
iPlanet

About the Author

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CHAPTER 10

International Data Post Brings Snail Mail to the Internet Age with iPlanet

INTERNATIONAL DATA POST (IDP), a Copenhagen, Denmark-based postal technology solutions company, is taking the communications realm of postal operations to the Internet age, using Java 2 Platform, Enterprise Edition (J2EE) technology. The company, owned by seven global postal operators, is a pioneer of “hybrid mail,” which streamlines a letter’s delivery cycle by enabling electronic delivery from the sender to the post office. There—rather than at the sender’s site—the document is printed, stamped, and physically delivered to the recipient. By using IDP’s solution, postal organizations can grow beyond providing only communications logistics services, and add e-messaging to their repertoire. And organizations from a multitude of other industries can license the solution to capture new revenue opportunities.

IDP’s hybrid mail management system, ePOST, was first developed in the late 1980s on a mixed infrastructure, of IBM mainframe computers and legacy middleware. Since then, the system has enjoyed incredible acceptance from both postal operators and corporations. In 1998 alone, IDP customers produced more than two billion hybrid mail letters.

A little over a year ago, IDP decided to extend ePOST by incorporating a front-end, Web-based access channel for the solution. Its engineers, however, lacked expertise in developing Internet-based applications. IDP consulted a half-dozen leading IT vendors to determine the type of technology and solution that would garner the most success. After talking with Sun Microsystems, the company was convinced that the total package from Sun—including J2EE technology, for its growing reputation as a highly flexible Internet application development platform—offered the most attractive option. IDP called on Sun Professional Services to architect and design the application, called WEB ePOST. WEB ePOST

was developed with J2EE-compliant iPlanet Application Server and iPlanet Web Server running various Java and J2EE technology components, including Enterprise JavaBeans (EJB), Java ServerPages (JSP), Java Servlets, and Java applets.

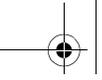
Now, IDP customers can mail letters using a standard Web browser, saving significantly on printing, administration, and postage costs. And traditional postal operators, whose market has been under pressure from new technologies and new competitors, finally have a Web-based offering that ties into their core business and helps them exploit new markets to grow their revenues and build their businesses. Currently, several postal operators—who reach more than one billion addresses and represent more than 75 percent of the worldwide postal mail volume—have licensed WEB ePOST. As for IDP, J2EE technology has given the company a rapid application development environment that can easily be leveraged for future projects.

10.1 Company Profile

Imagine sending colorful brochures to thousands of physical mailboxes—all with a click of the mouse. No more envelope stuffing, stamp licking, or traveling to the nearest post office. Thanks to cutting-edge technology from IDP, that day has arrived. Using IDP's hybrid-mail solution, which brings together electronic and physical delivery of mail, businesses are sending letters, paper invoices, and other printed materials directly from their PCs. "We call this the next-generation mail system," says Jacob Johnsen, vice president of research and development at IDP. "We're bringing the postal service to the Internet while saving corporations substantial dollars in the process, and enhancing the service standards and accessibility of the postal network."

IDP worked with Sun Professional Services to be at the forefront of this revolution, offering complex messaging software and related services that make Internet mailing a very practical reality. More than a dozen companies have pre-licensed IDP's state-of-the-art WEB ePOST, the Internet channel for its hybrid-mail system. As IDP continues to extend the market introduction of WEB ePOST, the company anticipates attracting even more licensees.

Unlike the many Web-born companies that have met their financial demise over the past year, IDP is an established IT company with a solid foundation. It garnered tremendous support from industry stalwarts. Shareholders include seven of the world's top public postal operators (the equivalent of the U.S. Postal Service) in Australia, Denmark, Finland, France, Germany, Norway, and Sweden. As noted earlier, these postal operators reach more than a billion addresses and represent more than 75 percent of the worldwide postal mail volume. IDP has 50 employees, half of whom are technical support, customer service, and testing



staff. The other half of the workforce includes staff from product management, consulting, sales, and administration.

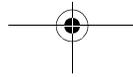
It is no wonder hybrid mail systems are attractive to postal operators. Hybrid mail presents a way by which an old industry can profit in the new economy. And the timing could not be better: With a growing range of electronic communications in our connected society—e-mail, electronic attachments, faxes, and cellular phones, to name a few—postal operators are facing significant competition in an ever-expanding market. Reliable TCP/IP connections and emerging technology such as digital signatures enable companies to send and receive corporate invoices and purchase orders—once the bastion of the physical letter—in the domain of the Internet. And as for letters that still find their way into a mail carrier's sack, the contrast with e-mail messages that arrive in minutes—even seconds—after the writer hits the “send” button is enough to make any postal operator want to go electronic. According to IDP, more than 70 percent of postal letters are originally created on computers and then printed out, placed in an envelope, stamped, and dropped off in a bin—an operation that can be inefficient, especially where mass mailings are concerned.

For postal operators, hybrid-mail systems are fast becoming the high-tech tools of choice for breaking into new market opportunities. “Hybrid mail secures the position of postal operators as trusted parties in the electronic communications age, creating a digital channel for efficient message delivery,” explains Flemming Skov Hansen, senior project manager at IDP. “For customers, our solution is attractive because it provides them with the ability to conduct high-volume mailings at lower prices and with shorter delivery times. What was once a cumbersome mailing project, particularly in terms of the logistics and resources needed, now becomes a streamlined communication process.” Indeed, IDP studies show that corporations using WEB ePOST cut mailing costs nearly in half, replacing time- and cost-intensive manual labor with lightning-fast, Internet-based automation.

IDP licenses its software to corporations, telecommunication carriers, Internet portal operators, ASPs, and of course, postal administrations. More than just a technology solution provider, IDP also offers an array of professional services, ranging from strategy consulting and marketing to technology implementation and operation. “We are a center of expertise for e-messaging solutions, technology, and markets,” Johnsen says.

10.1.1 Hybrid Mail: The Technology Evolution

Hybrid-mail systems emerged, with little fanfare, on the high-tech scene in the 1980s. The slow start had much to do with the fact that postal operators traditionally thought of themselves as logistics carriers, rather than as having a role in electronic communications. Still, a handful of European countries saw the seeds



of something spectacular; in 1992, Nordic Data Post, which included postal operators in Denmark, Finland, Norway, and Sweden, began developing its own hybrid mail offering. Intrigued by the solution's potential, postal operators in France, Germany, and Australia jumped on board over the next couple of years, and Nordic Data Post became International Data Post.

Shortly after, postal operators in 18 countries, including Italy, the United States, Singapore and Portugal, started licensing ePOST. These international companies realized they could suddenly and cheaply conduct mass mailings in countries where postal operators embraced ePOST. In other words, companies could send documents electronically to a country—possibly overseas—and have the documents printed there, rather than pay hefty charges for shipping bulky paper.

An early hybrid-mail application, ePOST/VM, was built on the IBM VM mainframe platform and ran on IBM S/370- and IBM S/390-compatible hardware (this version is being phased out). IDP then decided to build an access solution for PCs, called PC ePOST. It is a Microsoft Windows-based application that acts as a virtual printer—that is, PC ePOST users can submit print jobs directly into a hybrid mail system, sending electronic versions of their mailings through cyberspace and eventually to a printing company. (The carrier in this system is standard SMTP e-mail transport system.)

The next system, ePOST/Open 1—and later ePOST/Open 2, released in late 1998—is a UNIX-based system that supports printer servers such as IBM InfoPrint Manager, IBM PSF/6000, and Océ Prisma APA. It utilizes middleware from Oracle, as well as IBM MQSeries. Its major routing system runs on IBM AIX and HP-UX, though it is currently being ported to Sun's Solaris Operating Environment for greater stability.

The eventual rise of the Internet and the ubiquity of Web browsers triggered a momentous milestone in the evolution of IDP's hybrid-mail system application. In its quest to become the worldwide leader in postal e-messaging, IDP knew it needed to provide a Web channel to ePOST. This newest iteration of its solution eventually became known as WEB ePOST.

To develop WEB ePOST, IDP recognized it required powerful Internet-based software built on standard components and protocols that would enable customers to prepare sizable electronic documents for safe and reliable transport over the Internet. The software would need to work with just about any production tool or word processor and connect to both enterprise-scale server infrastructures and legacy mainframe environments. Moreover, IDP officials saw this as a big opportunity to brand the company and its postal operators as Web-savvy organizations. It was at this moment in its evolution that IDP remembered the promise of Java technology.

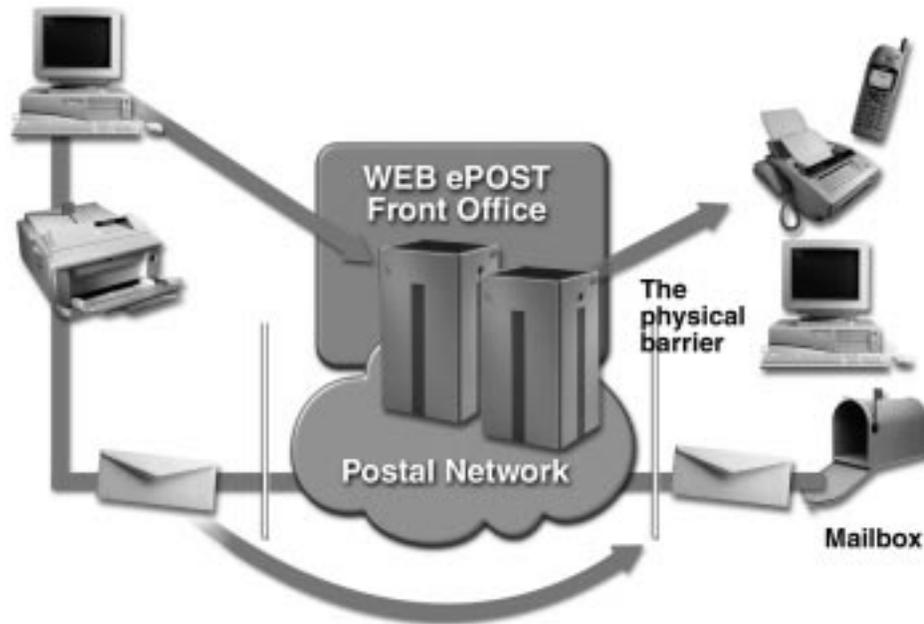


Figure 10.1 Postal Customers Save Substantially by Sending Hybrid Mail Through WEB ePOST

10.1.2 Why J2EE Technology?

The decision to extend ePOST using Java technology and a multitiered architecture was based on the need for flexibility and scalability, as well as on the ability to speed up future application development. WEB ePOST also needed to be easy to integrate into customer IT infrastructures and work seamlessly with nearly every production tool used for creating documents and graphics.

Since a company might possibly send thousands of mission-critical documents daily, IDP needed a multitiered architecture so that it could add servers quickly, to handle sudden and massive transaction spikes. Early on, IDP also envisioned organizations other than postal operators licensing WEB ePOST, so it wanted to be sure its solution could be customized for a variety of industries so that it could capitalize on new business opportunities. A restaurant chain could, for example, customize WEB ePOST to enable users to send postcards, birthday cards, or registered mail. Using the various components of the J2EE platform, IDP could save some time and effort because of the reusable business-logic code inherent in J2EE technology.

For WEB ePOST to be a practical, attractive solution, it had to require little or no end-user training. The fewer barriers to adoption, the more likely corporations

long familiar with traditional mailing methods would switch over to hybrid-mail systems—without concern about overcoming challenges that any new technology can bring. This meant WEB ePOST had to connect seamlessly with popular Web browsers, such as Microsoft Internet Explorer and Netscape. It also needed to work with packaged address books, such as Microsoft Outlook, with a MAPI interface or in conjunction with an LDAP or ODBC-based database.

After speaking to several vendors, IDP found the flexible development environment for building its multi-tier enterprise application—the J2EE platform. By basing enterprise applications on standardized, modular components, and managing many details of application behavior, without complex programming, J2EE technology simplifies their development. “Java technology offers the most flexible solution for this kind of development, because it can operate on any platform whatsoever,” notes Hansen. “In addition, from a marketing perspective, the Java brand has a lot of power with our customer base. Java technology was a natural choice.”

But even with the promise of application development ease, IDP engineers knew little about Java technology and the J2EE architecture—only that the technology was fast becoming the de facto standard for developing flexible applications, and for extending existing applications to the Web. The engineers desperately needed experienced professionals to work with them. “We were very new to the world of Internet development,” says Johnsen. “We had developed on big UNIX servers, built production-class software that ran 24x7, and even made some PC developments. But these were largely unconnected to architecting, building, and deploying a J2EE platform. We needed someone to guide us through the design and implementation phases.”

Consequently, IDP turned to the services firm that logically had the most Java technology expertise, Sun Professional Services. “Our main reason for choosing Sun Professional Services was that its proof-of-concept seemed to be a solid solution that met our criteria for reliably bringing our hybrid-mail system to the Web,” says Johnsen. “Another key reason was the reputation of Sun Professional Services in architecting sophisticated platform infrastructures based on Java technology.” He adds, “And the brand name of Sun was also an obvious factor.”

Of course, providing a Web front-end access point for an application such as ePOST using Java technology—or any other technology, for that matter—isn’t as simple as it sounds. To begin, powerful functionality needed to be built into the front end so that users could send Hybrid Markup Language (HML) documents to IDP’s hybrid message management system, where addresses could be inserted and the completed file routed to a post operator’s paper-based distribution system. In addition, there was a need for a complex server-side portion of the Web application to handle business logic and transaction processing.

10.2 Problem/Opportunity Profile: The Applet Dilemma

The biggest challenge in developing WEB ePOST was building the client-side Java applet—the lynchpin for the entire system, which performs complex tasks, as well as interfaces with different Web browsers. The problem was that this applet kept growing because IDP wanted it to be packed with functionality and graphics. As the development of the application progressed and more and more functionality was embedded in this applet, it reached a little more than a megabyte. At the same time, the company did not want the Java applet's size to become a barrier to adoption.

The Java applet provides the graphical user interface (GUI) and a rich array of functionality for the WEB ePOST user to send postscript files and select postal delivery options, as well as letter and envelope formats. Users can select a set of standard enclosures—residing at the core printing system—to be added with each letter. For example, a pitch letter offering a credit card with low interest rates might be paired with a flier describing a free gift for those who sign on. The applet also has a built-in calculator that enables users to calculate the cost of sending the letters, depending on their formats and delivery options. In addition, the Java applet is responsible for generating the HML file wrapped around the postscript file. (HML takes into account delivery attributes, such as addresses, document layout, and enclosures.)

The applet integrates seamlessly with a variety of address databases: Microsoft Outlook, through MAPI; Lotus Notes, through LDAP; and Microsoft Access, through ODBC. This enables users to select any number of recipients and enter data fields into the letter. Users could also preview a bit map of the letter, including recipient addresses, reserved fields, and other information, via the applet. The remaining functionality for WEB ePOST, such as document management and security, resides within the solution's server, iPlanet Application Server.

Sun and IDP decided to identify an alternative that would help ameliorate the challenges associated with using a large Java applet. Instead of having users download the applet over the Web every time they wanted to use WEB ePOST, they would have to download it only once and store it on their hard drives. Simply put, a megabyte would take too long to download over and over again from a narrow bandwidth, such as dial-up lines. By downloading the applet once and storing it locally, a user would have ready access to the application whenever needed.

Still, the size of the applet somewhat limited WEB ePOST in terms of the platforms it supported. The applet can run from two major browsers—Microsoft Internet Explorer and Netscape Communicator—and on Windows 95, 98, and NT. It should also work on any operating system (such as Macintosh and UNIX) that supports these browsers. “Our customers' IT environments vary incredibly, but the one thing they have in common is a browser,” says Michael Olsen, a software engineer at IDP. “That's why developing WEB ePOST was vital to the future success of our company.”

10.2.1 Collaboration with Sun Professional Services

The Sun Professional Services Java Center, in Stockholm, Sweden, was initially engaged to provide an architectural assessment for WEB ePOST. The proof of concept and other accompanying documents used IDP's service-level requirements as the basis to architect a multitier platform infrastructure with layers that contain the various J2EE components. And after developing an implementation plan, Sun Professional Services worked with IDP to build and deploy WEB ePOST. Although Sun Professional Services was an important component in architecting and building WEB ePOST, Hansen notes, its biggest contribution was in knowledge transfer: "From a technical standpoint, we found Sun Professional Services to be very skilled and extremely professional in its understanding of Java technology and moreover in mentoring our Java engineers."

Part of the services-driven methodology used by Sun Professional Services is based on the rational unified process (RUP) methodology for software development, which was leveraged in the development of Web ePOST. Developed by Rational Software Corporation, RUP is a case-driven software development process. In essence, it provides a roadmap that helps to ensure that the development of certain applications coincides with end-user requirements, not to mention coalesces with other applications in development. With RUP, you can focus on eliminating risks early by implementing and testing the most critical use cases first—typically, during the inception phase—and then building out the bulk of applications during the elaboration and construction phases. Since each RUP iteration results in an executable part of an application, performance testing can start as soon as the first iteration. Johnsen notes, "The consultants from Sun Professional Services trained our engineers in the RUP methodology, which helped us stay on track to deliver the product in a timely manner. And now that our IT staff has both a practical and theoretical understanding of the RUP methodology, we will likely be able to speed development cycles of projects in the future."

Along the way, IDP and Sun overcame the challenges that can come with any first-time collaboration and built a strong working relationship that promises to continue delivering benefits well into the future. Other technology providers played smaller roles in the development and enhancement of WEB ePOST. For instance, Cap Gemini Ernst & Young subcontracted with Sun to design the graphical user interface. EOS, a Danish IT start-up, developed JAD'K, a Java/RMI server for credit card authorizations, which IDP used in the solution's testing phases.

After working with consultants from Sun Professional Services for more than a year, IDP engineers say they now have a strong understanding of Java technology—and this has opened the doors to other revenue streams—namely, joint professional services. In addition to being a product company, IDP offers consulting, systems integration, and even custom-development of WEB ePOST's Java

applet. “There is an opportunity for us to offer consulting services to our installed base,” says Paul Donohoe, director of product management and professional services at IDP. “And Sun Professional Services may be able to play a role in this future, as well.”

10.3 Solution Analysis: The Lifecycle of a Hybrid Letter

The way in which hybrid mail is created by the end user is quite simple: A company or organization visits a participating postal operator’s site and registers its name, address, credit card information or other payment method, and then downloads the Java applet to run WEB ePOST. This large applet carries a variety of functionalities, including calculating mailing costs and previewing copies of the letter before shipping.

After creating a document, the user starts the applet from a Web browser with a built-in Java virtual machine (VM) and enters various criteria, such as recipients, paper choice, speed of delivery and envelope format, which are then sent to iPlanet Web Server. It routes the file to the business-logic tier, where a Java servlet running on iPlanet Application Server prepares the document for delivery, inserts the appropriate addresses, and sends a copy back to the user for review. This process is repeated until the user is satisfied and a final version of the letter is ready internally; it is then sent over the Web to the postal operator’s system for processing and delivery.

The Java servlet has four primary functions: managing communication between the user and the application server; communicating with the UNIX-based application server that renders JPEG images from HML documents with embedded Postscript files and passes these back to the applet for preview; storing Postscript documents on the file system; and calling up stateless session EJB components, which keep track of users actions with WEB ePOST in real time. IDP also worked with Sun Professional Services to map several Data Access Objects (DAO), which are responsible for inserting data into the Oracle8i database, handling searches of items end users save and managing the JDBC connection to the database tier.

The EJB components verify users and credit cards, maintain their security, authorize special functions, and register completed transactions. As soon as a transaction is validated, WEB ePOST notifies the end user using the Java applet, which also provides document previewing. In addition, IDP offers an administration system that can be hosted at a customer’s location. The system essentially transfers HTML forms via JSPs from the postal operator’s system to a company’s site, enabling new users to create profiles, existing users to change names and addresses, and hybrid mail jobs to be tracked—all accomplished while staying within their companies’ firewalls.

WEB ePost users fall into three primary categories. There are those who create and send letters (the end users). There are administrators, who run the WEB ePOST server in their environment (IDP's licensees). And there are help-desk personnel who monitor usage. All of them use JSP pages that generate HTML forms, which keep track of information and enable users to conduct their respective administrative tasks.

Since postal mail has a history of security and reliability—"through rain, sleet, or snow"—IDP wanted to bring these high standards to its Web-enabled system. WEB ePOST uses secure sockets layer (SSL) encryption, which encrypts the transmission of the document from the client to the application server. All the data retrieved from the client, such as credit card numbers and passwords, is encrypted with up to 128-bit algorithmic technology, so it can traverse the Internet securely.

In summary, a transaction that goes through the WEB ePOST infrastructure tiers follows these steps:

- Step 1: A new user registers at the WEB ePOST site and downloads a self-installing .exe file. This file contains the Java applet and a printer driver, which is installed on the hard disk and can be launched from a browser, or directly from the printer driver.
- Step 2: The Java applet connects to the site where a Java servlet, working in conjunction with an EJB, authenticates the user.
- Step 3: Users write a letter or attach a Postscript file, then select recipients from Outlook, ODBC or LDAP, or write them manually. Users then select a registered payment option, letter option and delivery option.
- Step 4: The Java applet creates a preview of the letter and sends it back to the user for approval. Prior to being sent, the electronic letter is wrapped in HML. The letter is then routed to the appropriate stateless sessions EJB.
- Step 5: The user selects appropriate delivery options, service types, payment options and confirms the transaction via the Java applet.
- Step 6: An EJB receives the letter, authorizes the transaction through credit card payment servers and places the electronic letter into the WEB ePOST server for delivery.

10.3.1 Future of Hybrid Mail

IDP and Sun have only scratched the surface of this nascent market—a world of opportunity awaits. According to the "Hybrid Mail in the Third Millennium" report,¹ the potential of hybrid mail messaging (in computer mail processing mar-

¹ Source: Mackintel Ltd., 1999 published report.

kets) will increase more than 460 percent between 1998 and 2005. And thanks to an aggressive first-mover advantage, IDP stands to become the de facto standard hybrid message management system provider. Moreover, it is not just the technology that gives the company its edge; rather, it is also the fact that IDP was heavily involved in the development of HML (Hybrid Mail Language), which was approved by the European Committee for Standardization (CEN) in January 2001. IDP serves as a technical advisor to the committee.

HML is a superset of Extensible Markup Language (XML), the standard protocol for describing Web documents. J2EE technology defines a set of descriptors in XML, making it easy to implement customizable components and to develop custom tools. HML allows applications to exchange mail or messages according to a standard, the “electronic envelope.” In this way, any document format can be exchanged between systems.

Prior to being sent, an electronic letter is wrapped in an HML formatted file so that it can be sent over the Internet and read by the receiving Web server. However, not all XML—or in this case, HML—documents are created equal. XML uses HTML-style tags not only to format documents but to identify the kinds of information in documents so that it can be reformatted for use in other documents, as well as used in information processing. For example, lawyers have a very different way of describing a particular event than, say, a marketing professional. HML is already being adopted by major postal operators as the industry’s standard document type definition (DTD).

“IDP has been a major driver in defining hybrid-mail language,” says Olsen. “We have helped introduce HML as the interface language between Java technology-based transactions, developed by Sun Professional Services, and the back-office system that we developed.” Messages are collected in WEB ePOST and transferred from the customer to the application server using HML. These messages are then routed by an appropriate EJB component through the JDBC layer to the back-end systems. Explains Johnsen, “HML gives us the flexibility to draw from, create, and exchange documents in multiple formats. That means our customers can count on WEB ePOST to support most business or personal communications.”

10.4 A Multitiered Architecture

IDP hosts the servers and handles the transactions that flow through Web ePOST. The platform infrastructure reflects a multitier architecture: Web server, application server, database server, and directory server. There are industrial-strength printing servers connected to the infrastructure, as well. Corporations also have the option of hosting the application in their own IT infrastructures. Physically, all these servers can run anywhere—even inside a corporation’s firewalls.

To Web-enable IDP's ePOST application, IDP and Sun Professional Services utilized three different EJBs—administration-service bean, customer-service bean, and hybrid-mail service bean. Each of these EJBs is a stateless session bean running on iPlanet Application Server, which is based on the EJB specifications. The use of stateless session beans provides IDP with high scalability, since a user's request can be executed in any application server process in such a replicated system. Two subsequent requests from the same user can be executed in two different processes on two different hosts. So if the WEB ePOST licensee has integrated the solution into a clustered environment, the application server always directs requests to the least-loaded host. "With stateless session beans," notes Hansen, "our customers can accommodate as many hosts as they need, without affecting user response time." The initial production hardware comprises any number of Sun Enterprise 450 servers running Solaris 7 (the number of servers is dictated by the WEB ePOST licensee).

The use of iPlanet Application Server and iPlanet Web Server was recommended by Sun Professional Services—a recommendation IDP didn't take lightly. iPlanet Application Server is a J2EE technology-compatible e-commerce platform that extends the reliability and portability of the J2EE environment through its failover capability, container-managed persistence, and transaction monitoring. iPlanet Web Server features a high-performance Java application platform that supports Java Servlet extensions, JSPs, and in-process, pluggable Java virtual machines. "We're pleased with this recommendation because together, these iPlanet solutions provide a reliable backbone to support our J2EE technology-based solution. As we grow our customer base, and in turn the transaction volume, we're confident we have a platform that will keep pace with us," notes Johnsen.

Each EJB handles requests from one of the various types of clients: hybrid-mail administration, customer administration and postal office administration. The EJBs authorize the request from the client, based on the user ID and password obtained during log in. They then read and write to the database. The hybrid-mail EJB also communicates with the credit card verification and payment server provided by the WEB ePOST licensee.

The GUIs for the customer administration, postal office administration, operator and help desk are provided through HTML pages generated by JSPs. Of course, these pages reside on the application server, along with servlets and EJBs. JSP pages consist mainly of forms and tables filled with data from the database. Each of WEB ePOST's 111 JSP pages provides unique functionality.

- The postal administrator can view and modify customer data, as well as register new customers.

- The operator can view logs and update application-server configurations, and the help desk can view customer data. The operator and help desk are not included in the Java applet; they are functions accessible through HTML pages for use by the postal organization or other IDP customer.
- The customer administrator can view and modify select data concerning the company, and can also add new users from the same company.

In terms of tiers, Web ePOST's underpinnings were distributed along the following lines as shown in Figure 10.2:

- Client tier: Java applet and Web browser running from a PC. The Java applet presents the graphical user interface, integrates with address databases, calculates shipping costs, and lets users send HML files with embedded postscript.
- Web tier: A client PC running Netscape, Microsoft Internet Explorer, or another Web browser downloads the Java applet. iPlanet Web server also resides on this tier. Firewalls and SSL encryption provide security.
- Business-logic tier: Java Servlets and JSPs running on iPlanet Application Server powered by two Sun Enterprise 450 servers. Java Servlets perform previews, store HML documents on the file system, and locate stateless session EJBs using Java Native Directory Interface (JNDI). JSPs consist mainly of generated HTML forms and tables with data read from the database using DAO, enabling postal operators to update application-server configurations.

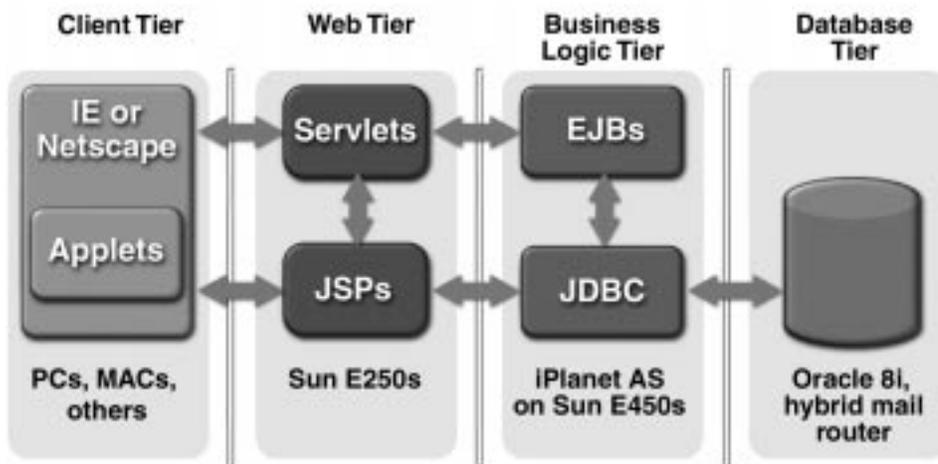


Figure 10.2 IDP Application Architecture

EJBs, JDBC, and a Postscript parser/JPEG renderer, to parse Postscript files and render them as JPEG images, run on Sun Enterprise 450 servers. EJBs authorize requests from the client, read/write to the database via DAO, and communicate with the credit card verification and payment server. JDBC 2.0-compliant Oracle OCI drivers are used to retrieve information stored in Oracle8i for the requesting EJB component.

- Database tier: When iPlanet Application Server receives an HML letter, a process is initiated that takes the HML document and places it in a directory on Oracle's server, a Sun Enterprise 450. EJBs put a record in a certain table, called hybrid-mail transact, and also trigger payment functions. A UNIX-based process then goes into the transact table to check for new print jobs, as well as for timestamps. If jobs exist, the process sends a call out that triggers the printing process. Also residing on the database tier is JAD'K, the credit card authorization application that IDP used when testing WEB ePOST.

10.5 A Bounty of Benefits

After a little more than a year of development and testing, IDP's Web-enabled hybrid mail system is up and running, and will eventually handle multiple channel delivery protocols, such as SMS, WAP, HTML, XML, and PDF. Several postal operators have already licensed WEB ePOST. "The driving principle behind all our development efforts is interoperability," explains Johnsen. "And it has paid off."

J2EE technology gives IDP flexibility and ease of use. The company expects that licensees will market the solution for direct marketing, business-to-business communications, and other needs. And IDP envisions selling its solution to other ASPs for even greater penetration into corporations, while growing sales revenues outside its core base of postal operators.

"Since WEB ePOST is an Internet application, it can be used in a variety of environments, not just within the postal industry," Donohoe says. "We are on our way to fulfilling our vision of really being an end-to-end electronic messaging systems company."

IDP also wants to leverage the Java applet in WEB ePOST by reusing and customizing an appearance for different service offerings on the Internet. For example, an oil company could conceivably place privately labeled kiosks using IDP's Java applet in its gas stations to offer simple messaging. Vacationing travelers, while pumping gas, could send a quick letter, postcard, or if a digital camera is mounted near the kiosk, even a self-portrait to multiple family members—delivered either electronically or as a paper document. In fact, with the reusability inherent in J2EE technology, IDP anticipates that it can reduce development

Value Chain Benefit →	IDP	IDP's Customers	End User
Faster Application Development	●		
Revenue Opportunities	●	●	
Improved Productivity	●	●	●
Cost Reduction	●	●	●
Strengthened Relationships		●	●

Figure 10.3 The WEB ePOST Value Chain, from Postal Providers to End Users

cycles for future J2EE technology-based applications significantly—so it can get a head start in meeting the needs of a wide range of industries.

At any rate, a postal operator can play the role of message manager, taking these documents and other communications and delivering them using IDP's back-end infrastructure. In turn, this will further solidify the place and importance of postal operators in today's new economy. "An oil company may want this kiosk to be branded with its own brand, which we can easily do with Java technology," explains Donohoe. "But in the back end, there is a postal connection."

Kiosks are not the only interface; IDP engineers are looking at wireless implementations, too. Many J2EE technology-based application servers also support wireless communication forms. All of which has IDP excited. "We could use a lot of our existing components for that application," says Olsen. "Because of this, coupled with the knowledge transfer we received from Sun Professional Services, future development could proceed more quickly."

The hope is that an international business traveler sitting in an airport will be able to make a wireless connection to the Internet and send a hybrid letter to anyone in the world using his or her laptop computer or personal digital assistant. "Our vision includes both wired and wireless connectivity, bringing greater efficiency to the way people do business," explains Donohoe. "And the flexibility of J2EE technology is key to evolving WEB ePOST to meet ever-changing needs of consumers and businesses."

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