OMEGAMON DB2 Performance Expert

Latest updates

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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

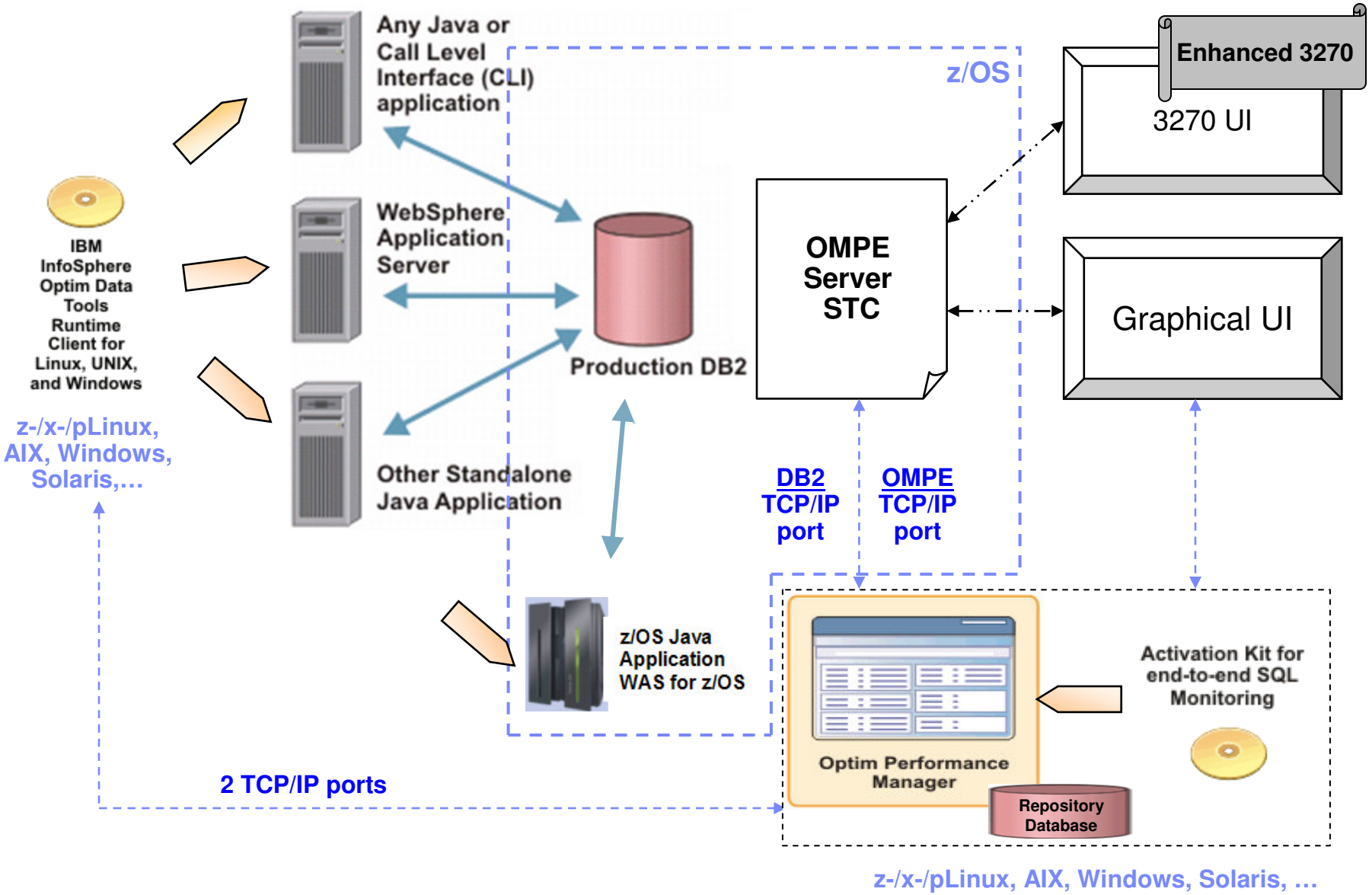
RETURN ON INVESTMENT

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

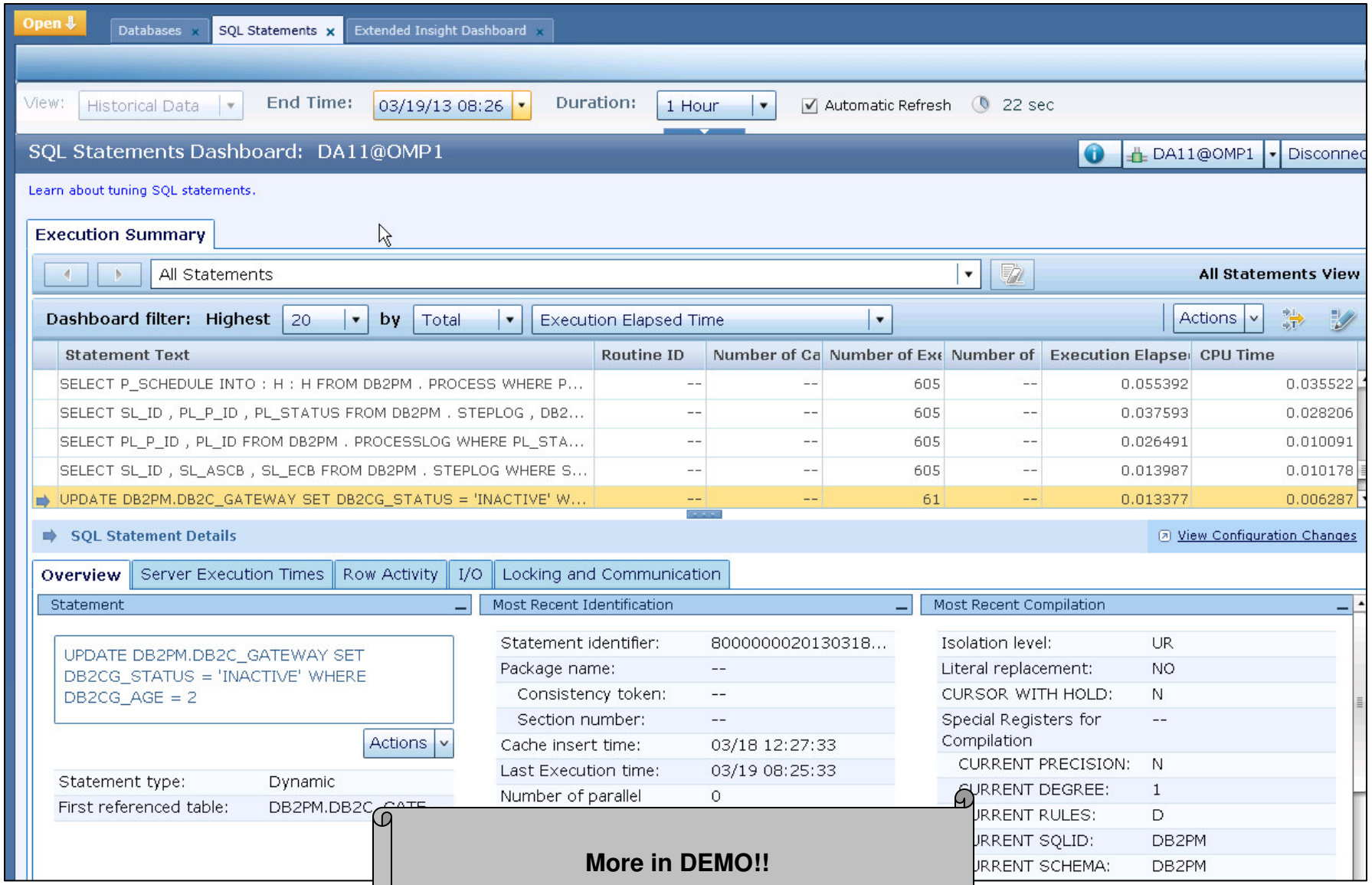
Architectural extensions in V510+V511



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



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)

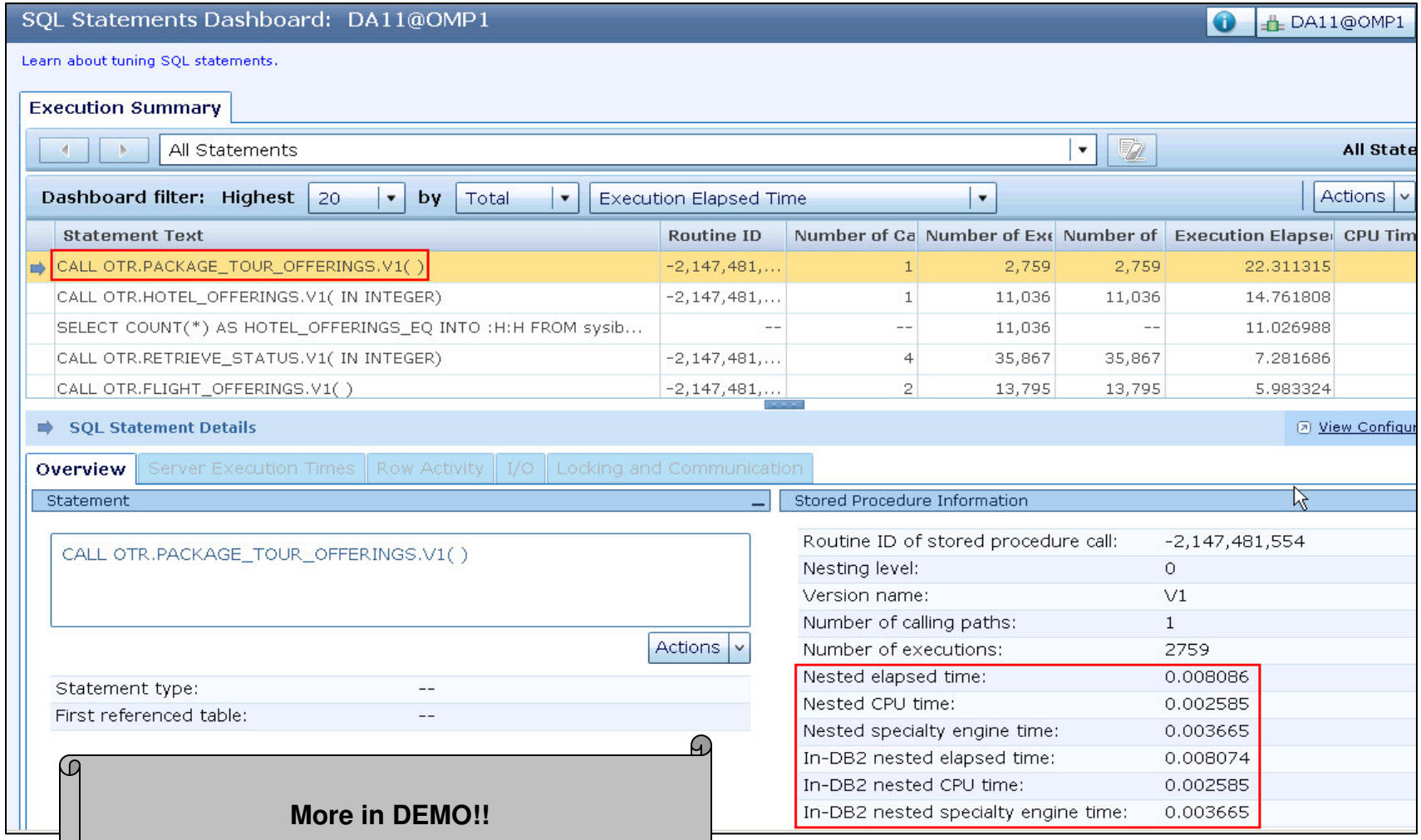
Enhanced Instrumentation for Stored Procedure Performance Analysis

- **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



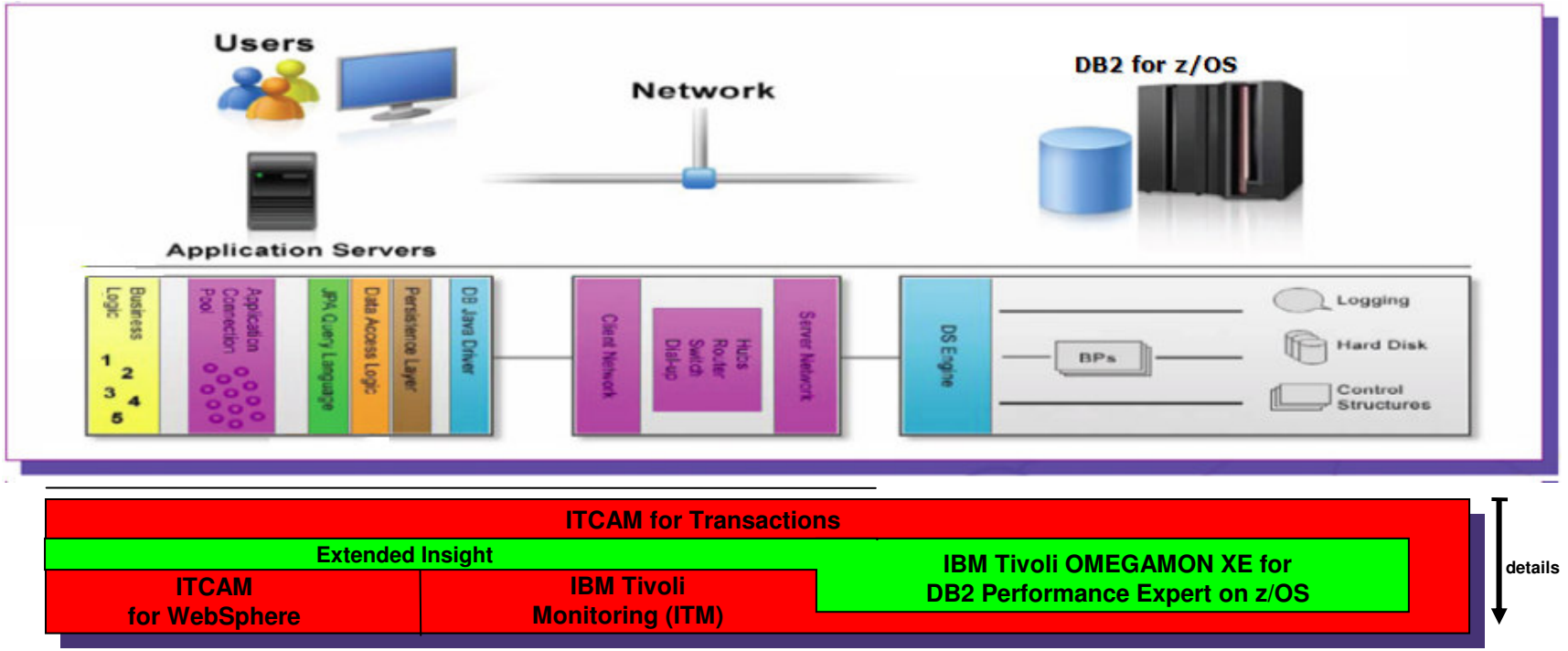
More in DEMO!!

IBM

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?

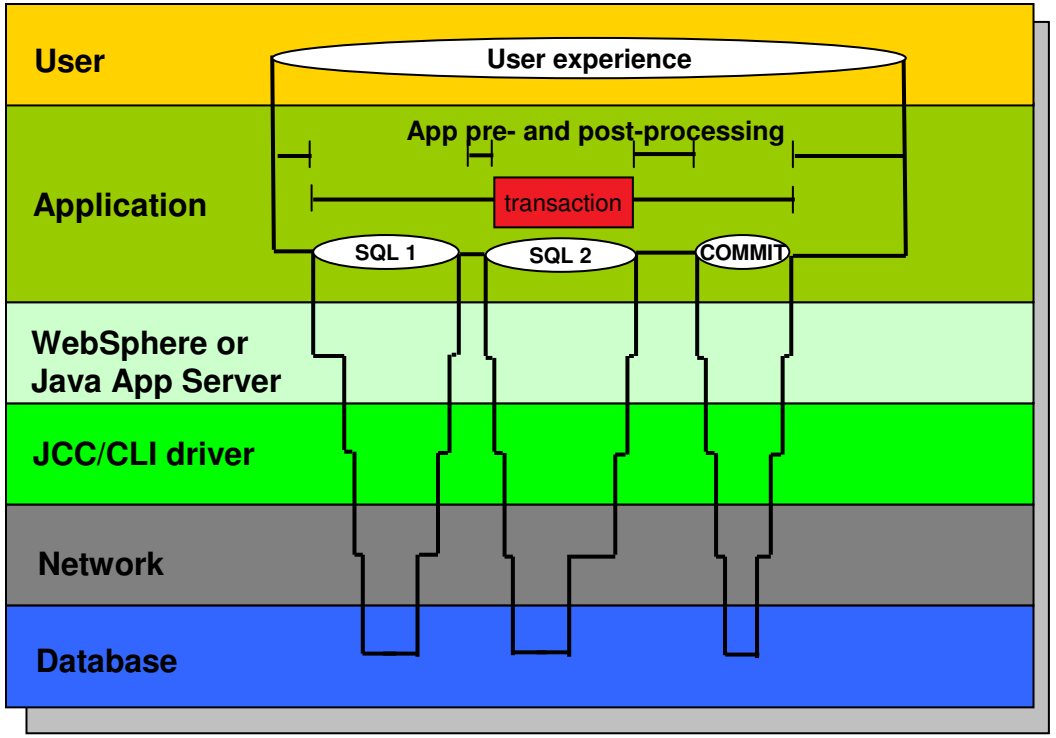
- Database workload monitoring based on end-to-end transaction response times
- What is it for: ***Manage response time SLAs, Monitor application health***

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

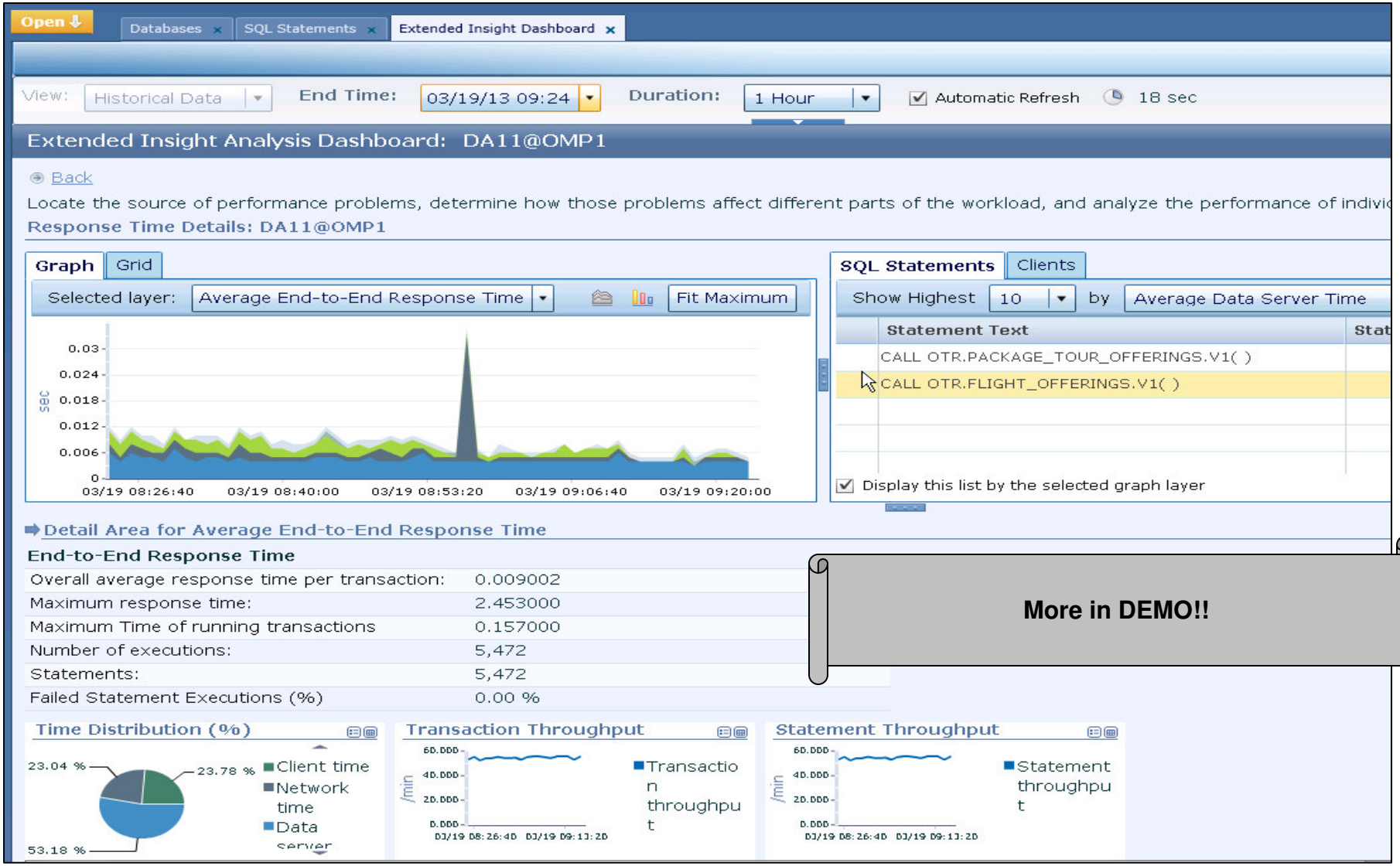
When
- **Identify the** problem period

What
- **Identify the** problem SQLs

Why
- **Identify the** problem layer



Extended Insight Dashboard sample screenshot



Extended Insight Client Data Collection Concepts

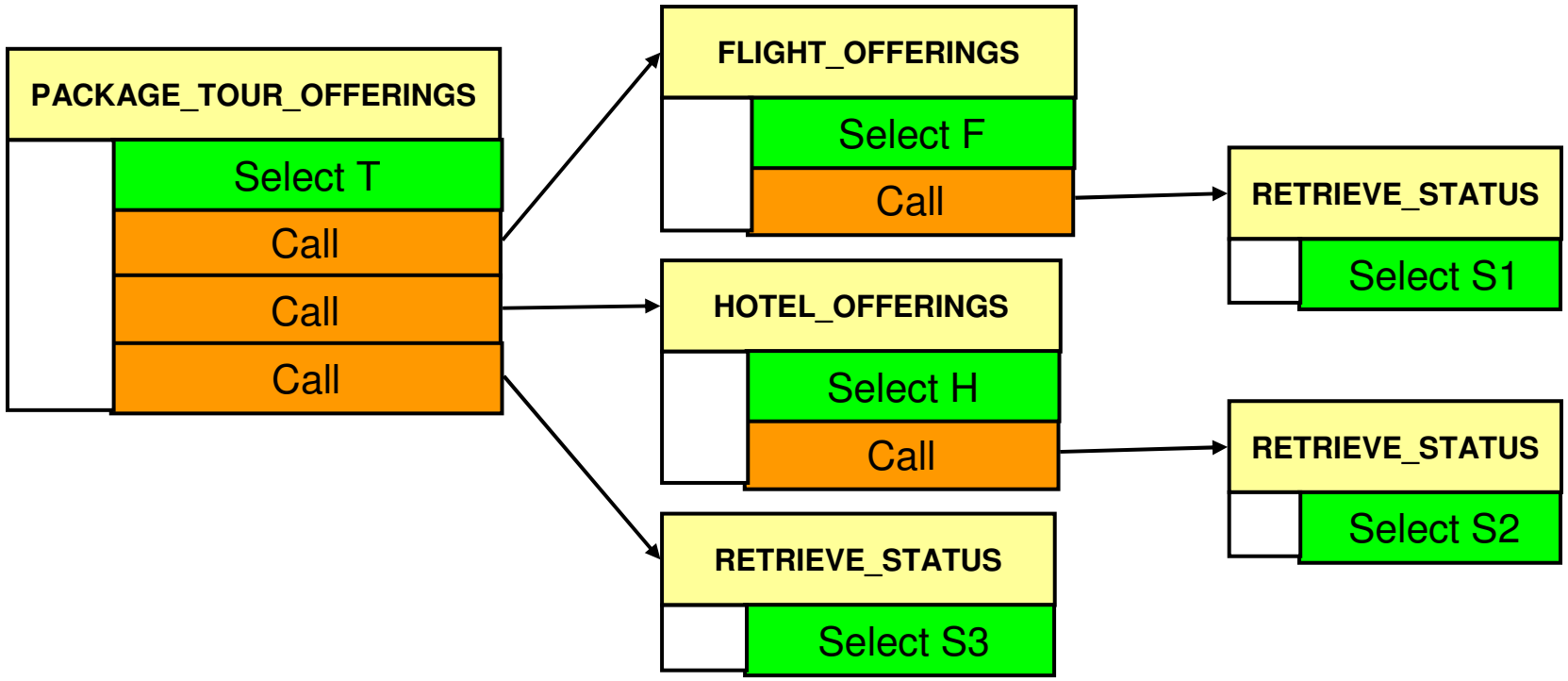
- **Overall goal**
  - Achieve End-to-End SQL monitoring with **lowest possible overhead**
- **Extended Insight client side data collection**
  - EI Client “sits” on top of CLI/JDBC driver and collects the performance data
  - Metrics aggregated for distinct SQL statement text
  - Aggregation is done 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 :**

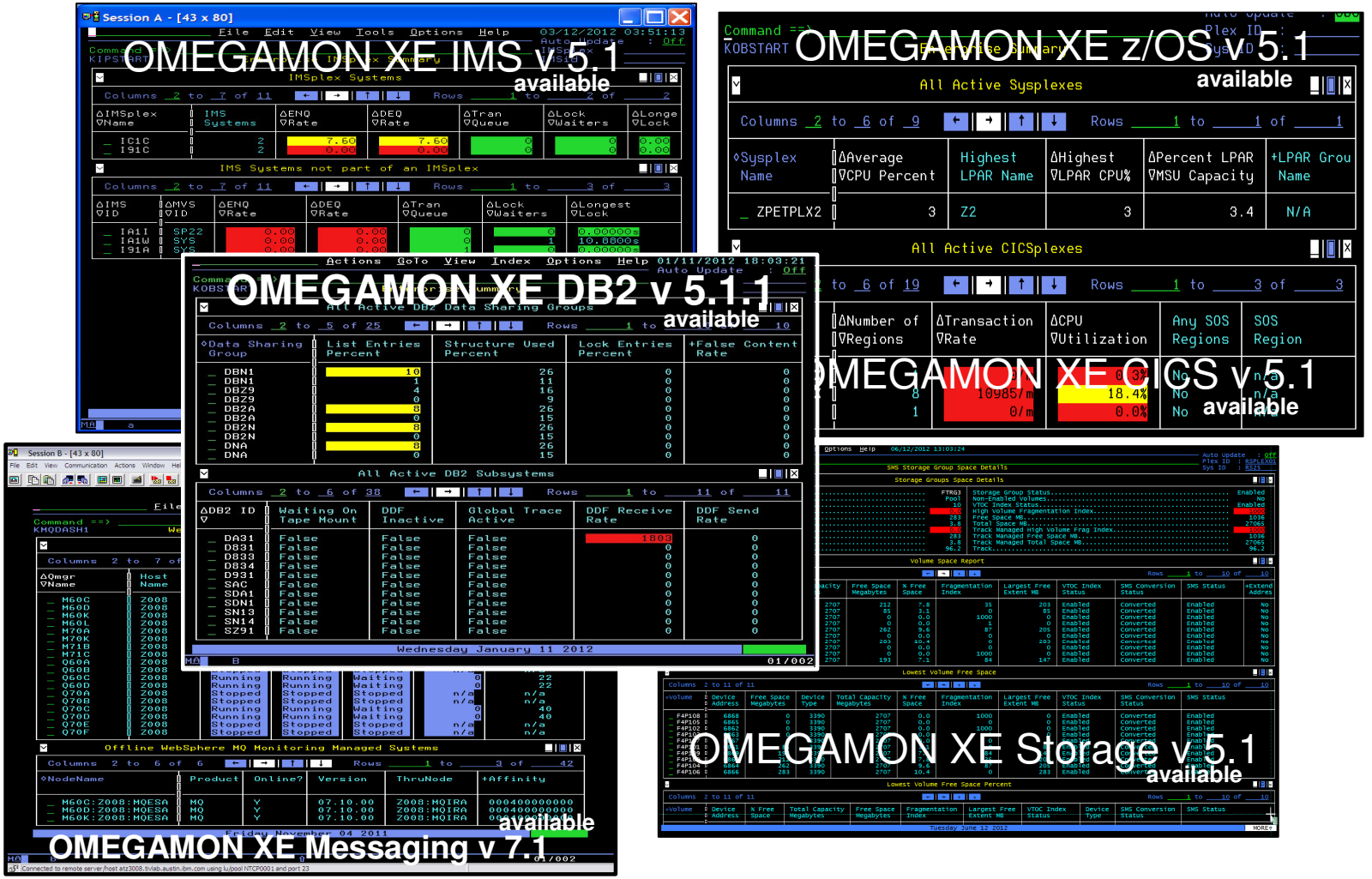


- **Java workload from Client application B, running arbitrary SQL and Stored Procedures**

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

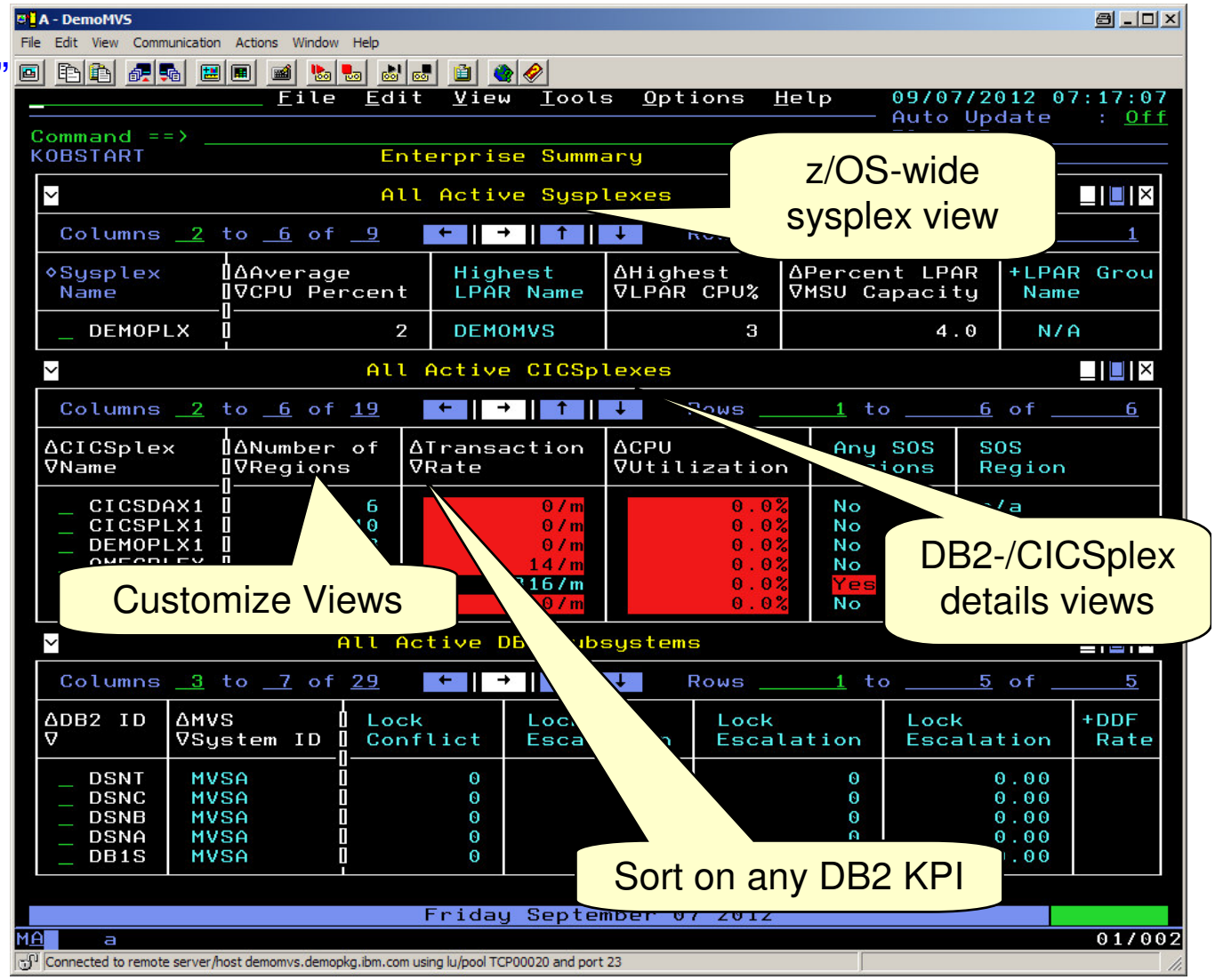
Enhanced 3270



OMEGAMON 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



Analysts already agree that OMEGAMON V5 provides value to customers

Ptak / Noel

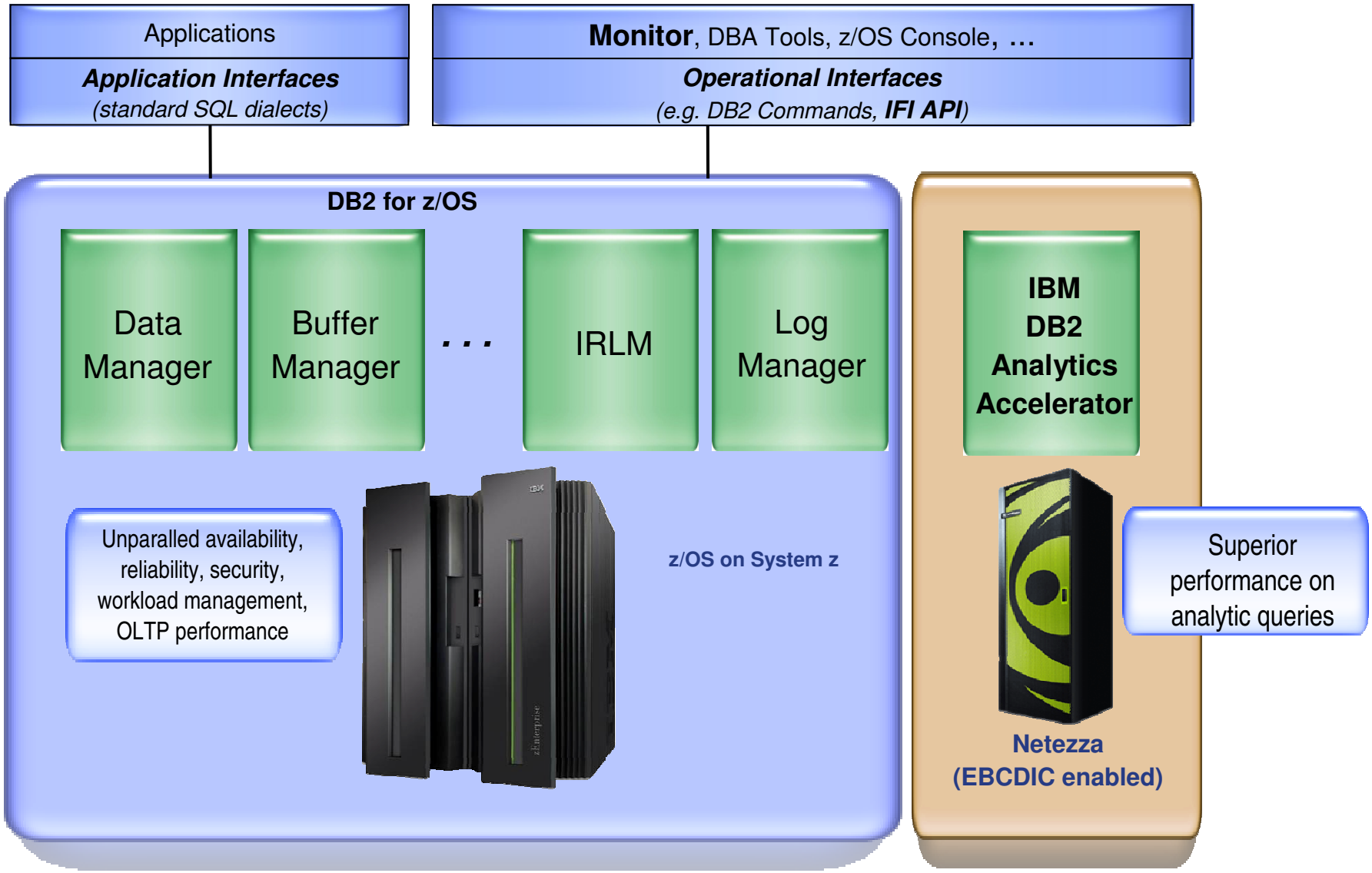
On OMEGAMON moving to simplified architecture and a common view across multiple domains, Rich Ptak of PNA commented, *"This is an important and much needed enhancement. We've heard consistently – there is a need for this kind of integration. Consistent interface – a couple of years ago, some people liked 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

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**

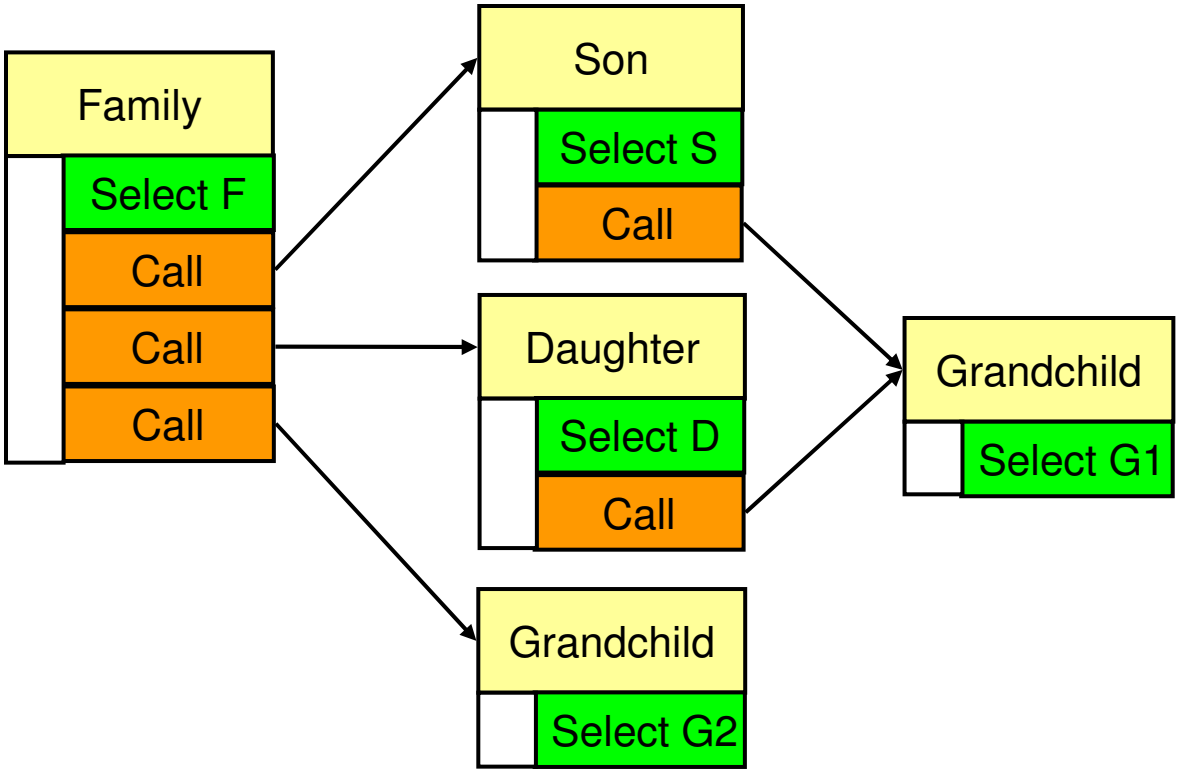
→ More interesting and fun 'stuff' to come ☺

BACKUP

Backup – Stored Procedure Monitoring

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

- **Workload:**

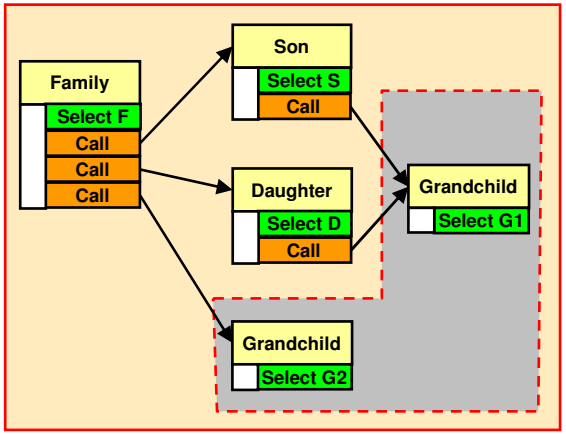


SQL Dashboard – aggregation by ROUTINEID

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

Σ of Family

Σ of Grandchild



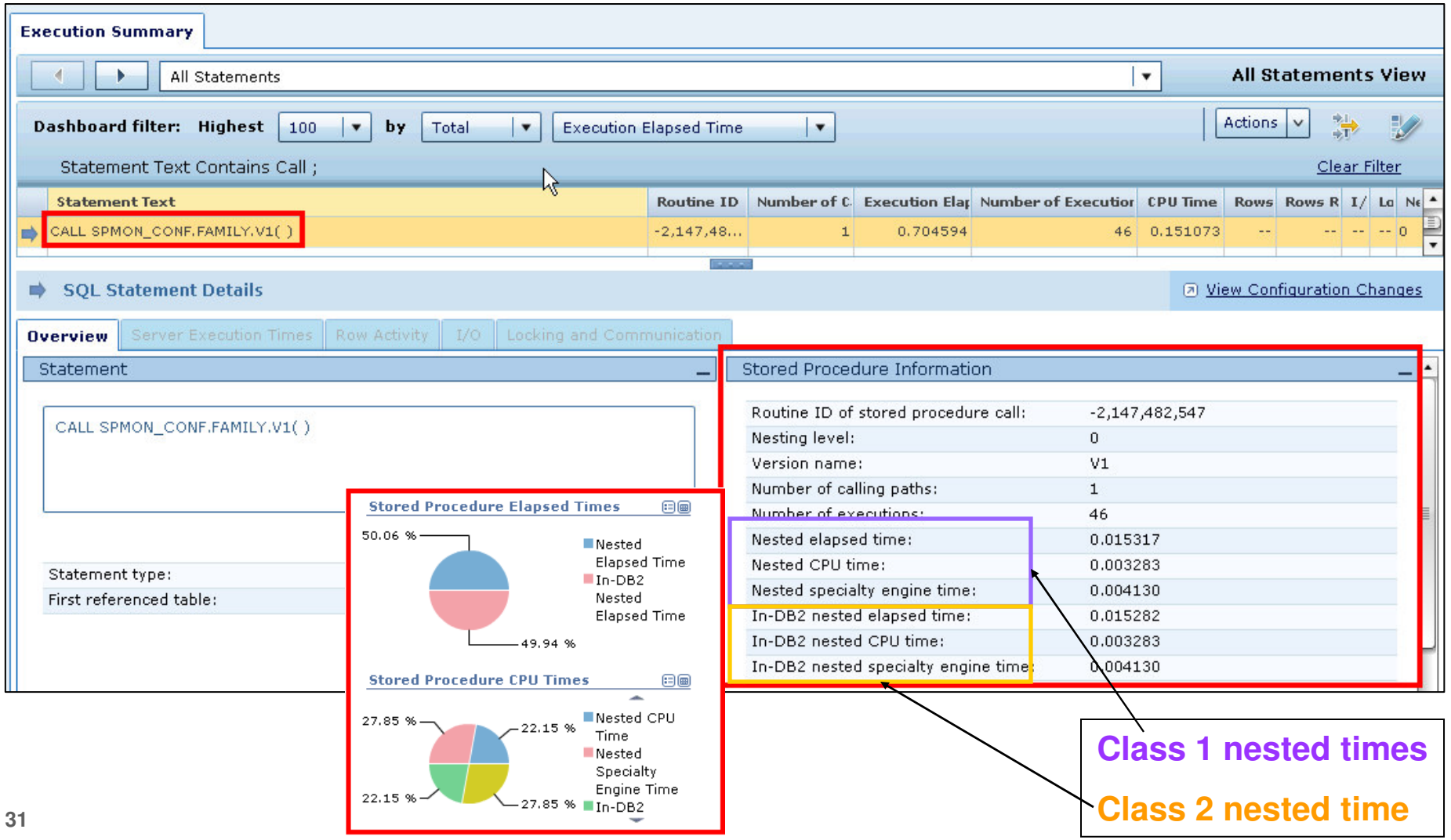
All Statements | All Statements View

Dashboard filter: Highest 20 by Total Execution Elapsed Time | Actions

Statement Text Contains call ; Clear Filter

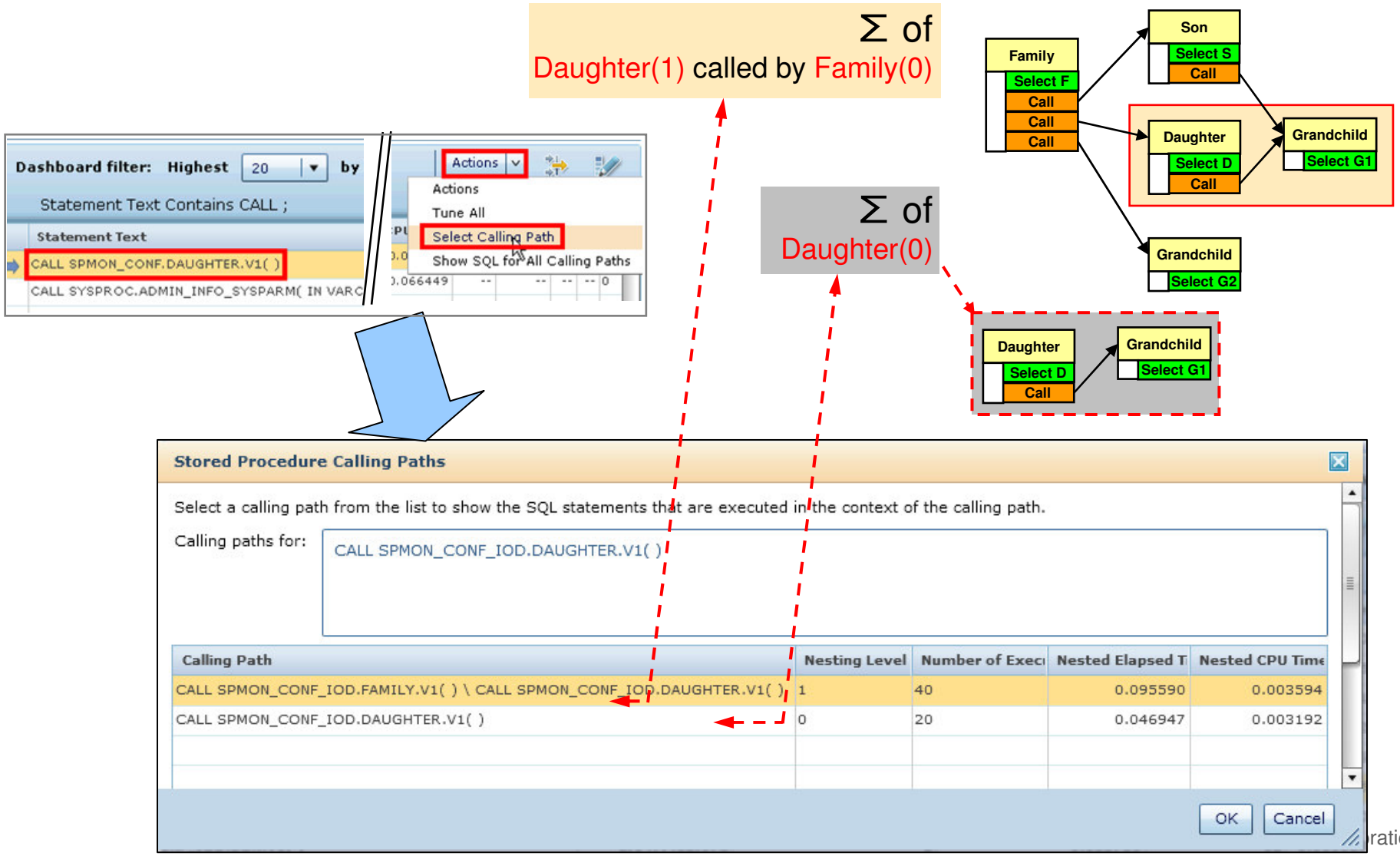
Statement Text	Routine ID	Number of Calling Paths	Execution Elapsed Time	Number of Execu	CPU Time
CALL SYSIBM.SQLPROCEDURECOLS(IN VARCHAR, IN VARCHAR, IN ...	-2,147,483,102	1	1.160051	168	0.148540
CALL SPMON_CONF_IOD.FAMILY.V1( )	-2,147,482,976	1	0.403588	40	0.018785
CALL SYSPROC.ADMIN_COMMAND_DB2(IN 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



Showing the calling paths of SPs (1/2)

- Select Calling Path for Daughter



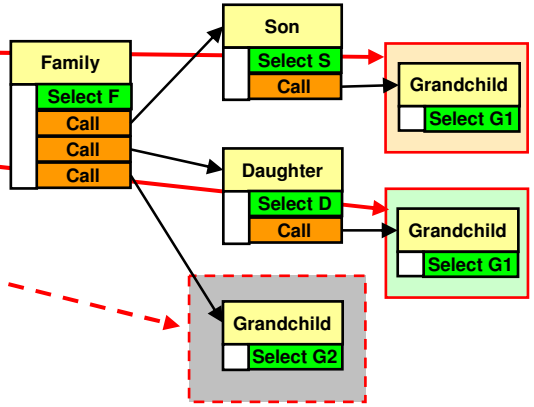
Showing the calling paths of SPs (2/2)

- Select Calling Path for Grandchild

Σ of Grandchild(2) called by Family(0)+Son(1)

Σ of Granchild(2) called by Family (0)+Daughter(1)

Σ of Grandchild(1) called by Family (0)



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.GRANDCHILD.V1( )

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

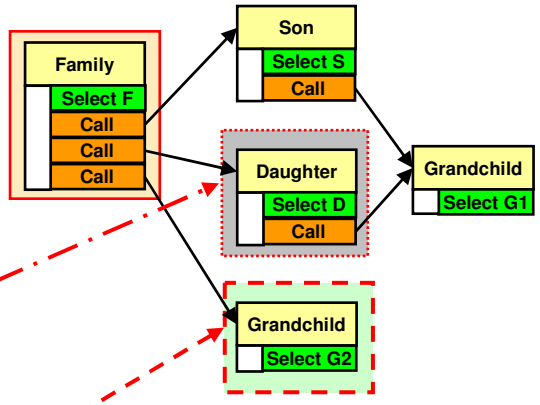
SELECT F *
Σ of Call Son(1) called by Family(0)
Σ of Call Daughter(1) called by Family(0)
Σ of Call Grandchild(1) called by Family(0)

Select of Daughter(1)
shows

SELECT D
Σ of Call Grandchild(2) called by Daughter(1)

Select of Grandchild(1)
shows

SELECT G

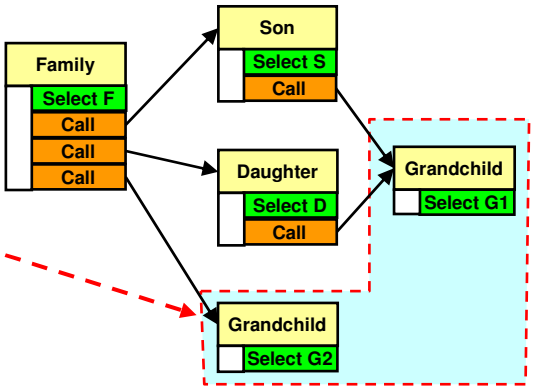


* see next slide

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

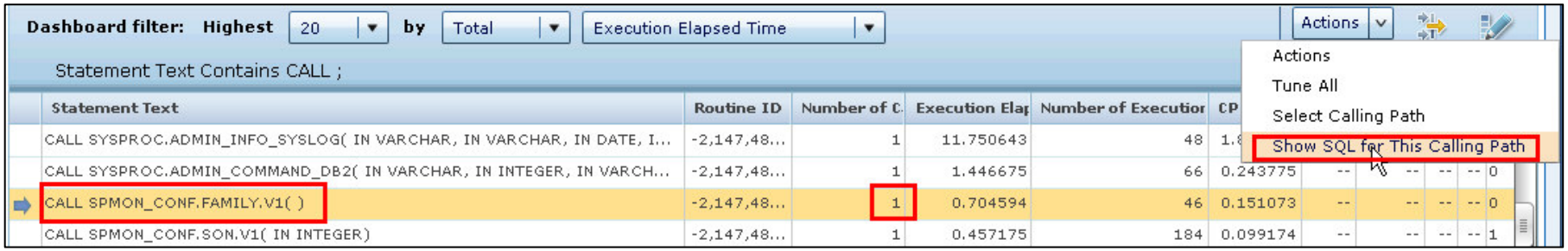
Select Grandchild()
shows Σ

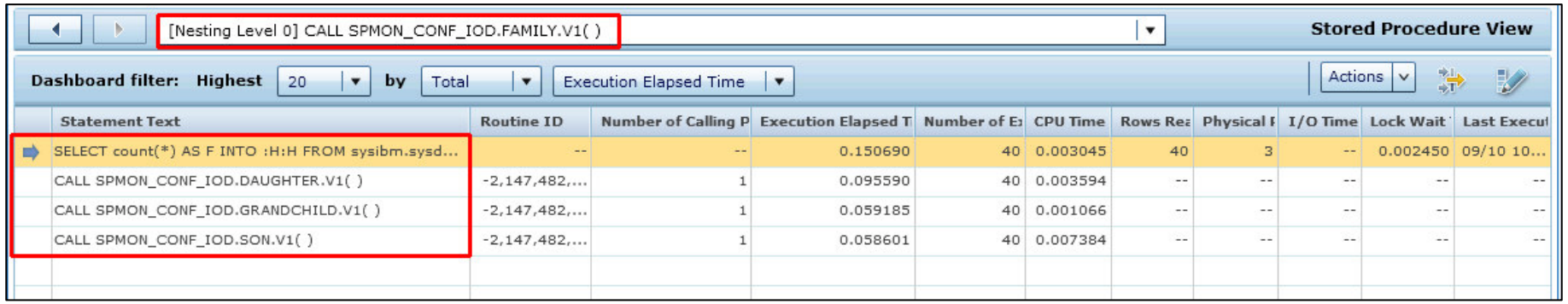
SELECT G1
SELECT G2



Show SQL executed by a SP (2/2)

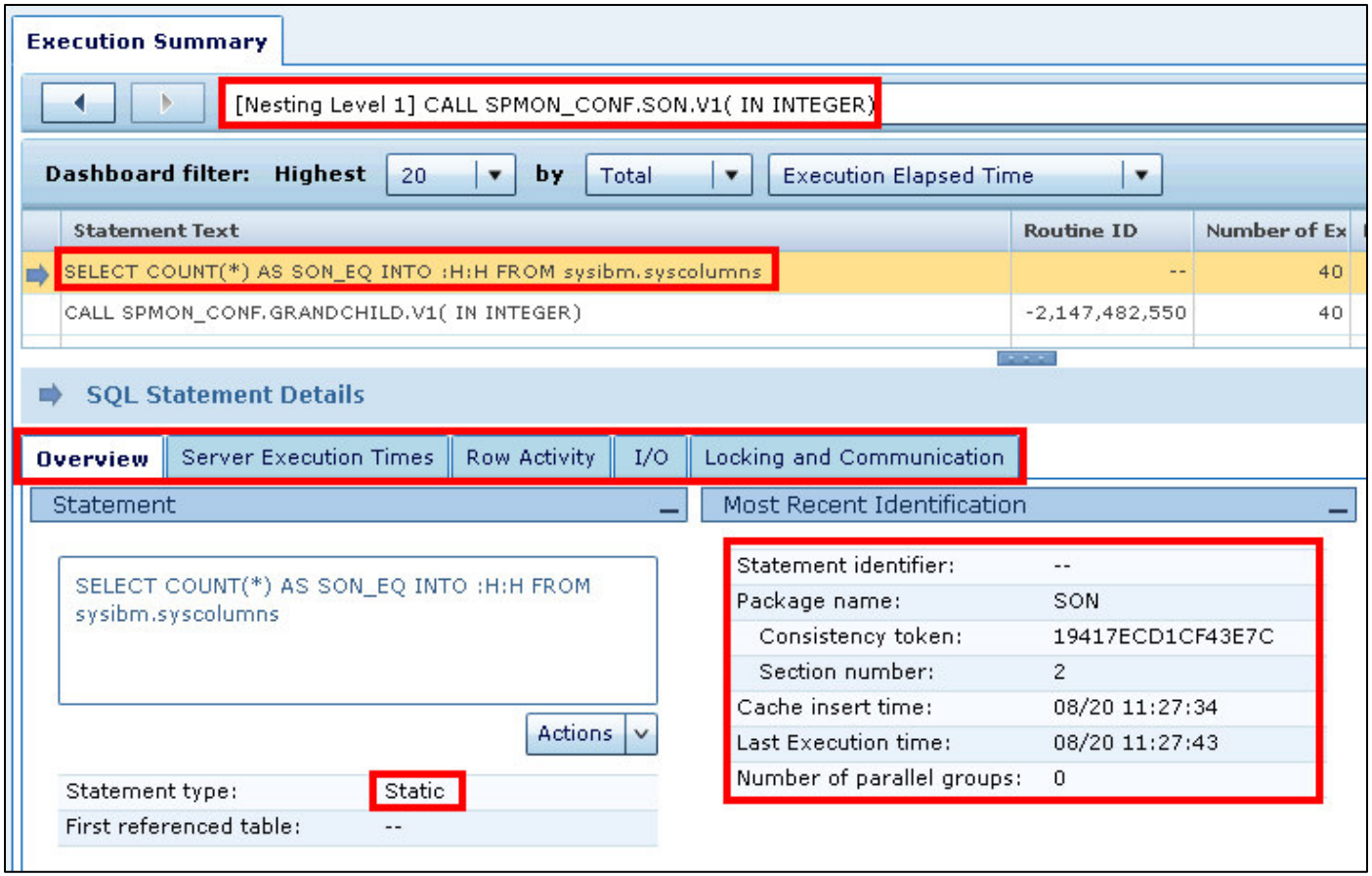
- Show SQL for **This** Calling Path for Family(0)





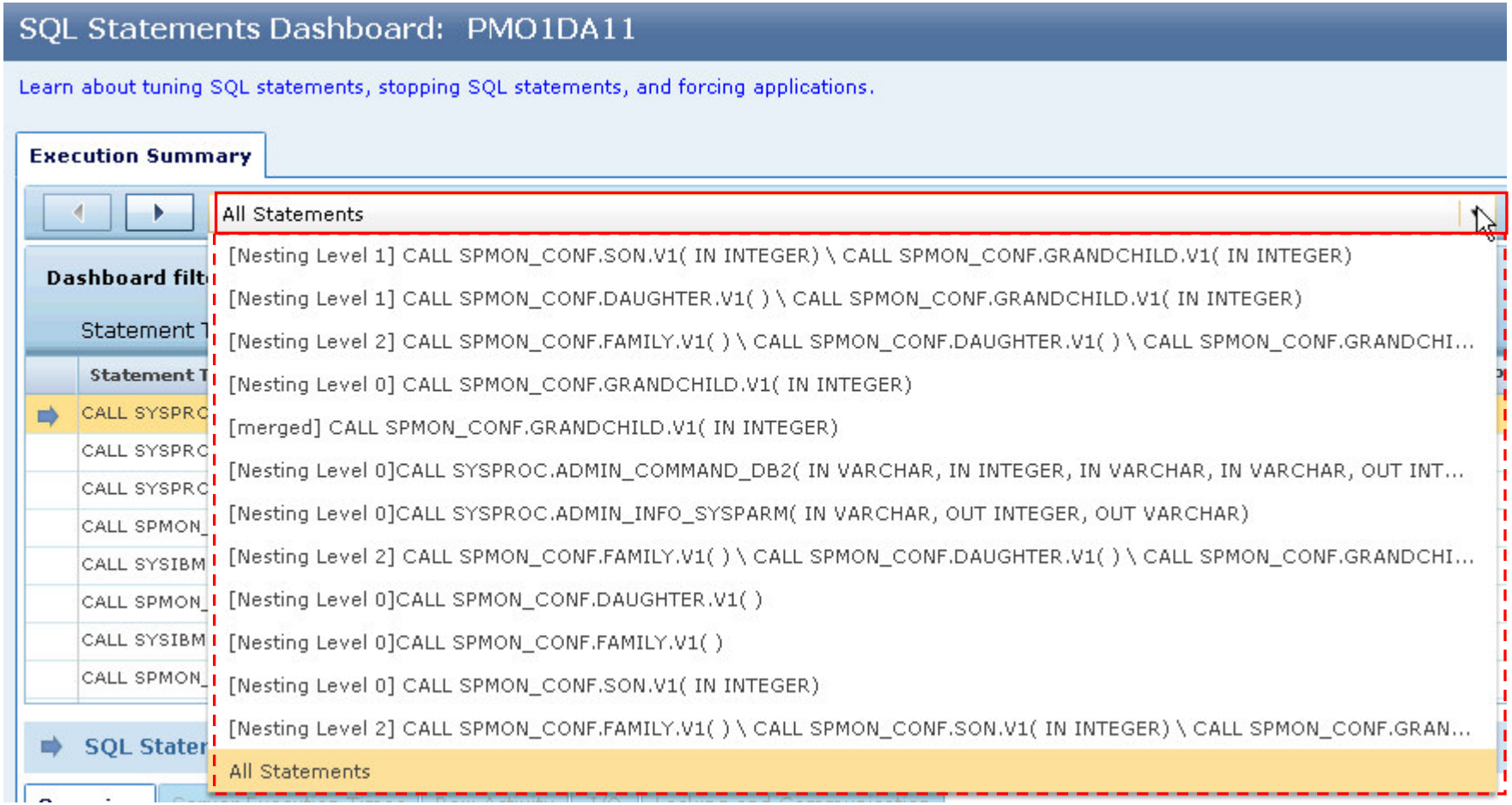
SQL Cache Correlation

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

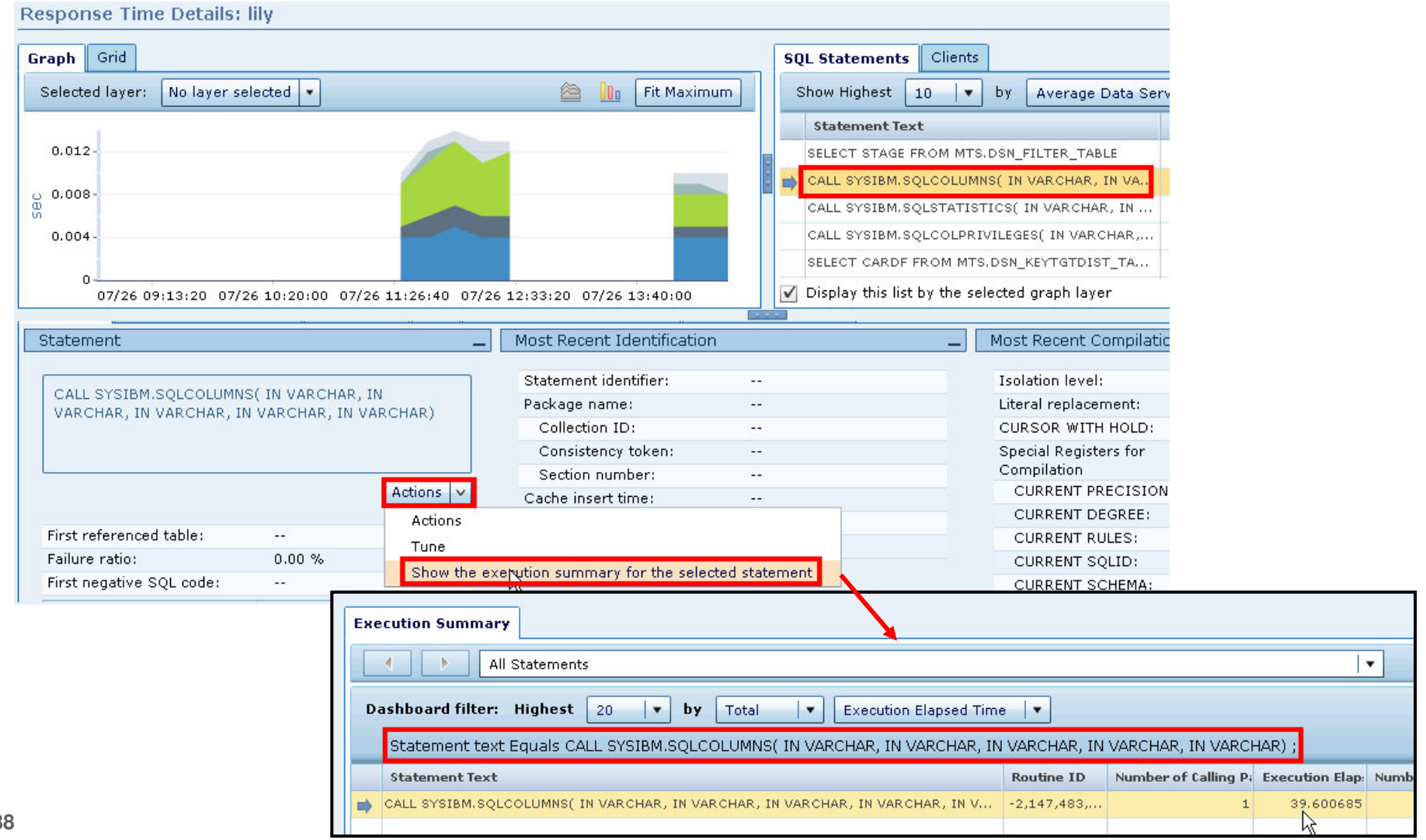


History Navigator

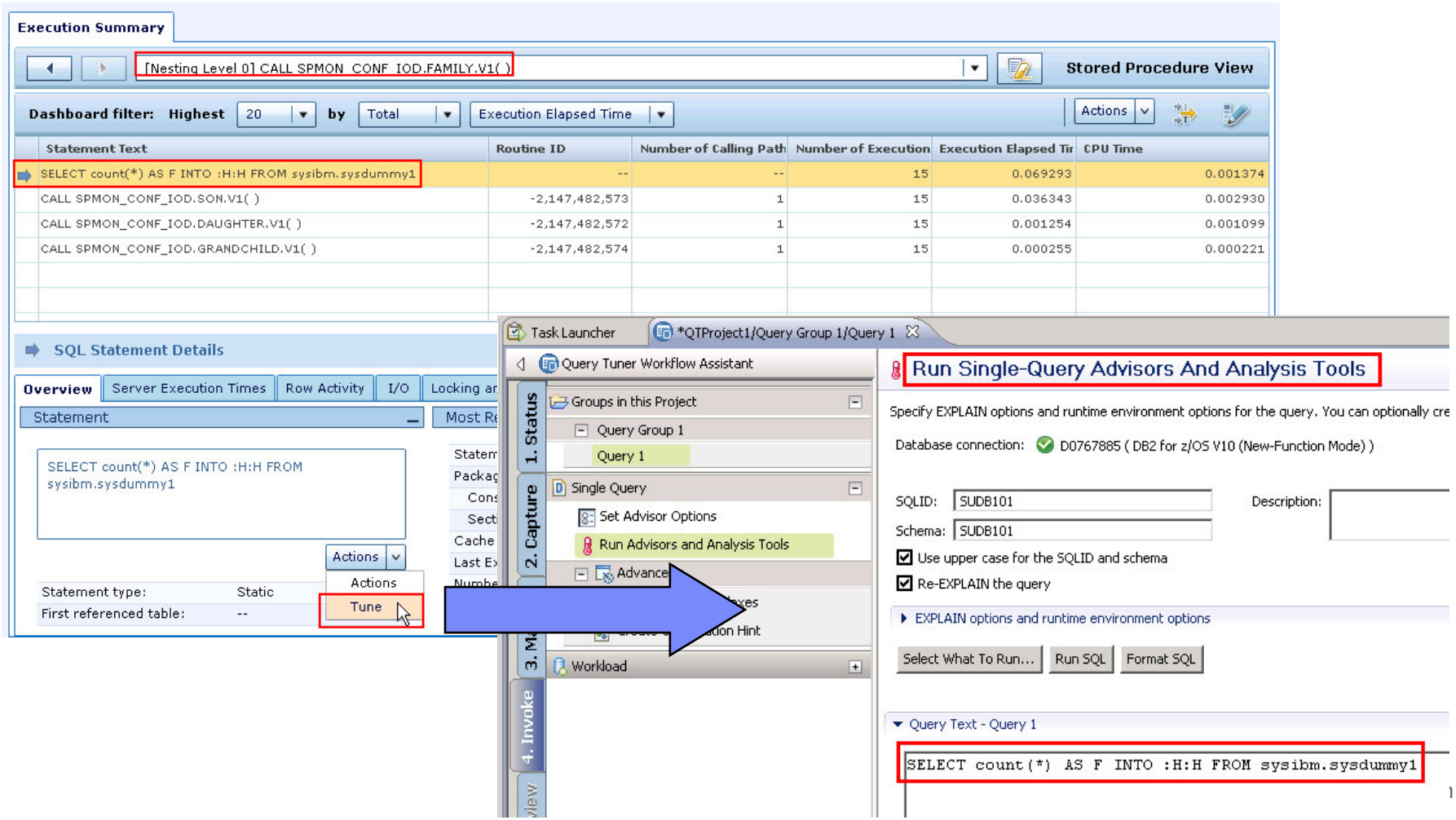
- The History Navigator shows the drill down history for Stored Procedures and can be used similar to a Browser History



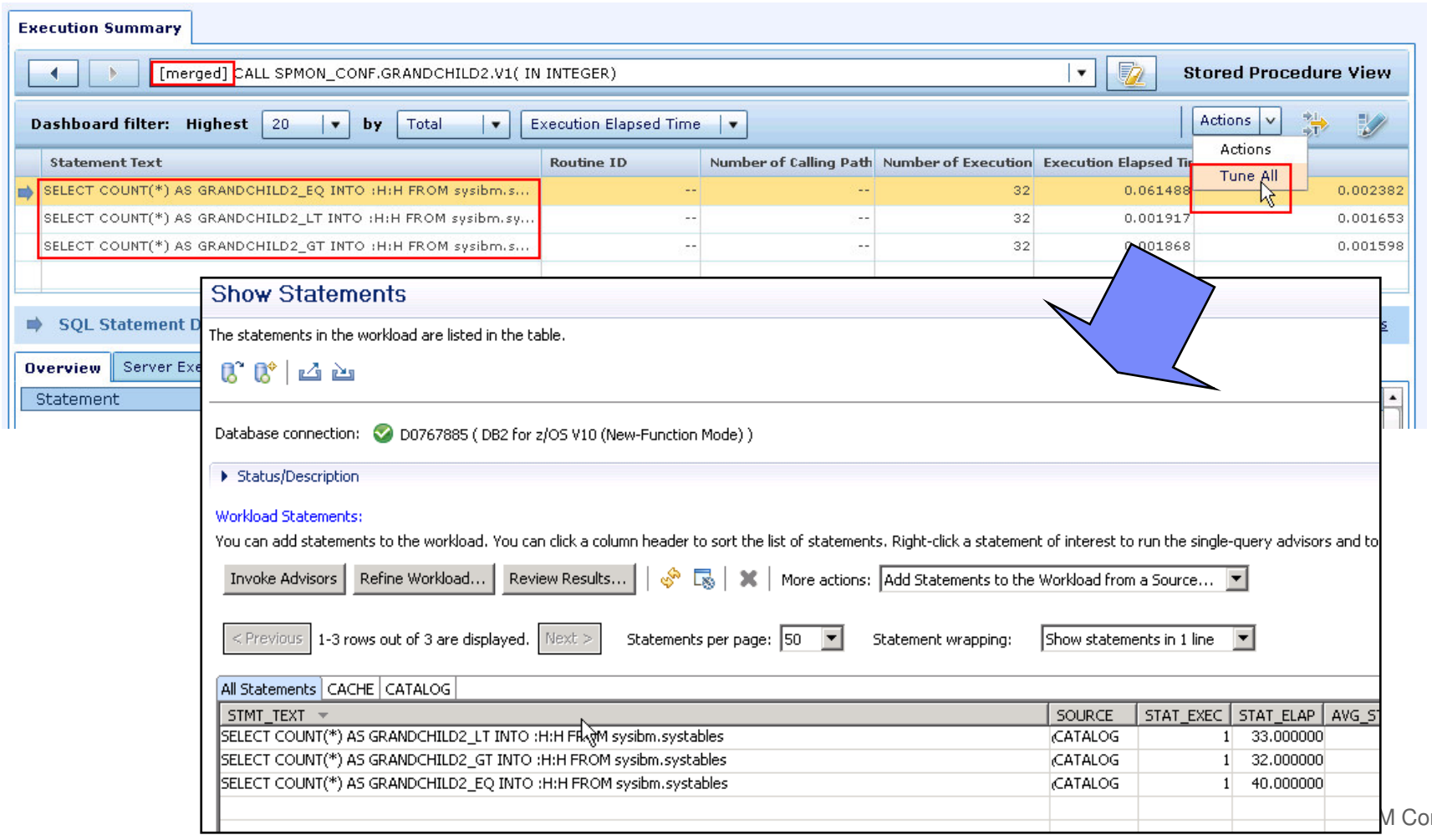
Finally: Link to ‘Extended Insight’ functionality



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



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



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