



The Mainstream

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Autonomic computing comes to IMS and IMS tools

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A critical element of e-business on demand is autonomic computing—that is, the ability for IT systems to tune themselves, manage complexity, adapt to unpredictable conditions and prevent failures. Autonomic computing provides improved resiliency, accelerated implementation of new capabilities, and a higher return on your IT investment.

In fact, autonomic computing is one of the four key characteristics of on demand computing.

To be an on demand business, the operating environment needs to be integrated with maximum flexibility to support and enable the world of integrated business processes and transactions—across the enterprise, often to partners, suppliers and customers.

The second requirement for the development of an on demand operating environment: it must be open. The rise of open standards is putting an end to control points. IBM® is actively engaged with other companies in many open standards initiatives such as XML, SOAP, UDDI and other protocols.

The third requirement of the on demand environment is virtualization. Most organizations today have plenty of computing power, but it's highly distributed within the enterprise and grossly underutilized. Virtualization allows a collection of distributed computing resources be shared and managed as if they were one, large, virtual computer.

The final requirement is that it must be autonomic. The focus of IMS™ and IMS Tools is exactly that: making the on demand operating environment less complex and easier to manage.



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Will autonomic computing bring on the demise of system administrators? No. Rather, it will free them to spend more time on new applications and less time putting out fires. And administrators will have the opportunity to evaluate recommendations before they're implemented. Once comfortable with system recommendations, administrators can enable tools to take actions automatically and simply report on them.

With the release of IBM IMS Version 8, autonomic computing capabilities have come to this powerful database management application. So, will IMS and IMS Tools actually be able to manage themselves? In the near term, you'll see infrastructure features that enable more autonomic behavior, wizards that guide your choices, and advisors that evaluate possibilities. The autonomic computing focus won't end until autonomic awareness is as pervasive in the design process as performance and usability now are.

The continued evolution of autonomic computing in IMS will take place over a number of years, providing customers with value every step along the way. After listening to our customers talk about how they would like to build on their existing infrastructure, IBM has developed a five-level deployment model for the evolution of autonomic capabilities:

Level 1: Basic. At Level 1, different parts of the IT environment exhibit essentially fundamental behaviors requiring highly skilled IT staff.

Level 2: Managed. This currently represents the most prevalent state of IT environments. At the Managed level, customers rely on tools to consolidate data and management actions. Managed capabilities provide system administrative teams with productivity gains through consolidation of data and controls.

Level 3: Predictive. For the Predictive level, the system performs analysis and planning, but decision-making still resides in control of the IT staff. Predictive functions provide the ability to make more accurate and faster decisions, with a positive impact on both efficiency and resiliency.



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Level 4: Adaptive. At the Adaptive level, the system takes responsibility for decision-making and initiation of management actions. IT staff becomes responsible for translating business requirements into inputs that control the adaptive decision-making process.

Level 5: Autonomic. At the Autonomic level, the system now manages itself through rules or policies. Business priorities are given for policies in the case where there are policy conflicts. The IT staff becomes implementers of the business needs through policies expressed in business-needs language.

As seen in these levels, autonomic computing is not an all-or-nothing concept. Many tools in the Basic and Managed levels will realize their ultimate potential in the autonomic computing evolution. Take, for example, IBM IMS Buffer Pool Analyzer. It analyzes buffer usage information and makes recommendations for Level 4 buffer pool tuning. How will it become more autonomic? By taking actions, versus merely giving recommendations to the DBA. In fact, the same can be said for the entire IMS Tools portfolio.

IBM IMS Information Management Tools

IMS tools can be assembled in several ways to meet requirements for specific functions. Here are some examples:

- *IMS Parallel Reorganization* supports the execution of IMS HP Unload, IMS HP Load, and IMS Index Builder in one address space.
- *IMS Database Control Suite* integrates control of database administration activities; supports full function, HALDB, and Fast Path databases. It offers functions that work with IMS Index Builder and IMS Image Copy Extensions, and interfaces with IMS HP Change Accumulation.
- *IMS Backup and Recovery Tools* assist with database backup and recovery tasks. Tools in this group include IMS HP Pointer Checker, IMS Image Copy Extensions, IMS Online Recovery Services, IMS Database Repair Facility, and IMS HP Change Accumulation.

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- *IMS Sysplex Package Tools* manage IMS Sysplex environments. They include IMS Program Restart Facility, IMS Command Control Facility, IMS HP Sysgen Tools, and IMS Queue Control Facility.
- *IMS Administration Package Tools* manage and administer an IMS environment. These tools include IMS Performance Analyzer, IMS Hardware Data Compression, IMS Library Integrity Utilities, and IMS Database Control Suite.
- *IMS High Performance Reorganization Package Tools* are used by DBAs to maintain and reorganize IMS databases. They include IMS HP Unload, IMS HP Load, IMS HP Prefix Resolution, IMS Index Builder, and IMS Parallel Reorganization.

Tivoli management of IMS

IBM Tivoli® products also demonstrate IBM's commitment to the management of IMS, maintaining high availability through the automatic recovery of critical IMS components. This includes automation rules for hundreds of messages and assisting operators. Tivoli products move beyond the monitoring of these individual messages, enabling DBAs to visualize their entire IMS environment.

Potential problems can be spotted by analyzing IMS performance trends and, finally, by managing all enterprise components end-to-end. In short, Tivoli tools can reduce the amount of “finger pointing” between different functions, dramatically reducing problem resolution times in the networking infrastructure upon which IMS relies.

How IMS, zSeries and z/OS can work together

IMS Version 8 is the first IMS version to exploit the extensive performance and self-managing capabilities inherent in the new zSeries® architecture.

Designed exclusively for the IBM S/390® and IBM zSeries platform, IMS V8 benefits from the industry-leading self-managing capabilities of IBM z/OS®. It also benefits from the built-in self-



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healing aspects of zSeries hardware, such as error-correcting memory, dynamic memory chip sparing, dynamic and non-disruptive CPU sparing, capacity-on-demand upgrades, and Parallel Sysplex clustering.

There are significant performance, throughput and scaling advantages in z/OS. Its 64-bit real memory support eliminates expanded storage overhead and paging, and allows consolidation of LPARs. In addition:

- *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, network routers and the storage subsystem to optimize and manage performance from the edge of the network to the heart of your IMS data.
- *The Managed System Infrastructure Facility (MSYS)* greatly simplifies system configuration and setup.

Powerful security to protect your IMS data

There is no more powerful way to protect your systems and IMS data than with z/OS. Among the Internet security measures built into z/OS are:

- Extensive encryption
- Administration of Kerberos registry information
- Support of Kerberos Third Party Authentication
- Automatic restart after TCP/IP network outages
- Intrusion detection
- Digital certificates
- Support for Embedded Public Key Infrastructure (PKI)

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IMS and the four principles of autonomic computing

Autonomic computing systems must follow four core 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)

IMS Version 8 facilitates all these areas, through the following functions:

Self-configuring functions

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 is an alternative graphical user interface for the new IMS V8 Operations Manager through IMS Connect, greatly simplifying IMS operations. It's integrated with IBM DB2® Universal Database™ for z/OS Version 8. It provides a single user interface to control both IMS and DB2 from a single workstation.

Self-healing functions

IMS/DB2 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.



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Parallel Database Processing automatically uses multiple MVS threads to significantly reduce the 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 use z/OS's CF Duplexing function 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 take advantage of z/OS Resource Recovery Services (RRS) Multi-System Cascaded Transactions support. That lets users 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 the original IMS.

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 dynamic expansion or contraction of a VSO structure based on its actual CF storage usage.

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



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Self-optimizing functions

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
- Enforces single user sign-on in the IMS Sysplex, if requested
- Enables name uniqueness enforcement for message destinations
- Supports Automatic Altering and System-Managed Rebuild
- Supports Structure Copy, to copy the contents from one resource structure to another

Single-Image Operations Manager provides for a single point of control 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.

Self-protecting functions

Batch Resource Recovery Service (RRS) Support uses MQSeries® and the new IMS DataPropagator V3R1 to provide asynchronous, near-real-time IMS-to-DB2 propagation that's simpler and less error-prone.

RACF Abend Suppression Enhancement prevents RACF® from causing the abnormal termination of the IMS system during an invalid user sign-on or equivalent request.

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-size PRILOG Compression. It has been enhanced to reduce overhead and improve performance.



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Evolve to the autonomic computing, IMS-style

The core benefits of autonomic computing are:

- Improved resiliency
- Ability to deploy new capabilities more rapidly
- Increased return from IT investments
- Greater manageability
- Improved productivity and effectiveness of technical support teams

In short, autonomic computing frees highly trained technical people from tedious manual tasks, so they can respond quickly to any customer demand, market opportunity or external threat that the on demand world requires.

The many autonomic features offered by IMS and IMS Tools are just the tip of the proverbial iceberg. The road to autonomic computing is like the road to e-business: It's evolutionary. For IMS, that evolution begins with Version 8. In upcoming releases, look for many more autonomic features in IMS. The ultimate goal is to reduce what you see, and take care of nearly everything behind the scenes.

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Resources:

DB2 Information Management Tools at ibm.com/software/data/db2imstools

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