

# Automation for IMS: Why It's Needed, Who Benefits, and What Is the Impact?

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# Agenda

- Better database management through automation
- Simple dynamic batch application optimization
- Summary

# Need for Automation - Why

- Growing quantity of IMS data
- Fewer IMS experts
- New engineers supporting IMS
  - Windows fluent
  - Green screen avoiders
- Need to capture 46+ years of IMS knowledge and pass it on quickly
- Constant pressure to reduce cost

# DBA Requirements – Maintain Database Health

Take care of the databases

Number of databases to manage

Available window to implement changes

Lead time required to implement changes

Lower cost

# Taking care of the databases

## COST



Availability



Performance



Recoverability

# Fast Path Online Restructure/EP and HALO

## Minimal outage database change - Availability



### The Problem

- Constant pressure to reduce number of outages
  - Conflicts with the need to change the database
  - Applications want additional availability
  - DBA's/Systems want to maintain the change window
- 
- The solution – Online Database Change
    - Minimal outage to the application
    - Change capture and apply technology
    - BMP coexistence
    - Resource management

# Fast Path Online Restructure/EP and HALO

## Minimal outage database change - Availability



Online Database Change integration with other BMC technologies

- Fast Path DEDB's, HALDB, and Full-Function
- Integration with other core technology
  - BMC PAUSE
  - Change Capture and Apply technology
  - Application Restart Control for IMS for Suspend/Resume
  - Secondary Index Utilities for index rebuilds
  - DELTA PLUS for control block management



# Existing process for managing databases – metrics based

- Track multiple data points
- Correlate these data points
- Collect data
- Analyze data

BLOCK / CI SUMMARY		
TOTAL NUMBER OF BLOCKS (DL/I).....	3,150	100.0%
COMPLETELY FULL (NO FSE).....	1	0.0%
PARTIALLY FULL (1 OR MORE SEGS).....	777	24.7%
EMPTY (FORMATTED BUT NO SEGMENTS)....	2,287	72.6%
UNUSED (NOT FORMATTED).....	84	2.7%
BITMAPS.....	1	0.0%
VSAM BLOCK 0.....	1	0.0%
HDAM RAP SUMMARY		
BLOCKS IN ROOT ADDRESSABLE AREA.....	2,500	
BLOCKS IN OVERFLOW AREA.....	649	
NUMBER OF RAPS PER BLOCK.....	2	
RAPS NOT USED.....	4,755	
RAPS USED.....	245	
RAPS POINTING OUTSIDE THEIR BLOCK.....	0	
SPACE USAGE ANALYSIS		
TOTAL NUMBER OF BLOCKS (DL/I).....	3,150	
NUMBER OF BLOCKS WITH FREE SPACE.....	3,148	
NUMBER OF FREE SPACE ELEMENTS.....	3,148	
NUMBER OF FSE THAT WILL HOLD LARGEST SEG	2,611	
NUMBER OF FSE TOO SMALL FOR SMALLEST SEG	447	
SEGMENT SIZE RANGE FOR THIS DSG.....	217 TO 531	
FREE BLOCK FREQUENCY FACTOR (FROM DBD)...	20	
FREE SPACE PERCENT FACTOR (FROM DBD)....	5	
BYTES OF SPACE REPRESENTED BY FSPF.....	102	
TOTAL BYTES OF SPACE.....	6,451,200	100.0%
SEGMENT PREFIX.....	145,078	2.2%
SEGMENT DATA.....	882,469	13.7%
SEGMENT PAD.....	3,751	0.1%
FREE SPACE -- USABLE.....	5,288,670	82.0%
FREE SPACE -- NOT USEABLE.....	69,364	1.1%
SLACK (DL/I & VSAM).....	3,148	0.0%
DL/I OVERHEAD.....	34,625	0.5%
VSAM CI OVERHEAD.....	24,091	0.4%



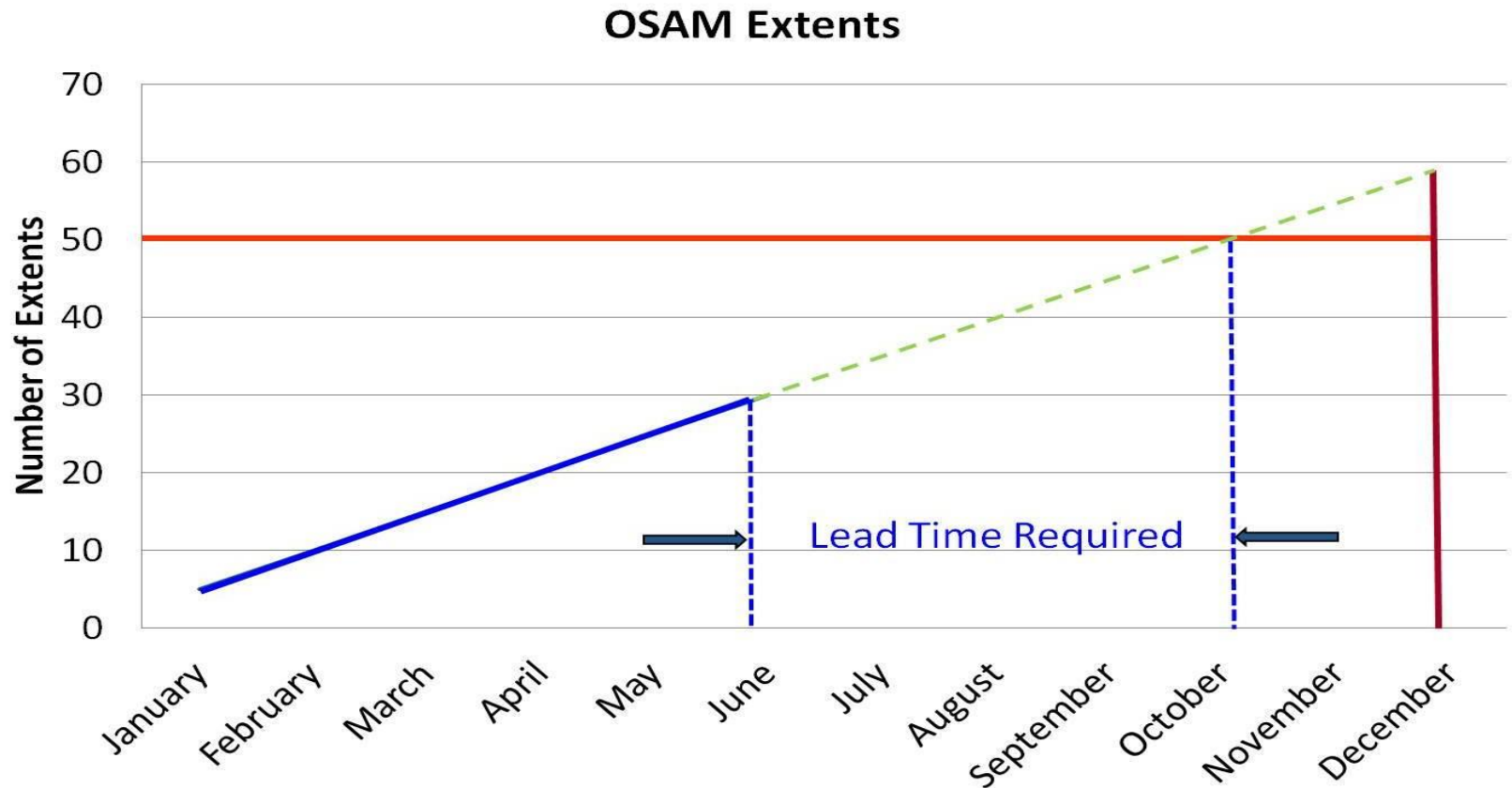
# Consider policy based database management

- Lead time required to implement a change
  - Database reorg may need 2 week lead time
  - Database change may need a 4 month lead time
- How frequently do you need to monitor databases
  - DEDB's may need to be monitored every hour
  - Database storing historical data once a week monitoring

# Taking care of your databases - Space

- My databases should have at least “x” free space
  - As example – all databases should have 20% freespace
- My database VSAM data sets should not be bigger than “Y” GB
  - As example – all data sets should be less than 3.5 GB
- My database data sets should not have more than “Z” extents
  - As example – all data sets should have less than 50 extents

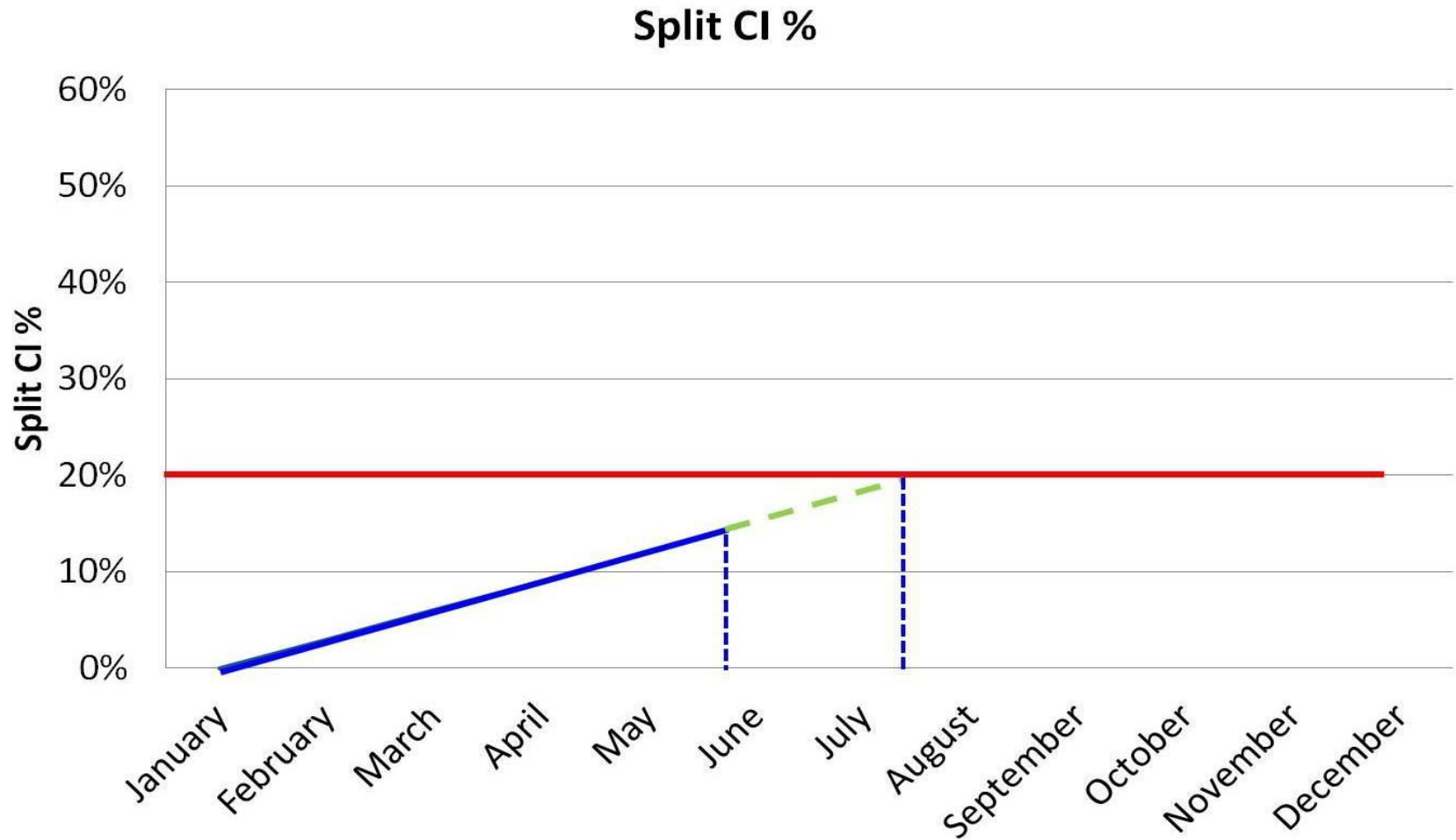
# Putting it together



# Taking care of your databases - Performance

- How many I/Os do you need to retrieve a record
  - As example - The growth in I/O should not exceed 20 %
- How many CI/CA splits do I have
  - As example – The % of split CIs should not exceed 20 %
- How are my randomizing parameters
  - As example – The parameters should be within 20% of optimal

# Same Concept for Performance Parameters



# Taking care of your databases - Recoverability

- RECONS – IMS recovery revolves around these datasets
  - Monitor the health of the RECONS
- My RECONS should have less than “X” % CI/CA splits
  - As example – The % of split CIs should not exceed 20 %
- My RECONS should have “Y” % allocated free space
  - As example – The allocated free space should be 15 % or more

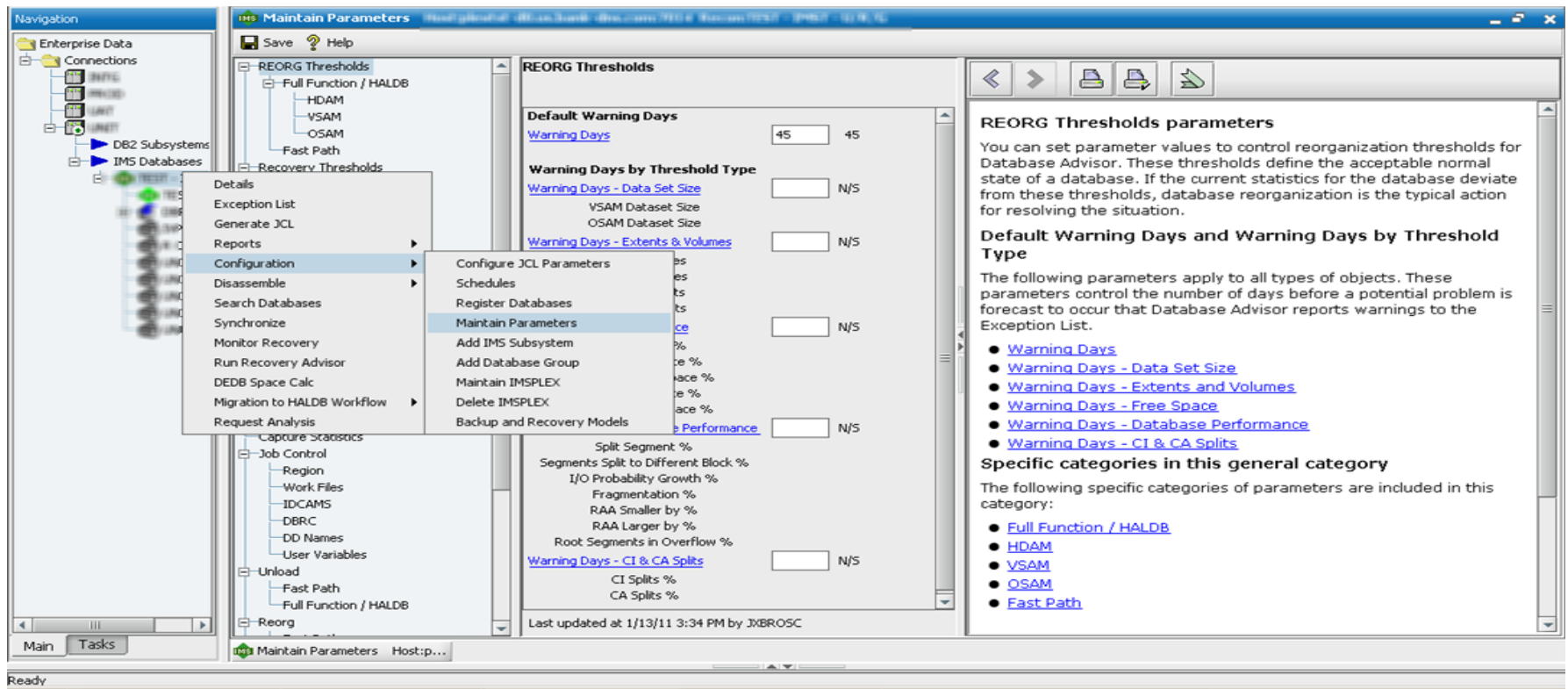
# Taking care of your databases - Recoverability

- Recovery Conditions – select the conditions to track from the RECON
  - As example – database marked as IC needed
- Recovery assets - can I perform a successful recovery
  - As example – Are all my image copies, change accum datasets and IMS log datasets cataloged?
- Manage the CA & DBDS groups
  - As example – Take an image copy when CA dataset size is too large



# MAXM Database Advisor for IMS – Database Thresholds and Parameters

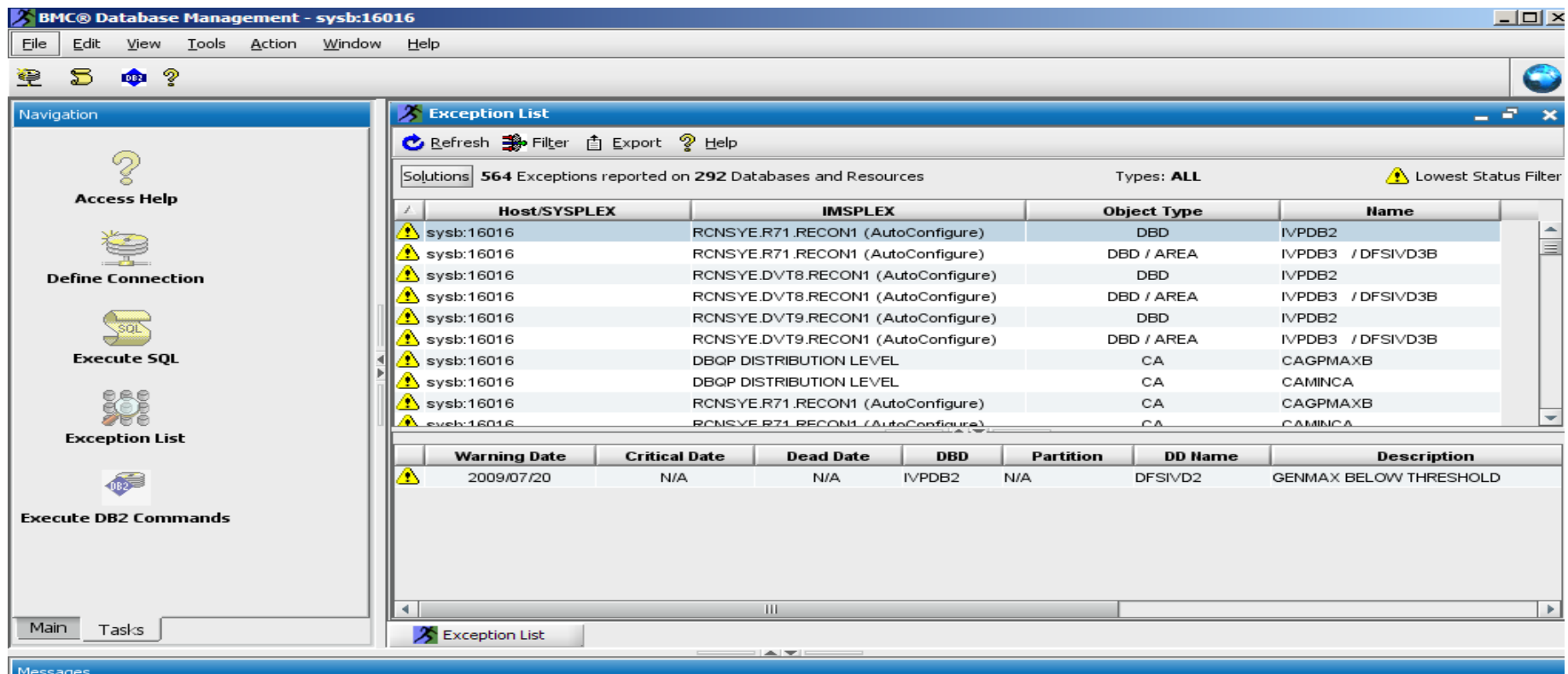
- Defaults are best rules of thumb
- Maintained and applied consistently across the environment
- Increases DBA productivity by 70%



The screenshot displays the 'Maintain Parameters' window for the MAXM Database Advisor for IMS. The left-hand 'Navigation' pane shows a tree structure with 'Enterprise Data', 'Connections', 'DB2 Subsystems', and 'IMS Databases'. Under 'IMS Databases', 'Full Function / HALDB' is selected, and a context menu is open with 'Maintain Parameters' highlighted. The main window area is titled 'REORG Thresholds' and contains several sections: 'Default Warning Days' (Warning Days: 45), 'Warning Days by Threshold Type' (Warning Days - Data Set Size: N/S, Warning Days - Extents & Volumes: N/S), and 'Warning Days - Extents & Volumes' (Warning Days - Database Performance: N/S). A right-hand pane titled 'REORG Thresholds parameters' provides detailed information about these thresholds, including a list of specific categories like 'Full Function / HALDB', 'HDAM', 'VSAM', 'OSAM', and 'Fast Path'. The status bar at the bottom indicates 'Ready'.

# MAXM Database Advisor for IMS – Database Exceptions are the DBA's Work List

- When exceptions exist that becomes the DBA's priority work list
- These are the correlated exceptions
- Increases DBA effectiveness by 50%



The screenshot shows the BMC Database Management - sysb:16016 interface. The main window displays the 'Exception List' for 'sysb:16016'. The list shows 564 exceptions reported on 292 databases and resources. The table below is a detailed view of the exceptions.

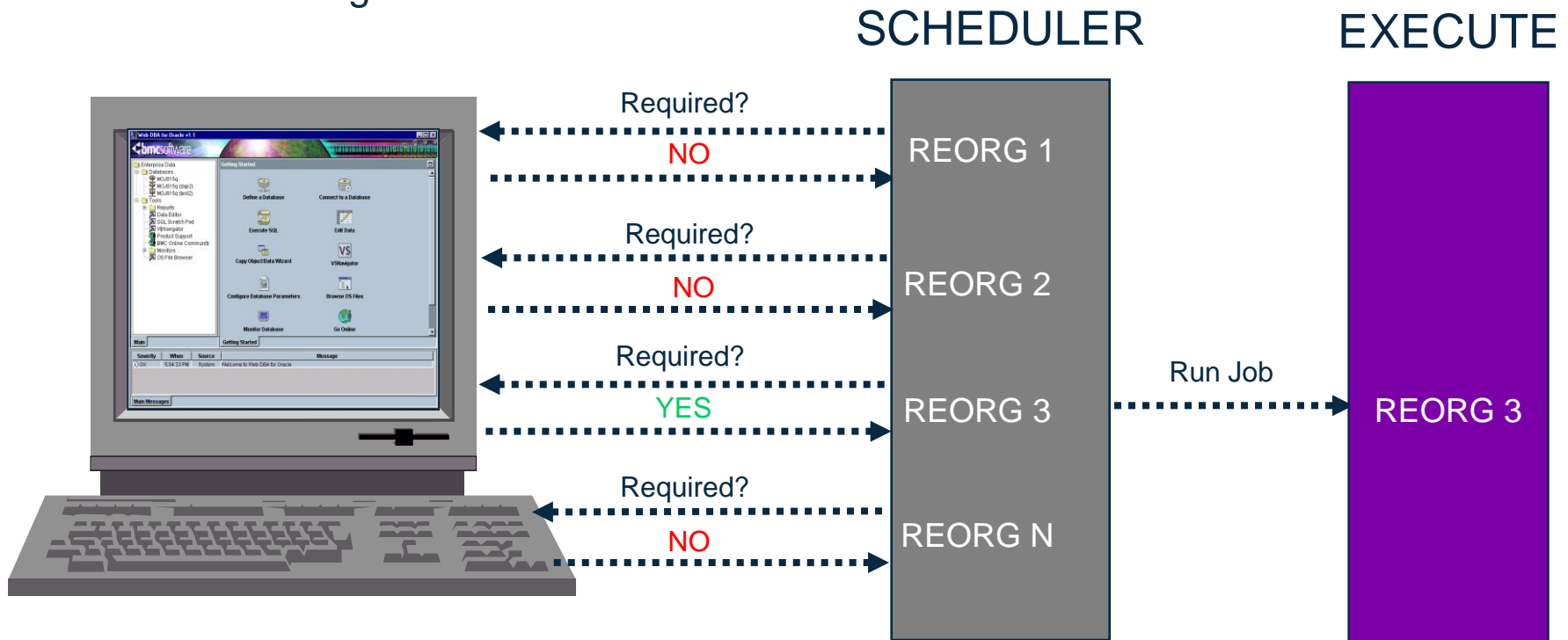
Host/SYSPLEX	IMSPLEX	Object Type	Name
sysb:16016	RCNSYE.R71.RECON1 (AutoConfigure)	DBD	IVPDB2
sysb:16016	RCNSYE.R71.RECON1 (AutoConfigure)	DBD / AREA	IVPDB3 / DFSIVD3B
sysb:16016	RCNSYE.DVT8.RECON1 (AutoConfigure)	DBD	IVPDB2
sysb:16016	RCNSYE.DVT8.RECON1 (AutoConfigure)	DBD / AREA	IVPDB3 / DFSIVD3B
sysb:16016	RCNSYE.DVT9.RECON1 (AutoConfigure)	DBD	IVPDB2
sysb:16016	RCNSYE.DVT9.RECON1 (AutoConfigure)	DBD / AREA	IVPDB3 / DFSIVD3B
sysb:16016	DBQP DISTRIBUTION LEVEL	CA	CAGPMAXB
sysb:16016	DBQP DISTRIBUTION LEVEL	CA	CAMINCA
sysb:16016	RCNSYE.R71.RECON1 (AutoConfigure)	CA	CAGPMAXB
sysb:16016	RCNSYE.R71.RECON1 (AutoConfigure)	CA	CAMINCA

Warning Date	Critical Date	Dead Date	DBD	Partition	DD Name	Description
2009/07/20	N/A	N/A	IVPDB2	N/A	DFSIVD2	GENMAX BELOW THRESHOLD

# MAXM Database Advisor for IMS – Lower Cost - Conditional Reorganization

- The Problem – Database reorganizations that do not need to run
- The Solution – Conditional Reorganization
  - Run time decision as to whether a database needs reorganization
  - No changes to Scheduler or JCL

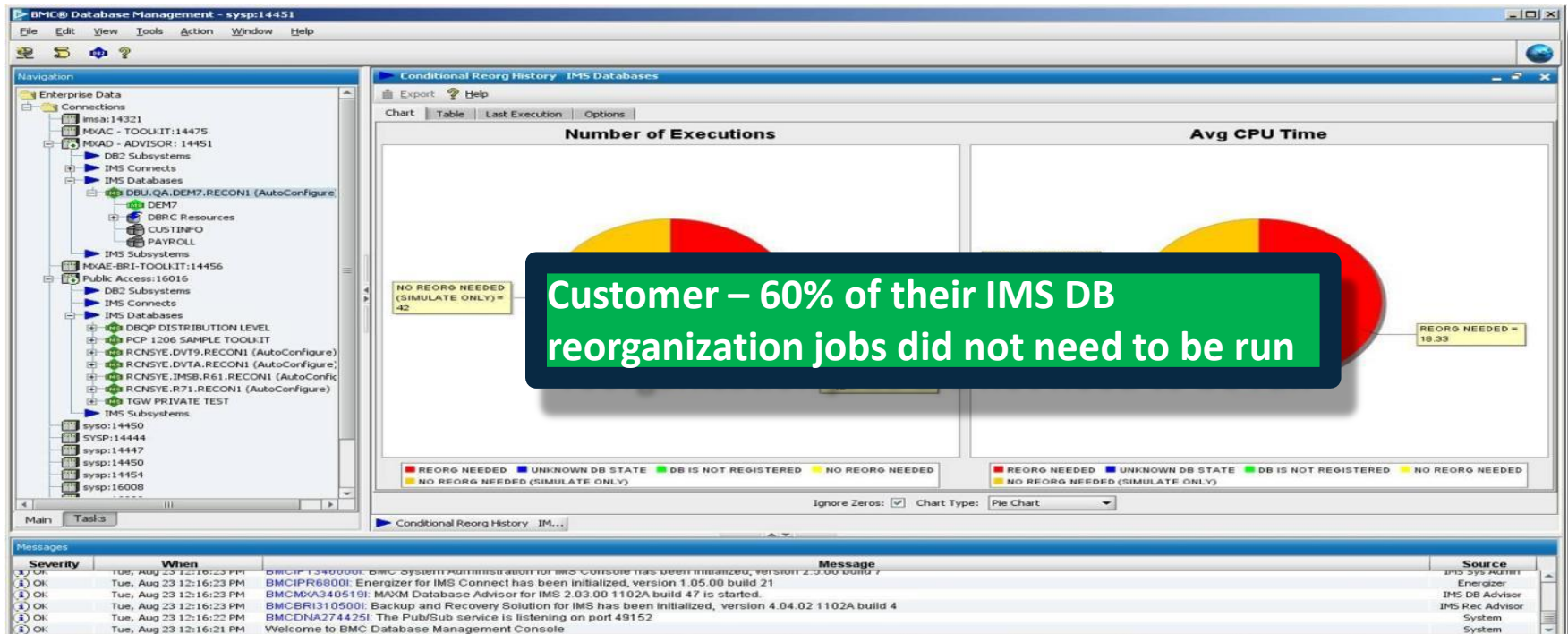


Reorganizes only the databases that need to be reorganized

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)

# MAXM Database Advisor for IMS – Lower Cost - Conditional Reorganization

- Validation – Everyone wants to know the benefit
- Simulation – Based on collected statistics
  - If you are doing weekly scheduled reorgs



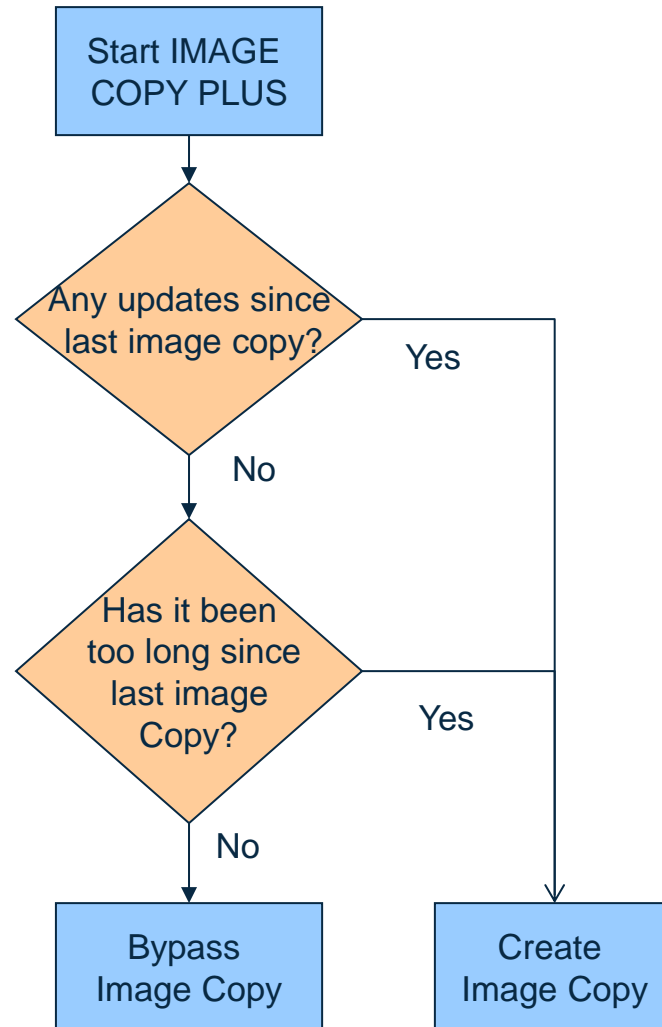
Reorganizes only the databases that need to be reorganized

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)

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# Lower Cost- Conditional Image Copy

- The Problem -
  - Am I taking too many batch image copies
  - Can I save money without changing the scheduler
- The Solution –
  - Conditional Image Copy



# Policy based database management - Summary

- You decide what you need
  - Lead time
  - Monitoring frequency
  - Database Thresholds
- You are presented with a list of objects that violate the policy
  - Smaller number of databases that you need to worry about
  - Enough lead time to implement your changes
- MAXM Database Advisor is a tool that automates this process to ensure:
  - You can manage your databases proactively
  - No database falls through the crack

# Application Program Tuning



- Peak usage occurs more and more during batch windows
  - Mobile devices are driving different usage patterns
  - Research shows that the time of day of peak usage has changed
- Volume of data is increasing
  - Amount of data in IMS continues to grow
- You need to improve throughput
  - The time available to process the data is shrinking
  - The amount of data to process is increasing



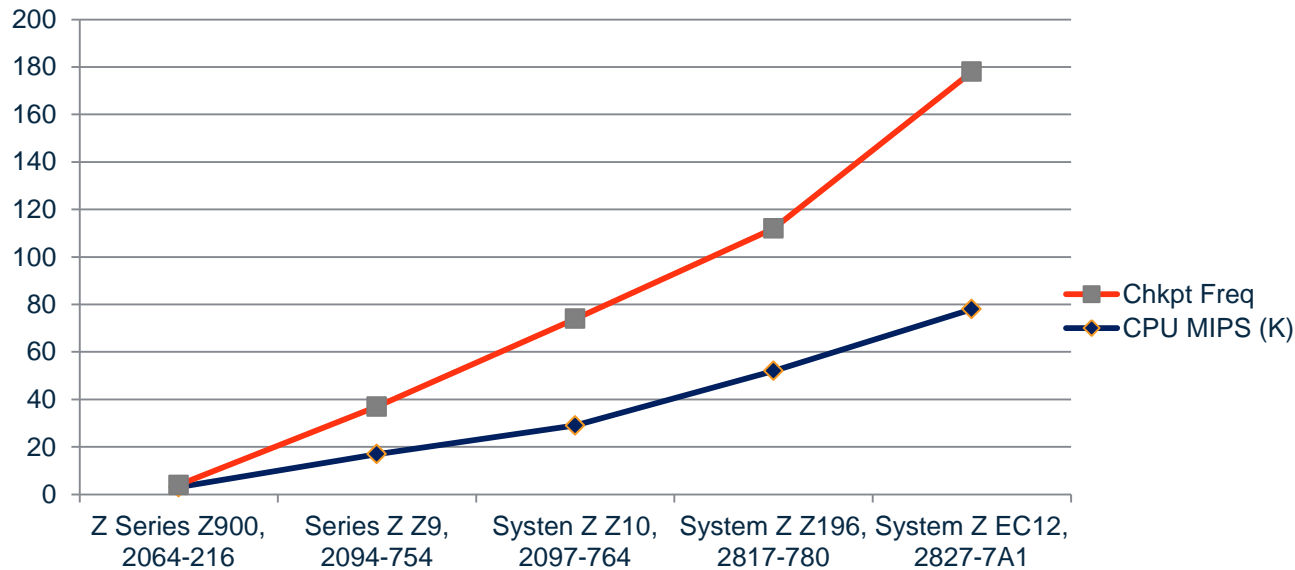


# Requirements for potential solutions

- Changing application programs might not be feasible
  - People familiar with the applications might not be available
- The solution needs to be scalable – lots of application programs
  - Policy based deployment e.g. Optimize all jobs starting with PAY\*
- JCL changes will probably be frowned on
  - Dynamic implementation of improvements

# Hidden BMP Overhead Costs

- CPU MIPS rates Increase
- Checkpoint intervals decrease
- Excessive checkpoints adds to overhead costs



# Log Analyzer for IMS

## Problem Visibility

- BMP's run to completion
  - Out of Sight, Out of Mind
- BMP's run in the same time frame
- I don't want to change the application

JOB-----	PSB-----		#CHKPTS/TYPE	JOB DURATION	CHECKPOINT FREQUENCY /MIN /SEC	-----Exceptions-----
			14323 SIMPLE	01:16:25	3.12	*** More than 1 chkp / sec
			40173 SIMPLE	00:14:49	45.17	*** More than 1 chkp / sec
			39949 SIMPLE	00:14:39	45.44	*** More than 1 chkp / sec
			39900 SIMPLE	00:13:40	48.64	*** More than 1 chkp / sec
			39975 SIMPLE	00:13:26	49.60	*** More than 1 chkp / sec
			39717 SIMPLE	00:14:34	45.43	*** More than 1 chkp / sec
			39900 SIMPLE	00:14:50	44.84	*** More than 1 chkp / sec
			39955 SIMPLE	00:14:39	45.45	*** More than 1 chkp / sec
			39375 SIMPLE	00:13:04	50.21	*** More than 1 chkp / sec
			40100 SIMPLE	00:14:35	45.83	*** More than 1 chkp / sec
			39975 SIMPLE	00:15:00	44.41	*** More than 1 chkp / sec

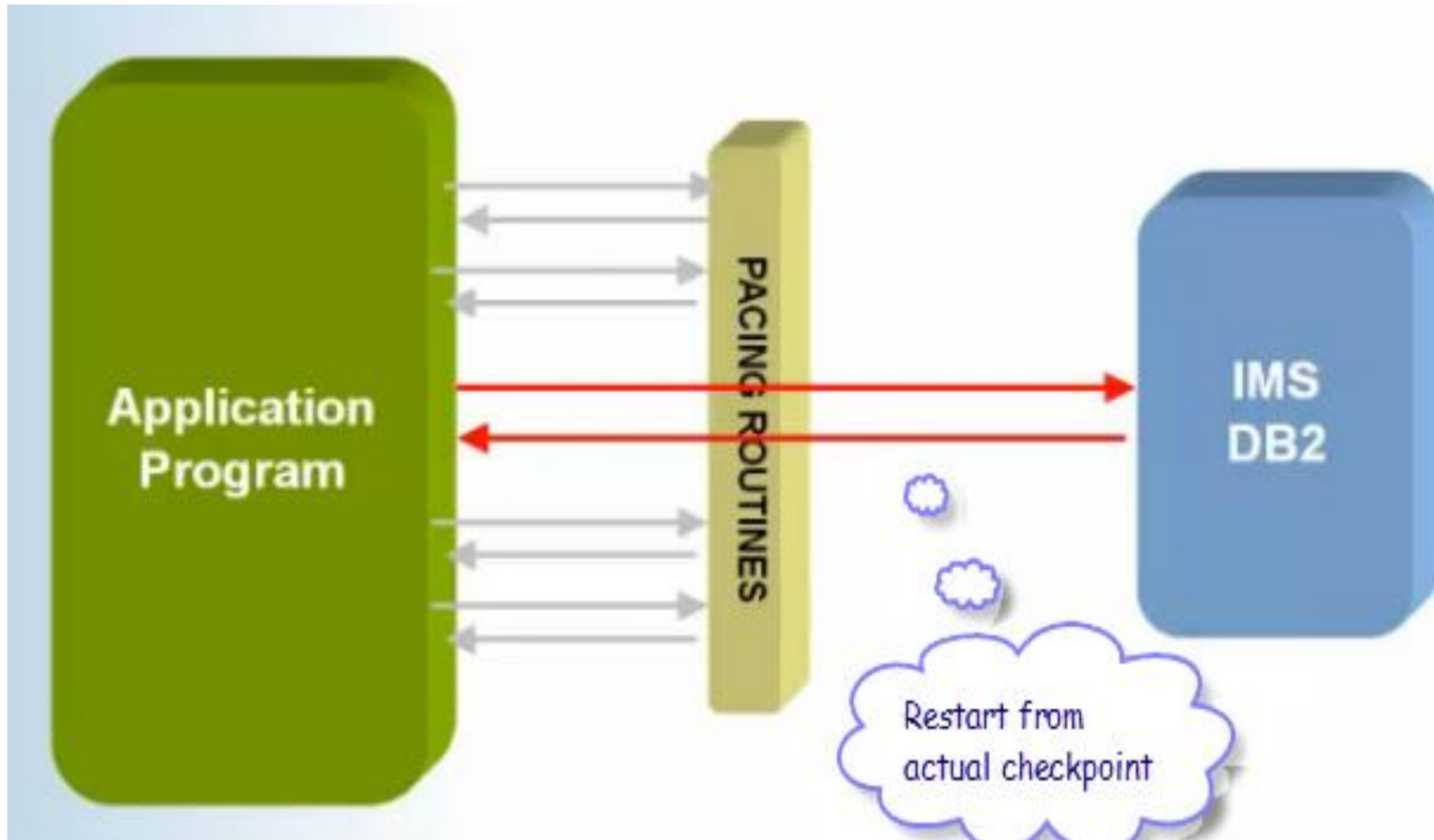
# Application Restart Control for IMS Application Programs - Checkpoint Pacing



- The Problem – IMS checkpoint processing
  - Required, necessary evil
  - Extremely expensive – 100% overhead
  - Removing excessive checkpoint activity can provide significant run time improvements
- The Solution – Checkpoint Pacing functionality
  - CPU Reduction – removes unnecessary checkpoints
  - Elapsed time Reduction – allow increased throughput of data
  - Policy based deployment



# Application Restart Control for IMS Conceptually Checkpoint Pacing



# Application Restart Control for IMS BMP Deadlock Reduction



- The Problem
  - BMP jobs abending with U0777
  - Issues with scheduler restart
- The solution – Application Restart Control for IMS
  - Implement a reattach solution
  - No scheduler requirements
  - Does not terminate the BMP, but delays reattach until most conflicts are circumvented
  - Operational savings
  - FTE Savings



# Application Accelerator for IMS

## Application Programs - Dynamic Tuning

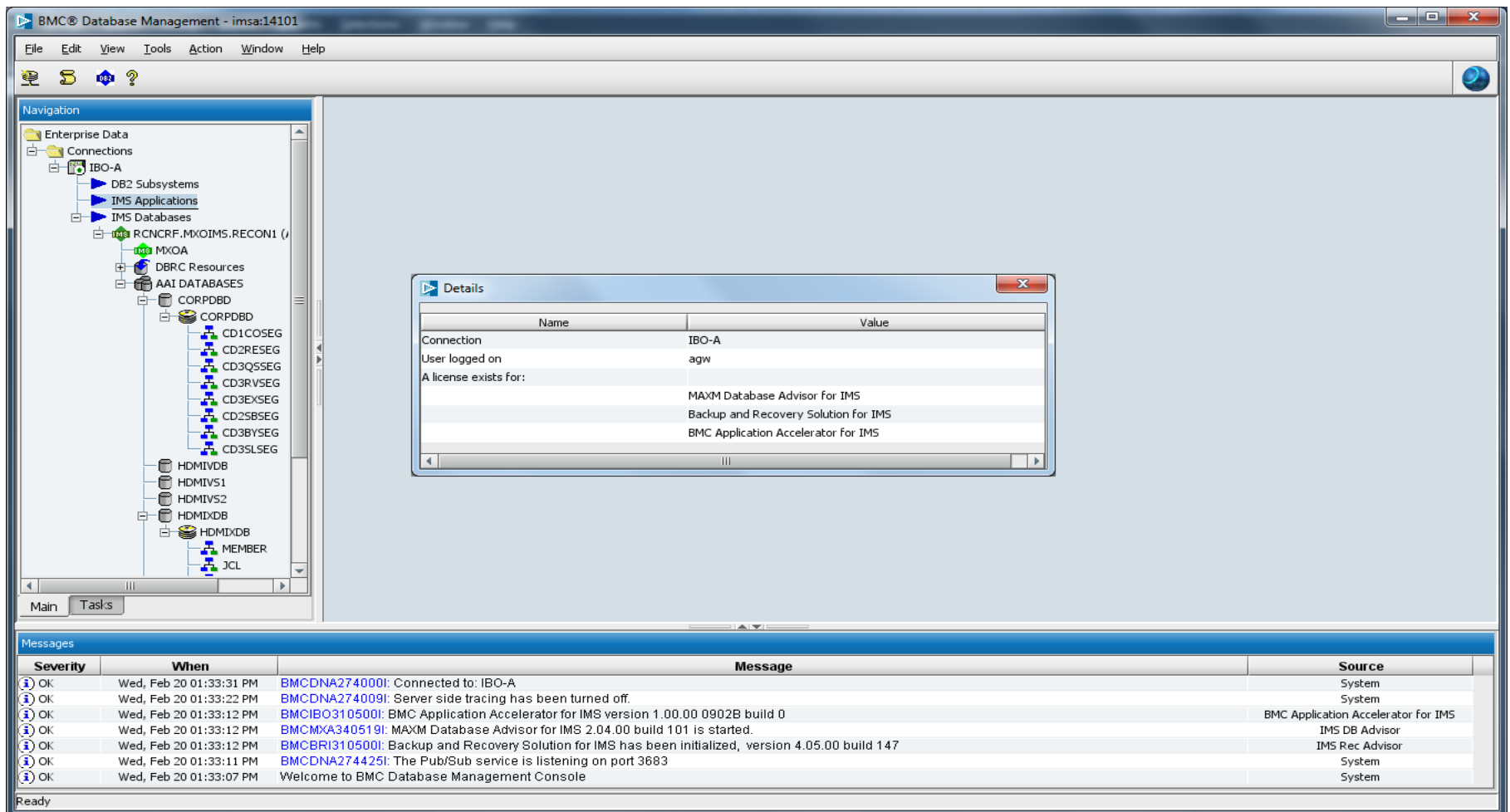


- The Problem
  - DL/I Batch jobs usually run with a one size fits all buffer definition
  - It is not customized to volume of data
  - It is not customized to individual job call patterns
- The solution – Application Accelerator for IMS
  - DLI, DBB, and BMP optimization
  - Implement dynamic buffer tuning based on call volume and call pattern
  - Implement OSAM sequential buffering
  - Implement enhanced I/O techniques where possible
  - Policy based deployment
  - Delivers significant CPU and elapsed time savings





# Application Accelerator for IMS Application Programs - Dynamic Tuning



The screenshot shows the BMC Database Management console window titled 'BMC® Database Management - imsa:14101'. The left pane displays a tree view of the database structure under 'Enterprise Data' > 'Connections' > 'IBO-A'. The tree includes 'DB2 Subsystems', 'IMS Applications', 'IMS Databases', 'RCNCRF.MXOIMS.RECON1 (U)', 'MXOA', 'DBRC Resources', 'AAI DATABASES', 'CORPDBD', 'CORPDBD', 'CD1COSEG', 'CD2RESEG', 'CD3QSESEG', 'CD3RVSEG', 'CD3EXSEG', 'CD2SBSEG', 'CD3BYSEG', 'CD3SLSEG', 'HDMIVDB', 'HDMIVS1', 'HDMIVS2', 'HDMIXDB', 'HDMIXDB', 'MEMBER', and 'JCL'. The right pane is mostly empty. A 'Details' dialog box is open in the center, showing a table with columns 'Name' and 'Value'.

Name	Value
Connection	IBO-A
User logged on	agw
A license exists for:	MAXM Database Advisor for IMS
	Backup and Recovery Solution for IMS
	BMC Application Accelerator for IMS

The bottom pane shows a 'Messages' log with the following entries:

Severity	When	Message	Source
OK	Wed, Feb 20 01:33:31 PM	BMCDNA274000I: Connected to: IBO-A	System
OK	Wed, Feb 20 01:33:22 PM	BMCDNA274009I: Server side tracing has been turned off.	System
OK	Wed, Feb 20 01:33:12 PM	BMCIBO310500I: BMC Application Accelerator for IMS version 1.00.00 0902B build 0	BMC Application Accelerator for IMS
OK	Wed, Feb 20 01:33:12 PM	BMCMA340519I: MAXM Database Advisor for IMS 2.04.00 build 101 is started.	IMS DB Advisor
OK	Wed, Feb 20 01:33:12 PM	BMCBR1310500I: Backup and Recovery Solution for IMS has been initialized, version 4.05.00 build 147	IMS Rec Advisor
OK	Wed, Feb 20 01:33:11 PM	BMCDNA274425I: The Pub/Sub service is listening on port 3683	System
OK	Wed, Feb 20 01:33:07 PM	Welcome to BMC Database Management Console	System

The status bar at the bottom indicates 'Ready'.

# Application Accelerator for IMS Application Programs - Dynamic Tuning

Configure JCL Parameters

**Configure Defaults**

Configure Defaults for IMS Application Accelerator

**Default Settings**

<a href="#">Primary filter</a>	JOB Name ▼
<a href="#">Process DL/I</a>	<input checked="" type="radio"/> Yes <input type="radio"/> No
<a href="#">Process DBB</a>	<input checked="" type="radio"/> Yes <input type="radio"/> No
<a href="#">Process BMP</a>	<input checked="" type="radio"/> Yes <input type="radio"/> No
<a href="#">Turn off Application Accelerator</a>	<input type="radio"/> Yes <input checked="" type="radio"/> No
<a href="#">Turn off dynamic screening</a>	<input type="radio"/> Yes <input checked="" type="radio"/> No
<a href="#">Use Custom I/O for Update Procopts</a>	<input checked="" type="radio"/> Yes <input type="radio"/> No
<a href="#">Number of monitor runs</a>	3
<a href="#">Min DL/I Calls for capturing statistics</a>	1000
<a href="#">Unit for Temporary Dataset Allocations</a>	SYSALLDA
<a href="#">Management class (MGMTCLAS)</a>	
<a href="#">Storage class (STORCLAS)</a>	
<a href="#">Data Class (DATACLAS)</a>	

**Manage Defaults window**

Use the Manage Defaults window to specify default values for the parameters that control how BMC Application Accelerator for IMS operates in your environment and interacts with your applications. The parameters in this window are identical to the parameters on the Configure Defaults page of the Application Accelerator [Setup Wizard](#).

The window displays the following parameters:

- [Primary filter](#)
- [Process DL/I](#)
- [Process DBB](#)
- [Turn off Application Accelerator](#)
- [Use custom I/O for Update Procopts](#)
- [Turn off dynamic screening](#)
- [Number of monitor runs](#)
- [Minimum DL/I calls for capturing statistics](#)
- [Unit for Temporary Data Set Allocations](#)
- [Management Class \(MGMTCLAS\)](#)

< Back   Next >   Finish   Cancel


# Application Accelerator for IMS

## Application Programs - Dynamic Tuning

Policy **Exclude**

Policy Display Filter


MVSID	IMSID	PSB Name	PGM Name	JOB Name
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

 Add Like

 Clear

Policies

MVSID	IMSID	PSB Name	PGM Name	JOB Name	Action
IMSA	BMC1	CORPDBG	DBREAD	IBOD0010	Optimize
SYSP	IMSA	PSB1	PGM1	JOB1	Optimize
*	*	*	*	AGW*	Optimize
*	*	*	*	IBOIBI	Ignore
*	*	*	*	IBOT*	Optimize
*	*	*	*	IBOD*	Optimize
*	*	*	*	IBOE*	Optimize
*	IMSA	PSB*	*	PRODIMS*	Monitor
*	*	*	*	IBOB*	Optimize
*	*	*	*	IBOV*	Optimize


 Move Up

 Move Down

 Delete

 Edit

 Add

 Recommend Jobs

# Application Accelerator for IMS Application Programs - Dynamic Tuning



Resource Savings imsa.bmc.com:14301

Help Export Filter Refresh

Total Optimized Job Steps: 796  
Total CPU Service Units: 221,638 K  
Total Elapsed Time in Seconds: 124,608  
Total EXCP Count: 87,342,381

Show History Job Status

**Change job filter**

**Export job step history**

**Summary of savings**

**Highlight job and see more detail**

MVSID	IMSID	PSB Name	PGM	JOB Name	Step Name	Procstep Name	Type	Saved CPU Service Units \	Saved Elapsed Seconds	Saved EXCP Count	Total Runs
MSA	MXOG	HDMEXS	HDMOUT	IBOV0300	DBKEYS1	DLIUPROG	DLI	97,584 K	32,767	645,761	14
MSA	MXOG	OLRHDR	RHDV03	IBOV0310	DBREAD1	DLIUPROG	BMP	7,196 K	251	2	2
MSA	MXOG	OLRHDR	RHDV01	IBOV0400	DBKEYS1	BMPUPROG	BMP	7,092 K	279	20,000	2
MSA	MXOG	HDMEXG2	DBREAD0	IBOV0400	DBKEYS1	BMPUPROG	BMP	2,643 K	1,555	2,099,315	2
MSA	MXOG	HDMEXG2	DBREAD0	IBOV0400	DBKEYS1	BMPUPROG	BMP	1,697 K	797	2,099,313	2
MSA	MXOG	HDMEX	DBREAD1	IBOV0310	DBREAD1	DLIUPROG	DLI	954 K	890	1,039,007	2
MSA	MXOG	HDMEX	DBREAD1	IBOV0310	DBREAD1	DLIUPROG	DLI	927 K	603	1,038,437	2
MSA	MXOG	HDMEXS	DFSDDL	IBOV0400	DBDLT01	DLIUPROG	DLI	877 K	440	1,144,134	2
MSA	MXOG	HDMEXR1	DBREAD0	IBOV0400	DBKEYS1	BMPUPROG	BMP	803 K	647	2	2
MSA	MXOG	HDMEX	HDMRDM	IBOV0400	DBREAD1	DLIUPROG	DLI	770 K	3,359	996,470	3
MSA	MXOG	HDMEXO2	DBREAD02	IBOV0400	DBKEYS1	BMPUPROG	BMP	752 K	499	2	2
MSA	MXOG	HDMEXS	DFSDDL	IBOV0400	DBDLT01	DLIUPROG	DLI	728 K	561	997,984	2
MSA	MXOG	HDMEXG	HDMRDMG	IBOV0400	DBKEYS1	BMPUPROG	BMP	709 K	1,627	992,204	3
MSA	MXOG	DBSGO	DBREAD05	IBOV0400	DBKEYS1	BMPUPROG	BMP	110 K	110	181,658	2
MSA	MXOG	DBSGO	DBREAD05	IBOV0400	DBKEYS1	BMPUPROG	BMP	113 K	113	182,192	2
MSA	MXOG	HDMEX	HDMRDM	IBOV0400	DBKEYS1	BMPUPROG	BMP	3,507 K	3,507	996,510	3
MSA	MXOG	HDMEX	DBREAD	IBOV0400	DBKEYS1	BMPUPROG	BMP	413 K	413	1,039,007	2
MSA	MXOG	HDMEXG	HDMRDMG	IBOV0400	DBKEYS1	BMPUPROG	BMP	615 K	415	995,246	3
MSA	MXOG	HDMEX	DBREAD	IBOV0400	DBKEYS1	BMPUPROG	BMP	611 K	440	1,039,007	2
MSA	MXOG	HDMEXS	DFSDDL	IBOV0400	DBKEYS1	BMPUPROG	BMP	579 K	393	1,296,921	2
MSA	MXOG	HDMRT	HDMRDMV	IBOV0400	DBKEYS1	BMPUPROG	BMP	558 K	394	748,852	2
MSA	MXOG	HDMEXS	DFSDDL	IBOV0400	DBKEYS1	BMPUPROG	BMP	550 K	356	997,984	2
MSA	MXOG	HDMPARTG	DBREAD	IBOV0160	DBREAD1	DLIUPROG	DLI	534 K	275	739,255	2
MSA	MXOG	HDMPARTG	DBREAD	IBOV0160	DBREAD1	DLIUPROG	DLI	450 K	226	743,600	2
MSA	MXOG	DBSGO	DBREAD05	IBOV0140	DBREAD1	BMPUPROG	BMP	443 K	48	2	2
MSA	MXOG	HDMRT	HDMRDMV	IBOV0040	DBREAD1	DLIUPROG	DLI	418 K	330	748,852	2
MSA	MXOG	F9P1GO	DBREAD	IBOV0110	DBREAD1	DLIUPROG	DLI	380 K	90	95,882	2
MSA	MXOG	DBSGO	DBREAD05	IBOV0615	DBREAD1	BMPUPROG	BMP	353 K	1	2	2
MSA	MXOG	HDMEXS	DFSDDL	AGWHD	DBDLT01	DLIUPROG	DLI	347 K	202	538,547	2
MSA	MXOG	F9P1GO	DBREAD	IBOV0110	DBREAD1	DLIUPROG	DLI	335 K	70	95,882	2
MSA	MXOG	HDMEX	CBLAPIQ	IBOV0050	DBREAD1	DLIUPROG	DLI	323 K	600	499,767	2

Resource Savings imsa.bmc.com:14301

# Summary

- Why? Use policy based database management
  - Consistent - no matter how many databases
  - Effective - “the right work at the right time”
- Who? DBA's, Applications
- What?
  - Fast Path Online Restructure/EP and HALO for Online Change
  - MAXM Database Advisor for IMS for Database and Recovery Management,
  - Application Restart Control for IMS and Application Accelerator for IMS Batch Optimization

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