

# Manufacturing's Middle Ground

Sun and Its Partners' Middleware Solutions Help Streamline Interactions Among Manufacturing Software Applications

With its open systems business growing by leaps and bounds, Sun Microsystems' own networks and business systems presented the company with new and unexpected challenges. As business leapt forward, Sun's installed hardware base and network could handle a much greater capacity than its applications could process. To solve this problem, Sun created its own middleware solution, which provided the ability to plug and unplug applications without impacting other applications.

In looking for a new way to move information around more quickly, more efficiently, and more safely, Sun developed the "Information Highway," an inter-application communication facility that supports a loosely-coupled distributed applications environment and enables the shared definition of business events, while acting as a transport mechanism for those events.

The Information Highway is structured around the "publish and subscribe" model, a powerful distributed mechanism that was first introduced by Tibco, Palo Alto, Calif.

"The ability to address and subscribe to data by name provides a dynamic binding between applications that is very powerful," says Brian Brown, Sun Microsystems' middleware market segment manager. "Sun used this model to build all of our business applications on our workstation server hardware."

"In the publish-and-subscribe model, authorized applications receive the data they need by subscribing to those events which are significant to them," says Angus MacDonald, product manager at Tibco. "This 'event-driven' style of computing is natural, responsive, and efficient for applications that require simple and rapid information dissemination. Our model allows applications to publish data to multiple data consumers in real time; consumers subscribe to information they want to see

anonymously without having knowledge of or an explicit connection to the data producer."

"Enterprise integration, making the set of software applications work well together, is the real challenge in building information systems for the manufacturing enterprise of the 21st century," says Robert Atherton, electronics industry marketing manager for Sun. "Fortunately, middleware and the Java-enabled intranet provide a solid infrastructure for the information needed for enterprise integration."

"Middleware is a lot like broadcast radio," explains Brown, "where a signal is transmitted universally. Receivers, tuned to specific frequencies, receive messages from those frequencies and ignore messages sent at other frequencies. And while broadcasting is a way to explain this concept, it's important to keep in mind that this model is optimized for the efficient usage of wide area networks."

For Sun, the primary benefit of its middleware solution was streamlined application interaction. Information can now go where it needs to, unencumbered by the application that produced it. "Information is near real-time, enabling information in the right place at the right time, all the time," says Atherton.

Sun's Information Highway creates a real-time window that lets people look at the state of the business. Business itself can be defined by events traveling on the Highway at any point in time. By opening the window and looking at traffic, information workers can monitor the status of any number of processes as they happen.

The middleware also enables faster application



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development and change. This means faster time-to-market for new products, quicker response time for customer inquiries, and faster completion of customer orders. "The event-driven architecture and the flexibility it brings to business systems enables rapid process reengineering and, at the same time, shortens that value chain," says Atherton. "Because business objects and the events they contain are the way information is defined, users can define and redefine business systems by describing things they already understand."

Tibco and Sun aren't alone in their zeal for middleware. Sunnyvale, Calif.-based BEA Systems Inc. provides a middleware product called



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Tuxedo. Tuxedo is a distributed transaction monitor that supplies the design confirmation and operation of mission-critical distributed applications on more than 35 platforms from PCs to mainframes.

For instance, outerwear wholesaler Burlington Coat Factory, Etna, N.H., relied heavily on efficient computer operations to keep the business functioning at its optimal capability and maintain the lowest overhead possible. During an explosive growth phase in the mid-1980s, Burlington Coat Factory was operating with a Bull DPS8 mainframe which ran the Dartmouth Time Sharing System. This system had limitations and would never be able to take the company through current and future growth periods. Its limitations and constraints led the company to explore open systems as a solution. With the number of retail outlets growing and the transaction volume generated at each outlet increasing, a key design criteria became wide-range scalability.

To solve their problems, Burlington Coat Factory moved to BEA's highly-distributed transaction processing architecture, which employs transaction services; asynchronous, recoverable queues; and partitioned databases. At peak, the transaction system operates at approximately one million transactions per day. Each of the three servers at

Burlington Coat Factory saves approximately \$3 million per year in hardware and maintenance costs compared to the cost of a comparable mainframe server.

With every stripe of software developer buzzing about Java, Sun's new, object-oriented, portable programming language, middleware vendors are not to be outdone.

"Middleware vendors will be supporting Java as a language that they can bind their applications to while making use of the middleware infrastructure to send messages around a network," says Zahra Ardehali, business development manager for Sun's reseller channel. "Java will also provide a magnificent front-end environment for middleware vendors who want to make strides toward new architectures."

Java is architecture-neutral and portable, allowing middleware developers to write small applications or "applets." Because Java is an interpretive language, a Java application written on one platform need not be altered to run on another. The Java compiler generates architect-neutral bytecode instructions, an intermediate form of code that can be transported easily over a network. The instructions are then translated by the Java interpreter into a format that the client machine understands, enabling execution of the program on virtually any machine.

"The potential of Java is incredible, and combined with publish-and-subscribe technology, it is having tremendous impact on middleware," says Tibco's MacDonald. "Java is becoming the scripting mechanism for reengineering intranets within companies. By leveraging Java along with Tibco's Information Bus middleware, companies are making their information assets available through their intranets in real time. This is helping companies to become event-driven, which translates to being more responsive to customers.

"Java is a key part of making that happen," MacDonald continues. "It is the emerging standard for manipulating and displaying information in distributed environments.

When it comes to middleware, the lesson is clear, adds Sun's Brown: "Your mission-critical applications won't scale well unless you apply some type of middleware.

"Today," Brown concludes, "you need a middleware infrastructure to manage, scale, and continue to maintain the performance level adequate for your system. In some cases, there will be a 10-to-1 improvement on a middleware-based system over a point-to-point client/server architecture—depending on the number of nodes and the amount of traffic.

"If you don't have a lot of traffic, simple client/server technology will work well, but as soon as you have a lot of messages, you need a sub-system to manage those messages effectively and provide you the efficiencies of scale—middleware is the only cost-effective solution. " 