

Managing Undo Data

Objectives

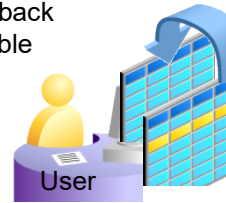
After completing this lesson, you should be able to:

- Explain DML and undo data generation
- Monitor and administer undo data
- Describe the difference between undo data and redo data
- Configure undo retention
- Guarantee undo retention
- Enable temporary undo
- Use the Undo Advisor

Undo Data: Overview

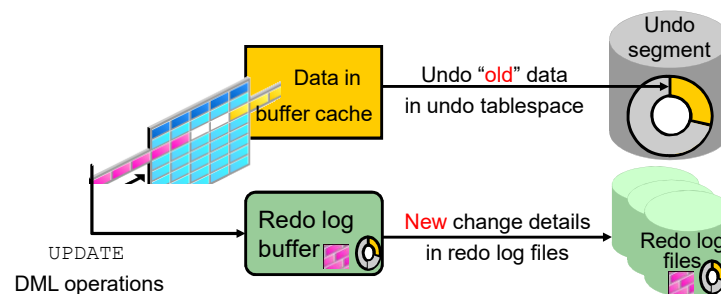
Undo data is:

- A record of the action of a transaction
- Captured for **every** transaction that changes data
- Retained at least until the transaction is ended
- Used to support:
 - Rollback operations
 - Read-consistent queries
 - Oracle Flashback Query, Oracle Flashback Transaction, and Oracle Flashback Table
 - Recovery from failed transactions



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Transactions and Undo Data



- Each transaction is assigned to only one undo segment.
- An undo segment can service more than one transaction at a time.

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Storing Undo Information

- Undo information is stored in undo segments, which are stored in an undo tablespace.
- Undo tablespaces:
 - Are used only for undo segments
 - Have special recovery considerations
 - May be associated with only a single instance
 - Require that only one of them be the current writable undo tablespace for a given instance at any given time

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Comparing Undo Data and Redo Data

| | Undo | Redo |
|-----------|---------------------------------------|----------------------------------|
| Record of | How to undo a change | How to reproduce a change |
| Used for | Rollback, read consistency, flashback | Rolling forward database changes |
| Stored in | Undo segments | Redo log files |



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Managing Undo

Automatic undo management:

- Fully automated management of undo data and space in a dedicated undo tablespace
- For all sessions
- Self-tuning in `AUTOEXTEND` tablespaces to satisfy long-running queries
- Self-tuning in fixed-size tablespaces for best retention

DBA tasks in support of Flashback operations:

- Configuring undo retention
- Changing undo tablespace to a fixed size
- Avoiding space and “snapshot too old” errors

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Configuring Undo Retention

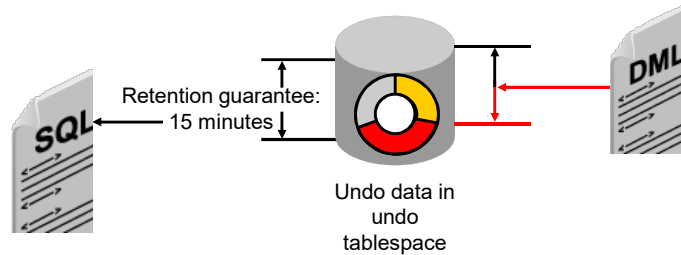
- `UNDO_RETENTION` specifies (in seconds) how long already committed undo information is to be retained.
- Set this parameter when:
 - The undo tablespace has the `AUTOEXTEND` option enabled
 - You want to set undo retention for LOBs
 - You want to guarantee retention



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Guaranteeing Undo Retention

```
SQL> ALTER TABLESPACE undotbs1 RETENTION GUARANTEE;
```



SELECT statements running 15 minutes or less are always satisfied.

A transaction will **fail** if it generates more undo than there is space.

Note: This example is based on an `UNDO_RETENTION` setting of 900 seconds (15 minutes).

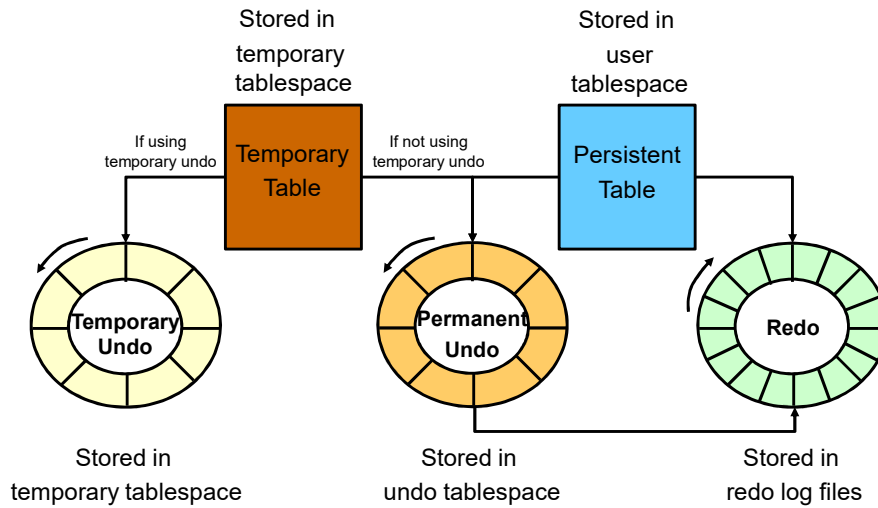
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Changing an Undo Tablespace to a Fixed Size

- Rationale:
 - Supporting Flashback operations
 - Limiting tablespace growth
- Steps:
 1. Run regular workload.
 2. Self-tuning mechanism establishes minimum required size.
 3. (Optional) Use the Enterprise Manager Cloud Control Undo Advisor, which calculates required size for future growth.
 4. (Optional) Change undo tablespace to a fixed size.

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Temporary Undo: Overview



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Enabling Temporary Undo

- Enable temporary undo for a session:

```
SQL> ALTER session SET temp_undo_enabled = true;
```

- Enable temporary undo for the database instance:

```
SQL> ALTER system SET temp_undo_enabled = true;
```

- Temporary undo mode is selected when a session first uses a temporary object.

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Monitoring Temporary Undo

```
SELECT to_char(BEGIN_TIME, 'dd/mm/yy hh24:mi:ss'),
       TXNCOUNT, MAXCONCURRENCY, UNDOBLKCNT, USCOUNT, NOSPACEERRCNT
FROM   V$TEMPUNDOSTAT;
```

| TO_CHAR(BEGIN_TIM | TXNCOUNT | MAXCONCURRENCY | UNDOBLKCNT | USCOUNT | NOSPACEERRCNT |
|-------------------|----------|----------------|------------|---------|---------------|
| ... | | | | | |
| 19/08/12 22:19:44 | 0 | | 0 | 0 | 0 |
| 19/08/12 22:09:44 | 0 | | 0 | 0 | 0 |
| ... | | | | | |
| 19/08/12 13:09:44 | 0 | | 0 | 0 | 0 |
| 19/08/12 12:59:44 | 3 | | 1 | 24 | 1 |

576 rows selected.

SQL>

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Viewing Undo Information

ORACLE Enterprise Manager Database Express 12c

ORCL (12.1.0.1.0) Configuration Storage Security Performance

Undo Management Details Change Analysis Parameters Switch Undo Tablespace Page Refreshed

Configuration

Undo Summary

Undo Setting

- Undo Management: auto
- Low Undo Retention Threshold: 900s

Tablespace

- Name: UNDOTBS1
- Retention Guaranteed: No
- Size: 145MB (88.1% free)
- Auto Extensible: Yes (maximum size unlimited)

Errors and Warnings

- Snapshot Too Old Errors: 0
- Out of Space Errors: 0
- Unexpired Blocks Stolen: 0

Advisor Findings

- Health: No problems
- Setting: No problems

Undo Statistics Summary

Analysis Period (Last Day)

- Adjusted Start Time: Thu Nov 1, 2012 9:25:30 AM
- Adjusted End Time: Fri Nov 2, 2012 9:21:44 AM
- Duration: 23 hours, 56 minutes, 14 seconds
- Target Undo Retention: Required Undo Retention (1 hour, 7 minutes, 49 seconds)

Undo Retention Analysis

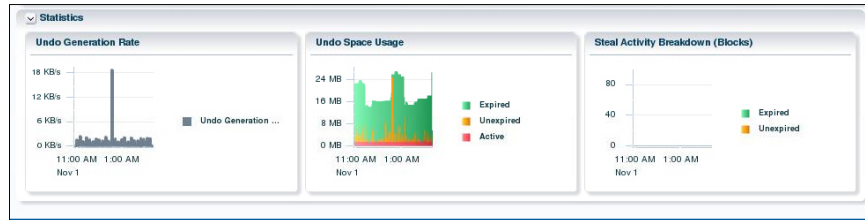
- Required Undo Retention: 1 hour, 7 minutes, 49 seconds
- Best Undo Retention: 514 days, 9 hours, 30 minutes, 19 seconds

Undo Statistics

- Undo Generation Rate: 625 B/s
- Maximum Undo Used: 27MB
- Longest SQL: 89w8y2pgn25yd
- Longest SQL Execution Time: 1 hour, 7 minutes, 49 seconds
- Transaction Rate: 0 transaction(s) per second
- Maximum Concurrency: 5

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Viewing Undo Activity



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Using the Undo Advisor

ORACLE Enterprise Manager Cloud Control 12c

Enterprise - Targets - Favorites - History

Search Target Name

Logged in as: SYSTEM | edR011p1.us.oracle.com

Oracle Database - Performance - Availability - Schema - Administration

Automatic Undo Management

In the General tab, you can view the current undo settings for your instance and use the Undo Advisor to analyze the undo tablespace requirements. This analysis can be performed based on the specified analysis period or the desired undo retention. The system activity for the specified time period can be viewed in the System Activity tab.

General | System Activity

Undo Retention Settings

Undo Retention (minutes) **15**

Retention Guarantee **No**

Undo Tablespace for this Instance

Tablespace **UNDOTBS1** [Change Tablespace](#)

Size (MB) **143**

Auto-Extensible **Yes**

Undo Advisor: Undo Retention and Undo Tablespace Sizing Advice

Undo retention is the length of time that undo data is retained in the undo tablespaces. Undo data must be retained for the length of the longest running query, the longest running transaction, and the longest flashback duration (except for Flashback Database). The undo tablespace should be sized large enough to hold the undo generated by the database during the undo retention period. Note that the undo retention parameter is also used as the retention value for LOB columns.

Analysis Period

Analysis Time Period: **Last Seven Days**

Desired Undo Retention: ☒ Automatically chosen based on longest query in analysis period

☐ Specified manually to allow for longer duration queries or flashback

Duration: minutes

[Run Analysis](#)

Analysis Results

Selected Analysis Time Period: **Oct 26, 2012 11:00:00 AM UTC To Nov 2, 2012 11:00:00 AM UTC**

Minimum Required Undo Tablespace Size (MB): **53**

Recommended Undo Tablespace Size (MB): **53**

☒ **TIP** Oracle advises that you configure the undo tablespace to be three times the Recommended Undo Tablespace Size to allow for workload fluctuations.

Potential Problems: **No Problem Found**

Recommendations: **No Recommendation**

[Show Graph](#)

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Summary

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