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Managing Undo Data

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Objectives

After completing this lesson, you should be able to:

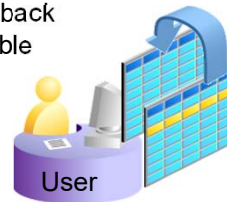
- Explain DML and undo data generation
- Monitor and administer undo data
- Describe the difference between undo data and redo data
- Configure undo retention
- Guarantee undo retention
- Use the Undo Advisor

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Undo Data: Overview

Undo data is:

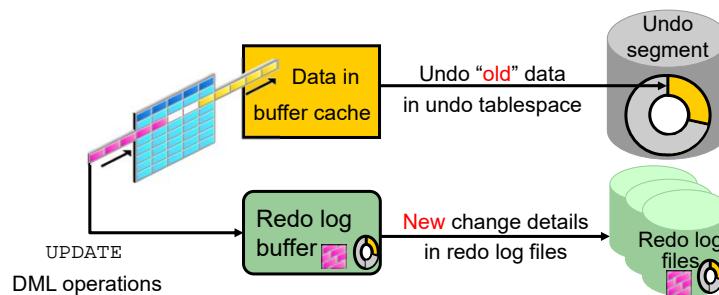
- A record of the action of a transaction
- Captured for *every* transaction that changes data
- Retained at least until the transaction is ended
- Used to support:
 - Rollback operations
 - Read-consistent queries
 - Oracle Flashback Query, Oracle Flashback Transaction, and Oracle Flashback Table
 -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

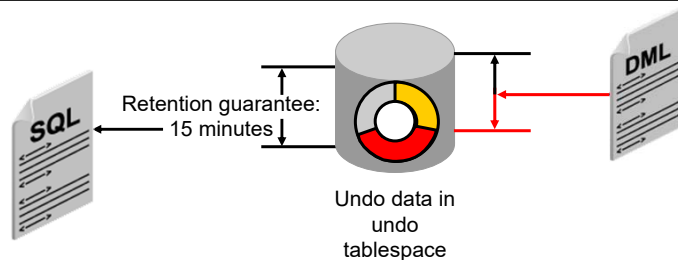


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Guaranteeing Undo Retention

```
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.

Viewing Undo Information

The screenshot displays the Oracle Enterprise Manager Database Express 12c interface. The top navigation bar includes 'ORACLE Enterprise Manager Database Express 12c' and a 'Help' dropdown. Below the navigation bar, the 'Undo Management Details' page is shown, with tabs for 'Configuration', 'Change Analysis Parameters', and 'Switch Undo Tablespace'. The 'Configuration' tab is active, displaying two main sections: 'Undo Summary' and 'Undo Statistics Summary'.

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

Using the Undo Advisor

The screenshot displays the Oracle Enterprise Manager Cloud Control 12c interface. The top navigation bar includes 'Enterprise', 'Targets', 'Favorites', and 'History'. The main content area is titled 'Automatic Undo Management' and contains the following sections:

- Undo Retention Settings:** Shows 'Undo Retention (minutes)' set to 15 and 'Retention Guarantee' set to No.
- Undo Tablespace for this Instance:** Shows 'Tablespace' as UNDOTBS1 and 'Size (MB)' as 143. There is a 'Change Tablespace' button.
- Undo Advisor: Undo Retention and Undo Tablespace Sizing Advice:** Provides an explanation of undo retention and a link to 'Run Analysis'.
- Analysis Period:** Includes a dropdown for 'Analysis Time Period' (set to 'Last Seven Days') and radio buttons for 'Desired Undo Retention' (set to 'Automatically chosen based on longest query in analysis period').
- Analysis Results:** Displays the 'Selected Analysis Time Period' as 'Oct 26, 2012 11:00:00 AM UTC To Nov 2, 2012 11:00:00 AM UTC'. It shows 'Minimum Required Undo Tablespace Size (MB)' as 53 and 'Recommended Undo Tablespace Size (MB)' as 53. A tip states: 'TIP Oracle advises that you configure the undo tablespace to be three times the Recommended Undo Tablespace Size to allow for workload fluctuations.' Below this, it indicates 'Potential Problems: No Problem Found' and 'Recommendations: No Recommendation'.

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Summary

In this lesson, you should have learned how 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
- Use the Undo Advisor

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