



Positioning
IMS Version 7 and IMS Version 8
On zSeries

by Robert M. Gilliam
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Foreword

Reinventing IMS for a Rapidly Changing World

If you've grown up with IMS over the years, you know that IMS has reinvented itself again and again as the Information Technology industry has embraced new and better technologies. IBM and IMS development are strongly committed and well-positioned to prepare IMS to meet the continuing challenges of the future. Today, as we move into a new world propelled by the internet and a transaction explosion, our movement is about transformation and integration. Enterprises large and small are focused on continuously available, integrated information. In this new world, IMS has become more than just an enterprise class system, but a global class system, as well. As such, it has provided customers a strong base with the agility and adaptability to move globally across company boundaries and address evolving requirements. IMS has provided customers with the ability to integrate new and existing applications and data and to deliver them for the global opportunity. IBM's focus with IMS continues to be on protecting the customers investment while providing the latest in technological innovation, uncompromising quality, unsurpassed performance and total customer satisfaction. We've been following this formula for the past 34 years and trust you will find it meets your needs for the next 34 years and beyond, as well.

Respectfully,

Bob Gilliam
IMS Family Product Manager,

Executive Summary

The dynamic nature of the exploding e-business marketplace dictated a responsive new business model was needed to deliver new software function, faster. Therefore, since the end of 2000 IMS development has adopted a process intended to deliver this rich new function to our customers, as soon as it is tested and ready.

IMS is now planning to deliver new IMS versions on a two year cycle. IMS Version 7 general availability date was October of 2000, the IMS Version 8 general availability date is October 2002 and IBM plans to ship subsequent IMS versions on a similar schedule. In addition, IMS has been shipping and will continue to ship new and enhanced data management tools twice yearly, in March and September. Thirdly, IMS is using the established maintenance process for delivering new function. These new capabilities receive the same rigorous function and integration testing and quality control measures as new versions but are shipped with the regular maintenance distribution. This new business model has achieved its objective in that it does indeed enable us to deliver a continuous stream of rich function to the marketplace and our customers have responded by migrating to IMS Version 7 faster than any previous IMS version.

The advent of a two year cycle for new IMS versions, however, does not mean that customers need to plan for an expected IMS migration every other year. The intention of this paper is to characterize or differentiate the now and future versions, in such a way that customers can evaluate which version is best suited to meet their foreseeable e-business needs.

IMS Version 7 can be characterized as the e-business enablement release, whereas we might describe Version 8 in terms of z/Architecture utilization and self-managing technologies. If an IMS Version 5 or Version 6 customer is in the beginning stages of their e-business transformation, the web-enabling capabilities of Version 7 will prove to be of great assistance, as it has been to so many others. IMS Version 5 customers should move to IMS Version 7, prior to consideration of Version 8 or perhaps Version 9. IMS Version 6 and Version 7 customers who are well along in their next generation e-business application deployment will derive significant performance, availability and ease-of-use benefits from a migration to IMS Version 8.

The next few pages will describe, at a high level, the enhanced function and intended business value of both IMS Version 7 and IMS Version 8, with the stated objective of assisting you in determining which version best matches your requirements, at this time.

IMS Version 7
General Availability October 2000

The e-business world of IMS Version 7. We can view the e-business evolution as being comprised of three phases, starting in the mid-90s. The first of these we view as the era of Net novelty, a time when cool technology and getting connected to the Net were all that mattered.

The second was a time of innovation in technology, innovation in integration and new business models. The third phase, and the one in which we find ourselves today, is a new generation of e-business -- a time of serious e-business. In roughly 1997, the world took notice. The Web wasn't just cool, it was an unprecedented opportunity. The concept was to unite the world of transactions and databases and industrial strength systems with the inter-connectivity of the Internet, thereby making that technology and processing power available to the entire world.

Being cool and innovative wasn't enough. Businesses had to be reliable, and they had to be available all the time. No batch windows. No scheduled downtime. Their customers came to rely on these e-businesses the way they relied on electricity or plumbing. And just like utility companies, e-businesses had to survive the old fashioned way -- by making money.

Over the last few years, many companies have tripled and quadrupled their e-business IT installations. These are companies that spent 30 years developing their IT infrastructures. Then in 24 months, they expanded fourfold. That is the power of serious e-business.

We have music and video and feature-length movies. Wireless devices are allowing people to access the Web anytime, from anywhere. And all of this is supported by increasing bandwidth. Businesses that will lead the world in the next 10 to 20 years are building their infrastructures today. The e-infrastructure that is needed must be fast - fast to design, fast to build, fast to deploy, fast to scale. It must always be available, and it must be reliable no matter what kind of spikes it has to endure. It must be intelligent and secure, it must be based on open standards, and it must be flexible. The infrastructure also has to be real-time. Real-time not only means the system has to be up all the time, it means you have to be able to fix it while it's running and grow it while it's running.

The infrastructure must be real world. In the real world, no single product or system is going to answer all workload requirements. It takes an open, flexible, real-world infrastructure to build, expand, integrate and scale for this new business environment while still protecting a company's investments in its existing IT infrastructure.

IMS Version 7 answers the e-business challenge. State-of-the-art industry standard open application development tools are available in IMS Version 7 now, to quickly and safely extend customers' long-standing investment in existing applications and data and to integrate them with new JAVA applications and programs using XML for next generation e-business

deployment. The objective is to further enhance the enterprise computing qualities of service our customers and their users have come to expect over the years, from IMS and IBM.

The major new attribute of IMS Version 7 is the introduction of High Availability Large Data Base Support (HALDB) support. HALDB allows your e-business database to grow to over 40 TERABYTES, more than 4 times the printed material in the Library of Congress and it can be divided into over 1000 independent partitions, thereby providing essentially unlimited growth and near-continuous availability. The 40 terabytes is a major expansion in capacity from V5 or V6 which allow 8 gigabyte databases. This support also allows for a partition to be taken off-line, have something done to it and be independently brought back online. This means each partition could be individually unloaded and reloaded and while off-line a batch reorganization could be done to on it. Or the entire database could be taken off-line and each partition could be reorganized in parallel, greatly speeding up the off-line reorganization process.

IMS Connect, a separately priced tool, provides easy-to-install, easy-to-use, high-performance transparent access to IMS applications and data from any internet application, including LINUX applications.

IMS Connector for Java provides easy development of new solutions that can readily access existing IMS transactions through IMS Connect, from any Java application. Java programs may be deployed in IBM's award-winning WebSphere Application Server as servlets, Java server pages (JSP) and with XML to quickly create an exciting, dynamic source of web content.

New Java applications, written and tested on workstations, can be executed under the new IMS Version 7 Transaction Manager on the host system and access IMS DB and DB2 data. These new IMS Java applications can exchange XML-formatted messages through the use of the OS/390 XML Parser, Java Edition.

IMS Open Database Access (ODBA) allows you to readily access IMS data directly from any OS/390 or z/OS application, written in any language. DB2 Stored Procedures allow access to both IMS and DB2 data, with full transactional integrity.

The IMS Java Database Connectivity (JDBC) application programming interface combined with ODBA facilitates ready access to IMS data from any OS/390 or z/OS Java program.

IMS Version 7 includes the new Rapid Network Reconnect Facility, providing faster reconnect, utilizing the facilities of VTAM's Multinode Persistent Sessions. This permits IMS TM to automatically reconnect terminal sessions following any kind of IMS failure and subsequent IMS restart.

The Online Recovery Service (ORS) is a separately orderable/priced tool which gives a customer the ability to recover multiple database data sets by reading log volumes in parallel and

applying the database changes to multiple database data sets simultaneously. Recovery-related processing takes place only when recovery is required. In addition, I/O overhead for recovery is reduced. This tool also gives a customer the ability to recover data bases to a 'point in time' which is earlier than the last committed updates.

IMS V7 includes numerous other availability, performance and systems management enhancements. To name a few: IMS Database Recovery Control (DBRC) enhancements improve diagnostics information, improve Database integrity protection, eliminate abends, provide large Recon record support, Recon loss notification, and migration/coexistence.

Shared Queues and Fast Path sharing enhancements, utilizing the coupling facility in a parallel sysplex environment, provide asynchronous APPC/OTMA (open transaction manager access facility) shared message queue enablement, additional client support (multiple clients and additional client information and control), enable user autologon for a printer when application output becomes available and performance and miscellaneous enhancements to shared Fast Path Expedited Message Handler (EMH) and Sequential Dependent Segments (SDEPs).

IMS is being made Tivoli ready and enhancements are being provided for management of IMS through the Tivoli Global Enterprise Manager, and the Tivoli Manager for OS/390.

IMS Version 7 enhancements made via the service process. If you looked at IMS Version 7 at general availability in October 2000, it is probably worth another look, as it has changed significantly. In 2001 we provided 64-bit real support with page fixing of OSAM/Log buffers storage above the 2GB bar, eliminating paging between expanded and central storage. We provided Sysplex Restart with DB2 MVS group support and some HALDB performance and system management improvements. We provided Batch Remote Recovery Service (RRS) support with a full two phase commit for batch programs.

Thus far in 2002 we've shipped much improved System Log Data Set (SLDS) read support; Fiber Channel support and a new Java Region Type, to run with the new scaleable Java Virtual Machine. There is IMS Java support for JDBC access to IMS DB from Java applications running in CICS/390 and from Java stored procedures running under DB2 for S/390. There is also JDBC access to IMS DB from a WebSphere/z/OS V4 Java Bean. We shipped enhanced Sysplex support which uses the z/OS Coupling Facility duplexing function for Shared Message Queue and Fast Path Expedited Message Handler structures system-managed rebuilds.

These and other enhancements are described in-depth in the Barbara Klein presentation, "What's New with IMS Since General Availability of V7" which can be downloaded from under "presentations/papers" on the IMS website at : www.ibm.com/ims.

IMS Version 8
General Availability October 2002

IMS Version 8 is the first of the next several IMS versions designed to exploit the extensive performance and self-managing capabilities inherent in the new zSeries architecture. . IMS recognizes an ever-increasing requirement to share and aggregate information. However, there continues to be a shortage of skilled DB administrators. It is projected that 40-60% of a company's IT budget is spent on people, with the largest portion of this spent on installing and maintaining existing systems. Therefore, IMS Version 8 contains much new function to enhance the productivity and effectiveness of database administrators and systems programmers. IMS continues to lead the marketplace in Information integration, Manageability, and Scalability to ease and grow customer use of IMS applications and data. If you have made your migration from OS/390 to z/OS, then IMS V8 should be your next IMS version. You can also install IMS Version 8 on OS/390 V2R10, if you choose . However, if you are planning to then move to z/OS at some future date, there are good reasons to consider advancing your time table.

Benefits of z/OS. There are significant performance, throughput and scaling advantages in z/OS. The 64-bit real memory support eliminates expanded storage overhead, eliminates paging and allows consolidation of LPARS. The Intelligent Resource Director (IRD) continuously and automatically reallocates processor, memory and channel resources across the system, based on business workload priorities you set. The Workload Manager works with the IRD and with network routers and the storage subsystem to optimize and manage performance from the edge of the network to the heart of your IMS data.

There are also potential software cost savings available with IBM Workload License Charges. The options you can choose include: a full capacity model; a sub capacity model that charges based on average utilization over a four-hour period and a defined-capacity model where users can define the hardware capacity they need, and pay accordingly. WLC can provide the capability to control costs by paying for what you actually use and not have to pay for any unused capacity. The Managed System Infrastructure Facility (MSYS) greatly simplifies system configuration and setup.

There is no more powerful internet security to protect your systems and IMS data than with z/OS. There is extensive encryption; administration of Kerberos registry information; support of Kerberos Third Party Authentication; automatic restart after TCP/IP network outages; intrusion detection; digital certificates and support for Embedded Public Key Infrastructure (PKI) .

Internet Protocol Version 6, delivered in z/OS Version 1 Release 4, provides unlimited internet addresses; simplifies configuration and management; enables greater security; provides mobile IP Support and makes possible the deployment of a new class of applications critical to e-business growth. The communication server element of z/OS supports IPv6. IMS Version 8 supports IPv6.

Autonomic Computing: self-managing systems. Managing a complex infrastructure is a fundamental challenge of e-business that exists today and the challenges will only grow. Within five years, it is expected that hundreds of millions of people will be connected via wireless and other devices to the Web, driving trillions of transactions and tremendous amounts of rich media like voice and video accessing petabytes of storage/data. The supporting infrastructure will be very diverse, including appliances, far-flung branch servers, mainframes, and systems hosted by service providers. Compounding this problem, according to one IT analyst, the world will be short at least a million IT administrators by then, assuming the use of today's technology. Companies of all sizes are faced with databases that are growing in size and complexity.

Autonomic computing is an approach to self-managed computing systems, requiring only a minimum of human intervention. The term derives from the body's autonomic nervous system, which controls key functions without our conscious awareness or involvement. You'll have a good grasp of what autonomic computing is meant to be, if you can imagine a world where the database is completely self-optimizing, never needs adjusting or maintenance, installs itself and should anything go wrong, the system heals itself. This is not going to happen immediately, but once again, IBM is leading the way, this time in autonomic computing. Autonomic computing is not a product, or a single feature. It's a collection of features, and a fundamental shift in the way we think about database management.

IMS, being designed exclusively for the S/390 and zSeries platform, benefits directly from the industry leading self-managing capabilities of z/OS, some of which are mentioned above. IMS availability also benefits from the built-in self-healing aspects of zSeries hardware, such as error-correcting memory; dynamic memory chip sparing; dynamic, non-disruptive CPU sparing; capacity-on-demand upgrades and parallel sysplex clustering.

In addition to the self-managing capabilities inherent in its zSeries residency, IMS Version 8 contains many autonomic computing-like functions, itself. IMS recognizes that from a data management perspective, there is an increased requirement to share and aggregate information. At the same time, there continues to be a shortage of skilled DB administrators. It is projected that 40-60% of a company's IT budget is spent on people with the largest portion of this is spent on installing and maintaining existing systems. Therefore, IMS Version 8 contains much new function to enhance the productivity and effectiveness of database administrators and systems programmers.

In IBM's view, autonomic computing systems must follow four principles. They must be:

- Self-configuring (able to adapt to changes in the system)

- Self-healing (able to recover from mistakes)

- Self-optimizing (able to improve performance)

- Self-protecting (able to anticipate and cure intrusions)

In IMS Version 8, the new functions to assist in these areas include:

Configuring:

- Coordinated Online Change - automates change across the IMS Sysplex. Any command entered on one IMS is coordinated across the IMS Sysplex, using the new IMS Resource Manager, replacing the earlier manual coordination process.
- Syntax Checker reduces the system generation effort for system programmers in defining and maintaining IMS PROCLIB parameter members.
- IMS Control Center - an alternative graphical user interface for the new IMS V8 Operations Manager through IMS Connect, greatly eases IMS operations. This is integrated with DB2 UDB V8 . It provides a single user interface to control both IMS and DB2 from a single workstation.

Healing:

- IMS/DB2 (tm) Coordinated disaster recovery support extends the IMS Remote Site Recovery (RSR) function to provide support for coordinated IMS/DB2 disaster recovery, reducing steps required to synchronize logs .
- Database Image Copy 2 Enhancements - allow multiple database data sets to be copied in one utility execution, to better manage and automate image copy processing.
- Parallel Database Processing - automatically uses multiple MVS threads to significantly reduce the amount of time required to reopen databases after an outage, replacing the earlier serialized process.
- Transaction Trace takes advantage of the OS/390 and z/OS Transaction trace facility to ease serviceability by providing transaction tracing information.
- Shared Message Queues (SMQ) and Expedited Message Handler (EMH) Coupling Facility (CF) Duplexing - uses z/OS's CF Duplexing to create a duplex copy of a Shared Queues structure for failure recovery and System-Managed Rebuild.
- Advanced Program-To-Program Communication (APPC) and Open Transaction Manager Access (OTMA) Synchronous Shared Queues - takes advantage of the z/OS Resource Recovery Services (RRS) Multi-System Cascaded Transactions support to allows users to run synchronous transactions entered from any IMS system in the Shared queues group to run on any back-end system with output sent back to the client from the front end system.
- Sysplex Terminal Management - recovers terminal state information after a session reconnect, and allows the terminal user to log back onto another IMS after a failure of his original IMS
- Fast Path Shared Virtual Storage Option (VSO) Coupling Facility (CF) enhancements -
 - System-Managed Rebuild enables migration of a VSO structure from one CF to another online, so all structures can be migrated using a single command.
 - Automatic Altering provides for dynamically expanding or contracting a VSO structure based on its actual CF storage usage

- System-Managed Duplexing provides for the automatic switch of modes when a loss of connectivity, a structure failure, or a CF failure occurs in one of the VSO structure instances.

Optimizing:

- Sysplex-Wide Resource Manager - provides for coordination of online change across the IMS Sysplex and for global Management of IMS terminal resources. It enhances availability by enabling a user to resume work on another IMS and to enforce single active users. It enforces single user sign-on in the IMS Sysplex, if requested, and enables name uniqueness enforcement for message destinations. It supports Automatic Altering and System-Managed Rebuild. It also supports Structure Copy to copy the contents from one resource structure to another.
- Single-Image Operations Manager - provides for a single point of control (SPOC) to help manage a group of IMSs in a parallel sysplex
- Dynamic Language Environment (LE) Runtime Parameters - update LE runtime parameters and make it easier to use the Debug Tool for application testing.

Protecting:

- Batch Resource Recovery Service (RRS) support uses MQSeries(tm) and the new IMS DataPropagator V3R1 to provide simpler, less error-prone asynchronous, near real-time IMS-to-DB2 propagation .
- RCAF Abend Suppression enhancement prevents RACF from causing the abnormal termination of the IMS system during an invalid user sign-on (or equivalent request)
- Database Recovery Control (DBRC) Enhancements
 - Automatic Recon Loss Notification automatically propagates a Recovery Control Data Set (RECON) reconfiguration to other DBRC instances to quickly recover from any losses.
 - RECON Command Authorization support protects the integrity of data
 - 16M RECON Record Size eliminates outages due to RECON record sizePrilog Compression enhanced to reduce its overhead and improve performance.

Application and data integration. IMS Version 8 also includes several XML and Java and system application development enhancements that will aid the productivity of application architects, designers and programmers.

These include:

- JDBC 2.0 support for Updatable ResultSet and limited reverse cursors.
- SQL support for a subset of aggregate functions (MIN, MAX, etc.) and scalars.
- JDBC access to IMS DB data from WebSphere(tm) EJBs, CICS TS Java applications, DB2 Java Stored Procedures and IMS TM applications.
- Java Dependent Regions support of new IBM Technology for Persistent Reusable Java Virtual Machines (JVM).

- Java tooling in a new IMS utility called DLIModel, which greatly eases development of Java applications and JDBC access to IMS DB.
- Java expanded sample applications for IMS, WebSphere, CICS and DB2 stored procedures, expanded examples for logically related databases and secondary indexes, improvements for installation and Installation Verification Program (IVP) applications, and expanded documentation.
 - IMS TM sends and receives messages as XML documents via WebSphere on Win/NT.
 - IMS COBOL and PL/I send and receive XML documents directly from IMS COBOL and PL/I applications in the data portion of the IMS message. The messages can be placed and retrieved for the IMS messages queue for all messages regions for IMS Message Processing Programs, Fast Path and Batch Message Processing Programs.
- Fast Path Data Entry Database (DEDB) Enhancements :
 - DEDBs Greater than 240 Areas (to 2048) extends capacity of Fast Path Databases above the previous 240 area restriction and significantly increases the number of Areas supported by Data Entry Databases. This provides more data storage capacity in each DEDB and could lead to greater design flexibility.
 - Non-recoverable DEDBs are provided for use as work databases where recoverability is not a requirement. Marking the DEDB non-recoverable would reduce the amount of log record and checkpoint information, thus improving on the performance of IMS.

Conclusions and Recommendations

If you are a Version 5 customer, your most likely next step is to Version 7. You may wish to look beyond Version 8 to Version 9, as your subsequent upgrade. If you are a Version 6 customer in the early stages of your e-business transformation, you may also find Version 7 to be an excellent choice for enabling your present systems for e-business.

If you are a Version 6 customer who is beyond the first phase of your e-business transformation, then you should consider Version 8. Version 7 customers should consider Version 8 for enhanced productivity, performance and management. All z/OS customers should consider Version 8 as their next upgrade.

The descriptions made in this brief paper cannot do justice to the rich functions in both IMS versions. Before you make a final determination, please visit the IMS website at : www.ibm.com/ims and look at the excellent, in-depth, comprehensive descriptions available under “presentations & papers”.