

## Agenda

- What this is about?
  - Learning How Oracle Locking Works
  - Understanding locking behavior
  - Tuning locking operations
- Tools
  - SQL\*Plus

## About Me

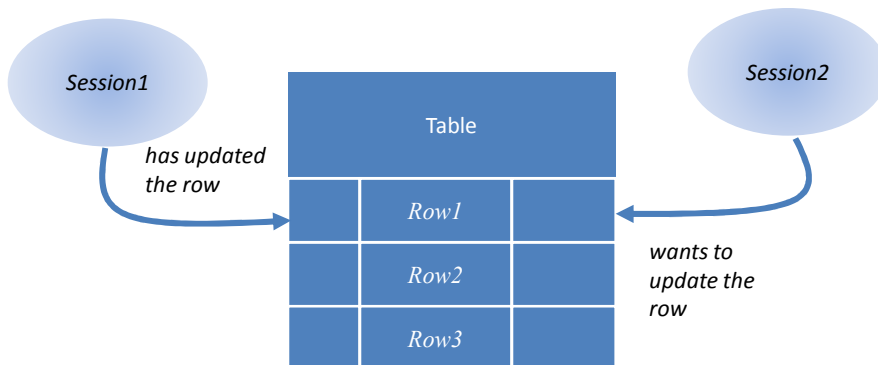
- Oracle DBA for 16 years and counting
- Speak at conferences, write articles, 4 books, provide trainings, security audits
- Brought up the Global Database Group at Starwood Hotels, in White Plains, NY
- Blog: arup.blogspot.com



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## Locking



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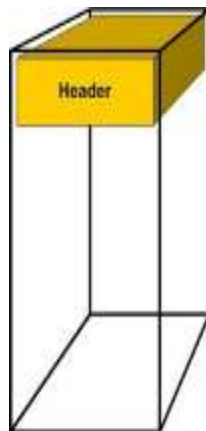
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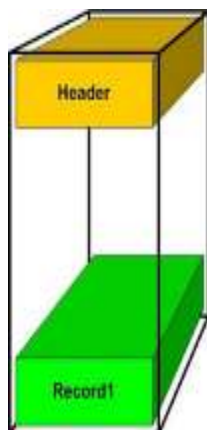
## Lock Location

- There is no central locking facility
- Oracle puts the lock for a row in the block itself
- In slots called ITL Entry

## Empty Block



## Records Getting Inserted

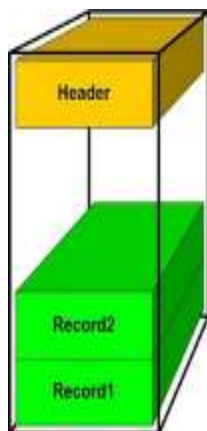


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## 2<sup>nd</sup> Record



Records get inserted from tail end

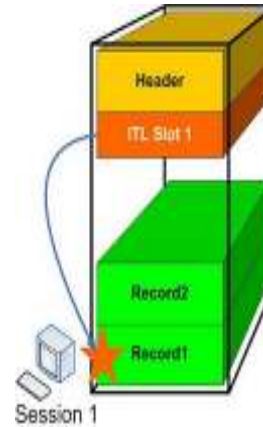
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## Locking

- Session 1 locks row 1
- It puts that information in the header of that block
- The transaction is “interested” in that row, hence “Interested Transaction”



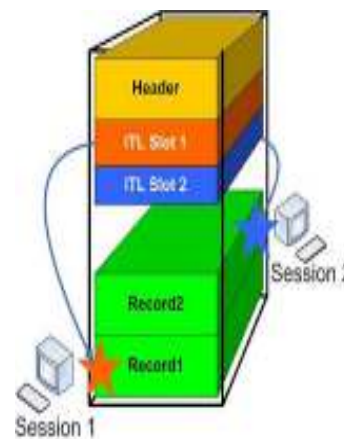
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## Locking #2

- Session 2 locks row 2
- It also puts an interested transaction entry
- Now there is a “list” of interested transactions known as ITL



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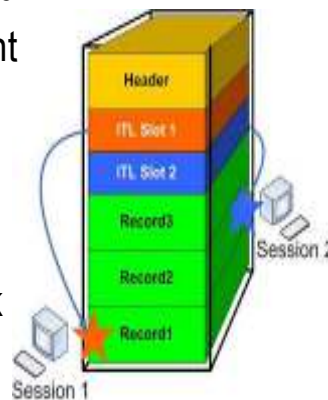
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## ITLs Continued

- Each ITL slot takes 24 bytes
- The total number of ITL slots can grow, as long as there is room in the block
- Can't exceed 50% of the block
- Max ITL is 255

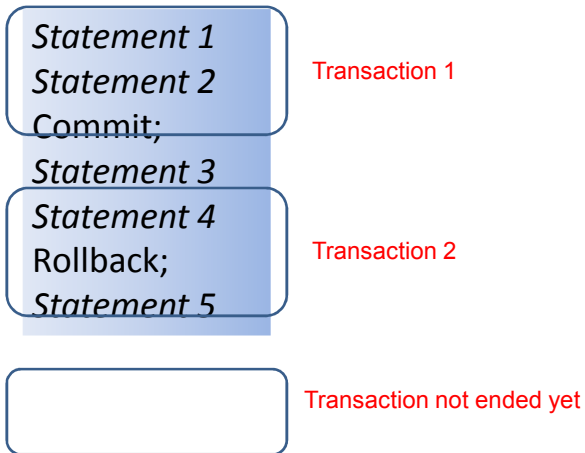
## ITL Shortage

- ITL can't grow when the block is full
- The session will wait with an event
- To avoid it
  - Have plenty of room in the block
    - Increased PCTFREE, etc.
    - MINIMIZE\_RECORDS\_PER\_BLOCK
  - Have a larger INITRANS

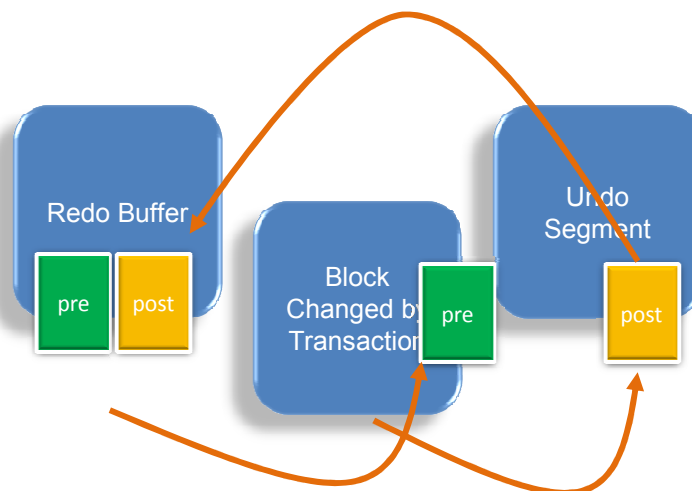


## Transaction

- A transaction is a block which is ended by a commit or a rollback

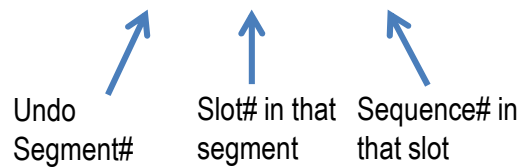


## Transaction ID



## Checking Transactions

- Local Transaction ID
  - `dbms_transaction.local_transaction_id`



loctxnid.sql

## Transaction Table

- A memory structure that holds all the active transactions in the instance
- Exposed through X\$KTCXB
- Shown as V\$TRANSACTION
- Different Across Instances in RAC



## A Different Session

- All the transactions in the instance
  - ADDR: the address of the transaction – a raw value
  - XIDUSN: the undo segment number
  - XIDSLOT: the slot#
  - XIDSQN: the sequence# or record# inside the slot

Vtxn.sql

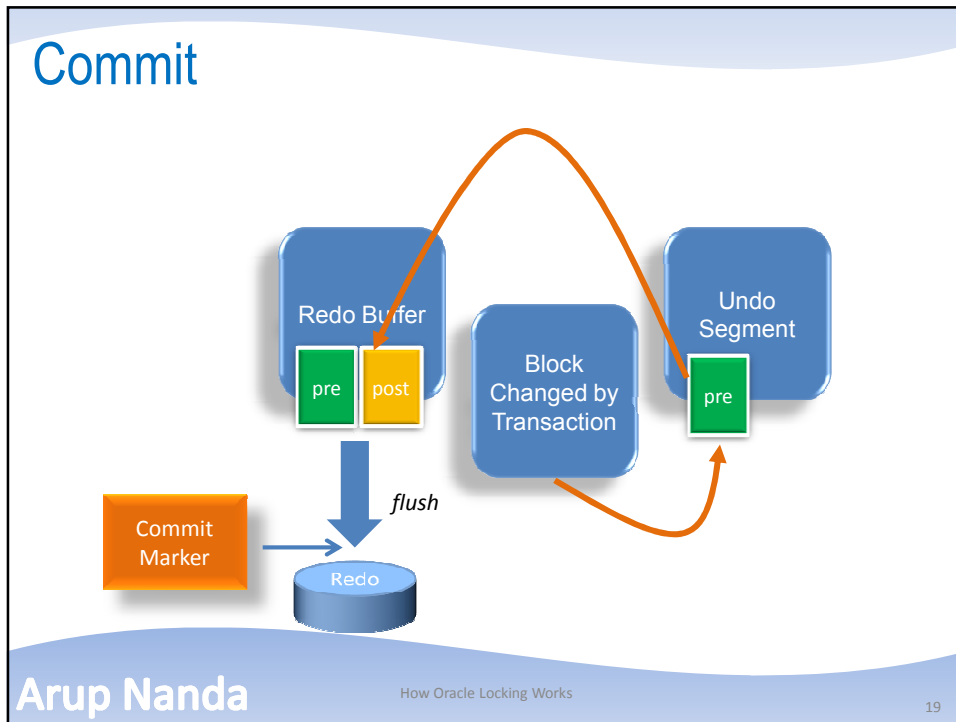
## Txn and Session

- To Know Active Txn of a Session, join with V\$SESSION
- Columns to join:

OR

V\$TRANSACTION	V\$SESSION
ADDR	TADDR
SES_ADDR	SADDR

Sesstxn.sql



## Checking ITL

- Getting a file and block Block.sql
- Getting a block dump
- Creates a tracefile with the dump of the block Dump.sql

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## ITL Record

Transaction ID, corresponding to V\$TRANSACTION

Undo Segment Information

Flag – locked, etc.

Number of rows locked

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## V\$LOCKED\_OBJECT

- Shows you the object locked
- 
- 
- 
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- 

V\$TRANSACTION

0 - None  
1 - Null  
2 - Row Share  
3 - Row Exclusive  
4 - Share  
5 - Sub Share Exclusive  
6 - Exclusive

Lockobj.sql

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Obj.sql

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## Blocking Session

- To find out the session that holds the lock this session is asking for

The SID of the session holding the lock

The Instance of the other session holding the lock

How long it has been waiting

Blocking.sql

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## Locked Row

- Checking for the row information

**To get the object information:**

Dobjid.sql

Rowwait.sql

## Row from RowID

Note:  
DATA\_OBJECT\_ID;  
not OBJECT\_ID

Row\_id.sql

← *This is the row on which the lock is being requested*

## ITL Shortage

- Query
  
- Output

STATISTIC\_NAME

## Historical

- AWR Repository
  
- Stats of Interest
  - ITL\_WAITS\_TOTAL
  - ITL\_WAITS\_DELTA
  - ROW\_LOCK\_WAITS\_TOTAL
  - ROW\_LOCK\_WAITS\_DELTA

## Summary

- There is no central locking in Oracle
- A txn marks the rows locked in the block itself
- This is called Interested Transaction List (ITL)
- If no ITL slot is available, one is created if there is space; otherwise txn waits with ITL waits
- ITL entry shows undo information
- ITL is not updated as a part of commit

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*Thank You!*

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