SOLUTION WHITEPAPER

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IMS and SOA

Table of Contents

So...ah...what is SOA, and what does it mean for IMS?

If you've attended a technical conference or read a technical magazine, you've heard about Service Oriented Architecture (SOA). As an IMS professional, you are probably trying to understand what challenges SOA introduces in your environment. This paper describes areas of concern and discusses how BMC Software IMS solutions can help you after you have implemented SOA.

What is SOA, and what does it have to do with IMS? The key to SOA is a service, and the definition of a service is

"A unit of work done by a service provider to achieve desired end results for a service consumer. Both provider and consumer roles are played by software agents on behalf of their owners."

Does this sound familiar? It should, because it sounds like an IMS transaction, which is also a reusable service. IMS architecture fits nicely into the SOA concept of a reusable service. A good SOA reuses existing applications and data. The whole concept of application reuse is not new; mainframe developers have been building reusable services forever.

What's revolutionary about SOA is not the concept itself, but the fact that it now can be implemented via the worldwide web. Just as web pages load on any platform, web services work the same regardless of platform, provided they are built using SOA standards.

Some IT organizations see mainframe (and especially IMS) technology as old and not compatible with trendier web-based technology. Nothing could be further from the truth--the mainframe has strong support for the web with IMS and DB2 supporting XML and Web Services. The mainframe provides strong granular security, scalable architecture, and a lower cost per MIPS than any other platform. The mainframe has another key resource: a development staff with strong business knowledge. Massive amounts of data are already on the mainframe, and moving that data to other platforms is both risky and costly. Combining the strength of the mainframe with the accessibility of the web makes sense.

Managing the SOA – keeping business services available

IMS provides unmatched scalability, performance, security, and availability. But perhaps the most important benefit of IMS is accessibility. IBM is ensuring that IMS will be around for a long time by providing access to IMS transactions and data outside of the normal mainframe environment. At technical conferences, IBM provides many sessions on SOA and the future of IMS. By opening IMS to non-mainframe environments, IBM has enabled you to make the most of the significant investment you have made in IMS.

This leads to why IMS and SOA are so important. Both IMS and SOA provide access to reusable tasks and services. You can use existing IMS transactions and data across multiple platforms while building applications from existing services.

IMS provides multiple options for transaction management and connectivity options:

- The IMS Database Manager services applications that run under IMS Transaction Manager or CICS Transaction Server and applications that run as DB2 stored procedures or WebSphere Enterprise JavaBeans (EJBs).
- The IMS Transaction Manager can be used with IMS or DB2 data.

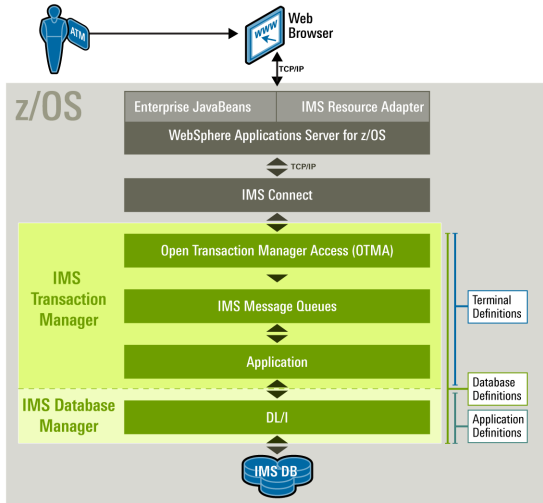
Opening IMS to clients outside of z/OS

Open Transaction Manager Access (OTMA) provides a way for TCP/IP users to access IMS. OTMA connects a client to a server so that the client can support many sessions or a large network while maintaining high performance. Other solutions use network-based protocols like Systems Network Architecture (SNA), but they consume a great deal of overhead because they are not transaction based.

OTMA is a transaction-based connection-less protocol. It is similar to a network protocol, but it can process many sessions simultaneously. Many types of OTMA clients use this interface to gain access to IMS data, including WebSphere MQ, OTMA callable interface (CI), and IMS Connect.

OTMA is implemented for IMS in a z/OS sysplex-capable environment, and it requires the Cross System Coupling Facility (XCF).

The following diagram shows some basic OTMA connections.



This diagram shows two scenarios.

- In the first scenario, the client is WebSphere Application Server. The web service is IMS TM Resource Adaptor, and it uses IMS Connect to communicate through OTMA. The IMS transaction is placed on IMS message queues to request information from the IMS databases.
- In the second scenario, the client is the IMS SOAP gateway, which is also the web service. The IMS SOAP gateway uses IMS Connect to communicate through OTMA. The IMS transaction is placed on IMS message queues to request information from the IMS databases.

You can see that IMS Connect, IMS TM (particularly the integrity of the message queues), and the IMS databases are key components to providing a robust SOA and are essential to the business and application flow.

IMS Connect

When IBM introduced IMS Connect, IMS system programmers experienced a huge paradigm shift because they now had to learn and understand new technologies and communication access methods such as TCP/IP.

IMS Connect uses TCP/IP socket calls to allow clients to exchange messages with IMS subsystems (data stores) by using OTMA. IMS Connect can communicate with multiple clients and multiple subsystems across a sysplex. IMS Connect runs in its own address space as a job or as a started task. Because IMS Connect uses XCF services to communicate with IMS/OTMA, IMS Connect does not need to be on the same z/OS image as the subsystem.

IMS Connect is included in the base IMS V9.1 and later code.

How clients communicate with IMS Connect

IMS Connect communicates with clients by using the IMS Request Message (IRM) prefix, an architected message prefix that contains information about where the message came from, where it is going, and what protocol to use. While much is known about IMS TM and IMS databases, many people still consider IMS Connect to be a "black box" environment. Messages arrive as input, and messages are sent back as output. Very little is known about the message within IMS Connect.

After a complete message has been received from any TCP/IP client on a mainframe or distributed platform, it is passed directly to IMS Connect. IMS Connect will then build OTMA information that IMS needs, invoking a user exit before passing the message and its formatted header information to IMS.

Because IMS Connect uses only Assembler-written user exits, you must be able to write Assembler code to customize your environment. Typically, these user exits provide services such as converting ASCII-EBCIDIC and vice-versa, routing, security checking, and so on.

From the SOA perspective, the interface is the key to the overall implementation of the service and access to the reusable objects. OTMA is the interface to the IMS transactions and data, and IMS Connect is one of the providers that supports OTMA. As an IMS system programmer, it is your responsibility to manage the calling of this interface and to maintain the environment in which it runs.

IMS Connect has no statistical or diagnostic type data. In theory, this is the way SOA is intended to be: expose the interface and there is no need to know what is actually going on in the background. In reality, however, you may need a tool to provide you with a view into the "black box" and a way to manage it.

Managing the IMS SOA environment includes many functions including:

- Workload balancing, which may require dynamic routing
- Maintaining security – appropriate authorization of requests
- Tracing via logging - statistics, auditing, work flows, and so on
- Optimizing performance – maintaining desired throughput and rapid access to data
- Ensuring availability – dynamic managing changes to ensure business continuity
- Recovering data quickly when errors occur
- Performing routine database and system maintenance, including reorganizing databases, taking image copies, managing of new versions of the SOA service
- Protecting your IMS systems and databases by maintaining services when rogue or errant transactions exist

In a perfect world, SOA would be a seamless environment where data would just flow without any problems. But IMS is complex and with messages flowing through many different types of front-ends and protocols, occasional failures will occur. Problems may surface when you start testing applications or implementing application changes. When you have a problem, how can you find the root cause? Is it a software performance problem, software definition problem, an application problem, or something else? What is required is a way to show the performance at each message intersection, show statistical information, automate responses when thresholds are met or when

bad return codes result, trace the message as it passes through each phase and display historical data collected after the occurrence. The remainder of this paper will discuss how to capture and resolve these problems using intelligent, automated solutions.

Manage your IMS SOA environment with BMC solutions

BMC Software supplies a complete set of solutions to manage your IMS SOA environment – from the communication structures that pass requests through the IMS Transaction Management layer where your IMS network and applications are dynamically defined and managed to the data at the heart of your business. BMC supports your databases, database connections, and systems before and after they are web-enabled, by simplifying IMS Connect, avoiding transaction overload, and managing performance.

Simplify IMS Connect

BMC Energizer for IMS Connect provides a Workload Governor that protects data store availability by limiting the number of messages passing through individual IMS Connects based upon the criteria that you specify, including the highest number of acceptable messages within a specified period of time. Incoming messages that exceed this rate are rejected until the volume falls below the defined limits. With BMC Message Advisor for IMS you can also set a warning threshold that issues a warning message when the message volume reaches a percentage of the specified transaction threshold.

Prevent transaction overload

BMC Message Advisor for IMS improves availability and prevents outages caused by message-related problems. It intelligently and automatically manages messages at the individual message level, by group or system-wide, and it simplifies the message recovery process.

Manage performance

BMC monitors all connections before and after connecting with IMS from your HTTP servers through all the connections to your IMS databases. All of the BMC products provide historical reporting. Real-time performance monitors include:

- BMC MAINVIEW for WebSphere Application Server
- BMC MAINVIEW for WebSphere MQ
- BMC MAINVIEW for IMS
- BMC MAINVIEW for DB/CTL

The BMC MAINVIEW architecture and the BMC MAINVIEW AutoOPERATOR Alert Management Facility queue structures enable a single person to truly monitor and manage multiple systems and subsystems from a single screen. Point-and-shoot problem investigation from a central location with online documentation removes the guess work.

BMC Energizer for IMS Connect feeds IMS Connect data into BMC MAINVIEW for IMS. BMC Message Advisor for IMS manages the message queues in real time. BMC Log Analyzer for IMS simplifies log analysis to speed problem resolution. Other monitoring solutions can find problems, but the strong integration of these products enables tracing a transaction from start to finish, thus assisting in faster problem resolution. This shortens the outage and provides a pre-deployment aid in the development of an SOA application.

Everything is wrapped together with our ongoing development of advisor technology. BMC MAXM Database Advisor for IMS produces an exception record for each threshold that is evaluated. The record identifies the database that was analyzed, the current status of the threshold, and the dates on which the threshold is expected to reach each status severity. When the next analysis occurs, the status of the exception is updated. The date on which the exception is forecast to reach the next status level (for example, from warning to critical) is also projected.

Enable continuous IMS availability

When IMS is web-enabled, you need 24 x 7 availability. BMC solutions have been providing high availability for over 25 years. The BMC MAXM Reorg solutions reorganize databases with minimal or no outages. The BMC Backup and Recovery Solution for IMS enables backups with no outages and sophisticated recoveries that ensure that your data is online as soon as possible after an unplanned outage. BMC DELTA PLUS VIRTUAL TERMINAL allows you to implement application and system changes with no outage.

Understand application paths

XML data is hierarchical and a natural fit for IMS. IMS V10 introduced XQUERY, an SQL-like function to view XML data stored in IMS. If you have worked with SQL, you may encountered runaway SQL queries, which cause response time and resource problems. If you have any applications that attempt to access XML data stored in IMS, you need a way to view the underlying DL/I calls. BMC can help:

BMC MAINVIEW for IMS Online and BMC MAINVIEW for DBCTL provide a trace facility that displays real-time activity performed by the application. Tracing identifies which databases were accessed and what specific DL/I calls were performed against those databases.

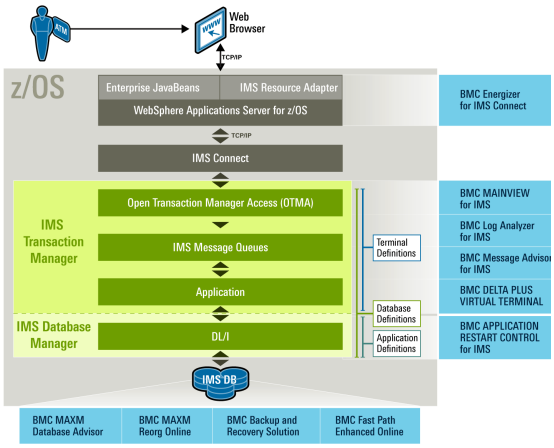
You can see DL/I activity for update applications by viewing log data through BMC Log Analyzer for IMS. BMC Log Analyzer for IMS formats all log records - including database update records and 5F DL/I trace log

records.

BMC solutions

IMS keeps evolving to support new technology and standards, including web applications and XML. A transaction-based database is a great fit for SOA development and deployment. BMC has kept up allowing for monitoring and managing multi-tiered IMS applications and with a direction for both advisor technology and a web-based interface the IMS console. BMC is ahead of the curve for the next generation of IMS-based applications.

BMC provides a comprehensive suite of solutions to manage your IMS databases and systems.



BMC System Administration for IMS

BMC System Administration for IMS simplifies IMS system administration and provides continuous availability, workload balancing, auditing, protection from errant transactions or message queue problems, security, recoverability, and visibility into IMS application work flows in the enterprise. BMC System Administration for IMS includes the following products:

- BMC DELTA PLUS
- BMC DELTA PLUS for DBCTL
- BMC DELTA PLUS VIRTUAL TERMINAL
- BMC EXTENDED TERMINAL ASSIST
- BMC Message Advisor for IMS
- BMC Energizer for IMS Connect
- BMC Log Analyzer for IMS

BMC System Administration for IMS elevates change management to a new level to address the increased complexity of IMS environments. DELTA PLUS provides the ability to dynamically add, delete, and rename IMS resource (programs, databases and transactions) definitions. Additionally, DELTA PLUS allows coordinated changes to IMS resource definitions across multiple IMS systems in a user-defined group.

BMC EXTENDED TERMINAL ASSIST PLUS maximizes the value of IBM's Extended Terminal Option (ETO) by providing an online interface for customizing complex environments and eliminating the need to write user exits and restart IMS.

BMC DELTA family

BMC DELTA products reduce the time and effort required to implement routine customizations to IMS. It improves system availability through dynamic customization functionality. By using BMC DELTA products, you can quickly realize improvements in IMS system performance, improve the productivity of both your system support personnel and end users, and gain the capability to more quickly accommodate your changing business needs.

BMC DELTA products allow coordinated changes of IMS system definition elements across all IMS systems in a user-defined group. BMC DELTA products enable multi-system execution of commands or dynamic, coordinated changes across multiple IMS systems, sysplex or non-sysplex. A coordinated change means that a change executed on a user-defined group of IMS systems must complete successfully on all systems or the change is not applied on any of the systems.

BMC DELTA products provide the following functionality:

- **Dynamic changes with continuous availability of IMS systems.** You can add databases, programs, transactions, and route codes without an IMSGEN. Because BMC DELTA products eliminate the need for resource addition and deletion related IMSGENs and the corresponding IMS downtime, it provides a faster response to application developers requesting system resource definition changes. BMC DELTA products verify the validity and accuracy of IMS resource definition changes prior to implementation to ensure system integrity.

- **Coordinated changes.** BMC DELTA products implement a group of dependent resource definition changes as a single unit of work. This ensures that all changes in the DELTA list complete successfully on the specified IMS system or none of the changes will be performed. BMC DELTA products synchronize a single resource definition change or group of dependent changes across a user-defined group of multiple related IMS systems. If an IMS system is unavailable when the resource definition changes are implemented, the changes will be made to the system when it is restarted. This guarantees system integrity by ensuring that the systems never have inconsistent resource definitions.

- **Change management.** BMC DELTA products provide an audit trail of resource definition changes recorded in a history file. It records all resource definition updates made to the IMS control region in

the product log for an automatic, optimized IMS restart. BMC DELTA products supply a central point for issuing IMS commands to multiple IMS systems and receiving output from those commands.

> **IMS resource analysis.** BMC DELTA products provide information about the defined relationships between IMS resources and enable you to keep an inventory of the IMS environment and relationships between IMS resource definitions. For example, you can see which programs and transactions may be affected if a change is made to a database resource definition. This reduces diagnostic and recovery time. BMC DELTA products help keep multiple IMS systems synchronized with Compare utilities.

> BMC DELTA PLUS VIRTUAL TERMINAL enables **virtual device definition**. It eliminates IMSGENs for 3270, SLUP and SLU2 terminals, local and remote LTERMs, and SLU1 and 328x printers. It automatically defines virtual printers to IMS when output is available for eligible 328x or SLU1 printers. BMC DELTA PLUS VIRTUAL TERMINAL provides administrative features to manage your IMS virtual devices: including automatic device signoff or logoff, automatic dequeue of messages, and automatic exit of conversations.

BMC Message Advisor for IMS

BMC Message Advisor for IMS improves IMS availability and prevents IMS outages caused by message-related problems. It is an intelligent, automated tool, managing messages at the individual message level, by group or system-wide. Recovering messages for business-critical applications is simplified with BMC Message Advisor for IMS. BMC Message Advisor for IMS prevents IMS outages caused by message queue overflows and automates the IMS queue management process. Message Advisor monitors and manages IMS systems and takes automated actions to ensure continuous availability. BMC Message Advisor for IMS is the fastest, most comprehensive solution available to manage IMS message queues. It prevents IMS outages caused by invalid messages and by message flooding. The queue management utilities perform fast, intelligent message queue analysis, quickly showing the queue contents and message queue polluters. BMC Message Advisor for IMS allows you to easily and effectively perform functions for local and shared queues management.

BMC Energizer for IMS Connect

BMC Energizer for IMS Connect simplifies the use of IMS Connect. You no longer need to code assembly language exits. With this product, you can dynamically control your IMS Connect environment without recycling IMS Connect. BMC Energizer for IMS Connect enhances the usability of the IBM IMS Connect product by allowing the customer to tailor how IMS Connect operates in their environment. Energizer for IMS Connect expands the functionality of IMS Connect by increasing availability, adding flexibility, extending security, improving performance and manageability, and enhancing reliability. BMC Energizer for IMS Connect enhances the functionality of IMS Connect by allowing you to tailor how it operates in your environment. BMC Energizer for IMS Connect eliminates the need to code assembly language exits, balances workloads, enables dynamic changes (which reduce the number of times IMS Connect must be recycled), and prevents outages caused by runaway transactions overloading data stores.

BMC Log Analyzer for IMS

BMC Log Analyzer for IMS makes it easy to diagnose problems, such as transaction failures and delays, using information from the IMS logs. Traditional DFSERA10, 30, and 70 records provide the ability to see a transactional flow – if you are an IMS expert and have the time to choose the correct records. With BMC Log Analyzer for IMS, it is easy to view the application flow. You can zoom to choose the level of detail you want. BMC Log Analyzer for IMS gathers the log records that are relevant to the problem and correlates the raw data into an application flow. It organizes log records by finding the specific records you need, grouping related records into logical units of work (LUOWs), sorting them, and identifying them with understandable labels. BMC Log Analyzer for IMS retains the LUOWs so that if you need them for subsequent processing, you have them – you don't need to rerun the log analysis job and incur the CPU and elapsed time associated with it.

System Performance and Automation

BMC System Performance for IMS monitors, manages, automates, and optimizes complex IMS and DBCTL environments. It provides IMS workload management, instant degradation detection, immediate exceptions determination, and rapid problem resolution with integrated action series. It offers extensive transaction level reporting and analysis capabilities, which can be used for cost recovery by providing a usage based method for allocating costs.

BMC System Performance for IMS includes the following products:

> BMC MAINVIEW for DBCTL
> BMC MAINVIEW for IMS Online
> BMC MAINVIEW for IMS Offline
> BMC MAINVIEW AutoOPERATOR for IMS

BMC MAINVIEW

BMC MAINVIEW for IMS Online manages and monitors IMS workloads. It ensures the availability, performance, and throughput of mission-critical IMS business applications. It simplifies IMS management by providing the same interface for managing traditional implementations and sophisticated data-sharing groups, such as parallel sysplex. BMC MAINVIEW for IMS Online identifies IMS system problems quickly so that you can

correct them before they escalate into larger problems.

In a DB/CTL environment, BMC MAINVIEW for DBCTL provides the same functionality as MAINVIEW for IMS Online.

BMC MAINVIEW for IMS Offline offers extensive transaction level reporting and analysis capabilities that can be used for cost recovery by providing a use-based method for allocating costs. It uses the unique information created by the BMC MAINVIEW for IMS Online Event Collector in combination with IMS log records to generate comprehensive response time and resource utilization analysis reports.

BMC MAINVIEW AutoOPERATOR for IMS

BMC MAINVIEW AutoOPERATOR for IMS provides automated operation across IMS environments and ensures high availability of required applications. It provides an easy-to-use rules-based interface that enables you to fully replace the functionality of the IMS master terminal operator. It also provides a full-function REXX and CLIST environment so that you can write your own specific automation scripts.

One of the key benefits to BMC MAINVIEW AutoOPERATOR for IMS is the integration into BMC MAINVIEW. This integration enables a swift transfer to problem analysis and correction.

Database Performance

BMC provides comprehensive solutions to manage performance of full-function, HALDB, and Fast Path databases (DEDBs).

BMC MAXM Database Advisor for IMS

BMC MAXM Database Advisor for IMS proactively and automatically manages full-function, HALDB, and Fast Path database environments across IMS and z/OS sysplexes. BMC MAXM Database Advisor for IMS predicts threshold-exceeding space and database performance events as an exception that requires action within a user-specified lead time. This proactive notification gives you advance warning so that required database maintenance can be planned and scheduled in such a way to have minimal impact on existing SLAs. You manage the product a flexible, easy-to-use graphical user interface.

BMC MAXM Database Advisor for IMS is the first tool to proactively notify you of database reorganization needs. Traditionally, database utilities have been able to report on threshold exceptions. BMC MAXM Database Advisor for IMS takes threshold reporting to the ultimate level and notifies you in advance, predicting when the threshold will be exceeded. BMC MAXM Database Advisor for IMS takes the current database maintenance cycle and automates the basic steps, from capturing statistical information, analyzing the statistics, forecasting threshold exceptions, and notifying you of upcoming exceptions to generating optimized

BMC MAXM Database Advisor for IMS provides the following benefits:

- Saves time, maximizes resources, and reduces costs for database and system administration
- Avoids unplanned downtime
- Automates and simplifies complex and error-prone tasks
- Ensures availability of mission-critical applications
- Speeds application change processes

BMC MAXM Reorg solutions

BMC MAXM Reorg solutions enable continuous availability for IMS full-function and HALDB databases. You can allow online applications to have read and update access to the database while it is being reorganized. The BMC exclusive Online/Defrag feature reorganizes hot spots in a database with absolutely no outage. The BMC exclusive Online Reorg feature performs a complete one-step database reorganization with an outage of two minutes or less. You can also perform individual reorganization tasks, such as adding a secondary index. Optimized reorganization JCL can be generated automatically, reducing the expertise needed to perform optimized reorganizations with little or no downtime.

BMC MAXM Reorg solutions provide the reorganization you need, when you need it, all while ensuring data integrity:

- Fast reorganizations—you have less downtime than ever before
- Simplified reorganizations—personnel of all levels can execute reorganizations that formerly required highly skilled technicians
- A tool to help you predict when to reorganize
- A tool to generate optimized JCL

The Online/Defrag feature keeps your critical databases online and your applications available 24 X 365. Because only the trouble spots are reorganized, valuable system resources are not wasted on reorganizing records that do not need to be reorganized.

BMC provides the following database performance products for full-function and HALDB databases:

- BMC Database Performance for IMS Online
- BMC Database Performance for IMS Express
- BMC MAXM Reorg/Online for IMS
- BMC MAXM Reorg/EP for IMS with Online/Defrag Feature
- BMC MAXM Reorg/EP for IMS
- BMC MAXM Reorg/EP for IMS Express

BMC POINTER CHECKER PLUS

BMC POINTER CHECKER PLUS maximizes data integrity and availability by identifying internal database problems. Application availability and performance are improved through the proactive monitoring of database space utilization. BMC POINTER CHECKER PLUS validates DL/I structural elements and it collects, reports, and monitors statistics. It also provides utilities to perform additional database management tasks.

BMC DATABASE INTEGRITY PLUS

BMC DATABASE INTEGRITY PLUS ensures the integrity and availability of the IMS database environment. It prevents programs from accessing a database with an incorrect IMS control block. It enhances the productivity of professionals who manage IMS databases.

BMC DATA PACKER/IMS

BMC DATA PACKER/IMS maximizes your hardware investment while improving maintenance time and online performance. Through its multiple compression options, BMC DATA PACKER/IMS allows you to select the best compression method for their unique data and provides compression of up to 80%. BMC Software's Extended Compression Architecture (XCA) to compress data helps reduce the I/O load as more data can be transferred per I/O occurrence.

BMC Fast Path solutions

BMC Fast Path solutions maximize data availability, improve database performance, enable application enhancement through indexing, and speed recoveries. They enable you to effectively plan and execute maintenance, analysis, indexing, and recovery. You can simultaneously analyze, reorganize, and take image copies of Fast Path databases online. BMC Fast Path solutions improve the performance and availability of IMS Fast Path databases for installations accustomed to handling DEDB maintenance during a time-constrained batch maintenance window.

BMC provides the following products for Fast Path:

- BMC Database Performance for IMS Fast Path
- Fast Path Enhanced Online Suite
- Fast Path Online Suite
- Fast Path Offline Suite
- Fast Path Restart Control Facility
- Fast Path Recovery Utility

BMC Backup and Recovery Solution for IMS

BMC Backup and Recovery Solution for IMS provides an integrated set of tools to support copy (including Snapshot Copy), recovery, recovery management, and log analysis/accumulation to provide for optimum availability. The Recovery Advisor provides automation and intelligence to address the reduced staffing levels many customers are experiencing in their IMS groups.

BMC Backup and Recovery Solution for IMS can reduce or eliminate the planned outages for backups, and dramatically reduce the impact of unplanned outages due to local or disaster recovery scenarios. There are features that automate the backup/recovery process, providing integrated and intelligent solutions to common (and uncommon) problems.

BMC Backup and Recovery Solution for IMS helps maintain availability by providing unique recovery techniques that can reduce outage for all types of recovery, log reporting, and recovery management.

BMC Backup and Recovery Solution for IMS includes the following products and features:

- BMC RECOVERY MANAGER for IMS
- BMC RECOVERY PLUS for IMS
- BMC CHANGE ACCUMULATION PLUS for IMS
- BMC IMAGE COPY PLUS for IMS with SNAPSHOT UPGRADE FEATURE
- BMC Recovery Advisor for IMS

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About BMC Software

BMC Software delivers the solutions IT needs to increase business value through better management of technology and IT processes. Our industry-leading Business Service Management solutions help you reduce cost, lower the risk of business disruption, and benefit from an IT infrastructure built to support business growth and flexibility. Only BMC provides best-practice IT processes, automated technology management, and award-winning BMC Atrium technologies that offer a shared view into how IT services support business priorities. Known for enterprise solutions that span mainframe, distributed systems, and end-user devices, BMC also delivers solutions that address the unique challenges of the midsized business. Founded in 1980, BMC has offices worldwide and fiscal 2008 revenues of $1.73 billion. Activate your business with the power of IT. www.bmc.com.

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