IMS Tools
– Adding intelligence to tooling

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Agenda

- Smarter Reorgs
- Analyzing Complex Transactions

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IMS Tools – Smarter Reorgs

Fix the Right Problem and Reorg it and You're Done

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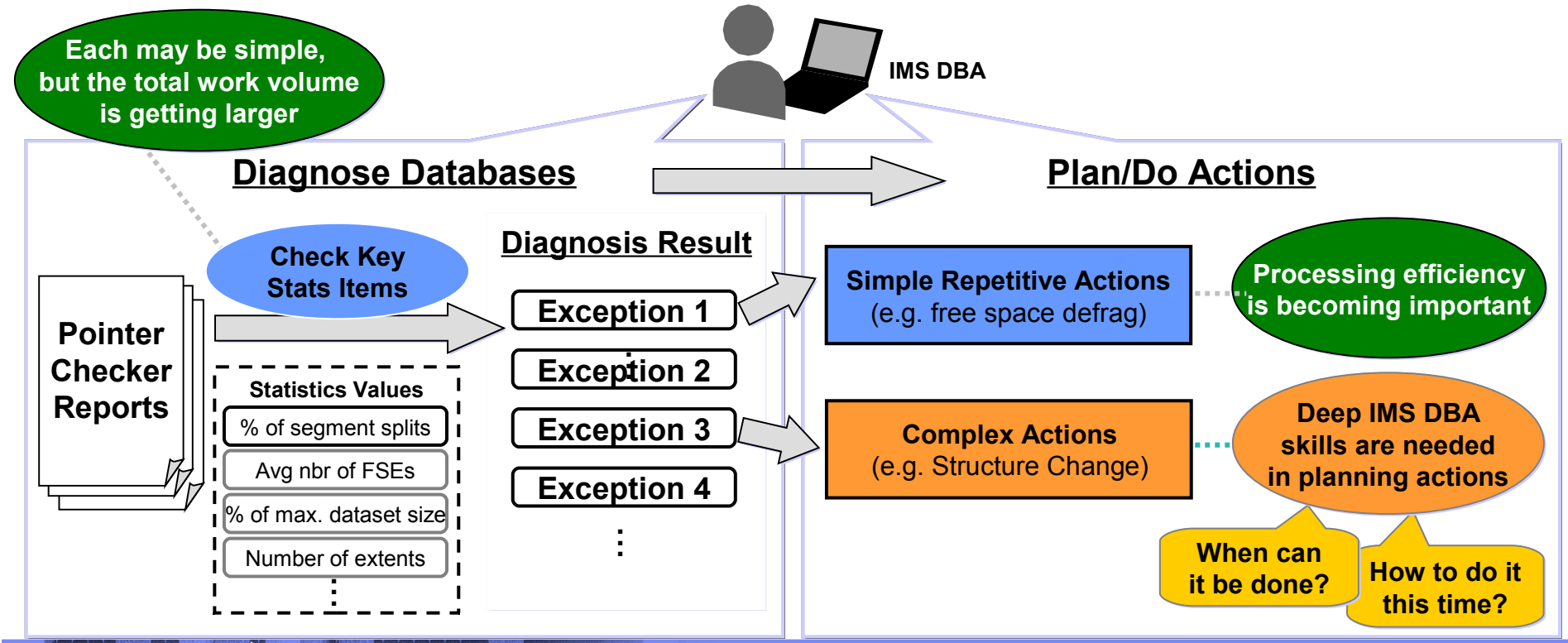
Objective of IMS Database Reorganization Expert

Help customers perform these tasks more efficiently with decreasing number of skilled DBAs.



IMS Database Reorganization Expert – 3 objectives

1. *Policy-based database space management*

Document DBA knowledge

- Exceptional states of database space usage are named
- Rules for exception detection are documented in a policy
- Target/method of exception notification are documented in the policy

2. *Policy-based automated operation*

Automate repetitive tasks

- The policy is used to detect reorganization need
- Free space reorg. can be done conditionally based on the policy
- Effectiveness of each free space reorg. can be evaluated

3. *Central management of information and data*

Keep info/data in one place

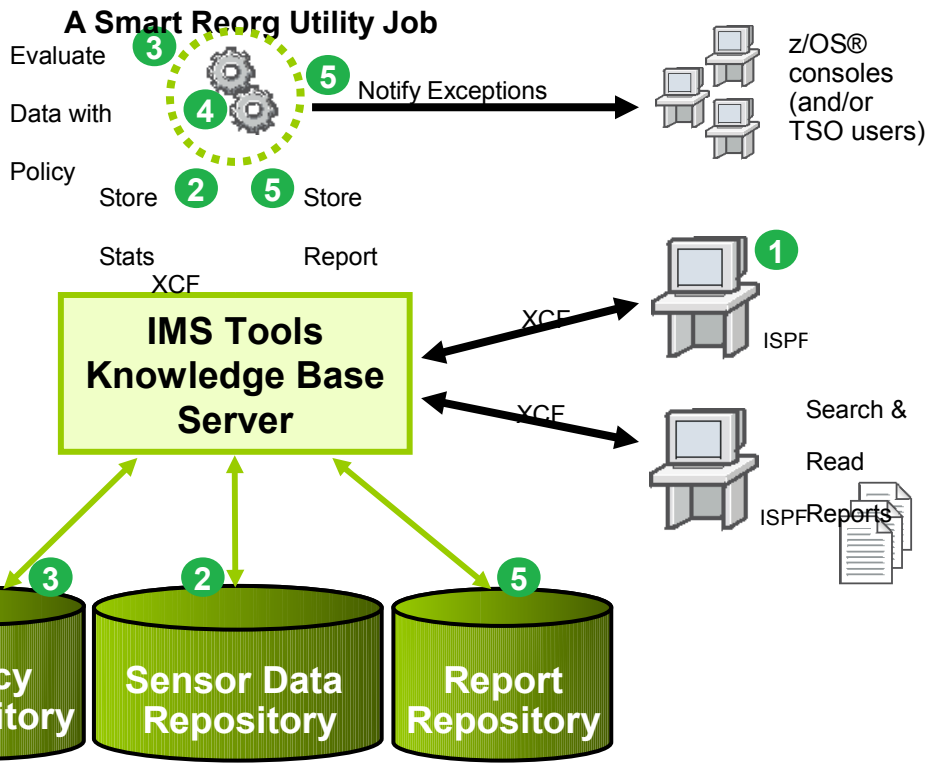
- Policies are kept and managed in a repository
- Statistics data needed for exception detection are kept in a repository
- History of exceptions and reorganizations are kept also in a repository

IMS Database Reorganization Expert – Follow-on product of IMS Parallel Reorganization

New *Smart Reorg Utility* extends Parallel Reorg Driver capability to provide smarter way of reorganization.

Smart Reorg 5 Major Features

1. Policy definition
2. Statistics data collection
3. Exception detection
4. Conditional reorganization
5. Exception reporting



All information and data are managed by IMS Tools Knowledge Base

IMS Tools Knowledge Base – Information and data for smarter reorganization

Smart Reorg Utility

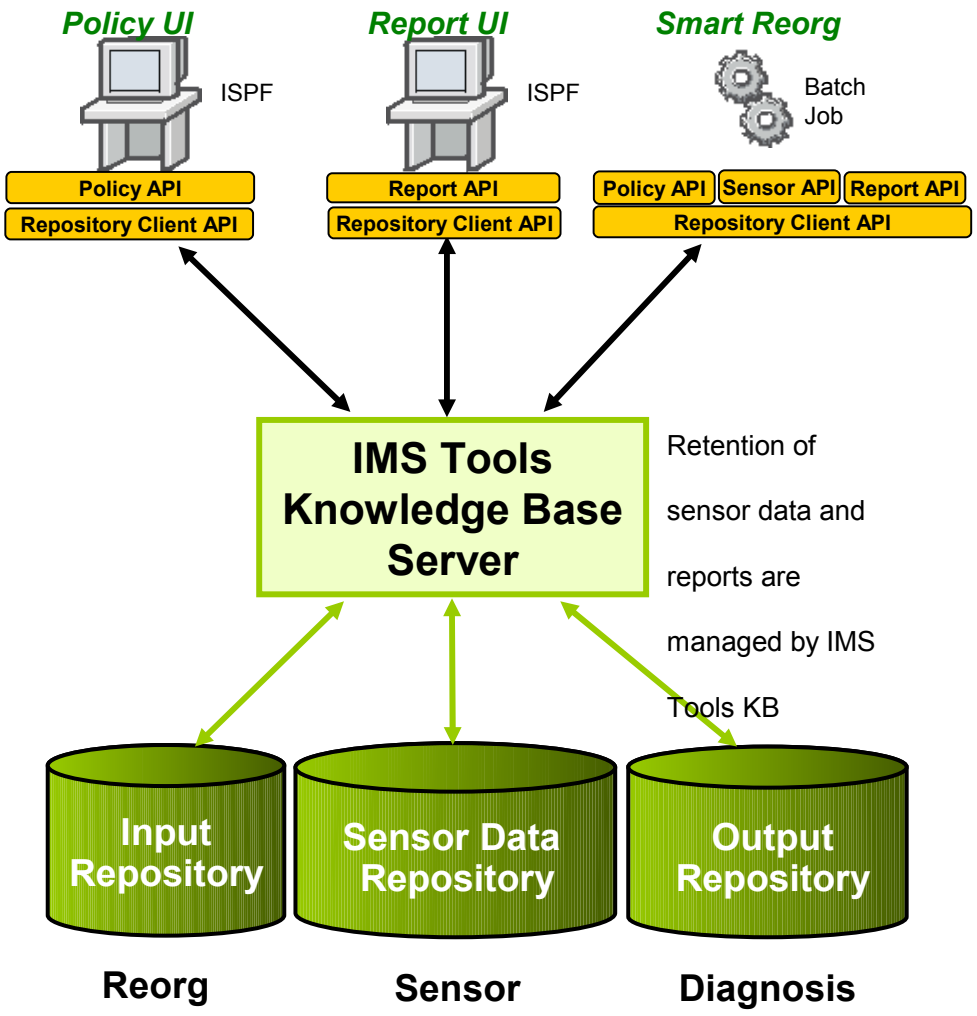
- Uses and/or generates the following information and data
  - **Reorganization Policies**
  - **Database Sensor Data** (database space statistics)
  - **Database Diagnosis Reports**

ISPF Policy User Interface

- Provided by IMS Tools Base – Policy Services
- Used to define and manage policies

ISPF Report User Interface

- Used to search and view reports of various IMS Tools



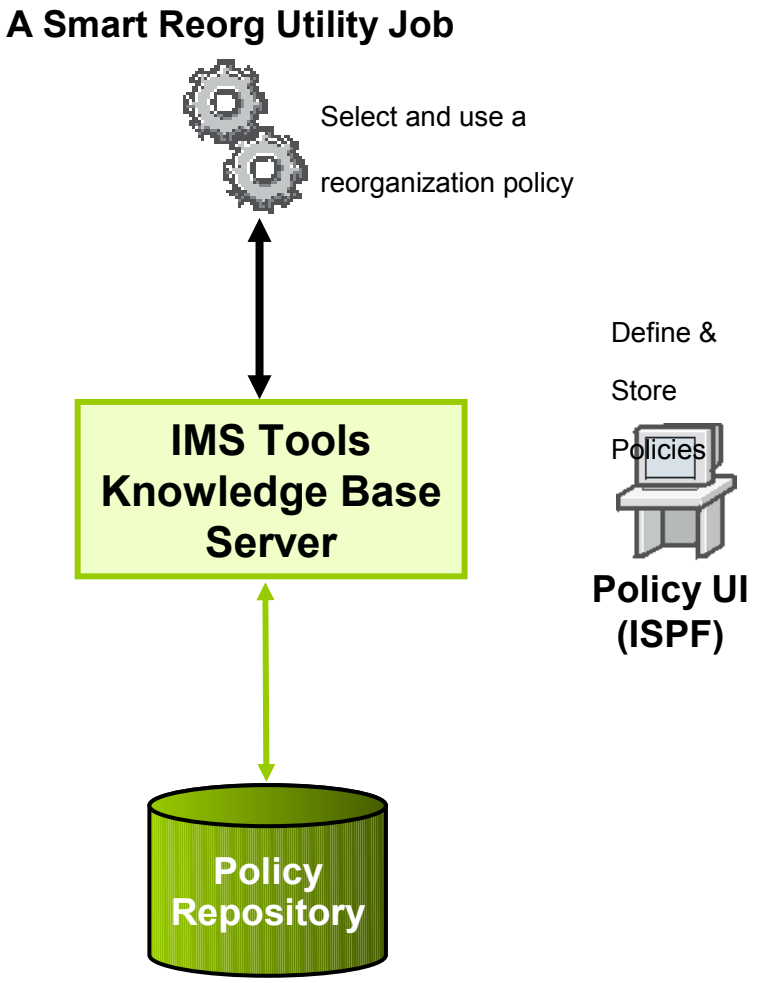
Policy-based
Database Space Management

Decision criteria and recommended actions are documented in a policy, and policies are kept in a centrally managed repository.

Policy-based Database Space Management – A policy describes decision criteria

Reorganization policy

- Describes
  - Criteria for exception detection
  - Action for detected exceptions
  - Destinations and methods of exception notification
- Can be defined
  - For a database type
  - For an individual database
  - For a group of databases
- Can be associated
  - With one or more Smart Reorg jobs through utility control statements



Policy-based Database Space Management – Structure of a policy description

Major components of a policy

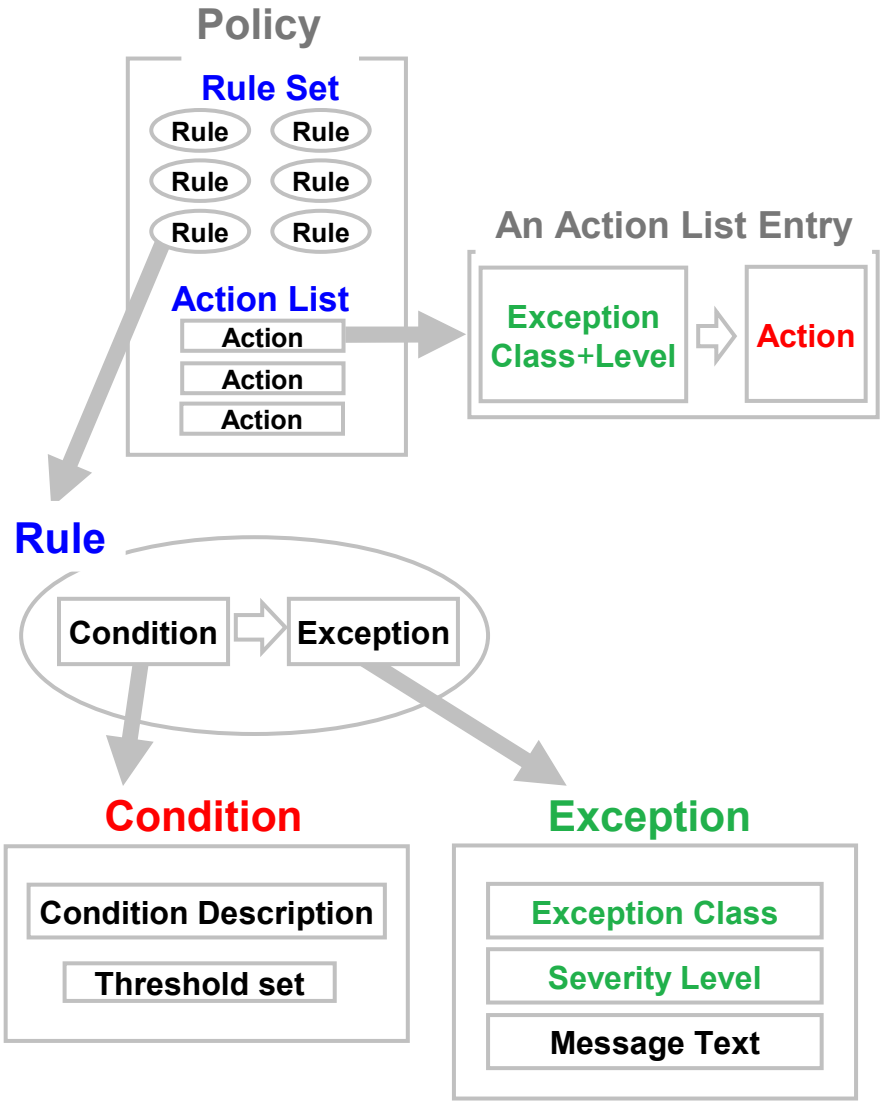
- Rules that detect exceptions
- Exception-based action list

A Rule

- Has two elements:
  - Condition
  - Exception

Action List

- Defines an exception-to-action mapping



Policy-based Database Space Management – A rule describes an exception detection criteria

A rule condition is defined as a pair of:

- **An evaluation condition**
  - Describes what data are evaluated and how
- **A set of threshold values**
  - Customizable

Evaluation Condition

```
Help
REORG/OPERATION
Command ===> _

Rule name . . . . . : IBM.DBDS_GROWTH.20    Locale . . : $IVP
Value set for threshold . MED
&1=85, &2=20,                          <-- Name of Threshold Set
 Evaluation formula description
Both of the following thresholds have been reached or
exceeded in a database data set. This condition indicates
the possibility that high percentage of unusable free
spaces has caused the growth in data set size.
 - Threshold on the percentage of data set size against
   its allowable maximum size:
     &1(85)
 - Threshold on the percentage of total free spaces against
   the used space that is allocated for the data set:
     &2(20)
********************************* Bottom of data ********************************
```

Threshold Values

```
Commands  Help
DOMAIN: REORG
Command ===>

View threshold values and press End to exit.

Locale . . . . . : $IVP      Rule name  : IBM.DBDS_GROWTH.20
Value set for threshold MED
ID#     Value                    Description
&1  85          Numeric, range: 0 to 100
                The percentage of allocated bytes (bytes for High allocated
                RBA) in the maximum size (4 GB or 8 GB).
&2  20          Numeric, range: 0 to 100
                The percentage of bytes of total free spaces compared to the
                total used bytes for the data set.
********************************* Bottom of data ********************************
```

Sensor Data to Evaluate

DB_PCT_OF_MAX_DS_SIZE

The percentage of allocated bytes (bytes for High Allocated RBA) compared to the maximum size (4 GB or 8 GB).

DB_PCT_BYTES_FREE_SPACE

The percentage of bytes of total free spaces to the total used bytes for the data set.

Policy-based Database Space Management – Describing an exception

Exception Class

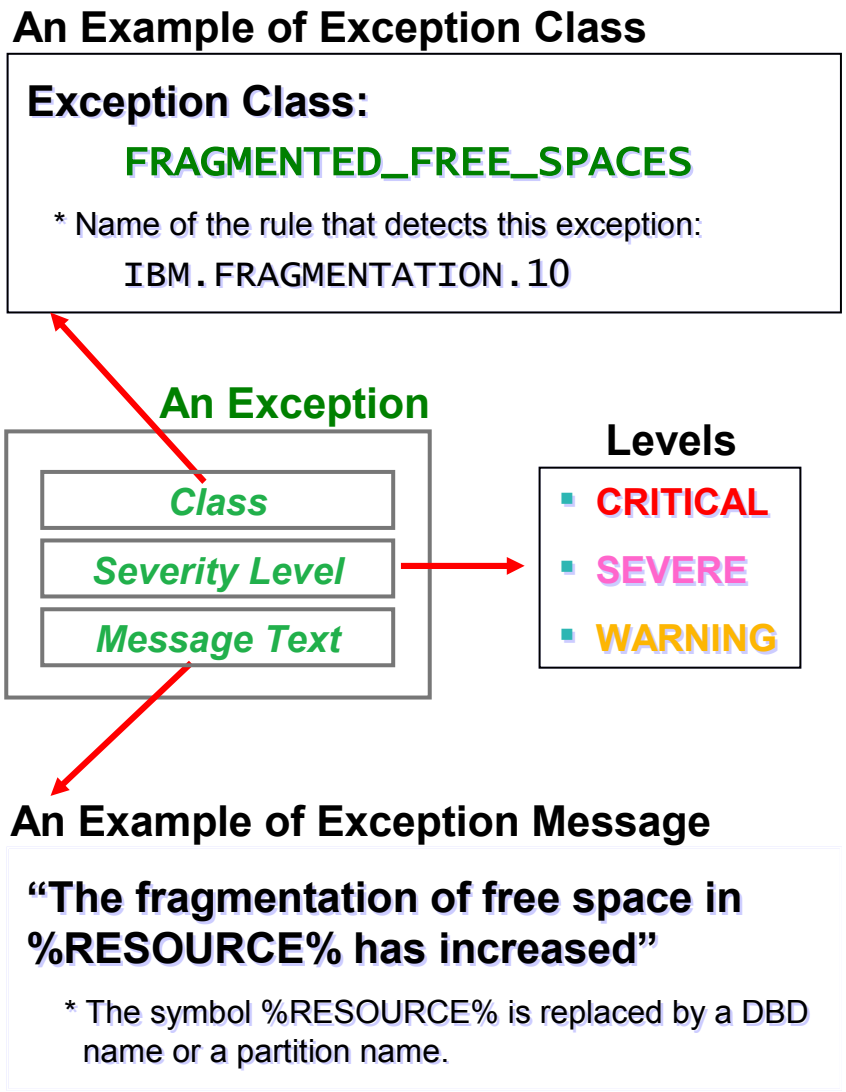
- A specific category of database states being monitored
- Defined by IBM

Exception Severity Level

- The severity of an exception detected by the Rule Condition
- Can be chosen from three levels

Exception Message Text

- The text describing the exception
- Can be modified



Policy-based Database Space Management – Describing an action

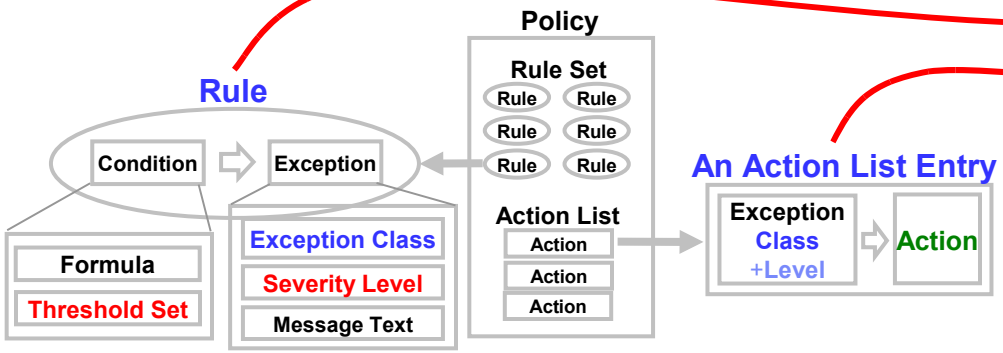
Exception-to-Action mapping

- Each rule is associated with an exception class
- The threshold set selected for the rule is associated with a severity level of the exception
- An action is associated with a pair of an exception class and its severity level

An Example

Threshold Set Name	Exception Class + Severity Level	Action
"HIGH"	CRITICAL	REORG
"MED"	SEVERE	MESSAGE
"LOW"	WARNING	MESSAGE

Reorganization (free space defrag through unload and reload without DBD change) is recommended



Alerting the user of the exception for preparation for user actions, or for immediate user actions

Policy-based Database Space Management – IBM-provided templates

IBM provides policies and rules

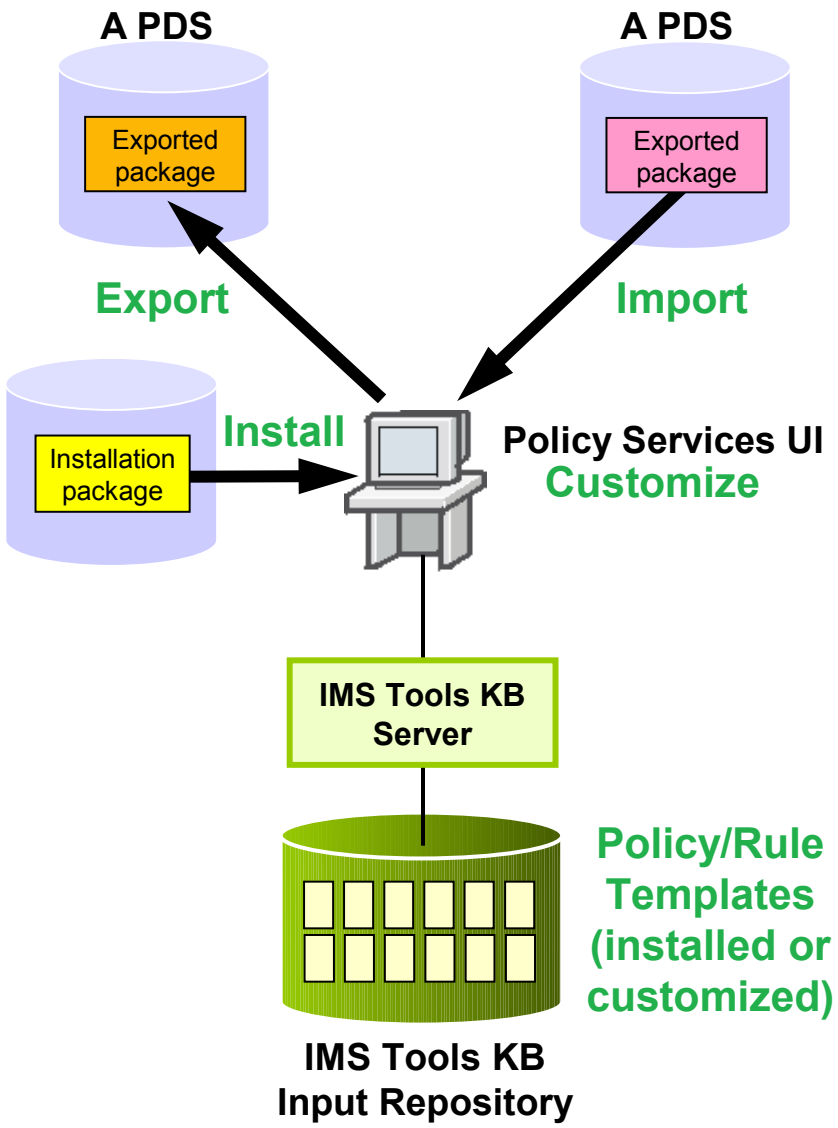
- Provided as a PDS member
- Installed into ITKB Input Repository as a set of policy/rule "templates"

Customization

- The installed policy/rule templates can be copied and customized

Import and export

- The copied/customized templates can be exported
  - For importing them into another environment
  - For backup



Using Smart Reorg Utility – Statistics Data Collection

Sensor data for an IMS full-function database

- A set of values of database statistics data elements at a specific time
- Used to detect exceptions by evaluating them with a reorg. policy

Data elements supported in the first release

- Total of about 60 data elements:
  - **Database Record Statistics** ← Per database or HALDB partition
  - **Randomizer Statistics** ← Per HDAM or PHDAM partition
  - **Volume/Extents Statistics**
  - **Data Set Space Usage Statistics**
  - **IMS Space Utilization Statistics**
  - **HISAM/SHISAM Statistics**

  ← Per data set

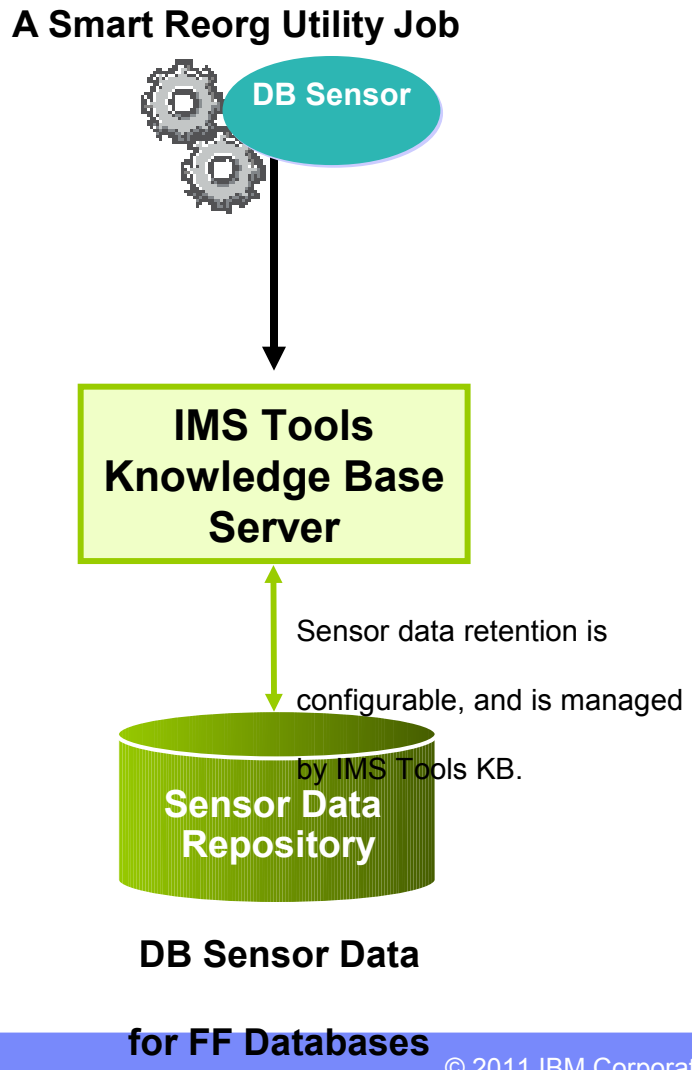
Complete list of data elements

- Can be found in *Policy Services User's Guide* (SC19-2718)

Using Smart Reorg Utility – Statistics Data Collection…

DB Sensor

- Is a sensor data collector for IMS full-function databases
- Is integrated in Smart Reorg Utility
- Can collect sensor data from a database or HALDB partition while it is online
  - One non-HALDB database or HALDB partition at a time
- Stores collected data in IMS Tools KB Sensor Data Repository
- Is much faster than HASH Check of High Performance Pointer Checker
  - DB Sensor bypasses pointer integrity check



Using Smart Reorg Utility – 3 modes of execution

Diagnosis Mode

- Sensor data is collected and evaluated by a policy to detect exceptions
- A diagnosis report can be stored in IMS Tools KB Output Repository
- Existence of an exception can be notified in various ways

Conditional Reorganization Mode

- Same as Diagnosis Mode
- But, performs reorganization when it is recommended by the diagnosis
  - The reorganized database is diagnosed again to see effectiveness of the reorganization and remaining exceptions

Unconditional Reorganization Mode

- Always performs reorganization regardless of the database status

Using Smart Reorg Utility – Conditional Reorganization Mode

Basic Scenario of Conditional Reorganization Mode

- **Step 1:** Sensor data are collected and stored in the Sensor Data Repository
- **Step 2:** The sensor data are evaluated with the specified policy
- **Step 3:** Reorganization is performed if it was recommended in Step 2
  - Sensor data of the reorganized database are stored
  - New sensor data is evaluated with the same policy again
- **Step 4:** A Diagnosis Report of the evaluation(s) is stored and the existence of remaining exceptions, if any, can be notified

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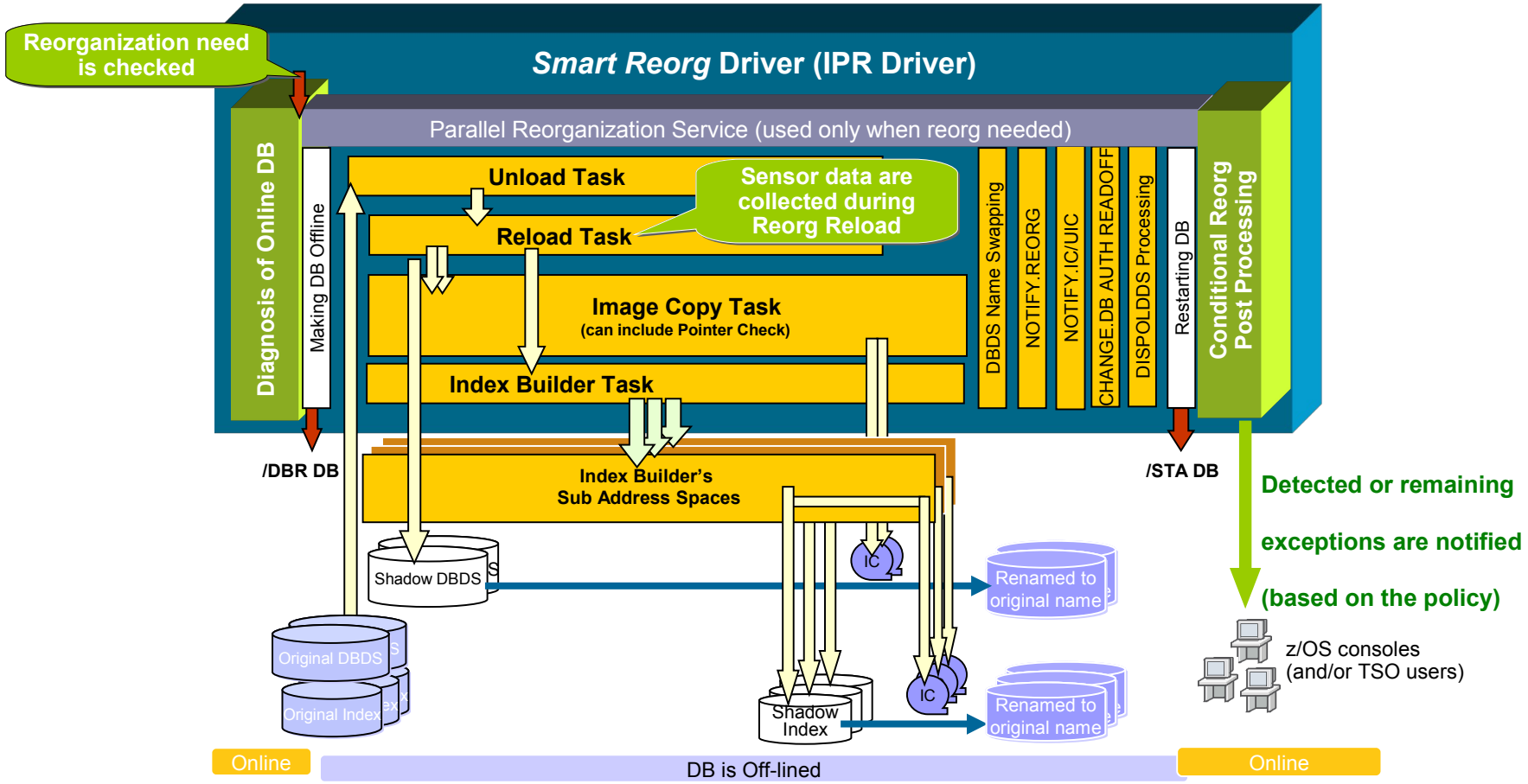
- **Step 5:** The Diagnosis Report is reviewed by DBA and necessity of further action (e.g., planning for database tuning) is determined

Using Smart Reorg Utility – Benefits of Conditional Reorganization

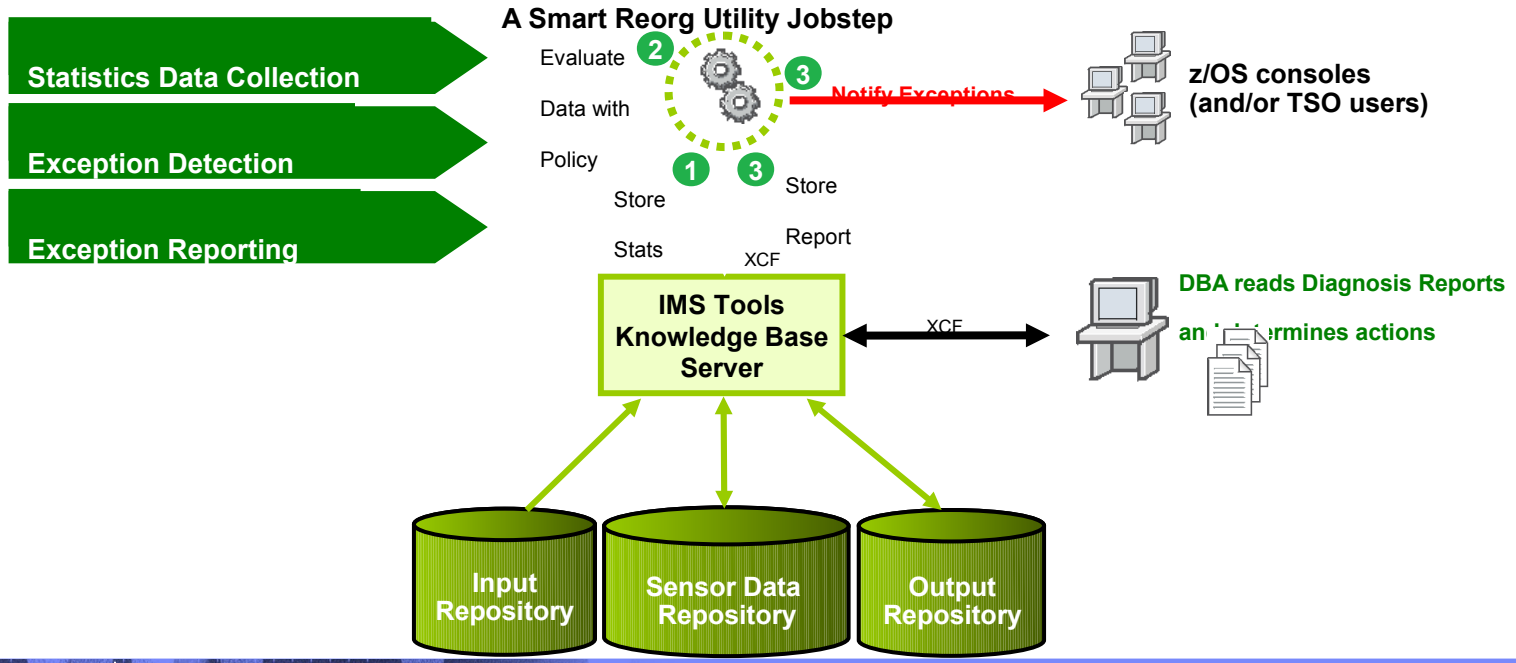
- A database can be reorganized only when it is really needed
- The Diagnosis Report provides an evidence of the necessity of reorganization and effectiveness of the reorganization



Using Smart Reorg Utility – Exception detection in Diagnosis Mode

Basic Scenario of Diagnosis Mode

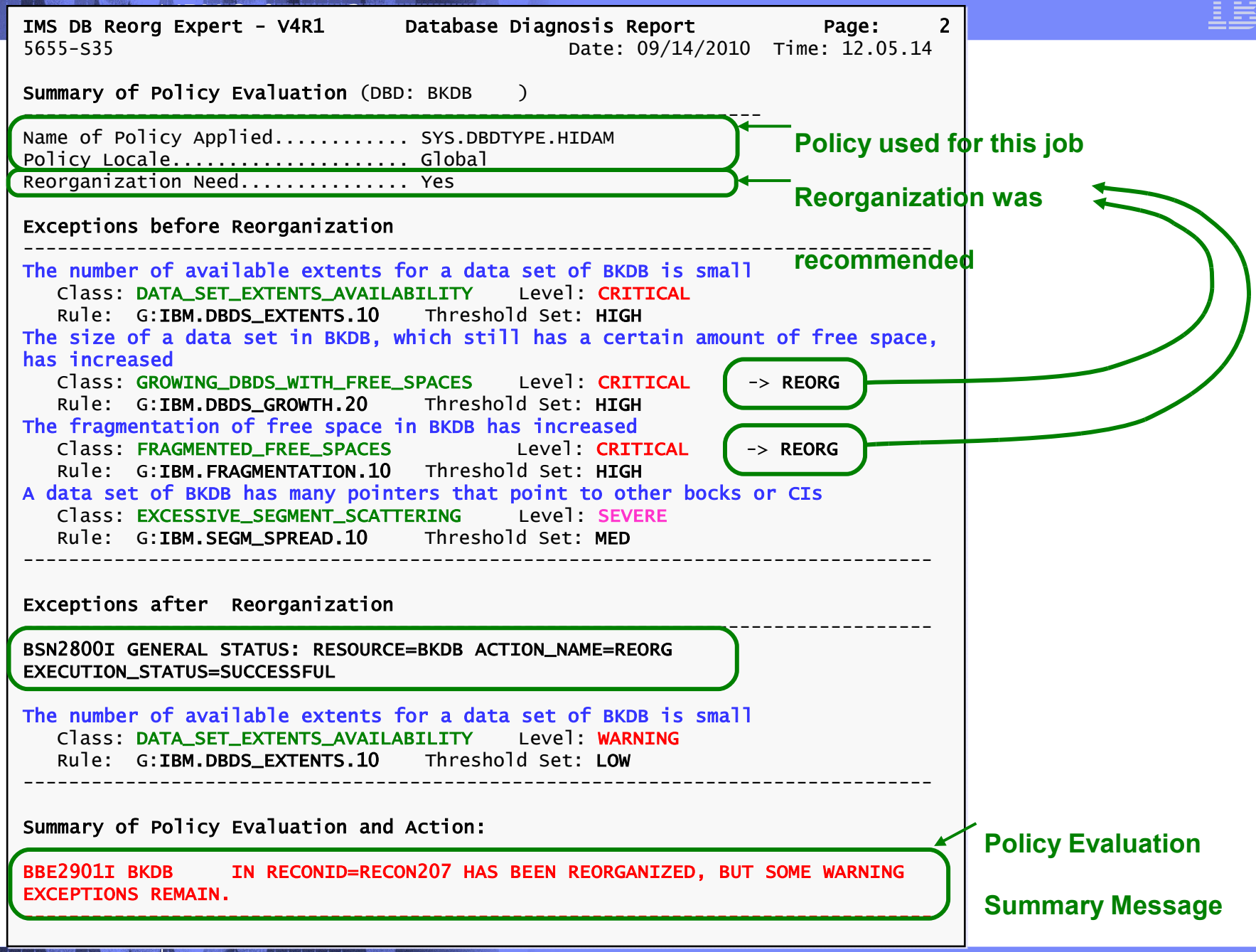
- **Step 1 & 2:** Same as those in Conditional Reorganization Mode
- **Step 3:** A Diagnosis Report of the evaluation is stored in the Output Repository and existence of an exception can be notified
- **Step 4:** The Diagnosis Report is reviewed by DBA and actions are determined. Or, the notification is used to control succeeding batch jobs or jobsteps.



Using Smart Reorg Utility – Exception reporting by Diagnosis Report

Information provided by Diagnosis Report

- **Summary of Policy Evaluation**
  - Policy that was applied to the database
  - Reorganization need
  - Result of policy evaluation
  - Result of policy evaluation after reorganization
    - if reorganization was performed
  - An evaluation summary message
- **Sensor data values before and after reorganization**
  - And their differences



IMS DB Reorg Expert - V4R1 Database Diagnosis Report Page: 6
5655-S35 Date: 09/14/2010 Time: 12.05.14

Data Set Statistics (DBD: BKDB , DSG: 01)

IMS Space Utilization Statistics

Note: The mark * in column P means that the data element is used in the policy.

Data Element Name	P	Before Reorg	After Reorg	Difference
DB_BYTES_SEG		2,465,800,000	2,465,800,000	0
DB_BYTES_FREE_SPACE		**1,610,723,680**	**283,136,678**	**-1,327,587,002**
DB_BYTES_UNIDENTIFIED	*	110	0	-110
DB_PCT_BYTES_FREE_SPACE	*	**39%**	**10%**	**-29**
DB_PCT_BYTES_SEG	*	**60%**	**89%**	**+29**
DB_PCT_UNUSED_BYTES	*	1%	1%	0
DB_NUM_SEG		85,620,000	85,620,000	0
DB_NUM_VLSEG		8,560,000	8,560,000	0
DB_NUM_VLSEG_SPLIT	*	0	0	0
DB_PCT_NUM_VLSEG_SPLIT	*	0%	0%	0
DB_NUM_UNIDENTIFIED	*	51	0	-51
DB_AVG_NUM_UNIDENTIFIED	*	0	0	0
DB_NUM_FSE	*	23,728,638	673,759	-23,054,879
DB_AVG_NUM_FSE	*	**23.75**	**1.00**	**-22.75**
DB_NUM_FSE_MIN	*	23,558,660	673,759	-22,884,901
DB_NUM_FSE_MAX	*	718,662	673,759	-44,903
DB_AVG_NUM_NOREUSE_FSE	*	.17	0	-.17
DB_NUM_PTR		85,070,408	84,946,241	-124,167
DB_NUM_PTR_DIFF_BLK	*	32,424,879	663,666	-31,761,213
DB_PCT_NUM_PTR_DIFF_BLK	*	**38%**	**1%**	**-37**

Using Smart Reorg Utility – A Simple Sample JCL

Three types of policy selection

- **By database type**
  - This is the default.
  - IBM-provided SYS.DBDTYPE.*type* policies is selected
- **By database name**
  - This is intended to be used to specify a database specific policy
- **By policy name**
  - This is intended to be used to specify a same policy for a group of databases

```
//CREORG EXEC PGM=HPSGMAIN,PARM='DBD=SAMPLEDB,DBRC=Y'
//STEPLIB  DD DISP=SHR,DSN=IMSTOOL.LOADLIB
//         DD DISP=SHR,DSN=IMS.SDFSRESL
//         DD DISP=SHR,DSN=USER.PGMLIB
//IMSDALIB DD DISP=SHR,DSN=IMS.MDALIB
//IMS      DD DISP=SHR,DSN=IMS.DBDLIB
//HPSIN    DD *
(REORG)
  CONDREORG=YES,DYAGONLY
  ITKBSRVR=FPQSVR00
  SPACEALLOC=YES
  NAMESWAP=YES
(CONDREORG)
  POLICYBY=DBTYPE
/*
```

Specifies Diagnosis Mode

Specifies XCF Group Name for ITKB Server to connect

Specifies how a policy is to be selected

Policy to be selected

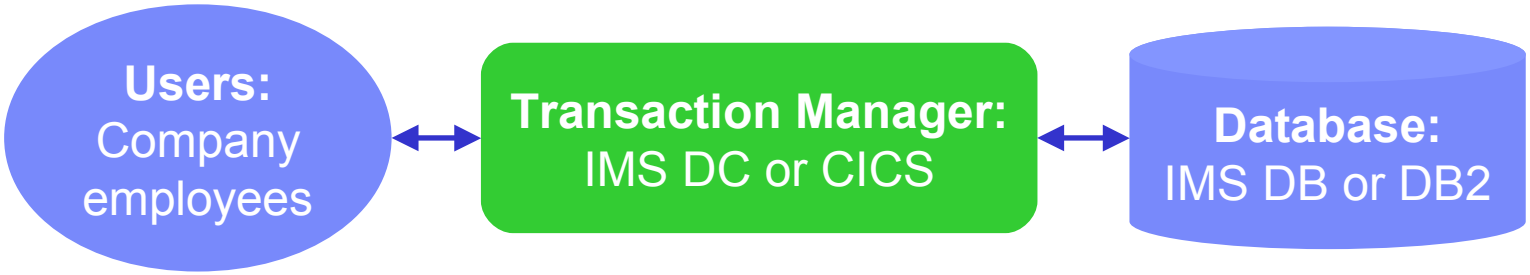
`POLICYBY=DBTYPE`	`SYS.DBDTYPE.`*`type`* (*type* = HDAM, HIDAM, PHDAM, PHIDAM, HISAM, or SHISAM)
`POLICYBY=DBDNAME`	`SYS.DBDNAME.`*`dbdname`*
`POLICYBY=NAME` `POLICYNM=MY.POLICY.GROUP1`	`MY.POLICY.GROUP1`

Introducing IBM Transaction Analysis Workbench for z/OS

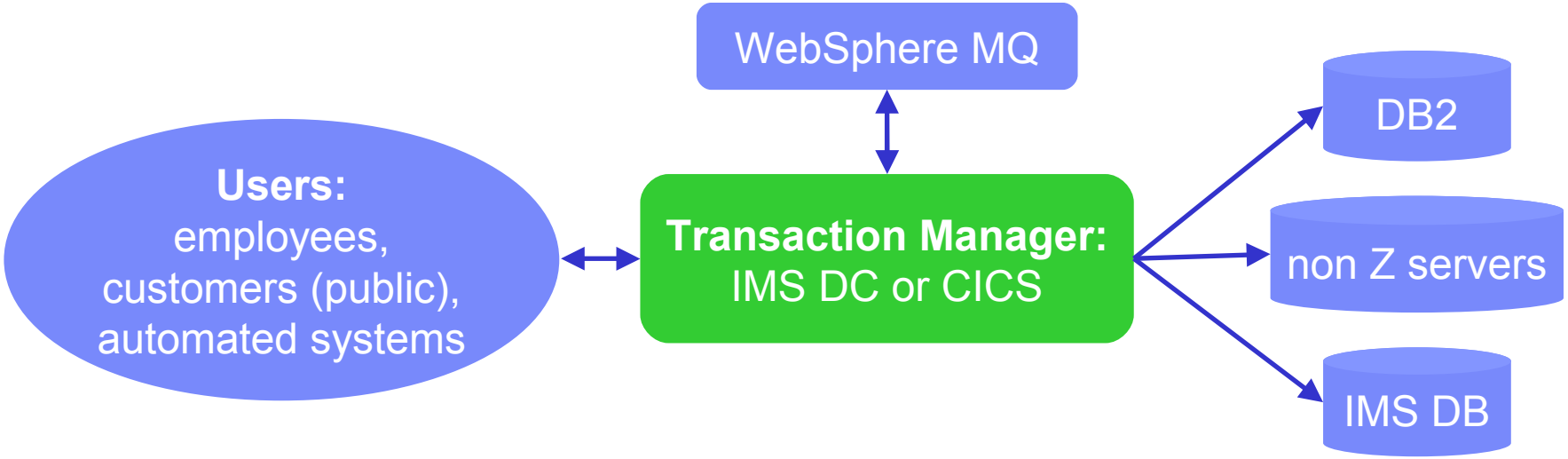
Silicon Valley Lab, San Jose, CA

It's all about evolution

1980: in-house users only; simple data, single data store

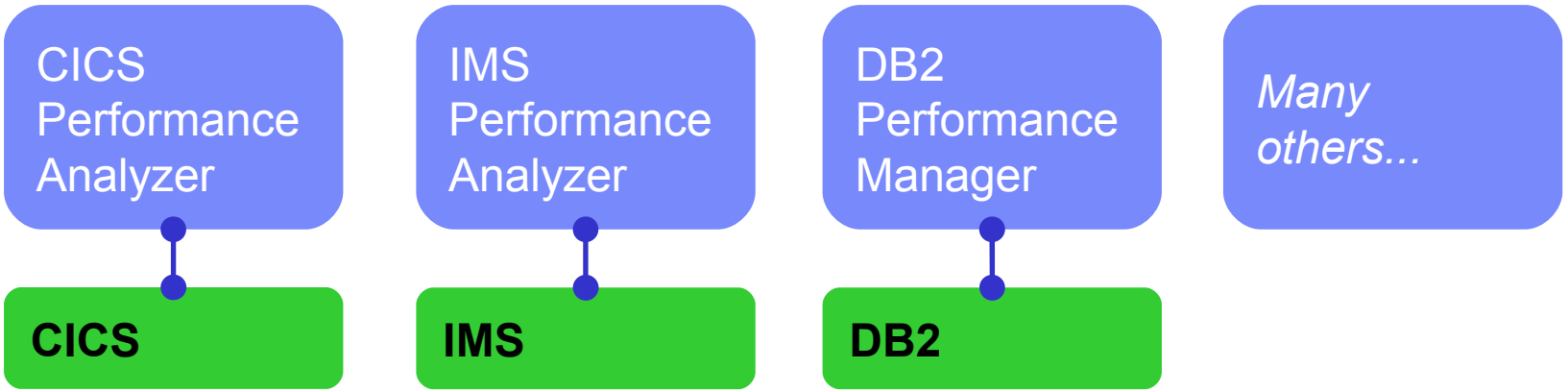


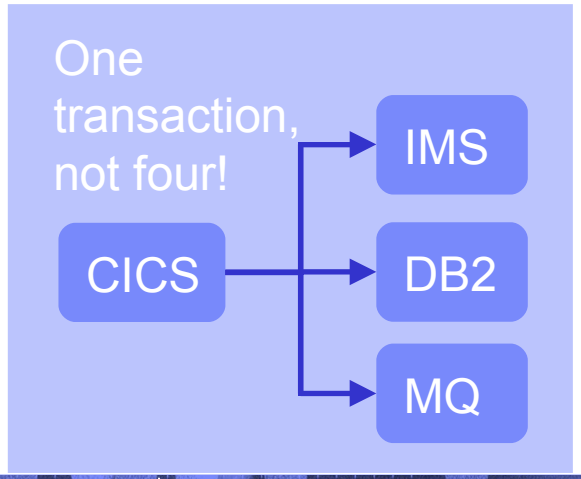
2011: users are customers; data is complex, often distributed

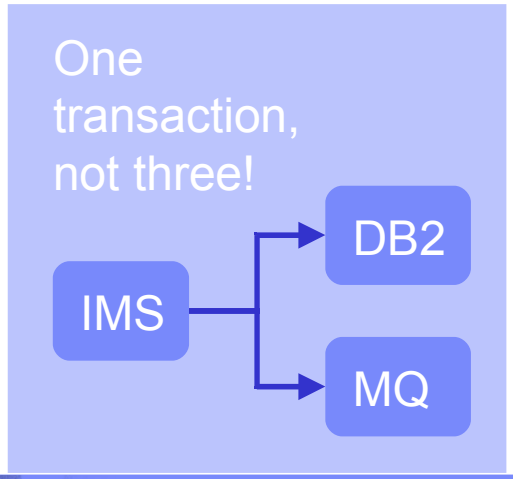


Analysis tools have not kept pace

There are many tools to help analyze *individual* transaction environments on System z:







Each tool is well-suited to its environment, but you often need a subject matter expert to use each tool

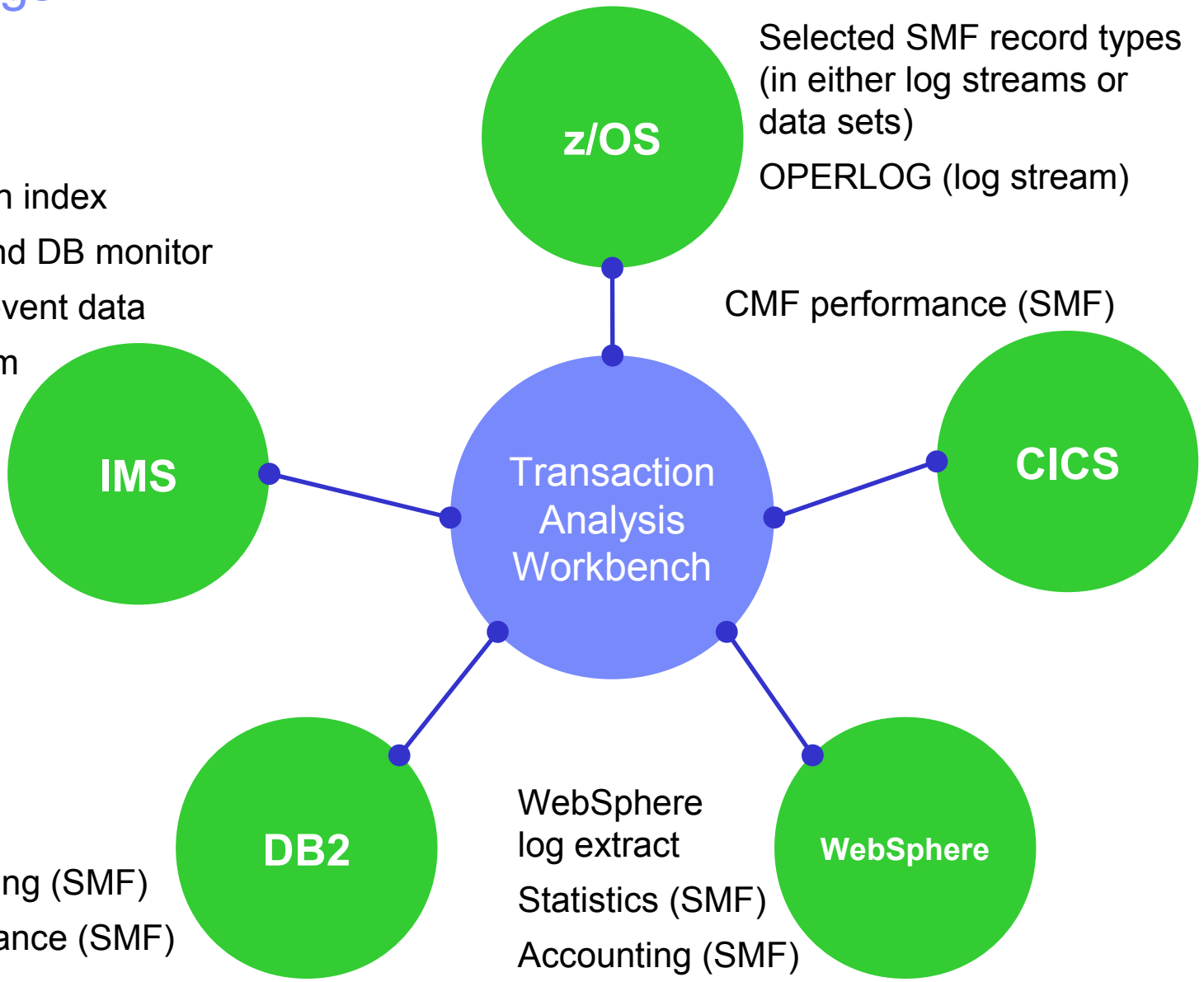
Product overview

- A transaction analysis framework for System z
  - Not transaction manager specific
  - Leverages current IBM tools for transaction analysis
- Not IMS or CICS specific, but first release provides more synergy with the existing tools for those transaction managers
- Automates collection of data needed for problem analysis
- Provides a session manager to manage problem analysis through its lifecycle
- In this presentation, it might look like the Workbench is IMS or CICS centric but that is not the case
  - The tools for IMS and CICS are the first to be engaged

Product goals

- Enable higher productivity by lower skilled staff, reduce problem analysis time, and serve as a training tool for new support staff
- Allow the “first responder” to determine the most likely source of the problem so that the right subject matter expert can work on the problem
- Allow for “deep dive” problem determination via synergy with other IBM tools
  - Subject-matter experts may also use tools not supported by the Workbench

Supported logs



Session manager (ISPF dialog)

- Session manager approach to problem management:
  - Register the problem
  - Locate the files required to diagnose the problem: IMS, DB2, CICS, SMF, OPERLOG etc.
  - Resume from where you left off, or from a previous save-point
  - Write reminder notes and information as you go
  - Re-assign the problem to the appropriate subject-matter expert
  - Use PI-style interactive analysis to look at related logs and other subsystem events via SMF, OPERLOG etc.
  - Run reports that are specific to the problem

Scenario 1: CICS DBCTL problem

- On the following slides, we present an example scenario: a user has reported an abend in a CICS transaction
- The analysis is divided into two parts:

1. The **first responder** registers the problem in the Workbench session manager, and runs some preliminary batch reports to attempt to identify the cause of the problem
2. The **specialist** performs a “deep dive” on the problem: reviewing the reports, and using interactive analysis to identify the specific log records for the cause of the problem

CICS DBCTL problem: creating a session

```
   File  Help
 ------------------------------------------------------------------------------
 V1R1M0           Transaction Analysis Workbench - Primary Option Menu
 Option ===> 1

 0 Profile      Customize your dialog profile
 1 Sessions     Analyze problems using the session manager
 2 Controls     Define record filtering and formatting controls
 3 Systems      Define the systems where transactions are processed
 4 Process      Analyze ad-hoc log files
 X Exit         Quit the workbench

 Session Repository . . . FUW.SESSIONS                              +
```

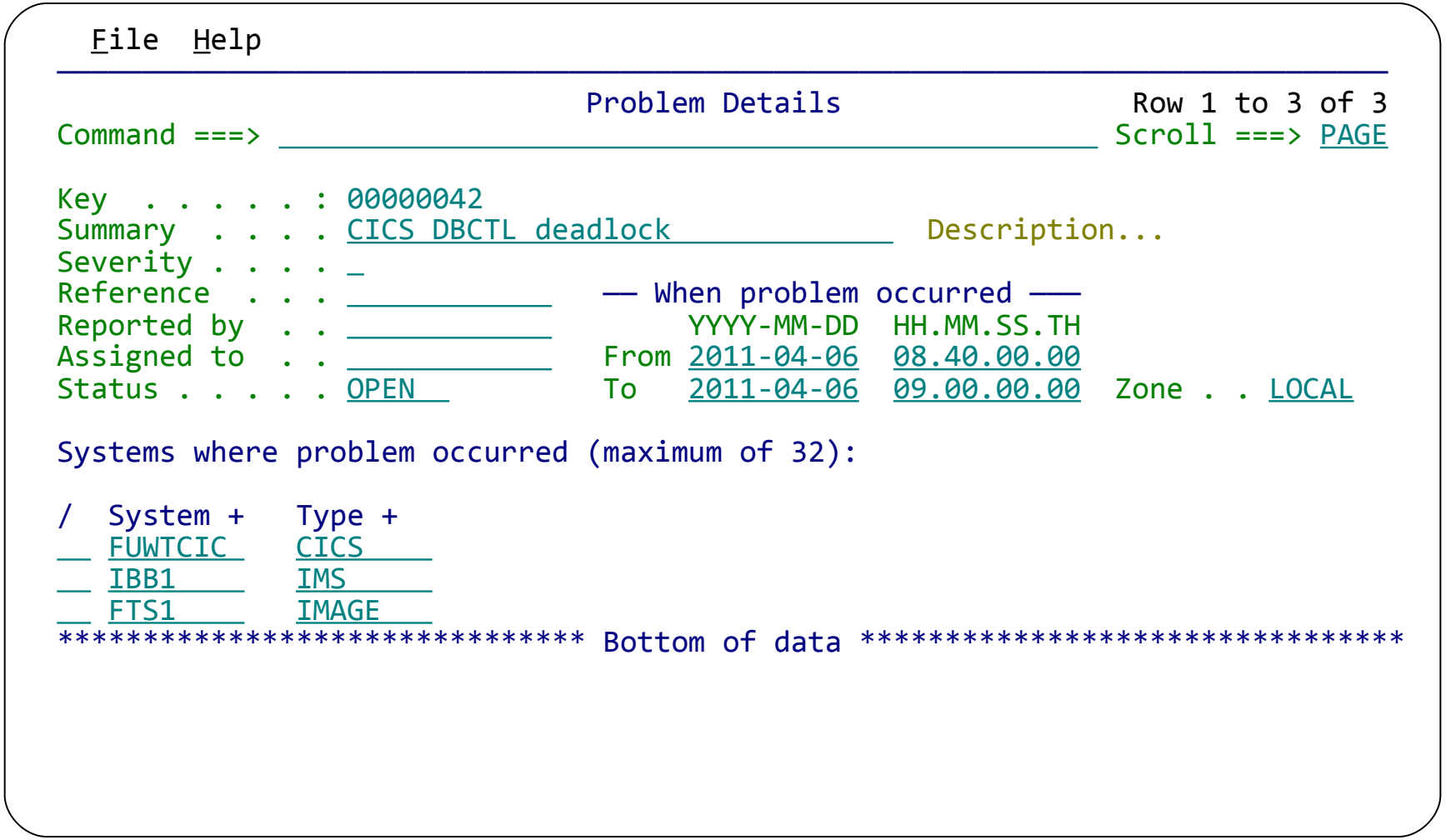
CICS DBCTL problem: creating a session

```
  File  Help
------------------------------------------------------------------------------
                               Session Manager          Row 1 of 3  More: < >
Command ===> new                                              Scroll ===> PAGE

Select a session or use the NEW command to register a new session.

/  Key        Status   Description
_  00000001   OPEN     CICS DB2
_  00000002   OPEN     CICS DBCTL
_  00000003   OPEN     IMS DB2
******************************* Bottom of data ********************************
```

CICS DBCTL problem: creating a session



CICS DBCTL problem: defining IMS system

```
   File  Menu  Help
 ------------------------------------------------------------------------------
                               IMS Subsystem                       More: < >
 Command ===> _________________________________________________________________

 IMS Subsystem definition:
  IMS Subsystem ID . . . . . IBB1  IMS Version (VRM) . . . 111  +
  Description . . . . . . . ____________________________________
  RESLIB Data Set . . . . . 'IMS.V11.SDFSRESL'______________________
 ------------------------------------------------------------------------------
 Specify required view . . 1  1. DBRC Settings    4. Groups
                              2. Log Files        5. OMEGAMON TRF Files
                              3. Monitor Files    6. OMEGAMON ATF Journals
 ------------------------------------------------------------------------------
 Specify DBRC Settings for automated log file selection:
                                                                 More:     +
 DBRC Subsystem ID . . . ________  (Specify RSENAME for XRF)
 DBRC IMSplex name . . . _____     (RECON Loss Notification)
 DBRC Sharing Group ID . ___       (Parallel RECON Access)
 RECON Data Set 1  . . . 'IBB1.VB10.RECON1'______________________
                2  . . . 'IBB1.VB10.RECON2'______________________
                3  . . . 'IBB1.VB10.RECON3'______________________
 MDA Data Set  . . . . . ______________________________________________
```

CICS DBCTL problem: adding log files

```
  File  Help
 ──────────────────────────────────────────────────────────────────────────────
                          Locate and Manage Log Files          Row 1 to 2 of 2
Command ===> ____________________________________________________ Scroll ===> PAGE

Select an option to add log files to the session then press Enter
2  1. Manually specify the log files required for analysis
   2. Run automated file selection to locate the required log files

Automated File Selection:          ── Locate Files Interval ──
  System . . . IBB1     +               YYYY-MM-DD  HH.MM.SS.TH
  Type . . . . IMS      +          From 2011-04-06  08.40.00.00
                                   To   2011-04-06  09.00.00.00
Log Files:
                                                    ─── System ─── File
/        Data Set Name                              Name     Type    Type
_________ FUNDID.SMF.D110406.DEADLOK.FULL           FTS1     IMAGE   SMF
_________ OPERLOG:SYSPLEX.OPERLOG                   FTS1     IMAGE   OPERLOG
****************************** Bottom of data ********************************
```

CICS DBCTL problem: automated file selection

```
  File  Help
──────────────────────────────────────────────────────────────────────────────
                          Locate and Manage Log Files          Row 1 to 3 of 3
Command ===> ____________________________________________________ Scroll ===> PAGE

Select an option to add log files to the session then press Enter
_   1. Manually specify the log files required for analysis
    2. Run automated file selection to locate the required log files

Automated File Selection:          ── Locate Files Interval ──
  System . . . ________  +              YYYY-MM-DD  HH.MM.SS.TH
  Type . . . . ________  +         From 2011-04-06  08.40.00.00
                                   To   2011-04-06  09.00.00.00

Log Files:

                                                      ──── System ──── File
/        Data Set Name                                Name      Type    Type
________ FUNDID.SMF.D110406.DEADLOK.FULL              FTS1      IMAGE   SMF
________ OPERLOG:SYSPLEX.OPERLOG                      FTS1      IMAGE   OPERLOG
________ IBB1.SLDSP.IBB1.D11096.T0841415.V15          IBB1      IMS     LOG
********************************* Bottom of data ********************************
```

CICS DBCTL problem: batch reporting

```
  File  Help
------------------------------------------------------------------------
                               Reporting
Option ===> ____________________________________________________________

Select a reporting option then press Enter.

1  IMS      Transaction and system analysis using IMS PA
2  CICS     Transaction and system analysis using CICS PA
3  SMF      z/OS and subsystem analysis
4  OPERLOG  Sysplex operations log (SYSLOG)
```

CICS DBCTL problem: CICS PA reporting

```
  File  Help
-----------------------------------------------------------------------------
                    Reporting - CICS Transaction Analysis
Command ===> ________________________________________________________________

                                               ----- Report Interval -----
Type of analysis:                                   YYYY-MM-DD  HH.MM.SS.TH
/  Individual transaction detail                From 2011-04-06  08.40.00.00
/  Transaction statistical summary               To   2011-04-06  09.00.00.00
/  Transaction suspend time breakdown

Focus of transaction analysis:
/  Response time and CPU usage
/  VSAM files
/  Virtual storage
/  DB2
/  IMS DBCTL

Select the CICS system to report against, or specify an SMF file:
2  1. System . . . ________  +
   2. SMF File . . 'FUNDID.SMF.D110406.DEADLOK.FULL'___________  +
```

CICS DBCTL problem: CICS PA reporting

CICS Performance Analyzer
Transaction details: Response time and

LIST0001 Printed at 16:55:17 4/11/2011 Data from 08:39:21 4/06/2011

Start Time	APPLID	Tran	SC	Term	Userid	RSID	Program	TaskNo	Response Time	Dispatch Time	U
08:43:19.3169	FUWTCIC	DBEU	TO	UW2B	FUW2		TWM$UPD	150	7.3433	.0066	
08:43:34.0141	FUWTCIC	DBEU	TO	UW2B	FUW2		TWM$UPD	152	7.3112	.0065	
08:47:22.0636	FUWTCIC	TWMU	TO	UW1B	FUW1		TWM$UPD	170	14.0675	.0368	
08:47:14.7397	FUWTCIC	DBEU	TO	UW2B	FUW2		TWM$UPD	168	22.5172	.0082	
08:47:36.1434	FUWTCIC	TWMU	TO	UW1B	FUW1		TWM$UPD	171	14.9865	.0360	

CICS Performance Analyzer report on transaction details.

Note – CICS task number 170 is the transaction that meets the criteria reported for the abend. .

CPU

User CPU Time	Suspend Time	DispWait Time	FC Wait Time	ABcu
.0053	7.3367	.0006	.0000	
.0055	7.3047	.0008	.0000	
.0265	14.0308	.0031	.0000	ADCD
.0061	22.5090	.0293	.0000	
.0271	14.9505	.0036	.0000	DE40

CICS DBCTL problem: IMS PA reporting

```
  File  Help
-------------------------------------------------------------------------------
               Reporting - IMS Transaction and System Analysis
Command ===> _________________________________________________________________

Type of analysis:                        ----- Report Interval -----
/  Individual transaction detail              YYYY-MM-DD  HH.MM.SS.TH
/  Transaction statistical summary       From 2011-04-06  08.40.00.00
/  IMS system resources                  To   2011-04-06  09.00.00.00
/  Deadlock analysis

Focus of transaction analysis:
/  Response time breakdown and CPU usage
/  DLI calls
/  Fast Path database and buffers
_  Subsystem usage
/  CICS DBCTL

Select the IMS system to report against, or specify an IMS log file:
2  1. System . . . ____  +
   2. Log File . . 'IBB1.SLDSP.IBB1.D11096.T0841415.V15'_____  +
```

CICS DBCTL problem: IMS PA reporting

IMS Performance Analyzer
Tran detail: Response & CPU

LIST0001 Printed at 11:41:35 12Apr2011 Data from 08.41.45 06Apr2011

CICS APPLID	Trancode	CICS TaskNo	Program	IMS Tran Start	PST	DB Call Count	FP Call Count	CPU Time
FUWTCIC	DBEU	150	DFHTWM04	08.43.19.317952	2	35	20	0.004429 7
FUWTCIC	DBEU	152	DFHTWM04	08.43.34.015461	2	35	20	0.004786 7
FUWTCIC	TWMU	170	DFHTWM04	08.47.22.064699	2	27	10	0.003550 1
FUWTCIC	DBEU	168	DFHTWM04	08.47.14.741096	1	35	20	0.004993 2
FUWTCIC	TWMU	171	DFHTWM04	08.47.36.145544	2	31	11	0.004575 1

IMS V11 has the improved instrumentation required to connect CICS and IMS events, and IMS PA now supports this (see APAR PM24076): the IMS PA reports show the CICS transaction name and task number.

Process Time	Total IO Count	DB IO Time	ABEND Code
7.340751	4	0.002947	
7.308276	5	0.004377	
13.98985	5	0.004129	U0777
22.51250	4	0.003052	
14.97864	5	0.004057	

CICS DBCTL problem: interactive investigation

```
   File  Menu  Time Slicing  Help
------------------------------------------------------------------------------
                               Investigate                Row 1 of 3 More: < >
Command ===> ______________________________________________ Scroll ===> PAGE

                ------------- Time Slice (ON) ----------------
                Time             Date            Duration
                HH.MM.SS.thmiju  YYYY-MM-DD      HH.MM.SS  Zone    Filter +
                08.41.41.519325  2011-04-06      00.14.19  LOCAL   ________
/
s_______   Type  Data Set Name                                     Coverage
________   SMF   FUNDID.SMF.D110406.DEADLOK.FULL                   COMPLETE
________   IMS   IBB1.SLDSP.IBB1.D11096.T0841415.V15               COMPLETE
________   MVS   OPERLOG:SYSPLEX.OPERLOG                           COMPLETE
******************************* Bottom of data ********************************
```

CICS DBCTL problem: interactive investigation

```
  File  Mode  Filter  Time  Labels  Options  Help
------------------------------------------------------------------------------
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00000059 More: < >
Command ===> filter                                        Scroll ===> PAGE
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday Time (LOCAL)
/  ---- ------------------------------------------------------ ---------------
__ 50   Database Update Database=DI21PART Region=0002          08.41.41.519325
__ 50   Database Update Database=DI21PART Region=0002          08.41.41.519601
__ 50   Database Update Database=DI21PART Region=0002          08.41.41.519659
__ 43   Log Data Set Control                                   08.41.41.567359
__ 42   Log Buffer Control                                     08.41.41.567362
__ CA52 DFS3257I ONLINE LOG NOW SWITCHED - FROM DFSOLP00 TO DF 08.41.41.567883
__ CA52 DFS3257I ONLINE LOG NOW SWITCHED - FROM DFSOLS00 TO DF 08.41.41.569543
__ CA52 HTRT03I JCP1FUW  VERIFY0              00     69        08.41.41.649266
__ CA52 HTRT03I JCP1FUW  DELC0                00     30        08.41.41.802076
__ CA52 $HASP100 JCP1FUW  ON INTRDR      FUW Testing           08.41.41.997997
__ CA52 HTRT03I JCP1FUW  VERIFYS              00     53        08.41.42.040191
__ CA52 IRR010I  USERID JCP1     IS ASSIGNED TO THIS JOB.      08.41.42.139646
__ CA52 HTRT03I JCP1FUW  DELCS                00     36        08.41.42.203048
__ 5C   File System Activity                                   08.41.42.250000
__ CA52 HTRT03I JCP1FUW  DELETES              00     34        08.41.42.356674
__ CA52 $HASP100 IBB1#ARC ON INTRDR      IMSDBC                08.41.42.552139
__ CA52 IRR010I  USERID STC@IMS  IS ASSIGNED TO THIS JOB.      08.41.42.569636
```

CICS DBCTL problem: filtering records

```
  File  Menu  View  Help
VIEW                           Filter                    Row 1 of 1 More: < >
Command ===> ______________________________________________ Scroll ===> PAGE

Specify filtering criteria then press EXIT (F3) to apply the filter.

Filter . . . . . ________  +
Description . . . New Log Record Filter ______________  _  Activate Tracking

/ Log Code + Exc Description
S CMF 6E13        CICS Transaction
                  Level ___  Conditions ___  Form ________ + REXX ________
------------------------------------------------------------------------------
****************************** Bottom of data *******************************
```

CICS DBCTL problem: filtering records

```
   File  Menu  Edit  Object Lists  Help
 ──────────────────────────────────────────────────────────────────────────────
                                  Conditions                       Row 1 to 1 of 1
 Command ===> ________________________________________________ Scroll ===> PAGE

 Code: 6E13 CICS Transaction

 /  Field Name +                       Oper Value +
 _  ABEND_____________________________ NE__ ' '___________________________________
 ******************************* Bottom of data ********************************
```

CICS DBCTL problem: viewing a CMF record

```
  File  Mode  Filter  Time  Labels  Options  Help
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00008199 More: < >
Command ===> _____________________________________________ Scroll ===> PAGE
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday Time (LOCAL)
/  ---- ------------------------------------------------- ---------------
s  6E13 CICS Transaction TranCode=TWMU Task=170 Abend=ADCD     08.47.22.063694
__ 6E13 CICS Transaction TranCode=TWMU Task=171 Abend=DE40     08.47.36.143484
__ 6E13 CICS Transaction TranCode=TWMU Task=173 Abend=DE40     08.47.51.142989
__ 6E13 CICS Transaction TranCode=TWMU Task=174 Abend=DE40     08.48.06.140979
__ 6E13 CICS Transaction TranCode=DBEU Task=181 Abend=ADCD     08.48.42.298937
__ 6E13 CICS Transaction TranCode=DBEU Task=183 Abend=ADCD     08.48.56.165539
__ 6E13 CICS Transaction TranCode=TWMU Task=185 Abend=DE40     08.49.10.328848
__ 6E13 CICS Transaction TranCode=DBEU Task=188 Abend=ADCD     08.49.29.735139
__ 6E13 CICS Transaction TranCode=DBEU Task=189 Abend=ADCD     08.49.41.183492
__ 6E13 CICS Transaction TranCode=DBEU Task=193 Abend=ADCD     08.50.03.586072
__ 6E13 CICS Transaction TranCode=TWMU Task=201 Abend=DE40     08.50.56.233561
__ 6E13 CICS Transaction TranCode=DBEU Task=200 Abend=ADCD     08.50.50.772178
__ 6E13 CICS Transaction TranCode=TWMU Task=223 Abend=ADCD     08.55.31.495953
******************************* Bottom of Data ********************************
```

CICS DBCTL problem: viewing a CMF record

```
BROWSE     FUNDID.SMF.D110406.DEADLOK.FULL       Record 00000006 Line 00000000
Command ===> ____________________________________________________ Scroll ===> PAGE
Form    ===> CMF      +  /  Use Form in Filter                    Format ===> FORM
******************************** Top of data ********************************
+0005  Code... 6E13  CICS Transaction
+0366  STCK... C79458194C1A7D60      LSN.... 0000000000000006
       Date... 2011-04-06 Wednesday  Time... 08.39.14.241959.835

+0005  SMFRTY..... 6E          SMFSID..... 'FTS3'     SMFMNPRN... 'FUWTCIC '

+0352  DFHTASK.... Task Control
+0352  Tran....... 'TWMU'      SC......... 'TO..'
+09E2  Dispatch... 0.006213/55                         UserCPU.... 0.005241/55
+09FA  Suspend.... 7.032136/55                         TaskNo..... +113
+0396  NETName.... 'FTS3.VAPFUW1B.......'   NETUOWID... 9458194C25C60001
+0A06  DispWait... 0.001080/54
+0C0A  RMIElap.... 0.020270/43 RMISusp.... 0.018037/39 ExtWait.... 0
+0C5E  CICSWait... 0           ICDelay.... 7.013661/7  GiveUpWt... 0
+03EA  RRMSURID... 00000000    RRMSWait... 0           DSCHMDLY... 0
+0AEA  QRModDly... 0.001080/54                         MaxOTDly... 0
+0A1E  QRCPU..... 0.005241/55                         MSDisp..... 0

       DFHCICS.... CICS task information
+0366  Start...... C79458194C1A7D60
+036E  Stop....... C794582002735C60                    Response... 7.038349
+035A  Userid..... 'FUW1    '  ExcWait.... 0           RTyp....... '   T'
+03B2  RSID....... 00000000    RecCount... +1
+03C2  SrvClass... 'TRANLO  '  RptClass... 'RCICS   '  EICTotCt... +28
```

CICS DBCTL problem: viewing a CMF record

```
        DFHDATA.... Data processing
+0916   IMSReqs.... +37          IMSWait.... 0.018037/39
+091A   DB2Reqs.... +0           DB2ThdWt... 0           DB2ConWt... 0
+0CFA   DB2SQLWt... 0           WMQReqs.... +0          WMQGetWt... 0
+0DAE   WMQSRBtm... 0

        DFHRMI..... Resource Manager (RMI)
+0DBA   RMITotal... 0.020270/43
+0DC6   RMIOthr.... 0.000011/2  RMIDB2..... 0           RMIDBCTL... 0.008084
+0DEA   RMIEXDLI... 0.012174/40                         RMIMQ...... 0
+0E02   RMICPSM.... 0           RMITCPIP... 0

        DBCTL...... IMS DBCTL
+0E1A   PSBName.... 'DFHTWM04'  PoolWait... 0           IntCWait... 0
+0E32   SchTElap... 0.000149    DBIOElap... 0.005186    PILockEl... 0
+0E4A   DBIOCall... +5          GUcall..... +0          GNcall..... +0
+0E56   GNPcall.... +0          GHUcall.... +14         GHNcall.... +0
+0E62   GHNPcall... +0          ISRTcall... +7          DLETcall... +7
+0E6E   REPLcall... +7          DLIcalls... +35         TestENQs... +0
+0E7A   TestENQW... +0          TestDEQs... +0          UpdtENQs... +0
+0E86   UpdtENQW... +0          UpdtDEQs... +0          ExclENQs... +0
+0E92   ExclENQW... +0          ExclDEQs... +0          DEDBcall... +15
+0EAC   DEDBRdOp... +3          OvflBfrU... +0          UOWConts... +0
+0EB4   DEDBBfrW... +0          USSN....... 0000002B    ThredCPU... 000000B9
+0E9A   SchedSta... C79458194C57AD22        SchedEnd... C79458194C60F902
********************************* End of data *********************************
```

CICS DBCTL problem: transaction tracking

```
  File  Mode  Filter  Time  Labels  Options  Help
------------------------------------------------------------------------------
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00008199 More: < >
Command ===> _____________________________________________ Scroll ===> PAGE
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday Time (LOCAL)
/  ---- ------------------------------------------------- ---------------
tx 6E13 CICS Transaction TranCode=TWMU Task=170 Abend=ADCD     08.47.22.063694
__ 6E13 CICS Transaction TranCode=TWMU Task=171 Abend=DE40     08.47.36.143484
__ 6E13 CICS Transaction TranCode=TWMU Task=173 Abend=DE40     08.47.51.142989
__ 6E13 CICS Transaction TranCode=TWMU Task=174 Abend=DE40     08.48.06.140979
__ 6E13 CICS Transaction TranCode=DBEU Task=181 Abend=ADCD     08.48.42.298937
__ 6E13 CICS Transaction TranCode=DBEU Task=183 Abend=ADCD     08.48.56.165539
__ 6E13 CICS Transaction TranCode=TWMU Task=185 Abend=DE40     08.49.10.328848
__ 6E13 CICS Transaction TranCode=DBEU Task=188 Abend=ADCD     08.49.29.735139
__ 6E13 CICS Transaction TranCode=DBEU Task=189 Abend=ADCD     08.49.41.183492
__ 6E13 CICS Transaction TranCode=DBEU Task=193 Abend=ADCD     08.50.03.586072
__ 6E13 CICS Transaction TranCode=TWMU Task=201 Abend=DE40     08.50.56.233561
__ 6E13 CICS Transaction TranCode=DBEU Task=200 Abend=ADCD     08.50.50.772178
__ 6E13 CICS Transaction TranCode=TWMU Task=223 Abend=ADCD     08.55.31.495953
****************************** Bottom of Data ******************************
```

CICS DBCTL problem: transaction tracking

```
  File  Mode  Filter  Time  Labels  Options  Help
-------------------------------------------------------------------------------
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00007007 More: < >
Command ===> _____________________________________________ Scroll ===> PAGE
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday Time (LOCAL)
/  ---- ------------------------------------------------- ----------------
__ 08   Application Start TranCode=TWMU Program=DFHTWM04        08.47.22.064705
__ 5607 Start of UOR Program=DFHTWM04 Region=0002               08.47.22.064706
__ 50   Database Update Database=DI21PART Region=0002           08.47.22.066178
__ 50   Database Update Database=DI21PART Region=0002           08.47.22.066466
__ 50   Database Update Database=DI21PART Region=0002           08.47.22.066498
__ 50   Database Update Database=DI21PART Region=0002           08.47.22.066649
__ 50   Database Update Database=DI21PART Region=0002           08.47.22.066690
__ CA52 HTRT03I JCP1FUW  REXEXPF              00    220         08.47.22.231829
__ CA52 HTRT03I JCP1FUW  UPDATE0              00     53         08.47.22.367418
__ CA52 HTRT03I JCP1FUW  DELETE0              00     36         08.47.22.515830
__ CA52 IEF404I JCP1FUW - ENDED - TIME=08.47.22                 08.47.22.519622
__ CA52 *=======================================================08.47.22.522669
__ CA52 |STEP# | STEPNAME | PROCSTEP | CONDCODE | CPUSECS | NU 08.47.22.525021
__ CA52 |=======================================================08.47.22.526151
__ CA52 |00001 | ALCMAST0 |          |   0000   |    0.03 |    08.47.22.527595
__ CA52 |00002 | FUWBAT   |          |   0000   |    0.04 |    08.47.22.528589
__ CA52 |00003 | REXEXM0  |          |   0000   |    0.12 |    08.47.22.530020
```

CICS DBCTL problem: identifying the specific problem

```
  File  Mode  Filter  Time  Labels  Options  Help
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00007297 More: < >
Command ===> _____________________________________________ Scroll ===> PAGE
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday LSN
/  ---- ------------------------------------------------------ ----------------
s  67FF Exception Condition SNAP - DEADLOCK                     2-00000000000F0B
__ 38   Release Input Message after Application ABEND          2-00000000000F2F
__ 5938 FP SYNC Fail-Application Program or Pseudo ABEND       2-00000000000F30
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F31
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F32
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F33
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F34
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F35
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F36
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F37
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F38
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F39
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F3A
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F3B
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F3C
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F3D
__ 50   Database Update Database=DI21PART Region=0002          2-00000000000F3E
```

CICS DBCTL problem: identifying the affected segment

```
  File  Menu  Format  Help
-------------------------------------------------------------------------------
BROWSE     FUNDID.SMF.D110406.DEADLOK.FULL +     Record 00002368 Line 00000032
Command ===> ____________________________________________________ Scroll ===> CSR
Form    ===>          +     Use Form in Filter                    Format ===> STD
+0080  DIPWAITR... Waiter Entry
+0080  DIPWOWU.... 00AABBB71BBB7060
+0088  DIPWRWU.... 00AABBB71BBB7060
+0090  DIPWDBMS... 'IBB1    '  DIPWWRTH... 5C          DIPWFUNC... 02
+009A  DIPWSTAT... 06          DIPWFROM... 00          DIPWDURA... 00
+009D  DIPWCLS.... 00          DIPWFLG.... 0B

+00A0  DLKDLD..... IRLM supplied UserData
+00A0  DLKDJOB.... 'FUWTCIC '  DLKDSTEP... 'FUWTCIC '
+00B0  DLKDPSB.... 'DFHTWM04'  DLKDPCBN... 'DI21PART'
+00C0  DLKDBNM.... 'DI21PART'  DLKLRPRM... 30400378    DLKLRIPM... 30400358
+00D0  DLKDCALL... 01          DLKDFLG1... 80          DLKDFLG2... 00
+00D4  DLKDMBTY... 09          DLKDRTYP... 02          DLKDPSTN... 0001
+00D8  DLKDSTCK... 9459EC803E0A41                      DLKDKYLN... +16
+00E0  DLKDKEY.... Key of Data Base record
      +0000  F0F2F9F2 F5F3F6F3 60F1F3F6 40404040   *02925363-136     *

+01E0  DIPENTRY... Deadlock Information Parameter List Entry
+01E0  DIPFLAG2... C0
```

CICS DBCTL problem: tagging a specific log record

```
  File  Mode  Filter  Time  Labels  Options  Help
------------------------------------------------------------------------------
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00007297 More: < >
Command ===> _____________________________________________ Scroll ===> PAGE
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday Time (LOCAL)
/  ---- ------------------------------------------------- ----------------
g_ 67FF Exception Condition SNAP - DEADLOCK                  08.47.36.016740
        UTC=08.47.36.016343 Region=0002
        Winner: IMS=IBB1 Job/Tran=FUWTCIC  PST=0001 PSB=DFHTWM04 DMB=DI21PART
        Victim: IMS=IBB1 Job/Tran=FUWTCIC  PST=0002 PSB=DFHTWM04 DMB=DI21PART
   ---------------------------------------------------------------------------
__ 38   Release Input Message after Application ABEND        08.47.36.019855
        Region=0002 RecToken=FUWTCIC/C79459EA853EFB03
   ---------------------------------------------------------------------------
__ 5938 FP SYNC Fail-Application Program or Pseudo ABEND     08.47.36.030531
        UTC=08.47.36.030522 Program=DFHTWM04 Region=0002
        OrgUOWID=IBB1/C79459F7D7136603 RecToken=FUWTCIC/C79459EA853EFB03
        RegTyp=DBC DBCall=10 DBGet=4 DBUpd=6 DBWait=0
   ---------------------------------------------------------------------------
__ 50   Database Update                                      08.47.36.047752
        UTC=08.33.00.631046 Program=DFHTWM04 Database=DI21PART RBA=00008B5E
        Region=0002 RecToken=FUWTCIC/C79459EA853EFB03
   ---------------------------------------------------------------------------
```

CICS DBCTL problem: tagging a specific log record

```
  File  Mode  Filter  Time  Labels  Options  Help
BROWSE    FUNDID.SMF.D110406.DEADLOK.FULL +          Record 00007297 More: < >
Command ===> _____________________________________________ Scroll ===> CSR
   Slice . . Duration  00.14.19     Date  2011-04-06     Time  08.41.41.519325
   Code Description  < 00.05.00.000000 >  2011-04-06 Wednesday Time (LOCAL)
/  ---- ------------------------------------------------- ---------------
__ TAG  Cause of abend in CICS DBCTL transaction                08.47.36.016740
__ 67FF Exception Condition SNAP - DEADLOCK                     08.47.36.016740
__ 38   Release Input Message after Application ABEND           08.47.36.019855
__ 5938 FP SYNC Fail-Application Program or Pseudo ABEND        08.47.36.030531
__ 50   Database Update                                        08.47.36.047752




__ CA52 DFS968I  DBD=DI21PART WITHIN PSB=DFHTWM04 SUCCESSFULLY 08.47.51.053525
__ CA52 DFS980I BACKOUT PROCESSING HAS ENDED FOR DFHTWM04 IBB1 08.47.51.056589

.
.
.
```

- The cause of the CICS transaction problem has been narrowed down to a deadlock in IMS
- Sufficient information about the two applications involved can now be passed on to the application developers

SMF reports

- System events or constraints can affect transaction processing
- Workbench provides reports for selected SMF record types, specifically aimed at identifying performance-related issues

System-related:

- SMF 30: Address Space activity; including CICS, IMS, DB2
- RMF 70-1: CPU usage
- RMF 76: Page data sets
- RMF 78-2: Virtual Storage
- SMF 64: VSAM data set I/O

Subsystem-related:

- SMF 33-2: APPC conversations
- SMF 88-1: System Logger
- SMF 101: DB2 accounting
- SMF 116: WebSphere MQ

Where are we going from here?

Feedback from the recent IMS Tools CAC

- “Would rather have automation take care of monitoring the databases.”
- The amount of work continues to grow but not the number of skilled DBAs. Automation will help.“
- “Having the repository will replace tedious tasks for generating many reports and maintaining in-house written procedures.”
- "reduce the amount of time spent on monitoring database environment."
- “Front end improvements would attract younger technicians and benefit all. The ability to have both GUI and mainframe normal access would be good.”
- “Must be able to access information quickly and easily in an easy-to-read format.
- “Simplify user interface, especially the initial setup/configuration, share this info between tools so each tool does not require its own unique setup.”

For more information on IMS Tools products

- Visit following web pages:
  - **IMS Database Reorganization Expert for z/OS**
    ibm.com/software/data/db2imstools/imstools/ims-reorganization-expert/
  - **IMS Database Solution Pack for z/OS**
    ibm.com/software/data/db2imstools/imstools/ims-database-solution-pack/
  - **IMS Tools Base for z/OS (IMS Tools KB, Policy Services, etc.)**
    ibm.com/software/data/db2imstools/imstools/ims-base-solution-pack/
  - **IBM Transaction Analysis Workbench for z/OS**
    http://www-01.ibm.com/software/data/db2imstools/imstools/trans-analysis
- Visit also:
  - **IBM IMS Tools Portal**
    ibm.com/software/data/db2imstools/products/ims-tools.html

Any Question?