The DB2Night Show™ #136

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Educate – Inform – Entertain

"Why WAIT? DB2 LUW Locking!"

Your host:

Scott Hayes
President, DBI
IBM DB2 GOLD Consultant
& IM Champion

Our Special Guest:

Paul Turpin, @pault99
Sr. DBA
BB&T Bank

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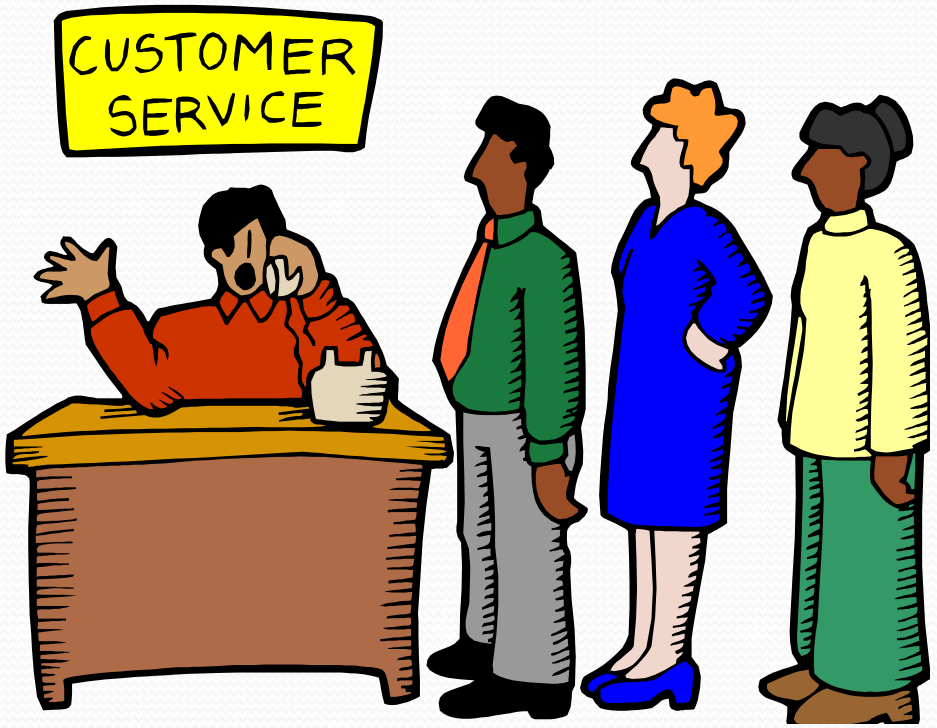
Upcoming Education…

- 19 June 3pm CDT – "How to Tune DB2 LUW in a Minute" by DBI Software
  - http://bit.ly/dbievents
- 20 JUNE – Leon Katsnelson, IBM, DB2 in the Cloud Update
- DB2 for z/OS shows:
  - 13 June – Big Data Disaster Recovery Performance w/ Dave Beulke
  - 27 June – Where's the problem in My z/OS Transaction w/ Martin Hubel

Our Featured Topic!

Why Wait?
DB2 LUW Locking



Paul Turpin, @pault99
Sr. DBA
BB&T Bank

Often we suspect a query is waiting on something because it has a long execution time, but a small CPU time. Is it a lockwait, is it a long compilation time, is it waiting on I/O or something else? It is impossible to resolve the underlying condition until you understand what is wrong. I will show you how to determine what it was waiting on.

This presentation will give high level information on time-spent elements. A deep dive into lockwait analysis will be done using various diagnostic tools. Some tools that will be covered are MONREPORT, MON_GET_PKG_CACHE_STMT, MON_LOCKWAITS and the locking event monitor (and queries to read that data).

Usage of several configuration parameters including mon_lockwait, mon_lw_thresh, mon_deadlock, mon_locktimeout, locktimeout and maxlocks will be discussed.

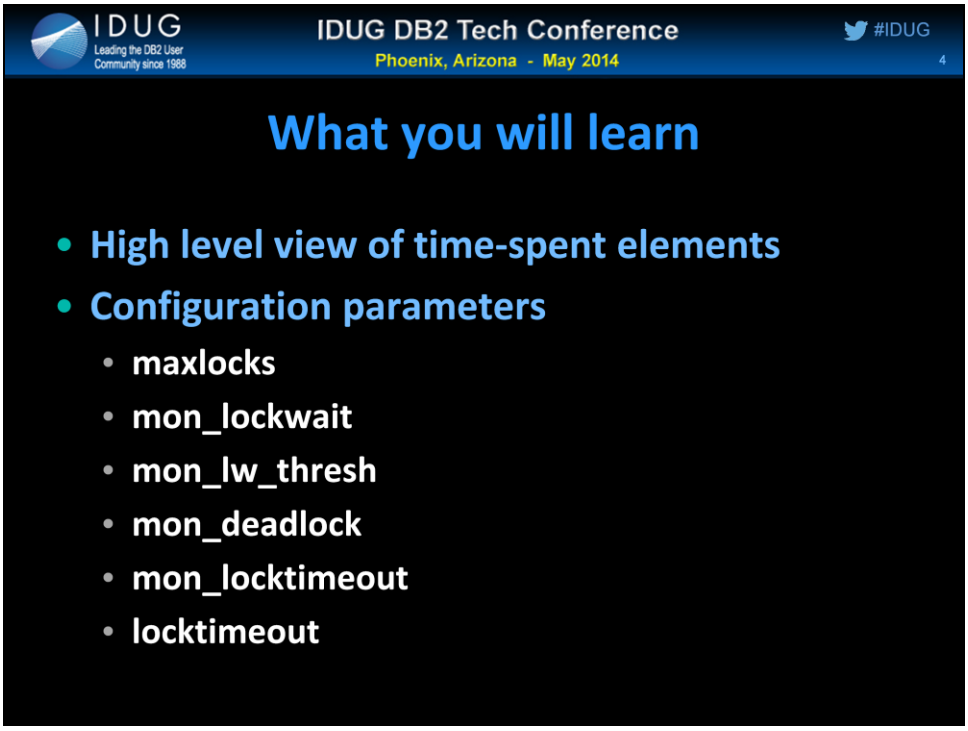
Why Do We Care About Waits?

- "Time is Money"
- Waits can cause queries to run much longer than expected

How Do You Know Waits Are Bad?

- Extreme example

Total execution time (sec.microsec) = 11720.504066
Total user cpu time (sec.microsec) = 0.174954
Total system cpu time (sec.microsec) = 0.017376



High level view of time-spent elements

Tools for looking at wait times using MONREPORT, MON_GET_PKG_CACHE_STMT

Lockwait analysis using MON_LOCKWAITS and other tools

Locking event monitor usage and locking table queries

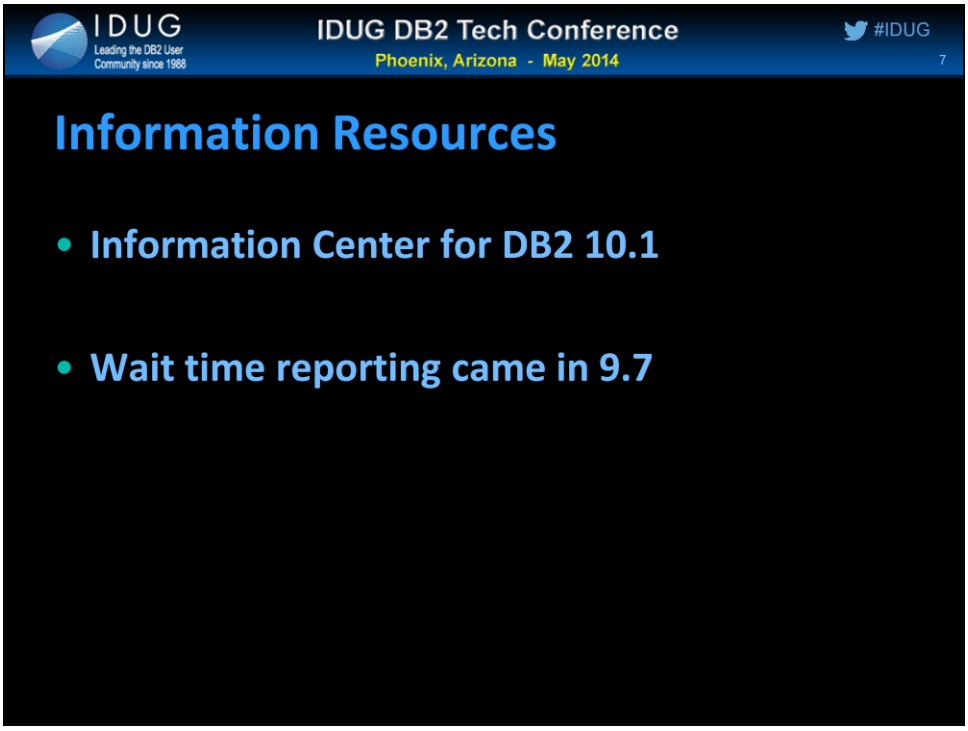
Usage of configuration parameters including mon_lockwait, mon_lw_thresh, mon_deadlock, mon_locktimeout, locktimeout and maxlocks

What you will learn

- Tools for looking at wait times including MONREPORT, MON_GET_PKG_CACHE_STMT
- Lockwait analysis using MON_LOCKWAITS and other tools
- Locking event monitor usage and locking table queries

Sharing Is Good

- Feel free to **tweet** or **blog** anything you find interesting in this session
- **#IDUGNA** is the hashtag for the conference



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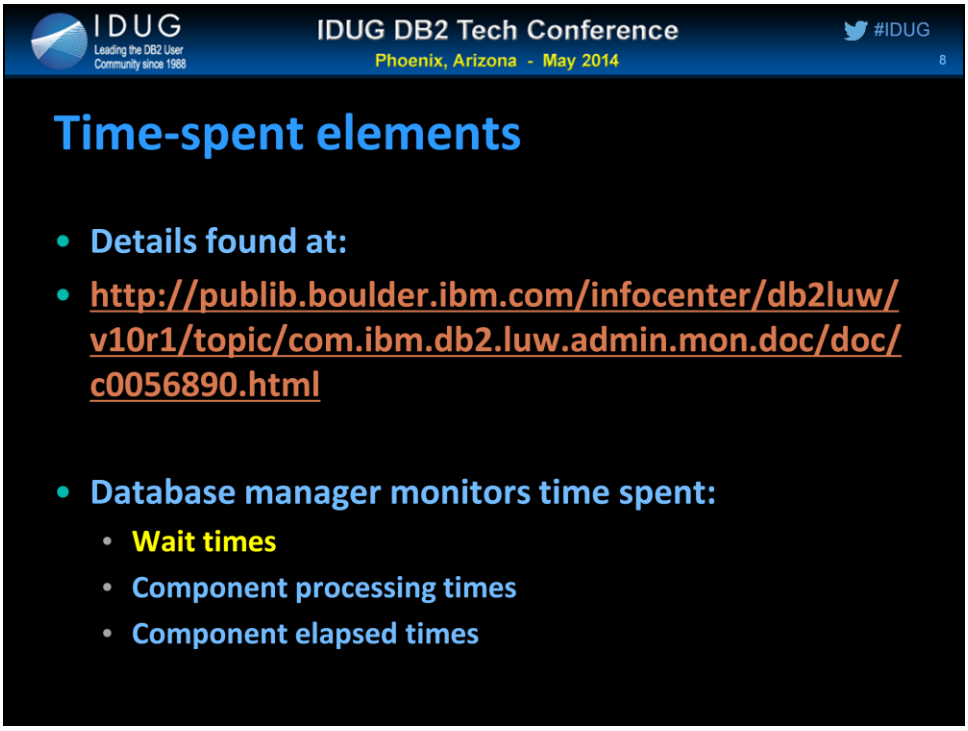

10.1

Logical data groups overview

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9.7

http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.admin.mon.doc/doc/c0056890.html

Hiearachy of elements

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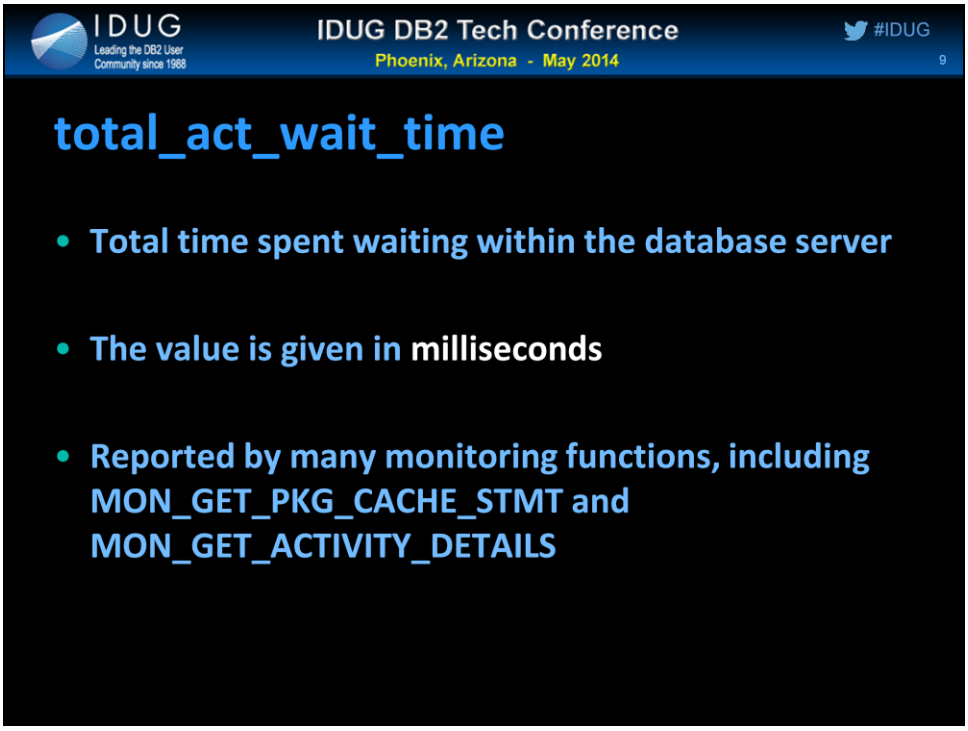

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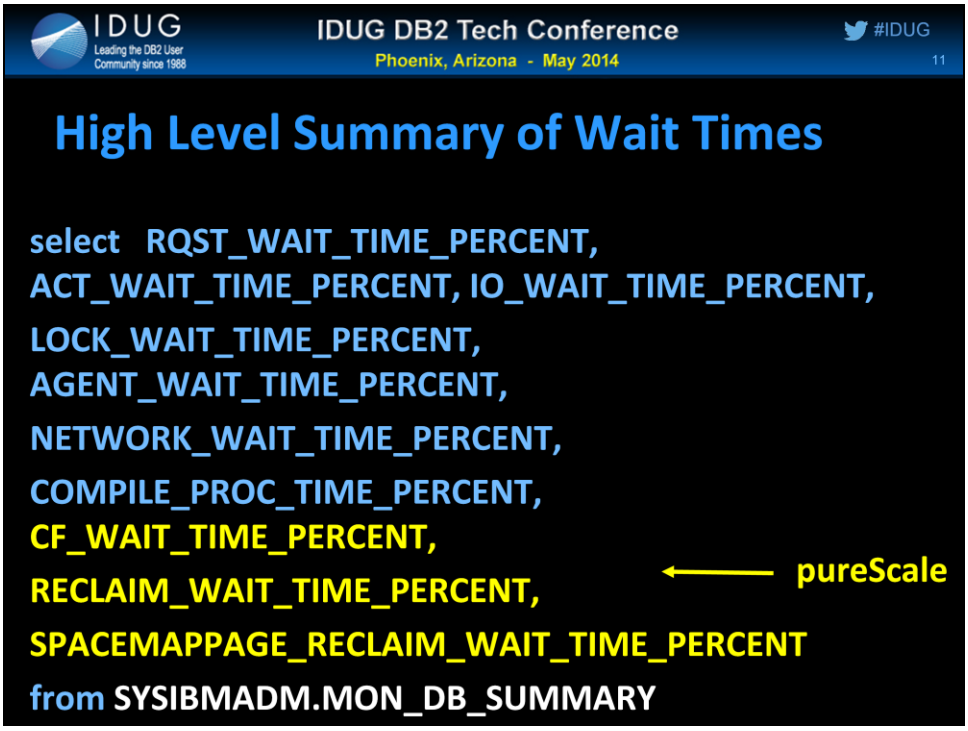

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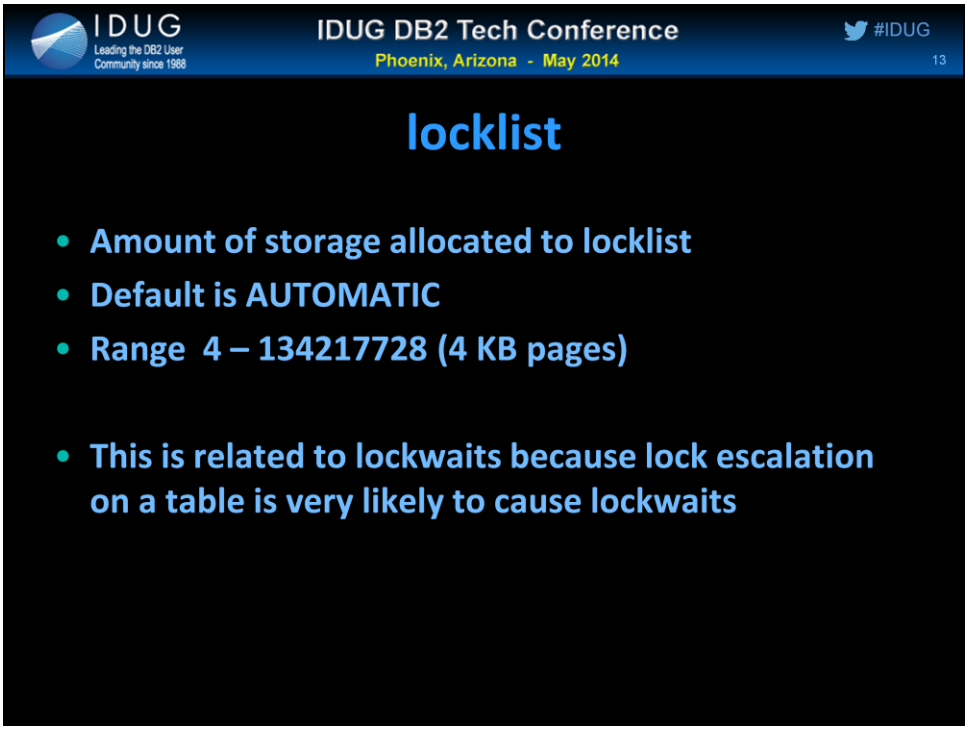
Configuration Parameters

- locklist
- maxlocks
- mon_lockwait
- mon_lw_thresh
- mon_deadlock
- mon_locktimeout
- locktimeout
- mon_lck_msg_lvl



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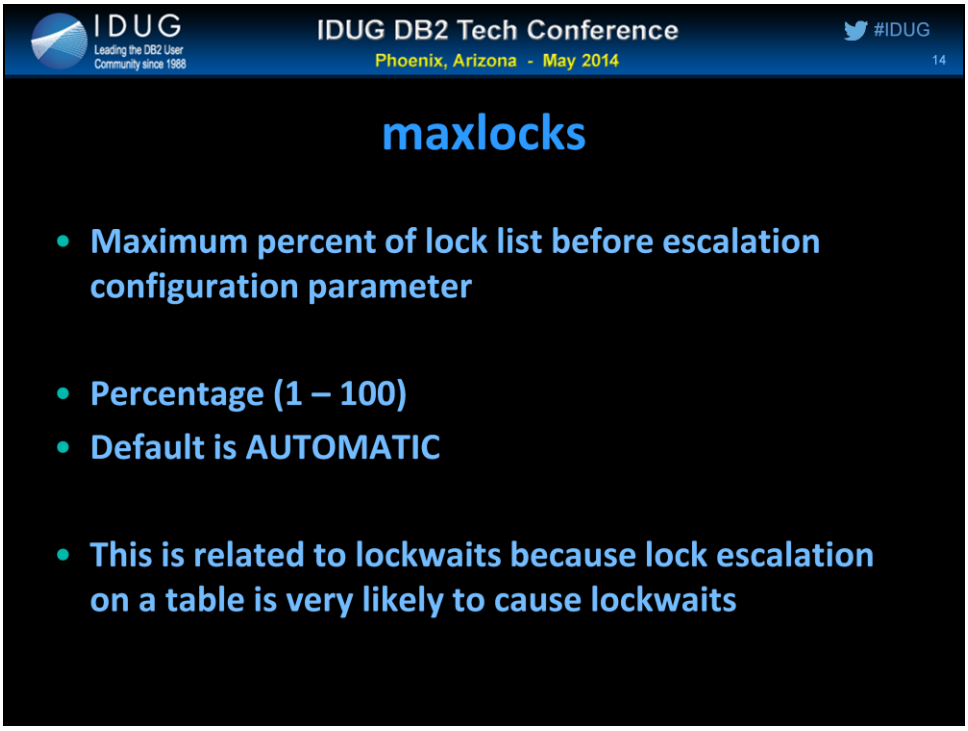

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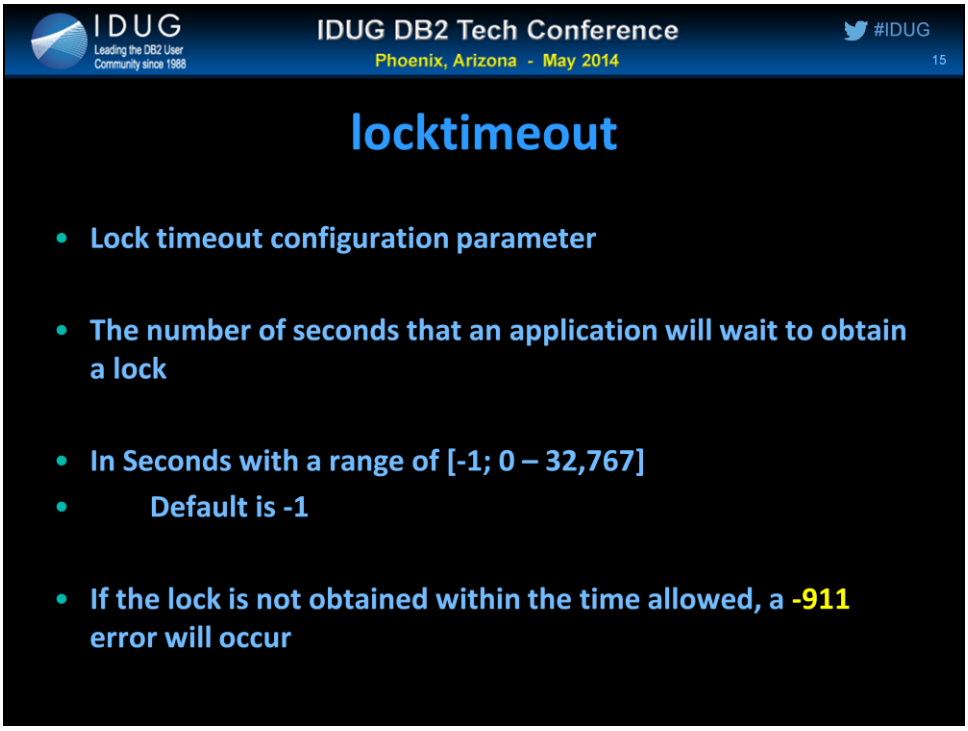

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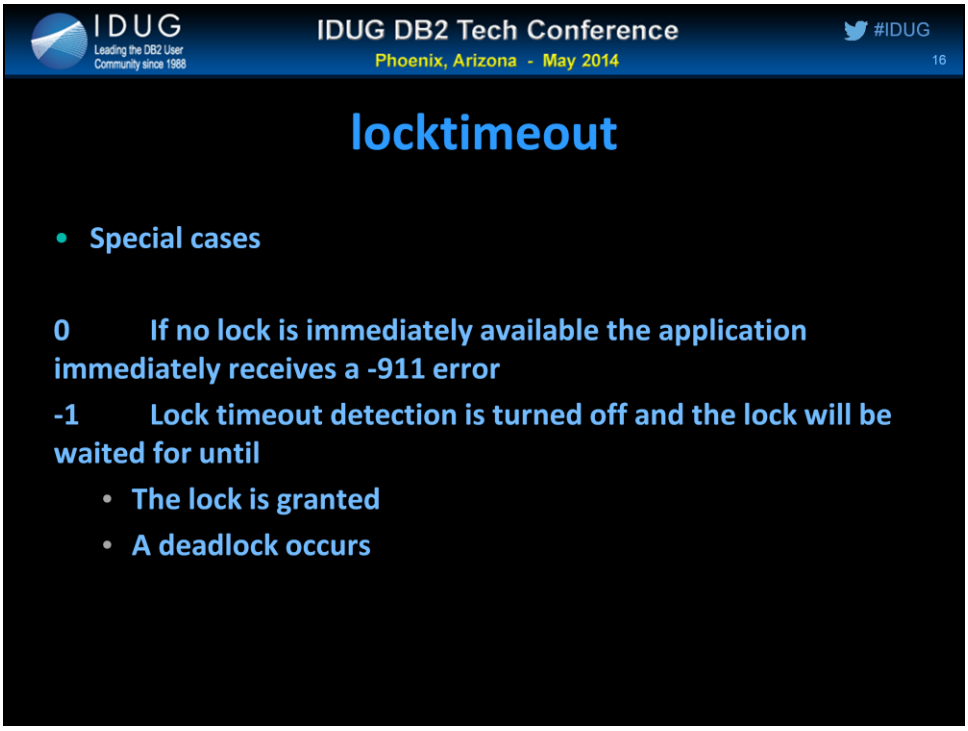

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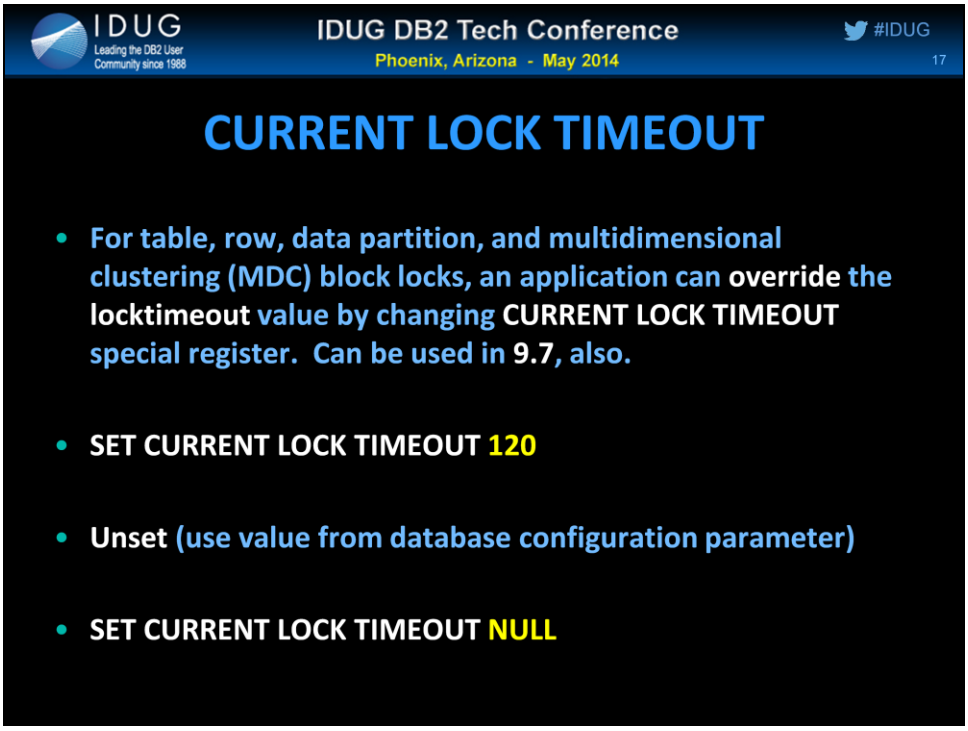

CURRENT LOCK TIMEOUT

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.sql.ref.doc/doc/r0011857.html

SET CURRENT LOCK TIMEOUT

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.sql.ref.doc/doc/r0011874.html

Special Registers (about 35 in 10.1)

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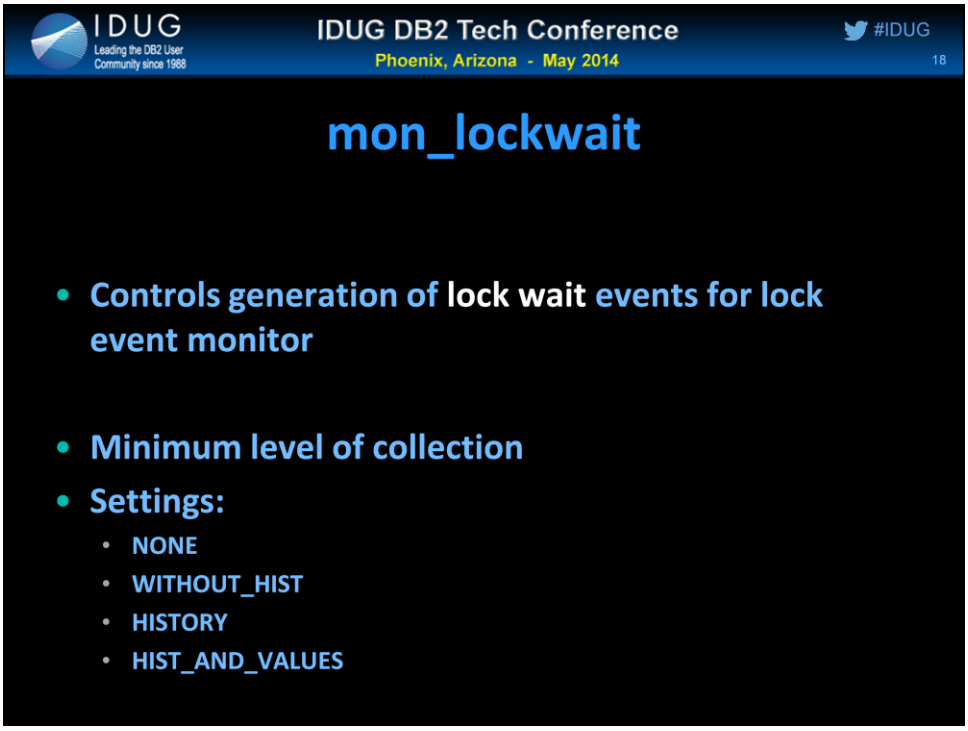

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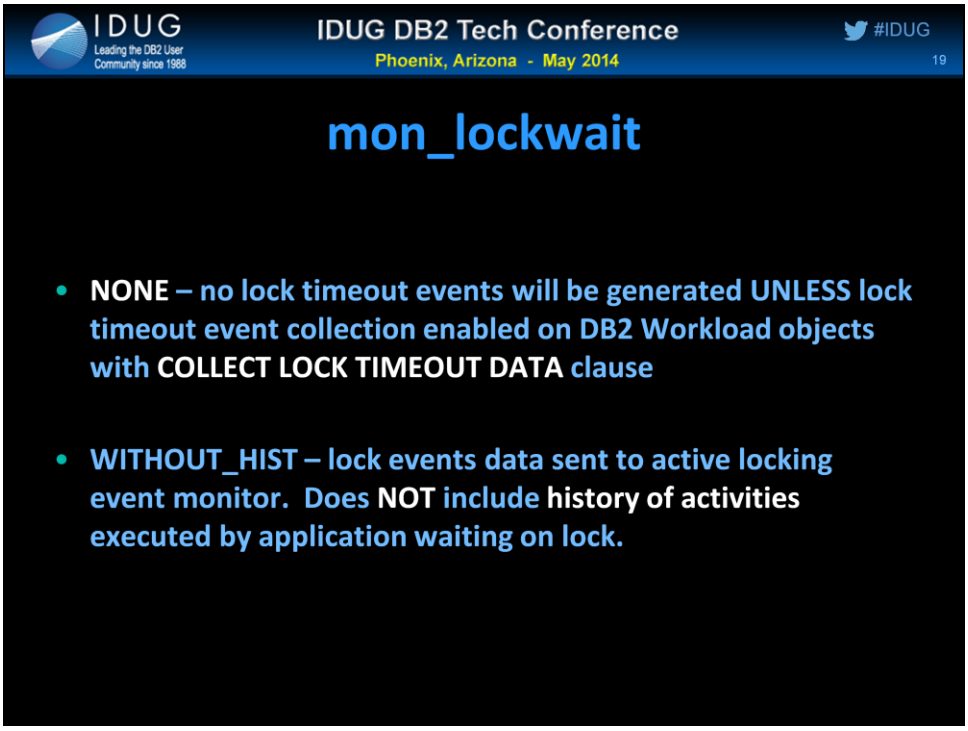

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Creating and altering workloads is a big topic. Some information can be found at:

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.sql.ref.doc/doc/r0050554.html

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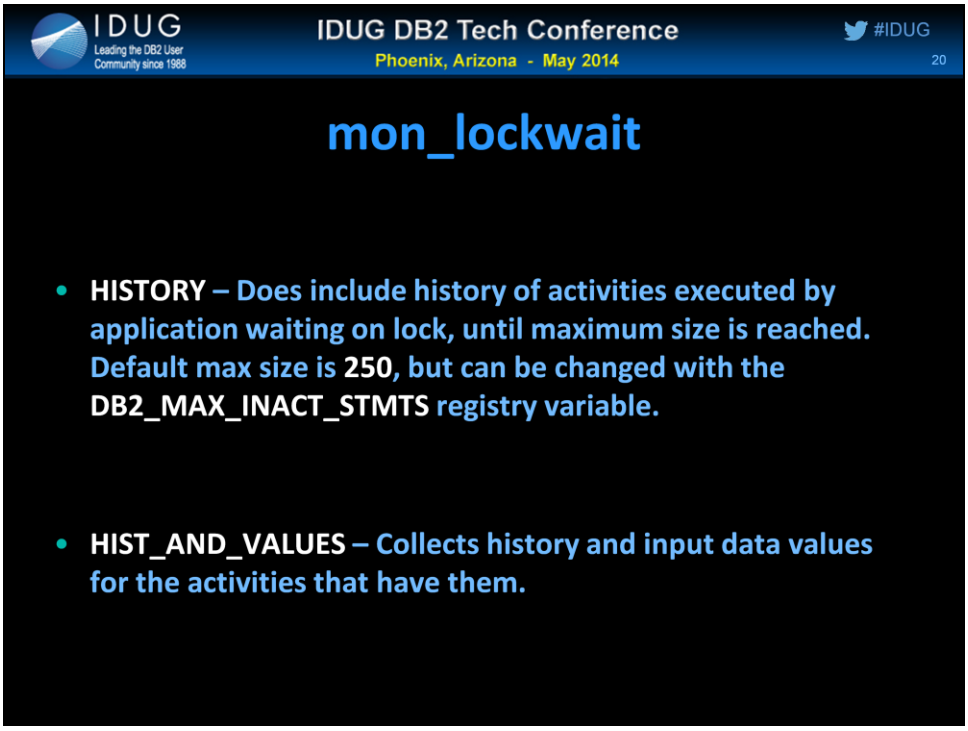

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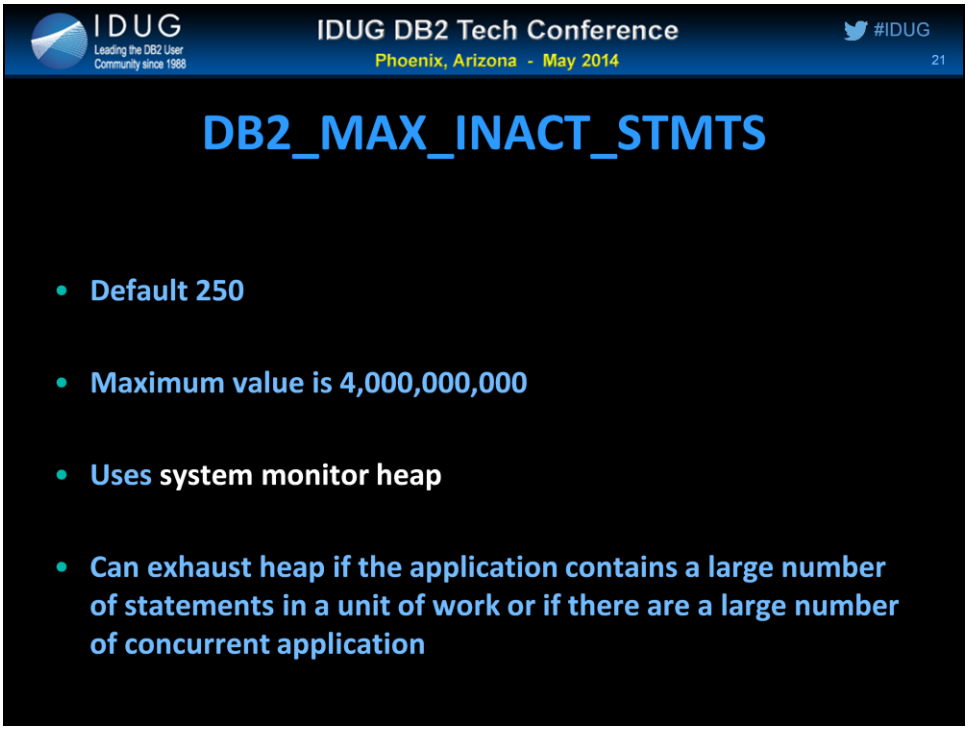
For HIST_AND_VALUES data values will NOT have LOB, LONG VARCHAR, LONG VARGRAPHIC or XML data.



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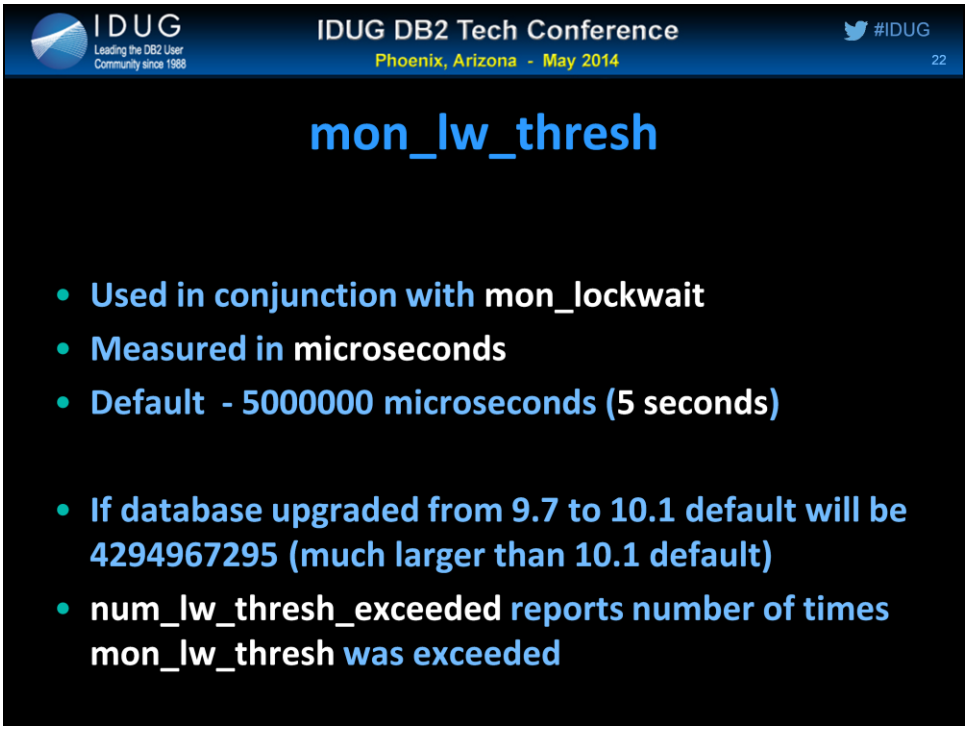
Overrides number of inactive statements kept by one application



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Microsecond to second conversion

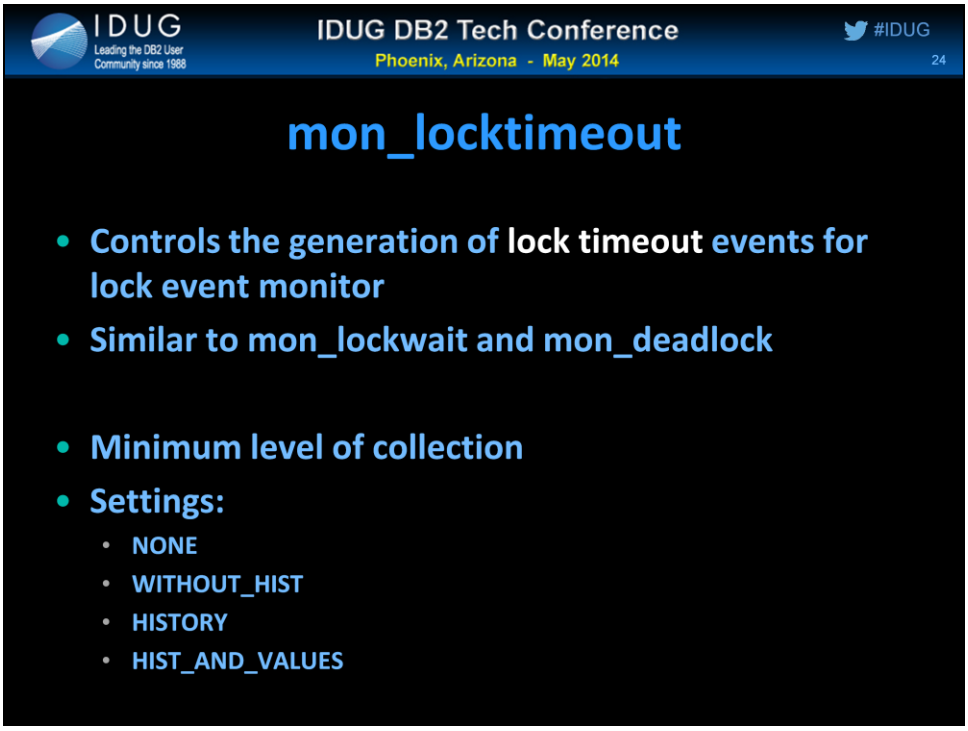
https://www.google.com/#q=microsecond+to+second

num_lw_thresh_exceeded
http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.mon.doc/doc/r0056500.html

In several of the monitor functions including MON_GET_PKG_CACHE_STMT, MON_GET_UNIT_OF_WORK and MON_GET_CONNECTION

mon_deadlock

- Controls generation of **deadlock** events for lock event monitor
- Similar to mon_lockwait and mon_locktimeout
- Settings:
  - NONE
  - WITHOUT_HIST
  - HISTORY
  - HIST_AND_VALUES



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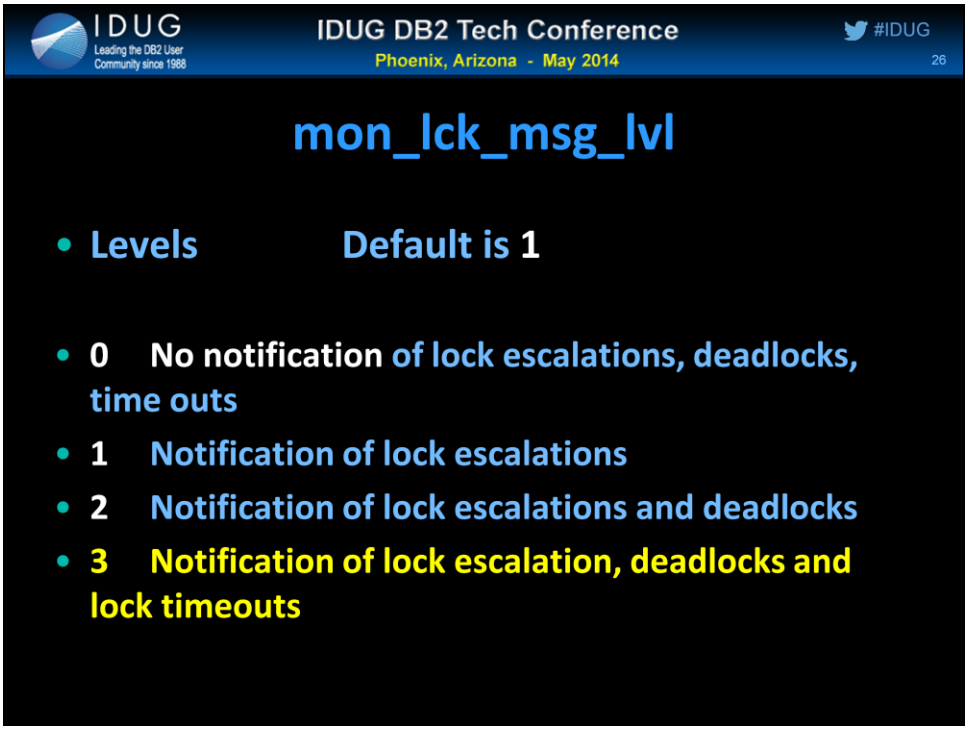
Overrides number of inactive statements kept by one application



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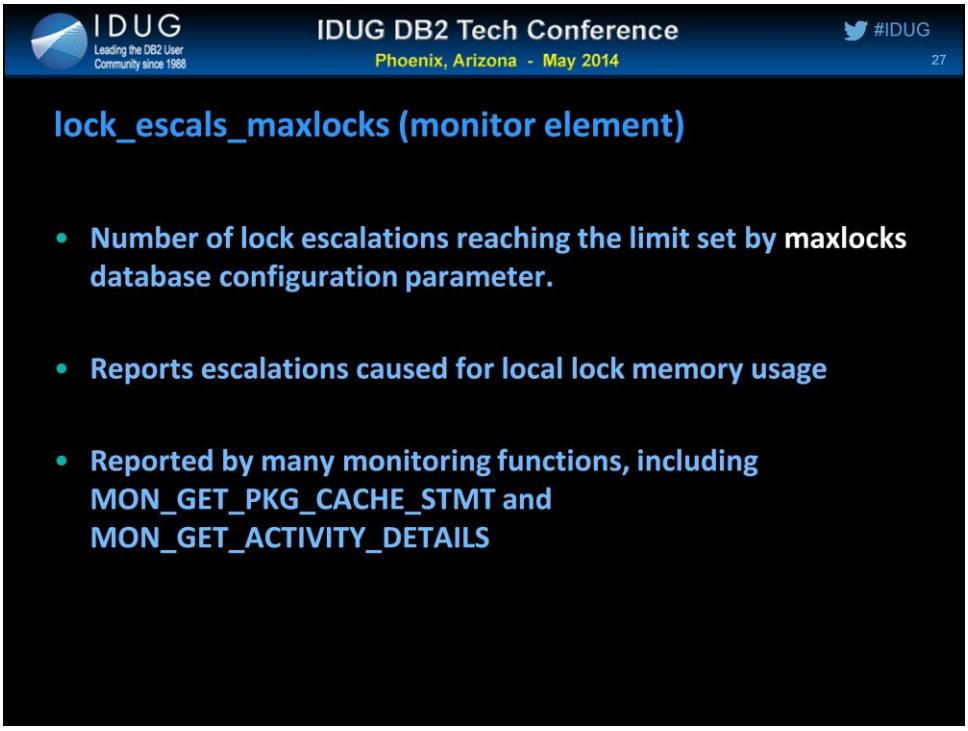
Overrides number of inactive statements kept by one application



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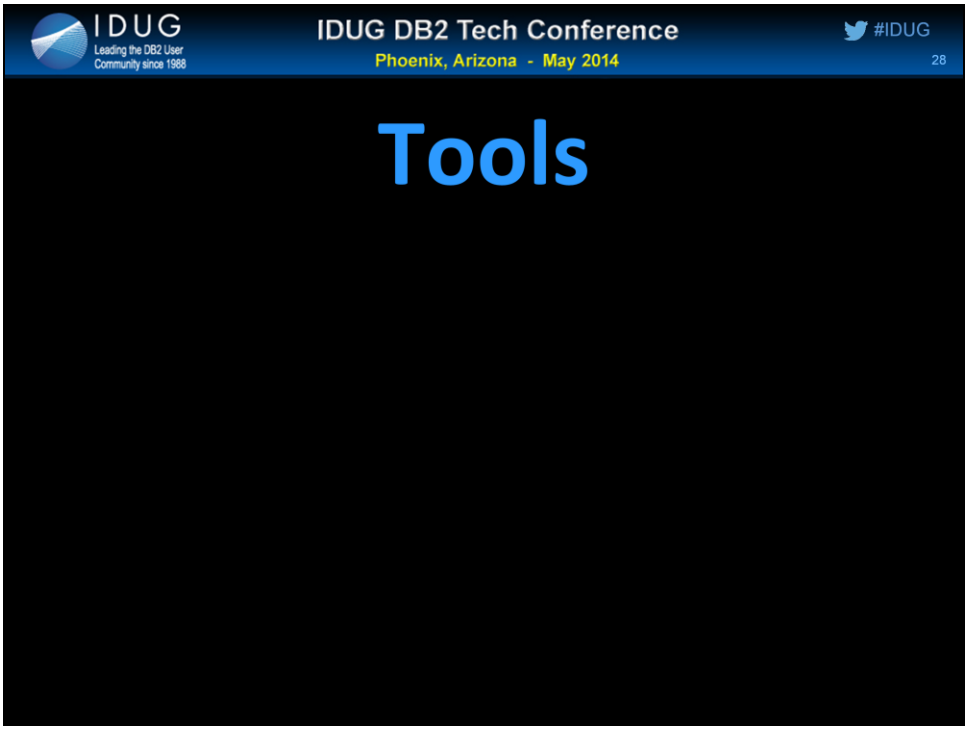

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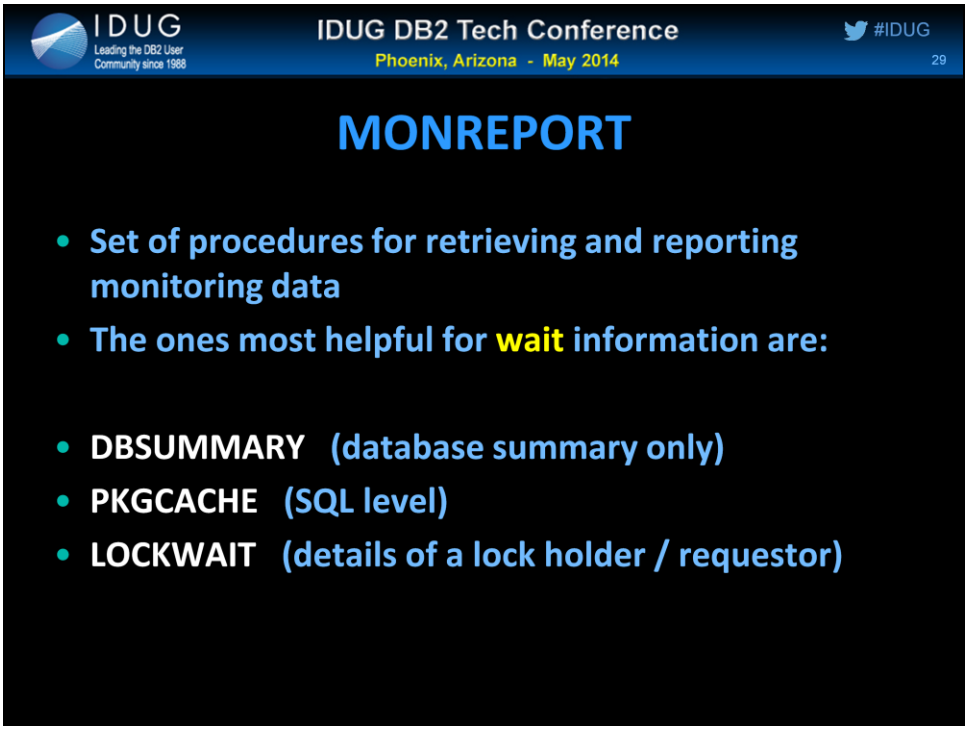

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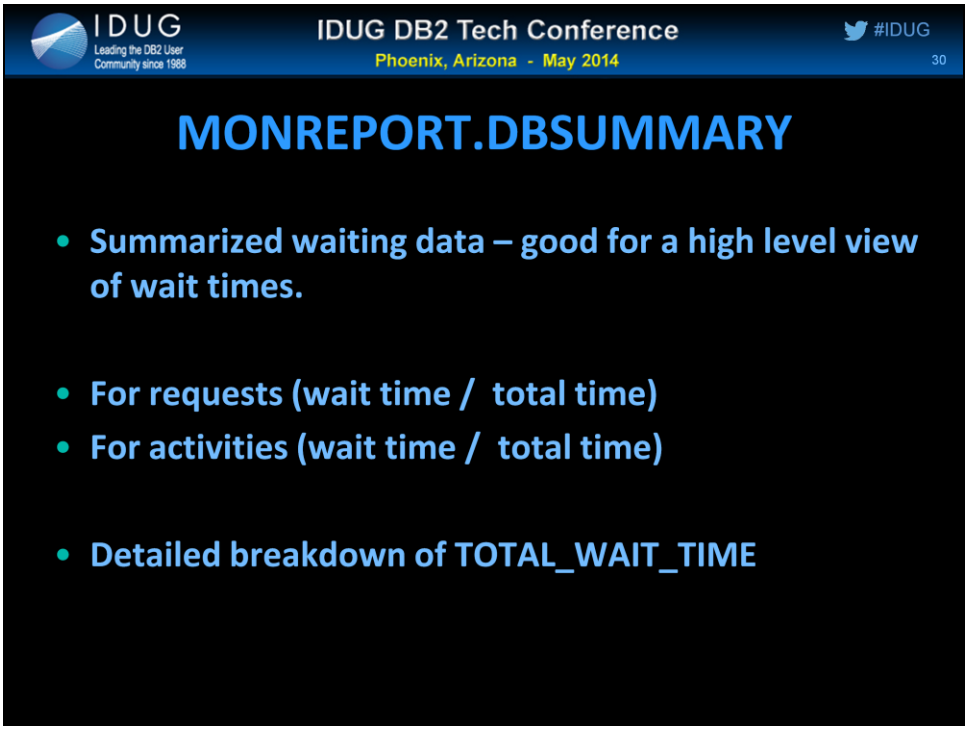

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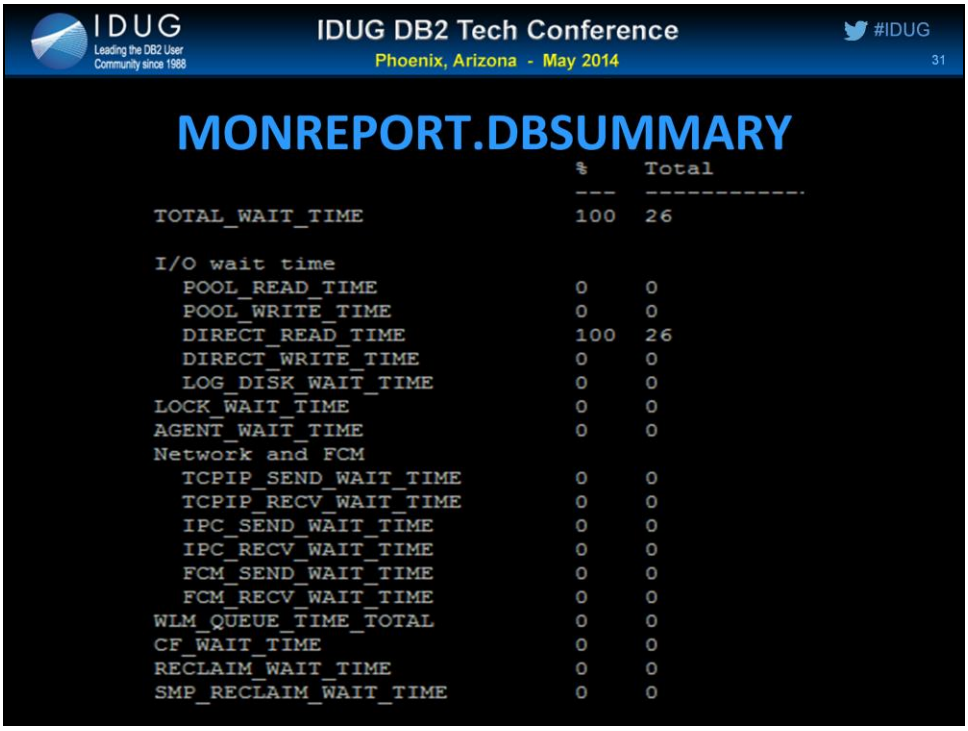

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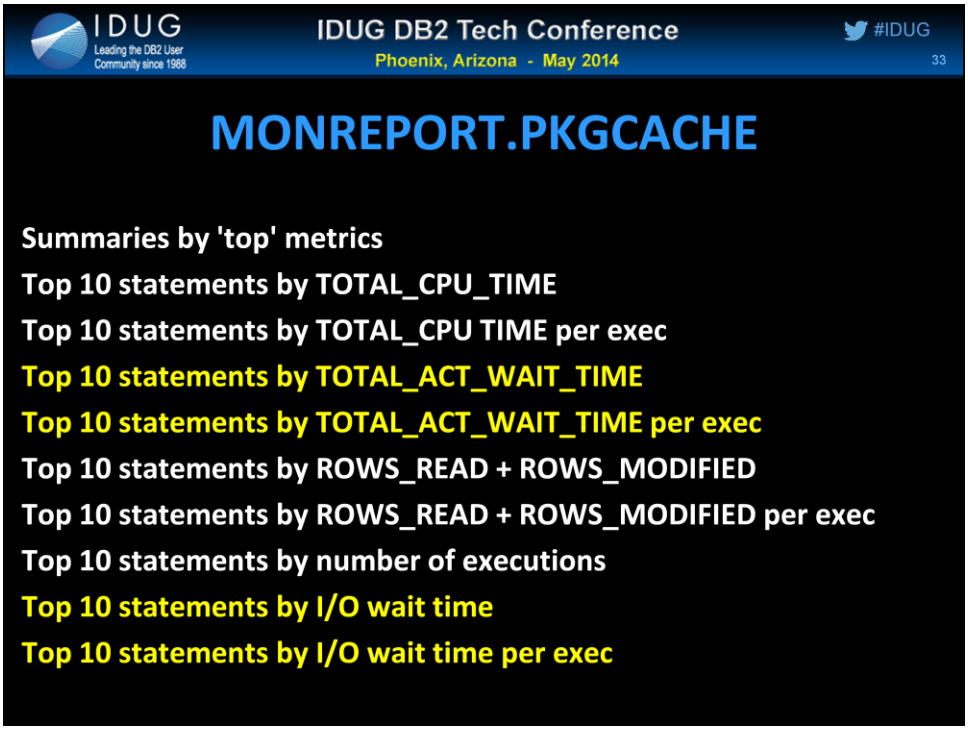

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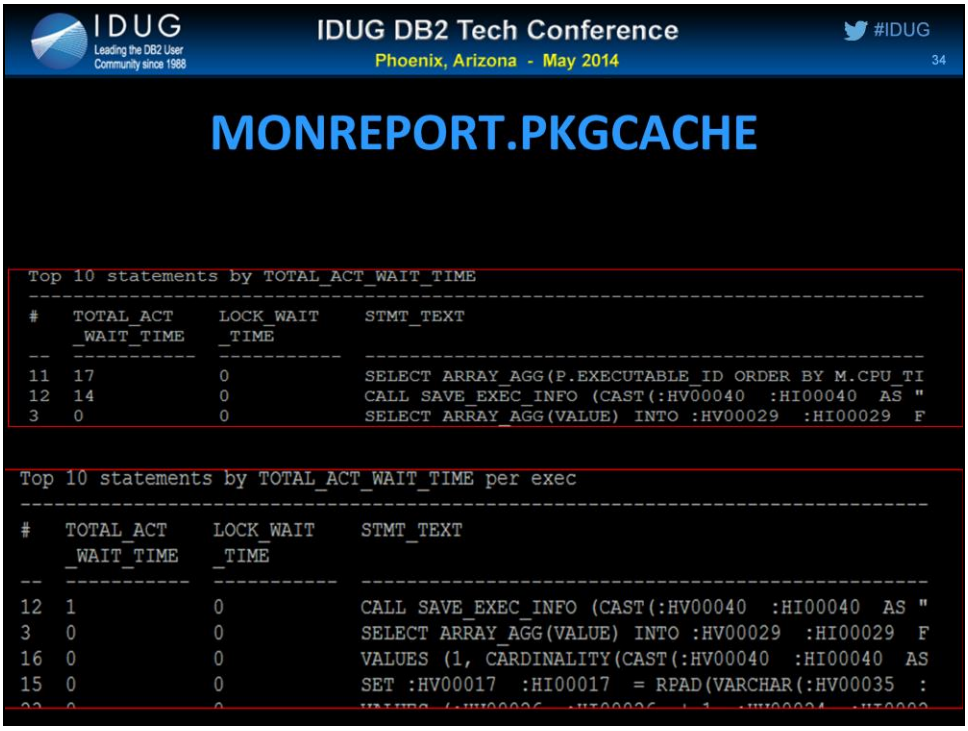

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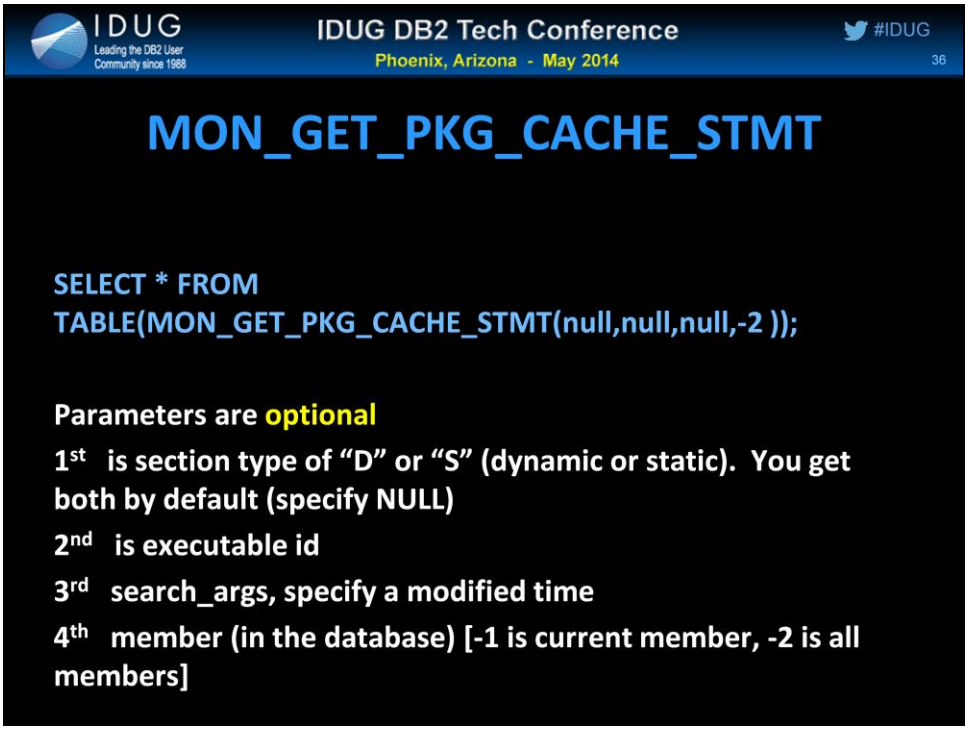
MONREPORT.LOCKWAIT

- Reports shows detailed lockwait information for lock holder and lock requestor
- Report will **ONLY** contain data if there are lockwaits when it runs (no historical data)

```
db2 "call monreport.lockwait "
```



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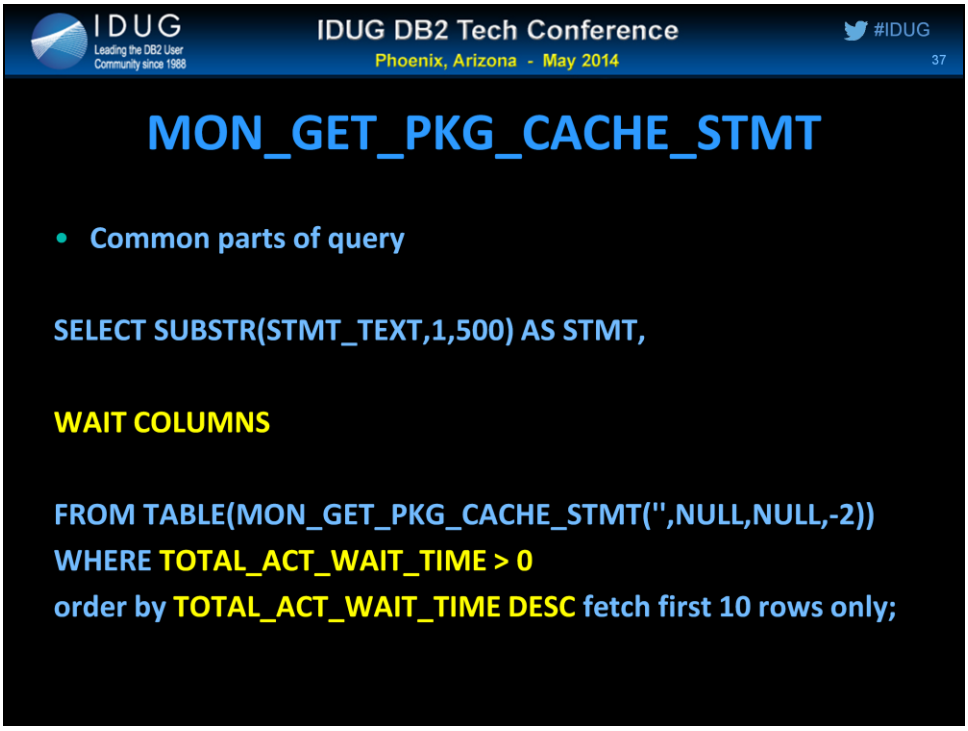

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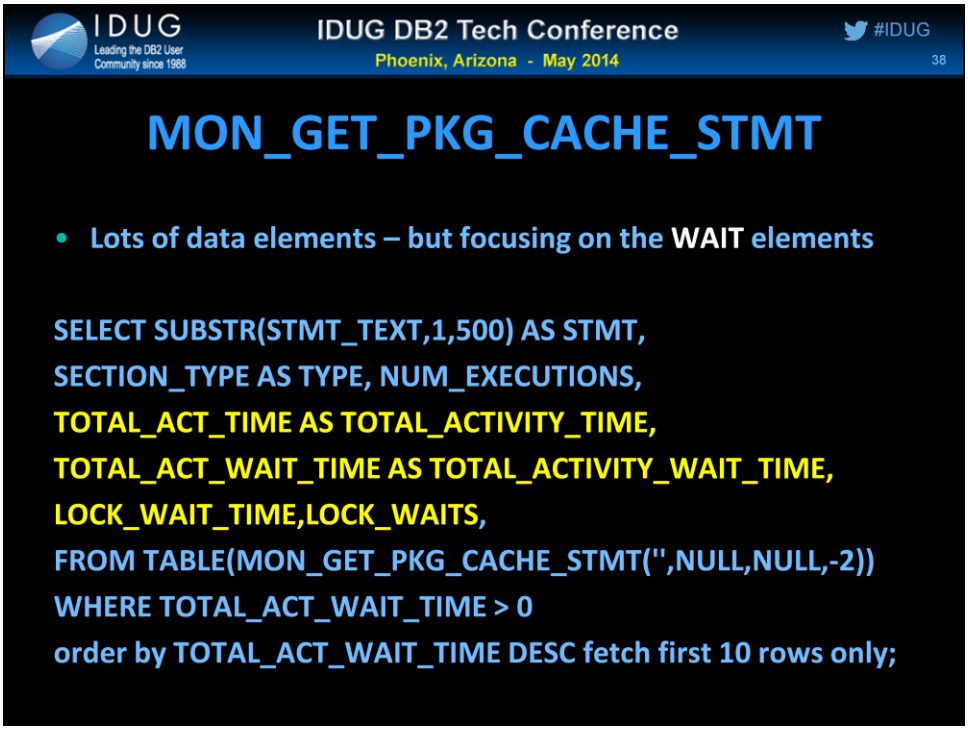

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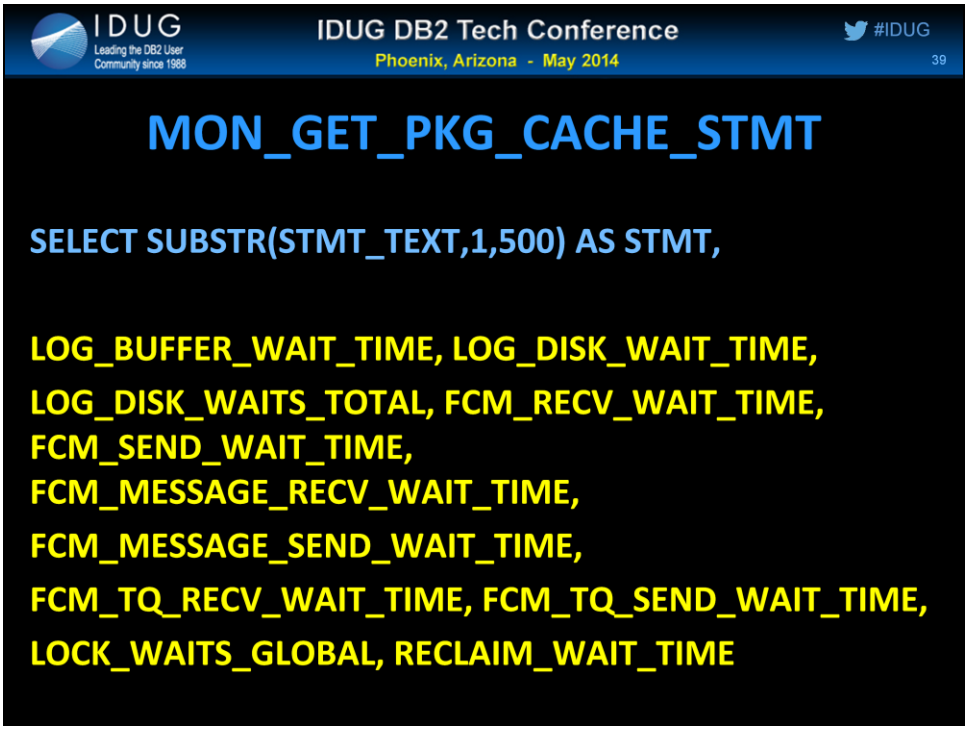

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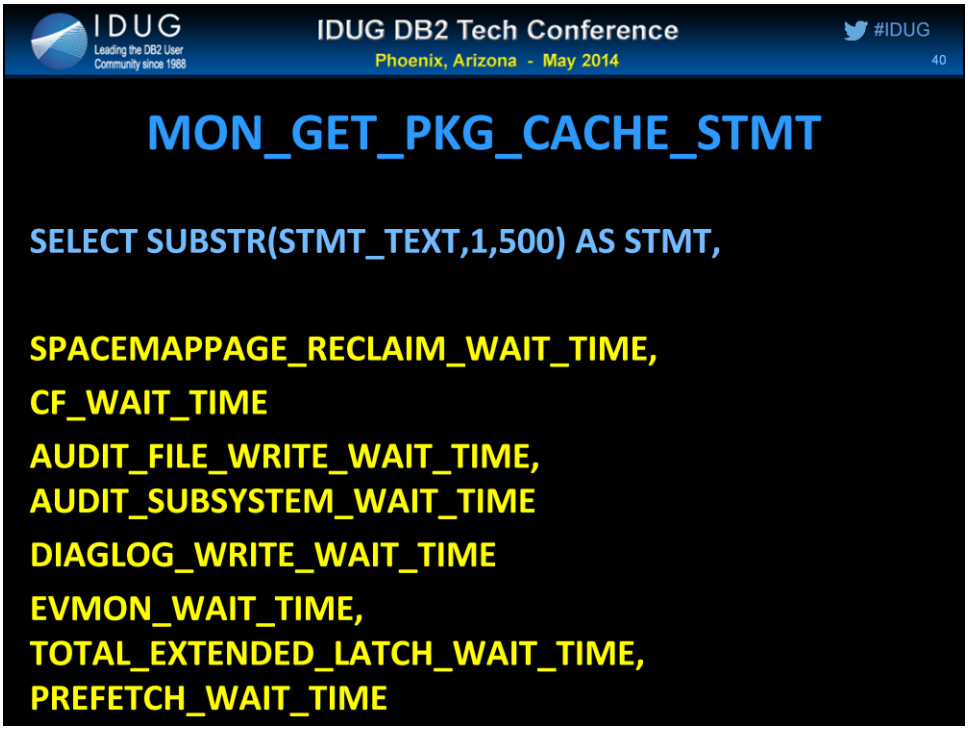

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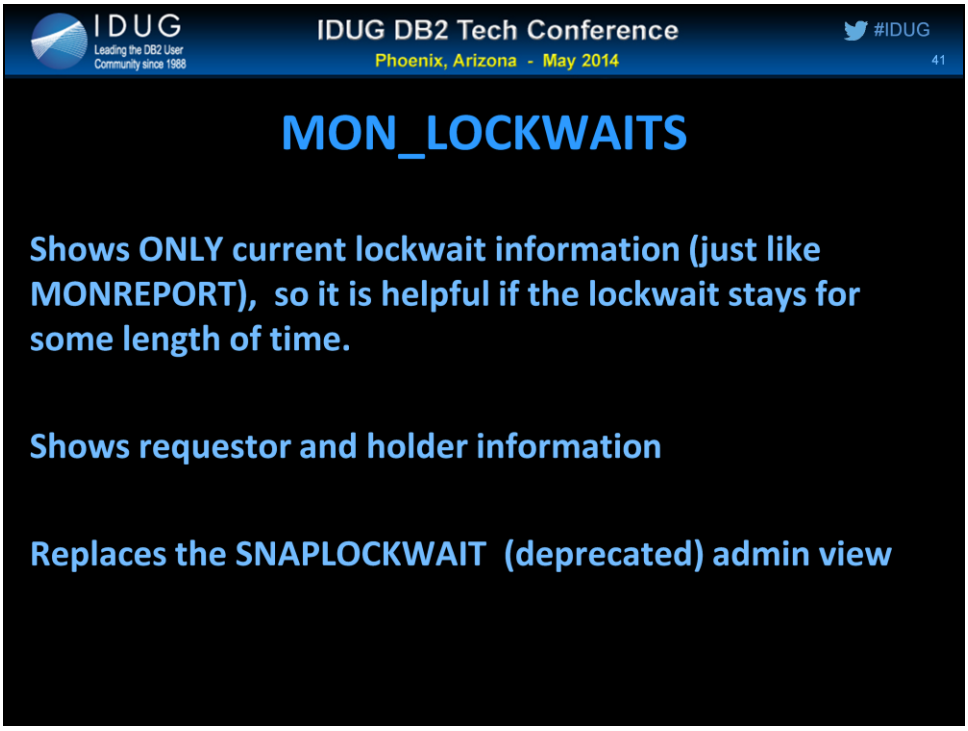

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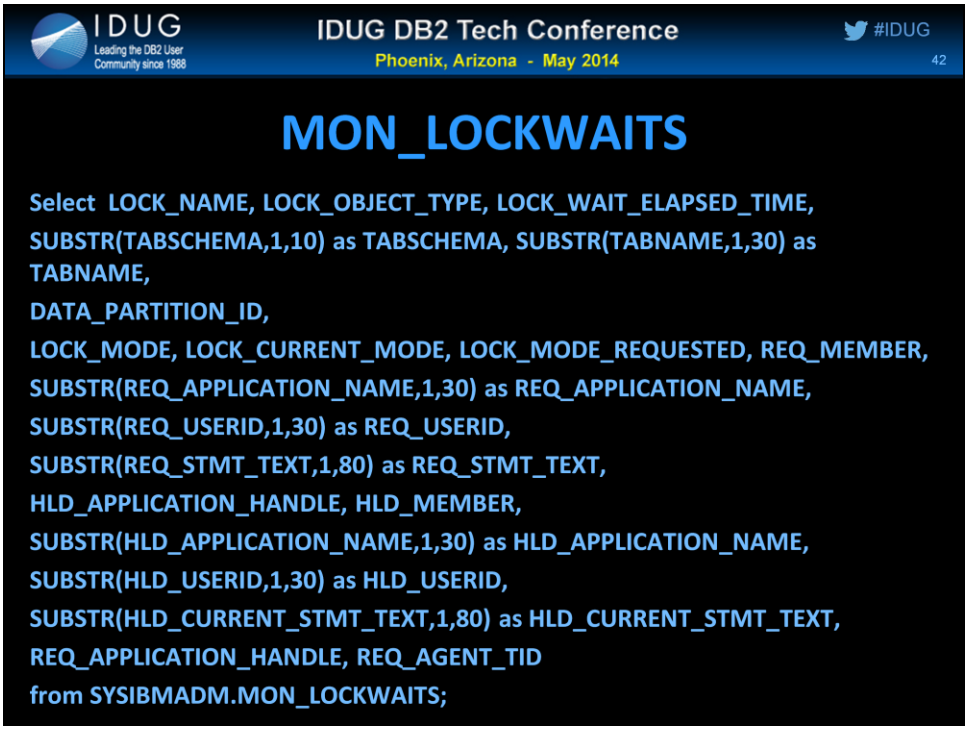

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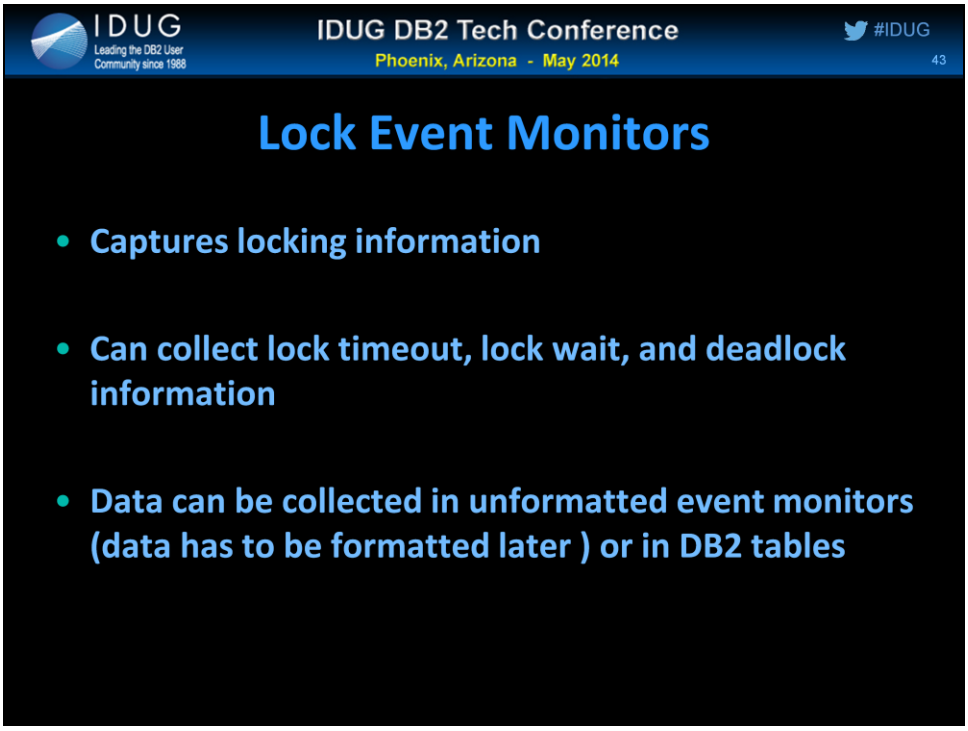
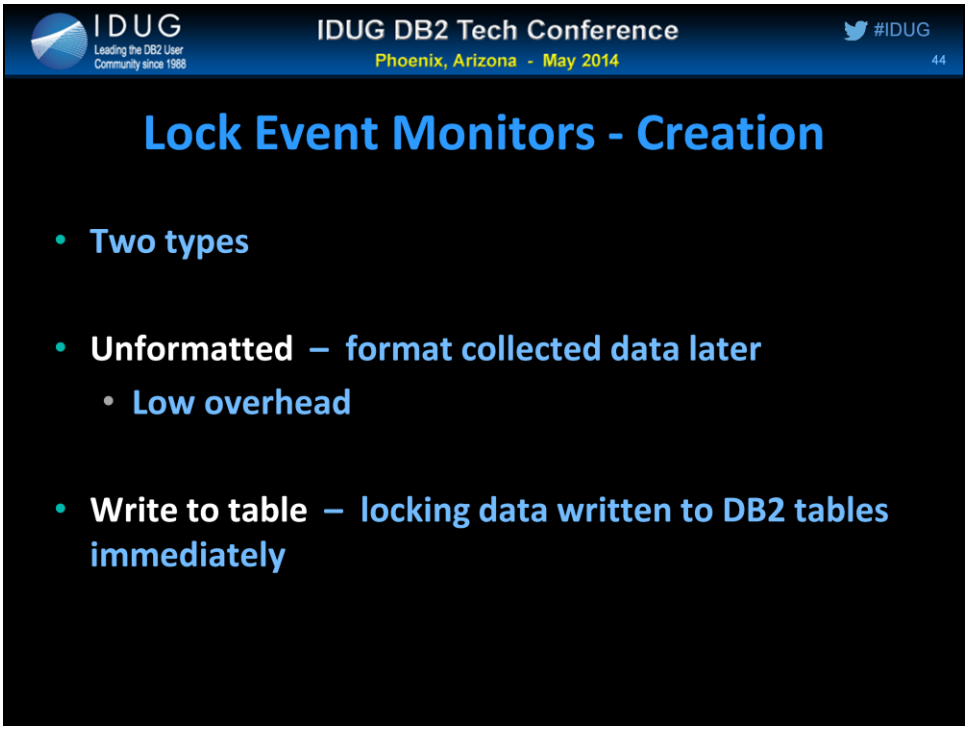


Data generated by locking event monitors

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.mon.doc/doc/c0059025.html

Collecting lock event data and generating reports

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.mon.doc/doc/t0055093.html



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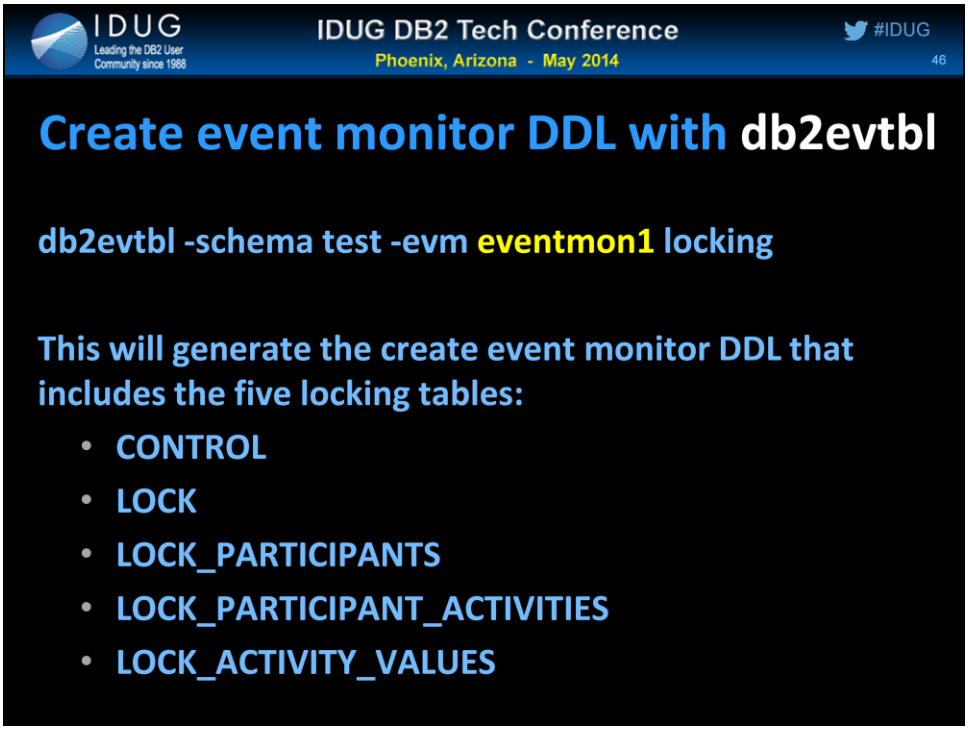
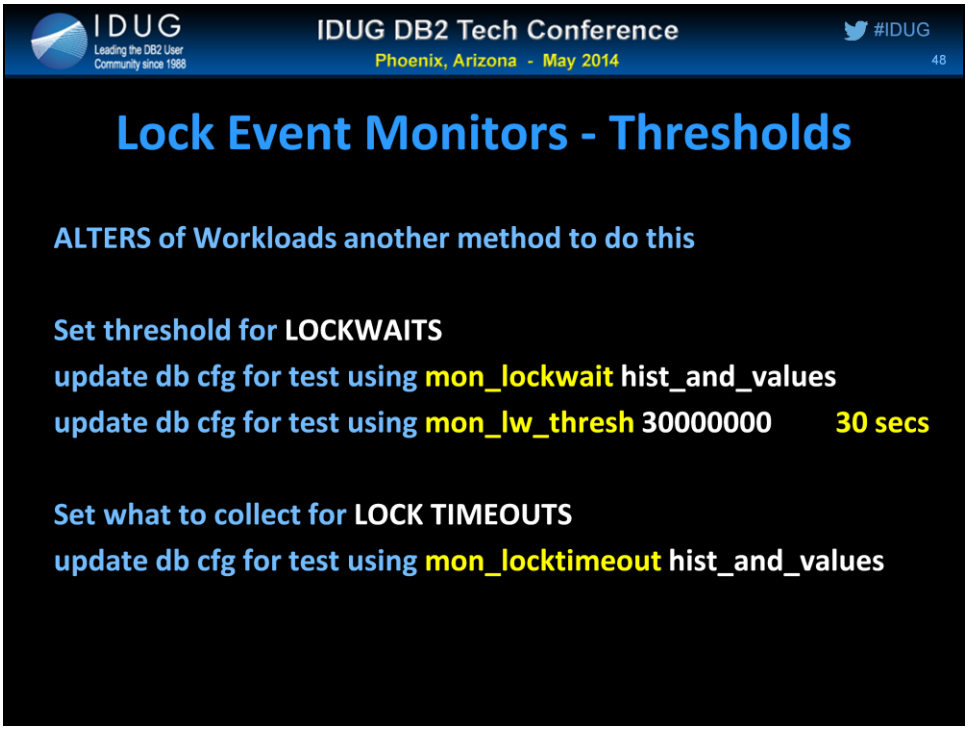


http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.cmd.doc/doc/r0008959.html

Lock Event Monitors - Creation

```
CREATE EVENT MONITOR eventmon1
  FOR LOCKING  WRITE TO TABLE
  CONTROL (TABLE test.CONTROL_eventmon1),
  LOCK (TABLE test.LOCK_eventmon1),
  LOCK_PARTICIPANTS (TABLE
test.LOCK_PARTICIPANTS_eventmon1),
LOCK_PARTICIPANT_ACTIVITIES (TABLE
test.LOCK_PARTICIPANT_ACTIVITIES_eventmon1),
LOCK_ACTIVITY_VALUES (TABLE
test.LOCK_ACTIVITY_VALUES_eventmon1);
```



mon_lockwait

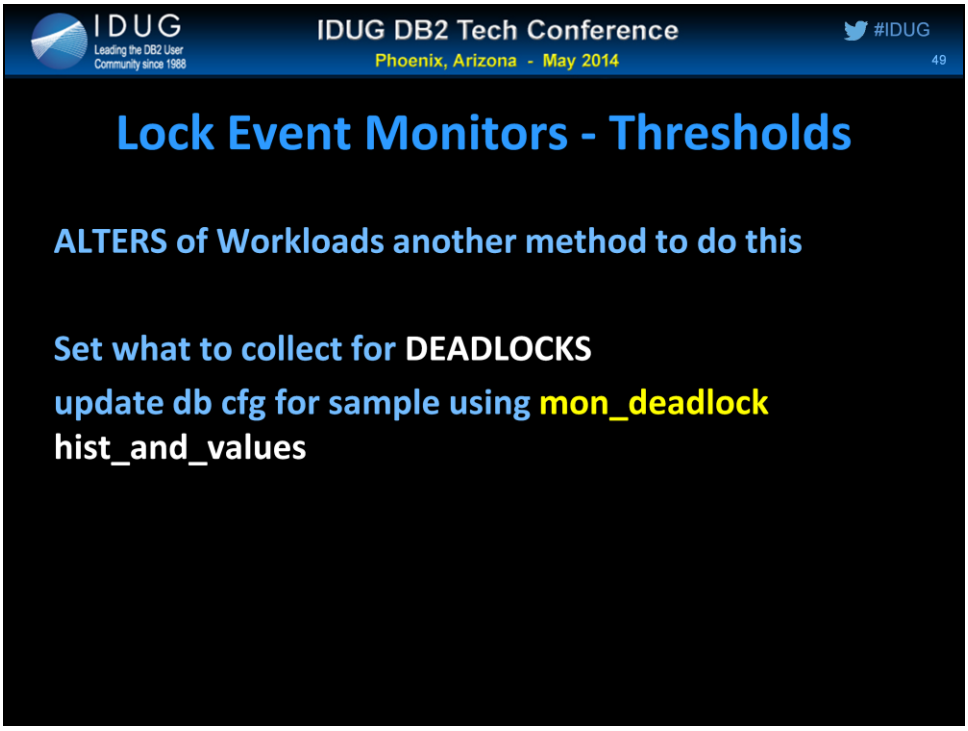
http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.config.doc/doc/r0054941.html

mon_lw_thresh

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.config.doc/doc/r0054942.html

mon_locktimeout

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.config.doc/doc/r0054939.html



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http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.mon.doc/doc/t0055093.html

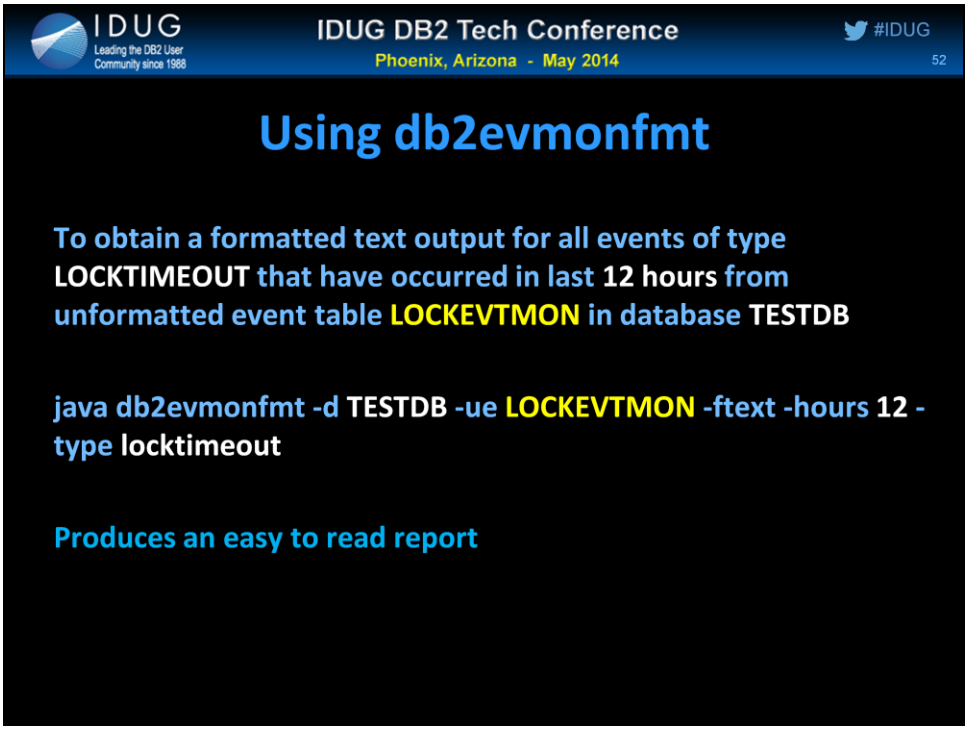
Set up db2evmonfmt

- These give information for how to get db2evmonfmt set up:

http://db2forum.wordpress.com/2011/10/17/lock-event-monitor-in-db2-9-7-to-solve-concurrency-issues/

http://www.ibm.com/developerworks/data/library/techarticle/dm-1004lockeventmonitor/

http://db2commerce.com/2012/01/23/analyzing-deadlocks-the-new-way/



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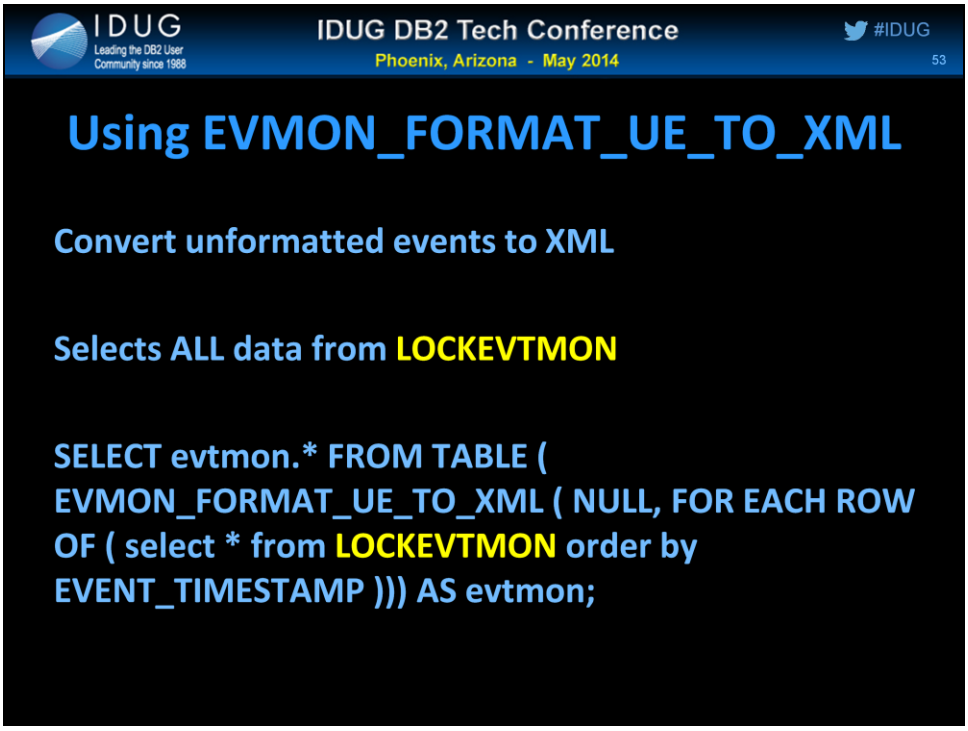

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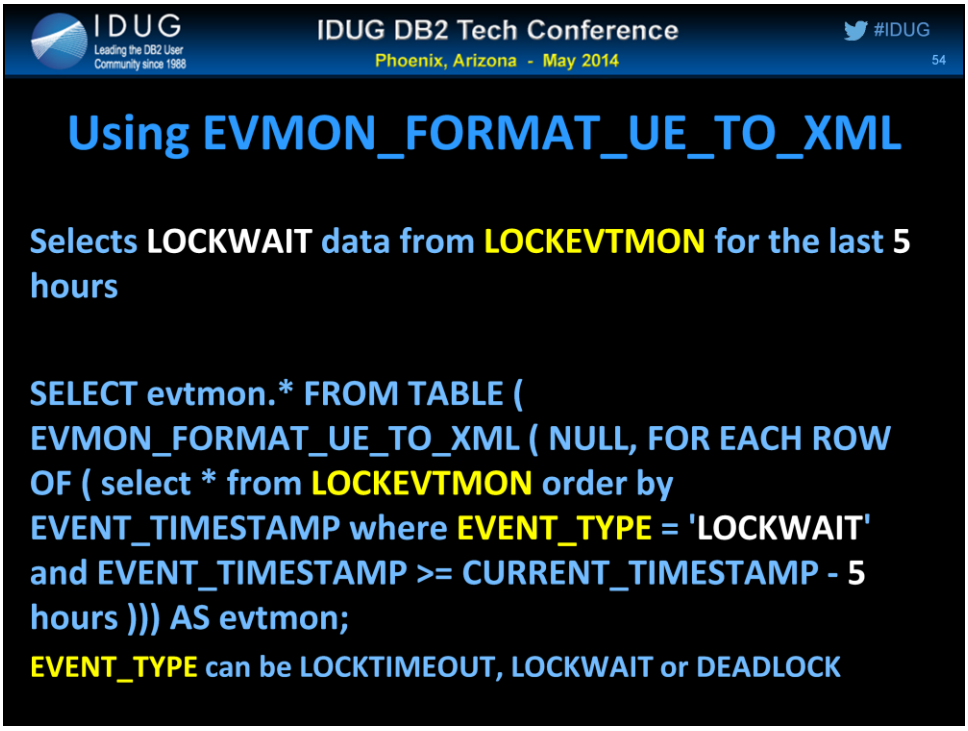

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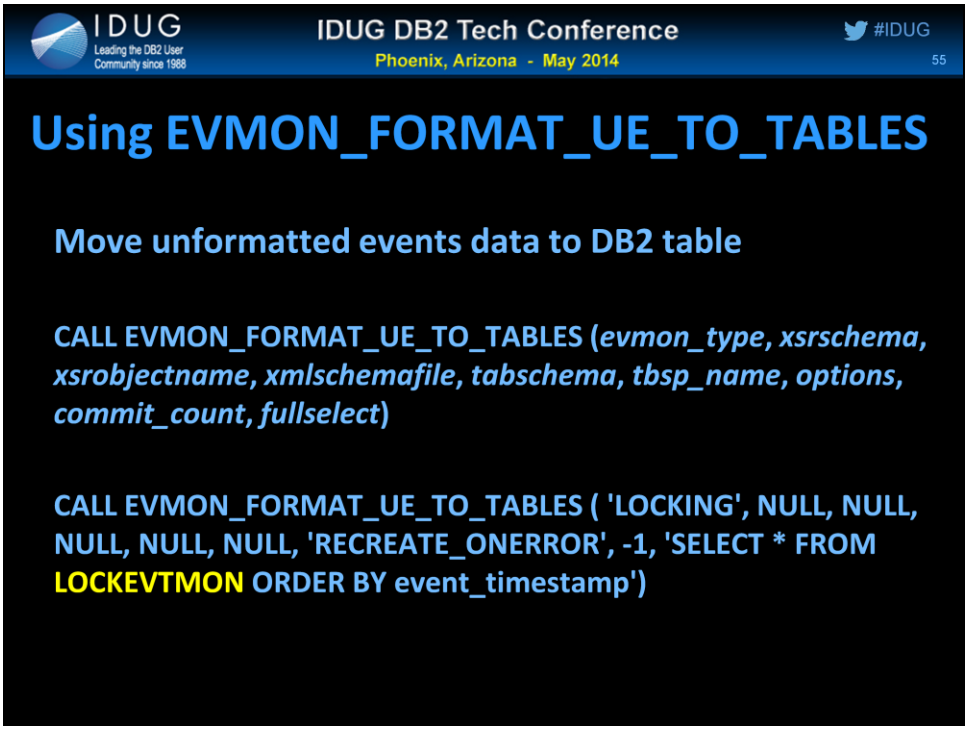


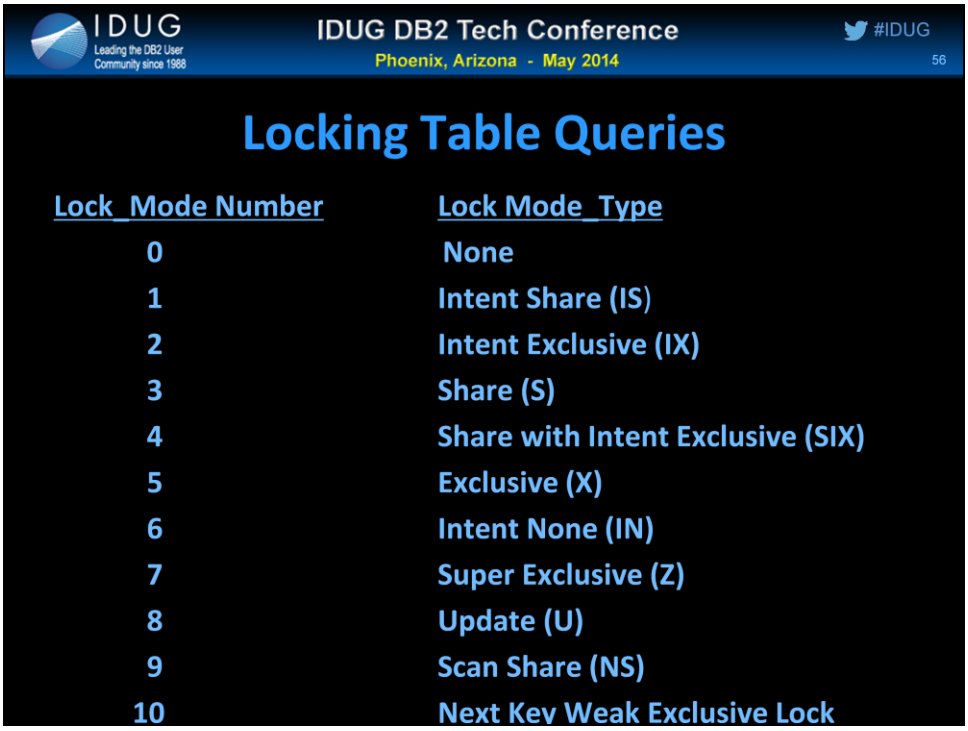
http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.sql.rtn.doc/doc/r0054910.html

evmon_type – Type of data stored in unformatted event table. The possible values are:

LOCKING - Data stored in the unformatted event table is from a locking event monitor.

PKGCACHE - Data stored in the unformatted event table is from PACKAGE CACHE event monitor.

UOW - Data stored in the unformatted event table is from UOW event monitor.



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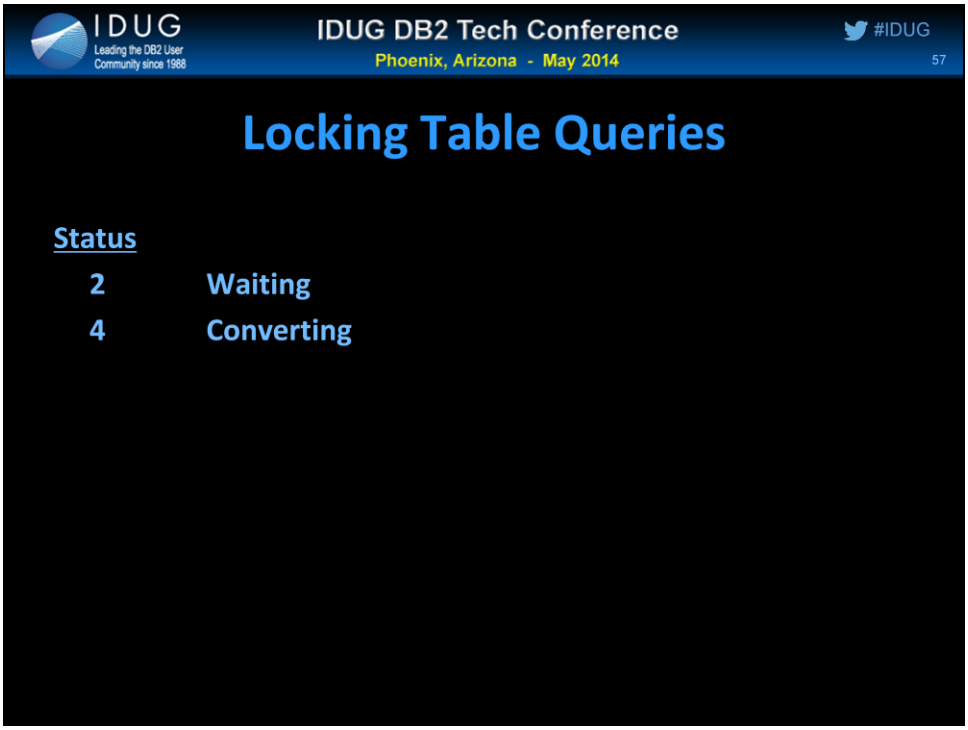
10 is



http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.mon.doc/doc/r0001286.html

Locking Table Queries

select * from LOCKEVENTS fetch first 5 rows only

select * from LOCK_ACTIVITY_VALUES fetch first 5 rows only

select * from LOCK_EVENT fetch first 5 rows only

select * from LOCK_PARTICIPANTS fetch first 5 rows only

select * from LOCK_PARTICIPANT_ACTIVITIES fetch first 5 rows only

Locking Table Queries

- LOCK_PARTICIPANT_ACTIVITIES

```
EXPORT TO
'/db2data/exports/lock_participant_activities_March9.csv' of del
select STMT_FIRST_USE_TIME,STMT_LAST_USE_TIME,
package_name, effective_isolation, stmt_type, rtrim(stmt_text)
from test.LOCK_PARTICIPANT_ACTIVITIES
order by STMT_LAST_USE_TIME desc;
```

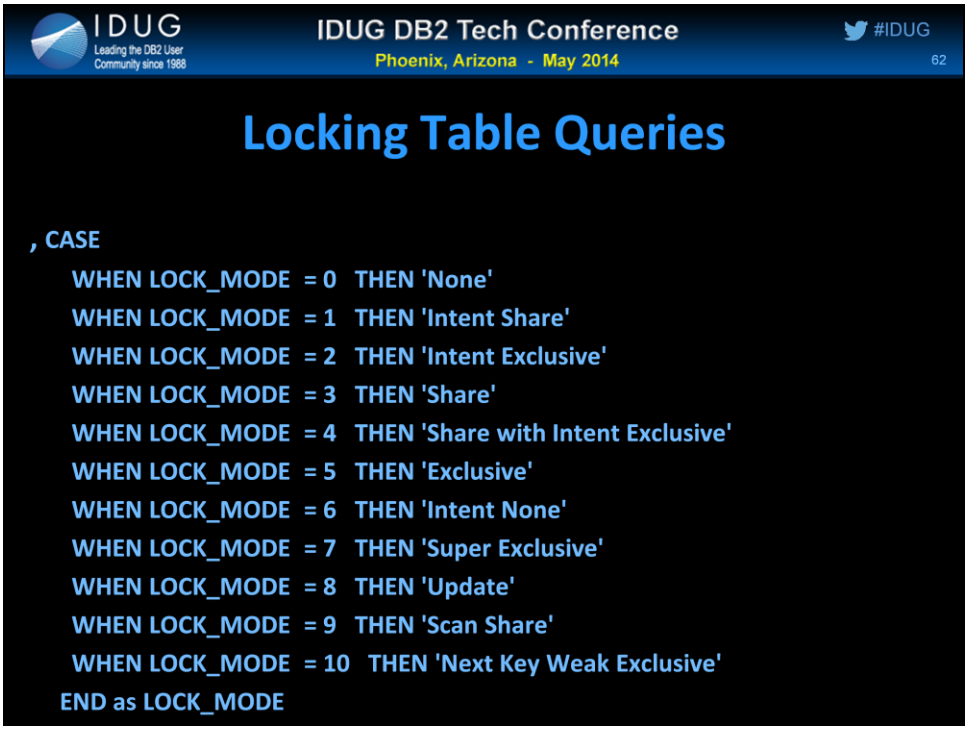
Locking Table Queries

- LOCK_PARTICIPANTS

```
EXPORT TO '/db2data/exports/lock_participants_March9.csv' of del
select  *
from test.LOCK_PARTICIPANTS;
```

Locking Table Queries

```
select e.EVENT_ID, e.DEADLOCK_TYPE , SUBSTR(e.EVENT_TYPE,1,12) as
event_type
,p.LOCK_MODE_REQUESTED
,substr(p.TABLE_NAME,1,30) as TABLE_NAME
,    CASE
       WHEN LOCK_MODE  = 0 THEN 'None'
        WHEN LOCK_MODE  = 1 THEN 'Intent Share'
 END as LOCK_MODE
, substr(a.STMT_TEXT,1,80)
from LOCK_EVENT e, LOCK_PARTICIPANTS p, LOCK_PARTICIPANT_ACTIVITIES a
where e.EVENT_ID = p.EVENT_ID and e.EVENT_ID = a.EVENT_ID
and p.TABLE_NAME ^= ''
```



Could use a similar case statement for LOCK_MODE_REQUESTED column in the LOCK_PARTICIPANTS table

What We Covered

- High level view of time-spent elements
- Configuration parameters
  - maxlocks
  - mon_lockwait
  - mon_lw_thresh
  - mon_deadlock
  - mon_locktimeout
  - locktimeout

What We Covered

- Tools for looking at wait times using MONREPORT, MON_GET_PKG_CACHE_STMT
- Lockwait analysis using MON_LOCKWAITS and other tools
- Locking event monitor usage and locking table queries

Additional Information

- Appendix of this presentation contains a number of items that could not be covered
- Appendix has links to a number of other presentations that have more information

THANK YOU!

Paul Turpin is a consulting database administrator for a large financial institution. He specializes in DB2 for LUW on large systems. He enjoys exploring new features and functionality in DB2. He has spoken at IDUG North America, IDUG Europe, SHARE, IBM's Information on Demand conference, and several RUGs. Paul currently serves on the IDUG Board of Directors. He was one of IBM's inaugural Information Champions.

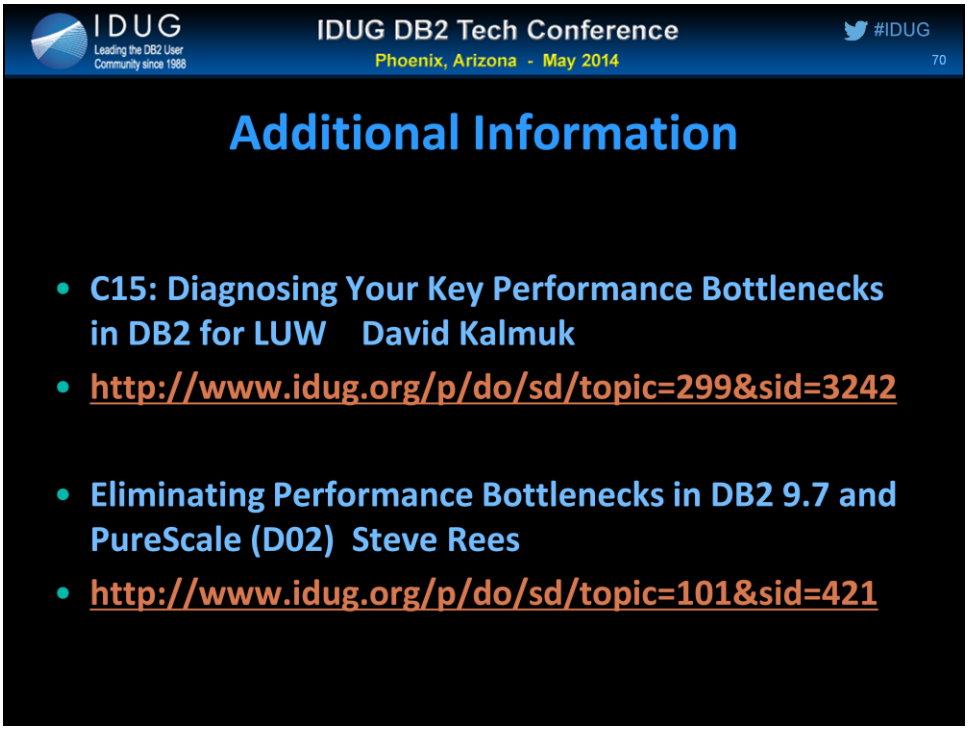
Appendix

- Additional information resources
- db2fopt information
- Information for researching
  - Lock waits
  - Lock timeouts
  - Deadlocks
  - Lock escalation

Additional Information

- Alexander Kopac presented
- C08 "Secrets of the Dead - Locks, Waits, Escalations & Semaphores“ earlier in the week

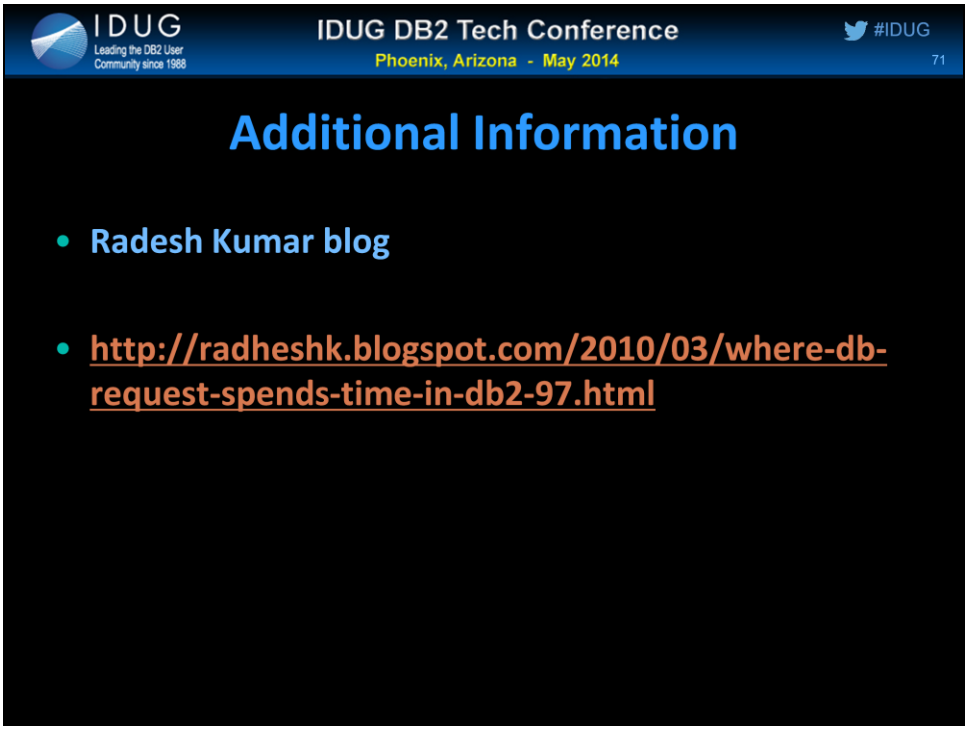
- Where my request spending time? --- First taste DB2 9.7 Time Spent metrics (C04) Pak Kwan May 11, 2010
- http://www.idug.org/p/do/sd/topic=103&sid=1539



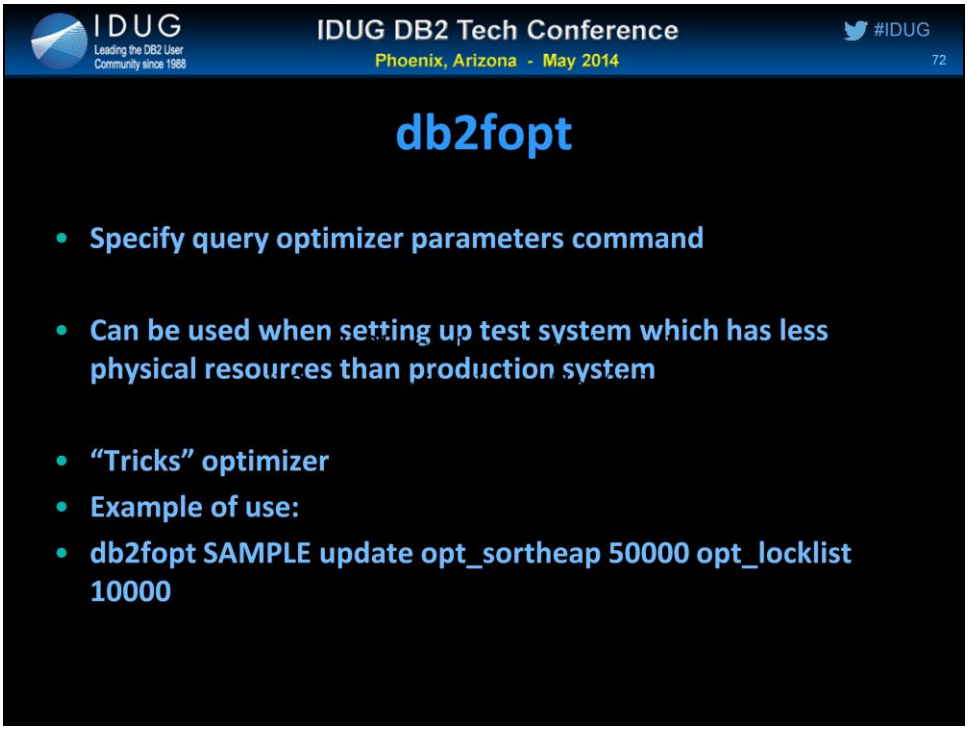
Radesh Kumar

http://radheshk.blogspot.com/2010/03/where-db-request-spends-time-in-db2-97.html

http://www.db2guide.blogspot.com/



http://www.db2guide.blogspot.com/



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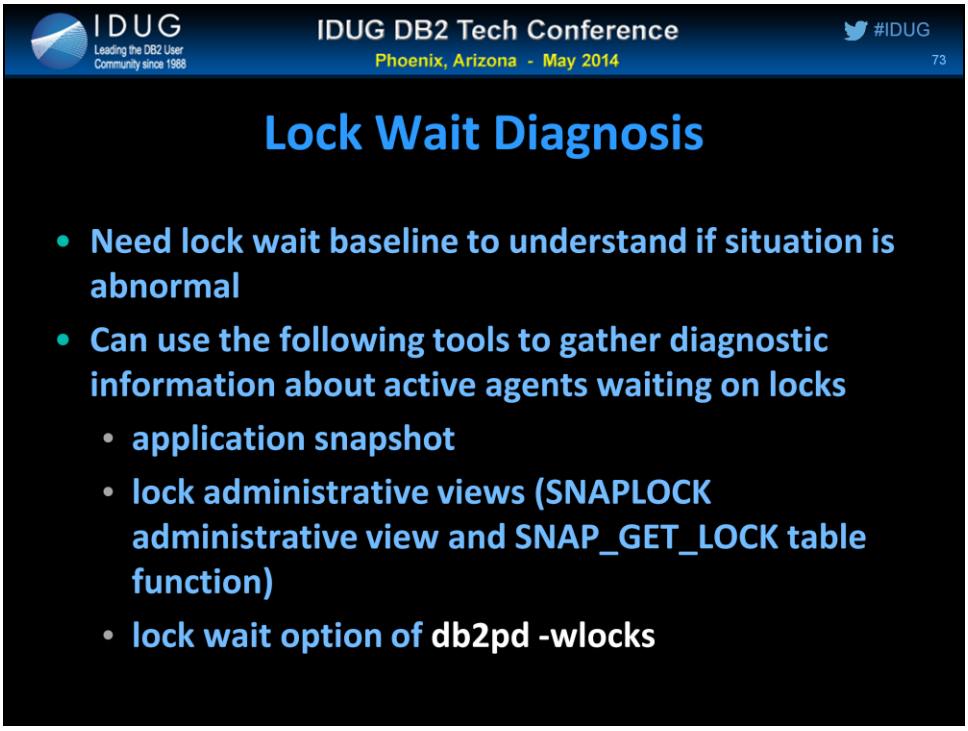
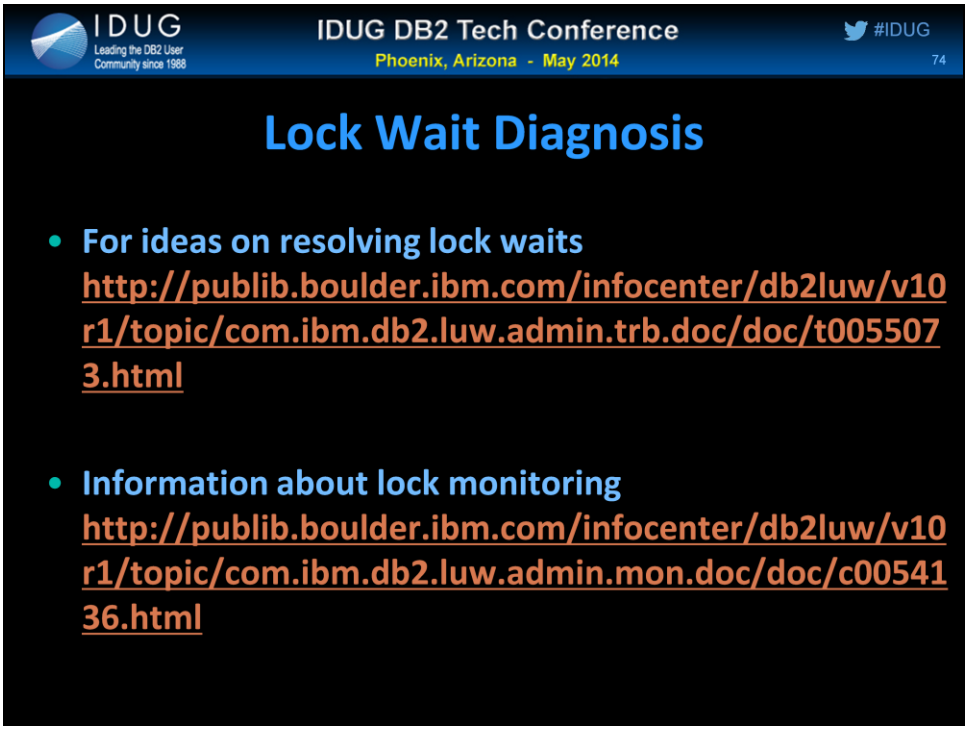


http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.trb.doc/doc/t0055234.html

SNAPLOCK administrative view and SNAP_GET_LOCK table function

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.sql.rtn.doc/doc/r0021992.html



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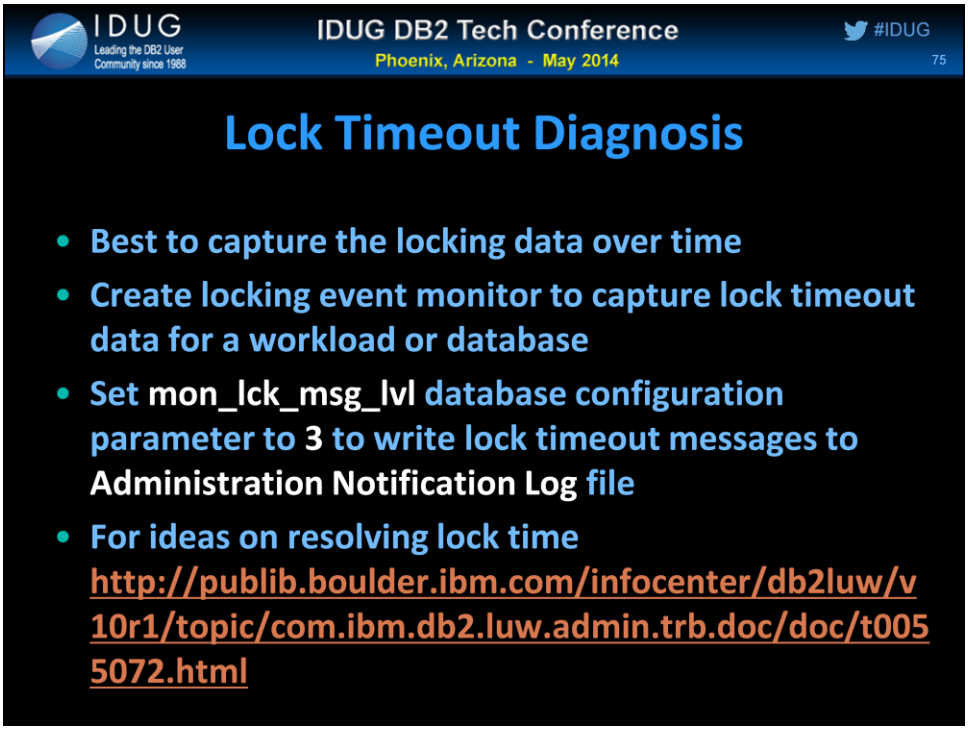

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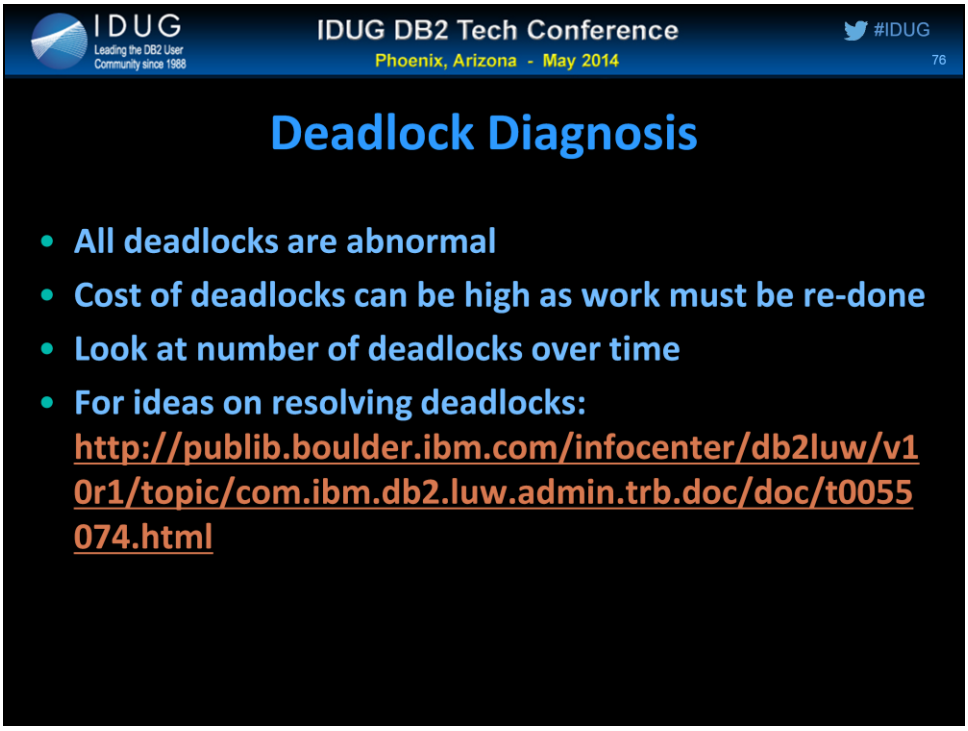

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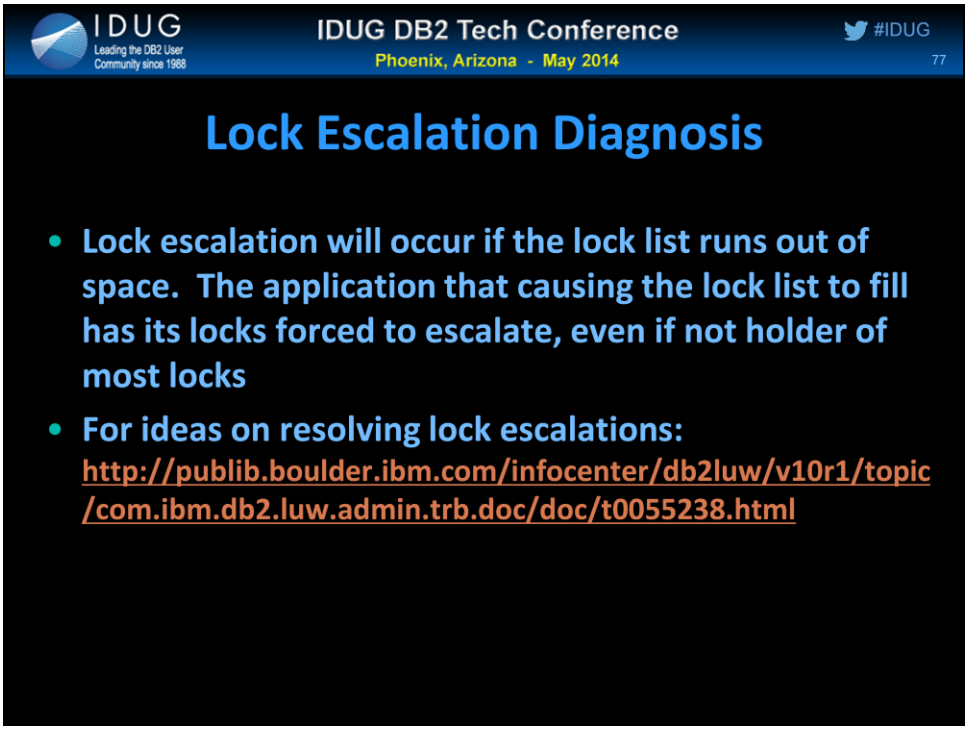

http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.trb.doc/doc/t0055237.html

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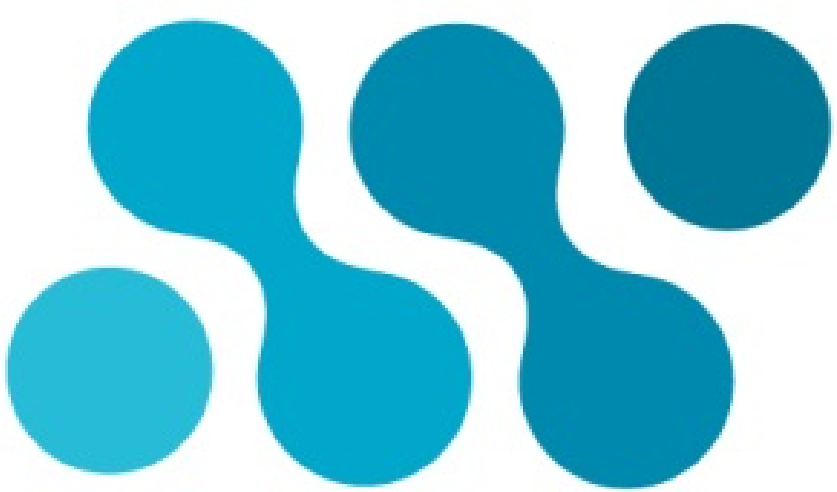

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Compare Database Workload

Before: 3/14/14 9:00 AM to 3/14/14 3:00 PM
After: 4/29/14 9:00 AM to 4/29/14 3:00 PM

Last Refresh: 4/29/14 4:47 PM
Rows: 1

Server	Instance	Database	IX Read Efficiency After	IX Read Efficiency Change	% CPU Busy Improved	% CPU Busy Before	% CPU Busy After	% CPU Busy Change	SQL Sync Read % Improved	SQL Sync Read % Before	SQL Sync Read % After	SQL Sync Read % Change	Logi Rea Imp
SAP.PRIM...	db2per	PER	2.568	-27.055	N	28.760%	30.320%	1.560%	Y	57.452%	62.423%	4.971%	

Compare Database Workload

Before: 3/14/14 9:00 AM to 3/14/14 3:00 PM
After: 4/29/14 9:00 AM to 4/29/14 3:00 PM

Last Refresh: 4/29/14 4:47 PM
Rows: 1

Server	Instance	Database	Tx Avg Outside Time (ms) After	Tx Avg Outside Time (ms) Change	SQL/Sec Improved	SQL/Sec Before	SQL/Sec After	SQL/Sec Change	IX Read Efficiency Improved	IX Read Efficiency Before	IX Read Efficiency After	IX Read Efficiency Change	% CF Impr
SAP.PRIM...	db2per	PER	947.46475	285.39264	Y	1,226.930	3,765.232	2,538.302	Y	29.623	2.568	-27.055	

File Edit View Tools Reports Window Help

Compare Database Workload

Before: 3/14/14 9:00 AM to 3/14/14 3:00 PM
After: 4/29/14 9:00 AM to 4/29/14 3:00 PM

Last Refresh: 4/29/14 4:47 PM
Rows: 1

Server	Instance	Database	SQL Sync Read % Change	Logical IX Reads/Tx Improved	Logical IX Reads/Tx Before	Logical IX Reads/Tx After	Logical IX Reads/Tx Change	Logical Reads/Tx Improved	Logical Reads/Tx Before	Logical Reads/Tx After	Logical Reads/Tx Change	Tmp Logical Reads/Tx Improved	Tmp Read Befo
SAP.PRIM...	db2per	PER	4.971%	Y	742.37	193.40	-548.97	Y	6,152.67	550.79	-5,601.88	Y	

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