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4 in 1  
BIF Usage  
Index Maintenance Costs  
Quiet Times  
Audit

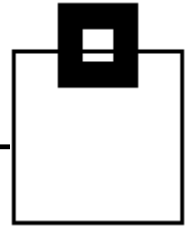


**Roy Boxwell**  
***SOFTWARE ENGINEERING GmbH***  
**&**  
***SEGUS Inc***



# AGENDA

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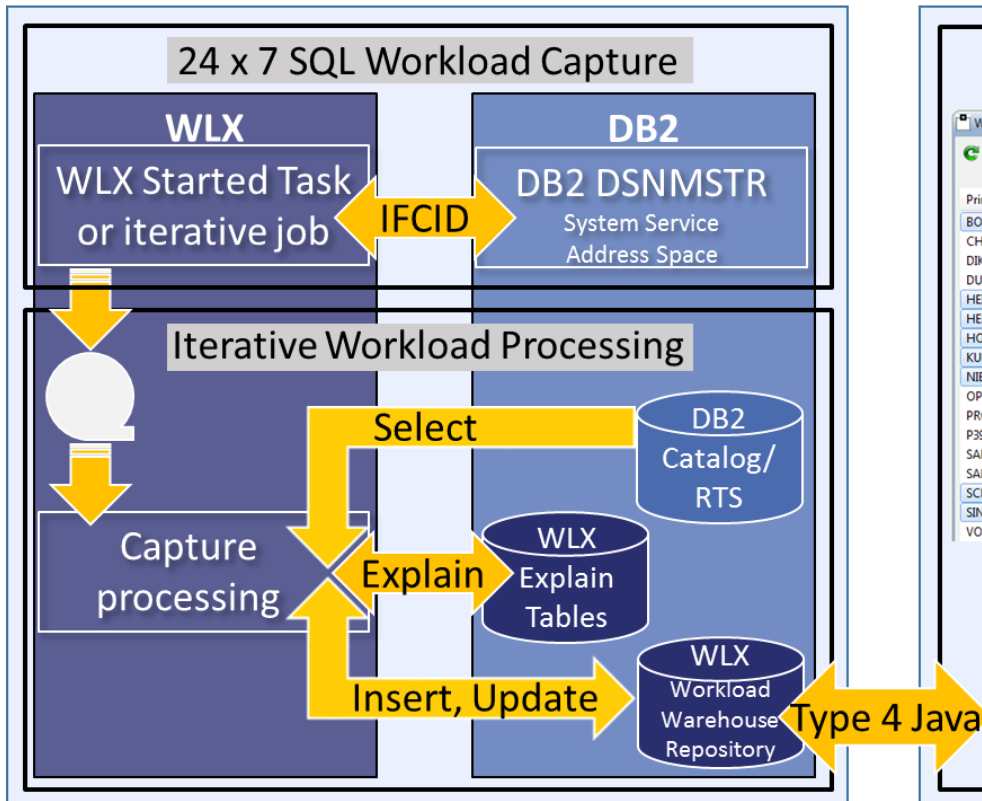
1. WLX - How it works
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6. Q&A Session



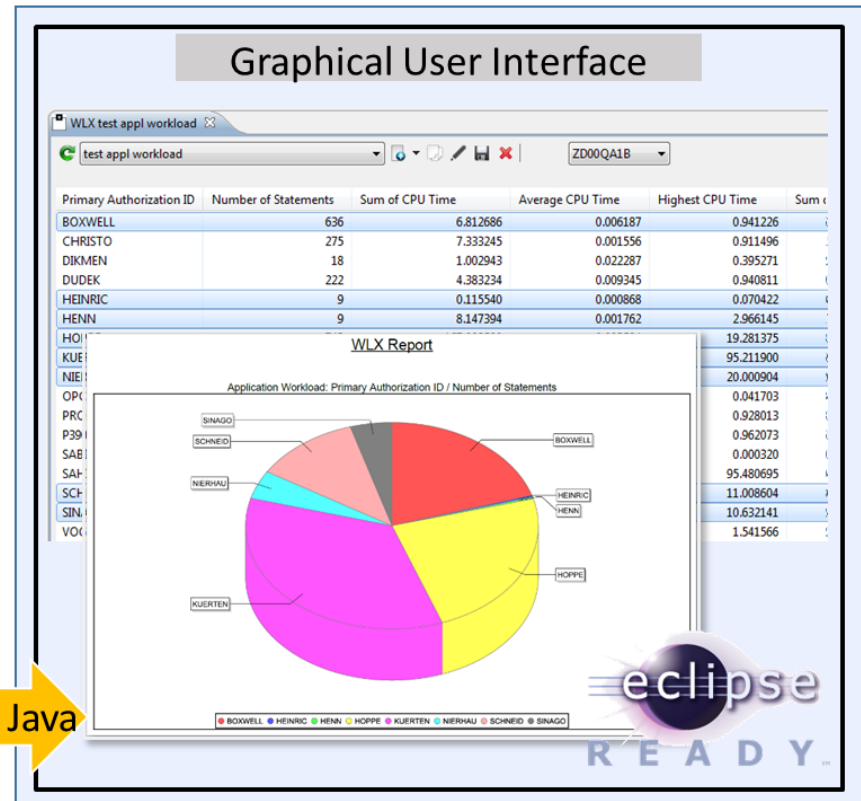
# WLX - How it works

Captures the hard to get SQLs,  
even the ones that disappear ...

Mainframe Engine

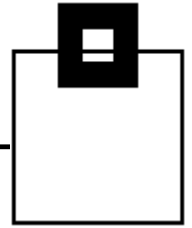


Workstation Engine



# AGENDA

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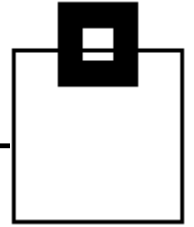


1. WLX - How it works
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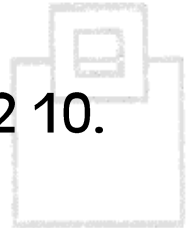
# BIF Usage

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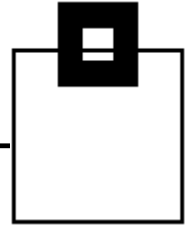
BIF: Built-In Function: CHAR, VARCHAR, SPACE etc.

Problem: DB2 9 – 10 change of behavior with CHAR and DECIMAL type. CHAR(1.0) returned different format in DB2 10.



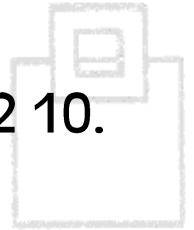
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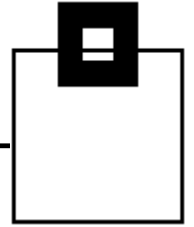
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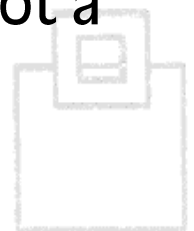
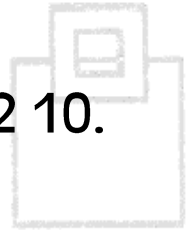
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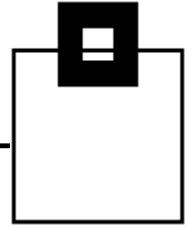
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Then they discovered VARCHAR...so BIF\_COMPATIBILITY got a new value: V9\_DECIMAL\_VARCHAR which included CHAR.



# BIF Usage

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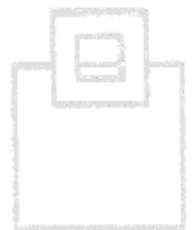
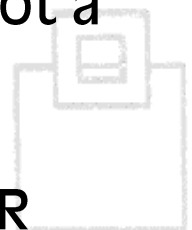
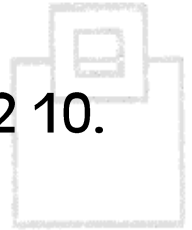


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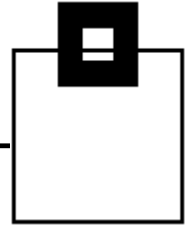
Then they discovered TIMESTAMPS...so then if BIF\_COMPATIBILITY was set to V9 or V9\_DECIMAL\_VARCHAR illegal TIMESTAMP formats were “accepted”.





# BIF Usage

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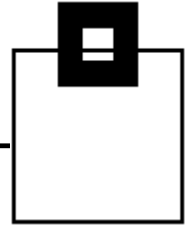
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Then they discovered TIMESTAMPS...so then if BIF\_COMPATIBILITY was set to V9 or V9\_DECIMAL\_VARCHAR illegal TIMESTAMP formats were “accepted”.

Then they discovered TRIM...so BIF\_COMPATIBILITY got a new value: V9\_TRIM for LTRIM, RTRIM, and STRIP which also included all of the above...

# BIF Usage - Fixes

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BIF: Built-In Function: CHAR, VARCHAR, SPACE etc.

Two new SCHEMAS: SYSCOMPAT\_V9 and SYSCURRENT (Just for CHAR, VARCHAR and all the TRIM stuff. They must be added before SYSIBM in the path of course!)



DB2 11: APPLCOMPAT – New ZPARM introduced.

V10R1 after migration

V11R1 after install

If set to V10R1 then DB2 10 NFM behavior is guaranteed for the next two releases. So in DB2 13 it will all go horribly wrong...That's about seven years from now!

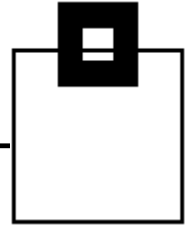


DB2 11: Two new BIF's - CHAR9 and VARCHAR9.



# BIF Usage - Fixes

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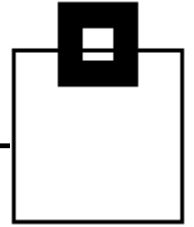
BIF: Built-In Function: CHAR, VARCHAR, SPACE etc.

Now at this point everyone agreed, well at least Roy, that it was getting pretty silly. So then the IFCID 366 was born. This IFCID is output whenever DB2 detects a *possible* change of behavior from the current release to the next release.

Within this IFCID are a bunch of fields (for the full details please look in your <db2hlq>.SDSNMACS(DSNDQW05) member) including a QW0366FN field that is a number (ICI – Incompatible Change Indicator) that started at 1 and went to 3 with the initial version. A “1” meant a CHAR decimal problem, a “2” meant a VARCHAR decimal problem, and a “3” meant a TIMESTAMP problem.

# BIF Usage - Fixes

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BIF: Built-In Function: CHAR, VARCHAR, SPACE etc.

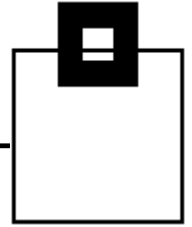
Now it has 10 numbers for DB2 10 and 17(!) for DB2 11.

People also started getting lots of 366's and so the 376 was born, but only for DB2 11. This is an aggregated version of the 366.



# BIF Usage - Fixes

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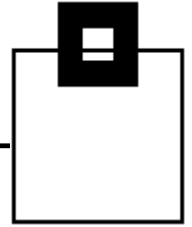


This was TMI (Too Much Information) as most shops were attempting to use SMF and filling up packs of disks with millions of records that contained Statement Ids of dynamic SQL that had long disappeared from the DSC.



# BIF Usage - Fixes

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BIF: Built-In Function: CHAR, VARCHAR, SPACE etc.

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This was TMI (Too Much Information) as most shops were attempting to use SMF and filling up packs of disks with millions of records that contained Statement Ids of dynamic SQL that had long disappeared from the DSC.




This was “sub-optimal” ...



# BIF Usage - Fixed!

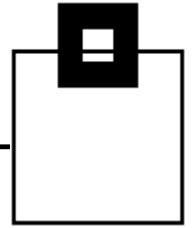
---

BIF: Built-In Function: CHAR, VARCHAR, SPACE etc.

With  SQL WorkloadExpert you can easily capture  
\*all\* of the DSC and  
\*all\* of the Static SQL (SSC) and  
\*all\* of the 366's or 376's

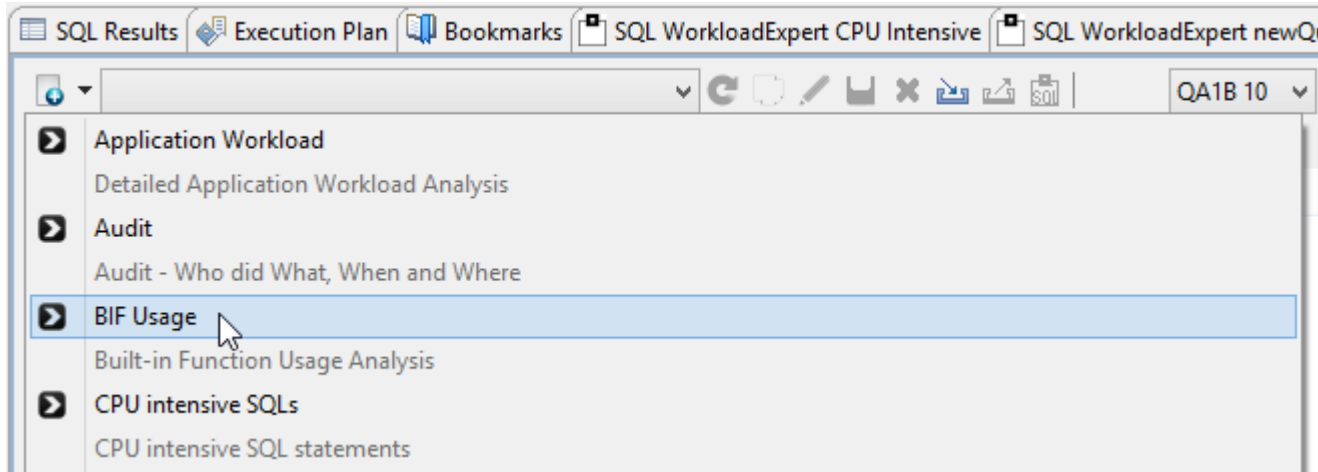
So that you get all the data you need at the time  
you need it all in one place.

Neat huh?



# BIF Usage

In SQL WorkloadExpert just select the BIF Usage:



The screenshot shows the SQL WorkloadExpert application window with the 'BIF usage' tab selected. The table displays the following data:

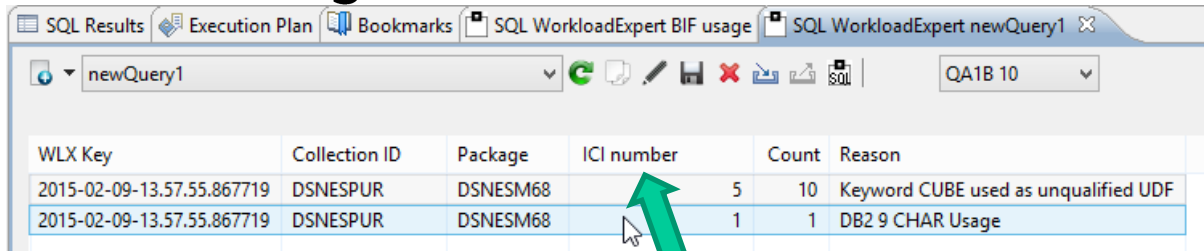
WLX Key	Collection ID	Package	Count
2015-02-09-10.01.01.177164		IQADBACP	8
2015-02-09-10.01.01.177164		IQAXPLN	8
2015-02-09-10.01.01.177164	IQA_COLLECTION_...	IQAXPLN	8
2015-02-09-10.01.01.177164	DSNESPUR	DSNESM68	3
2015-02-09-10.01.01.177164	IQA_COLLECTION_...	TESTPGM	2
2015-02-09-13.57.55.867719	IQA_COLLECTION_...	IQAXPLN	12
2015-02-09-13.57.55.867719	DSNESPUR	DSNESM68	11

A green arrow points to the last row of the table.



# BIF Usage

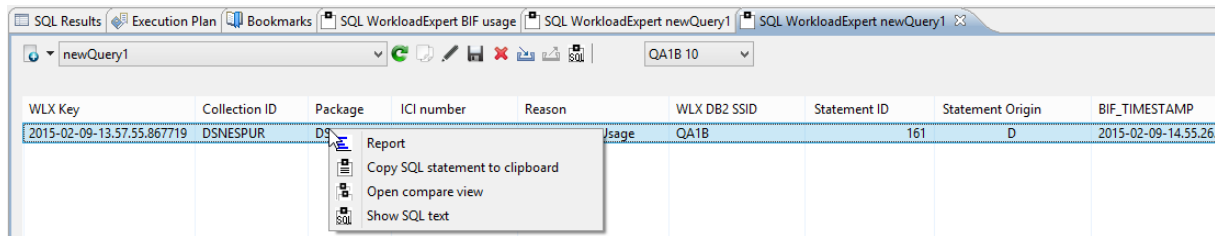
Then drilling on down:



SQL Results | Execution Plan | Bookmarks | SQL WorkloadExpert BIF usage | SQL WorkloadExpert newQuery1

newQuery1 QA1B 10

WLX Key	Collection ID	Package	ICI number	Count	Reason
2015-02-09-13.57.55.867719	DSNESPUR	DSNESM68	5	10	Keyword CUBE used as unqualified UDF
2015-02-09-13.57.55.867719	DSNESPUR	DSNESM68	1	1	DB2 9 CHAR Usage

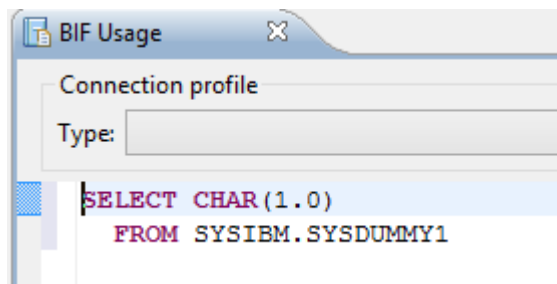


SQL Results | Execution Plan | Bookmarks | SQL WorkloadExpert BIF usage | SQL WorkloadExpert newQuery1 | SQL WorkloadExpert newQuery1

newQuery1 QA1B 10

WLX Key	Collection ID	Package	ICI number	Reason	WLX DB2 SSID	Statement ID	Statement Origin	BIF_TIMESTAMP
2015-02-09-13.57.55.867719	DSNESPUR	DSN	1	Report	QA1B	161	D	2015-02-09-14.55.26

- Report
- Copy SQL statement to clipboard
- Open compare view
- Show SQL text



BIF Usage

Connection profile

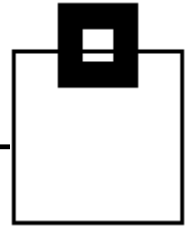
Type:

```
SELECT CHAR(1.0)
FROM SYSIBM.SYSDUMMY1
```

Yes indeed - a Decimal value!

# AGENDA

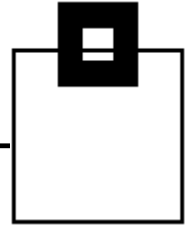
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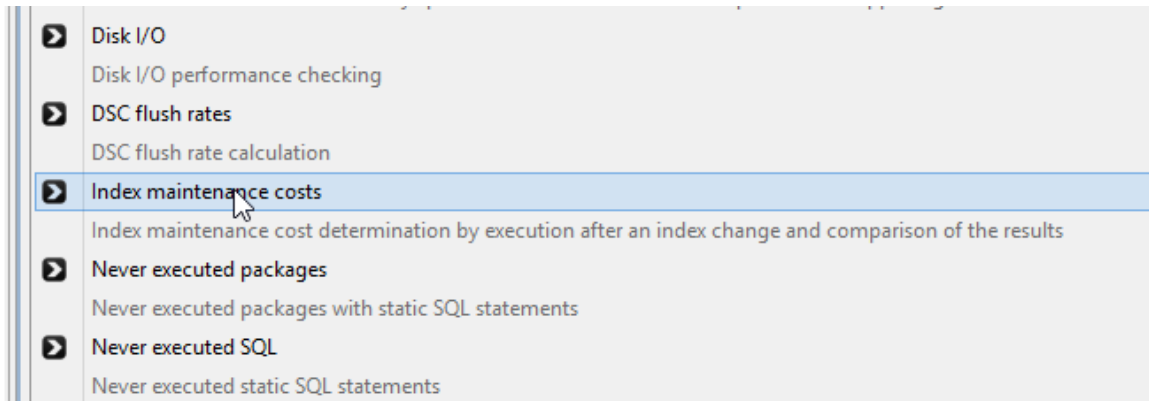
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# Index Maintenance Costs



Question: Does the index that you have recently created for performance reasons actually have a systemic impact or not?



# Index Maintenance Costs

Give the Table Name and the date ranges:

**Index maintenance costs**

Description: IndexCostsAnalysis20150210075910

Table creator: SYSIBM

Table name: SYSTABLES

**Period 1**

Date/Time from: 15.12.2014 00:00

Date/Time to: 59

**Period 2**

Date/Time from: 15 00

Date/Time to: 59

Heute: 10.02.2015

OK Cancel

# Index Maintenance Costs

Give the Table Name and the date ranges:

**Index maintenance costs**

Description: IndexCostsAnalysis20150210075910

Table creator: SYSIBM

Table name: SYSTABLES

**Period 1**

Date/Time from: 15.12.2014 00:00

Date/Time to: 22.12.2014 23:59

**Period 2**

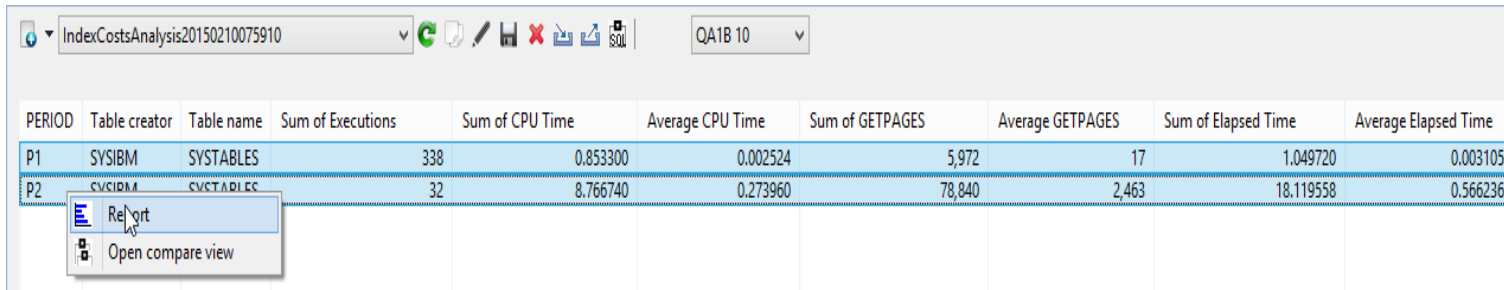
Date/Time from: 02.02.2015 00:00

Date/Time to: 09.02.2015 23:59

OK Cancel

# Index Maintenance Costs

Then select the report option in the context menu:



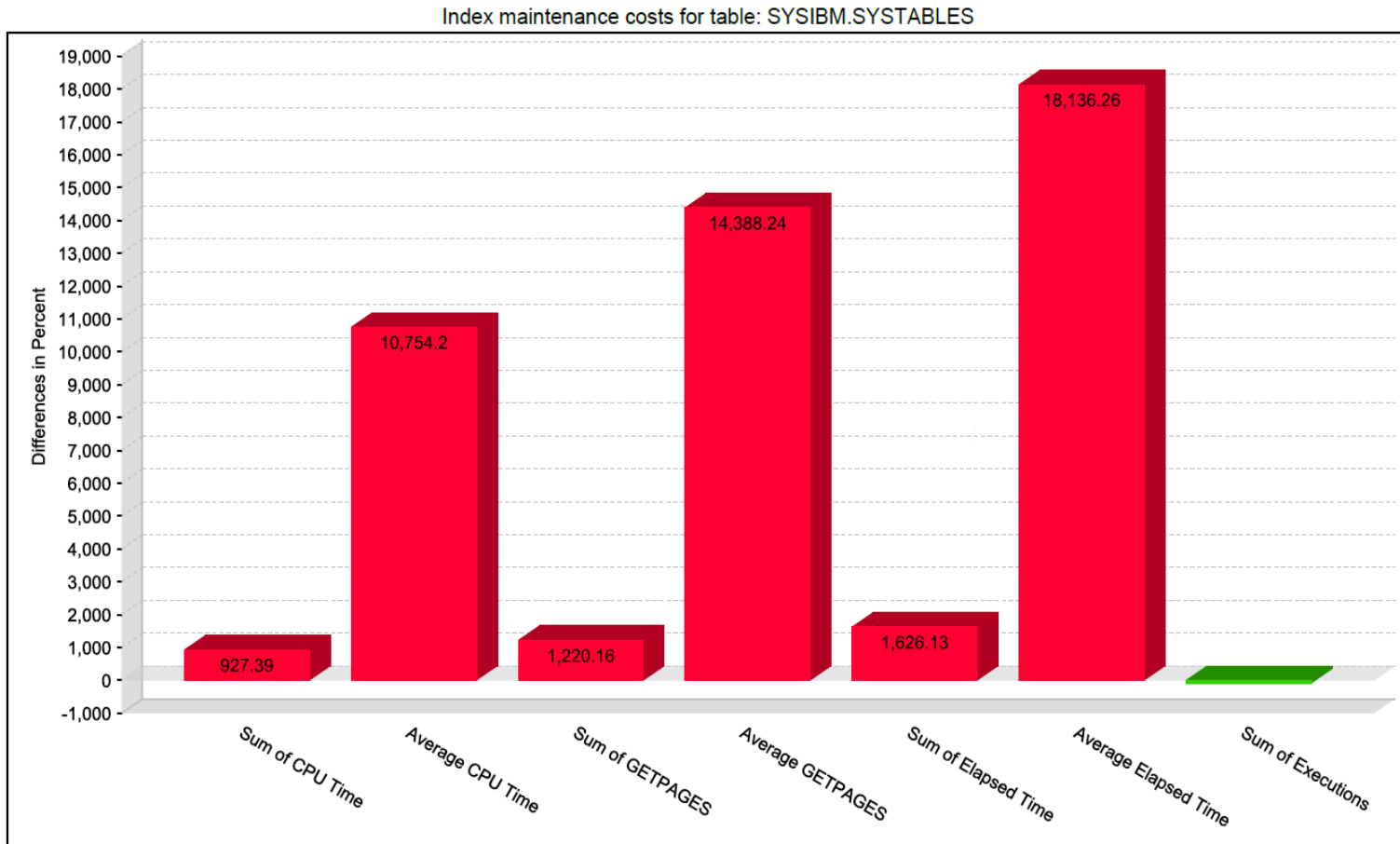
The screenshot shows a SQL Server Enterprise Manager interface. At the top, there is a toolbar with various icons and a dropdown menu set to 'QA1B 10'. Below the toolbar is a table with the following data:

PERIOD	Table creator	Table name	Sum of Executions	Sum of CPU Time	Average CPU Time	Sum of GETPAGES	Average GETPAGES	Sum of Elapsed Time	Average Elapsed Time
P1	SYSIBM	SYSTABLES	338	0.853300	0.002524	5,972	17	1.049720	0.003105
P2	SYSIBM	SYSTABLES	32	8.766740	0.273960	78,840	2,463	18.119558	0.566236

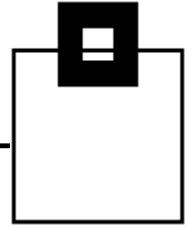
A context menu is open over the table, showing two options: 'Report' and 'Open compare view'. The 'Report' option is highlighted.

# Index Maintenance Costs

Then you see the result:

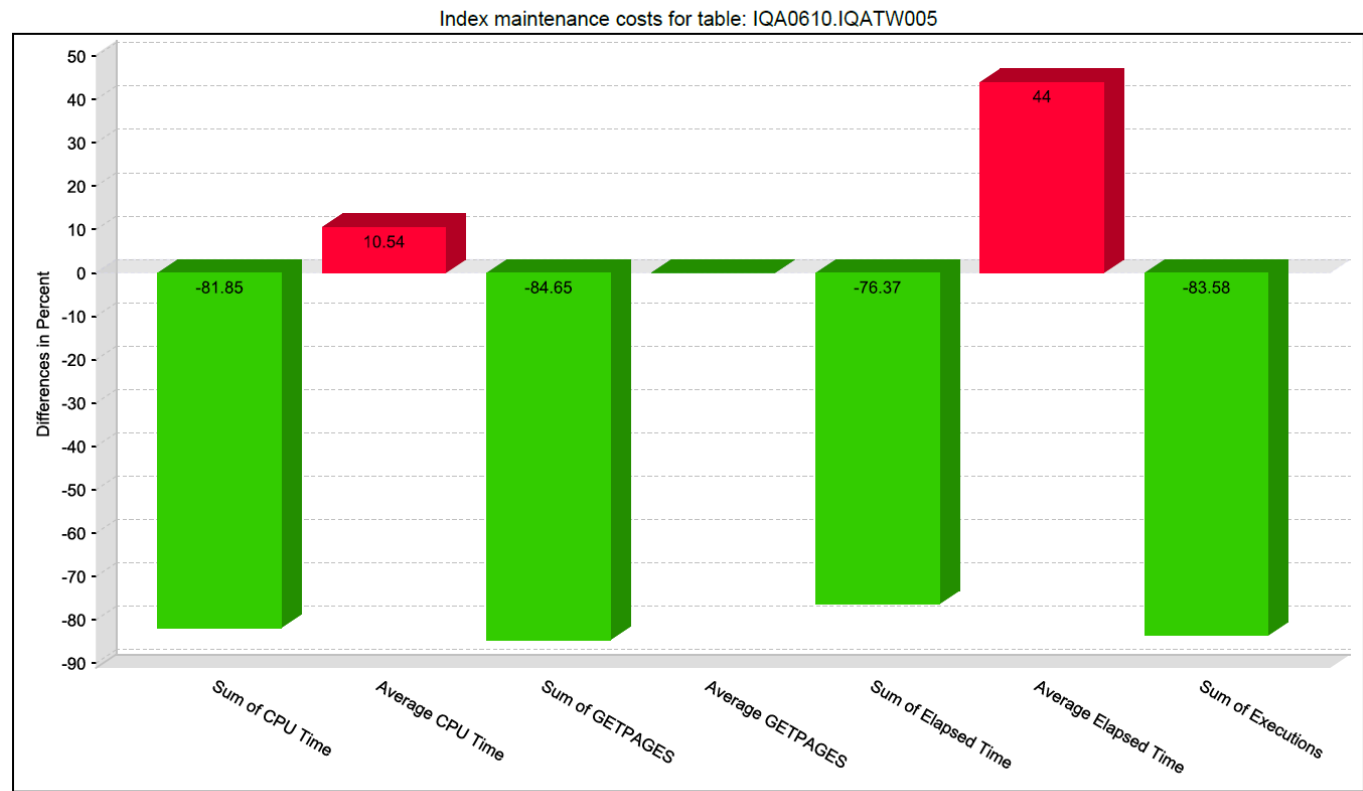


# Index Maintenance Costs



Compare KPIs before and after Index creation. Especially twinned with Virtual Index usage this is a real winner!

WLX Report



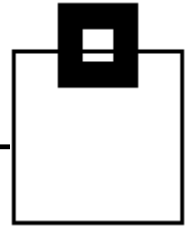
© SQL WorkloadExpert™ for DB2 z/OS, © SOFTWARE ENGINEERING GmbH, 2012-2015

Feb 23, 2015 9:44:10 AM



# AGENDA

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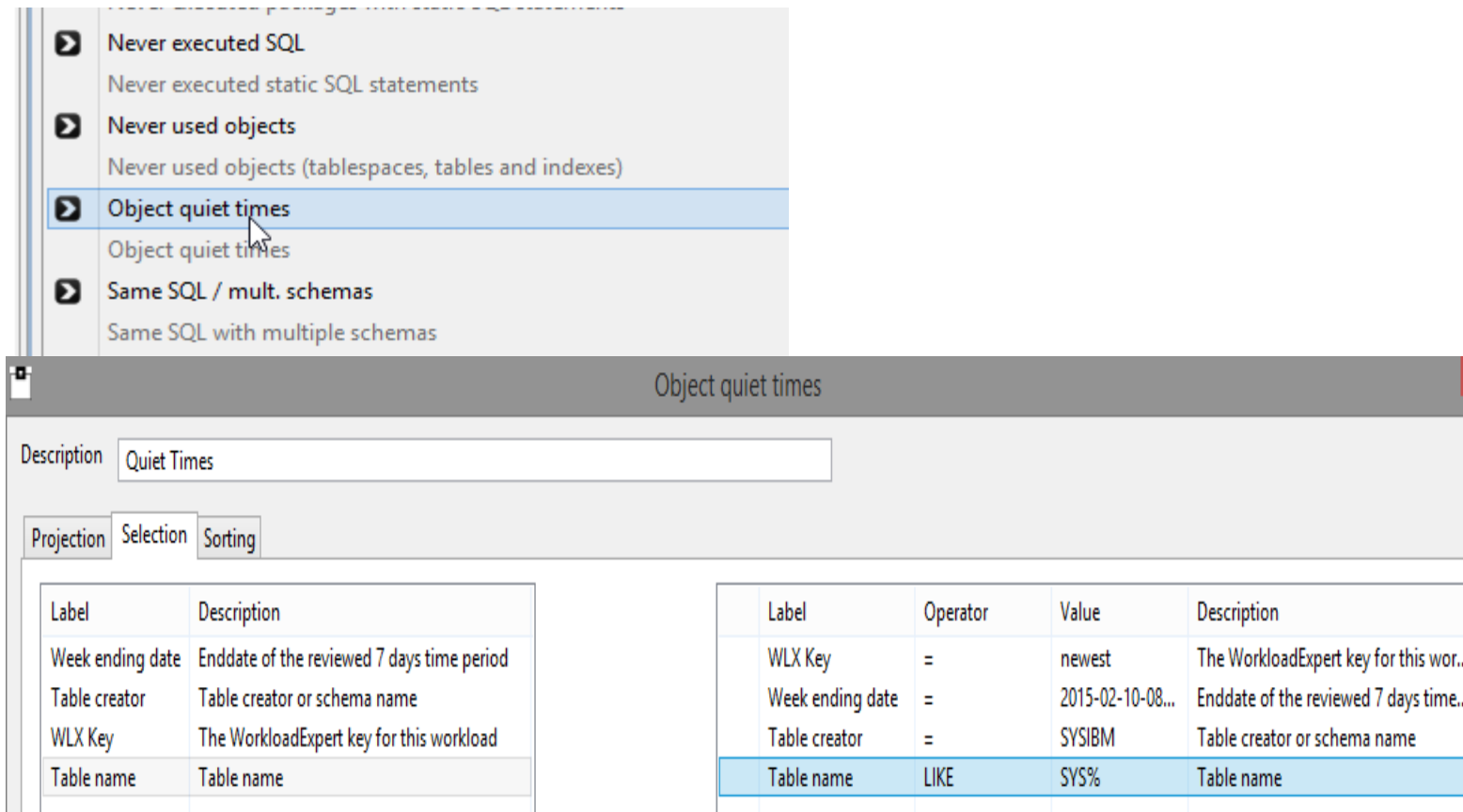


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# Quiet Times

Question: Do you know how often tables are “in use” and so cannot easily be ALTERed or REORGed?



Object quiet times

Description: Quiet Times

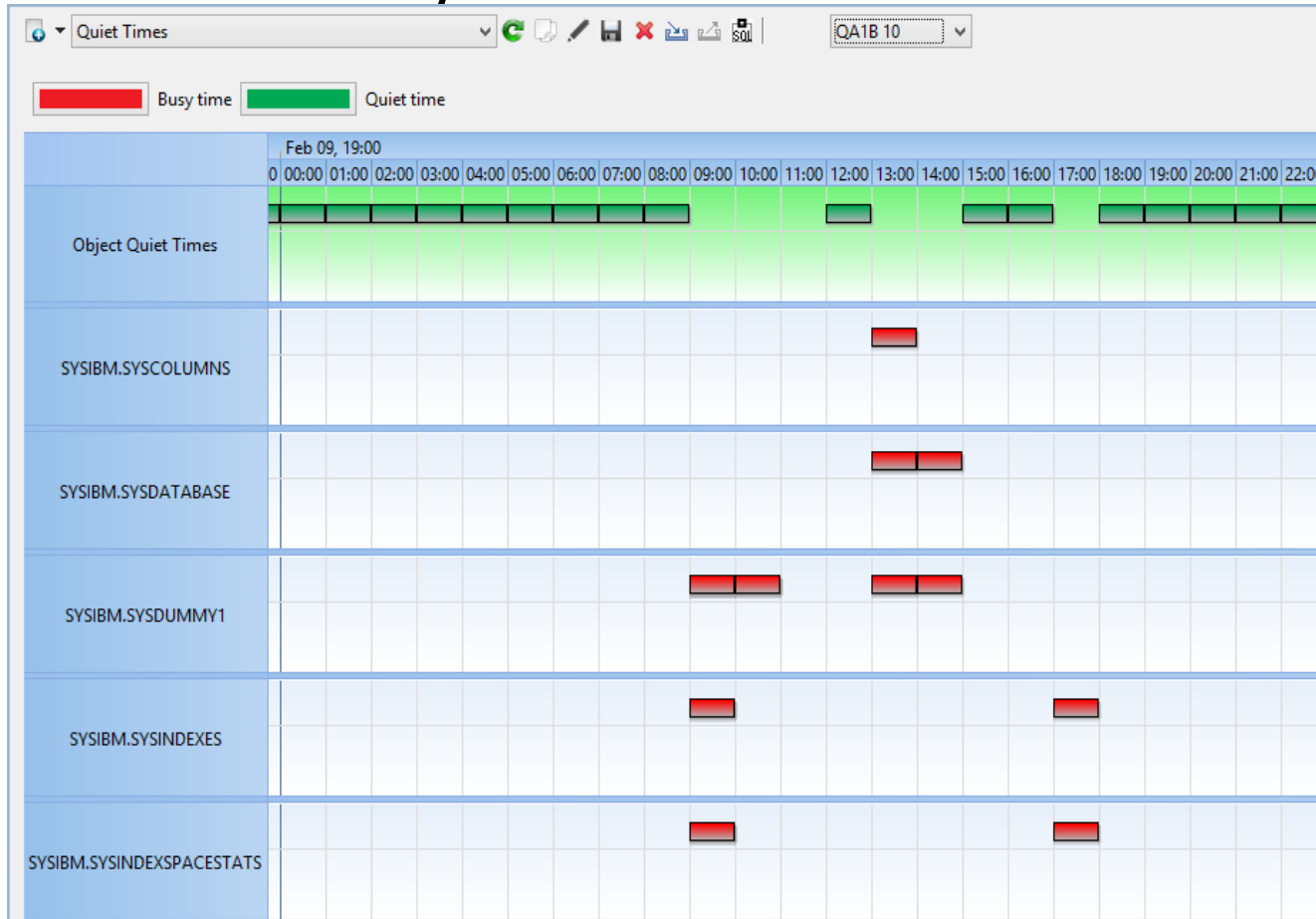
Projection Selection Sorting

Label	Description
Week ending date	Enddate of the reviewed 7 days time period
Table creator	Table creator or schema name
WLX Key	The WorkloadExpert key for this workload
Table name	Table name

Label	Operator	Value	Description
WLX Key	=	newest	The WorkloadExpert key for this wor...
Week ending date	=	2015-02-10-08...	Enddate of the reviewed 7 days time...
Table creator	=	SYSIBM	Table creator or schema name
Table name	LIKE	SYS%	Table name

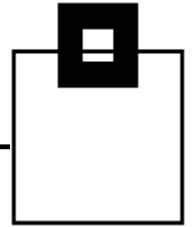
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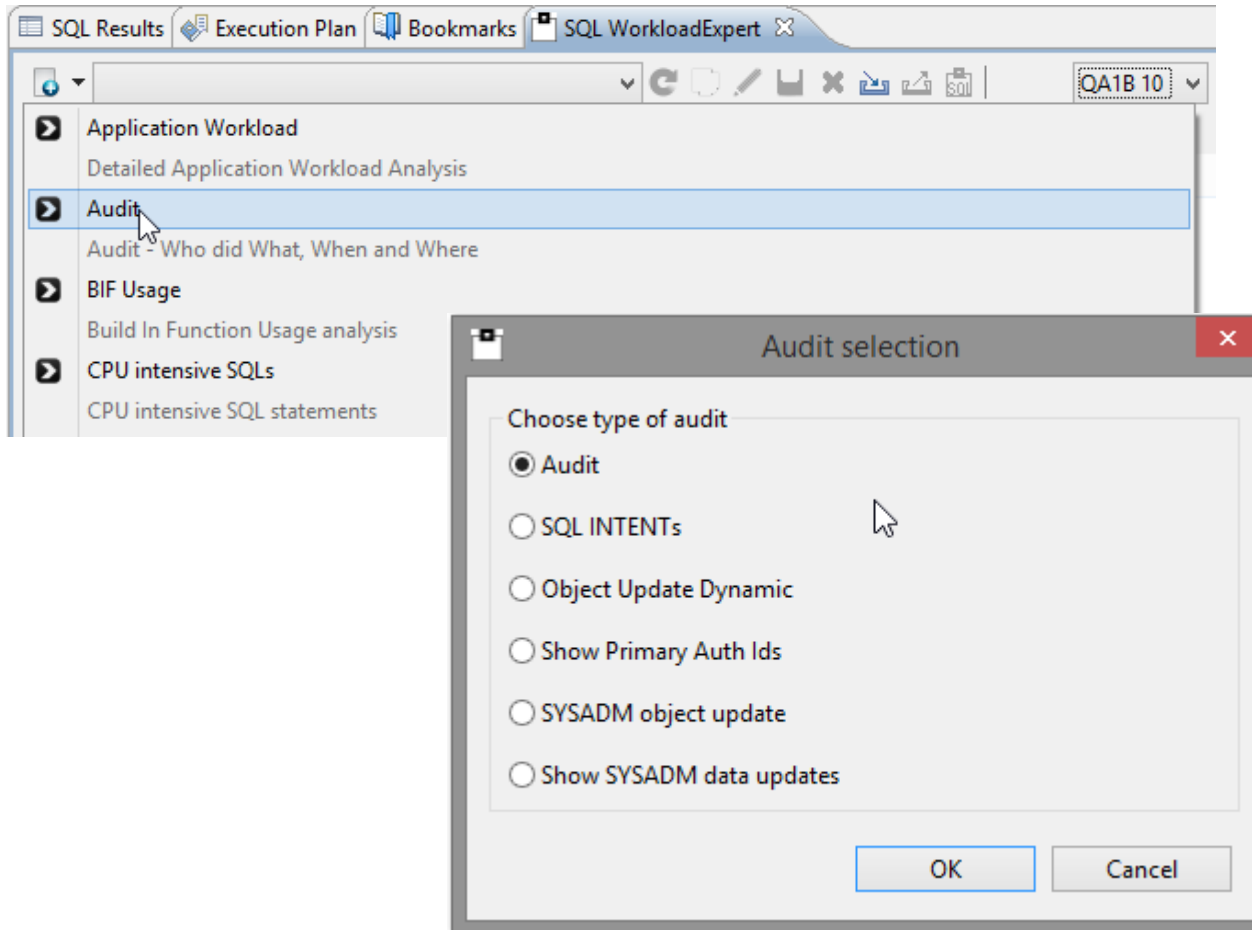


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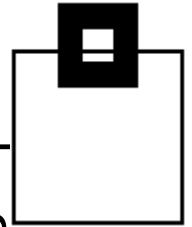


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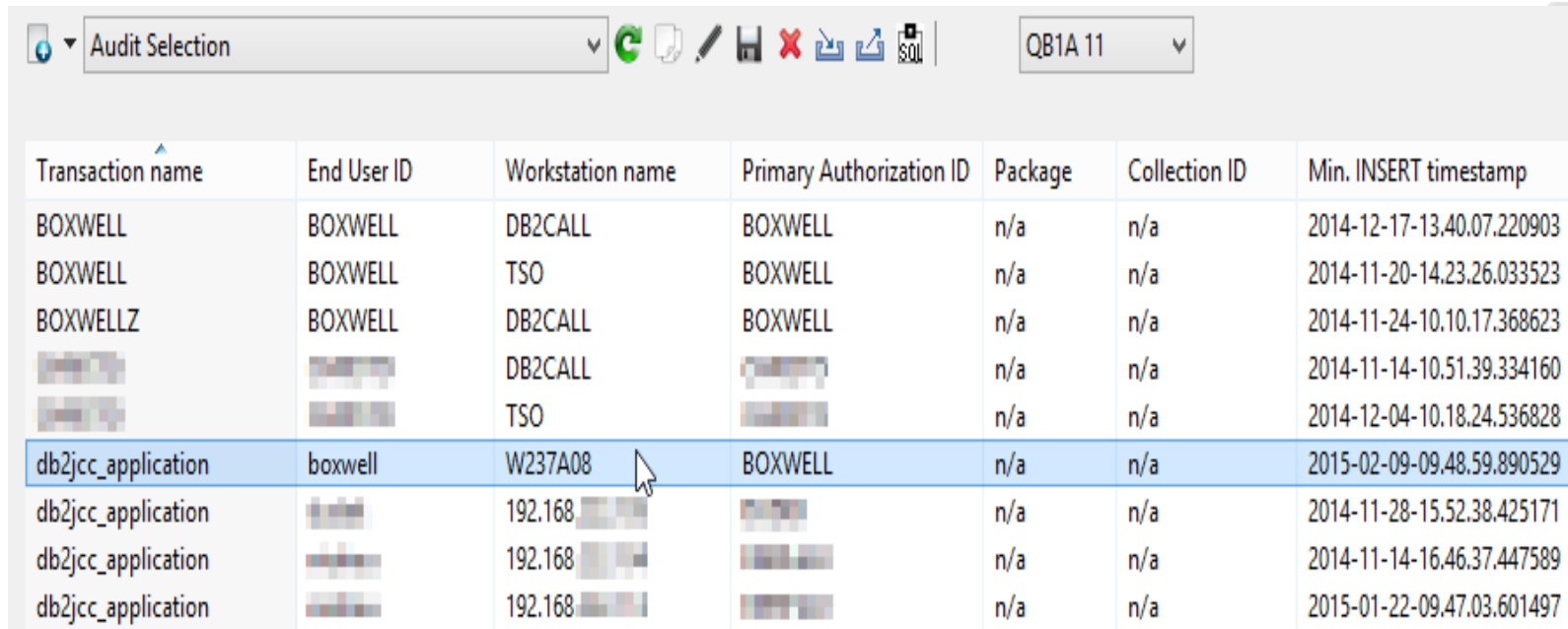
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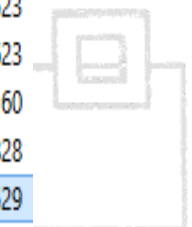
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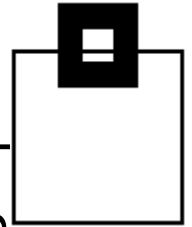
Question: Do you know who is doing what to which table and when?



Transaction name	End User ID	Workstation name	Primary Authorization ID	Package	Collection ID	Min. INSERT timestamp
BOXWELL	BOXWELL	DB2CALL	BOXWELL	n/a	n/a	2014-12-17-13.40.07.220903
BOXWELL	BOXWELL	TSO	BOXWELL	n/a	n/a	2014-11-20-14.23.26.033523
BOXWELLZ	BOXWELL	DB2CALL	BOXWELL	n/a	n/a	2014-11-24-10.10.17.368623
		DB2CALL		n/a	n/a	2014-11-14-10.51.39.334160
		TSO		n/a	n/a	2014-12-04-10.18.24.536828
db2jcc_application	boxwell	W237A08	BOXWELL	n/a	n/a	2015-02-09-09.48.59.890529
db2jcc_application		192.168		n/a	n/a	2014-11-28-15.52.38.425171
db2jcc_application		192.168		n/a	n/a	2014-11-14-16.46.37.447589
db2jcc_application		192.168		n/a	n/a	2015-01-22-09.47.03.601497

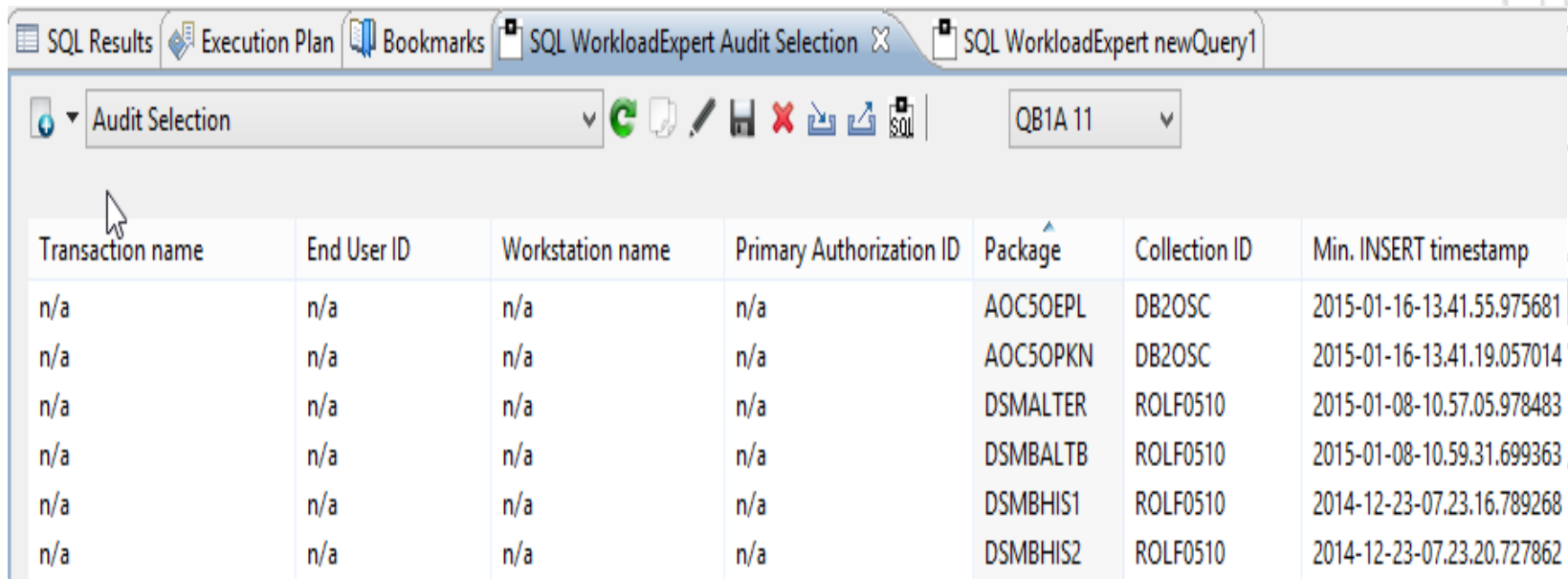


# Audit



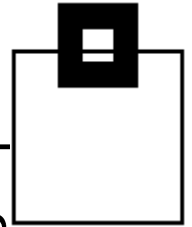
Question: Do you know who is doing what to which table and when?

For static you also get the Package and Collection of course!

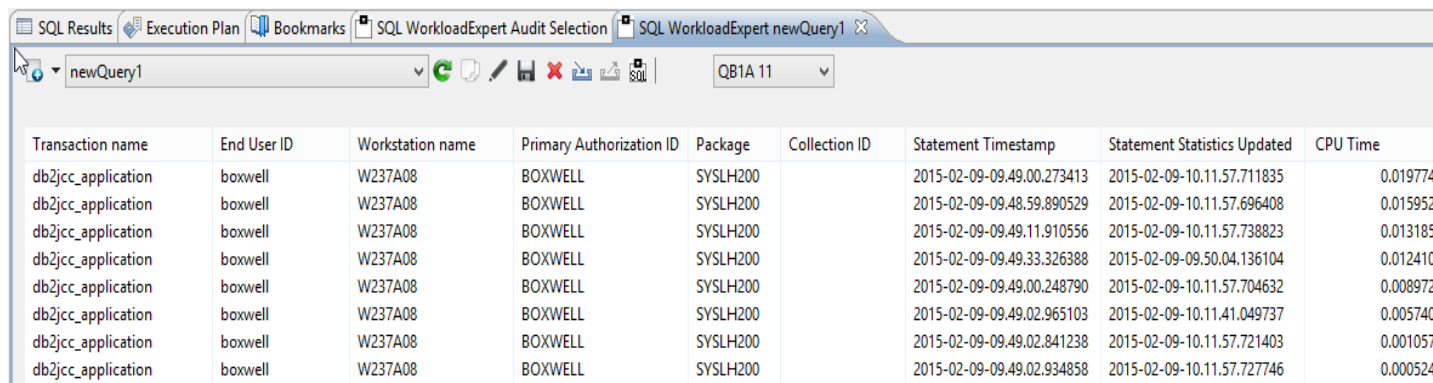


Transaction name	End User ID	Workstation name	Primary Authorization ID	Package	Collection ID	Min. INSERT timestamp
n/a	n/a	n/a	n/a	AOC5OEPL	DB2OSC	2015-01-16-13.41.55.975681
n/a	n/a	n/a	n/a	AOC5OPKN	DB2OSC	2015-01-16-13.41.19.057014
n/a	n/a	n/a	n/a	DSMALTER	ROLF0510	2015-01-08-10.57.05.978483
n/a	n/a	n/a	n/a	DSMBALTB	ROLF0510	2015-01-08-10.59.31.699363
n/a	n/a	n/a	n/a	DSMBHIS1	ROLF0510	2014-12-23-07.23.16.789268
n/a	n/a	n/a	n/a	DSMBHIS2	ROLF0510	2014-12-23-07.23.20.727862

# Audit

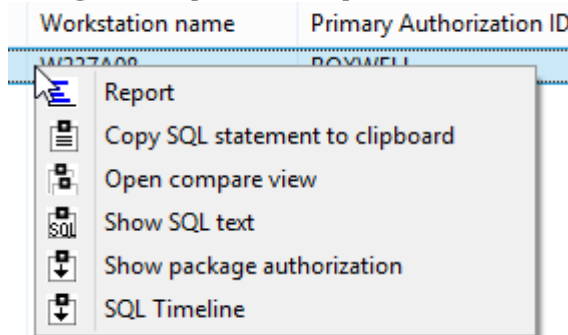


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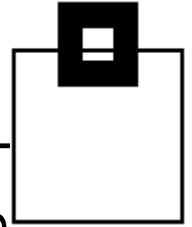
Transaction name	End User ID	Workstation name	Primary Authorization ID	Package	Collection ID	Statement Timestamp	Statement Statistics Updated	CPU Time
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.00.273413	2015-02-09-10.11.57.711835	0.019774
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.48.59.890529	2015-02-09-10.11.57.696408	0.015952
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.11.910556	2015-02-09-10.11.57.738823	0.013185
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.33.326388	2015-02-09-09.50.04.136104	0.012410
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.00.248790	2015-02-09-10.11.57.704632	0.008972
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.02.965103	2015-02-09-10.11.41.049737	0.005740
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.02.841238	2015-02-09-10.11.57.721403	0.001057
db2jcc_application	boxwell	W237A08	BOXWELL	SYSLH200		2015-02-09-09.49.02.934858	2015-02-09-10.11.57.727746	0.000524

Right-clicking to pull up the context menu you can see more:



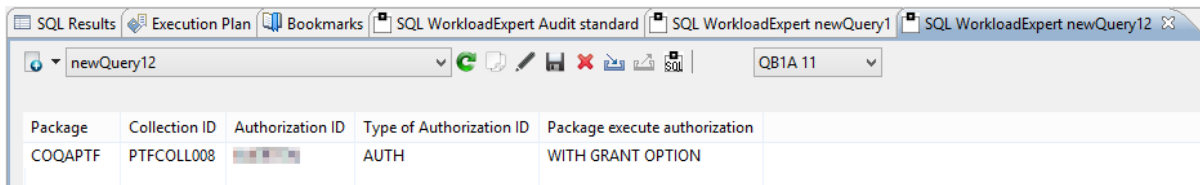


# Audit



Question: Do you know who is doing what to which table and when?

Package Authorizations are then all listed:

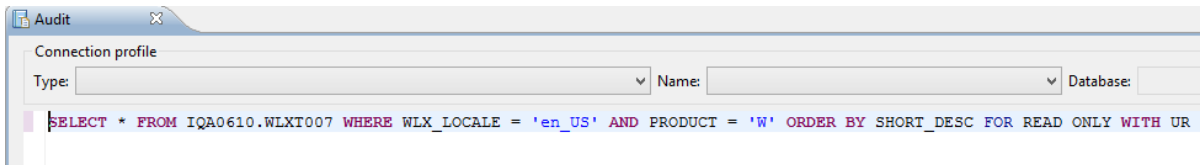


The screenshot shows the SQL WorkloadExpert interface with a table of Package Authorizations. The table has five columns: Package, Collection ID, Authorization ID, Type of Authorization ID, and Package execute authorization. The data row shows Package COQAPTF, Collection ID PTFCOLL008, Authorization ID (represented by a small icon), Type of Authorization ID AUTH, and Package execute authorization WITH GRANT OPTION.

Package	Collection ID	Authorization ID	Type of Authorization ID	Package execute authorization
COQAPTF	PTFCOLL008		AUTH	WITH GRANT OPTION



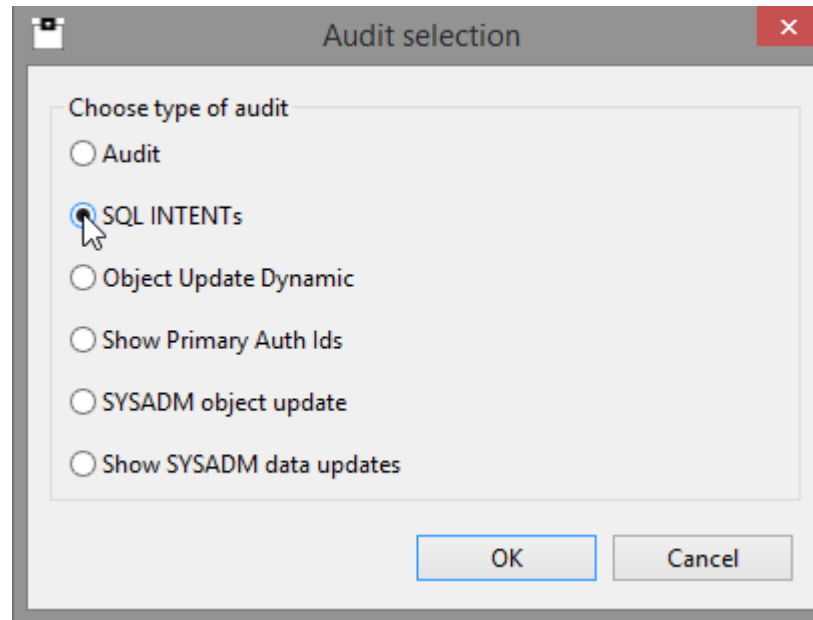
Or even the executed SQL Text:



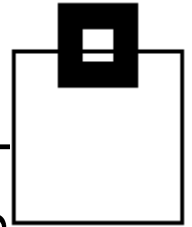
# Audit

Question: Do you know who is doing what to which table and when?

SQL Intents – Update or just Read ???



# Audit



Question: Do you know who is doing what to which table and when?

SQL Intents – Update or just Read ???

Label	Operator	Value	Description
WLX Key	=	newest	The WorkloadExpert key for this wor...
Intent	=	UPDATE	Intent

Transaction name	End User ID	Workstation name	Primary Authorization ID	Current SQL ID	Qualifier	Package	Collection ID	Query type	Intent	Table creator	Table name
					MVNXTEST	MD82DB30	MD82VNE_X_TEST	UPDATE	UPDATE	MVNXTEST	MVNX30
					MVNXTEST	MD82DB05	MD82VNE_X_TEST	INSERT	UPDATE	MVNXTEST	MVNX05
					MVNXTEST	MD82DB30	MD82VNE_X_TEST	UPDATE	UPDATE	MVNXTEST	MVNX30
					MVNXTEST	MD82DB30	MD82VNE_X_TEST	UPDATE	UPDATE	MVNXTEST	MVNX30
					PTFADMIN	DSNREXX		UPDATE	UPDATE	PTFADMIN	USERTAB
					PTFADMIN	DSNREXX		UPDATE	UPDATE	PTFADMIN	PTFTIN01

CPU Time	Statement Statistics Updated	Transaction name	End User ID
1,338,478	2014-12-03-07.51	12-771163	
70,665	2014-12-03-07.51		
2,373,407	2014-12-03-07.51		
2,373,407	2014-12-03-07.51		
2,324	2014-12-03-08.04		
2,324	2014-12-03-08.04		
23,400	2014-12-09-15.46		

- Report
- Copy SQL statement to clipboard
- Open compare view
- Show SQL text
- SQL Timeline

Connection profile

Type:  Name:  Database:

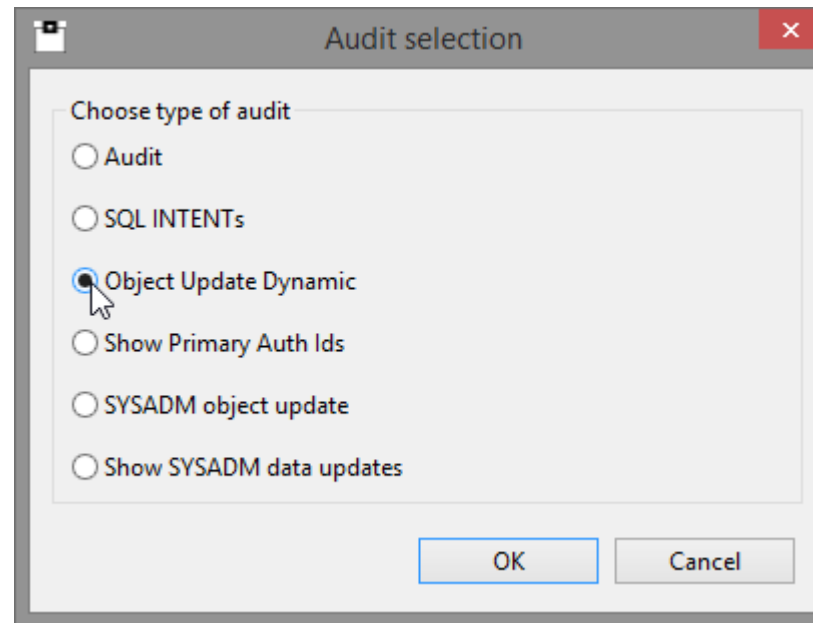
UPDATE M82JBIM SET MAX\_NUMBER\_OF\_STEP = : H , NBR\_TOGETHER\_STEPS = : H , CALC\_STEP\_NBR = : H , ICB1\_DISK\_DEVTYPE = : H , ICB1\_DISK\_UNIT = : H ,



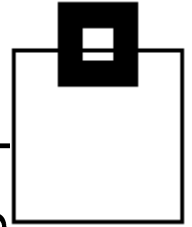
# Audit

Question: Do you know who is doing what to which table and when?

Dynamic SQL updates???



# Audit



Question: Do you know who is doing what to which table and when?

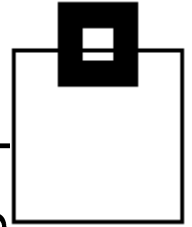
Dynamic SQL updates???

Audit object Dynamic						
CPU Time	Statement Statistics Updated	Transaction name	End User ID	Workstation name	Primary Authorization ID	
551,546	2015-02-09-06.30.02.551096	IQAHIST	OPCC	DB2CALL	OPCC	
3,643	2015-02-08-06.32.36.302761	PTFRS000	...	OPCC	UTILITY	OPCC

Current SQL ID	Qualifier	Package	Collection ID	Query type	Table creator	Table name	Object type
OPCC	OPCC	IQADBACP		INSERT	IQA0610	IQATHGT0	T
OPCC	OPCC	DSNUGSQL		UPDATE	SYSIBM	DSNRTX01	I

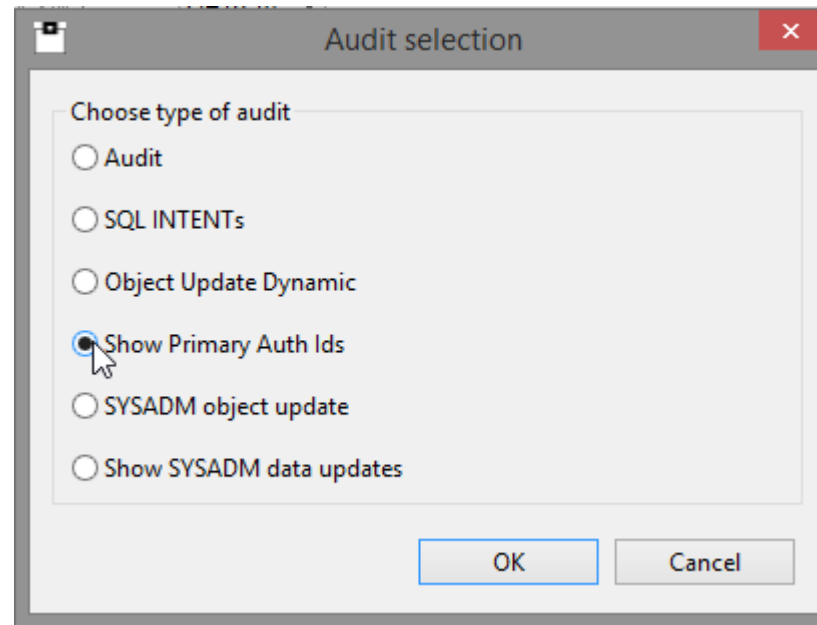
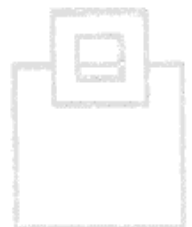
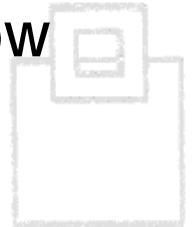


# Audit

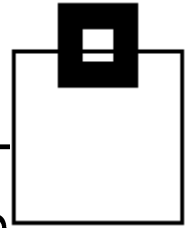


Question: Do you know who is doing what to which table and when?

How many Primary Authorization Ids do you have and how active are they?

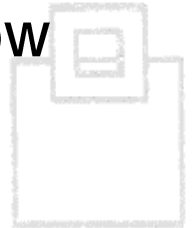


# Audit



Question: Do you know who is doing what to which table and when?

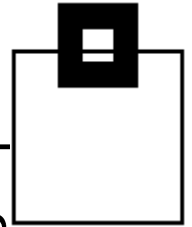
How many Primary Authorization Ids do you have and how active are they?



Occurrences	Statement Origin	Primary Authorization ID
163	D	[REDACTED]
146	D	[REDACTED]
87	D	BOXWELL
33	D	[REDACTED]
12	S	IQA_COLLECTION_610.IQADBACP
10	S	[REDACTED]
9	S	RTDX0510_PTFTOOL.M2DBSC09
9	S	[REDACTED]
9	S	RTDX0510_PTFTOOL.MDB2DB06
9	S	RTDX0510_PTFTOOL.MDB2DB01

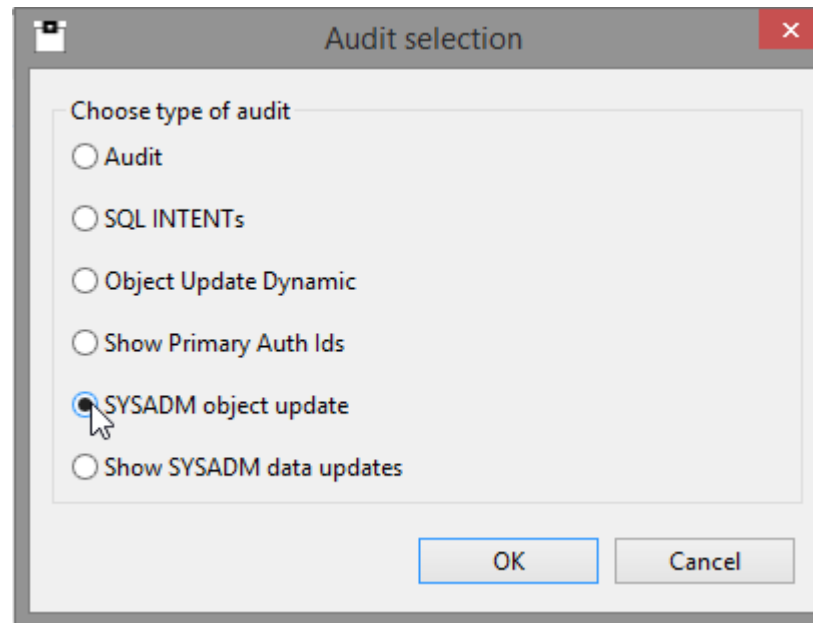


# Audit



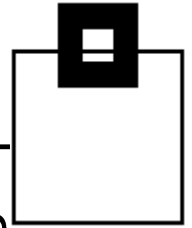
Question: Do you know who is doing what to which table and when?

Which User objects were updated with a Primary Authorization Id that has SYSADM authorization?





# Audit



Question: Do you know who is doing what to which table and when?

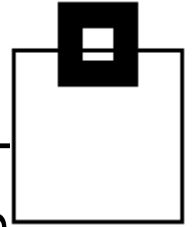
Which User objects were updated with a Primary Authorization Id that has SYSADM authorization?

Transaction name	End User ID	Workstation name	Primary Authorization ID	Current SQL ID	Qualifier	Package	Query type	Table creator	Table name	Object type
WLX0QA1B	...	BOXWELL	BOXWELL	BOXWELL	BOXWELL	IQADBACP	UPDCUR	IQA0610	IQATXX00	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	DELETE	IQAXXX02	PLAN_TABLE	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	DELETE	IQAXXX02	DSN_STATEM...	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	DELETE	IQAXXX02	DSN_PREDICA...	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	DELETE	IQAXXX02	DSN_FILTER_T...	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	DELETE	IQAXXX02	DSN_DET_COST...	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	UPDATE	IQA0610	IQAXXX001	I
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	UPDATE	IQA0610	IQATXX00	T
WLX0QA1B	...	BOXWELL	BOXWELL	IQAXXX02	IQAXXX02	IQADBACP	UPDATE	IQA0610	IQAXXX001	I

End User ID	Workstation name	Primary Authorization ID
BOXWELL		
BOXWELL		
BOXWELL		
BOXWELL		
BOXWELL		
BOXWELL		
BOXWELL	DB2CALL	BOXWELL

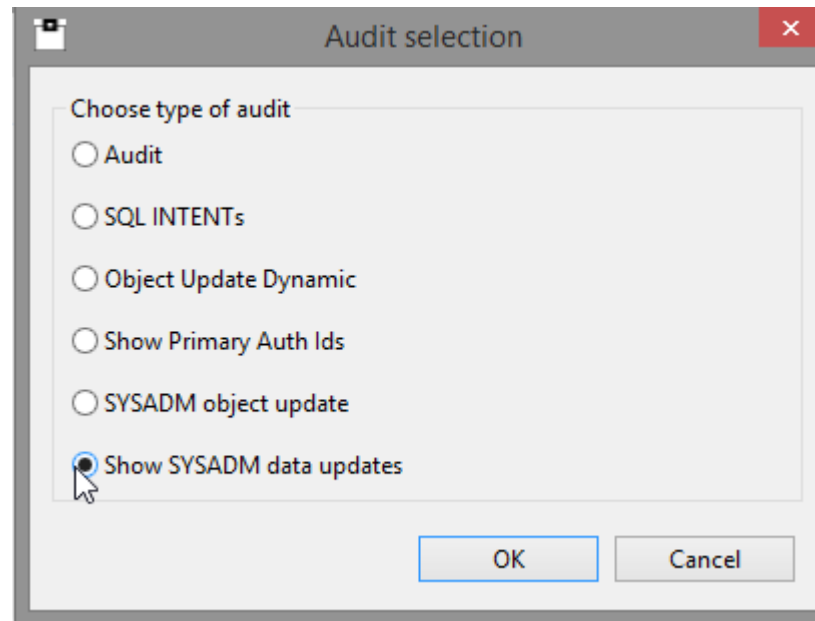


# Audit

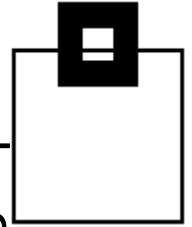


Question: Do you know who is doing what to which table and when?

How many User objects were updated with a Primary Authorization Id that has SYSADM authorization?



# Audit



Question: Do you know who is doing what to which table and when?

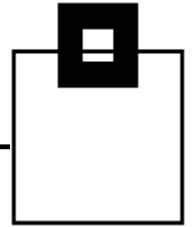
How many User objects were updated with a Primary Authorization Id that has SYSADM authorization?



SYSADM data updates	
Occurrences	Primary Authorization ID
163	[REDACTED]
146	[REDACTED]
87	BOYWELL
33	[REDACTED]
3	OPCC
3	[REDACTED]
2	[REDACTED]

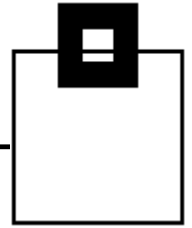
# AGENDA

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1. WLX - How it works
2. BIF Usage: Where's the BIF?
3. Index Maintenance Costs: Is this index really good?
4. Quiet Times: Is this table not in use?
5. Audit: Who is doing what to which data from where?
6. Q&A Session





Thank you for listening!



If you want more info then please subscribe to my newsletter by going to [www.seg.de](http://www.seg.de) or [www.segus.com](http://www.segus.com)

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