



**IBM Optim Performance Manager
V4.1.0.1 Extended Edition for IBM DB2**
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InformationOnDemand**India2011**

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Who Needs InfoSphere Optim Solutions for Managing Performance?

Target Audience

- CIO
- IT Director
- Database Administrators
- Developers
- Administrators



CIO



IT Director



Developer



DBA/
Administrator

What are they working on?

- BI & Data Warehousing
- OLTP transactional systems
- DB2 environments
- ERP applications
- Application Implementation, Consolidation or Migration
- Custom & Packaged applications

How is performance managed today?

- Reactive approach using tedious, manual processes and disconnected tools

Why is this a challenge?

- **Expensive** - Need specialized skills
- **Time-consuming** - Gather disparate diagnostics
- **Imprecise & error-prone** - Correlate data to pin-point problem
- **Stop-Gap Approach** – Use band-aid solution
- **Reactive** - Address performance only after negative business impact or missed SLA



InfoSphere Optim Solutions for Managing Performance

Key Business Values



✓ **Guided Problem Solving Approach**

- Identify, diagnose, solve and prevent problems
- Integrate with the InfoSphere Optim family to close the loop on problem resolution

✓ **Overall Performance Management**

- Manage performance of both databases and applications
- Deliver application monitoring for Java™ and DB2 Call Level Interface (CLI) applications, with out-of-the-box configurations for SAP, WebSphere, Cognos, InfoSphere DataStage, and InfoSphere SQL Warehouse applications
- Integrate with Tivoli for enterprise performance analysis

✓ **Rapid deployment for immediate value**

- Install and configure quickly with templates

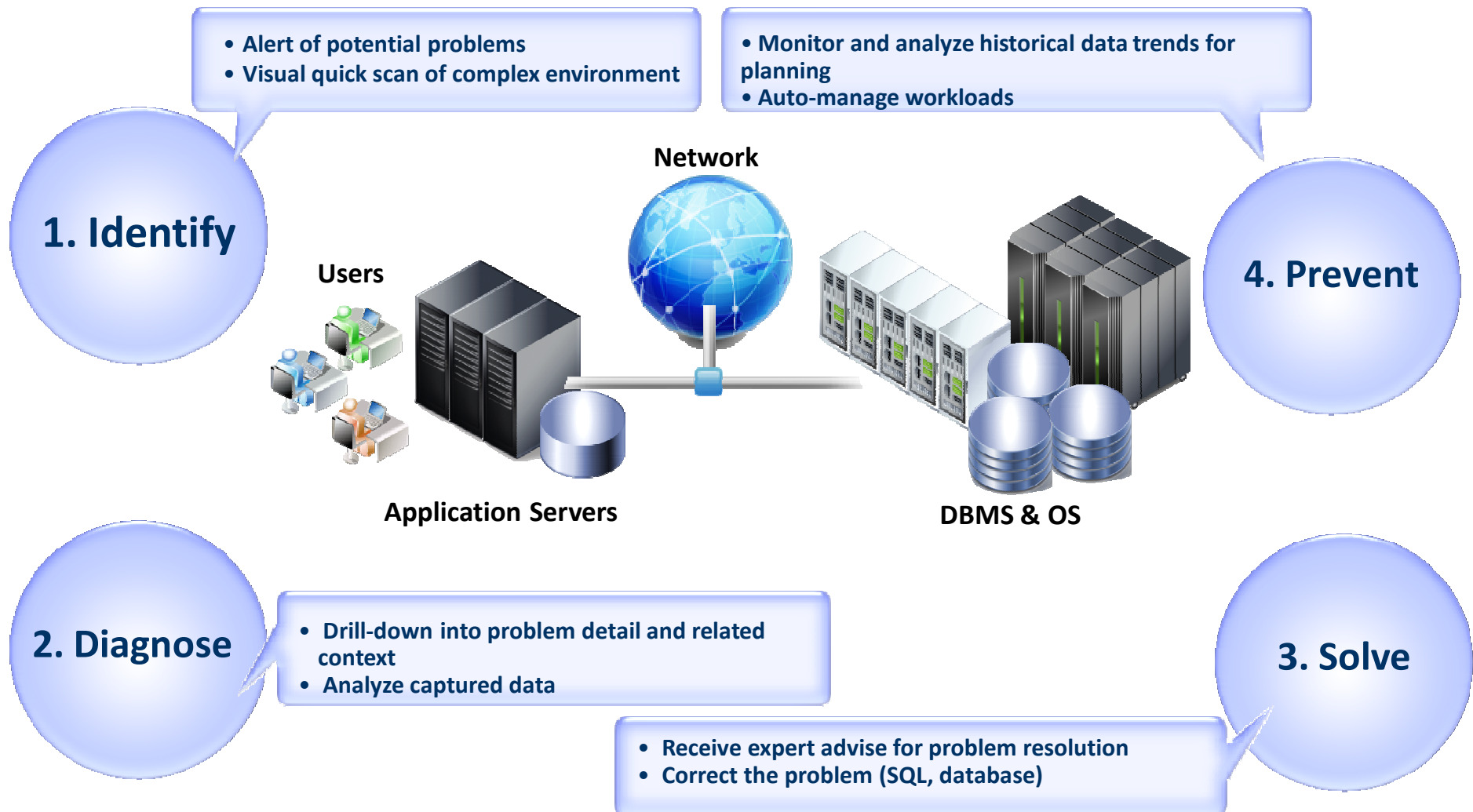
Supporting Product Offerings

- *InfoSphere Optim Performance Manager V4.1.0.1*
- *InfoSphere Optim Performance Manager Extended Edition V4.1.0.1*



Guided Problem Solving Approach

Identify, diagnose, solve and prevent performance problems





New Optim Performance Manager for DB2 on LUW (OPM)

- Successor product of DB2 Performance Expert
- New easy-to-use browser interface
 - To access health and availability information outside of the office
 - Overall health summary with immediate problem detection and drill-down analysis
 - Reduce „up and running“ costs with single simplified install per site
- Integration with IBM Optim Query Tuner
 - Get immediate expert advice and resolve problematic SQL statements
- Integration with Optim Development Studio
 - Detect line of code containing SQL statement for immediate problem resolution
- Immediate resolution of common performance problems with OPMs problem focused dashboards
- Integrated workload management UI
 - Let's you assign resources to the right tasks
- Enhanced Extended Insight
 - Support for more than just JCC clients with new CLI support
 - Out of the box support for Cognos, SAP, SQW, and DataStage
 - Insights into what workload is doing inside database (I/O, locking, etc.)
- New graphical report engine
- **FixPack 1 just released with additional functionality**



Optim Monitoring Editions



Optim Performance Manager Extended Edition

- o Transaction Response Times
- o end-to-end database monitoring

Optim Performance Manager

- o Performance alerts
- o Inflight analysis
- o WLM configuration & monitoring
- o Reports
- o Historical information

Data Studio Health Monitor

- o Health monitoring
- o Health alerts

Part of DB2 Performance Optimization Feature

No-charge



DB2 Advanced Enterprise Server Edition



DB2 9.7 Advanced Enterprise Server Edition is based on DB2 Enterprise Server Edition and includes key features and tools for complex information systems including:

- DB2 9.7 Enterprise Server Edition
- DB2 9.7 Storage Optimization feature
- DB2 Advanced Access Control feature

DB2 Workload Management feature

Optim Performance Manager

- Data Studio 2.2.1
- Optim Development Studio 2.2.1
- Optim Database Administrator 2.2.3
- Limited use Homogeneous Replication feature
- InfoSphere Federation Server between DB2 and Oracle data sources

... all at a low cost and with one part number



Data Studio Health Monitor

New in FP1



- Replacing DB2s Health Monitor
- Offered at no-charge in a standalone version, or as part of an OPM edition
- Can be downloaded here: <http://www-01.ibm.com/software/data/optim/>
- Offers health alerts and basic monitoring capabilities:
 - Look at current application connections
 - Check which statements are currently running
 - Check current table space status
 - Be alerted for health problems
- Database Status
- Number of Connections
- Table space states
- Table space utilization
- HADR state

The screenshot displays the Optim Performance Manager interface. The top section shows 'Current Table Spaces' with a table of table space details. Below this, there are navigation tabs for 'Health Summary', 'Alert List', 'Current Application Connections', 'Current Table Spaces', and 'Current Utilities'. The main area shows a list of application connections with columns for Product, Client ID, Idle Time, Rows Read, and Rows Written.

ID	Name	Type	Content type	State	Utilization	Free Size (KB)	Total Pages	Usable Pages	Used Pages	Free Pages	Total Size (KB)
0	SYSCATSPACE	DMS	ANY	NORMAL	83.31%	16400	24576	24572	20472	4100	98304
1	TEMPSPACE1	SMS	SYSTEMP	NORMAL	0%		1	1	1	0	4
2	USERSPACE1	DMS	LARGE	NORMAL	21.96%	24704	8192	8160	1792	6176	32768
3	SYSTOOLSPACE	DMS	LARGE	NORMAL	1.85%	32144	8192	8188	152	8036	32768

Product	Client ID	Idle Time	Rows Read	Rows Written
SQL09072	7988	24	7666	2562
SQL09072	7988	20	96	84
JCC03580	0	0	0	0
JCC03580	0	2258	5	0
JCC03580	0	1851	0	0
JCC03580	0	1852	0	0
JCC03580	0	2721	0	1333
JCC03580	0	1852	0	0
JCC03580	0	2721	0	1340
JCC03580	0	2721	177	0
JCC03580	0	1853	2	0
JCC03580	0	2721	0	150





OPM - Getting a health overview – the Health Summary

Alert details tell you what happened when and where

Databases can be grouped together into e.g. QA, test, production

Alert Severity	Critical	Warning	Data Server Status	Monitoring Status	Memory Usage	CPU Utilization (%)	Connections	Storage	Recovery	Workload	Logging	I/O	Sorting	Locking	Transactions (/min)	Physical Page I/O (/min)	Lock Wait Time (sec)	Longest Running SQL (sec)	Average End-to-End Response Time (sec)	Maximum End-to-End Response Time (sec)
DEMO@local	13	5	--	1...	14	--	--	--	--	--	--	1...	46...	0s	0.5...	0.047s	1.713s			

Severity	Alert Type	Start Time	End Time
Warning	Table Space Cont...	09/14/2010 01:13:09 PM	
Warning	Table Space Cont...	09/14/2010 01:13:09 PM	
Warning	Table Space Cont...	09/14/2010 01:13:09 PM	
Warning	Table Space Cont...	09/14/2010 01:13:09 PM	
Critical	Table Space Utili...	09/14/2010 01:13:09 PM	

... gives you a quick overview about the health and utilization of ALL your databases.

- alerts for performance areas will tell you immediately if something is critical and needs further attention
- alerts can be send automatically via email to database staff, even if not being logged on
- alert sensitivity can be adjusted a according to system and workload
- configuration can easily be cloned to other databases
- chronological list of alerts also available



Enhanced alerting and notification capabilities



New in FP1

Flexible alert notifications per alert type, alert severity and database ...

- Send Email or SNMP trap to console, such as TEC or HP Openview
- Send reminder if problem still open

New Alert Notification

Alert type:

Alert description: The percentage of data, index, and XML data pages that were already in the buffer pool when an application requested the data.

Severity:

Enabled

Email addresses:

Send SNMP notifications

Reminder interval: Repeat every minutes
 Do not repeat

Send a notification when an alert is closed

Blackout time: Use blackout time
 Start time:
 End time:
 No blackout time

Notes:

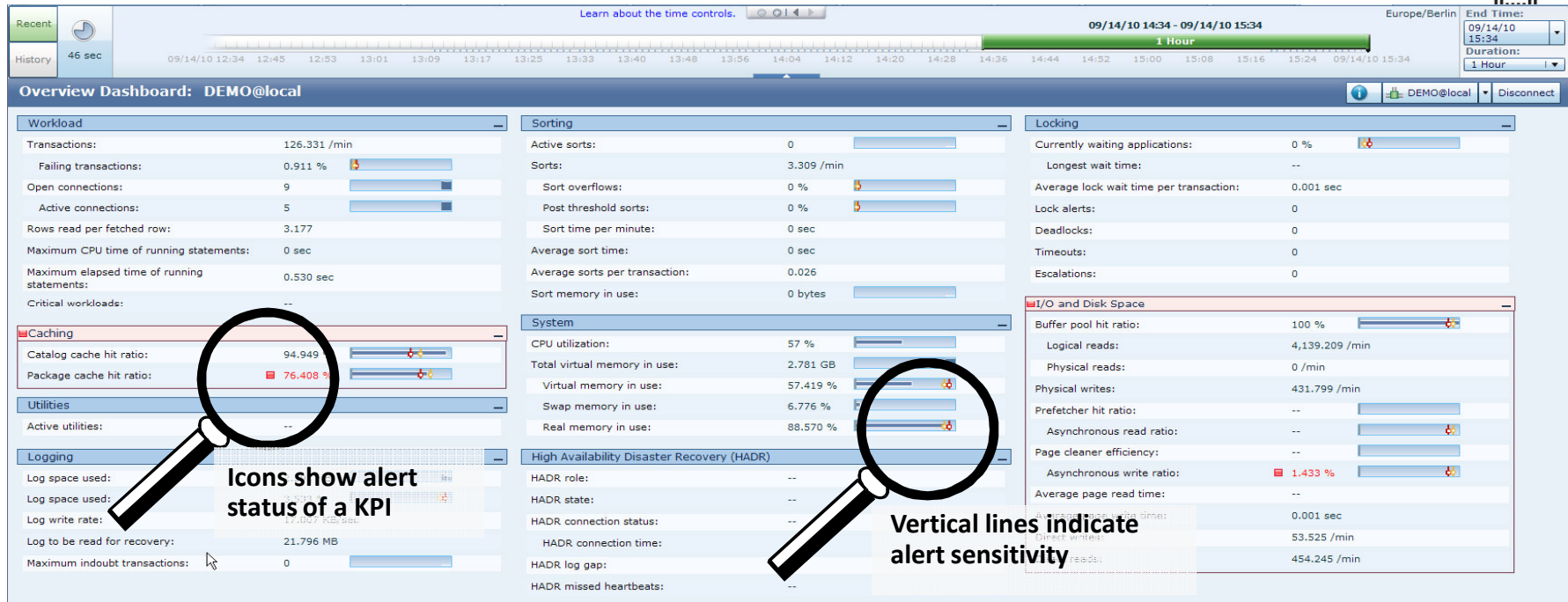
Alerts during maintenance windows

SNMP	Reminder Interval	Notify On Close	Blackout Time
<input type="checkbox"/>	15	No	--
<input type="checkbox"/>	15	No	--
<input checked="" type="checkbox"/>	10	Yes	2:48 PM - 3:48 PM
<input checked="" type="checkbox"/>	15	No	2:48 PM - 3:48 PM
<input checked="" type="checkbox"/>	15	No	2:48 PM - 3:48 PM





Getting a health overview – the Overview dashboard



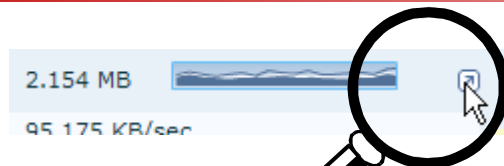
... gives you a quick overview about the health and utilization of a database.

- Key-performance-indicators (KPIs) will tell you what's going on
- alerts for critical areas will tell you if something is critical and needs further attention
- detailed dashboards for each of the areas will let you then isolate and analyze a problem
- historical information lets you go back in time and see how a problem arised, or if problems occurred in the past



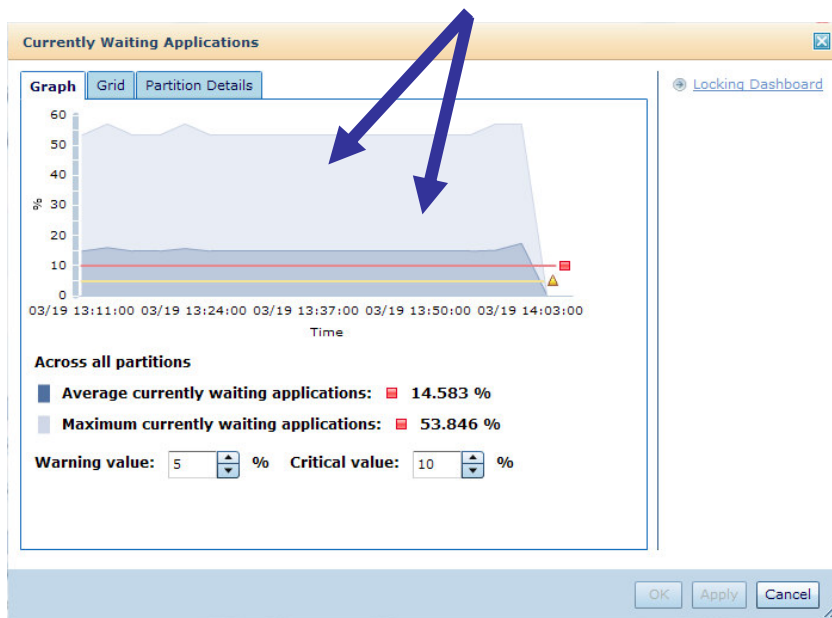


Getting a health overview – the overlays

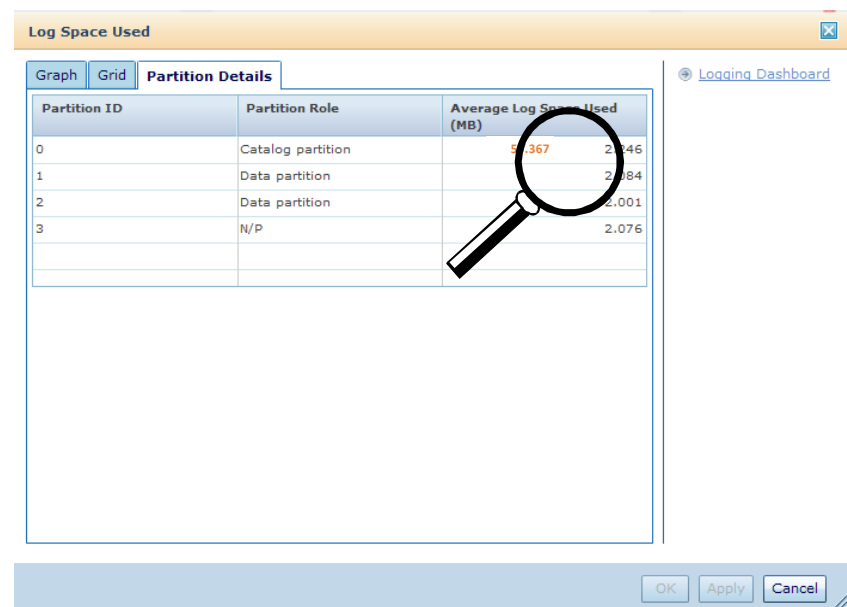


Buttons let you get more information

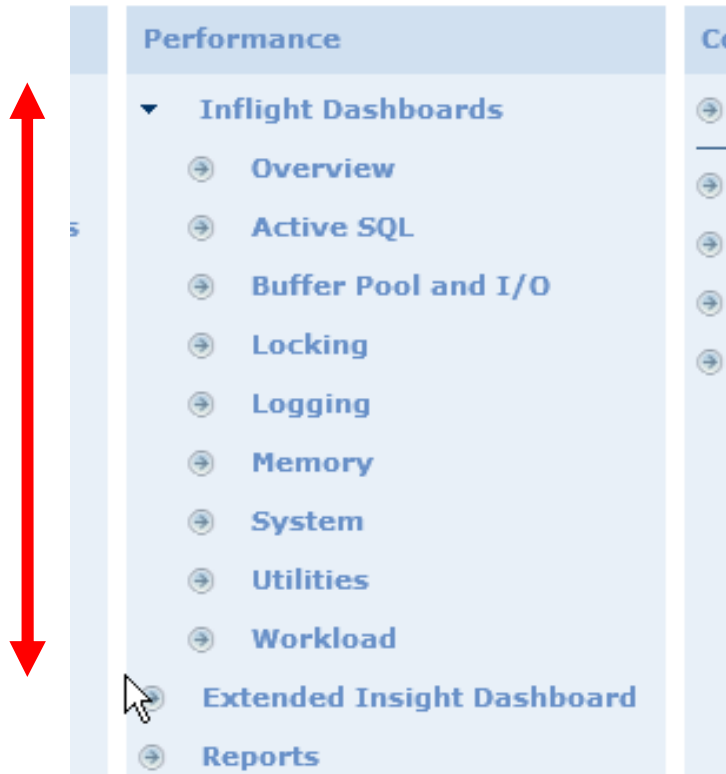
Charts tell you what the average was and if there was an outlier partition ...



...and which partition it was



OPMs inflight dashboards



... will let you quickly isolate and analyze typical database performance problems

- **Memory**
Check memory consumption of system and see which areas consume how much memory and if they really need it.
- **Buffer Pool and I/O**
Check and tune database I/O
- **Active SQL**
Isolate misbehaving currently running queries, stop them, or tune them with Optim Query Tuner
- **Logging**
Check and tune log performance
- **Locking**
Identify, analyze, and fix deadlocks, timeouts, and lock waits
- **Utilities**
Plan execution of utilities and identify failures
- **System**
Check system resources
- **Workload**
Get overview about database utilization



Locking dashboard



Locking Dashboard: SAMPLE@uzziel

This dashboard shows the workload cluster groups that are in a locking situation. Click a workload cluster group to view locking information for that group.

Overview

Database Workload	Maximum Wait Time (sec)	Maximum Block Time (sec)	Lock Wait Alerts	Deadlocks	Timeouts
SAMPLE@uzziel	7,480	7,480	0	500	0
Client application names	7,480	7,480	0	500	0
Cognos report servers	0	0	0	0	0
Cognos users	0	0	0	0	0
Cognos report packages	0	0	0	0	0

Locking Information for Client application names

Locking Event (500) | Current Waiting Connections (8) | Current Blocking Connections (8)

The grid shows lock wait alerts, deadlocks, and timeouts for the selected workload cluster group. Choose an event and click Analyze to view about the participants and statements that are involved in the event.

Alert Time	Alert Name	Severity	Partition/Member
Fri Mar 19 14:16:05 CET 2010	Deadlock in application	PROBLEM	N/P
Fri Mar 19 14:16:05 CET 2010	Deadlock in application	PROBLEM	3
Fri Mar 19 14:16:05 CET 2010	Deadlock in application	PROBLEM	3
Fri Mar 19 14:16:05 CET 2010	Deadlock in application	PROBLEM	N/P
Fri Mar 19 14:15:55 CET 2010	Deadlock in application	PROBLEM	3
Fri Mar 19 14:15:55 CET 2010	Deadlock in application	PROBLEM	3
Fri Mar 19 14:15:55 CET 2010	Deadlock in application	PROBLEM	3

Deadlock in application

Overview | Participants | Statements | Lock

Activity ID	Participant 1 - Owner	Participant 2 - Victim
2	UPDATE WE_65X2B2P18DL2 set tex...	
1	SELECT * FROM WE_65X2B2P18DL2	
1		UPDATE WE_65X2B2P18DL2 set text='conn2' ...

Statement text

```
UPDATE WE_65X2B2P18DL2 set text='conn1' where id=2
```

Lock Details

General

Lock Name	000500110000000...
Lock Object Type	TABLE
Lock Attributes	00003010
Lock Mode Requested	U
Lock mode	U
Locks Held	1
Lock hold count	0
Lock Status	Converting
Release flags	40000001
Table name	WE_65X2B2P18DL2
Table Schema	TST97L6
Table Space Name	WE_BNBP18NTS1
Data partition id	N/P

Statement details

Participant ID:	5267
Activity ID:	2
QWJW ID:	659
Package Name:	SYSSH200
Package Schema:	NULLID
Package Version ID:	N/P
Consistency Token:	SYSLVL01
Section Number:	65
REOPT Bind Option:	none

Locking Event (500)

Analyze...

... let's you see the real application which is causing trouble or having problems.

- auto-detects typical applications, such as WebSphere apps, DataStage jobs, Cognos reports, SQL Warehouse operations, or SAP transactions
- helps to differentiate easily between critical problems and just 'background noise'
- uses application terms instead of database terms to point to root cause area (such as report name, or DataStage step ID inside job)
- shows you also the statement history which lead to a deadlock problem





Buffer Pool and I/O dashboard

Buffer Pool and I/O Dashboard: DEMO@local

Buffer Pools | Table Spaces | Tables

Show Lowest 5 | buffer pools by Hit Ratio (%) | Show Contained Objects | Change Configuration...

Buffer Pool Name	Main Usage	Buffer Pool Size (pages)	Hit Ratio (%)	Logical Reads (/min)	Physical Reads (/min)	Physical Writes (/min)	Updates per Read	Average Read Time (sec)	Avg Page Write Time (sec)	Prefetcher Hit Ratio (%)	Async Read Ratio (%)	Async Write Ratio (%)
Total	N/P	4,919	99.988	452,801.729	52.088	140.123		0.008	0.003	100	23.395	13.565
IBMDEFAULTBP	MIXED	4,855	99.988	452,801.729	52.088	140.123	0	0.008	0.003	100	23.395	13.565
IBMSYSTEMBP16K	MIXED	16	N/P	0	0	0	N/P	N/P	N/P	N/P	N/P	N/P
IBMSYSTEMBP8K	MIXED	16	N/P	0	0	0	N/P	N/P	N/P	N/P	N/P	N/P
IBMSYSTEMBP4K	MIXED	16	N/P	0	0	0	N/P	N/P	N/P	N/P	N/P	N/P

→ Detailed Information for IBMDEFAULTBP

General: Buffer pool name: IBMDEFAULTBP, Page size: 4,096 KB, Main usage: MIXED, Buffer pool size: 4,855 pages

Prefetchers: Number of I/O servers: 3, Number of prefetch requests: 3,252 /min, Prefetcher hit ratio: 100 %, Asynchronous read ratio: 23.395 %

Utilization and Health: Buffer Pool Size, Buffer Pool Hit Ratio, Logical Page I/O, Logical versus Physical I/O Activity

Double clicking or using the 'Show Contained Objects' button lets you drill down into contained objects ...

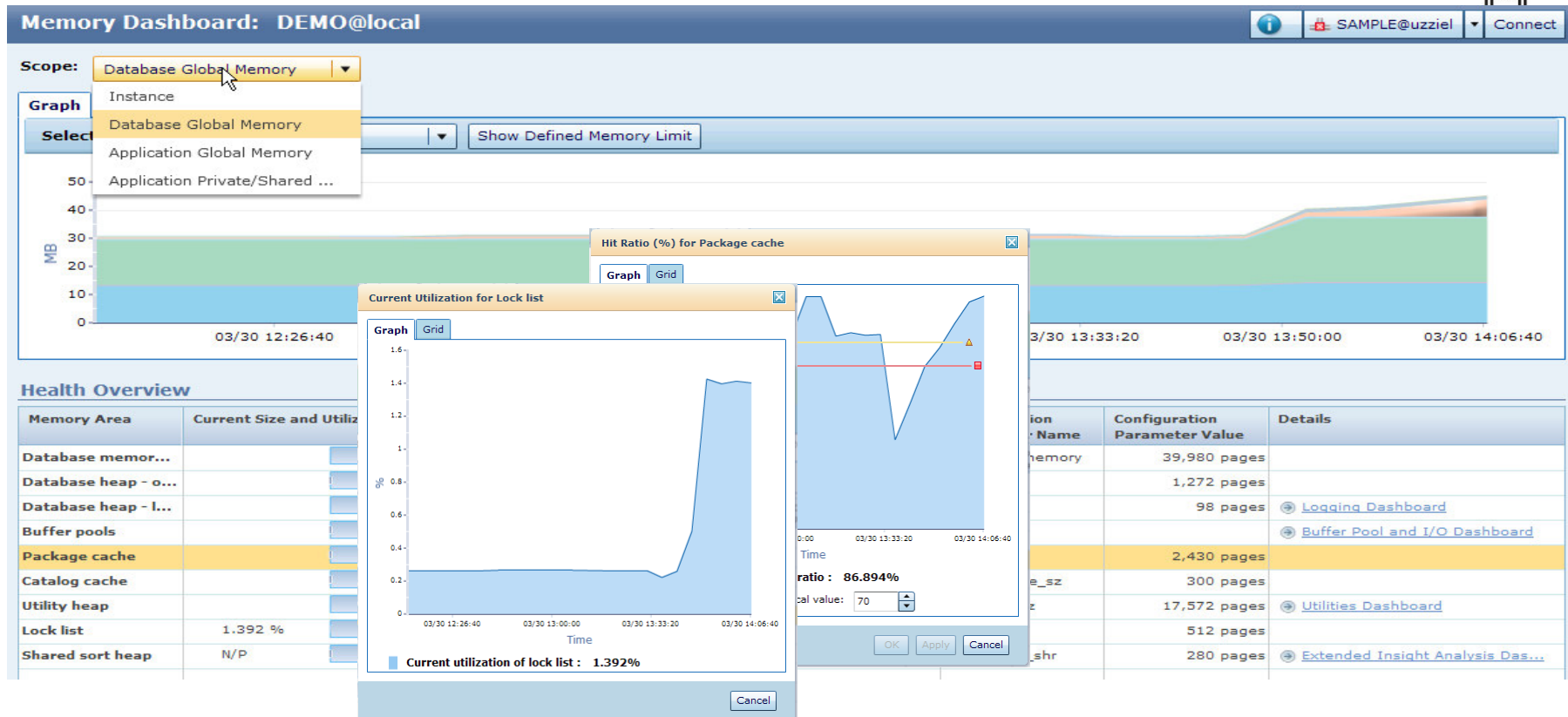
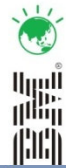
Buffer Pool ↔ Table Space ↔ Table

... lets you check buffer pools, table spaces, and tables

- helps identifying hot objects and moving them to dedicated buffer pools
- lets you check the appropriate size of a buffer pool
- lets you check the disk space and container definition of table spaces

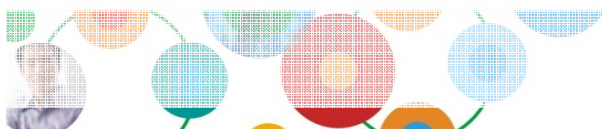


Memory dashboard

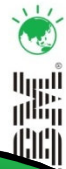


... lets you check which area inside DB2 is using how much memory

- shows memory usage by instance, database, application shared usage, and application private usage
- shows you how those areas are configured
- for a partitioned DB you also see if you have outlying partitions
- depending on the area you also get health information (hit ratios) and utilization information



Active SQL dashboard



New in FP1

The screenshot shows the Active SQL Dashboard interface. At the top, there's a header with 'Active SQL Dashboard: DEMO@local' and a 'Disconnect' button. Below the header is a table of active SQL statements with columns for Statement Text, Start Time Stamp, Stop Time Stamp, Elapsed Time (sec), CPU Time (sec), Sort Time (sec), Sort Overflows, Rows Read, Rows Written, Logical Read I/O (pages), and Physical Read I/O (pages). A red arrow points from the 'Customize Columns...' button in the table header to a 'Column Settings' dialog box. The dialog box has a title bar and a list of checkboxes for additional columns to display: Authentication ID, Client User ID, Client Workstation Name, Client Application Name, Accounting String, and WLM Workload ID. Below the table, there's a section for 'SQL Statement Details' showing the statement text, row statistics, and application/workload information. A red box highlights the 'Transactions' section, which shows transaction start timestamp, lock wait time, and log space used. A green oval with 'New in FP1' is positioned next to this section.

... lets you add information about the WLM workload it is running under, or about the DB2 client information fields (if set by your application)

... lets you easily check if rogue queries are eating up your database resources

- queries can be stopped or whole connection be canceled if necessary
- statement execution plan can be analyzed via Optim Query Tuner for a missing index, MQT, or outdated statistics
- historical data allows you to better plan execution of heavy statements



Tune queries with *Optim Query Tuner*



Active SQL Dashboard: DEMO@local

Learn about tuning SQL statements, stopping SQL statements, and forcing applications.

Show highest 5 by Elapsed Time (sec)

Statement Text	Start Time Stamp	Stop Time Stamp
CALL WE_M09E2IP1C.WE_CR_TB(100, 10, 'WE_M09E2...	03/30 13:30:49	03/30 13:51:12
SELECT * FROM SYSCAT.COLUMNS AS A, SYSCAT.TAB...	03/30 13:31:21	03/30 13:51:12
SELECT * FROM SYSCAT.COLUMNS AS A, SYSCAT.TAB...	03/30 13:34:29	03/30 13:54:12
SELECT * FROM SYSCAT.COLUMNS AS A, SYSCAT.TAB...	03/30 13:34:29	03/30 13:54:12
SELECT * FROM SYSCAT.COLUMNS AS A, SYSCAT.TAB...	03/30 14:02:30	03/30 14:02:30

SQL Statement Details

Statement

```
SELECT * FROM SYSCAT.COLUMNS AS A, SYSCAT.TABLES AS B, SYSCAT.ATTRIBUTES AS C
```

Identify Workload...

Coordinator partition/member: 0
Statement type: Dynamic statement
Most recently executed operation: SQL Fetch
Costs (moneros): 710,201
Query cardinality estimates: 59105120
Package name: SYSSH200
Version:
Consistency token:
Section number: 2

Data - OPM_Project_1_OPMMonitoringSQLs_OPM_SQL7 - IBM Optim Query Tuner Client

File Edit Navigate Search Project Data Run Window Help

Optim Solutions

Query Format

Parsed Query

Formatted Query

```
SELECT COUNT (*)
FROM DB2PM.STMTHIST_DB2@BL3P6965
```

Annotation

Access Plan Graph

```

graph TD
    A["(1) RETURN  
175,855"] --> B["(2) GRPBY  
175,855"]
    B --> C["(3) TBSCAN  
175,804"]
    C --> D["(4) STMTHIST_DB2@BL3P6965  
DB2PM"]
  
```

Node Type : Return[1]
Operator Type : RETURN
Estimated Cardinality : 848
Cumulative Total Cost : 175,855

Advisor Recommendation Overview

Advisor	Priority	Description
Recommendations		
Statistics Advisor	HIGH	Gather and recollect all

Context

Query Analysis Result 1

Tune Query

New in FP1

Tune button will also launch the Explain in IBM Data Studio V2.2.0.1, which is offered at no charge !

Advisors give you hints how to tune the query ...

Statistics advisor
Provides advice for missing, outdated and conflicting statistics, and suggests additional statistics that you can gather to improve query performance. RUNSTATS jobs are provided with the recommendations.

Index advisor
Provides advice on new indexes that may improve performance as well as the ability to define and validate user-defined virtual indexes. The index advisor provides DDL scripts that you can run to create the recommended indexes.

Query advisor
Provides query rewrite advice based on a set of best practice rules.

Access path advisor
Provides advice on how to resolve access path issues that might result in poor performance.



Reports



Optim Performance Manager | Log out | About | ?

Task Manager | Manage Database Connections | Welcome - My Optim Central

Welcome - My Optim Central | Reports

Reports: SAMPLE@uzziel

Database name: SAMPLE@uzziel | Disconnect

Report type: * Database Configuration report

Description: * <Select a type of report>
Database Configuration report
Database Manager Configuration report
Database Connection report
Disk Space Consumption report
Dynamic SQL Statement report

Report duration (GMT+01:00): * Show most recent activity of last 1 Hour
Show period of 1 Hour With start date of 03/18/2010 Hours 14 Minutes 29

Generate Report

... allows you to generate printable reports for trend analysis, capacity planning, or long-term analysis.

- disk space usage
- DB and DBM configuration
- WLM configuration & utilization
- top resource-consuming SQL
- active Database connections

- fully integrated into OPMs web user interface
- can be saved and shared as PDF, Microsoft PowerPoint, comma-separated list (CSV)





The top SQL report ...

Dynamic SQL Statements

Sort by: Average elapsed time Number of statements: 5

Note: Selecting any of the options above will reload the report.

Click the chart to drill down to show more detailed periods of time (from years to months, months to days, and days to hours). If the bar displays hourly data, click it to reload the page.

Top criteria and statement # can be changed on the fly

Top 5 SQL statements by Average elapsed time (sec.)

Interactive chart lets you zoom in by clicking on bar

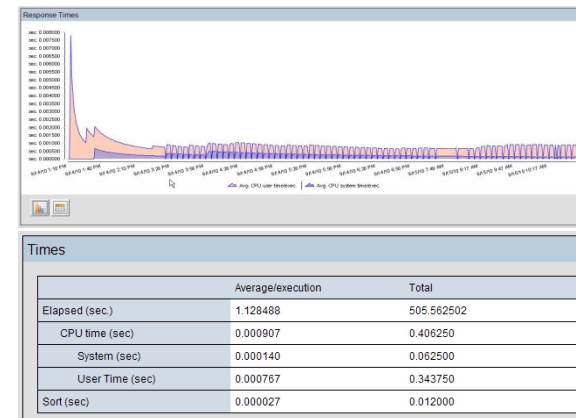
Statement Identifier	Statement Text	Partition ID	Number of executions	Total elapsed time (sec)	Average elapsed time (sec)	Number of Logical Reads	Number of physical reads	CPU time (sec)	Total System CPU Time (sec)	Total User CPU Time (sec)	Sorts	Average rows read	Total rows read	Average rows read per selected row	Average rows written	Total rows written
3BC073F6228F9E16	SELECT DBPARTITIONNUM,MAX(CASE WHEN NAME='HOST_NAME' THEN SUBSTR(VALUE,1,255) END),MAX(CASE DBPARTITIONNUM WHEN - 2 THEN 'GLOBAL' WHEN - 1 THEN 'PART0' ELSE PART CAST(DBPARTITIONNUM as CHAR(3)) END),MAX(CASE WHEN NAME='OS_NAME' THEN SUBSTR(VALUE,1,63) END),MAX(CASE WHEN NAME='OS_VERSION' THEN SUBSTR(VALUE,1,31) END),MAX(CASE WHEN NAME='OS_RELEASE' THEN SUBSTR(VALUE,1,31) END),MAX(CASE WHEN NAME='MACHINE_IDENTIFICATION' THEN SUBSTR(VALUE,1,127) END),MAX(CASE WHEN NAME='OS_LEVEL' THEN SUBSTR(VALUE,1,17) END),MAX(CASE WHEN NAME='CPU_TOTAL' THEN SUBSTR(VALUE,1,5) END),MAX(CASE WHEN NAME='CPU_ONLINE' THEN SUBSTR(VALUE,1,5) END),MAX(CASE WHEN NAME='CPU_CONFIGURED' THEN SUBSTR(VALUE,1,5) END),MAX(CASE WHEN NAME='CPU_SPEED' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='CPU_HMT_DEGREE' THEN SUBSTR(VALUE,1,5) END),MAX(CASE WHEN NAME='CPU_CORES_PER_SOCKET' THEN SUBSTR(VALUE,1,5) END),MAX(CASE WHEN NAME='MEMORY_TOTAL' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='MEMORY_FREE' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='MEMORY_SWAP_TOTAL' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='MEMORY_SWAP_FREE' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='VIRTUAL_MEM_TOTAL' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='VIRTUAL_MEM_RESERVED' THEN SUBSTR(VALUE,1,10) END),MAX(CASE WHEN NAME='CPU_USAGE_TOTAL' THEN SUBSTR(VALUE,1,10) END) FROM SYSIBMADM.ENV_SYS_RESOURCES GROUP BY DBPARTITIONNUM	0	448	505.562502	1.128488	0	0	0.406250	0.062500	0.343750	448	0	0	0	0	0
4C75329984C8FAFE	SELECT evmon.xmlreport FROM TABLE (EVMON_FORMAT_UE...	0	11	10.885401	0.989582	669	0	0.187500	0.093750	0.093750	0	11	131	0	0	0
C0174D55A62C9156	SELECT IBM.TID, IBM.FID FROM SYSIBM.SYSTABLES AS	0	5													0

A detailed report can then be opened for each SQL statement to analyze the poor behavior further ...

Statement text

```
SQL Statement
SELECT DBPARTITIONNUM,MAX(CASE
WHEN NAME='HOST_NAME' THEN SUBSTR(VALUE,1,255) END),MAX(CASE DBPARTITIONNUM
WHEN - 2 THEN 'GLOBAL'
WHEN - 1 THEN 'PART0'
ELSE PART || CAST(DBPARTITIONNUM as CHAR(3)) END),MAX(CASE
WHEN NAME='OS_NAME' THEN SUBSTR(VALUE,1,63) END),MAX(CASE
WHEN NAME='OS_VERSION' THEN SUBSTR(VALUE,1,31) END),MAX(CASE
WHEN NAME='OS_RELEASE' THEN SUBSTR(VALUE,1,31) END),MAX(CASE
WHEN NAME='MACHINE_IDENTIFICATION' THEN SUBSTR(VALUE,1,127) END),MAX(CASE
WHEN NAME='OS_LEVEL' THEN SUBSTR(VALUE,1,17) END),MAX(CASE
WHEN NAME='CPU_TOTAL' THEN SUBSTR(VALUE,1,5) END),MAX(CASE
WHEN NAME='CPU_ONLINE' THEN SUBSTR(VALUE,1,5) END),MAX(CASE
WHEN NAME='CPU_CONFIGURED' THEN SUBSTR(VALUE,1,5) END),MAX(CASE
WHEN NAME='CPU_SPEED' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='CPU_HMT_DEGREE' THEN SUBSTR(VALUE,1,5) END),MAX(CASE
WHEN NAME='CPU_CORES_PER_SOCKET' THEN SUBSTR(VALUE,1,5) END),MAX(CASE
WHEN NAME='MEMORY_TOTAL' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='MEMORY_FREE' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='MEMORY_SWAP_TOTAL' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='MEMORY_SWAP_FREE' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='VIRTUAL_MEM_TOTAL' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='VIRTUAL_MEM_RESERVED' THEN SUBSTR(VALUE,1,10) END),MAX(CASE
WHEN NAME='CPU_USAGE_TOTAL' THEN SUBSTR(VALUE,1,10) END)
FROM SYSIBMADM.ENV_SYS_RESOURCES
GROUP BY DBPARTITIONNUM
```

Response times:





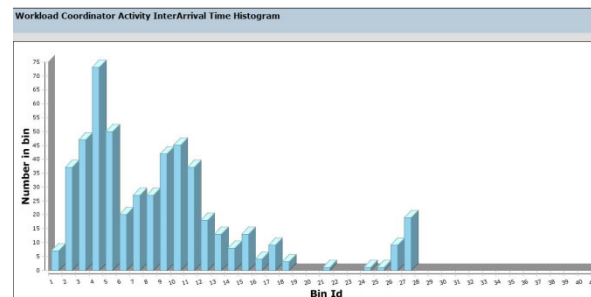
WLM Report

Definitions:

Service Superclass Definitions									
Service Superclass Name	ID	Enabled	Agent Priority	Prefetch Priority	Outbound Correlator	Partition for Activity Data Collection	Activity Data to Collect	Collect Aggregate Activity Data	Collect Aggregate Activity Data
SYSDEFAULTSYSTEMCLASS	1	Y	-32768	Default	--	C	N	N	N
SYSDEFAULTMAINTENANCECLASS	2	Y	-32768	Default	--	C	N	N	N
SYSDEFAULTUSERCLASS	3	Y	-32768	Default	--	C	N	N	N
DS_AUTO_MGMT_SUPER	14	Y	-32768	Default	--	C	N	N	N
OPM	20	Y	-32768	Default	--	C	N	N	N

Service Subclass Definitions									
Service Superclass Name	Service Subclass Name	ID	Enabled	Agent Priority	Prefetch Priority	Outbound Correlator	Partition for Activity Data Collection	Activity Data to Collect	Collect Aggregate Activity Data
SYSDEFAULTSYSTEMCLASS	SYSDEFAULTSUBCLASS	11	Y	-32768	Default	--	C	N	N
SYSDEFAULTMAINTENANCECLASS	SYSDEFAULTSUBCLASS	12	Y	-32768	Default	--	C	N	N
SYSDEFAULTUSERCLASS	SYSDEFAULTSUBCLASS	13	Y	-32768	Default	--	C	N	N
DS_AUTO_MGMT_SUPER	SYSDEFAULTSUBCLASS	15	Y	-32768	Default	--	C	N	N
DS_AUTO_MGMT_SUPER	DS_HIGH_PRI_SUBCLASS	16	Y	-32768	Default	--	C	N	E

Histograms:



Statistics:

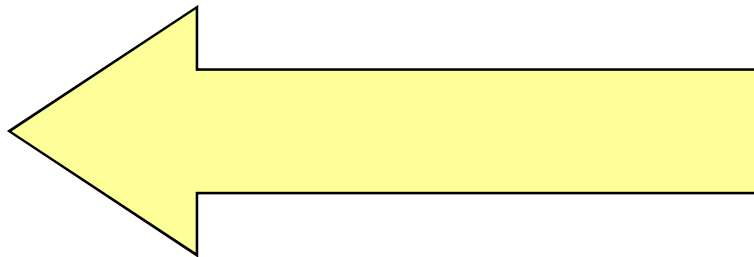
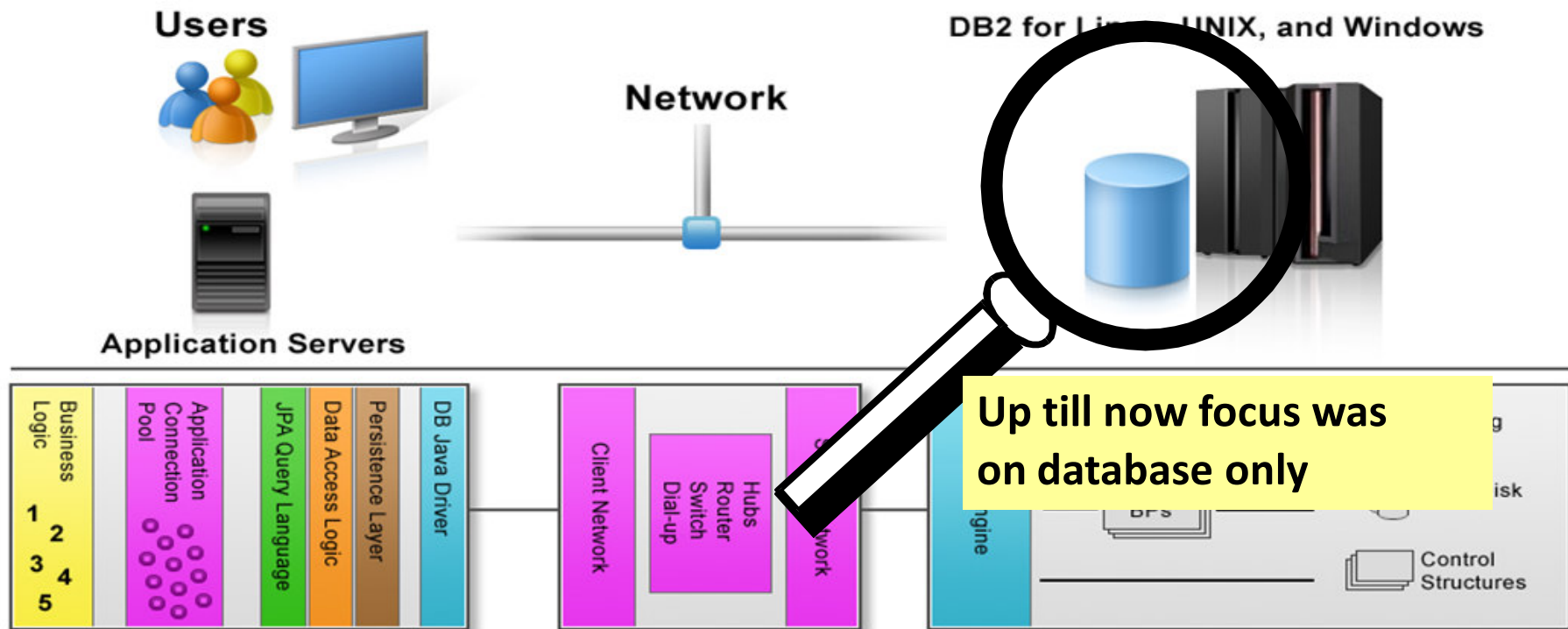
Service Subclass Statistics													
Service Superclass Name	Service Subclass Name	Partition ID	Concurrent Activities	Failed Coordinator Activities	Completed Coordinator Activities	Maximum lifetime of Coordinator Activities (ms)	Rejected Coordinator Activities	Max. Estimated Cost (timerons)	Rows Returned	Temporary Tablespace Usage (KB)	Average Lifetime of Coordinator Activities (ms)	Average Queue Time Coordinator Activities (ms)	
DS_AUTO_MGMT_SUPER	DS_HIGH_PRI_SUBCLASS	0	0	0	0	0	0	0	0	0	0	0	
DS_AUTO_MGMT_SUPER	DS_LOAD_SUBCLASS	0	0	0	0	0	0	0	0	0	0	0	
DS_AUTO_MGMT_SUPER	DS_LOW_CONC_SUBCLASS	0	1	0	64	12	0	0	1	0	0.055	0	
DS_AUTO_MGMT_SUPER	DS_MED_CONC_SUBCLASS	0	1	4	340	2496	0	384	166	0	83.777	0	
DS_AUTO_MGMT_SUPER	SYSDEFAULTSUBCLASS	0	0	0	0	0	0	0	0	0	0	0	
OPM	DS_HIGH_PRI_SUBCLASS	0	0	0	0	0	0	0	0	0	0	0	
OPM	DS_LOAD_SUBCLASS	0	0	0	0	0	0	0	0	0	0	0	
OPM	DS_LOW_CONC_SUBCLASS	0	2	0	1325	23227	0	0	68	0	104.574	0	
OPM	DS_MED_CONC_SUBCLASS	0	3	0	2638	14498	0	15568	2050	0	148.925	0	

Provides for the selected timeframe:

- Overview of configured WLM objects like service classes, workloads and so on
- Summary of statistics summed up for the configured WLM objects
- Detailed statistics, histograms and definitions per service class, work load, work action set and so on



Extended insight: Where is my problem?



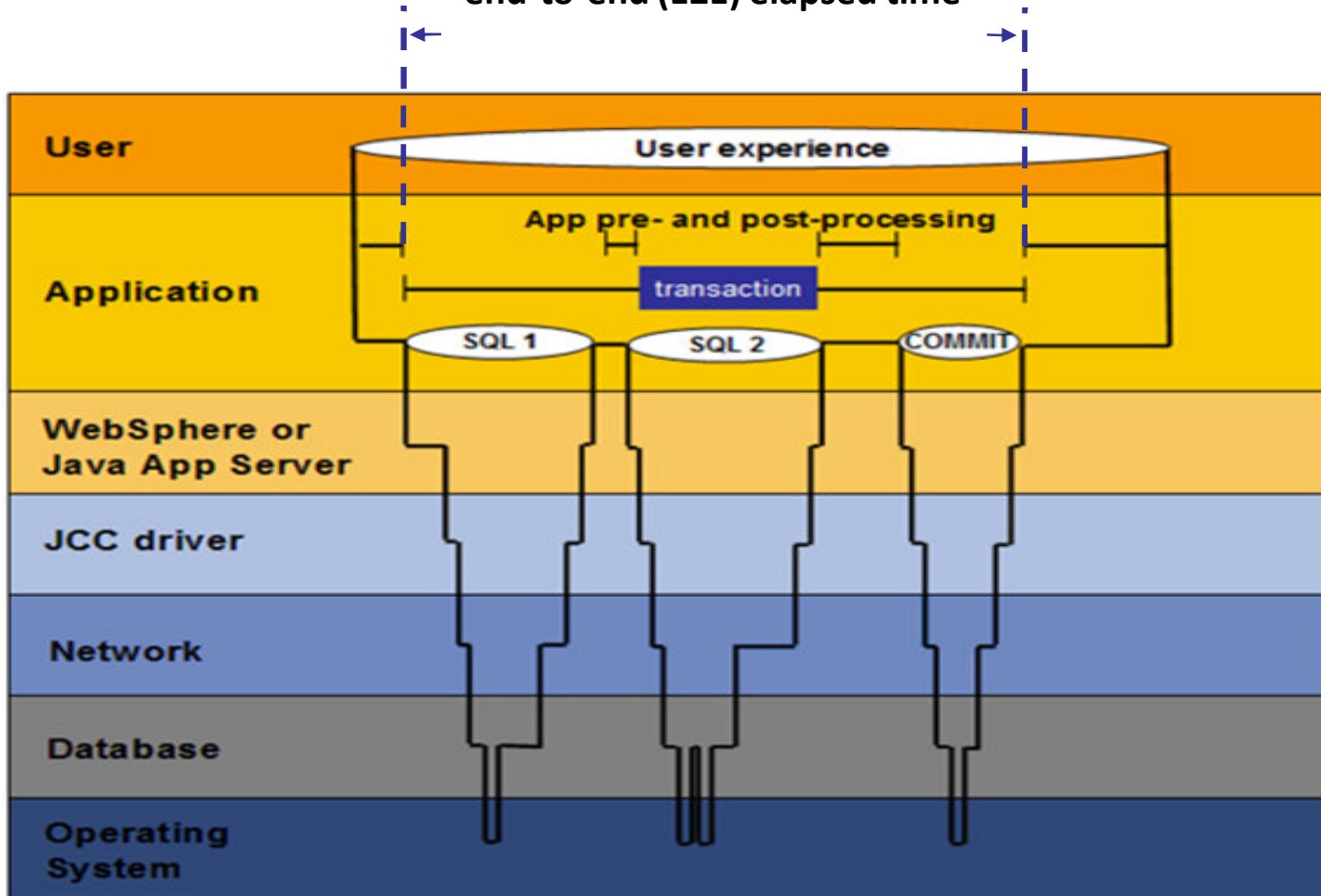
Now it should also look beyond the database



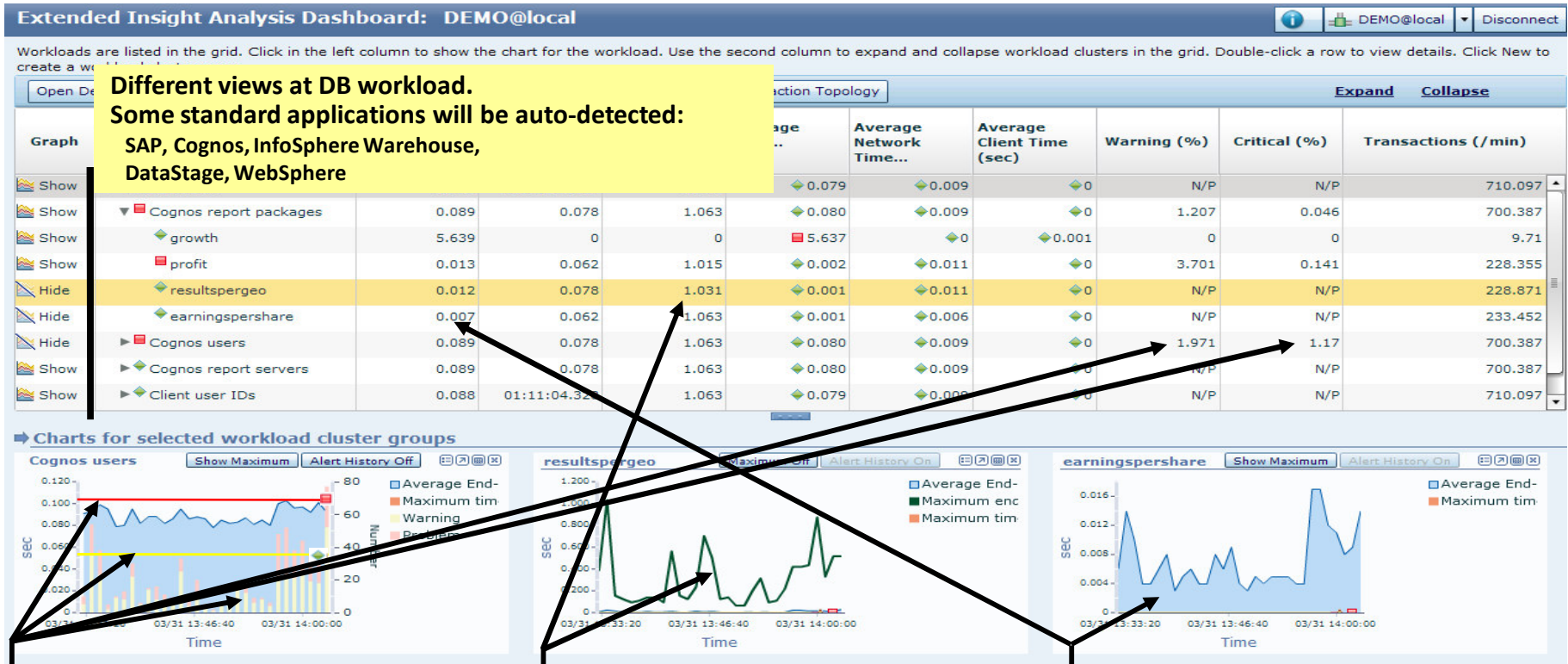
**Extended insight:
Where is my DB application spending its time?
E.g. in application, SQL, and network?**



This is what OPM measures as
'end-to-end (E2E) elapsed time'



Show me the health of my apps



Tells you how many DB transactions of a DB workload violated the warning or problem SLAs

Tells you what the maximum E2E elapsed time for a DB transaction of a DB workload was.

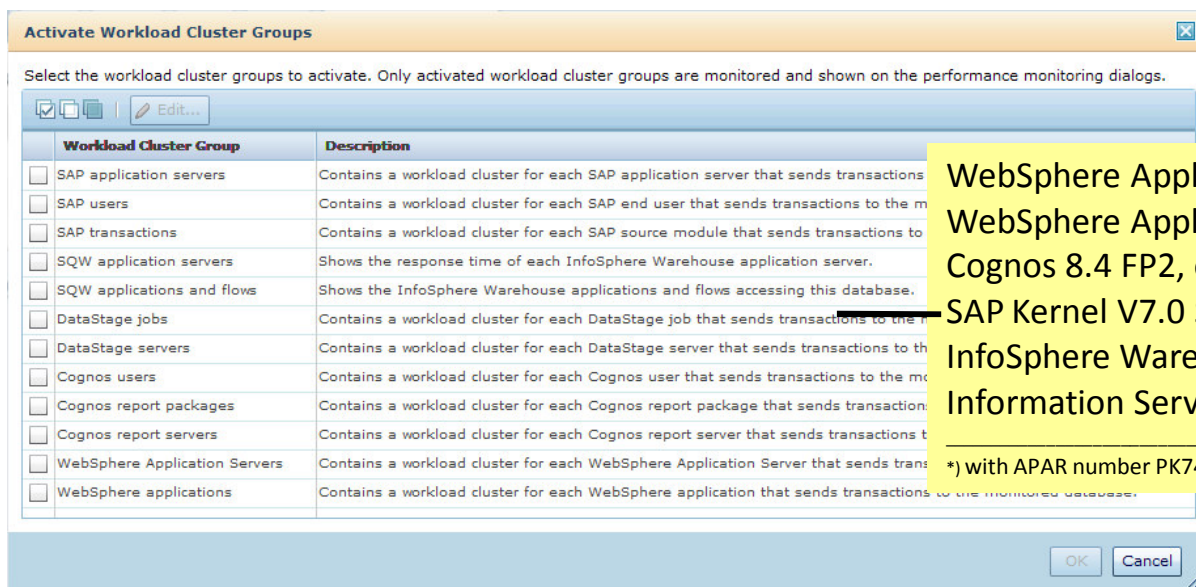
Tells you what the average E2E elapsed time for a DB transaction of a DB workload was and how it changed over time.





Built-in support for standard applications

- Pre-defined application specific views let you look at database workload from different angles
- Shows application specific terms (e.g. report name, SAP transaction code, etc.)
- Simply activate/de-activate the views you need for your environment





Let me analyze what's wrong and why

Where is this DB workload spending its time – client, network, or inside DB2? Most insight into DB2 will be offered with DB2 V9.7.

Which statements have been executed. Which app servers or DB clients are involved. For a partition DB how does it look on each partition.

Extended Insight Analysis Dashboard: DEMO@local

Back

Locate the source of performance problems, determine how those problems affect different parts of the workload, and analyze the performance of individual SQL statements, clients, and partitions.

Response Time Details: profit

Graph Grid

Selected layer: Average End-to-End Response Time Show Maximum

SQL Statements Clients Partitions/Members

Show highest 10 by Average Data Server Time (sec)

Statement Text	Statement Executions	Average Data Server Time (sec)	Average End-to-End Response Time (sec)
INSERT INTO WE_ZXZ...	140	0.001	0.049
INSERT INTO WE_ZXZ...	139	0.002	0.020
INSERT INTO WE_ZXZ...	150	0.002	0.020

Display this list by the selected graph layer

Detail Area for SQL Statements

Statement information

INSERT INTO WE_ZXZRFJP1G.WE_1G0_85894 (value) values(100)

All Tune

Package name: N/P
Section number: N/P
Package Consistency token: N/P
Package Version: N/P
Collection: N/P

Statement Performance

Number of Executions: 140
Average end-to-end elapsed time: 0.049 sec
Average client time: 0 sec
Average driver time: 0 sec
Average network time: 0.048 sec
Average data server time: 0.001 sec

Statement Time Distribution (%)

Client time
Driver time
Network time
Data server time

This area shows then the details to the selected layer or entity above ...





Data server execution metrics per SQL statement

Identify the exact statements causing high processing or wait times in data server time layers

New in FP1

(1) Select an SQL statement

(2) Look at general end-to-end metrics of the statement using the ,General information' tab

(3) Look at data server execution metrics of the statement using the ,Statement Server Execution Details' tab

Statement Text	Statement Executions	Average Data Server Time (sec)
SELECT COH.CUST_ORDER_NUMBE...	68	3.641
SELECT CUST_CODE, CUST_FIRST...	66	1.316
SELECT P.PRODUCT_NUMBER, P.BA...	78	0.071
select cust_order_number from fin...	124	0.044
SELECT CUST_COUNTRY_CODE, CU...	124	0.027
SELECT P.PRODUCT_NUMBER, P.BA...	207	0.026
SELECT O.PRODUCT_NUMBER, O.RA...	69	0.022

Statement identifier:	102,	31,266
Package name:	--	1.115
Statement Type:	DML	0
Package Version:	--	
Cache Insert timestamp:	08/23 17:51:51	
La		
In		

Compilation time:	279
Isolation level:	UR
Estimated cost:	0

Row Efficiency	Sort Efficiency
100 %	0 %
In Memory Sorts	Rows Read and Not Used
Number of Sort Overflows	Rows Returned or Modified



Data server execution metrics per SQL statement



New in FP1

Detail Area for SQL Statements

General Information | **Statement Server Execution De**

The tab displays data for each time that the statement ran on the data server during the time interval: 08/23 18:29:00 and 08/23 17:49:00. In some cases, this data can comprise more statement executions for the same statement than indicated on the tab that displays the client metrics.

Most Recent Identification

Statement identifier:	0100000000000000fe0200000000000000000000000020020100823175251...
Package name:	--
Statement Type:	DML, Select (blockable)
Package Version:	--
Cache Insert time stamp:	08/23 17:52:51
Last execution:	08/23 18:35:36
Involved partitions:	1

Statement Row and Sort Details

Average rows read:	267,301.423
Average rows returned:	0
Average rows modified:	0
Average Sort Processing Time:	
Total sorts:	520
Number of Sort Overflows per Partition/Member:	0
Post threshold sorts:	0
Post threshold shared sorts:	0

Most Recent Compilation

Compilation time:	465
Isolation level:	UR
Estimated cost:	0

Data Server Execution Time

Number of executions:	520
Average execution time:	4.062 sec
Average CPU time:	0.053 sec
Average activity time:	4.062 sec
Average WLM queue time:	
Average Routine Processing time:	
Average Section Processing time:	2.953 sec
Average Section Wait Time:	

Overall Time Distribution

Row Efficiency

Sort Efficiency

I/O Statistics

Buffer Pool Hit Ratio:	99.120 %
Logical page I/O:	795,310
Physical page I/O:	6,998
Pages written:	2

Logical Page I/O Distribution

Physical Page I/O Distribution

Page Write Distribution

Transaction Logging Statistics

Average log disk wait time:	
Average log buffer wait time:	
Log disk waits:	0

Locking Statistics

Overall average lock wait time per transaction:	
Average global lock wait time:	
Lock waits:	0
Lock escalations:	0
Timeouts:	0
Deadlocks:	0

FCM Statistics

FCM send time:	
FCM receive time:	
FCM receives:	0
FCM sends:	0
FCM receive volume:	0 bytes
FCM send volume:	0 bytes



WebSphere – a first class OPM citizen



Extended Insight Analysis Dashboard: DEMO@local

⊙ [Back](#)

Locate the source of performance problems, determine how those problems affect different parts of the workload, and analyze the performance of individual SQL statements, clients, and partitions.

Response Time Details: profit

Graph **Grid**

Selected layer: **Average End-to-End Response Time** [Show Maximum](#)

SQL Statements **Clients**

Show highest **10** by **Average Response Time (sec)**

Client Host Name or IP Address	Transaction Executions	Time of First Connection	Average Response Time (sec)
GoSales2.ibm.com	18	03/31 12:52:22	01:04.491
GoSales1.ibm.com	35	04/07 17:17:39	4.758

Client Comparison

Client Host Name or IP Address	Time of First Connection	Network Time	Client Time	Currently Used Connections	Connection Pool Size	Maximum Connection Wait Time	JRE Version	Operating System	Database Driver Level
GoSales2.ibm.com	03/31 1...	13:50.8...	11:04.0...	47	50	57.67	6.2-b04	Window...	3.58.82
GoSales1.ibm.com	04/07 1...	7.367	25.336	52	100	0.34	6.2-b04	Window...	3.58.82

Client Properties:

- pureQuery level: 2.15.24
- JRE vendor: Sun Microsystems
- JRE version: 6.2-b04
- WebSphere Application Server data source name: GSDB
- WebSphere Application Server server name: GoSales2
- WebSphere Application Server version: 7.0.1

WAS Connection Pool:

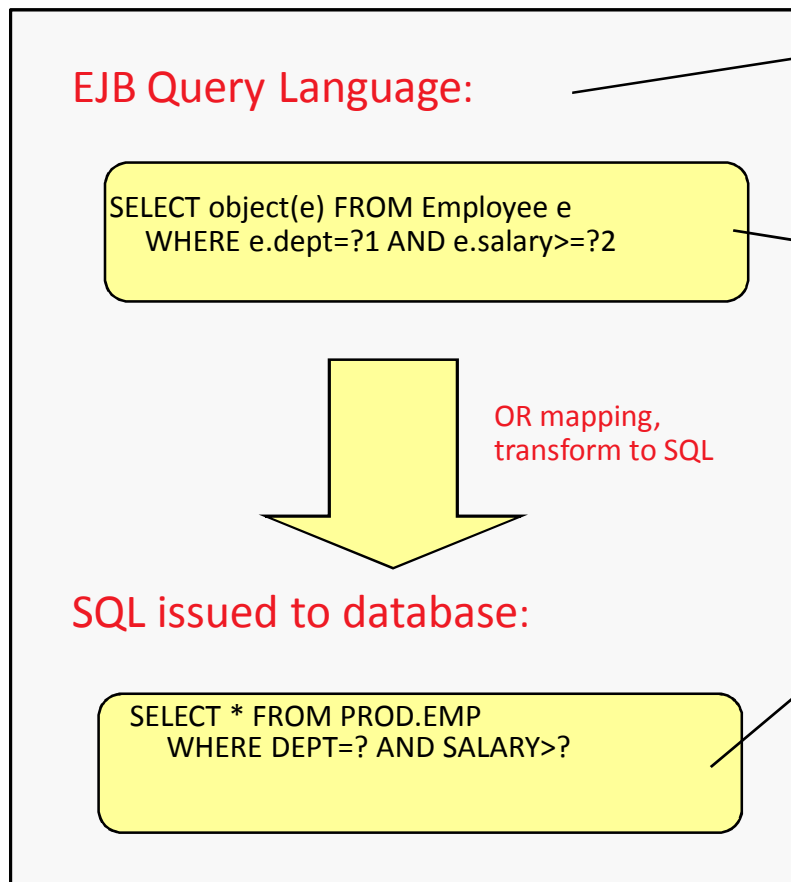
- Connection pool size: 50
- Average connections in use: 47
- Maximum connection wait time: 57.67

Pool Usage:

Client Comparison



Another addressed problem: SQL is generated ...



1

Query language is a subset of SQL. Doesn't have all the SQL features you want.

2

App query syntax is different from SQL query. How do you track problem SQL queries back to the app that issued the original query???

3

Often, app query is intercepted by persistence layer, and the resulting SQL query looks nothing like the app query.

- > Resulting query might perform badly.
- > Changing app query might not result in a similar change in the SQL query...



How Optim pureQuery Runtime can help



It offers three primary features:

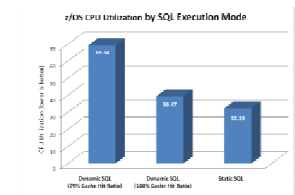
1. **Client optimization** which allows converting any Java applications from dynamic to static SQL execution

- fix or tune problematic SQL without changing application source code
- Benefit from performance improvement and SQL injection prevention

2. **Annotation method style** to boost Java coding efficiency by offering an JPA like coding style via @notations, but without the need of an heavy EJB container

3. **Tracing SQL statements back to origin** source (via #1 or #2)

built into WAS 6.1+





OPM can tell you where the query came from ...

Application source

```
public class TestOPM {  
    public static void main(String [] args) throws Exception {  
        String url = "jdbc:db2://sv1-intstg12.svl.ibm.com:50000/SAMPLE";  
        Connection con = SampleUtil.getConnection(url, "db2admin", "hot6cold");  
        ((com.ibm.db2.jcc.DB2Connection) con).setDB2ClientApplicationInformation("blah");  
  
        Statement stmt = con.createStatement();  
        for(int i = 0; i < 10000; i++) {  
            stmt.execute("SELECT * FROM DB2ADMIN.INVENTORY");  
            Thread.sleep(1000);  
            System.out.println(i);  
        }  
    }  
}
```

application name

Capture SQL with pureQuery runtime

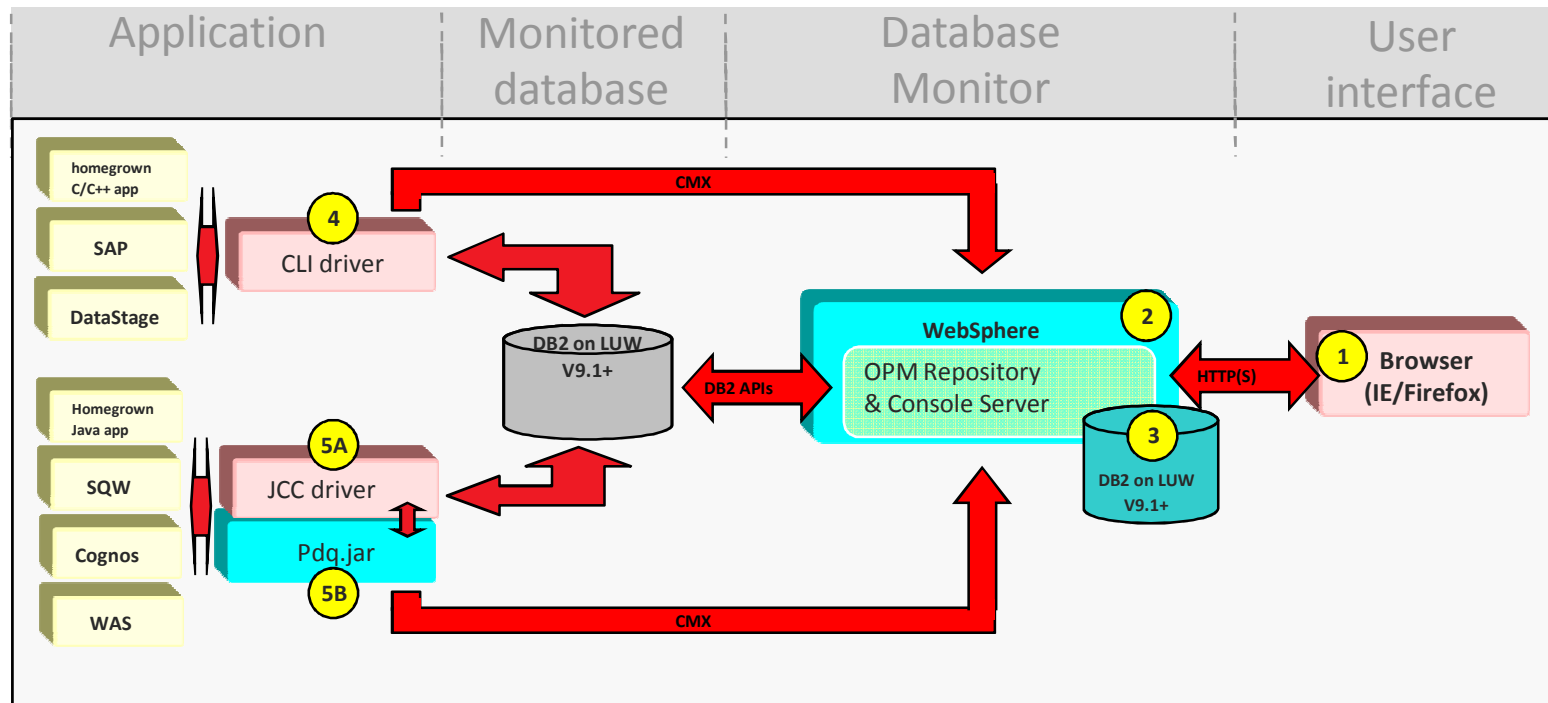
```
pdq.captureMode=ON  
pdq.executionMode=DYNAMIC  
pdq.pureQueryXml=pureQueryFolder/capture.pdqxml  
pdq.cmx.controllerURL=9.30.77.61:60000
```

Java class	Java package	Method	Source line number	Build version	Source expression	Method Signature	Application Name	Metadata File
TestOPM	my.test	main	13	blahVer	N/P	N/P	blah	capture...

The screenshot shows a detailed view of the application source and its execution. The table above is a summary of the captured data. The application source code is shown in the top left, with the application name "blah" highlighted in red. The execution details are shown in the bottom left, including the statement "SELECT * FROM DB2ADMIN.INVENTORY" and its performance metrics. The metadata file "capture.pdqxml" is shown in the bottom right, with the application name "blah" highlighted in red. Arrows indicate the flow of information from the application source to the execution details and the metadata file.



Product Architecture



For base product:

- Firefox or Internet Explore is required (1).
- WAS can be either installed by OPM, or an existing WAS 6.0.21+ reused (2).
- A DB2 V9.1+ is required to store performance information (3). A restricted-use DB2 license is shipped with OPM.

For Extended Edition (optional):

- C/C++ applications have to upgrade the CLI driver (4) to a specific level.
- Java applications have to upgrade the JCC driver to a specific JCC level (5A) and to install a pdq.jar file (5B) into the same directory where db2jcc.jar is stored



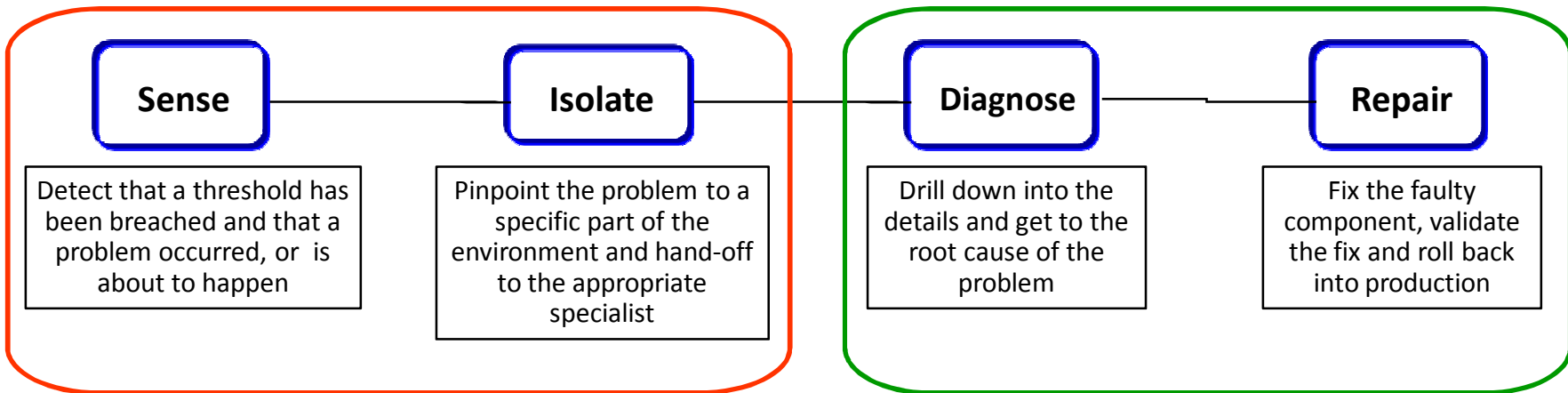
Tivoli and Optim – system wide monitoring with drilldown



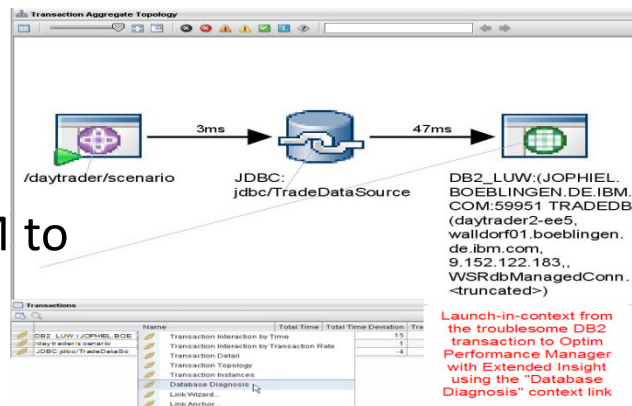
ITCAM for Transactions

Deep-dive tools

- ✓ Optim Performance Manager
- ✓ OPM with Extended Insight



Drill down from ITCAM to OPM



Challenges

- Slow, unpredictable application response times resulting from poorly formed SQL
- Lack of insight into where and when performance bottlenecks occur
- Deep technical skill required to diagnose performance problems
- Inability to recreate performance problems making it impossible to diagnose issues
- Insufficient data to determine root cause
- Employees unable to complete routine tasks due to long application response times
- Inefficient use of human and IT resources
- Declining customer satisfaction

Solution

- IBM InfoSphere Optim Performance Manager Extended Edition
- Optim Query Tuner

Business Benefits

- Improved performance with optimized SQL statements
- Analyzed performance based on historical trends
- Identified performance bottlenecks before production impact to improve end user satisfaction
- Permanently solve performance problems rather than temporary workarounds
- Empowered IT staff to efficiently identify, diagnose, solve and prevent performance issues



Client Success



"In complex environments it can be very difficult to find performance bottlenecks. It can take several people with skills in application servers, networking and databases to analyze and then fix the bottleneck. OPM EE is a single tool that can handle all of that process. It is also very easy to use"

"Banks need to know when there's a problem. OPM EE presents powerful summaries, out of the box alerts and in-depth analysis that is available anywhere at any time."



"OPM EE has sensible defaults that give productive monitoring straight out of the box. The end-to-end monitoring capability from a single point of control saves costs and resources."





Client Success: US Financial Services Firm

Challenge

- Manage storage, maintenance and performance costs for hundreds of thousands of DB2 instances
- Eliminate reactive approaches to performance bottlenecks to ensure SLAs and high customer satisfaction
- Establish a scalable approach to managing historical performance data
- Empower DBAs to be more effective with powerful yet easy to use administration tools
- Break free from the raising costs of Quest software maintenance

Solution

- IBM InfoSphere Optim Performance Manager Extended Edition
- IBM InfoSphere Optim Database Administrator
- IBM DB2 Storage Optimization Feature

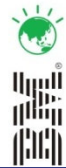
Business Benefits

- Comprehensive, proactive system performance management to mitigate risk of downtime
- Better resource utilization to minimize capital spending, achieved 60% compression rate
- Robust scalable repository for history performance data to diagnose problems at any point in time
- Detailed reporting to validate performance improvements
- Flexible capabilities for DBAs to streamline change management

"We adopted InfoSphere Optim Performance Manager to replace Quest Spotlight. With Optim we get more functionality for less cost. The historical repository provided with Optim saves us hours tedious work."
— Database Manager, US Financial Services Firm



Client Success: Consumer Product Company



Challenge

- Develop a single, comprehensive view of performance across the enterprise
- Improve performance of business critical SAP applications
- Establish key performance indicators to ensure the DB2 and SAP environment support business goals
- Optimize the data warehouse to drive strategic decision making
- Run reports to analysis performance
- Identify performance bottlenecks and document resolution

Solution

- IBM InfoSphere Optim Performance Manager Extended Edition

Business Benefits

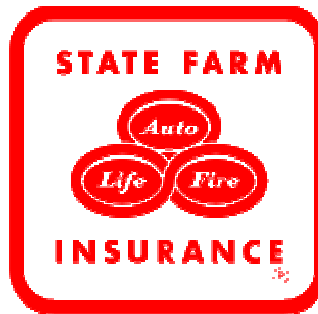
- Comprehensive, proactive performance management to prevent problems before negative impact
- Better resource utilization to minimize capital spending
- Document improvements in data warehouse and SAP application performance
- Empower junior DBAs to contribute sooner
- Immediate ROI in terms of cost & performance
- Improved performance without negative product impact

“With InfoSphere Optim Performance Manager, our DBAs get a simple way to understand performance across the enterprise. Proactive alerts and the ability to set key performance indicators help optimize the performance of our data warehouse and SAP applications. We are also able to document cost savings with easy to use customizable reports.”

--Lead DB2 DBA



Some more 2010 Client Success



Health Care Service Corporation,
a Mutual Legal Reserve Company





Thank You

InformationOnDemandIndia2011

The Premier Conference for Information Management
Manage. Analyze. Govern.

February 2, 2011

Hyatt Regency | Mumbai, India