

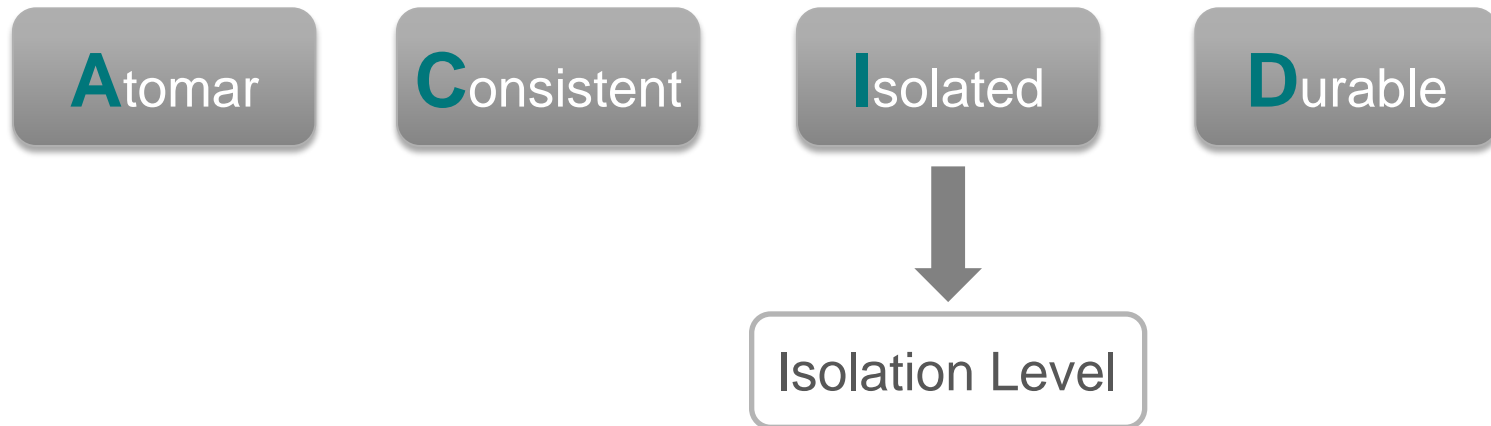


ORA-1555 snapshot too old Eine unerwartete Reise

DOAG Konferenz
19. - 21.11.2013, Nürnberg

Martin Hoermann
info@ordix.de
www.ordix.de

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden



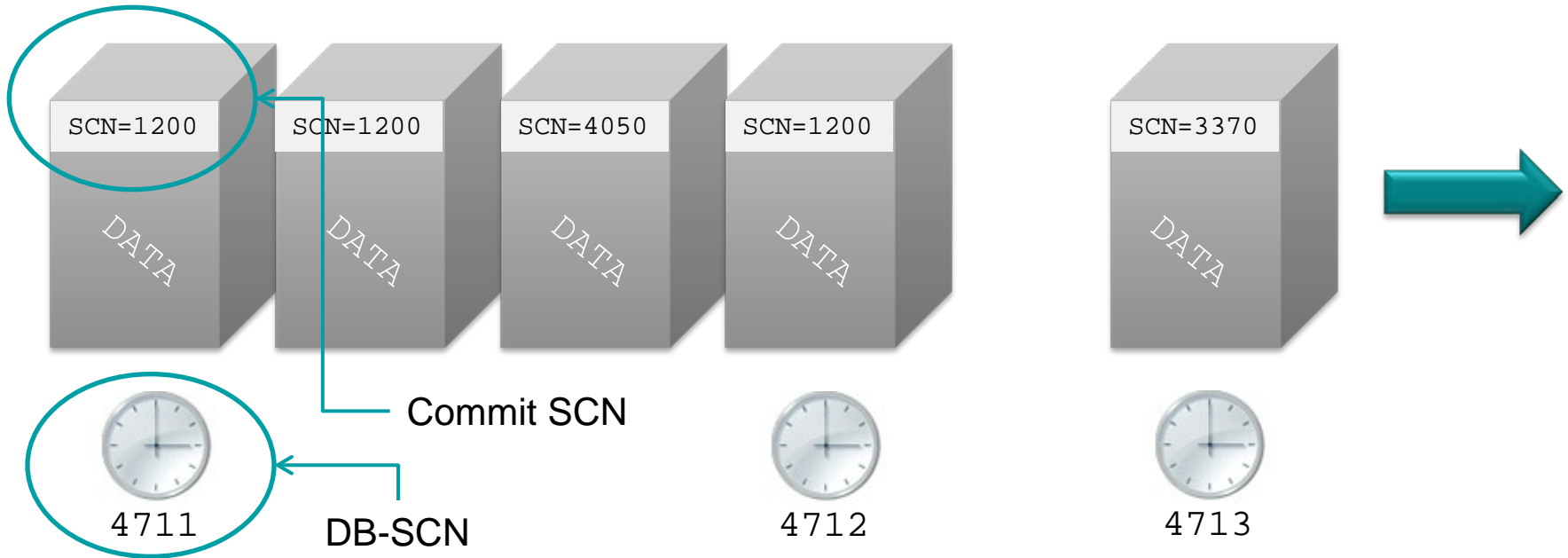
- Read uncommitted / dirty read
- Read committed
- Repeatable read
- Serializable

- Oracle: Consistent Read
 - Leser warten nie auf Schreiber
 - Schreiber warten nie auf Leser
- MS-SQL: Read Committed Snapshot Isolation Level
- Informix: USELASTCOMMITTED-Configuration-Parameter
- DB2: currently committed

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

ORA-1555 (I)

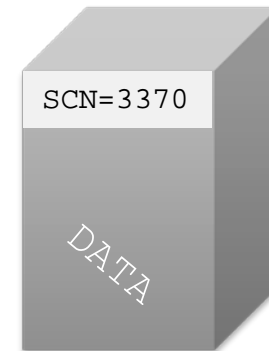
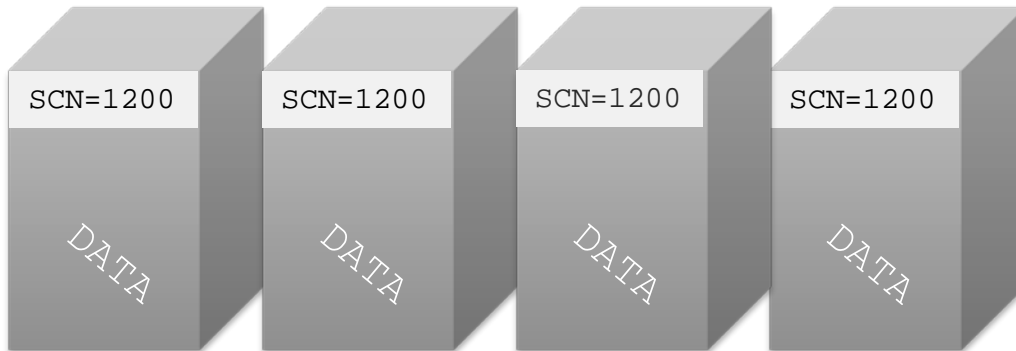
Query Environment (QENV) = 4711 (SCN)



```
SELECT *  
FROM data  
ORDER BY id;
```

ORA-1555 (II)

Query Environment (QENV) = 4711 (SCN)

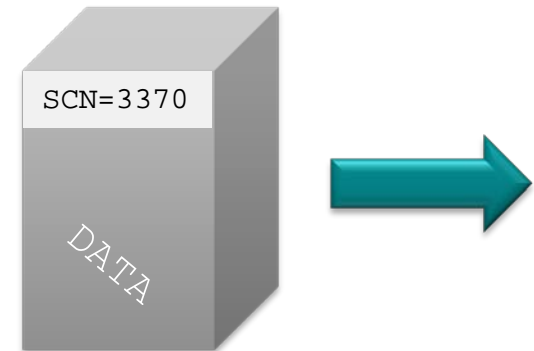
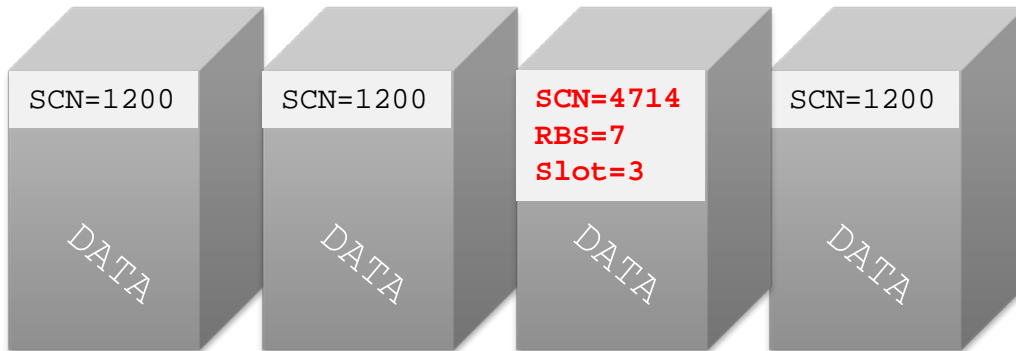


4714

```
UPDATE data
SET     xyz = 'xxxx'
WHERE  id IN( 3333, 4444, 5555 );
commit; -- SCN 4714
```


ORA-1555 (III)

Query Environment (QENV) = 4711 (SCN)

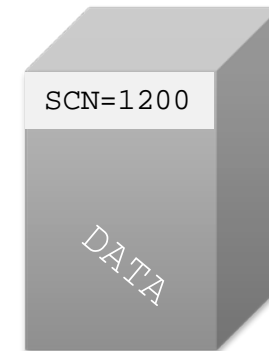


4714



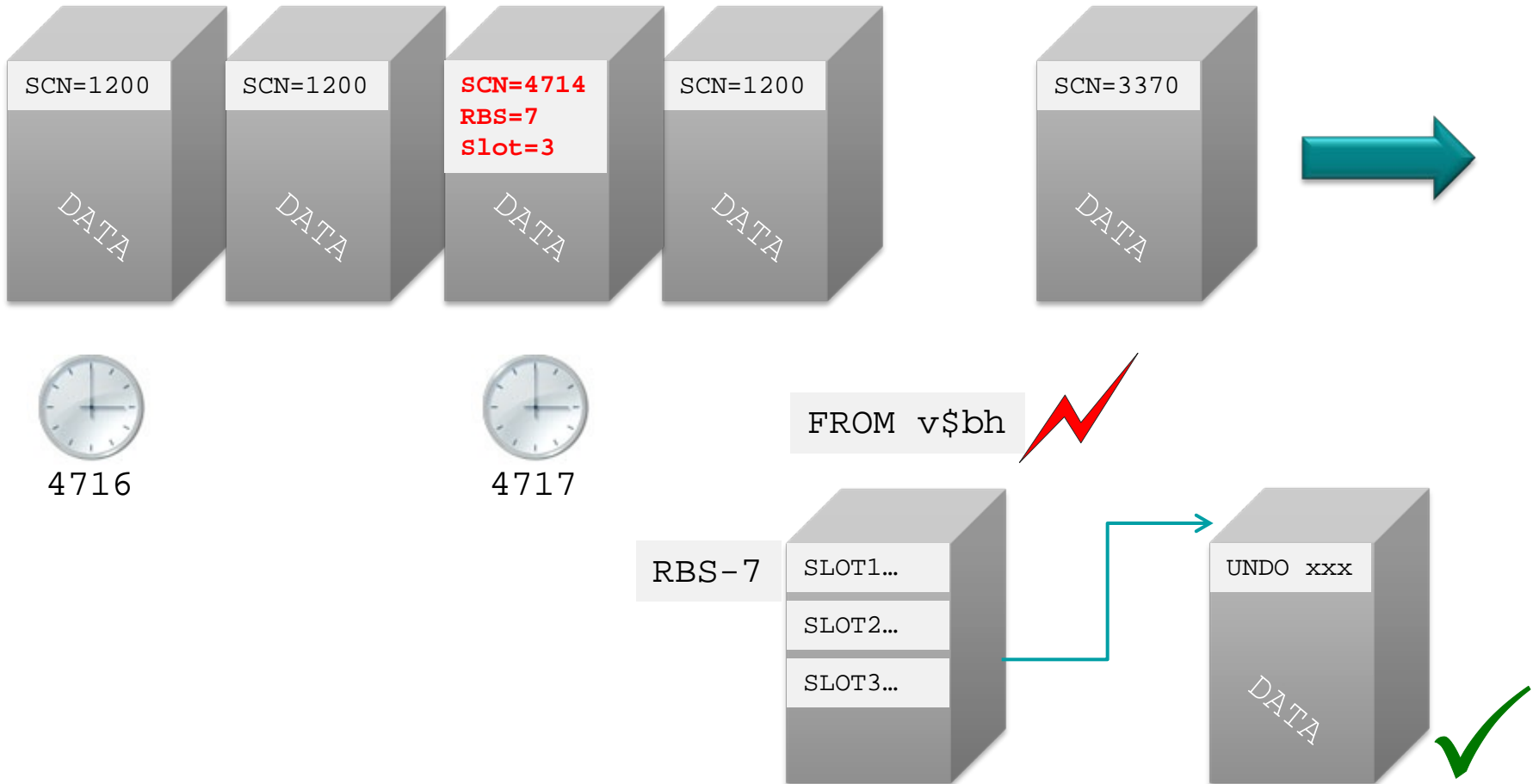
4715

```
SELECT *  
FROM v$bh  
WHERE file# = ...  
AND block# = ...  
AND status = 'cr';
```



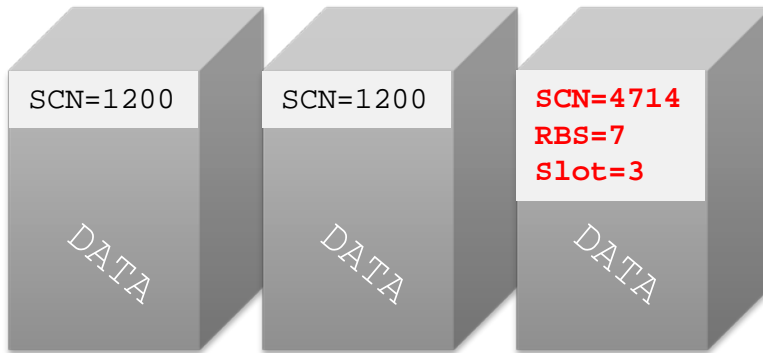
ORA-1555 (IV)

Query Environment (QENV) = 4711 (SCN)



ORA-1555 (V)

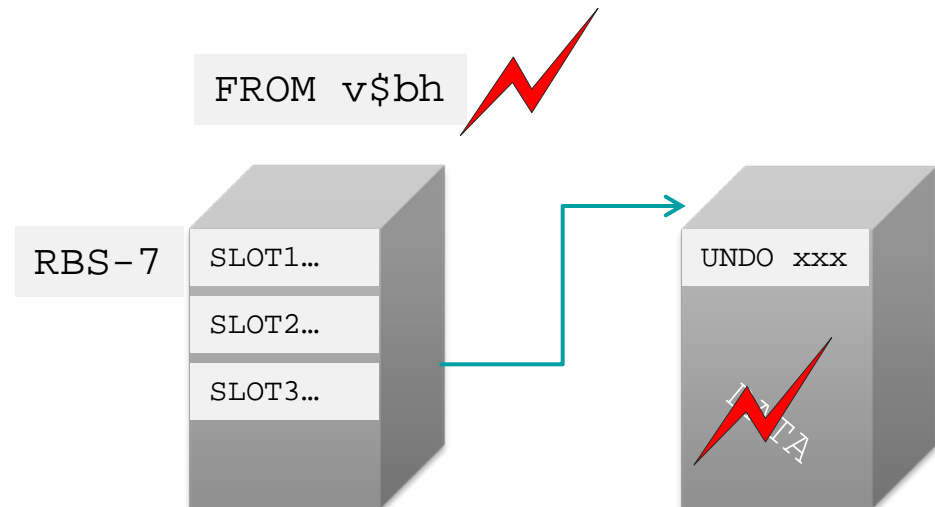
Query Environment (QENV) = 4711 (SCN)



4719



4720



ORA-01555: snapshot too old: rollback segment number 6 with name
"_SYSSMU6_569811948\$" too small

01555. 00000 - "snapshot too old: rollback segment number %s with name \"%s\" too small"

*Cause: rollback records needed by a reader for consistent read are
overwritten by other writers

*Action: If in Automatic Undo Management mode, increase undo_retention
setting. Otherwise, use larger rollback segments

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

- UNDO-Tablespace
 - Größe
 - Autoextensible
- UNDO-Retention
 - Autoextend:
Tablespace wird erweitert um UNDO_RETENTION zu gewährleisten
 - Kein Autoextend:
UNDO_RETENTION wird überschrieben durch TUNED_UNDO_RETENTION
- UNDO-Guarantee

- **Active:**
Transaktion benötigt Informationen für Rollback
- **Unexpired:**
Transaktion beendet, aber UNDO-Retention noch nicht abgelaufen
- **Expired:**
Transaktion beendet und älter als UNDO-Retention

After a transaction is committed, undo data is no longer needed for rollback or transaction recovery purposes. However, for consistent read purposes, long-running queries may require this old undo information for producing older images of data blocks. Furthermore, the success of several Oracle Flashback features can also depend upon the availability of older undo information. For these reasons, it is desirable to retain the old undo information for as long as possible. (Oracle Dokumentation)

- UNDO wird überschrieben wenn expired
- Kein Platz im UNDO-Tablespace und Autoextend aus


```
CREATE UNDO TABLESPACE undotbs2
  DATAFILE 'E:\ORACLE\XE\APP\ORACLE\ORADATA\XE\UNDOTBS2.DBF'
  SIZE 4M AUTOEXTEND OFF
  RETENTION GUARANTEE;
```

Möglicher SQL-Fehler: ORA-30036:

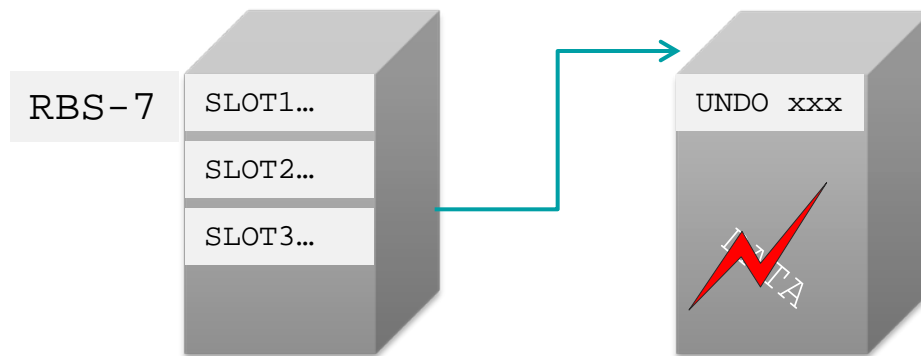
unable to extend segment by 8 in undo tablespace 'UNDOTBS2'

30036. 00000 - "unable to extend segment by %s in undo tablespace '%s'"

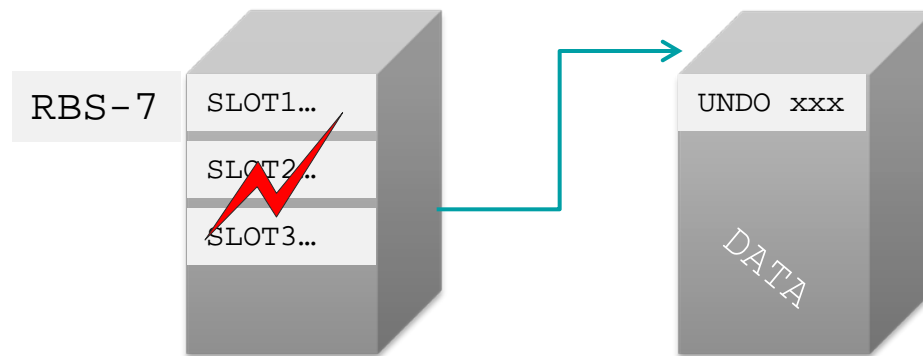
*Cause: The specified undo tablespace has no more space available.

*Action: Add more space to the undo tablespace before retrying the operation.
An alternative is to wait until active transactions to commit.

- i.d.R. durch umfangreiche Datenänderungen
- große Transaktionen



- i.d.R. durch viele Transaktionen
- meist kurze Transaktionen



Wenn UNDO_RETENTION > Max Query Length

UND



UNDO_TABLESPACE groß genug

DANN

gibt es keinen ORA-1555

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

Mon Jul 29 09:17:36 2013

ORA-01555 caused by SQL statement below (SQL ID: 4k2f8hv1yng5g,
Query Duration=2 sec, SCN: 0x0000.0021f144):

```
SELECT * FROM TEST02 ORDER BY ID
```

Analyse

v\$undostat / awr / statspack

End Time	Num Undo Blocks	Number of Transactions	Max Qry Len (s)	Max Tx Concy	Tun Ret (mins)	STO/ OOS	uS/uR/uU/ eS/eR/eU
17-Okt 12:16	16	40	2,252	3	0	0/0	0/0/0/0/0/0
17-Okt 12:06	31,559	2,315,879	1,649	3	0	1/0	238456/8/70 40/820964/1 155432/0
17-Okt 11:56	30,901	2,259,167	944	3	0	0/0	182665/0/50 78/788581/1 206320/0
17-Okt 11:46	30,113	2,205,321	342	2	0	0/0	272796/0/81 45/781113/1 061432/0
17-Okt 11:36	1,510	67,931	945	4	1	0/3	21510/0/672 /21952/3544 /0

- UNXPSTEALCNT: The number of attempts when unexpired blocks were stolen from other undo segments to satisfy space requests.
- UNXPBLKRELCNT: The number of unexpired blocks removed from undo segments to be used by other transactions.
- UNXPBLKREUCNT: The number of unexpired undo blocks reused by transactions.

End Time	Num Undo Blocks	Number of Transactions	Max Qry Len (s)	Max Tx Concy	Tun Ret (mins)	STO/ OOS	uS/uR/uU/ eS/eR/eU
17-Okt 12:16	16	40	2,252	3	0	0/0	0/0/0/0/0/0
17-Okt 12:06	31,559	2,315,879	1,649	3	0	1/0	238456/8/70 40/820964/1 155432/0
17-Okt 11:56	30,901	2,259,167	944	3	0	0/0	182665/0/50 78/788581/1 206320/0
17-Okt 11:46	30,113	2,205,321	342	2	0	0/0	272796/0/81 45/781113/1 061432/0
17-Okt 11:36	1,510	67,931	945	4	1	0/3	21510/0/672 /21952/3544 /0

- **EXPSTEALCNT:** The number of attempts when expired extents were stolen from other undo segments to satisfy a space requests.
- **EXPBLKRELCNT:** The number of expired extents stolen from other undo segments to satisfy a space request.
- **EXPBLKREUCNT:** The number of expired undo blocks reused within the same undo segments.

End Time	Num Undo Blocks	Number of Transactions	Max Qry Len (s)	Max Tx Concy	Tun Ret (mins)	STO/ OOS	uS/uR/uU/ eS/eR/eU
17-Okt 12:16	16	40	2,252	3	0	0/0	0/0/0/0/0/0
17-Okt 12:06	31,559	2,315,879	1,649	3	0	1/0	238456/8/70 40/820964/1 155432/0
17-Okt 11:56	30,901	2,259,167	944	3	0	0/0	182665/0/50 78/788581/1 206320/0
17-Okt 11:46	30,113	2,205,321	342	2	0	0/0	272796/0/81 45/781113/1 061432/0
17-Okt 11:36	1,510	67,931	945	4	1	0/3	21510/0/672 /21952/3544 /0

- SSOLDERRCNT: The number of ORA-1555 errors that occurred during the interval.
- NOSPACERRCNT: The number of Out-of-Space errors

End Time	Num Undo Blocks	Number of Transactions	Max Qry Len (s)	Max Tx Concy	Tun Ret (mins)	STO/ OOS	uS/uR/uU/ eS/eR/eU
17-Okt 12:16	16	40	2,252	3	0	0/0	0/0/0/0/0/0
17-Okt 12:06	31,559	2,315,879	1,649	3	0	1/0	238456/8/70 40/820964/1 155432/0
17-Okt 11:56	30,901	2,259,167	944	3	0	0/0	182665/0/50 78/788581/1 206320/0
17-Okt 11:46	30,113	2,205,321	342	2	0	0/0	272796/0/81 45/781113/1 061432/0
17-Okt 11:36	1,510	67,931	945	4	1	0/3	21510/0/672 /21952/3544 /0

- TUNED_UNDORETENTION: Retention für fixed size UNDO Tablespace

End Time	Num Undo Blocks	Number of Transactions	Max Qry Len (s)	Max Tx Concy	Tun Ret (mins)	STO/ DOS	uS/uR/uU/ eS/eR/eU
17-Okt 12:16	16	40	2,252	3	0	0/0	0/0/0/0/0/0
17-Okt 12:06	31,559	2,315,879	1,649	3	0	1/0	238456/8/70 40/820964/1 155432/0
17-Okt 11:56	30,901	2,259,167	944	3	0	0/0	182665/0/50 78/788581/1 206320/0
17-Okt 11:46	30,113	2,205,321	342	2	0	0/0	272796/0/81 45/781113/1 061432/0
17-Okt 11:36	1,510	67,931	945	4	1	0/3	21510/0/672 /21952/3544 /0

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

```
BEGIN
  FOR rec IN ( SELECT *
                FROM   data
                ORDER BY id )
  LOOP
    UPDATE data SET my_col := rec.id
    commit;
  END LOOP;
END;
/
```

**ORA-01555: snapshot too old:
rollback segment number *string*
with name "*string*" too small**

- Fetch across commit vermeiden
- Weniger Commit
- Sortierung mit weniger mehrfach Blockzugriffen

Doing fetch across commits is not an ANSI supported operation.

According to ANSI standard, a cursor is invalidated when a commit is performed and should therefore be closed and reopened.

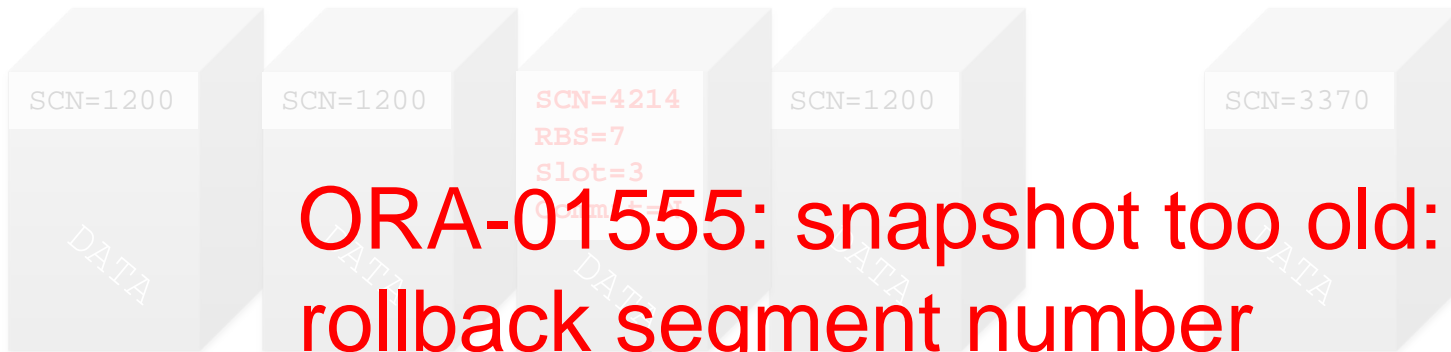
Oracle, however, allows application programmers and users to do fetch across commits. Hence, they should be aware of the potential ORA-01555 error and the fact that they are relying on a cursor behavior that is not ANSI standard.

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

- ORA-1555 obwohl Tabelle seit Tagen NICHT verändert wurde
- Ursache Kombination aus:
 - Delayed Block Cleanout
 - Lang laufender Cursor
 - Viel UNDO-Traffic

<http://jonathanlewis.wordpress.com/2009/06/16/clean-it-up/>
<http://oracle-randolf.blogspot.de/2011/04/delayed-block-cleanout-ora-01555.html>

Query Environment (QENV) = 4711 (SCN)



**ORA-01555: snapshot too old:
rollback segment number
string**

with name "string" too small



- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

SCN_ASCENDING

Hint

ORACLE MY ORACLE SUPPORT

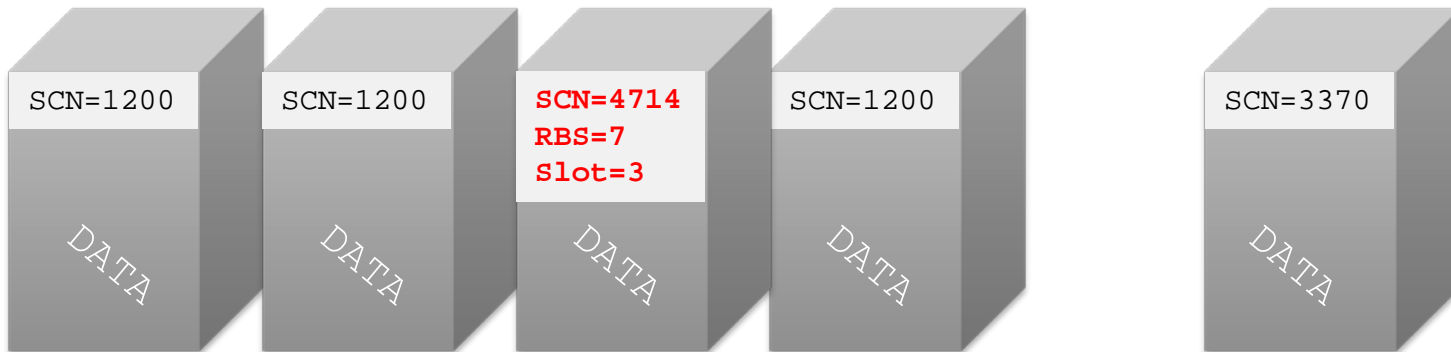
Bug 6688108 Enhancement - Allow ORA-1555 to be ignored during table scan

```
select /*+ scn_ascending */ ...
```

SCN_ASCENDING

ORA-1555

Query Environment (QENV) = 4711 (SCN)



4714



4715

```
SELECT /*+ scn_ascending */ *  
FROM data  
ORDER BY id;
```

- **Randolf Geist - Blog**
- http://oracle-randolf.blogspot.de/search/label/SCN_ASCENDING
- <http://oracle-randolf.blogspot.de/2009/04/read-consistency-ora-01555-snapshot-too.html>



SCN_ASCENDING = Dirty Read



- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

- https://blogs.oracle.com/db/entry/troubleshooting_ora_1555
- <http://www.ixora.com.au/tips/admin/ora-1555.htm>
- <http://oraspot.wordpress.com/2011/04/17/undo-analysis/>
- http://asktom.oracle.com/pls/asktom/f?p=100:11:0:::P11_QUESTION_ID:360536564061
- http://asktom.oracle.com/pls/asktom/f?p=100:11:0:::P11_QUESTION_ID:275215756923

Out-of-row LOB undo is maintained in the LOB segment.

So the UNDO tablespace and undo retention is not associated with most LOB ORA-1555 issues. Instead the LOB column is created using either PCT_VERSION or RETENTION to manage how much space within blocks or time transpires before the LOB undo is overwritten. In environments with high updates, deletes on rows including LOBs, the chances of ORA-1555 on LOB undo is very high.

PCT_VERSION and RETENTION are not auto-tuned. To “tune” those configuration settings, you must change the values for PCT_VERSION or RETENTION. Changes to UNDO_RETENTION does not change LOB retention time frames.

[Note 162345.1](#)

LOBs - Storage, Read-consistency and Rollback

[Note 386341.1](#)

How to determine the actual size of the LOB segments and how to free the deleted/unused space above/below the HWM

[Note 563470.1](#)

Lob retention not changing when undo_retention is changed

[Note 422826.1](#)

How to identify LOB Segment Use PCTVERSION or RETENTION from Data Dictionary

- Transaktionsmanagement
- „Snapshot too old“
- UNDO
- Analyse
- Fetch Across Commits
- Delayed Block Cleanout
- SCN_ASCENDING
- Verschiedenes
- „Snapshot too old“ vermeiden

- Erhöhung UNDO-Retention
- Vergrößerung UNDO-Tablespace
- Betroffene Abfrage beschleunigen
- Zeitliche Trennung Abfrage und Änderungen
- Dunkle Bedrohung: SCN_ASCENDING Hint
- UNDO-Retention reduzieren



Zentrale Paderborn
Westernmuer 12 - 16
33098 Paderborn
Tel.: 05251 1063-0

Seminarzentrum Wiesbaden
Kreuzberger Ring 13
65205 Wiesbaden
Tel.: 0611 77840-00

Zentrales Fax:
0180 1 67349 0
0180 1 ORDIX 0

Weitere Geschäftsstellen
in Köln, Münster und Neu-Ulm

E-Mail: info@ordix.de
Internet: <http://www.ordix.de>

Vielen Dank für Ihre Aufmerksamkeit!