically linking together chains of transactions and tasks on the fly. With the reliability, stability, and the world class transaction server, the HP e3000 fits well in the new e-services paradigm. There are three major trends in the e-services model:

1. Apps-on-tap is a way for companies to utilize information technology. Rather than build large, complex systems themselves, they can "rent" e-services that do the same job.
2. E-services portal: a portal where all the services offered are linked so that when one service makes a change, all the other services are notified and can take appropriate action
3. Brokering. Customers can send out requests for services via the Internet. E-services brokers will bid to handle these requests

In fact, HP e3000 has already been participating in the e-service world. Here are some of the Apps-on-tap e-services examples:

Open Skies

HP Open Skies offers the next generation, internet enabled airline reservation and revenue management solutions, supported by HP engineers, and hosted on ultra-reliable HP e3000 systems. Open Skies innovates with software and e-services to redefine your airline business systems and processes to be efficient, intuitive, and easy to access.

Telenomics

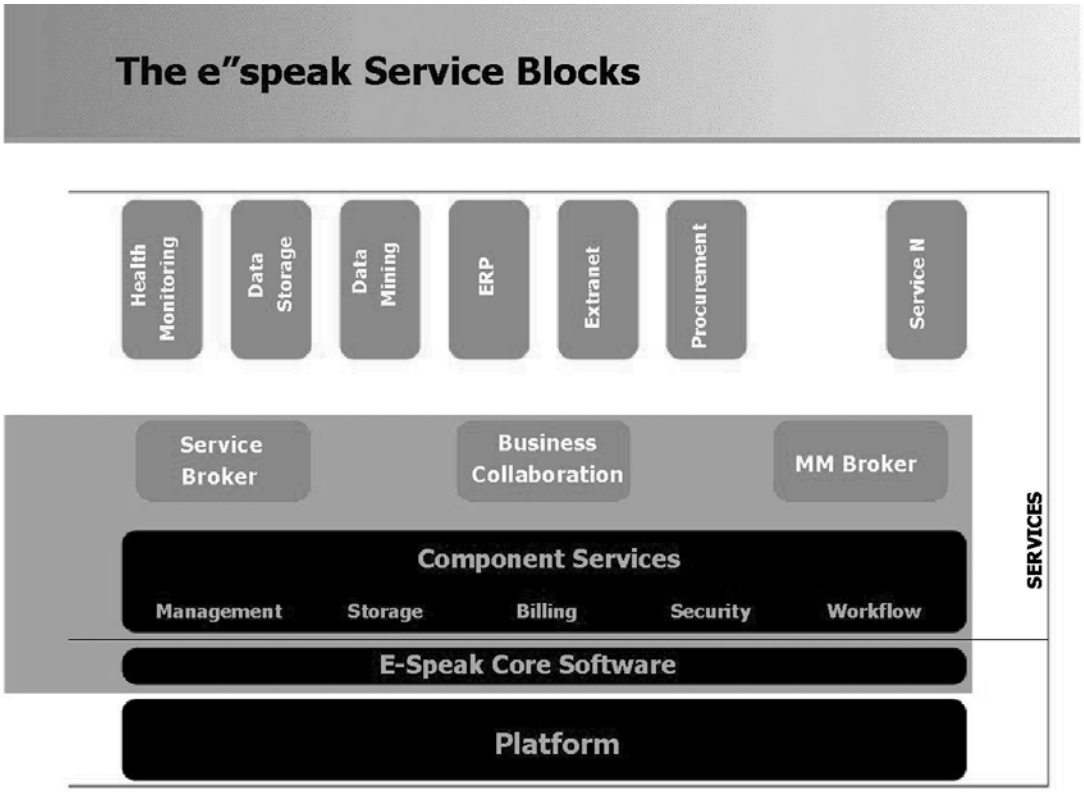
Telenomics provides telephone accounting and management software solutions. The combination of Telenomics software and HP systems, PWARE running on HP e3000 servers provides businesses with cost-effective, telephone-management services. The service is available for a transaction-based fee of just cents per use, enabling companies to efficiently manage their phone systems.

E”speak

To accelerate the creation of open, e-services world, HP has engineered the e-speak technology. E”speak will make it easier and faster to create, deploy, manage and connect e-services. By defining a common services interface that lets e-services talk to each other and work together — regardless of what technology platform they were built on — e-speak will serve as the universal language of e-services.

E-speak is an infrastructure providing a framework of developing and deploying distributed services. It makes it easy to develop solutions that take advantage of the networked world. With it, vendors and devices can be interconnected and be clients and providers of information. Most importantly, e-speak provides a framework upon which you can easily build services.

A prototype of e”speak has been running on the HP e3000. We will aggressively explore the possibility of bringing this key technology to MPE.



Internet Security

The explosive growth of the Internet has revolutionized the way companies communicate and conduct business. More companies use the Internet in conjunction with their Intranets to store, process and exchange information. In order to enable HP e3000 applications to play a key role in this evolving e-services and Internet world, HP embraces a key Internet security building block SSL (Secure Sockets Layer Protocol), and offers a secure web server on the HP e3000. So the privacy and integrity of the e3000 data that flows over untrusted networks can be guaranteed, the HP e3000 applications can interoperate seamlessly with other SSL-enabled applications, while ensuring system security when connected to the Internet.

What is SSL?

Secure Sockets Layer (SSL) is an Internet security protocol for point-to-point (client and server) connections. It provides protection against eavesdropping, tampering, and forgery. Clients and servers are able to authenticate each other and to establish a secure link, or "pipe", across the Internet or intranets to protect the information transmitted. The SSL protocol works at the Transport Layer and is independent of the application protocol used. Therefore application protocols such as HTTP, FTP, TELNET, etc. can transparently build on the SSL protocol, regardless of the underlying transport protocols such as TCP/I, IPX/SPX, etc. SSL is the most widely used protocol for transmitting data securely over the Internet and addresses the fundamental Internet communication requirements of authentication, confidentiality and data integrity. Therefore, the SSL protocol has become the de facto standard for securing Internet data exchange.

BSAFE SSL-C development toolkit

Hewlett-Packard Company and RSA are working together to increase security capabilities for HP customers with RSA's support of its recently introduced BSAFE SSL-C toolkit on the HP e3000. SSL-C is a software development suite for building SSL security into e-commerce and Internet applications. SSL-C offers a comprehensive set of security software components for building SSL-enabled applications, combined with the full suite of RSA algorithms. RSA developed the SSL-C product suite by extending the original SSLeay core. SSL-C contains SSLv2, SSLv3 and TLS 1.0 (as of IETF draft) compliance. The latest enhancement of SSL is called Transport Layer Security (TLS).

SSL-C toolkit enables application developers such as independent software vendors (ISVs) to easily embed SSL-based encryption capabilities into their applications. As a result, application developers can embed a high level of privacy and security in a wide range of client/server interactions without being encryption experts. Developers can reduce development time by using SSL-C, the complete solution from the most trusted source in cryptography and security components.

BSAFE SSL-C was developed at RSA Australia, which also provides customer technical support. BSAFE SSL-C for MPE/iX can be ordered directly from RSA Australia. For more information, call 61-7-330-39380; send e-mail to info@aus.rsa.com; and on the Web at http://www.aus.rsa.com.

Secure Edition of the MPE/iX Web Server based on Apache

The MPE/iX Web Server based on Apache provides HP e3000 customers a quick, easy, powerful and affordable way to establish an Internet and intranet presence. In addition, HP will offer the Secure Edition of the MPE/iX Web Server based on Apache for users to conduct secure transactions over the Internet. The Features include:

- Full-strength 128-bit encryption
- Support for SSLv2, v3 and TLS v1.0 protocols. The protocols provide protection against eavesdropping, tampering, forgery, and ensure privacy and the integrity of data transferred between a web browser and a web server.
- Support for X.509 certificates authentication
- Support for session caching for better SSL performance.

The Secure Edition of the MPE/iX Web Server based on Apache running on MPE/iX 6.0 and 6.5 will be available to order from an HP authorized reseller, or for downloading in the near future.

System Security

When your HP e3000 system connects to the Internet, it is important to tighten the security. System security is built into the operating system to protect against unauthorized access and data corruption. MPE/iX is designed so that user capabilities, the account structure, the file system, and system security are all integrated. HP e3000 allows you to configure your system security to meet your business policy requirements. There are several ways a System Manager can administer operating system level security on a HP e3000:

- A user's identity and capabilities determine how a user is known to the system and what systems access levels or functions they are allowed to perform. System access levels range from the lowest, available to all users, to the highest, open only to system and security management. The system checks a user's identity and capabilities to determine access level. As users execute system functions and tasks, the system constantly checks their capabilities to make sure he or she is allowed to do so.
- Access to files and programs can be restricted by assigning users to accounts, issuing appropriate capabilities, enforcing the use of passwords, and applying file access restrictions and lockwords.
- Using access control definitions (ACDs) can also control file access. ACDs are the recommended method of controlling access to files in systems that maintain a C2 level of trust. C2 is a set of security criteria defined by the U.S. Government Department of Defense.
- Programs also have capabilities, which are assigned by the programmer at the time the program is created. The capabilities assigned to a program allow it to access particular functions. When a program that has special capabilities run, the system does not require the user to have those capabilities. The program runs and exercises its capabilities in conjunction with those of the user. In addition to the capabilities just described, some programs check user capabilities before issuing certain functions.
- The HP Security Monitor/iX product can be used to provide further protection against unauthorized access to sensitive data and system resources through stronger password protection and stronger audit trails. Controls are also available via the Security Configuration Utility (a tool provided by the Security Monitor) to manage system global security policies. Security Monitor/iX complies with the U.S. Government's "C2" security specification.

Firewall

To secure your system in the Internet world, you must use multiple lines of defense. The outermost layer of security is the firewall. A firewall is a security device that places a combination of hardware and software between a company's internal network and systems and the Internet. Today, firewalls are widely recognized as the preferred security technology for controlling network traffic crossing the boundary between the Internet and business private internal networks. They are used to control the types of communications that can be conducted over the Internet by both internal users and outsiders.

There are many Firewall products available on the market. Some can be added to existing routers and switches; others can be on standalone servers. We recommend Cisco IOS Firewall, which is an add-on module available for a wide range of Cisco routers and switches.

Securely Running Your Internet Solutions

When you host a Web site, you are inviting information access to your system to wide audiences. This invitation could result in exposing your system to significant security risks. A typical architecture for implementing an Internet application "outside the firewall" accesses a resource on the Intranet to supply customers with a "webified" view of the internal data. If you host your external Web site directly on a production database server without rigorous measures in place, your enterprise data can be compromised. When you place the firewall between your Web server and your database server, if anyone hacks into your external Web server, the problem most likely can stop at your web server. The threat to the system that houses your database is reduced.

However, firewall does not protect against all security threats, nor can they sufficiently reduce the risk for applications that implement dynamic contents like CGI programs. Firewalls are designed to restrict and direct traffic between external machines on a more hostile environment (the Internet) from internal machines on a more protected network (the internal company network). They are not designed to run or host application programs. Therefore, other security measures are absolutely required to protect the applications data and the operating system itself. Some of the commonly used measures are:

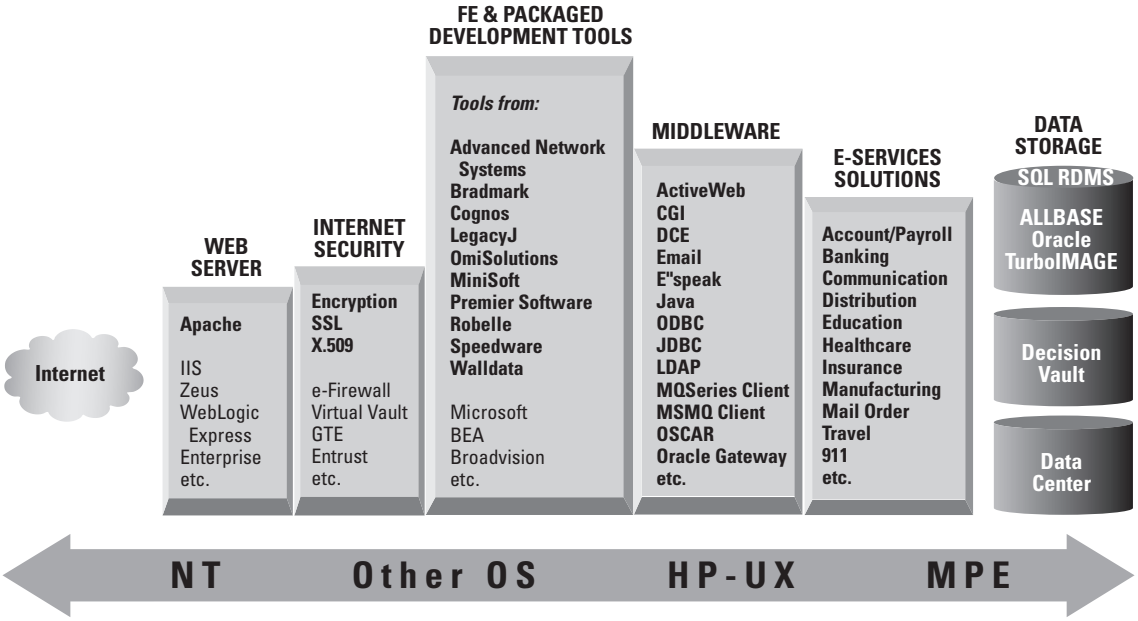
- Securing the host machine. Ensuring strong host security is a necessary precondition for any of the other security mechanisms. The following are some methods you can use to secure your host machine:
  - Properly configure the system security policies. Run the web server as an unprivileged user with minimum capabilities and restrict file system access by limiting read/write access using file access restrictions or permissions, lockwords and ACDs.
  - All subsystems must be configured properly to not allow unintentional access points.
  - Activate all logging facilities and regularly examine the logs to detect intrusion attempts.
  - Limit the number of login accounts on the server.

- Securing the web server. Most web security incidents are caused by improperly configured Internet software. The software could be the web server itself, or applications run by the web server such as CGI programs. However, CGI introduces major security vulnerabilities because CGI allows a client to activate custom programs on the server. A CGI program may have a security hole that allows an intruder to execute unauthorized commands or to discover information about the system. The following are some common practices and guidelines for running a web server:
  - Configure the web server to restrict access control to directories and files based on hostname, IP address, user name and passwords.
  - Store CGI programs in a central location and evaluate the CGI programs before using them.
  - Disable unneeded insecure web server features such as server side includes, symbolic links, user-supported directories, automated directory listing, etc.
  - Run a secure web server and enable SSL for secure transactions to ensure the privacy and integrity of data transferred over the Internet.
- Constantly monitor new Internet security vulnerabilities. Update the operating system and the web server with security patches as soon as they are available.

It is important to understand the potential risks of deploying Internet-enabled applications and to provide security architecture with integrated solutions that let you build a strong defense against potential Internet pitfalls. HP continues to evaluate and monitor the security needs for your e3000 Internet solutions, and will continue to refresh the platform with key security technologies and security-enabled services. Our goal is to ensure that the HP e3000 customers and their businesses are successful by providing a worry-free, secure environment to seamlessly integrate their solutions into the Internet and the e-services world.

Summary

Various tools and methods are available to web-enable HP e3000 applications and to interoperate the HP e3000 with different systems. The best business solution for today's evolving computing environment is often the usage of: the Internet connectivity, more than one platform and the leverage of each platform's strength. In these heterogeneous environments, MPE/iX provides the best in class transaction server, reliability, stability, Web connectivity and interoperability with NT, UNIX and other systems. The mix of HP e3000, Unix and NT is becoming the common foundation for e-services. Therefore, your existing HP e3000 systems are here to stay. Your business that runs on the HP e3000 today will still run on the HP e3000 tomorrow in the new paradigm.



With the Internet, things are moving at an astounding rate (defined as "web time"). New technologies and products are becoming available. We are continuing to work with existing partners as well as potential new partners. We'll do our best to keep you posted on new developments.

Appendix: Third Party Middleware and Tools

ADBC (Adager DataBase Connectivity)

ADBC Technology requires a Java client (using native methods) to communicate as directly as possible with the IMAGE intrinsics. A "monitor" program on the HP e3000 may be required, but, ideally, there should be a minimum of layers between the client and the IMAGE intrinsics. ADBC is a registered trademark of Adager Corporation.

ADBC/API, an implementation of ADBC technology developed by Advanced Network Systems, Inc. consists of a set of Java objects that allow developers to write Java applications, web-enable applications, and implement e-commerce solutions that access data on an HP e3000 using any Java-enabled client or Java server application (under MPE/iX, Windows, Mac OS, Linux, Unix, and so on). The API provides you access to your IMAGE databases without using ODBC or JDBC, as well as access to your KSAM, MPE, and SPOOL files. It also has objects that pass queries to the LISTSPF, and SPOOL commands to pass the results back to your ADBC objects.

All ADBC/API objects communicate directly with the native intrinsics on the HP e3000 for optimum performance. ADBC API is very user friendly, and allows any developer to write Java applications that access your HP e3000 without any HP e3000 knowledge. The API is object-oriented to expedite application development. ADBC /API can be used with all the popular IDE developer tools such as Visual Café and J++. You can also use any editor to write server-side Java (servlets).

ADBC/API comes with a set of Java objects (erp3000) that gives you complete object oriented interfaces to ManMan and MM3000 applications. Any application, from any platform, can be easily integrated into ManMan and MM3000 using standards such as CORBA, Java Messaging, and Java RMI. Using the ADBC/API, HP e3000 driver and a Java programmer you can read/write IMAGE, MPE, KSAM, Spool files from your HP e3000, from any web-enabled Java-enabled application.

Real-life applications

ADBC /API is currently in use by applications in the manufacturing and medical research sectors. In one case, an ADBC customer (and Java developer) used ADBC and erp3000 to interface a virtual shop-floor control solution to ManMan and MM3000, opening access of this developer's product to the HP e3000. This Java developer, in a week's time, interfaced his application to ManMan using ABDC and erp3000 without any knowledge of the HP e3000 specifics. The Javadoc (documentation) he created from the Java API gave the developer all the information he needed to use the erp3000 interface, without the need to place any ADBC support calls.

Other customers have used ADBC to web-enable Medical Research applications, interfaces to SAP/R3, mission-critical sales orders, Quote Systems that extract data from IMAGE databases to print, fax or email formal quotes, purchase order inquiry systems, etc.

Additional information on ADBC contact Advanced Network Systems, Inc. (**http://www.advnetsys.com**) or Adager Corporation (**http://www.adager.com**).

Bradmark's StarMan™

StarMan(takes CA-MANMAN into the future by bringing web-enabled functionality to this HP e3000-based product. StarMan(eliminates the need for direct connection to the HP e3000, and brings data processing for CA-MANMAN into the web environment via a unique distributed processing model.

StarMan(supports the most popular CA-MANMAN modules, bringing point & click ease-of-use, as well as offering functionality not currently available in CA-MANMAN packages, such as RMA Authorization, Order Quotation, and Purchase Requisition. By bringing Windows functionality to CA-MANMAN, StarMan(eliminates the common practice of generating multiple sessions for data retrieval.

StarMan(utilizes a state-of-the-art GUI interface that brings a true client/server relationship to the CA-MANMAN product. StarMan(works with the existing CA-MANMAN architecture, while allowing true distributed processing. This is accomplished by utilizing the Quantum Transaction Server (QTS), which is a native mode application running on the HP e3000 that fulfills the requests from the clients. The server and the client can communicate in a predefined protocol that enables web-compatible applications to function in a heterogeneous environment. StarMan(utilizes this server, along with a highly secured firewall, to create browser-based applications that facilitate the e-services for the CA-MANMAN community.

Additional information on StarMan can be found at **www.bradmark.com/starman22.htm**.

Cognos' PowerHouse® Web and the HP e3000

As organizations around the world begin to investigate the use of Web technologies for some of their business application needs, the Cognos® PowerHouse family of high-productivity application development tools is ready to help save valuable developer time and money in building and deploying those solutions.

There are currently thousands of HP e3000 sites around the world that rely on PowerHouse 4GL to build and run their business-critical application solutions. With its easy-to-use English-like specification language and efficient native access to TurboIMAGE, KSAM and MPE data, PowerHouse 4GL quickly established itself as the most productive and cost-effective way to develop terminal-based business applications for the HP e3000. Twenty years of on-going research, development and performance tuning have seen PowerHouse 4GL evolve to the point where many customers have stopped using COBOL and other 3GLs altogether. PowerHouse 4GL now also supports native access to relational databases, such as ALLBASE/SQL and ORACLE, other platforms such as UNIX and Windows NT, and has become the application server for Axiant® 4GL client/server applications using both the thin-client and fat-client deployment models.

The Cognos product philosophy is, and always has been, to enable customers to adopt new computing technologies and environments as-and-when they are ready to do so...while at the same time protecting existing investments in applications and developer skills. For example, current terminal-based PowerHouse 4GL applications can be imported into Axiant 4GL, the visual PowerHouse integrated development environment (IDE), where a Windows user interface is automatically generated. The application can then be deployed back to the original server machine to run in a thin-client configuration with Windows-based Axiant 4GL clients and server-based PowerHouse 4GL application servers - providing an updated interface for users and protecting the customer's investment in their application code, servers, data and developer skills. As well as providing capabilities to assist in re-deploying or migrating existing PowerHouse 4GL applications, the modern Windows-based Axiant 4GL IDE is an ideal environment for building entirely new server-based, client/server or mobile PowerHouse 4GL applications.

PowerHouse Web is the latest addition to the Cognos PowerHouse family. It enables Web applications to be built using the proven developer productivity of either PowerHouse 4GL or Axiant 4GL, and then deployed using a Web-specific version of the robust PowerHouse application server engine. The latest versions of PowerHouse 4GL and Axiant 4GL are both enhanced with new web-specific features that generate a default HTML user interface. The generated user interface is fully functional, and by default uses only standard HTML.

However, this user interface is open to enhancement with HTML, XML, JavaScript or any other feature supported by the target Web browser - simply by editing the PowerHouse-generated HTML template file with a text editor, or using any of the popular Web authoring tools, such as Microsoft FrontPage or Macromedia Dreamweaver. PowerHouse Web also provides a sophisticated request distribution mechanism, enabling these applications to be deployed across a heterogeneous network of Web servers, PowerHouse Web application server and database servers.

Existing HP e3000-based PowerHouse 4GL applications can be Web-enabled with PowerHouse 4GL 8.29 to then run on the HP e3000 under PowerHouse Web 2.29 - with the same native access to TurboIMAGE, ALLBASE/SQL, KSAM, MPE and ORACLE data that PowerHouse 4GL currently provides. And because PowerHouse Web provides a Web-specific PowerHouse application server engine, all of the existing business rules in the application logic are protected and reused. Additionally, the flexibility of the PowerHouse Web architecture enables the Web server supporting these applications to be on any of the PowerHouse Series 8 platforms - such as the HP e3000, UNIX (including the HP 9000) or Windows NT. Versions of PowerHouse 4GL and PowerHouse Web for Windows NT can, like other Windows-based applications, use ODBC drivers to access HP e3000-resident data - so enabling proof-of-concepts or portions of existing PowerHouse 4GL applications to be built and deployed on low-cost PC workstations and servers.

Further details of the productive, robust and flexible PowerHouse Web solution for your business-critical Web applications can be found on the Cognos Web site at **http://www.cognos.com/powerhouse**.

Comco's CGIgnite

HP e3000 Stability

The Internet and the Web have added new ways of doing business to every industry. The HP e3000 provides a reliable, robust environment in which to do high-volume online transaction processing. Why should a company then be forced to introduce new architectures and learn how to manage them just to take advantage of the Web?

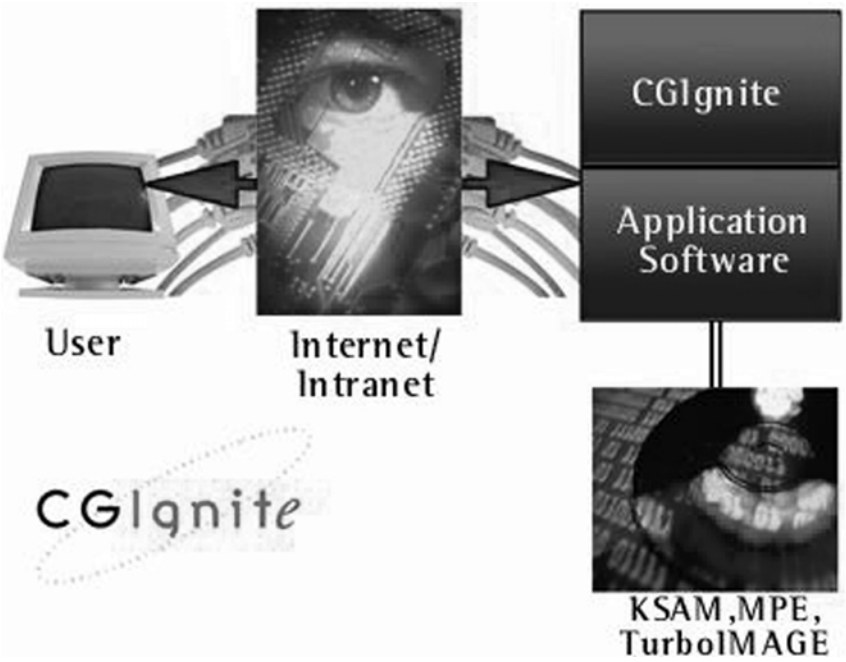
Work How You Want To

What is needed is a product that can bring your data to the Web quickly and with as little cost as possible. CGIgnite is that product. CGIgnite is a tool that helps developers write dynamic web-enabled applications entirely on the HP e3000 in whatever programming language they are currently using. The web application you write, in COBOL for example, uses the CGIgnite programs to merge your data (KSAM, TurboIMAGE, and MPE) with a HTML template file and send the page to the requesting browser. CGIgnite can then be used to get data from a Web form and return it to your application so you can process it as needed.

The Direct Solution

CGIgnite provides a way to quickly bring your HP e3000 to the Web with very little investment. With CGIgnite all you need is an HP e3000 and your favorite programming language. CGIgnite is the direct solution.

www.comcosolutions.com



CSL's LINKWAY Solution

Web Architecture

The key to multi-tier web architecture is the integration from the web application server to the enterprise data, which must be presented in a totally secure manner. Performance is a critical issue where thin server/client connectivity is essential to optimize performance. It is self evident that the transfer of large volumes of data to a server application creates unnecessary overhead on the network environment resulting in a low end user adoption of the application.

LINKWAY Server

The LINKWAY solution, when resident on the HP e3000 Database server, is capable of managing 980 concurrent processes per socket connection. LINKWAY is truly robust to ensure continued high volume transaction processing and provide non-stop 24 hour by 7-day operational capability. Inherent software management utilities allow systems managers to identify and manage individual processes, which means that specific rogue processes can be terminated without recourse to closing entire socket connections. LINKWAY also provides the ultimate in security features, including Application Profiling - a facility that ensures only authorized applications are able to access the database. All transactions are fully encrypted, adding additional network security to the web application. For ultimate protection from external attack, LINKWAY can deliver serial connectivity that places the HP e3000 systems outside the web/network environment.

LINKWAY Client

When installed on the Web Server/Client, LINKWAY integrates seamlessly with all major web developments, including Microsoft Active Server Pages, Cold Fusion, PHP and Amazon from Intelligent Environments. In determining Web infrastructures, it is important to consider the impact of significant "web activity" on the HP e3000. Standard multi-tier web architectures are designed to deliver static information and applications at the Server/Client level and immediate responsiveness from the database tier to active pages of the application.

Ease of Use

Installation of LINKWAY can be undertaken within minutes, immediately web enabling the HP e3000 and providing immediate access for all authorized users to the data repository on the HP e3000. Included within the standard functionality of the product are the integrated date management, numeric scaling and multi-lingual facilities, which present, store and retrieve specialist character sets.

LINKWAY from CSL is the technology best suited to implement HP e3000 users' preferred web infrastructure. With almost all web development and web applications available on NT or Windows-based platforms it is necessary to provide links to Databases resident on HP e3000 systems in order to maximize the benefit of the HP e3000 system within the web infrastructure. Please visit our web site at **www.csllink.com**.

OMNIDEX for the Web from DISC

Browser-based applications now come in many flavors, from e-commerce sites to company intranets to extranets, all designed for various purposes. However, as these Web applications grow in sophistication, all share a common requirement. The need to ***display the "freshest" data possible*** by integrating dynamically changing content from so-called "production" databases, often Image/SQL, to browser-based front-ends.

Users have grown in sophistication as well. Most are now comfortable utilizing keyword lookups to navigate the web. ***Users expect answers fast regardless of where the Web "content" happens to originate from***. Web (html) search engines allow searches by any combination of words located anywhere on a Web page, so users naturally expect the same abilities from "new" Web-enabled database applications as well. Unfortunately, ***most databases do not support instant keyword searching or complex criteria searching. Until now...***

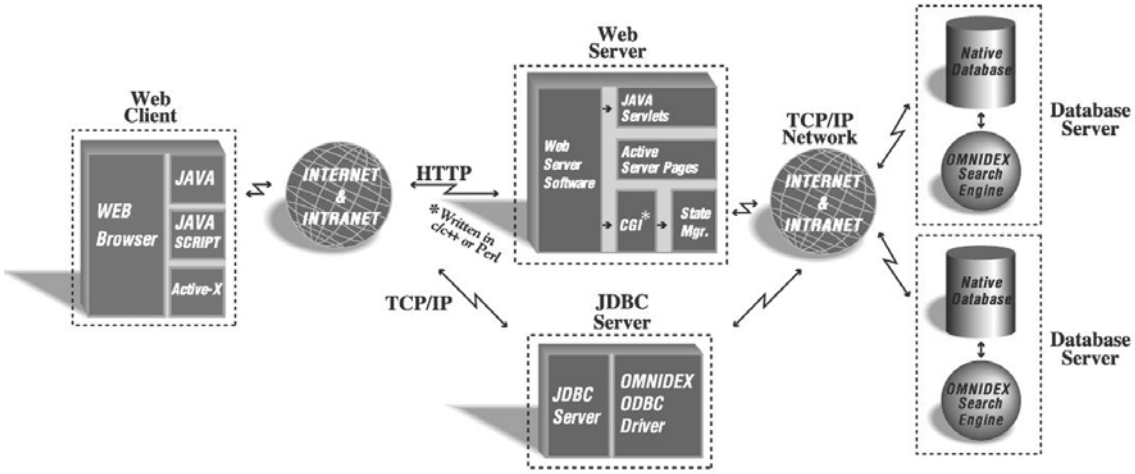
OMNIDEX for the Web from Dynamic Information Systems Corporation (DISC) ***delivers the search capabilities and speed*** required for highly demanding Web applications, ***transforming the HP e3000 into a "real-time" content provider***.

OMNIDEX allows access to information the way people think - by the content of the data. It allows users to select by keywords across any combination of fields using AND, OR, NOT. For example, when a user enters the keywords "Internet OR Web", OMNIDEX can instantly find phrases such as "OMNIDEX for the Web". This powerful keyword search technology has enhanced the Image database with name and description lookups for 15 years, and it far surpasses conventional database indexing to this day.

In addition to production databases, OMNIDEX can index HTML, Word and ASCII text documents. Moreover, OMNIDEX enhances data warehousing applications with new indexes that provide unlimited multidimensional analysis and high-speed dynamic data aggregations, eliminating the need for summary tables. In short, OMNIDEX for the Web allows data from multiple databases, platforms, and sources such as online applications, data warehouses, and documents, all to be instantly available from a company's Web site. Users immediately obtain the information they need, with one consistent method to access data across the enterprise.

OMNIDEX for the Web supports JAVA, Javascript, and Active-X, as well as CGI with Perl or C/ C++ through the OMNIDEX API, Object Library, or JNI. It interfaces to web-enabled front-end tools and includes DISC's State Manager for high-performance, persistent-state database connections and transactions. OMNIDEX supports multiple databases including Image/SQL, relational databases and flat files. It runs on numerous platforms including HP e3000 MPE/iX, HP 9000/HP-UX, and HP NetServer.

Refer to the diagram below for the architecture of how a user connects from a Web client through the Internet or an Intranet to a Web server, and from there to a database server such as an HP e3000 running Image/SQL.



For more information, please contact a DISC account representative at (303) 444-4000, or via e-mail at info@disc.com, or visit our Web site at **www.disc.com/home**.

Web Enabling with the LeeTech AIM Solution

The LeeTech AIM, Application Intelligent Middleware, delivers Rapid Application Development (RAD) environment for the expedient development of enterprise and Internet solutions, while retaining the major investment in legacy systems. With LeeTech AIM, there's no need to start a company-wide revolution, take and use evolution on your systems!

- Secure, High Performance Internet Connectivity
- Connect emerging and legacy databases to each other
- Link emerging NT platforms to legacy systems
- Improve data access performance
- Internet/Intranet enable legacy systems
- Retain investment in back-end systems

LeeTech AIM is a true client/server, Internet development solution, distributing the processing load naturally between the PC clients, browsers and servers. But LeeTech AIM goes further than that. It not only provides server-based drivers to service ODBC-like SQL commands, but offers program-to-program communications between the client and the server through a easy-to-use messaging technology, regardless of whether the client is a PC or another computer within the environment. Many new concepts are being promoted throughout the industry to solve the problem of connectivity between systems, but none to-date address the most practical solution — a simple enhancement to the current application systems.

LeeTech AIM Building block components

- Enterprise Monitor
- Encryption Engine
- Developers Facility— For reliable code testing and analysis.
- StandBy— Load balancing and Dynamic process pre-loading for E-Commerce and WEB type transactions.
- STS— Server To Server gateway for building multiple tiers corporate applications.
- SDK— SQL Development Kits for rapid client server application development.
- CSF— Client Server Foundation for the other building blocks of LeeTech AIM.

The ODBC products, that have been so popular over the last few years, only provide limited solutions to the PC developer who wants an interface to relational databases residing on a server. The answer is a scalable architecture that utilizes high connectivity stateless business objects and load sharing. This is the concept of distributed processing, and the principle benefit of LeeTech AIM.

This is what makes LeeTech AIM unique! LeeTech AIM takes into account the trillions of dollars of corporate investment in application systems that are currently production based systems, and allows them to be converted into client/server, web enabled solutions with little modification to the original code. Other client/server solutions require that the user both completely abandon the current system. Another alternative is to implement a messaging system that will operate only on the vendor's platforms, but will not supply a solution for the other platforms that the user may have. Therefore, the only product to offer a near universal solution is LeeTech AIM.

Please visit the LeeTech Web site at **http://www.leetech.com** for more information about Leetech's AIM solution or contact a LeeTech sales representative with e-mail at *info@leetech.com* or telephone 408.253.1987.

LeeTech DOOR

DOOR - Data Mart Builder

- Platforms: NT, UNIX, HP-UX, Solaris and MPE/iX
- RDBMS: ORACLE, MS SQL Server, ALLBASE and TurboIMAGE

LeeTech is proud to introduce LeeTech DOOR - Data Object Open Replication- for the HP e3000. Now HP e3000 data that resides on TurboImage databases can be replicated to SQL based relational databases like ORACLE, MS SQL Server and ALLBASE. DOOR provides an easy to use administration tool that maps data sets to SQL tables in minutes. No expensive programming or hard to learn languages, just simply point and click.

Enter LeeTech's DOOR

The LeeTech DOOR product was designed to literally provide a door to the RDBMS world from the HP e3000. DOOR streamlines, and tightly couples the legacy data to the RDBMS by opening a real-time access, conversion vehicle between the two environments. From a Windows based interface, a system administrator can define a host of parameters which gives management capabilities on parameters such as data flow-mapping, destination servers and scheduling.

DOOR uses the powerful OLTP portion of LeeTech AIM-middleware to create multiple pipelines that deliver real-time data replication. DOOR does not limit the number of servers that are going to receive the data, nor does it restrict the number of servers from which legacy data is replicated. DOOR operates in a distributed environment. This means that the replication is real-time! DOOR utilizes a message queuing approach. This means that if the destination server is down, the originating system will retain data integrity until the requester comes back up again.

Protect Investments

Door is the perfect solution for building real-time data marts and Internet solutions, while retaining the major investment in proven HP e3000 TurboImage technology. DOOR makes HP e3000 TurboImage data available to the leading database solutions and the Internet without compromising performance or security. Try DOOR today!

For more information, please contact a LeeTech sales representative at 408.253.1987, e-mail: *info@leetech.com* or LeeTech's Web site at **www.leetech.com**.

Level 8's Geneva Message Queuing

Geneva Message Queuing for HP e3000 provides communication and interoperability between HP e3000 - MPE/iX Version 5.1 and Windows NT.

Message Queuing

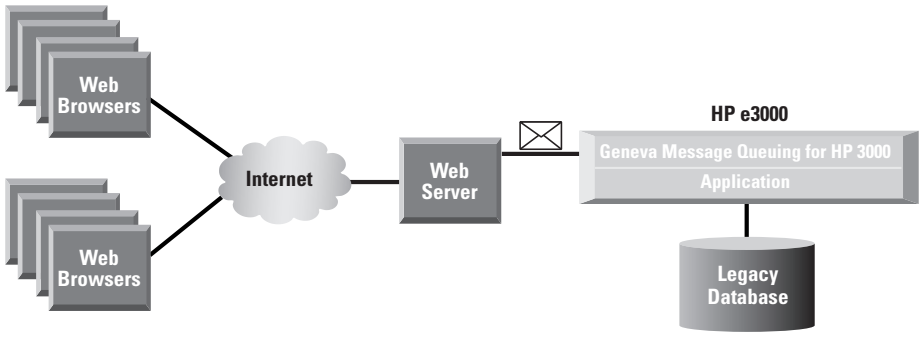
Message queuing is a very simple, reliable mechanism for sending information between applications that reside on different business systems.

Prior to message queuing, cross-platform applications were built using one-off, point solutions that needed to be created each time a new development effort was started. With message queuing, the overhead needed to build distributed, cross platform applications has been greatly reduced. As a result, building cross-platform distributed applications is now relatively simple.

Web Enablement

A major stumbling block in Web Enablement is connecting business systems in a simple and reliable way. Geneva Message Queuing (GMQ) is ideally suited for connecting applications runs on HP e3000 with web servers to provide guaranteed, "exactly-once" delivery of messages.

GMQ supports complicated, multi-step, business transactions. A typical transaction may include HP e3000 servers, web servers, application servers or database servers, outside service bureaus for checking credit cards, inventory systems, and supply chain partners. GMQ is a consistent, reliable transport mechanism for all of these different servers.



GMQ also allows HP e3000 applications to be decoupled from the web server so that the application sending a message can continue processing without having to wait for a reply from the application receiving the message. If the receiver is temporarily unavailable, the message will be forwarded at a later time.

Another use for GMQ in web enablement is de-coupling the interactive web experience from the HP e3000 business process. Since GMQ supports asynchronous communication it is easy to respond to the user and initiate HP e3000 processing in a way isolate the web users from the back-end environment.

In summary message queuing technology is crucial to Web enabling HP e3000 systems and isolating the front-end Web experience from HP e3000 business processes. For more information visit our web site at **www.level8.com**.

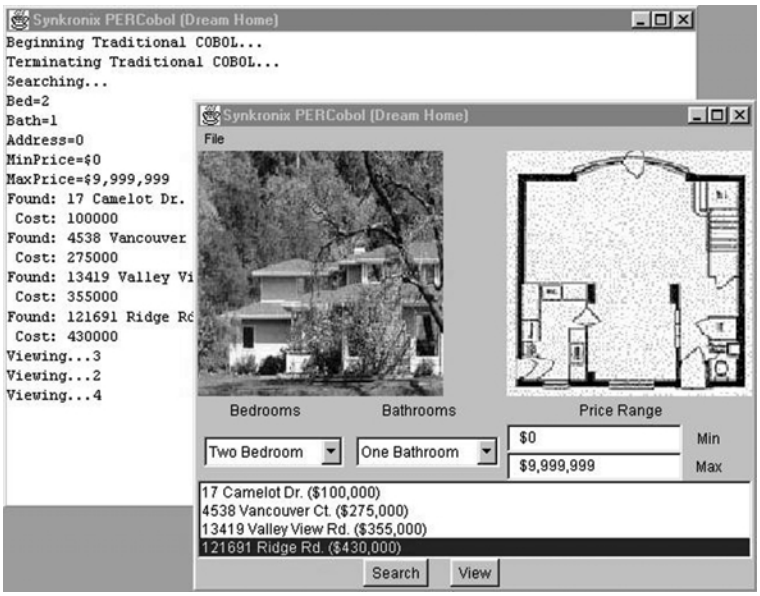
LegacyJ PERCobol

Develop in COBOL, Deploy in Java

Enabling legacy applications to be extended to multi-platform multi-threaded client/server computing architectures, and deploy applications to the Internet. In addition, companies with COBOL programmers can now produce Java applications without needing to spend time and money to learn Java.

Features

- Year 2000 Compliant
- COBOL Standard Compliance (Including popular COBOL extensions from IBM, HP, Wang, MF, X/Open and others)
- CICS Client
- IMS Client
- MQSeries Messaging
- NFS and WebNFS remote file access
- Screen Section for graphical and non-graphical terminals
- Event driven programming (GUI)
- Threading for building multi-tier Client/Server applications
- SQL Access (EXEC-SQL)
- HTML/CGI Access (EXEC-HTML)
- Access and manipulation of Java Beans and Objects
- Graphical Printing including Java Beans
- Embed Java Beans in COBOL
- Embed Java (EXEC-JAVA)
- COBOL Data Types
- National Language Support for Messages and Error Text
- Image Database access for HP-MPE
- IDE with debug tool and programming templates
- TCP/IP as COBOL files
- Compiler Scaleability features.
- Pointers
- Applets and Servlets from COBOL
- Java Beans from COBOL



Build Portable Applications

PERCobol can be used to improve the portability of COBOL applications. Using PERCobol, COBOL programmers can create new or modify existing programs to deploy as platform independent Applications, Applets, Servlets and create Java Beans.

Interactive transactional subsystems (such as IMS and CICS) can be extended with PERCobol to add enhanced user interaction and portability offered by running in Java.

Imagine being able to use existing business logic (as expressed in COBOL) within Java application or incorporating new Java functions in COBOL programs. PERCobol makes both these requirements attainable.

Reuse Existing Business Logic

PERCobol enables today's base of COBOL programs and programming staff to be used in creating advanced Internet based applications using the COBOL skills.

COBOL Screen Sections can be deployed using PERCobol screen support on any platform where the Java Virtual Machine exists; allowing users to deploy existing screens across graphical displays and terminals without rewriting the interface.

Information can be displayed within a browser or as independent Java applications connected through TCP/IP.

Exploit the Power of the Internet

Once a COBOL application has been enabled for the Java environment, many capabilities become possible. With PERCobol multi-threaded server programs or Servlets can be created to support local or remote clients all in COBOL.

Applications can take advantage of the compute power on the user's desktop to reformat presentation to provide additional information such as graphs (Beans) or reports. Applications can store data back to the server from a remote client allowing business to keep business information together in a secure environment.

Development Platforms

- IBM — OS/390, OS/400, AIX, OS/2
- HP - MPE, UX
- Linux
- SUN - Solaris, Solaris X86
- SCO - Unix Ware 7
- Microsoft - Window NT, Windows 95/98

Components

- Full Function COBOL compiler and runtime library
- COBOL Debug Tool
- COBOL Bean Utility
- MicroEdge SlickEdit for Windows, OS/2 and Unix platforms

In addition to the PERCobol compiler and runtime libraries, complimentary tools are included to assist COBOL programmers write or modify existing code.

The Debug Tool is an execution time source level debugger enabling programmers to step through COBOL source code level while the application is running on the Java Virtual Machine.

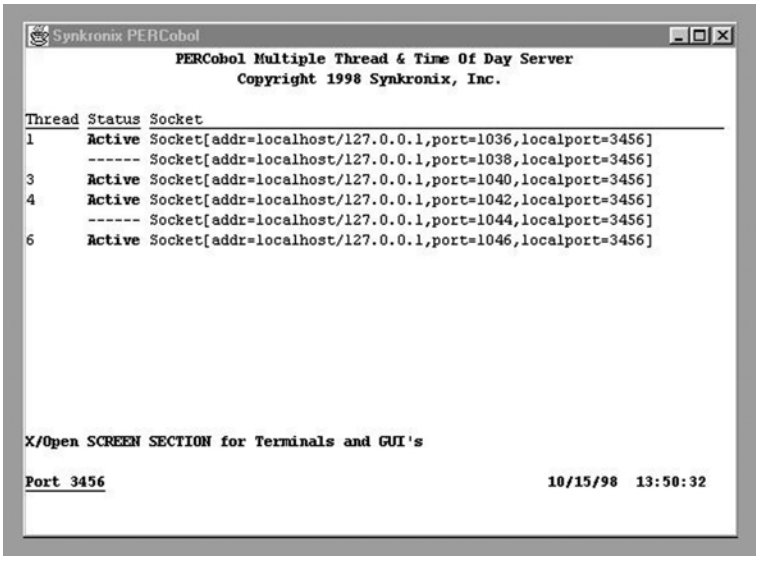
The COBOL Bean Utility generates the necessary PERCobol to allow Java Beans to be incorporated into a COBOL application.

COBOL Standards

PERCobol is a fully compliant ANSI 1985 X3.23b COBOL compiler and also supports the addendums to the COBOL standard.

PERCobol supports many of the popular COBOL extensions including IBM VS COBOL II, HP COBOL II/XL, Wang COBOL, X/Open, and the object access subset of the new COBOL 2000 standard definition.

PERCobol is a Y2K compliant solution and includes the date intrinsics as defined in the COBOL 2000 standard.



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Using ODBCLink/SE to Webify HP e3000

ODBCLink/SE is an implementation of Microsoft's Open Database Connectivity (ODBC) interface that enables Microsoft Windows based applications and tools to access IMAGE/SQL on the HP e3000 and ALLBASE/SQL on the HP e3000 and HP 9000, in a client/server environment. In this environment, application developers and end-users can take advantage of the PC's graphical user interface (GUI) and processing power, while relying on the security, integrity, and database management capabilities of ALLBASE/SQL and IMAGE/SQL.

For users who need access to other file types — MPE, KSAM, Oracle and self describing file formats like DataExpress subfiles, Cognos' Powerhouse subfiles, or Query SD files see **http://www.MBFoster.com/DataExpress**.

By using a three-tier architecture with an NT server in the mid-tier, a browser can access data via ODBCLink/SE. The NT server acts as a client to the HP e3000 server. Access security can be managed through the login security on the HP e3000 server or using facilities on the NT server.

Using Web toolkits such as MicroSoft's Internet Information Server or Allaire's Cold Fusion —- a website can be rapidly set up to access data on an HP e3000.

Design considerations

First, remember the speed of the web page will depend on the amount of time spent getting the records back to the user. When designing the web page start by "story boarding" it. Look at the data requirements for the following aspects:

Security

- Who should be allowed to use these web pages?
- How will you validate the user?
- Is there any data that needs security?
- Should the server put any pages into Secure Sockets Mode or is it OK for everyone to read the data?

Performance

- How many records need to be read to satisfy the request?
- How many records will be selected by the largest query?
- How will the selection be done? Do any of the queries span multiple databases?
- Does your web server allow connection pooling?

Simplicity

- How will we avoid supplying more data than the user wants?
- Is there a need to require selection criteria to reduce the information retrieved?

8 Steps for Setting up a web server with ODBCLink/SE

1. Create the data source on the NT server.
2. Configure the MS-IIS server to use the data source.
3. Build a basic web page.
4. Configure the ODBCLink/SE server on the HP e3000.
5. Start the server (or make it permanent by adding it to SYSStart).
6. Populate the web page with data from the HP e3000 Image/SQL server.
7. Design Considerations.
8. Monitoring the listener.

For an illustrated detailed version of this step by step method see **http://www.MBFoster.com/whitepapers/ODBCLinkSE**.

There are some settings for ODBC as well as for the webserver that will need to be selected and configured in. The concepts of pooling, threads, and concurrency as well as database isolation levels need to be understood before implementing a website. Depending on your environment your settings will be different. See the above website for more information.

Minisoft
Connectivity solutions for the world.®

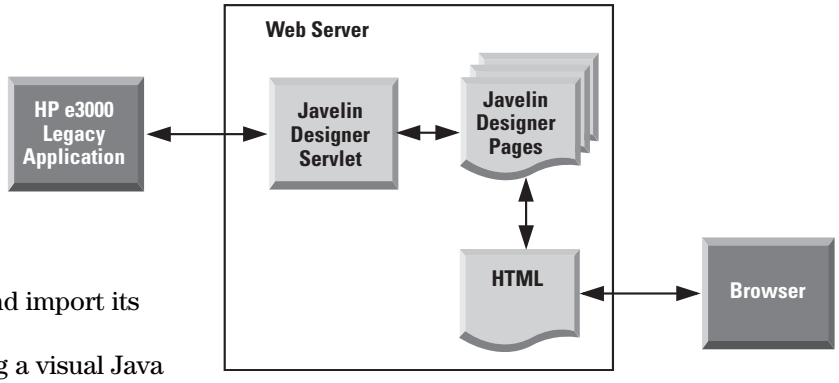
Minisoft's Javelin Designer

Javelin Designer is a Java servlet and a collection of Java components that enable running legacy applications from a web browser. The Java components provide a framework for translating between the user interface of the legacy application and a user interface presented through a web browser. The Designer allows existing legacy applications to run through the web browser "as is", or the components can be used to form new user interfaces. Manipulation of the components to form new user interfaces can be accomplished with any visual Java development tool that supports Java Beans, such as Jbuilder and Visual Café.

Javelin Designer's servlet communicates with a legacy application via normal 700/92 terminal emulation. As far as the application is concerned, it is talking to a terminal. Because of this fact most legacy application can run through the Javelin Designer with no modifications. Based upon various criteria, most likely the contents of the screen, a Javelin Designer page is used to generate a HTML page, which will be presented to the user's web browser by the web server. The page is actually a Java class, which contains the Javelin Designer components needed for the user interface. Some common components are text boxes, list boxes, check boxes, radio buttons, tables, and push buttons. In addition, there are components to load background HTML, link to databases via JDBC, and link to custom objects.

A Javelin Designer page can be built in many ways. First there a default pages to implement common screens, such a block mode screens. There is an import facility that will build a page for any screen. In most cases, a page can be modified just by changing the properties of the components contained in it. This can be done using any visual Java development tool. A Javelin Designer page could also be built by coding in Java. This gives a developer great flexibility when implementing the user interface.

A typical scenario for implementing a legacy application on a web browser would involve the following steps.



1. Run the application and import its screens into pages.
2. Modify the pages using a visual Java development tool.
   a) Change field appearance and order
   b) Add background HTML (logos, pictures, etc...)
   c) Change field types (radio buttons for Y/N responses)
   d) Add new user interface components (a list box with data from a dataset)
   e) Create a trigger to determine when the page will be used
3. Package all the pages in JAR file and install on the web server.

The legacy application, with a whole new look and some new functionality, can now be run from a web browser. For more information visit our web site at **www.minisoft.com**.

Web Dimension

Web Dimension is an application server and a collection of Java components for designing and deploying web and client/server applications. The main components of Web Dimension are:

- A platform independent application server that can be use with or without a web server. The application server will deploy site-built applications through web browsers or through the Web Dimension UI Viewer.
- Java components for building applications and user interfaces. The applications and user interface pages that are built are actual Java code, but because they are built using the Web Dimension components, no Java programming is necessary. Assembling and configuring the components into applications and user interface pages can be accomplished in a number of visual development environments, including Visual CafÈ and JBuilder. Because the built applications and user interface pages are Java they, like the application server, are platform independent.
- A platform independent UI viewer that runs applications from the application server. Applications can be run through the UI viewer or a web browser. The UI viewer, however, supports complicated user interfaces not suited for web pages.

Backend Components

Web Dimension includes a several back-end components for building applications. These are a legacy application access component, a database access component, and a custom object access component.

The legacy application access component allows Web Dimension applications to use and control existing HP e3000 legacy applications. An existing legacy application is accessed transparently through built-in 700/92 emulation. The legacy application requires no changes to be used by the Web Dimension legacy application access component. Information from the legacy application's user interface can be used in new Web Dimension user interface pages. Web Dimension user interface pages can also supply input information to the legacy application's user interface. There are a number of pre-built Web Dimension applications included that will run typical HP e3000 legacy applications as-is.

The database access component allows Web Dimension application to access databases through the JDBC API. Using this component will allow access to many popular databases, such as TurboImage, Oracle, SQL Server, Informix, Sybase, and DB2.

The custom object access component allows Web Dimension applications to access custom-built objects. Custom objects can be built in any language and deployed on a number of platforms.

Combinations of any of these components can be used in the same Web Dimension application. Web Dimension applications can very powerfully combine legacy applications, data, and objects from a wide variety of computers.

User Interface Components

Web Dimension includes a wide variety of user interface components for building user interface pages. These include text boxes, labels, check boxes, combo-boxes, radio buttons, push buttons, tables, graphics, and others. These components are used to build user interface pages using a visual development environment such as Visual CafÈ or JBuilder. User interface pages can also be merged at run-time with HTML pages to provide sophisticated web-content in the user interfaces.

Design-time Wizards

Web Dimension provides several design-time wizards to help rapidly build applications and user interface pages. One such wizard will build user interface pages corresponding to legacy applications and/or database queries. This gives the developer a starting point for a new application and its user interface pages. Another wizard will build HTML pages to match Web Dimension user interface pages. For user interface pages that will be deployed through a web browser, this lets the developer use any HTML editor to edit the appearance of the pages.

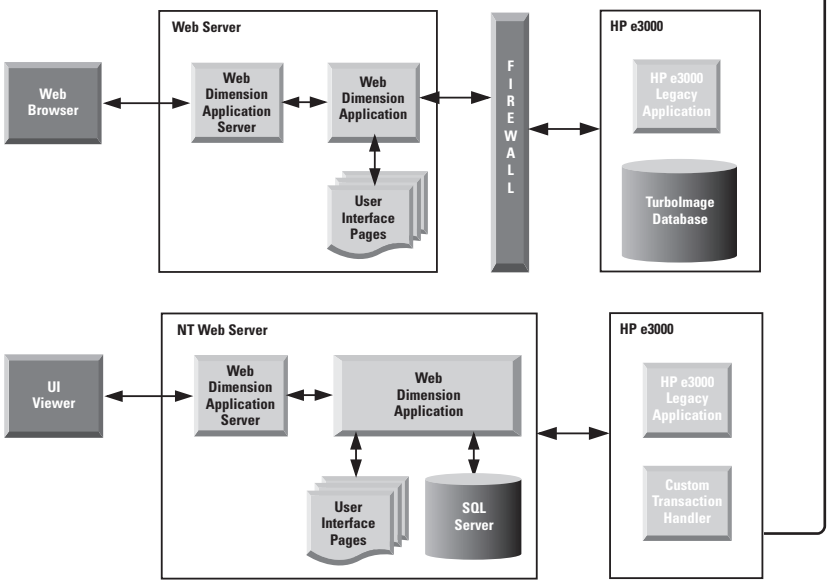
Web Dimension Application Structure

A Web Dimension application consists of an application class and one or more users interface page classes. These classes are actual Java code, which use the Web Dimension components to construct an application and its user interface. The application and user interface page classes can be built using typical visual development environments such as Visual CafÈ and JBuilder. The Web Dimension back-end and user interface components are very powerful and flexible, so typically no coding is required. However, having access to the Java code can be useful for building very complex applications and user interfaces. All the Web Dimension components implement many events and user exits, so adding to or changing their functionality requires very little effort.

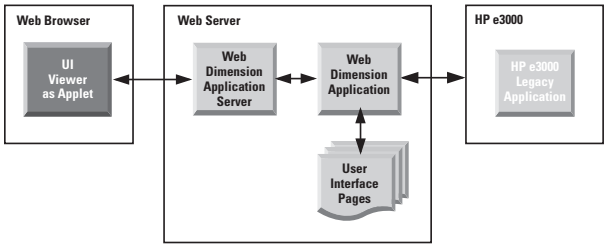
Web Dimension Deployment Scenarios

Web Dimension can be deployed in a number of different ways. The following are a few common deployment scenarios.

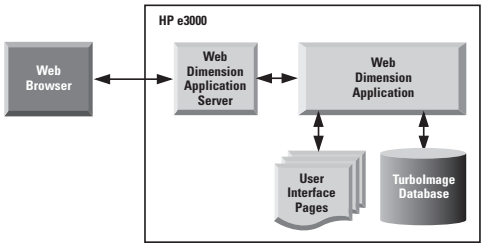
1. A new web interface is created for an HP e3000 legacy application. At the same time the web interface will access a TurboImage database to add new functionality to the application. The new application is served from a HP-UX web server outside of a firewall surrounding the HP e3000.
2. A new graphical user interface is created for an existing HP e3000 legacy application. The new user interface will also write information to a SQL Server database and a custom transaction-handling program running on the HP e3000.



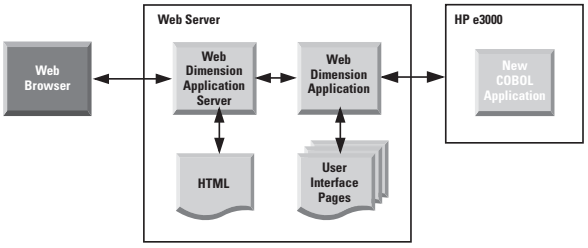
3. A new graphical user interface is created for an existing HP e3000 legacy application. The user interface is delivered from a web server, but requires more complexity than possible with HTML.



4. A new web application is created to access a TurboImage database. The application resides completely on the HP e3000 and the HP e3000 is not a web server.



5. A new application is created, written in COBOL, on the HP e3000 but deployed through a web server to users using web browsers.



Summary

The Web Dimension application server, its components, and it design-time tools provide a powerful and flexible method for building and deploying web and client/server applications. The applications have access to a wide variety of back-end objects including legacy applications, databases, and custom-built objects. The design-time wizards will rapidly create an application and user interface based upon a database or legacy application user interface. The components that make up a Web Dimension application are very powerful and highly configurable. In most cases no coding is needed to make new Web Dimension applications. For extremely complex applications and user interfaces, the components expose many events and user exits to allow pinpoint customization. All the components are standard Java Beans, so they can be accessed and configured with visual development environments such as Visual Café and JBuilder. The Web Dimension application server and applications are all pure-Java, so they are platform independent. The application server can operate stand-alone or in conjunction with an existing web server. Web Dimension applications can be deployed through a web browser or through the Web Dimension UI viewer. This viewer is platform independent and can also be deployed as an applet.

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Premier Technical Brief - OSCAR

Inside of each "legacy" application are the yearnings of discrete functions, borne to encapsulate access to our data, under oath to secure its access from proposed and even unknown access platforms (the Web being the current hype). Premier Software insists that what's important is to re-architect the legacy application such that requesting client applications can exist as Web clients, non-HP e3000 application, other HP e3000 applications, and the future software appliances that appear.

OSCAR uses a high performance, scalable, RPC middleware - instead of ODBC/Image driver software, to wrap and encapsulate application business and data access logic. This approach is strategic for a number of significant reasons:

1. The new MPE Server Objects provide remotely invocable transaction services to a companies distributed development team and access platforms.
2. The transaction services are published in the OSCAR catalog. A developers companion tool, the catalog serves to provide the organization with a visual repository of service interfaces.
3. OSCAR provides utilities to use these MPE services directly from your WWW browser, as well as a variety of utilities for testing.

These transaction services are accessible from simple Web Servers using scripting languages, as well as from more complex Web solutions that involve the deployment of a Web Application Server.

For example a company using Cold Fusion as the Application Server links calls to a standard "C" language DLL that implements a series of RPC's to the HP e3000. These RPC's (built with our middleware-generation product) represent a variety of "business functions" which were harvested from an existing COBOL/VPLUS/ IMAGE application. All the investment in the COBOL, rules, and edits were preserved. This approach allowed our customer to leverage their IMAGE database PLUS the code they've written and maintained for years.

The "C" language DLL is not handcrafted. OSCAR code-generates these DLL's from an IDL-like specification that expressed each HP e3000 transaction service as a function name with discreet inputs and outputs. The scripting in Cold Fusion was simplicity itself.

The end result was an industry-strength e-biz solution which re-used an application that had been strictly accessible from MPE sessions. Now, instead of hundreds of MPE logons, there is one session serving hundreds of Internet users.

http://www.premiersoft.com/temp

Recent Publication(s)

http://www.interex.org/hpworldnews/hpw907/02mpe.html
http://www.hp.com/ibpprogs/csy/advisor/spring99/interop.html

Premier Technical Brief - ACTIVE

Premier Software has released support for an MPE interface to Active

Software's Active/Web Information Broker. Now in addition to Premier's own RPC legacy wrapping technology, customers can enjoy the full range of non-MPE integration capabilities available with the Active/Web Information Broker - one of the top Message broker technologies in the market. Premier's offering allows customers to fully engage MPE application's in the world of Web Event based integration.

Premier has ported the Active "C" Language API set to the MPE environment. This enables any MPE application connectivity to Active/Web Broker (available on NT and UNIX). MPE applications can now "publish" events (messages) and "subscribe" to events. CO-EXISTENCE of MPE Legacy applications and packages with newer (in birth only) ERP's is now easier than ever.

Integrating the Active MPE directly to your legacy application code facilitates the use of the multitude of integration points provided by Active (and the ActiveWorks product) and Active partners, like Premier. In fact Premier provides a Web Adapter product which interacts with the ActiveWorks broker to translate messages into predefined html templates.

So putting this all together. The developer builds a new MPE Application Server using the Active Middleware. The Active Message Broker is deployed on UNIX or NT. The Web Server is deployed along side the Active Message Broker and translates any number of Web pages into request/reply messages to the broker.

The strength of this approach is again the encapsulation of the legacy MPE machine from the Web —- during development and deployment.

Companies

http://www.premiersoft.com/temp
http://www.activesw.com

Recent publications

http://www.interex.org/hpworldnews/hpw905/02mpe.html

Speedware: The Leader in Web-enabling HP e3000 Applications

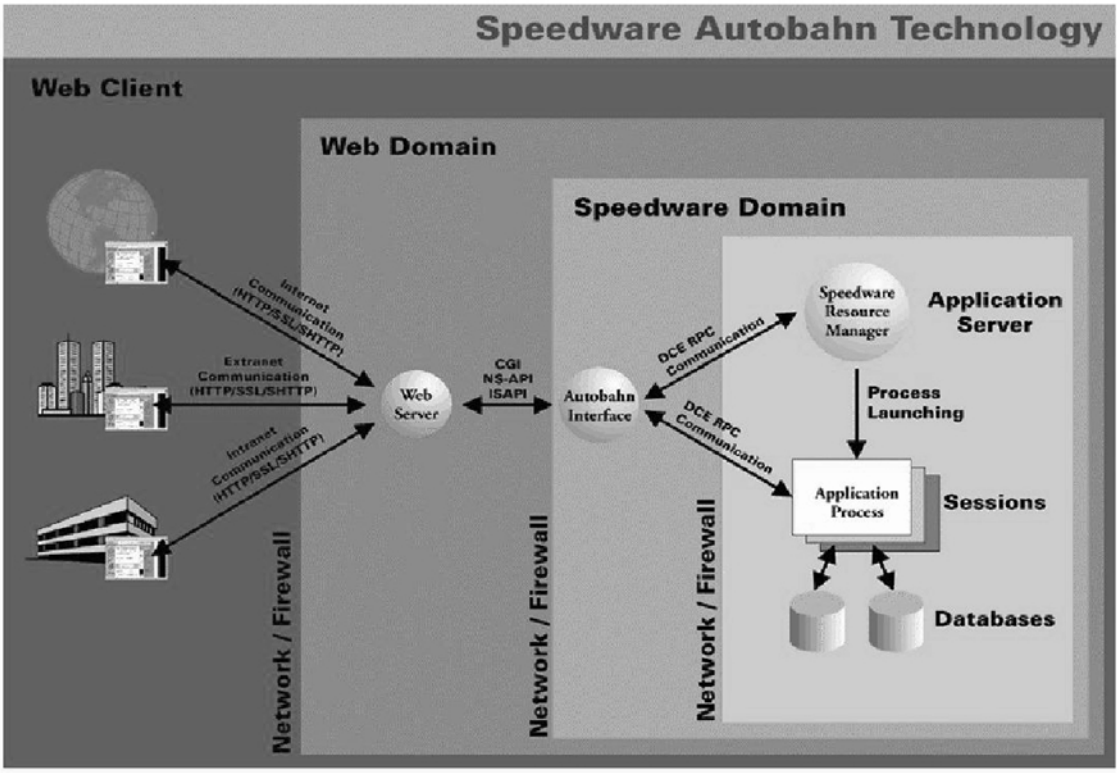
Speedware Autobahn offers the first and only Web Application Server specifically designed for the HP e3000. Speedware Autobahn's Open Web Architecture integrates current Web technology into your HP e3000 environment while leaving the door open for future technologies.

Productivity

Autobahn's Open Web Architecture isolates the program code from the presentation layer, lets developers focus on application requirements instead of Web integration issues, protects your environment from technological change, and accelerates the application development cycle. The robust development environment contains many timesaving wizards and is designed to speed up the development process. Applications can be Web-enabled in a few hours; complete projects in a matter of days.

Architecture for Scalable, Distributed Computing

Speedware Autobahn's n-tier model of scalability means its capacity can be precisely adjusted to a multi-platform environment, incorporating configuration parameters such as firewalls, secure networks, and multiple server platforms. Autobahn's automatic deployment feature distributes application components to the appropriate platforms. Autobahn supports secure Web-commerce servers that encrypt transmissions between commerce servers and browsers.



Speedware Autobahn's Open Web Architecture can integrate a wide range of Web technologies into your HP e3000 environment and provide a framework for integrating new Web technologies as they appear. These include Java, ActiveX, JavaScript, Visual Basic Script, Flash, VRML, XML, HDML, NS API, IS API, and many more.

Speedware Application Server

Speedware Autobahn uses a unique Application Server architecture that offers a key advantage to HP e3000 users. Web applications can run directly on the HP e3000 natively accessing all local databases, including Image, Allbase, Oracle, KSAM, KSAMXL, etc.

Autobahn makes full use of all HP e3000 resources including calling subroutines (written for the OS or in languages such as C or COBOL), launching batch processes, integrating existing legacy systems, executing operating system commands, and running other programs.

Session persistence and state management

The Web is connectionless and therefore stateless-links between browsers and servers are not maintained-but Speedware Autobahn overcomes this limitation. Autobahn's unique state management distinguishes user sessions and tracks where a user is at any time within an application.

Security

Speedware Autobahn incorporates two additional layers of security to the usual Web provisions. Multiple built-in security functions restrict initial access to applications and Re-access Authentication ensures that the initial user is the only one who can re-access that process.

Conclusion

Move up to market leadership, take advantage of innovative technology, speed up your development cycle for HP e3000-based Web applications, and reap the benefits of Web-enabled applications today-explore the possibilities of Speedware Autobahn! If you're moving your HP e3000 applications to the Web, Speedware Autobahn will get you there fast!

For more information and to see who's benefiting from Speedware Autobahn right now, visit the Speedware Web site at **www.speedware.com**.

Willow Technology

MQSeries and the Internet

For most companies, the reality of information systems is a mix of old and new technologies, with tried-and-tested systems co-existing with dynamic new innovations like the Web. Unfortunately, making these systems work well together can be costly and time-consuming.

MQSeries simplifies communication between applications running on identical or different hardware platforms across networks. MQSeries leverages your company's in-house skills and makes them even more valuable across multiple platforms. Whether you are connecting your application with older legacy systems, developing a client/server solution or distributing your software onto other platforms, MQSeries is a necessary part of your solution. MQSeries lets you:

- integrate your trusted, in-production systems with new developments like e-business and Web servers
- develop and roll-out new enterprise-wide applications faster and more cost-effectively, without having to write complex communication code
- free up application development resources - let your staff focus on serving the business, not fixing connectivity problems
- connect up your supply chain - put suppliers, partners and customers in contact to save money and improve service
- seamlessly connect powerful ERP-type applications such as SAP R/3 to new and existing systems
- pull together distributed information resources to build powerful data warehousing, data mart and decision support applications
- build secure, high-performance mobile-enabled information networks to support dynamic global business operations
- use important new technologies like message brokers and publish-and-subscribe engines to build state-of-the-art information delivery systems

MQSeries makes all these tasks faster, simpler and less expensive - giving you a real edge, and delivering value to your bottom line. Here's how:

- Programmatic solution to arduous in-house socket code and ftp based connectivity
- Built-in connectivity to over 35 platforms
- Built-in access to XA compliant databases and transaction processing monitors
- Built-in connectivity to WWW, Lotus, SAP R/3
- Built in data security and reliability
- Comprehensive management of information flow across an enterprise in a multi-platform environment
- A standard means of programming information exchange within and between applications on multiple hardware and software platforms
- Leverages existing skills and development environments by supporting C, C++, COBOL, java, Perl

Benefits of the Internet to MQSeries users

- Provides easy access to customers and suppliers for Electronic Commerce
- Low cost clients with an attractive user interface
- Low cost Wide Area Network providing intra- or inter-company communications

Benefits MQSeries brings to integration of the Internet and WWW

- Assured delivery of messages
- Transactional message support
- Deliver a message once, and once only
- Time-independent (asynchronous) processing
- Heterogeneous any-to-any connectivity
- Standard API providing simple, convenient programming environment
- Network transparency
- Isolation of internal networks from Internet
- Bridge to non-IP networks
- Support for parallelism in processing
- MQSeries security exits can protect sensitive data
- MQSeries Internet Gateway supports access to MQSeries applications from browsers with no application or code on browser
- Supports multiple users with User ID and context management
- Client authentication capability
- Synchronous HTTP to asynchronous MQSeries messages mapping and browser progress notification
- Automatic ASCII/EBCDIC data conversion if required
- Co-ordination of requests and responses to multiple non-web aware applications (local or remote) from web server
- Multiple application servers can process work queues on web servers using MQSeries client connections

For more information

Willow Technology, Inc
+1.408.377.7292
email: info@willowtech.com
www.willowtech.com

(Rev: 06/99)

Partners Summary: Third Party Middleware and Tools

Tool	Tool Type	Contact Info
Advanced Network Systems VPLUS+	GUI front-end	http://www.advnetsys.com/
Bradmark MPE Command Center	GUI front-end	http://www.bradmark.com/
Bradmark StarMan	GUI front-end	http://www.bradmark.com/
HP SAMBA/iX	GUI front-end	http://www.hp.com
Minisoft Frontman	GUI front-end	http://www.minisoft.com/
Minisoft Javelin	GUI front-end	http://www.minisoft.com/
Minisoft Web Dimension	GUI Front-end	http://www.minisoft.com/
OmniSolutions GUI3000	GUI front-end	http://www.gui3000.com/
Qedit	GUI front-end	http://www.robelle.com/
Remote VPlus Client	GUI front-end	http://www.legacyj.com
Symantec VisualCafÈ	GUI front-end	http://www.symantec.com/domain/cafe/
Synkronix PERCobol	GUI front-end	http://www.legacyj.com
Walldata RUMBA Web-to-Host	GUI front-end	http://www.walldata.com/
Whisper Technology Programmer Studio	GUI front-end	http://www.whispertech.com/
CSL LinkWay	ODBC driver	http://www.csllink.com/products.html
MB Foster ODBCLink	ODBC driver	http://www.mbfoster.com
Minisoft ODBC/32	ODBC driver	http://www.minisoft.com/
Crystal Reports	ODBC spreadsheet	http://www.img.seagate.com
Lotus 1-2-3	ODBC spreadsheet	http://www.lotus.com
Microsoft Excel	ODBC spreadsheet	http://www.microsoft.com
Casahl Replic-Action (Lotus Notes and Microsoft Exchange)	ODBC tool	http://www.casahl.com
Haht Hahtsite	ODBC tool	http://www.haht.com
Macromedia Backstage	ODBC tool	http://www.macromedia.com
Microsoft Access	ODBC tool	http://www.microsoft.com
Microsoft dbWeb	ODBC tool	http://www.microsoft.com
Microsoft FrontPage	ODBC tool	http://www.microsoft.com
Microsoft Visual Interdev	ODBC tool	http://www.microsoft.com
Microsoft Word	ODBC tool	http://www.microsoft.com
NetObjects Fusion	ODBC tool	http://www.netobjects.com
Information Builders EDA	Gateway	http://www.ibi.com
Oracle Transparent Gateway for IMAGE/SQL	Gateway	http://www.oracle.com
Active Software ActiveWeb	Middleware	http://www.premiersoft.com
Cognos PowerHouse	Middleware	http://www.cognos.com/
Comco Solutions CGIgnite	Middleware	http://www.comcosolutions.com
DCE	Middleware	http://www.hp.com
DISC OMNIDEX for the Web	Middleware	http://www.disc.com/index.html
Leetech/CSF	Middleware	http://www.leetech.com
Level 8 FalcomMQ	Middleware	http://www.level8.com
Minisoft Middleman	Middleware	http://www.minisoft.com
Premier Software OSCAR (Open Services Catalog & Application Registry)	Middleware	http://www.premiersoft.com
Speedware Autobahn	Middleware	http://www.speedware.com
Taurus Bridgeware (database to database extraction)	Middleware	http://www.taurus.com
Willow Technology MQSeries	Middleware	http://www.willowtech.com

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