Learn how the IBM® Information Management System (IMS™), IBM’s premier transaction and hierarchical database management system, is focusing on enterprise modernization through integration and open access with a service-oriented architecture available on demand.

**Introduction**

The IBM Information Management System (IMS) is IBM’s premier transaction and hierarchical database management system, the product of choice for critical online operational applications and data where support for high availability, performance, capacity, integrity, and low cost are key factors. Today, IMS manages the world’s mission-critical data and continues as a major player in the on demand world. IMS customers’ MIPS have been growing rapidly to over 2.6 million MIPS worldwide. And customer migration to the latest IMS versions has also been growing rapidly, with greater numbers getting into production faster than with previous versions.

As we move further into the new era of on demand computing, IMS is still leading the way. More than 35 years since the first IMS-ready message for the Apollo space program, IMS, along with the zSeries, continues to lead the industry and break technology barriers. IMS is continuing to provide solutions that use the latest technologies to address customers’ requirements.

In exploiting new technologies and balancing priorities to address increasing demands and sophistication of their customers, IMS customers are at the bleeding edge. Their customers have been making the highest demands for performance and availability, along with interoperability, flexibility, and support for emerging technologies. And IMS has been continuing to provide solutions to address these needs. To extend customers’ existing assets in modern on demand architectures, IMS is focusing on enterprise modernization through integration and open access with a service-oriented on demand architecture.

**The challenge**

As the economy tightens, pressure grows for companies to increase revenues and reduce costs. Companies are requiring increased returns on their existing investments, improved reuse of their
existing assets, simplified access, and better integration with other subsystems and environments. Customers are looking for a lower total cost of ownership, improved application development productivity, and easier systems management with an information technology infrastructure that is scalable, available, reliable, and secure.

This requires an On Demand Operating Environment that is flexible, self-managing, scalable, economical, resilient, and based on open standards. Yet customer environments are becoming more and more complex. The inherent complexity of the solution and the sheer number of heterogeneous components increase the challenge of managing large systems. Integration and manageability become critical issues of the new environments. IMS is continuing to help efficiently provide heterogeneous access across global networks and address companies' changing needs. IBM is providing integrated solutions with IMS to help customers with their on demand processing.

**Setting the stage**

Enhanced integration is required to address the increasing complexity. The keys to providing an integrated environment for on demand solutions are a service-oriented architecture (SOA), and services as building blocks. Customers need the flexibility to treat elements of business processes and the underlying IT infrastructure as secure, standardized components (for example, services) that can be reused and combined to address changing business priorities. An extensive integration capability allows for the automation of business processes, and provides benefits for business and IT departments. Perhaps the best advantage is that it offers the ability to incorporate new technology, and provide automation and significant benefits, while leveraging existing investments made over the last few decades.

IMS leads the way in enabling customers to extend their long-standing investment in existing applications and data. They can integrate new applications for on demand business using state-of-the-art industry standard open application interfaces, and further enhance the quality of enterprise computing service that IMS customers and their users have come to expect.

IBM's overall SOA solution will be in the form of an enterprise service bus (ESB), a combination of WebSphere® Application Server runtime support for message transport, and transformation with ESB "endpoint" support provided in existing server environments. IMS ESB endpoint support will be a very important part of the overall ESB deliverables.

**Providing solutions**

IMS Version 9 provides significant support for On Demand Service-Oriented Architecture. IMS transactions can be published on the Internet as Web Services connecting via SOAP and EJB bindings. This helps to streamline interactions with customers, suppliers, partners, and employees, and better integrates business processes end-to-end in the enterprise. Using IMS Transactions as Web services leverages past investment in application development. It can also eliminate or greatly reduce new programming effort, reduce end-to-end business process transformation, and facilitate application integration with partners, suppliers, and customers.

For rapid response to business transactions and inquiries, IMS V9 includes the Integrated Connect function. Easy to install and to use, it provides secure, transparent access to IMS applications.
and data at high volumes with high performance, from any application environment, including Linux. The Integrated Connect function also assists in managing the network environment, and with workload balancing for better resource utilization. It reduces design and coding effort for client applications and provides easier access to IMS applications and operations, thereby improving programmer productivity. It can also be used with IBM WebSphere servers and tools to quickly transform IMS transactions into Web services.

To help customers manage increasingly complex environments, rapidly deploy new Web-based applications at the lowest possible cost, and maintain competitive advantage, IMS V9 also provides a DLI Model utility for generating metadata, and state-of-the-art JAVA and XML development tools.

For training and maintaining the highly skilled professionals who operate and manage increasingly complex environments, IMS provides additional enhanced autonomic computing functions and tools. These are provided with IMS V9 and as separate IMS Tools.

And to ensure continuous access to critical business information and unlimited data management capacity to handle unpredictable volumes, IMS V9 provides integrated high availability large database (HALDB) on line reorganization (OLR) and XML database support. XML database support is a key element of the On Demand Operating Environment, providing storage and retrieval of XML data in IMS databases. The implementation is native IMS, not merely a mapping, and provides efficient use of resources and top overall performance. It lets you easily convert existing IMS data to XML, to facilitate integration with business processes, improve programmer productivity, and reduce development lead times. You can also decompose XML data for use by non-XML-enabled applications, thereby preserving and extending past investment and enhancing programmer productivity. You can use the same data descriptions for distributed and host environments, which reduces overhead and improves data consistency and integrity.

IMS V9 also improves reuse and collaboration support. It adds a SOAP Gateway to widen the range of standard IMS interfaces. You can create converters to transform XML messages and COBOL data, using WebSphere® Developer for zSeries®. A preview of this technology is currently available at http://www.ibm.com/ims.

Figure 1 illustrates the Web connectivity solutions that are available for IMS.
Opening up access

IMS has restructured to support the latest technologies and provide open data, applications, and operations access. Traditionally, messages came into IMS through its SNA data communication protocol from VTAM. APPC/IMS support took advantage of the new Cross Coupling facility (XCF) to communicate with APPC/MVS. XCF is a software facility that allowed MVS subsystems to communicate more efficiently. IMS has also extended its use of XCF for use by other IBM subsystems (such as TCP/IP and MQSeries), providing them more efficient and robust access to IMS. The IMS Open Transaction Management Access (OTMA) facility allows access to existing, unchanged IMS applications on any IMS TM system on any z/OS system, including that of a zSeries Sysplex. The IMS Connect function extends this application access out to the TCP/IP network.

IMS also extended its use of XCF through the structured call interface (SCI) to the IMS Operations Manager (OM). Distributed IMS single point of operations management is provided through IMS Connect from a Distributed Control Center to operate IMS, and to similarly operate DB2.

The IMS Open Database Access (ODBA) facility also opens up and simplifies database access. z/OS Resource Recovery Services (RRS) let you coordinate synchpoint processing from one address space, provide connectivity to more than one IMS DB subsystem on the same z/OS image, and commit or back out changes with a single call. This helps you to isolate a failure and recover resources independently. You can use JDBC to access IMS Databases from WebSphere ejbs, CICS and IMS TM Java applications, and DB2 Java Stored procedures.

WebSphere Information Integrator Classic Federation can also provide SQL and JDBC access to IMS Databases. This allows distributed common access to IMS databases (and other databases) using the DB2 Information Integration product set. It provides IMS access using SQL SELECT, INSERT, UPDATE, DELETE, and stored procedure calls for ODBC, JDBC, or Call-Level-Interface (CLI) clients. No mainframe programming is required. It is multi-threaded with native DRA IMS driver to IMS Databases for scalable multi-user performance. It is designed to work with existing
mainframe tools and application infrastructure, and offers enterprise-ready 2-phase commit, transactional throughputs, and seamless integration.

For Java application access and XML database support, IMS supports industry standards. It also provides Java and XML application development tools.

**Tooling up**

IBM has been enhancing its wide range of IMS tools for the On Demand Service Oriented Architecture. These have focused on simplifying the development, automation, and optimization of applications.

IBM provides a broad array of application development tools designed to support existing enterprises as they make their applications available on demand. These tools are particularly helpful in the areas of discovery, development, and deployment. They include compilers designed to support XML, tools to help identify the impact of program modifications, debugging and performance aids, and utilities to help correct errors and manipulate files. IBM’s application development focus is on helping customers provide innovative service-oriented architecture-based IT solutions, while leveraging their existing asset base.

The WebSphere tools available today enable IMS transactions using COBOL, C, and MFS-based applications as Web services. The IMS Connector for Java provides mapping of COBOL, C, and MFS IMS applications, as part of the WebSphere tool set. This lets you develop Java applications that run under WebSphere Servers and connect to IMS transactions through the IMS V9 Integrated Connect function. IMS Connector for Java interacts with the J2EE server to provide you transparent support of quality of service (like Transaction management, Connection management, and Security management). Your application is unaware of all the complicated issues.

The IMS Java tools include the DLIModel Utility, which automatically constructs the required IMS Java metadata class from program status blocks (PSBs) and database definitions (DBDs). This lets you use user-coded control statements or XMI descriptions of COBOL copybook members to supply information on additional fields, long Java-style names, and data types. It can produce XML descriptions of databases that conform to the OMG’s Common warehouse Metamodel 1.1. This greatly eases development of IMS Java applications and JDBC access to IMS DB. In addition, IMS V9 DL/I Model Utility enhancements generate XML schemas from existing IMS DBDs and PSBs, for XML storage and retrieval at runtime. This improves application development time, reduces errors, and makes it possible to consolidate skills by allowing programmers to code in an industry standard interface.

IBM also provides a suite of problem determination tools. Since OS/VS COBOL is no longer supported, customers can use the IBM Debug Tool to help convert old COBOL programs to supported levels of COBOL.

In addition, several new and recently enhanced IMS Tools are provided to help with automation and optimization:
• **IMS Problem Investigator for z/OS**, V1.2 provides an enhanced level of problem determination services for IMS Transaction Manager (IMS TM) and IMS Database Manager (IMS DB) systems. These services include navigation aids and investigative procedures, as well as powerful automated features which help reduce the amount of time required to identify and analyze defects or other events of interest in the IMS log. IMS Problem Investigator supports IMS Connect Extensions for z/OS event data collection, formatting, and the other features available with IMS log records. IMS Performance Analyzer for z/OS system definitions can now be shared with IMS Problem Investigator. IMS Problem Investigator makes IMS log analysis quicker and easier than ever before.

• **IMS Connect Extensions for z/OS**, V1.1 enhances the basic IMS Connect function with extended features in the areas of availability and security. It includes comprehensive event recording and performance monitoring features, dynamic workload management capabilities, and additional security features. By enhancing the IMS Connect function with the high-performance IMS Connect Extensions, you gain the ability to measure and analyze the activities that take place within your IMS connectivity environment.

• **IMS Performance Analyzer for z/OS**, V3.3 provides comprehensive performance analysis and tuning assistance for IMS Transaction and Database Managers. IMS Performance Analyzer for z/OS processes IMS Log, Monitor, and IMS Connect event data, and provides comprehensive reports that IMS specialists can use to tune their IMS systems, and that managers can use to verify service levels and predict trends.

**Conclusion**

IMS On Demand Service Oriented Architecture solutions help you quickly and easily configure your environment to address your needs. These solutions can help organizations better manage complex transactions, adapt more easily to growing workloads without impacting system responsiveness, improve end-user service and promote secure access to heterogeneous enterprise computing resources. Integrating existing IMS applications and data into an On Demand Service Oriented Architecture can offer a number of benefits for organizations. A Service Oriented Architecture integration strategy with IMS can help organizations respond to rapid changes in markets, capture new markets, improve products, better address regulatory issues, strengthen business partnerships, lower IT overhead, increase profits and better align IT with long–term business goals.

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