



# OMEGAMON DB2 Performance Expert

## Latest updates

**Matthias Tschaffler**

OMPE Technical Development Lead  
*[tschaffl@de.ibm.com](mailto:tschaffl@de.ibm.com)*



# Disclaimer



© Copyright IBM Corporation 2013. All rights reserved.

U.S. Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

THE INFORMATION CONTAINED IN THIS PRESENTATION IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. WHILE EFFORTS WERE MADE TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION CONTAINED IN THIS PRESENTATION, IT IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. IN ADDITION, THIS INFORMATION IS BASED ON IBM'S CURRENT PRODUCT PLANS AND STRATEGY, WHICH ARE SUBJECT TO CHANGE BY IBM WITHOUT NOTICE. THE INFORMATION ON NEW PRODUCTS IS FOR INFORMATIONAL PURPOSES ONLY AND MAY NOT BE INCORPORATED INTO ANY CONTRACT. THE INFORMATION ON ANY NEW PRODUCTS IN NOT A COMMITMENT, PROMISE, OR LEGAL OBLIGATION TO DELIVER ANY MATERIAL, CODE OR FUNCTIONALITY. THE DEVELOPMENT, RELEASE, AND TIMING OF ANY FEATURES OR FUNCTIONALITY DESCRIBED FOR OUR PRODUCTS REMAINS AT THE SOLE DISCRETION OF IBM. IBM SHALL NOT BE RESPONSIBLE FOR ANY DAMAGES ARISING OUT OF THE USE OF, OR OTHERWISE RELATED TO, THIS PRESENTATION OR ANY OTHER DOCUMENTATION. NOTHING CONTAINED IN THIS PRESENTATION IS INTENDED TO, NOR SHALL HAVE THE EFFECT OF, CREATING ANY WARRANTIES OR REPRESENTATIONS FROM IBM (OR ITS SUPPLIERS OR LICENSORS), OR ALTERING THE TERMS AND CONDITIONS OF ANY AGREEMENT OR LICENSE GOVERNING THE USE OF IBM PRODUCTS AND/OR SOFTWARE.

IBM, the IBM logo, ibm.com, Information Management, Tivoli, DB2, DRDA, OMEGAMON, Optim, z/OS, CICS, VTAM, SMP/E, and Unix and are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml)

Java, JDBC, Microsoft, ODBC, Windows, UNIX,

Other company, product, or service names may be trademarks or service marks of others.




## Agenda

- V511 release themes and content
- Architectural extensions in V510/V511
- SQL Dashboard and Stored Procedure Monitoring
- Adding Extended Insight to the picture
- **Live DEMO**
- Enhanced 3270
- Analytics Accelerator Monitoring
- What's next?

# V511 release themes and content

## INVESTMENT PROTECTION

### Improved time-to-value


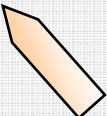
- **Enhanced 3270 user interface** 
  - CUA-like (Replacement for CUA in the near-term)
  - OMEGAMON 3270 integration capability/support
  - User customizable screens

### Total Cost-of-Ownership (TCO) reduction

- **Enhanced 3270 user interface**
  - Address space reduction for multiple OMEGAMONs
- **Self Describing Agents**
  - “Manages” ITM infrastructure complexities
- **Latest OPM for LUW release (for **Extended Insight**)** 
  - Up and Running improvements
  - Embedded application server

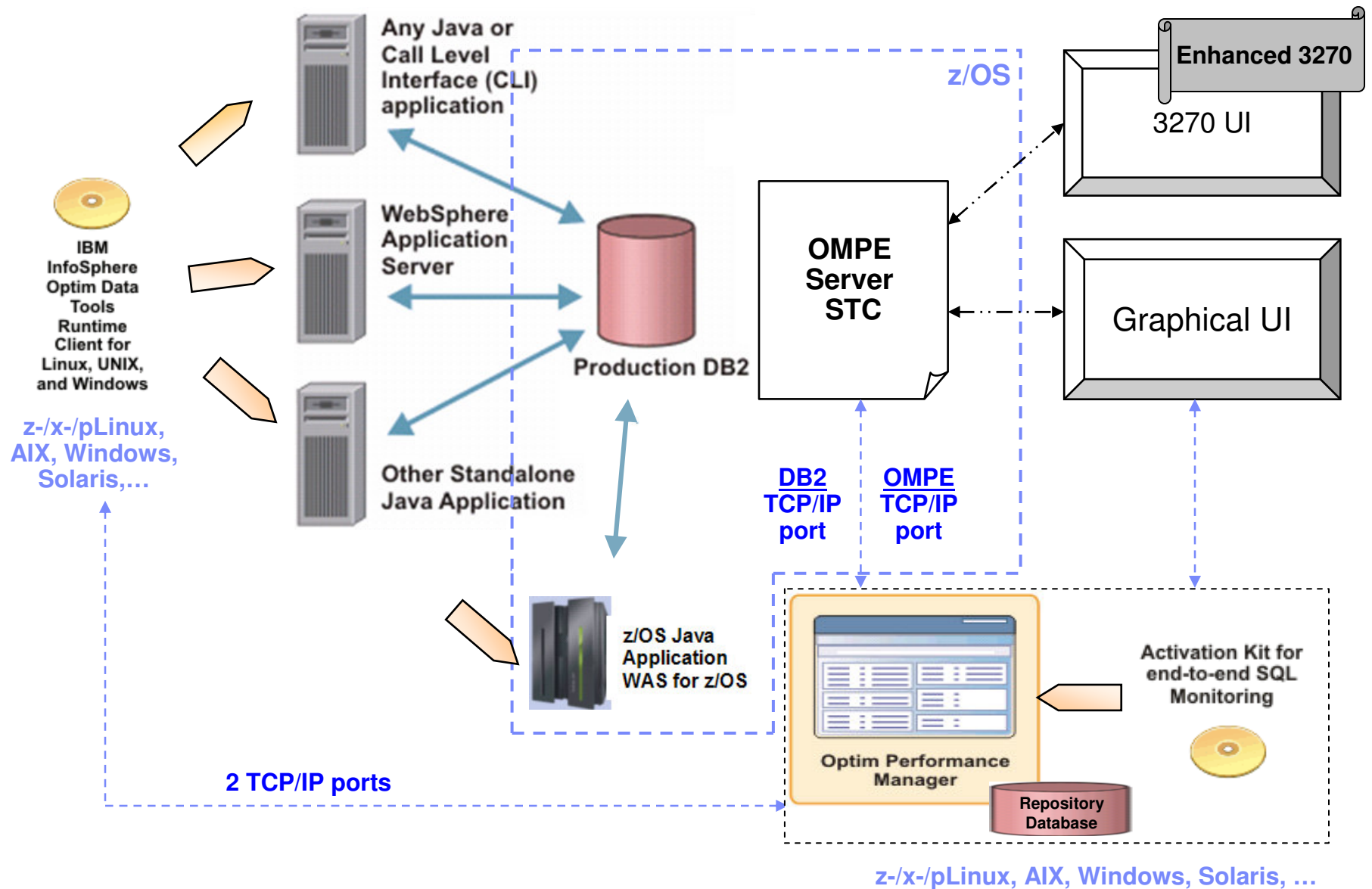
## RETURN ON INVESTMENT

### New Features

- **Updated and rolled-up currency for DB2 service stream enhancements** 
- **IBM DB2 Analytics Accelerator**
- **SQL Dashboard and Stored Procedure Monitoring (→ PM67565 + PM70645)** 
- **Enhanced SQL monitoring (ATF input Host variable support)**
- **Data sharing group extensions (ZPARM support added)**
- **Aggregated Accounting Statistics (IFCID 369)**

 Will be discussed in more detail later on

# Architectural extensions in V510+V511





# SQL Dashboard and Stored Procedure Monitoring

## ▪ SQL Dashboard

- Shows dynamic and static SQL executed during the selected time period
- Provides statement cache 'History' functionality
- Delta calculated cache metrics to identify spikes in certain metrics like logical I/O (GetPages)
- Various representation alternatives
- Flexible filtering on statement text



# SQL Dashboard sample screenshot

Open ↓ Databases x SQL Statements x Extended Insight Dashboard x

View: Historical Data End Time: 03/19/13 08:26 Duration: 1 Hour Automatic Refresh 22 sec

SQL Statements Dashboard: DA11@OMP1

Learn about tuning SQL statements.

**Execution Summary**

All Statements

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text	Routine ID	Number of Ca	Number of Exe	Number of	Execution Elapse	CPU Time
SELECT P_SCHEDULE INTO : H : H FROM DB2PM . PROCESS WHERE P...	--	--	605	--	0.055392	0.035522
SELECT SL_ID , PL_P_ID , PL_STATUS FROM DB2PM . STEPLOG , DB2...	--	--	605	--	0.037593	0.028206
SELECT PL_P_ID , PL_ID FROM DB2PM . PROCESSLOG WHERE PL_STA...	--	--	605	--	0.026491	0.010091
SELECT SL_ID , SL_ASCB , SL_ECB FROM DB2PM . STEPLOG WHERE S...	--	--	605	--	0.013987	0.010178
UPDATE DB2PM.DB2C_GATEWAY SET DB2CG_STATUS = 'INACTIVE' W...	--	--	61	--	0.013377	0.006287

SQL Statement Details

Overview Server Execution Times Row Activity I/O Locking and Communication

Statement	Most Recent Identification	Most Recent Compilation
UPDATE DB2PM.DB2C_GATEWAY SET DB2CG_STATUS = 'INACTIVE' WHERE DB2CG_AGE = 2	Statement identifier: 8000000020130318... Package name: -- Consistency token: -- Section number: -- Cache insert time: 03/18 12:27:33 Last Execution time: 03/19 08:25:33 Number of parallel 0	Isolation level: UR Literal replacement: NO CURSOR WITH HOLD: N Special Registers for -- Compilation CURRENT PRECISION: N CURRENT DEGREE: 1 CURRENT RULES: D CURRENT SQLID: DB2PM CURRENT SCHEMA: DB2PM

Statement type: Dynamic  
First referenced table: DB2PM.DB2C\_GATEWAY

**More in DEMO!!**



# Stored Procedure Monitoring

- **Stored Procedures becoming more and more important**
  - Programming benefits (modularity and security)
  - TCO benefits (zIIP redirect)
- **Currently challenges on Plan and Package level analysis**
  - Multiple SPs called in a transaction are summed at the plan level. By definition this affects the analysis of nested SPs.
  - Package level analysis can be difficult if an SP execute different paths and SQL based on parameters. How do you differentiate between the invocations paths?
  - Package level analysis does not apply to SPs that do not execute SQL (e.g. a SP that calls MQ or accesses a VSAM dataset)





## Enhanced Instrumentation for Stored Procedure Performance Analysis

- **PM53243 (DB2 10): New IFCIDs 380 and 499**
- **IFCID 380**
  - Identifies the stored procedure beginning or ending
  - Includes the **current CP, specialty engine, and elapsed time details** for nested activity
  - can be used to determine the CP, specialty engine, and elapsed time for a given SP invocation
- **IFCID 499**
  - for SQL ‘drill down’ analysis. These records contain the dynamic or static statement IDs for SPs
  - The statement IDs can be correlated to IFCID 316 dynamic statement or IFCID 401 static statement cache data.



## How OMPE makes use of IFCID 380/499

- The new DB2 instrumentation records for Stored Procedures are ingested by the OMPE Collector, aggregated on a system level and returned to the (OPM) Repository Server.
- The OMPE Collector processing includes the sequencing logic and the calculation of elapsed times for the different accounting class times written in the IFI records as timestamps, considering nesting as well.
- In parallel the IFCID 316/401 data for the Statement Caches is collected and a correlation to the executed stored procedure statements via IFCID 499 is made.
- Full RECTRACE support for all new IFCIDs is provided



# Stored Procedure Analysis in SQL Dashboard

SQL Statements Dashboard: DA11@OMP1

Learn about tuning SQL statements.

### Execution Summary

All Statements

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text	Routine ID	Number of Ca	Number of Exc	Number of	Execution Elapse	CPU Tim
CALL OTR.PACKAGE_TOUR_OFFERINGS.V1( )	-2,147,481,...	1	2,759	2,759	22.311315	
CALL OTR.HOTEL_OFFERINGS.V1( IN INTEGER)	-2,147,481,...	1	11,036	11,036	14.761808	
SELECT COUNT(*) AS HOTEL_OFFERINGS_EQ INTO :H:H FROM sysib...	--	--	11,036	--	11.026988	
CALL OTR.RETRIEVE_STATUS.V1( IN INTEGER)	-2,147,481,...	4	35,867	35,867	7.281686	
CALL OTR.FLIGHT_OFFERINGS.V1( )	-2,147,481,...	2	13,795	13,795	5.983324	

### SQL Statement Details

View Configuration

#### Overview

Server Execution Times | Row Activity | I/O | Locking and Communication

Statement: CALL OTR.PACKAGE\_TOUR\_OFFERINGS.V1( )

Statement type: --  
First referenced table: --

#### Stored Procedure Information

Routine ID of stored procedure call:	-2,147,481,554
Nesting level:	0
Version name:	V1
Number of calling paths:	1
Number of executions:	2759
Nested elapsed time:	0.008086
Nested CPU time:	0.002585
Nested specialty engine time:	0.003665
In-DB2 nested elapsed time:	0.008074
In-DB2 nested CPU time:	0.002585
In-DB2 nested specialty engine time:	0.003665

**More in DEMO!!**



## DB2 Traces used for SQL Dashboard and SP analysis

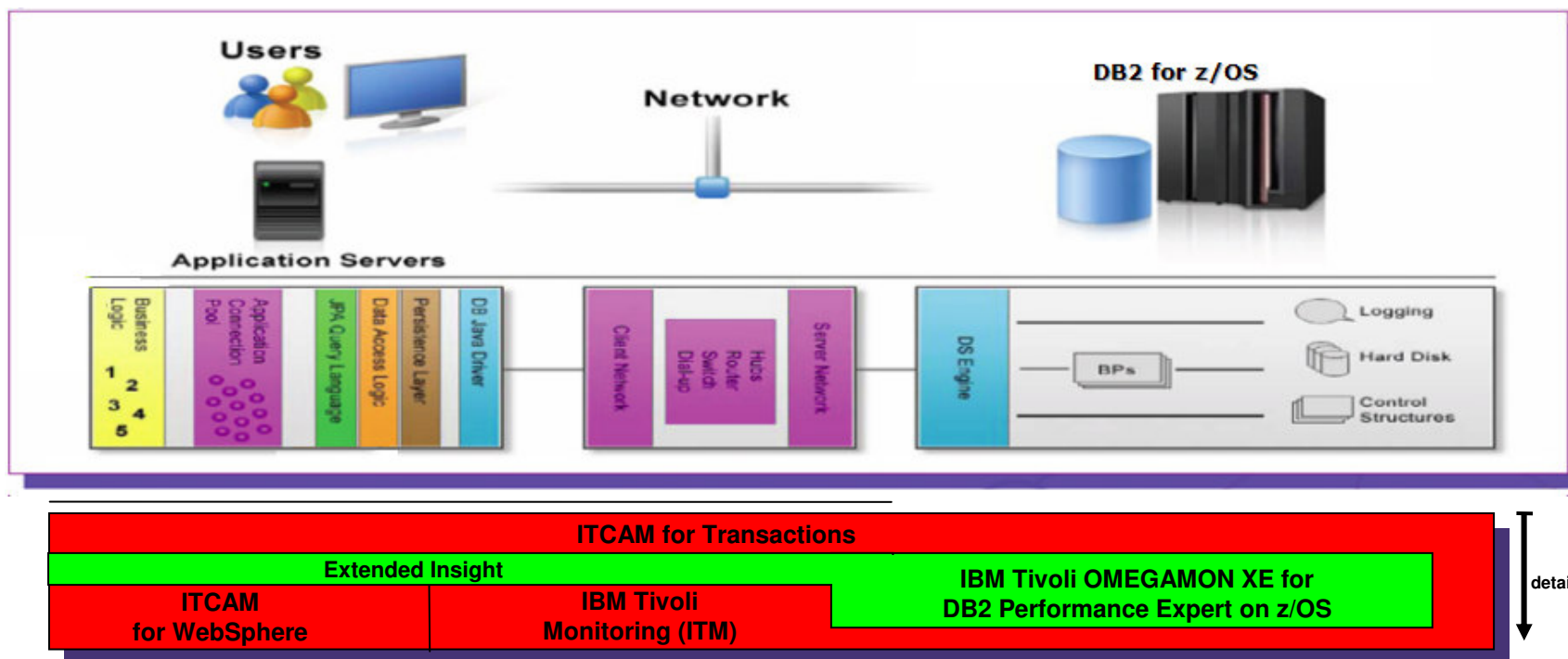
### ▪ **SQL Dashboard:**

- Dynamic SQL (IFCID 316/317 + 318 (“flag”)):
- Static SQL (IFCID 401 + 400 (“flag” )):
  - Static Statement Cache Metrics only for DB2 10+
- Accounting trace classes 1,2,3 to report meaningful values in Statement Caches

### ▪ **SP Analysis:**

- Same as above +
- Performance Class 24 (=IFCID 380+499)

# Adding Extended Insight to the picture



## Extended Insight ...

- ... tells me **which application** ultimately which business function is performing the specific database requests
- ... measures what my application/user is really **experiencing**
- ... tells me **which components are involved** and **where my application/SQL is spending its time**



## Extended Insight: Where is my DB application spending its time?

- Database workload monitoring based on end-to-end transaction response times
- What is it for: *Manage response time SLAs, Monitor application health*

Who

- **Identify the** problem workload (user, client machine, application etc.)

When

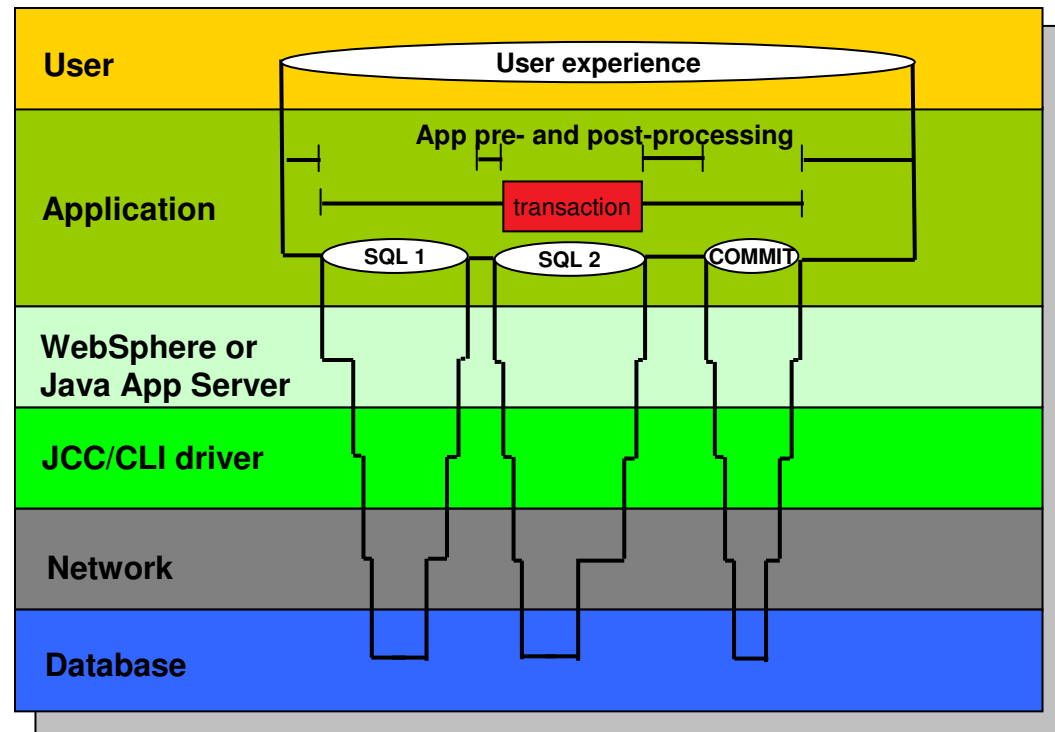
- **Identify the** problem period

What

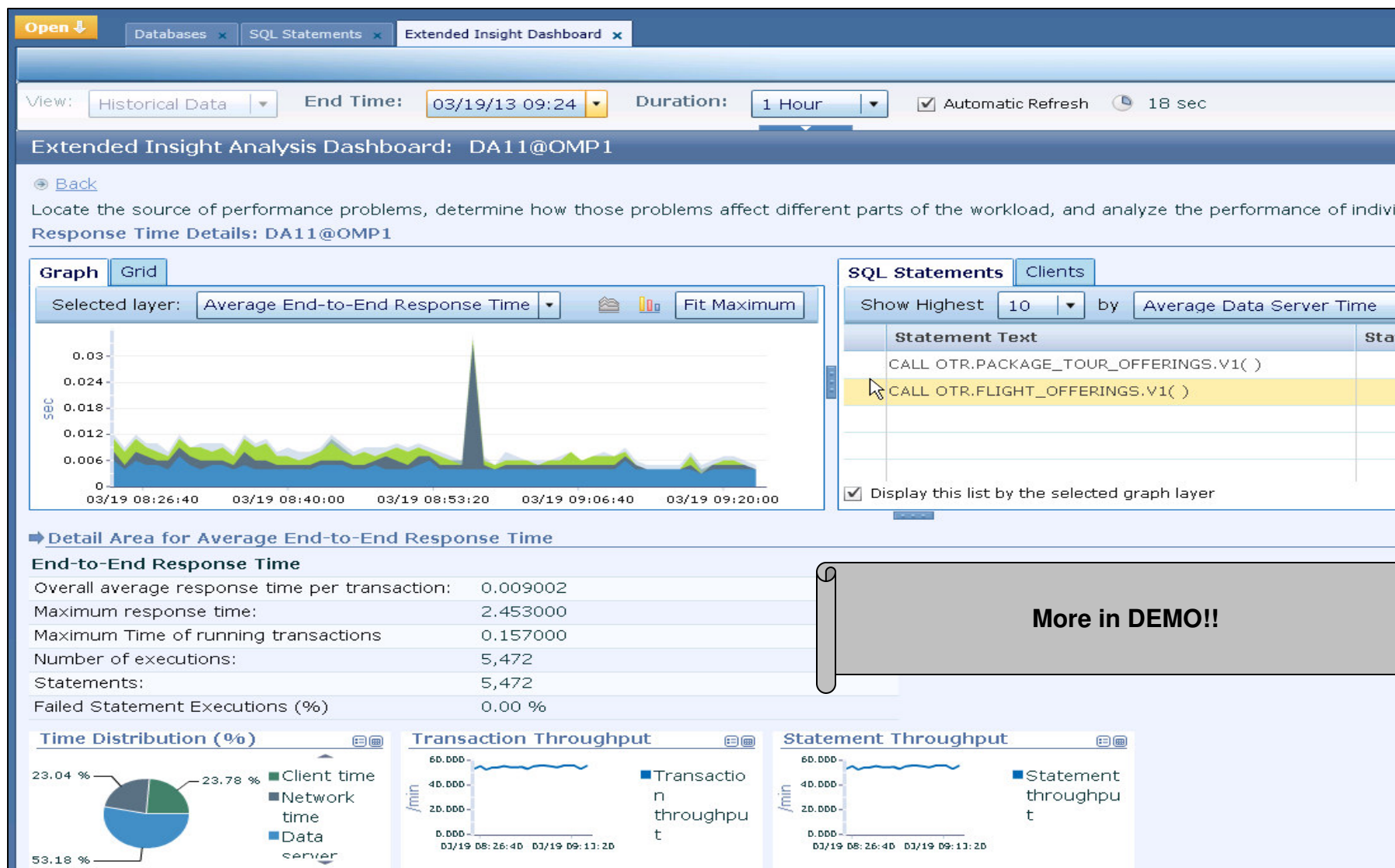
- **Identify the** problem SQLs

Why

- **Identify the** problem layer



# Extended Insight Dashboard sample screenshot



**More in DEMO!!**





## Extended Insight Client Data Collection Concepts

- **Overall goal**
  - Achieve End-to-End SQL monitoring with **lowest possible overhead**
- **Extended Insight client side data collection**
  - EI Client “sits” on top of CLI/JDBC driver and collects the performance data
  - Metrics aggregated for distinct SQL statement text
  - Aggregation is done at client side
    - **Not** each execution is handed over to Repository Server!  
(→ **No** SQL Activity trace!)
- **Overall overhead**
  - Extended Insight client side:
    - Strongly depending on client workload (distinct SQL /min)
  - DB2 z/OS side:
    - Same as for SQL Dashboard (incl. SP Monitoring, if configured)

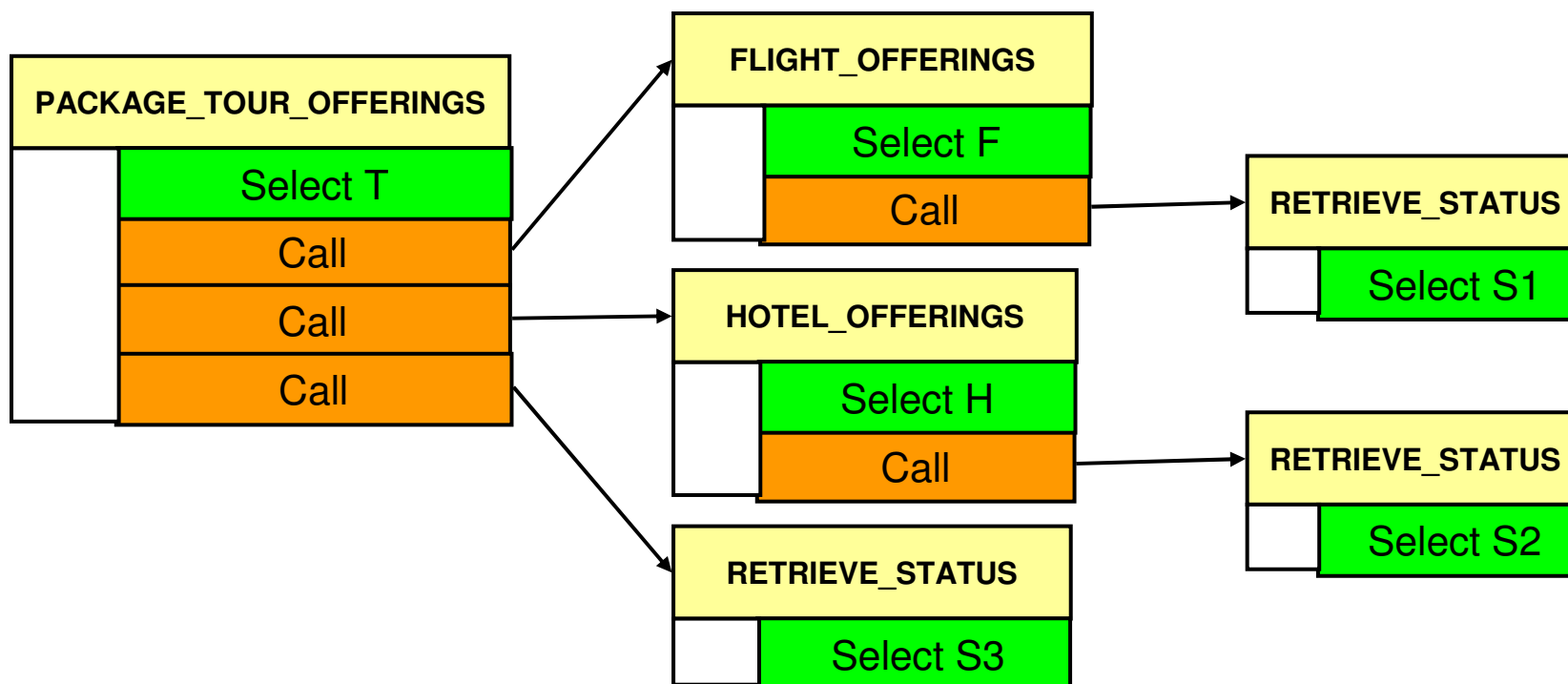


## Extended Insight - Take Away points

- **Advanced way to monitor the workload/SQL of your applications**
  - Get response times and time breakdown (appl, driver, network, data server) per defined workload/cluster, e.g. per system, per application, per user
  - Compare workload from various servers / applications
  - Select a time period for analysis
  - Get top SQL statements per defined workload
  - Identify top clients contributing in the workload
  - Zoom into the various layers
- **Optional *integration* with ...**
  - IBM Optim Query (Workload) Tuner / Data Studio
  - IBM pureQuery
  - ITCAM for WebSphere applications accessing DB2 via JDBC

# It's DEMO Time!

- **Stored Procedure Workload from Java Client application A :**



- **Java workload from Client application B, running arbitrary SQL and Stored Procedures**



# Live Demo – use cases

- **SQL Dashboard overview/general benefits**
  - Overall layout of Dashboard
  - DSC execution history over time (even if Statements evicted from Cache)
  - Filtering/Ranking capabilities
- **SQL Dashboard for Stored Procedure Drill down analysis**
  - Basic contents
  - Where are the SPs?
    - Aggregation by ROUTINEID
    - SP Details as per new instrumentation
  - SP drill down/calling path analysis
    - Calling Path analysis
    - Analyzing nesting
    - Statement Cache metric correlation
  - Interpreting the values in Top SQL and Details views
  - Show Integration with Data Studio etc.
- **Extended Insight view**
  - Specific for DRDA connectivity based applications
  - Response Time breakdown at Transaction and SQL statement level
  - Out of the box or User defined Workload clusters (client info field usage!!)
  - Show Integration with Data Studio and pureQuery



# Enhanced 3270

**OMEGAMON XE IMS v 5.1** available

ΔIMSplex VName	IMS Systems	ΔENQ VRate	ΔDEQ VRate	ΔTran VQueue	ΔLock VWaiters	ΔLongest VLock
IC1C 191C	2/2	7.50	7.50			0.00000

**OMEGAMON XE z/OS v 5.1** available

ΔSysplex Name	ΔAverage VCPU Percent	Highest LPAR Name	ΔHighest VLPAR CPU%	ΔPercent VMSU Capacity	+LPAR Group Name
ZPETHX2	3	Z2	3	3.4	N/A

**OMEGAMON XE DB2 v 5.1.1** available

Data Sharing Group	List Entries Percent	Structure Used Percent	Lock Entries Percent	+False Content Rate
DBN1	10	26	0	0
DBN1	1	11	0	0
DB29	4	16	0	0
DB29	0	19	0	0
DB2A	0	26	0	0
DB2A	0	15	0	0
DB2N	0	26	0	0
DB2N	0	15	0	0
DNA	0	16	0	0
DNA	0	15	0	0

**OMEGAMON XE CICS v 5.1** available

ΔNumber of VRegions	ΔTransaction VRate	ΔCPU Utilization	Any SOS Regions	SOS Region
8	10985/m	18.4%	No	n/a
1	0/m	0.0%	No	available

**OMEGAMON XE DB2 Subsystems**

ADB2 ID	Waiting On Tape Mount	DDF Inactive	Global Trace Active	DDF Receive Rate	DDF Send Rate
DA31	False	False	False	1000	0
DB31	False	False	False	0	0
DB33	False	False	False	0	0
DB34	False	False	False	0	0
D931	False	False	False	0	0
SAC	False	False	False	0	0
SD01	False	False	False	0	0
SDN1	False	False	False	0	0
SN13	False	False	False	0	0
SN14	False	False	False	0	0
SZ91	False	False	False	0	0

**Storage Group Space Details**

FR03 P03	Storage Group Status	Enabled
10	Non-Enabled volumes	Enabled
10	VTOC Index status	Enabled
348	High volume Fragmentation Index	Enabled
383	Free Space MB	1036
383	Track Managed high volume Frag Index	2700
383	Track Managed Free Space MB	2006
383	Track Managed Total Space MB	2700
383	Track Managed	2700

**Offline WebSphere MQ Monitoring Managed Systems**

NodeName	Product	Online?	Version	ThruNode	Affinity
M60C 200B:MOESA	HQ	Y	07.10.00	200B:MOIRA	000400000000
M60D 200B:MOESA	HQ	Y	07.10.00	200B:MOIRA	000400000000
M60K 200B:MOESA	HQ	Y	07.10.00	200B:MOIRA	000400000000

**OMEGAMON XE Storage v 5.1** available

Volume	Device Address	Free Space Megabytes	Device Type	Total Capacity Megabytes	% Free Space	Fragmentation Index	Largest Free Extent MB	VTOC Index Status	SMS Conversion Status	SMS Status	Extend Address
FAP001	6880	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP002	6881	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP003	6882	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP004	6883	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP005	6884	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP006	6885	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP007	6886	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP008	6887	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP009	6888	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	
FAP010	6889	0	3390	2707	0.0%	1000	0	Enabled	Converted	Enabled	

**OMEGAMON XE Messaging v 7.1** available



# OMEGAMON Family – Enhanced 3270 user interface creates Enterprise wide view of information for improved availability

“GUI on a green screen”

- ✓ Understand transactions across multiple SYSPLEXs
- ✓ Color coding to provide ability to find and resolve problems quickly
- ✓ Eliminates need to move between multiple screens and monitors

The screenshot displays the OMEGAMON Enterprise Summary GUI. It features a menu bar (File, Edit, View, Tools, Options, Help) and a status bar (09/07/2012 07:17:07, Auto Update: Off). The main content is divided into three sections:

- All Active Sysplexes:** A table with columns for Sysplex Name, Average CPU Percent, Highest LPAR Name, Highest LPAR CPU%, Percent LPAR VMSU Capacity, and LPAR Group Name. A callout points to this section with the text "z/OS-wide sysplex view".
- All Active CICSplexes:** A table with columns for CICSplex Name, Number of Regions, Transaction Rate, CPU Utilization, Any SOS Regions, and SOS Region. A callout points to the Transaction Rate and CPU Utilization columns with the text "DB2-/CICSplex details views".
- All Active DB2 Subsystems:** A table with columns for DB2 ID, MVS System ID, Lock Conflict, Lock Escalation, and DDF Rate. A callout points to the Lock Conflict and Lock Escalation columns with the text "Sort on any DB2 KPI".

Additional callouts include "Customize Views" pointing to the column headers of the CICSplexes table and "Sort on any DB2 KPI" pointing to the Lock Conflict and Lock Escalation columns of the DB2 Subsystems table.



## Analysts already agree that OMEGAMON V5 provides value to customers

### Ptak / Noel

On OMEGAMON moving to simplified architecture and a common view across multiple domains, Rich Ptak of PNA commented, *"This is an important and much needed enhancement. We've heard consistently – there is a need for this kind of integration. Consistent interface – a couple of years ago, some people liked to be in a silo and just toss things over to someone else. But, they can't live that way anymore."* PNA also gave IBM high marks for doing so without losing functionality.

### Clabby Analytics

On OMEGAMON Enhanced 3270 User Interface, Joe Clabby with Clabby Analytics commented: *What you've done to your 3270 interface is kind of a "wow"! I'm not a 3270 fan and I love what you've done with it"*

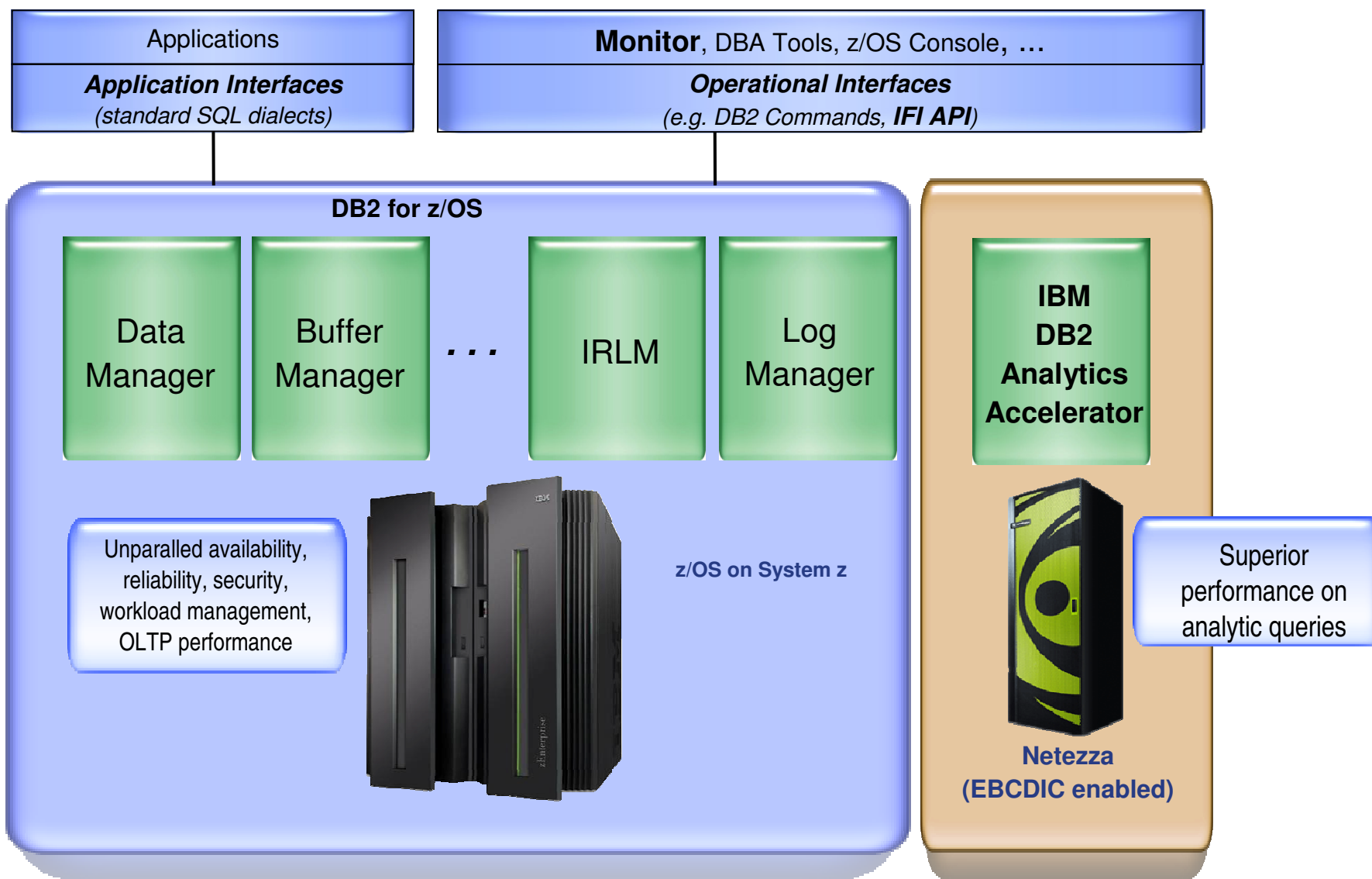


[ftp://public.dhe.ibm.com/software/data/ECM/industry/TWDIBMTivoli\\_OMEGAMON.pdf](ftp://public.dhe.ibm.com/software/data/ECM/industry/TWDIBMTivoli_OMEGAMON.pdf)





# Analytics Accelerator Monitoring





## IBM DB2 Analytics Accelerator metrics supported by OMPE/PM V510/511

- **Batch Statistics** Trace/Report of IBM DB2 Analytics Accelerator used by DB2 subsystem
- **Batch Accounting** of applications with IBM DB2 Analytics Accelerator accelerated SQL queries and accelerator specific performance metrics
- **Batch Record Trace** reporting on single DB2 trace record with accelerator specific metrics
- **Real-Time** IBM DB2 Analytics Accelerator Statistics Monitoring now available with V511 (PE client L4068+)
- Saving of IBM DB2 Analytics Accelerator metrics into **Performance Database** (PTF UK81551/APAR PM68928)



## What's next?

- **DB2 Sequoia (a.k.a. DB2 11) ESP support**
  - OMPE VNext and several other DB2 Tools can be used free of charge for all DB2 Sequoia participants
- **More customer requirements**
- **More reduction on CPU and memory footprint**
- **More zIIP redirect**
- **More interesting and fun 'stuff' to come 😊**



धन्यवाद  
Hindi

多謝  
Traditional Chinese

ขอบพระคุณ  
Thai

Спасибо  
Russian

Gracias  
Spanish

Merci  
French

Thank You  
English

شكراً  
Arabic

Obrigado  
Brazilian Portuguese

Grazie  
Italian

多谢  
Simplified Chinese

Danke  
German

Kiitos  
Finnish

நன்றி  
Tamil

ありがとうございました  
Japanese

Teşekkürler  
Turkish

감사합니다  
Korean



# BACKUP

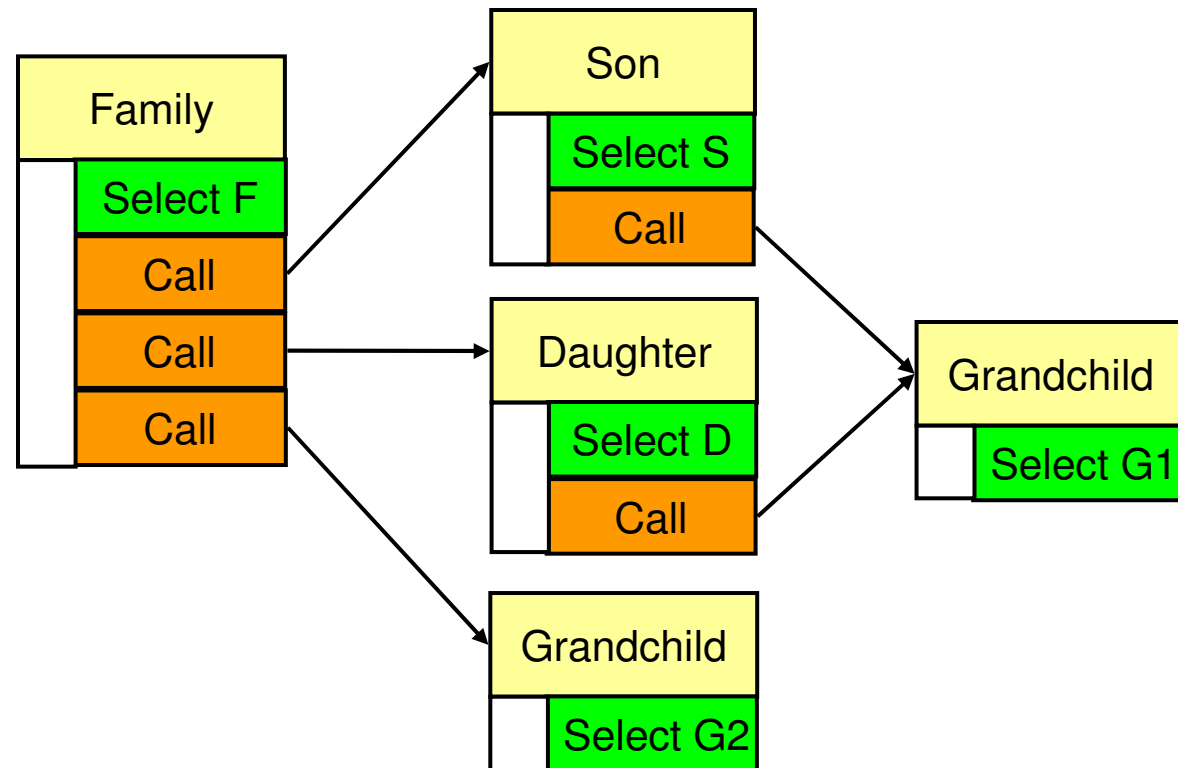


# Backup – Stored Procedure Monitoring



# Using the OMPE Web Console to analyze Stored Procedures – sample scenario

▪ **Workload:**





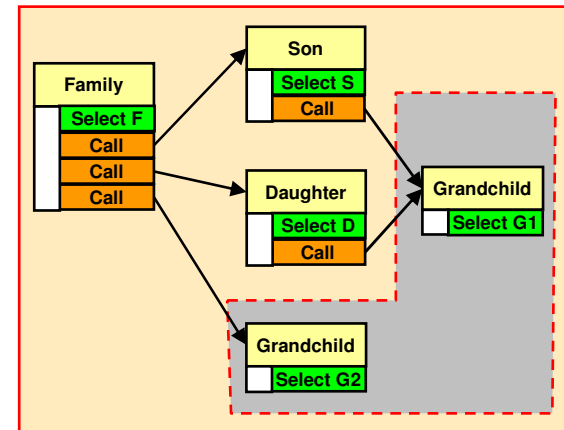


# SQL Dashboard – aggregation by ROUTINEID

- Workload at SQL dashboard (“All statements” view) executed in the selected time period (time slider), valid for all subsequent views

$\Sigma$  of Family

$\Sigma$  of Grandchild



All Statements

All Statements View

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text Contains call ; Clear Filter

Statement Text	Routine ID	Number of Calling Paths	Execution Elapsed Time	Number of Execu	CPU Time
CALL SYSIBM.SQLPROCEDURECOLS( IN VARCHAR, IN VARCHAR, IN ...	-2,147,483,102	1	1.160051	168	0.148540
CALL SPMON_CONF_IOD.FAMILY.V1( )	-2,147,482,976	1	0.403588	40	0.018785
CALL SYSPROC.ADMIN_COMMAND_DB2( IN VARCHAR, IN INTEGER, I...	-2,147,483,148	2	0.372614	13	0.065811
CALL SYSPROC.ADMIN_INFO_SYSPARM( IN VARCHAR, OUT INTEGER,...	-2,147,483,134	1	0.360020	2	0.033512
CALL SYSIBM.SQLPROCEDURES( IN VARCHAR, IN VARCHAR, IN VAR...	-2,147,483,101	1	0.268017	84	0.051966
CALL SPMON_CONF_IOD.DAUGHTER.V1( )	-2,147,482,977	2	0.142537	60	0.006785
CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	-2,147,482,979	6	0.108440	164	0.005870
CALL SPMON_CONF_IOD.SON.V1( )	-2,147,482,978	2	0.083759	52	0.009528
CALL OPM.DB2MON_LOC.V1( OUT VARCHAR)	-2,147,482,972	1	0.023140	1	0.004644



# Showing SP Details

**Execution Summary**

All Statements

Dashboard filter: Highest 100 by Total Execution Elapsed Time

Statement Text Contains Call ;

Statement Text	Routine ID	Number of C	Execution Elap	Number of Execution	CPU Time	Rows	Rows R	I/	Lo	Ne
CALL SPMON_CONF.FAMILY.V1( )	-2,147,48...	1	0.704594	46	0.151073	--	--	--	--	0

SQL Statement Details

View Configuration Changes

Overview: Server Execution Times, Row Activity, I/O, Locking and Communication

Statement: CALL SPMON\_CONF.FAMILY.V1( )

Statement type:  
First referenced table:

**Stored Procedure Information**

Routine ID of stored procedure call: -2,147,482,547

Nesting level: 0

Version name: V1

Number of calling paths: 1

Number of executions: 46

Nested elapsed time: 0.015317

Nested CPU time: 0.003283

Nested specialty engine time: 0.004130

In-DB2 nested elapsed time: 0.015282

In-DB2 nested CPU time: 0.003283

In-DB2 nested specialty engine time: 0.004130

**Stored Procedure Elapsed Times**

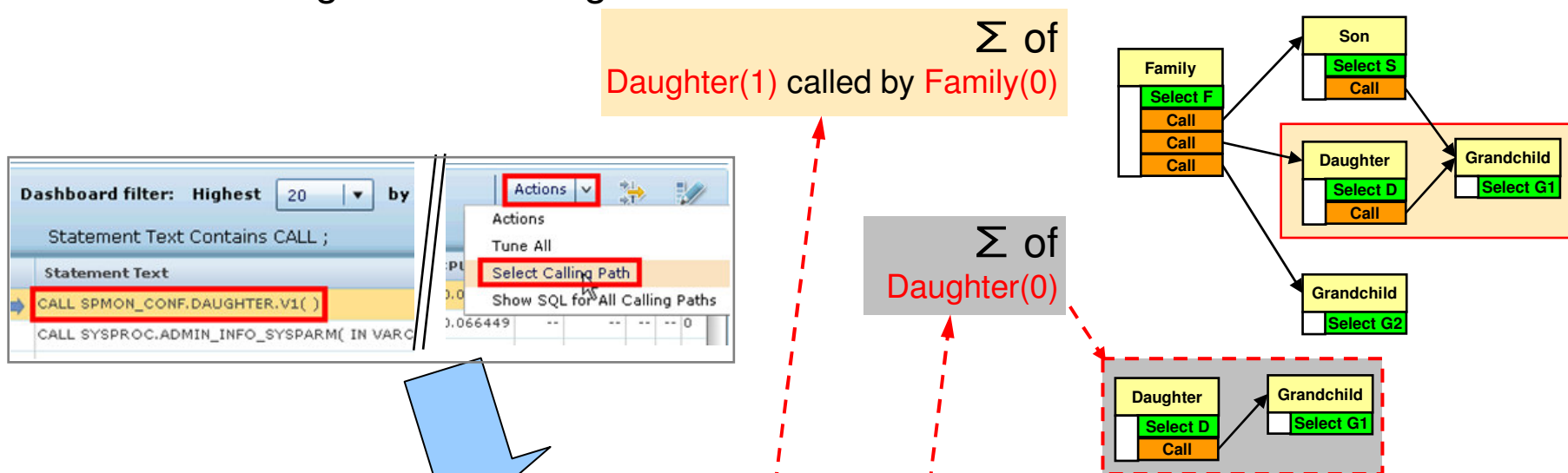
**Stored Procedure CPU Times**

**Class 1 nested times**

**Class 2 nested time**

# Showing the calling paths of SPs (1/2)

- Select Calling Path for Daughter



Dashboard filter: Highest 20 by

Statement Text Contains CALL ;

Statement Text

CALL SPMON\_CONF.DAUGHTER.V1( )

CALL SYSPROC.ADMIN\_INFO\_SYSPARM( IN VARC

Actions

Tune All

Select Calling Path

Show SQL for All Calling Paths

**Stored Procedure Calling Paths**

Select a calling path from the list to show the SQL statements that are executed in the context of the calling path.

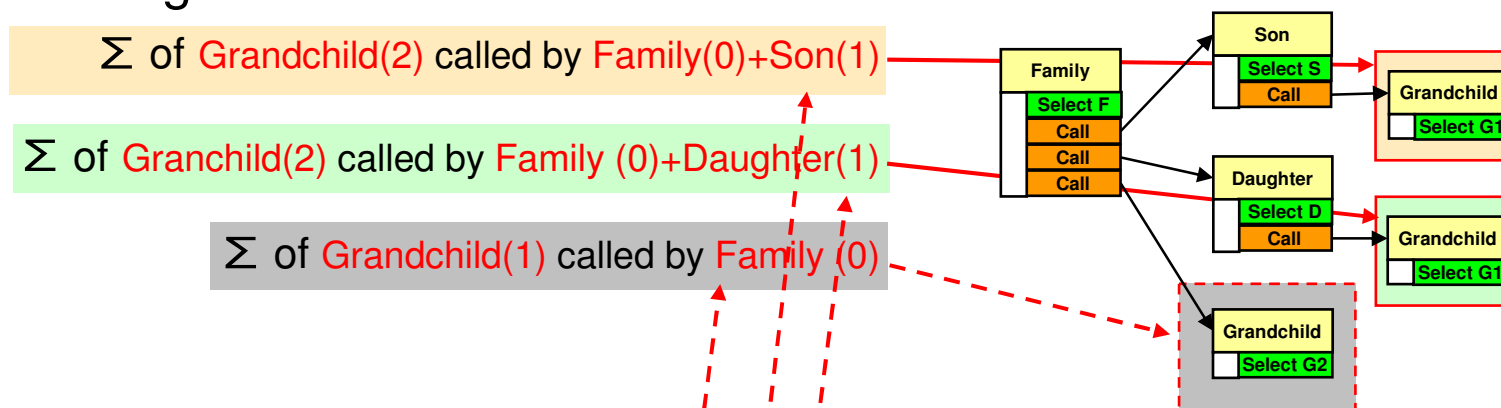
Calling paths for: CALL SPMON\_CONF\_IOD.DAUGHTER.V1( )

Calling Path	Nesting Level	Number of Exec	Nested Elapsed T	Nested CPU Time
CALL SPMON_CONF_IOD.FAMILY.V1( ) \ CALL SPMON_CONF_IOD.DAUGHTER.V1( )	1	40	0.095590	0.003594
CALL SPMON_CONF_IOD.DAUGHTER.V1( )	0	20	0.046947	0.003192

OK Cancel

# Showing the calling paths of SPs (2/2)

- Select Calling Path for Grandchild



**Stored Procedure Calling Paths**

Select a calling path from the list to show the SQL statements that are executed in the context of the calling path.

Calling paths for:

Calling Path	Nesting Level	Number of Execut	Nested Elapsed T	Nested CPU Ti
CALL SPMON_CONF_IOD.FAMILY.V1( ) \ CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	1	40	0.059185	0.001066
CALL SPMON_CONF_IOD.FAMILY.V1( ) \ CALL SPMON_CONF_IOD.SON.V1( ) \ CALL SPMON_CONF_IOD.GRAND...	2	40	0.024043	0.002116
CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	0	12	0.020522	0.000740
CALL SPMON_CONF_IOD.DAUGHTER.V1( ) \ CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	1	20	0.001797	0.000783
CALL SPMON_CONF_IOD.FAMILY.V1( ) \ CALL SPMON_CONF_IOD.DAUGHTER.V1( ) \ CALL SPMON_CONF_IOD....	2	40	0.001689	0.000641
CALL SPMON_CONF_IOD.SON.V1( ) \ CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	1	12	0.001203	0.000524

OK Cancel

# Show SQL executed by a SP (1/2)

- Action: Show SQL for **This** Calling Path

Select of Family (0)  
shows

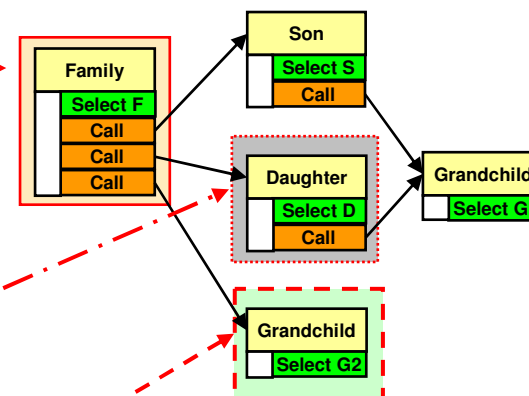
SELECT F \*  
 $\Sigma$  of Call Son(1) called by Family(0)  
 $\Sigma$  of Call Daughter(1) called by Family(0)  
 $\Sigma$  of Call Grandchild(1) called by Family(0)

Select of Daughter(1)  
shows

SELECT D  
 $\Sigma$  of Call Grandchild(2) called by Daughter(1)

Select of Grandchild(1)  
shows

SELECT G

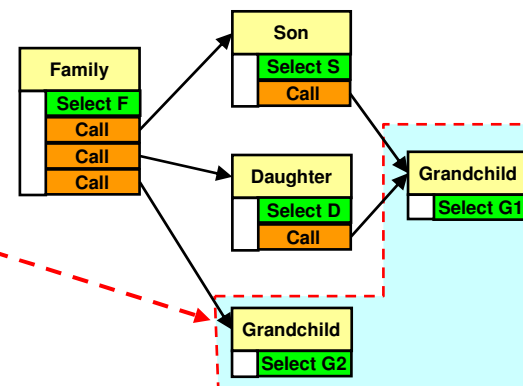


\* see next slide

- Action: Show SQL for **All** Calling Paths

Select Grandchild()  
shows  $\Sigma$

SELECT G1  
SELECT G2





# Show SQL executed by a SP (2/2)

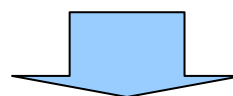
- Show SQL for **This** Calling Path for Family(0)

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text Contains CALL ;

Statement Text	Routine ID	Number of C.	Execution Elap	Number of Execution	CP						
CALL SYSPROC.ADMIN_INFO_SYSLOG( IN VARCHAR, IN VARCHAR, IN DATE, I...	-2,147,48...	1	11.750643	48	1.8						
CALL SYSPROC.ADMIN_COMMAND_DB2( IN VARCHAR, IN INTEGER, IN VARCH...	-2,147,48...	1	1.446675	66	0.243775	--	--	--	--	0	
CALL SPMON_CONF.FAMILY.V1( )	-2,147,48...	1	0.704594	46	0.151073	--	--	--	--	0	
CALL SPMON_CONF.SON.V1( IN INTEGER)	-2,147,48...	1	0.457175	184	0.099174	--	--	--	--	1	

Actions  
Tune All  
Select Calling Path  
Show SQL for This Calling Path



[Nesting Level 0] CALL SPMON\_CONF\_IOD.FAMILY.V1( )

Stored Procedure View

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text	Routine ID	Number of Calling P	Execution Elapsed T	Number of E:	CPU Time	Rows Rea	Physical I	I/O Time	Lock Wait	Last Execu
SELECT count(*) AS F INTO :H:H FROM sysibm.sysd...	--	--	0.150690	40	0.003045	40	3	--	0.002450	09/10 10...
CALL SPMON_CONF_IOD.DAUGHTER.V1( )	-2,147,482,...	1	0.095590	40	0.003594	--	--	--	--	--
CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	-2,147,482,...	1	0.059185	40	0.001066	--	--	--	--	--
CALL SPMON_CONF_IOD.SON.V1( )	-2,147,482,...	1	0.058601	40	0.007384	--	--	--	--	--



# SQL Cache Correlation

- For a nested statement correlation to the cache is shown in “SQL Statements Details” area:

The screenshot displays the 'Execution Summary' and 'SQL Statement Details' sections of the IBM DB2 Performance Center interface. The following table shows the execution summary for the selected statement:

Statement Text	Routine ID	Number of Ex
SELECT COUNT(*) AS SON_EQ INTO :H:H FROM sysibm.syscolumns	--	40
CALL SPMON_CONF.GRANDCHILD.V1( IN INTEGER)	-2,147,482,550	40

The 'SQL Statement Details' section is currently on the 'Overview' tab. The statement type is identified as 'Static'. The 'Most Recent Identification' details are as follows:

Statement identifier:	--
Package name:	SON
Consistency token:	19417ECD1CF43E7C
Section number:	2
Cache insert time:	08/20 11:27:34
Last Execution time:	08/20 11:27:43
Number of parallel groups:	0

# History Navigator

- The History Navigator shows the drill down history for Stored Procedures and can be used similar to a Browser History

SQL Statements Dashboard: PMO1DA11

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

**Execution Summary**

Dashboard filter

Statement

Statement	Statement Text
CALL SYSPROC	[Nesting Level 1] CALL SPMON_CONF.SON.V1( IN INTEGER) \ CALL SPMON_CONF.GRANDCHILD.V1( IN INTEGER)
CALL SYSPROC	[Nesting Level 1] CALL SPMON_CONF.DAUGHTER.V1( ) \ CALL SPMON_CONF.GRANDCHILD.V1( IN INTEGER)
CALL SYSPROC	[Nesting Level 2] CALL SPMON_CONF.FAMILY.V1( ) \ CALL SPMON_CONF.DAUGHTER.V1( ) \ CALL SPMON_CONF.GRANDCHI...
CALL SYSPROC	[Nesting Level 0] CALL SPMON_CONF.GRANDCHILD.V1( IN INTEGER)
CALL SYSPROC	[merged] CALL SPMON_CONF.GRANDCHILD.V1( IN INTEGER)
CALL SYSPROC	[Nesting Level 0]CALL SYSPROC.ADMIN_COMMAND_DB2( IN VARCHAR, IN INTEGER, IN VARCHAR, IN VARCHAR, OUT INT...
CALL SPMON_	[Nesting Level 0]CALL SYSPROC.ADMIN_INFO_SYSPARM( IN VARCHAR, OUT INTEGER, OUT VARCHAR)
CALL SYSIBM	[Nesting Level 2] CALL SPMON_CONF.FAMILY.V1( ) \ CALL SPMON_CONF.DAUGHTER.V1( ) \ CALL SPMON_CONF.GRANDCHI...
CALL SPMON_	[Nesting Level 0]CALL SPMON_CONF.DAUGHTER.V1( )
CALL SYSIBM	[Nesting Level 0]CALL SPMON_CONF.FAMILY.V1( )
CALL SPMON_	[Nesting Level 0] CALL SPMON_CONF.SON.V1( IN INTEGER)
CALL SYSPROC	[Nesting Level 2] CALL SPMON_CONF.FAMILY.V1( ) \ CALL SPMON_CONF.SON.V1( IN INTEGER) \ CALL SPMON_CONF.GRAN...
CALL SYSPROC	All Statements

SQL Stater





# Finally: Link to 'Extended Insight' functionality

Response Time Details: lily

Graph Grid

Selected layer: No layer selected

SQL Statements Clients

Show Highest 10 by Average Data Serv

Statement Text

- SELECT STAGE FROM MTS.DSN\_FILTER\_TABLE
- CALL SYSIBM.SQLCOLUMNS( IN VARCHAR, IN VA...**
- CALL SYSIBM.SQLSTATISTICS( IN VARCHAR, IN ...
- CALL SYSIBM.SQLCOLPRIVILEGES( IN VARCHAR,...
- SELECT CARDF FROM MTS.DSN\_KEYTGTDIST\_TA...

Display this list by the selected graph layer

Statement Most Recent Identification Most Recent Compilatio

CALL SYSIBM.SQLCOLUMNS( IN VARCHAR, IN VARCHAR, IN VARCHAR, IN VARCHAR, IN VARCHAR)

Statement identifier: --  
Package name: --  
Collection ID: --  
Consistency token: --  
Section number: --  
Cache insert time: --

Isolation level:  
Literal replacement:  
CURSOR WITH HOLD:  
Special Registers for Compilation  
CURRENT PRECISION  
CURRENT DEGREE:  
CURRENT RULES:  
CURRENT SQLID:  
CURRENT SCHEMA:

Actions

- Actions
- Tune
- Show the execution summary for the selected statement**

First referenced table: --  
Failure ratio: 0.00 %  
First negative SQL code: --

**Execution Summary**

All Statements

Dashboard filter: Highest 20 by Total Execution Elapsed Time

**Statement text Equals CALL SYSIBM.SQLCOLUMNS( IN VARCHAR, IN VARCHAR, IN VARCHAR, IN VARCHAR, IN VARCHAR) ;**

Statement Text	Routine ID	Number of Calling P:	Execution Elap:	Numb
<b>CALL SYSIBM.SQLCOLUMNS( IN VARCHAR, IN VARCHAR, IN VARCHAR, IN VARCHAR, IN V...</b>	-2,147,483,...	1	39.600685	



# Integration with Optim Query Workload Tuner for z/OS – Single query tuning

**Execution Summary**

[Nesting Level 0] CALL SPMON\_CONF\_IOD.FAMILY.V1( )

Stored Procedure View

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text	Routine ID	Number of Calling Path	Number of Execution	Execution Elapsed Time	CPU Time
SELECT count(*) AS F INTO :H:H FROM sysibm.sysdummy1	--	--	15	0.069293	0.001374
CALL SPMON_CONF_IOD.SON.V1( )	-2,147,482,573	1	15	0.036343	0.002930
CALL SPMON_CONF_IOD.DAUGHTER.V1( )	-2,147,482,572	1	15	0.001254	0.001099
CALL SPMON_CONF_IOD.GRANDCHILD.V1( )	-2,147,482,574	1	15	0.000255	0.000221

**SQL Statement Details**

Overview Server Execution Times Row Activity I/O Locking and

Statement

```
SELECT count(*) AS F INTO :H:H FROM sysibm.sysdummy1
```

Statement type: Static  
First referenced table: --

Actions  
Tune

**Task Launcher** \*QTProject1/Query Group 1/Query 1

Query Tuner Workflow Assistant

Groups in this Project

- Query Group 1
  - Query 1
    - Single Query
      - Set Advisor Options
      - Run Advisors and Analysis Tools
      - Advance

1. Status  
2. Capture  
3. Monitor  
4. Invoke

**Run Single-Query Advisors And Analysis Tools**

Specify EXPLAIN options and runtime environment options for the query. You can optionally create a workload.

Database connection:  D0767885 ( DB2 for z/OS V10 (New-Function Mode) )

SQLID:  Description:

Schema:

Use upper case for the SQLID and schema  
 Re-EXPLAIN the query

EXPLAIN options and runtime environment options

Select What To Run...

Query Text - Query 1

```
SELECT count(*) AS F INTO :H:H FROM sysibm.sysdummy1
```



# Integration with Optim Query Workload Tuner for z/OS – Workload level tuning

**Execution Summary**

[merged] CALL SPMON\_CONF.GRANDCHILD2.V1( IN INTEGER) Stored Procedure View

Dashboard filter: Highest 20 by Total Execution Elapsed Time

Statement Text	Routine ID	Number of Calling Path	Number of Execution	Execution Elapsed Time
SELECT COUNT(*) AS GRANDCHILD2_EQ INTO :H:H FROM sysibm.s...	--	--	32	0.061488
SELECT COUNT(*) AS GRANDCHILD2_LT INTO :H:H FROM sysibm.sy...	--	--	32	0.001917
SELECT COUNT(*) AS GRANDCHILD2_GT INTO :H:H FROM sysibm.s...	--	--	32	0.001868

Actions: Tune All

**Show Statements**

The statements in the workload are listed in the table.

Database connection: ✓ D0767885 ( DB2 for z/OS V10 (New-Function Mode) )

Status/Description

Workload Statements:

You can add statements to the workload. You can click a column header to sort the list of statements. Right-click a statement of interest to run the single-query advisors and to

Invoke Advisors Refine Workload... Review Results... More actions: Add Statements to the Workload from a Source...

1-3 rows out of 3 are displayed. Statements per page: 50 Statement wrapping: Show statements in 1 line

STMT_TEXT	SOURCE	STAT_EXEC	STAT_ELAP	AVG_S
SELECT COUNT(*) AS GRANDCHILD2_LT INTO :H:H FROM sysibm.systables	(CATALOG	1	33.000000	
SELECT COUNT(*) AS GRANDCHILD2_GT INTO :H:H FROM sysibm.systables	(CATALOG	1	32.000000	
SELECT COUNT(*) AS GRANDCHILD2_EQ INTO :H:H FROM sysibm.systables	(CATALOG	1	40.000000	



# Integration with Optim Configuration Manager for z/OS – Configuration optimization

The screenshot displays the 'InfoSphere Optim Performance Manager' interface. At the top, there are browser tabs for 'InfoSphere Optim Performance Manager...' and 'IBM InfoSphere Optim Configuration Man...'. The main interface shows a 'SQL Statements Dashboard: DB11 MOP' with a 'View Configuration Changes' link highlighted in a red box at the bottom right. A red arrow points from this link to the 'IBM InfoSphere Optim Configuration Manager' browser tab. The dashboard includes a time range selector (10/13/12 23:03), a duration of 1 hour, and a table of SQL statements.

Statement Text	Routine ID	Number of C	Execution El	Number of	CPU Time	Rows Read	I/O Time	Lock Wait Ti
CALL SYSPROC.ADMIN_INFO_SYSLOG( IN DATE, IN TIME, IN VARCHAR, IN DATE...	-2,147,482...	1	11.327164	7	0.184351	--	--	--
CALL OPM.DB2MON_LOC.V1( OUT VARCHAR)	-2,147,482...	1	3.115494	1	0.004006	--	--	--
CALL SYSPROC.ADMIN_COMMAND_DB2( IN VARCHAR, IN INTEGER, OUT INTEGE...	-2,147,482...	1	2.969018	7	0.019101	--	--	--
CALL SYSPROC.ADMIN_INFO_SYS Parm( IN VARCHAR, OUT INTEGER, OUT VARC...	-2,147,482...	1	1.115085	1	0.009035	--	--	--
SELECT COLLID AS COLLID, VERSION AS VERSION, STATEMENT, NAME, HEX(CO...	--	--	1.086924	48	0.301781	1,883,904	--	0.000000
SELECT 'OMPE Extended Insight' FROM SYSIBM.SYSTABLES	--	--	0.539504	793	0.518125	0	--	0.000001
SELECT 'IOD 2011 HOL 1777' FROM SYSIBM.SYSTABLES	--	--	0.531736	791	0.514187	0	--	0.000002