

# 17

## Performing Flashback

# Objectives

**After completing this lesson, you should be able to:**

- **Describe Flashback Database**
- **Restore the table content to a specific point in the past with Flashback Table**
- **Recover from a dropped table**
- **View the contents of the database as of any single point in time with Flashback Query**
- **See versions of a row over time with Flashback Versions Query**
- **View transaction history or a row with Flashback Transaction Query**

# Flashback Technology: Benefits

>	Overview
	Database
	Table
	Drop
	Query
	Versions
	Transaction

- The Flashback technology is a revolutionary advance in recovery.
- Traditional recovery techniques are slow.
  - The entire database or a file (not just the incorrect data) has to be restored.
  - Every change in the database log must be examined.
- Flashback is *fast*.
  - Changes are indexed by row and by transaction.
  - Only the changed data is restored.
- Flashback commands are *easy*.
  - No complex multiple-step procedures are involved.

# When to Use the Flashback Technology

Object Level	Scenario Examples	Flashback Technology	Uses	Affects Data
Database	Truncate table; Undesired multitable changes made	Database	Flashback logs	True
Table	Drop table	Drop	Recycle bin	True
	Update with the wrong WHERE clause	Table	Undo data	True
	Compare current data with data from the past	Query	Undo data	False
	Compare versions of a row	Version	Undo data	False
Tx	Investigate several historical states of data	Transaction	Undo data	False

# Flashing Back Any Error

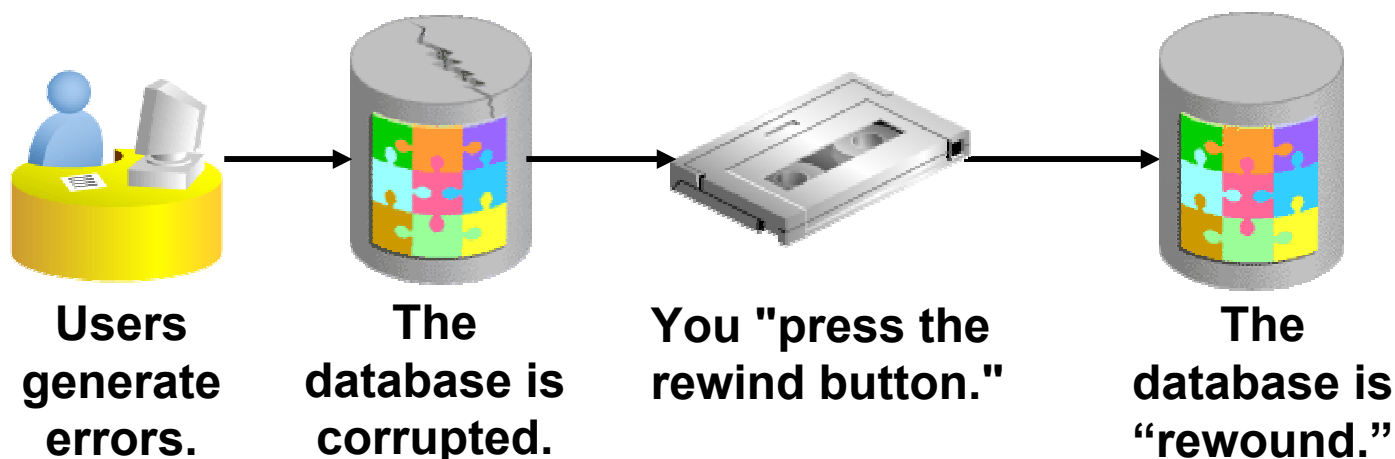
- **Flashback Database** brings the database to an earlier point in time by undoing all changes made since that time.
- **Flashback Table** recovers a table to a point in time in the past without having to restore from a backup.
- **Flashback Drop** restores accidentally dropped tables.

# Flashback Database: Overview

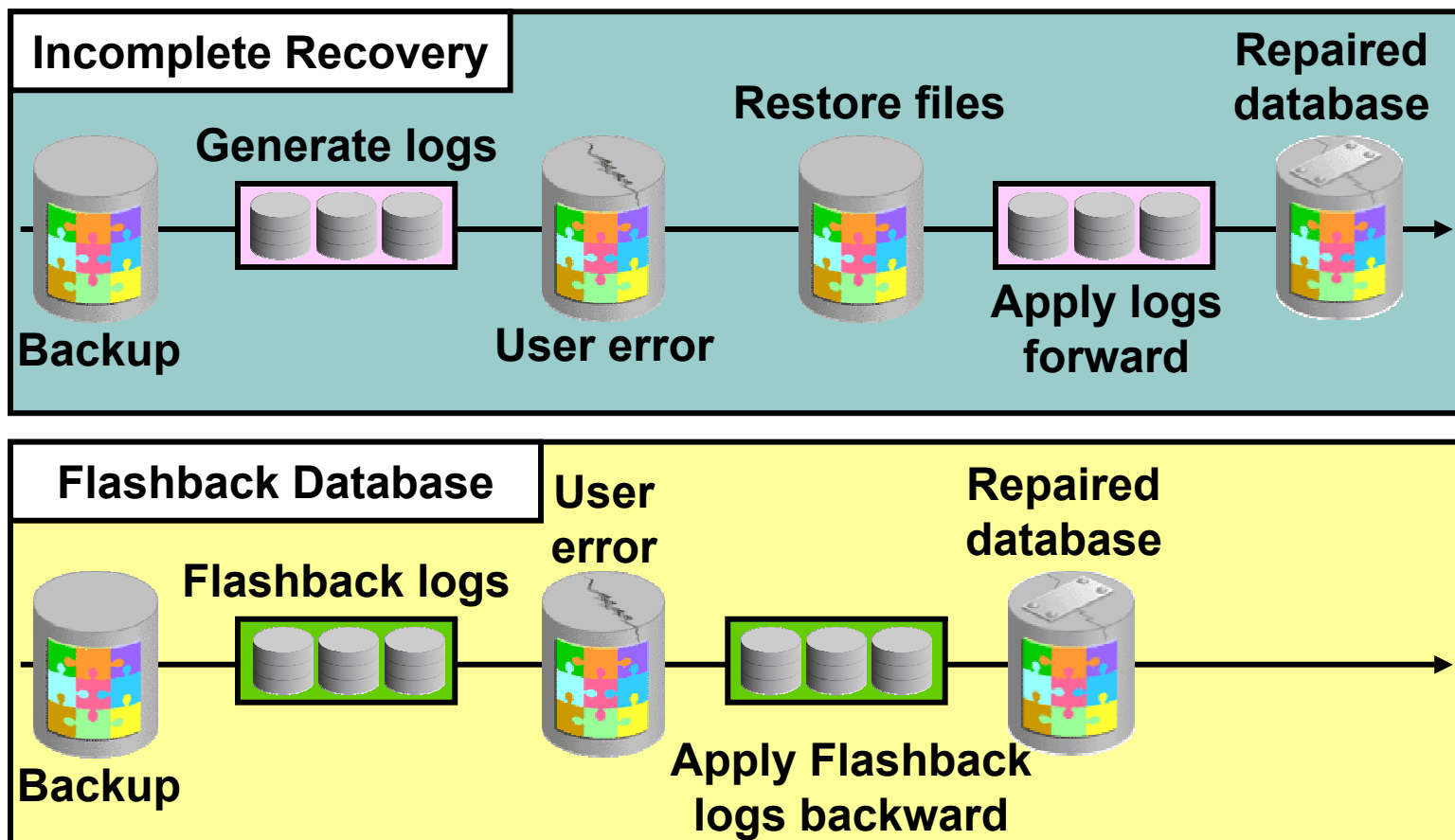
Overview
> Database
Table
Drop
Query
Versions
Transaction

## The Flashback Database operation:

- Works like a rewind button for the database
- Can be used in cases of logical data corruptions made by users



# Flashback Database: Reducing Restore Time



# Flashback Database: Considerations

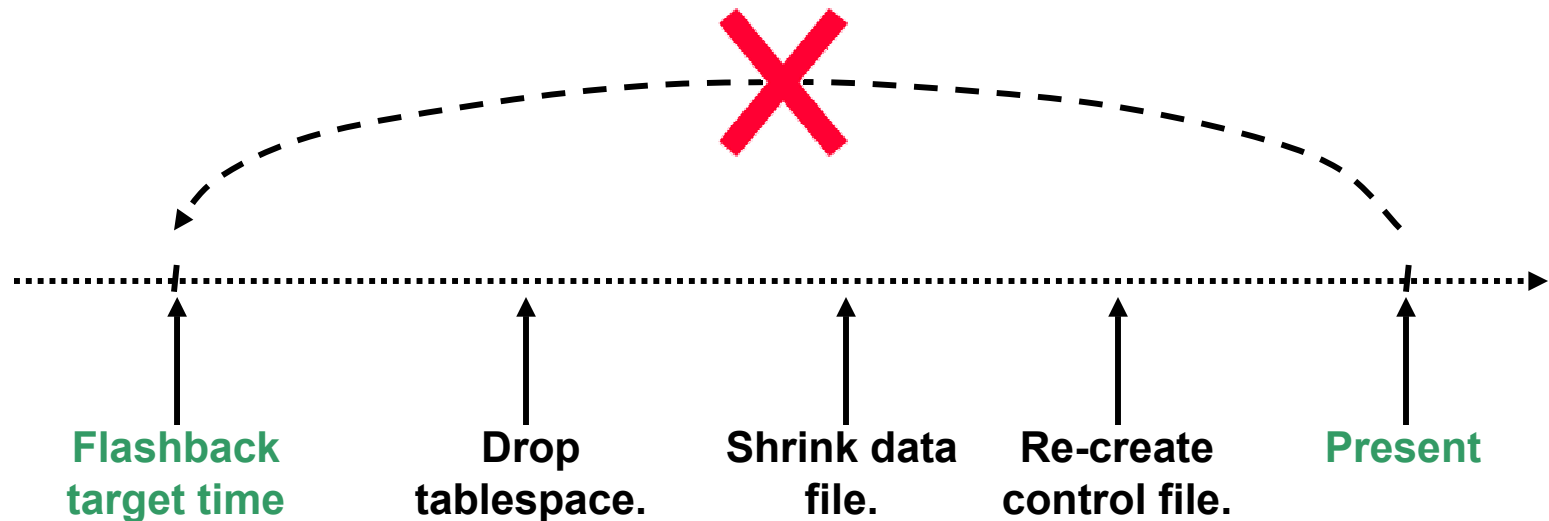
- **When the Flashback Database operation completes, the database must be opened by using one of these methods:**
  - In read-only mode to verify that the correct target time or SCN has been used
  - With the `RESETLOGS` parameter to allow for updates
- **The opposite of flash back is recover.**



# Flashback Database: Limitations

**You cannot use Flashback Database in the following situations:**

- **The control file has been restored or re-created.**
- **A tablespace has been dropped.**
- **A data file has been shrunk.**



# Enabling Flashback Database

☒ Enable Flashback Database - flashback logging can be used for fast database point-in-time recovery\*

The flash recovery area must be set to enable flashback logging. When using flashback logs, you may recover your entire database to a prior point-in-time without restoring files. Flashback is the preferred point-in-time recovery method in the recovery wizard when appropriate.

Specify how far back you wish to flash the database in the future

Flashback Retention Time

Current size of the flashback logs(GB) **n/a**

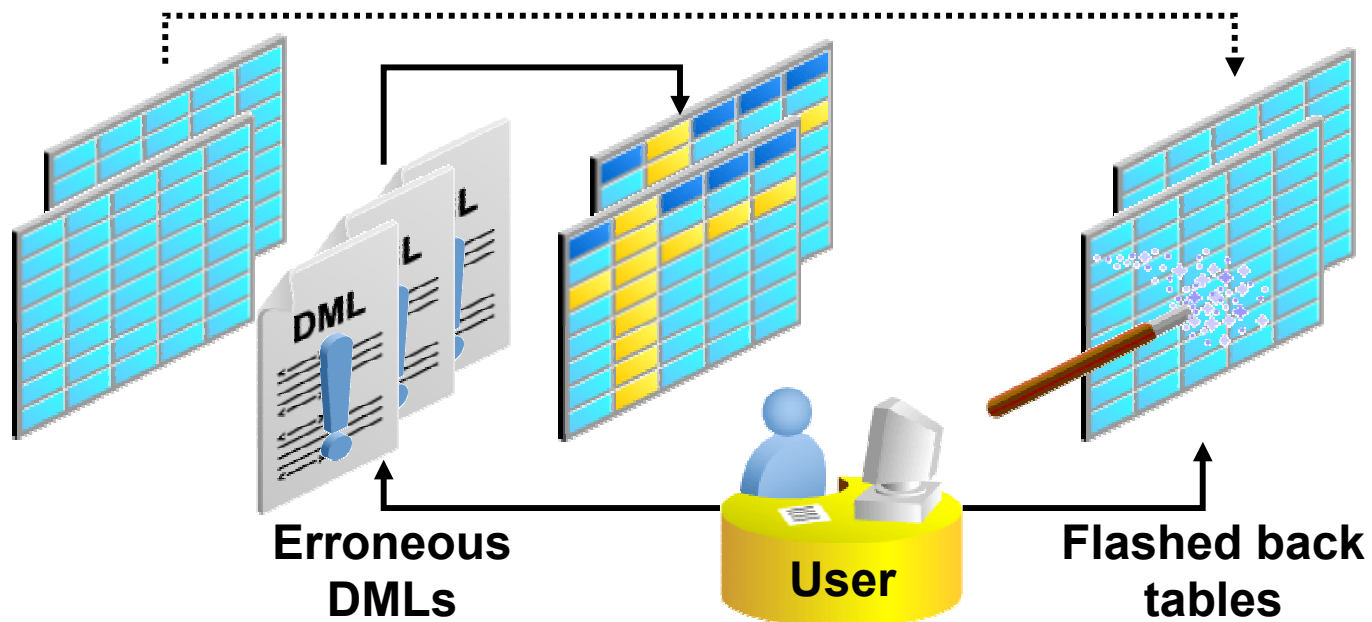
Lowest SCN in the flashback data **n/a**

Flashback Time **n/a**

# Flashback Table: Overview

Overview
Database
> Table
Drop
Query
Versions
Transaction

- Flashback Table recovers tables to a specific point in time.
- Flashback Table is an in-place operation.
- The database stays online.



# Flashback Table

- **Using Flashback Table, you can recover a table or tables to a specific point in time without restoring a backup.**
- **Data is retrieved from the undo tablespace to perform a Flashback Table operation.**
- **The FLASHBACK object privilege and the FLASHBACK ANY TABLE system privilege can be granted to allow a non-owner of a table to flashback that table.**
- **Row movement must be enabled on the table that you are performing the flashback operation on.**

# Enabling Row Movement on a Table

**Edit Table: HR.EMPLOYEES**

Actions

[General](#) [Constraints](#) [Segments](#) [Storage](#) **Options** [Statistics](#) [Indexes](#)

**Enable Row Movement**

☐ Parallel - Use multiple threads when creating this object or when executing DML against this object.  
Parallel Degree ☐ Default ☐ Value

☐ Cache - Place frequently accessed data to the top of the buffer cache.

[General](#) [Constraints](#) [Segments](#) [Storage](#) **Options** [Statistics](#) [Indexes](#)

```
ALTER TABLE employees ENABLE ROW MOVEMENT;
```

# Performing Flashback Table


**Perform Object Level Recovery: Point-in-time**

Cancel Step 1 of 7 Next


Object Type **Tables**  
Operation Type **Flashback Existing Tables**

Specify the point in time to which to recover.

☐ Evaluate row changes and transactions to decide on a point in time

\* Table    
Example: SCOTT.EMP

☒ Flashback to a timestamp

Date   Time   ☒ AM ☐ PM  
Example: Mar 19, 2003

☐ Flashback to a known SCN

SCN

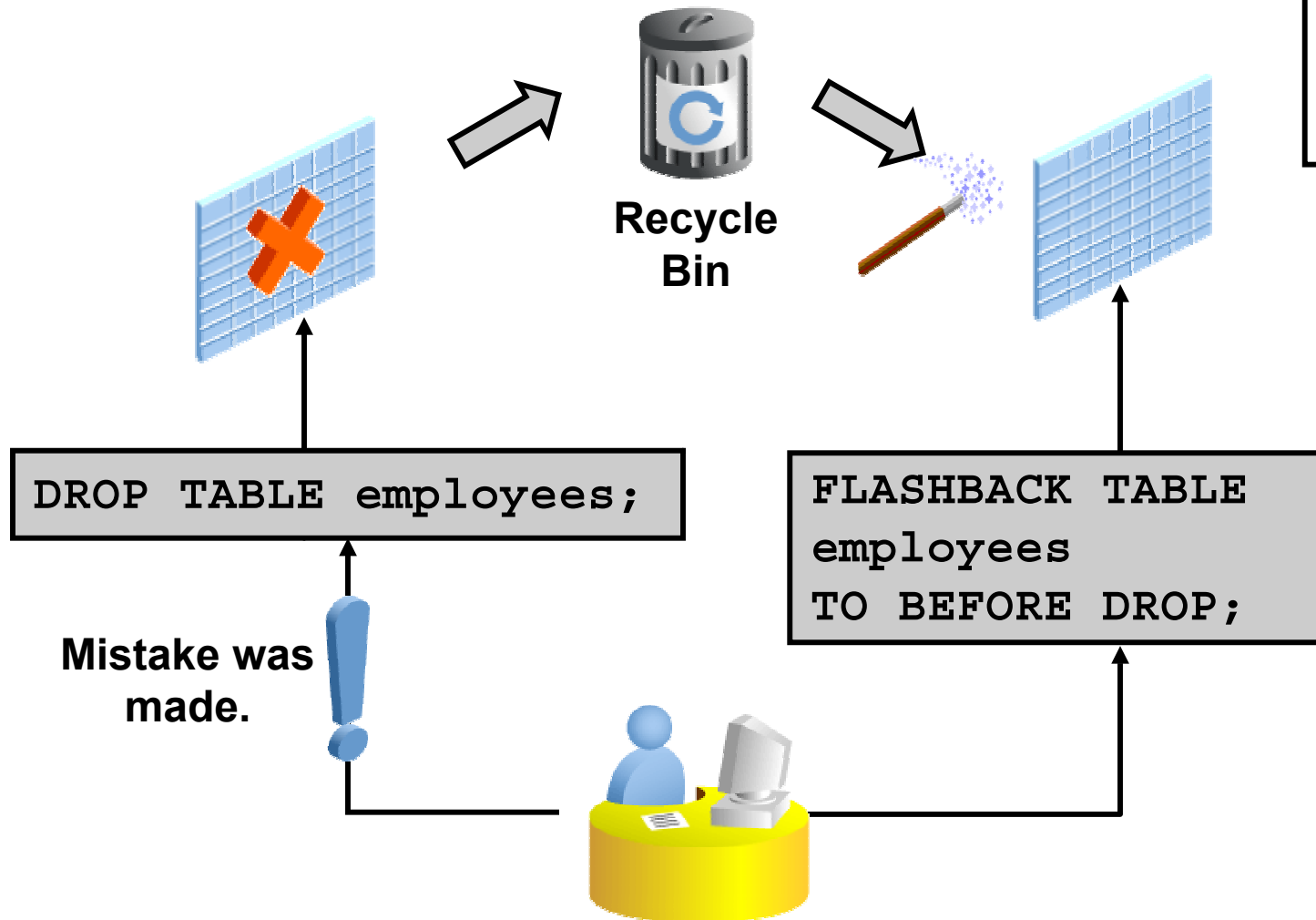
```
FLASHBACK TABLE hr.employees TO TIMESTAMP  
TO_TIMESTAMP('2005-05-05 05:32:00',  
'YYYY-MM-DD HH24:MI:SS');
```

# Flashback Table: Considerations

- The **FLASHBACK TABLE** command executes as a single transaction, acquiring exclusive DML locks.
- Statistics are not flashed back.
- Current indexes and dependent objects are maintained.
- Flashback Table operations:
  - Cannot be performed on system tables
  - Cannot span DDL operations
  - Generate undo and redo data

# Flashback Drop: Overview

Overview  
Database  
Table  
> Drop  
Query  
Versions  
Transaction





# Flashing Back Dropped Tables Through Enterprise Manager

Results

Select All | Select None | Expand All | Collapse All

Select	Object Name	Schema	Object Type	Tablespace	Drop Time	Create Time	Size	Operation
<input type="checkbox"/>	▼ Recycle Bin							View Content
<input type="checkbox"/>	▼ EMP	HR	TABLE	USERS	2005-05-04:10:35:37	2005-05-04:10:35:22	8	View Content
<input type="checkbox"/>	▶ EMP_IX	HR	INDEX	USERS	2005-05-04:10:35:37	2005-05-04:10:35:31	8	View Content

**Dependent bitmap index will also be flashed back.**

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL
198	Donald	OConnell	DOCONN
199	Douglas	Grant	DGRANT
200	Jennifer	Whalen	JWHALE

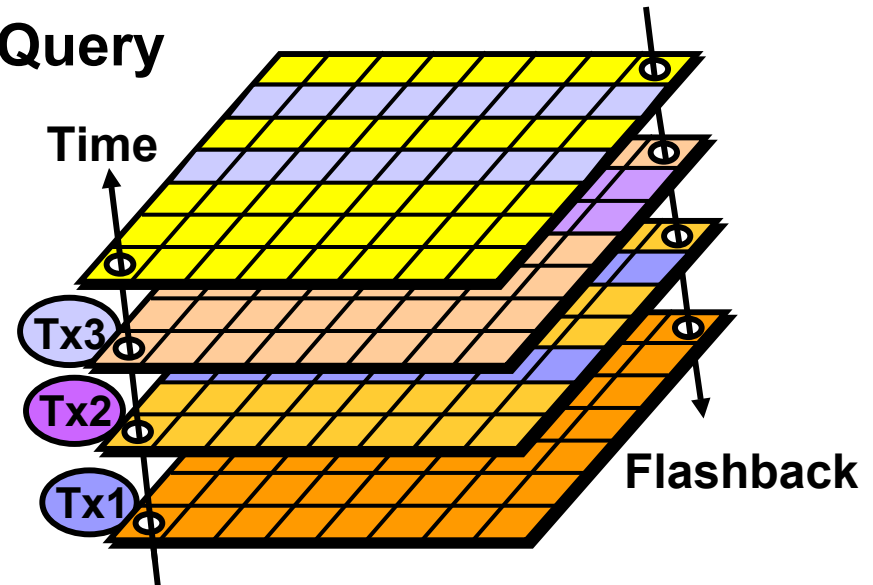
# Flashback Drop: Considerations

- **Flashback Drop does not work for tables that:**
  - Reside in the `SYSTEM` tablespace
  - Use fine-grained auditing or Virtual Private Database
  - Reside in a dictionary-managed tablespace
  - Have been purged, either by manual purging or automatic purging under space pressure
- **The following dependencies are not protected:**
  - Bitmap-join indexes
  - Materialized view logs
  - Referential integrity constraints
  - Indexes dropped before tables

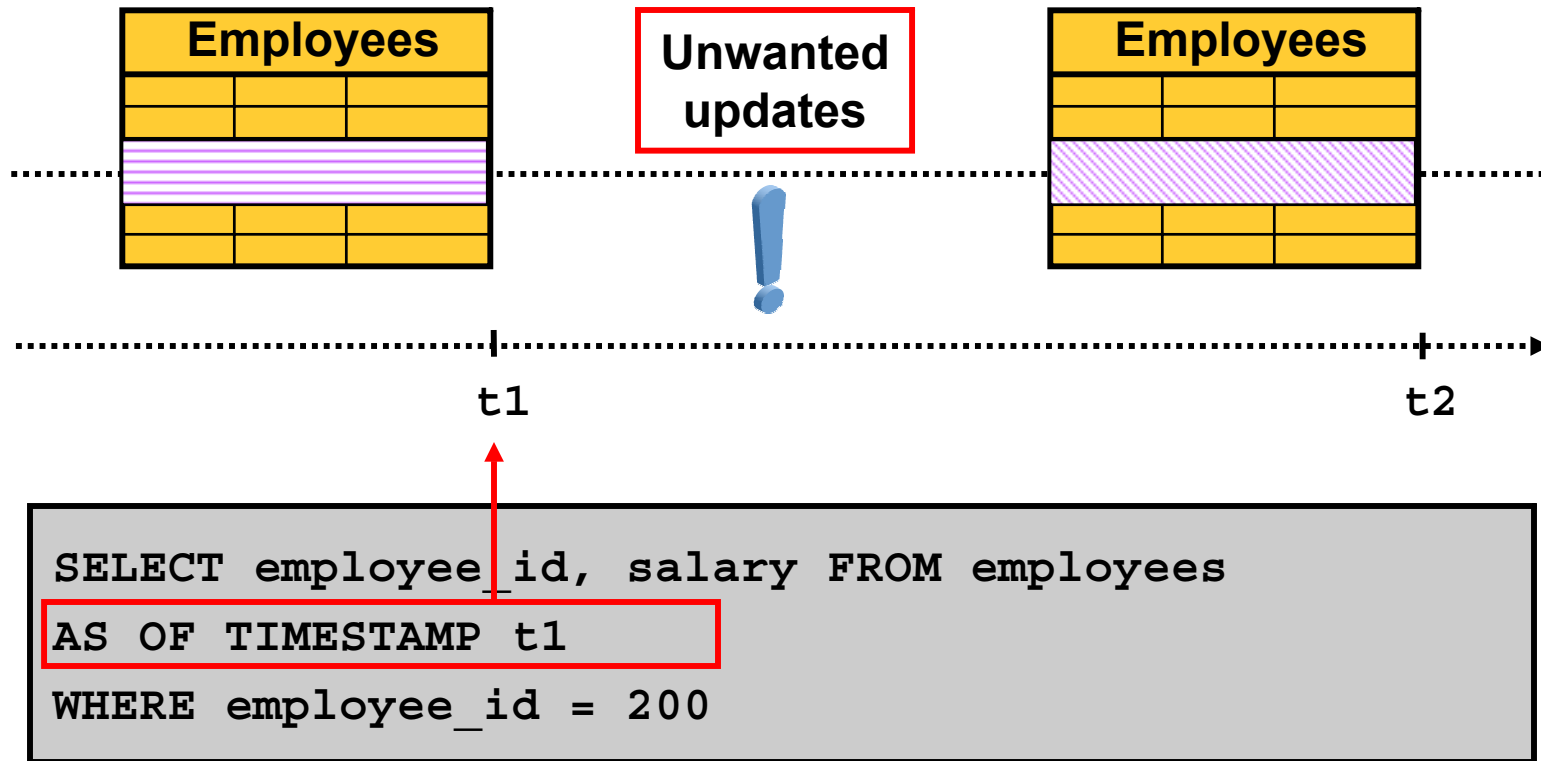
# Flashback Time Navigation

Overview
Database
Table
Drop
> Query
Versions
Transaction

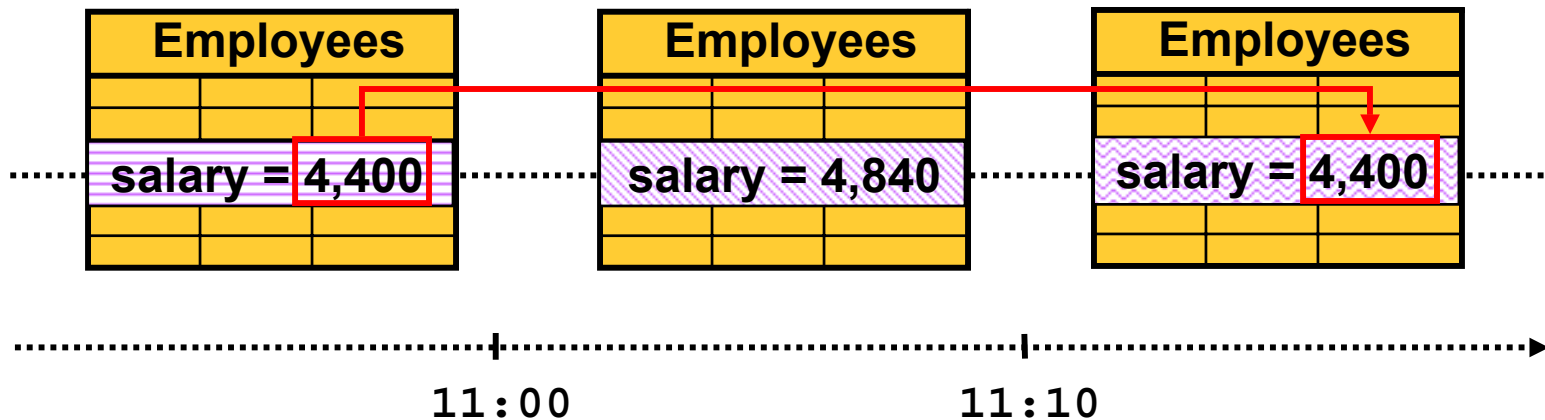
- **Flashback Query**
  - Query all data at a specified point in time.
- **Flashback Versions Query**
  - See all versions of a row between two times.
  - See the transactions that changed the row.
- **Flashback Transaction Query**
  - See all changes made by a transaction.



# Flashback Query: Overview



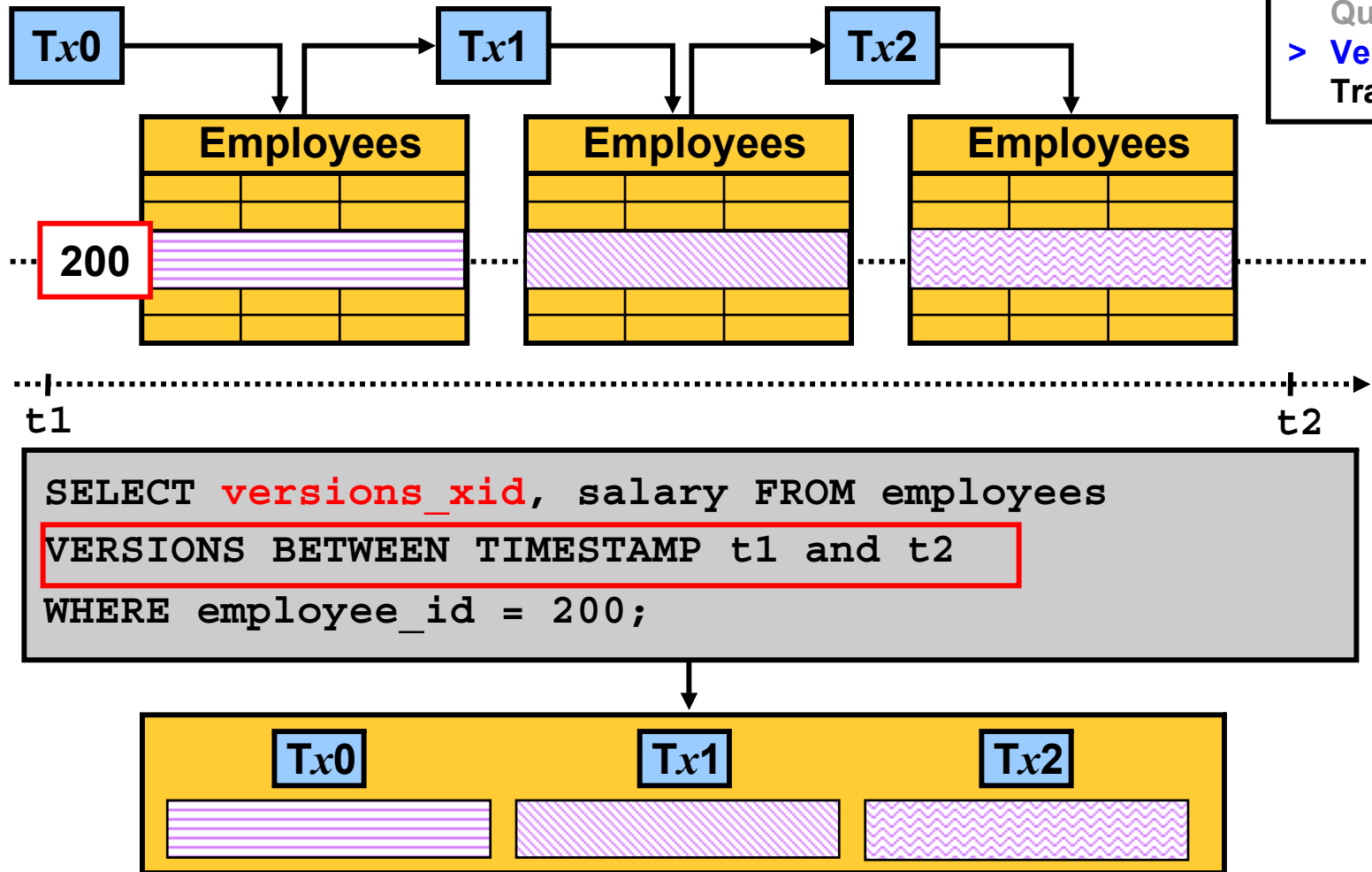
# Flashback Query: Example



```
UPDATE employees SET salary =  
    (SELECT salary FROM employees  
     AS OF TIMESTAMP TO_TIMESTAMP  
     ('2005-05-04 11:00:00', 'yyyy-mm-dd hh24:mi:ss'))  
    WHERE employee_id = 200)  
WHERE employee_id = 200
```

# Flashback Versions Query: Overview

Overview  
Database  
Table  
Drop  
Query  
Query  
> Versions  
Transaction



# Flashback Versions Query Through Enterprise Manager

## Perform Object Level Recovery: Flashback Versions Query Filter

[Cancel](#)[Show Flashback Versions Query SQL](#)[Back](#)[Step 2 of 7](#)[Next](#)

Object Type **Tables**  
Operation Type **Flashback Existing Tables**  
Table Name **hr.jobs**

Flashback Versions Query allows you to query metadata and historical data within a time interval. Select the filter conditions that allows you to retrieve the different versions of rows in a table that existed in a specific time interval.

### Step 1. Choose Columns

#### Available Columns

JOB\_TITLE  
MIN\_SALARY

[Move](#)[Move All](#)[Remove](#)[Remove All](#)

#### Selected Columns

JOB\_ID  
MAX\_SALARY

### Flashback Versions Query Result

Select	Flashback SCN	Flashback Timestamp	Transaction ID	Operation	JOB_ID	MAX_SALARY
<input checked="" type="radio"/>	531132	May 5, 2005 10:50:44 AM	<a href="#">080002007C010000</a>	UPDATE	IT_PROG	13200
<input type="radio"/>	531111	May 5, 2005 10:50:20 AM	<a href="#">030029007E010000</a>	UPDATE	IT_PROG	11000

### Step 2. Bind The Row Value

Specify a where clause based on the columns selected above to narrow the search to a particular set of values.

where job\_id = 'IT\_PROG'

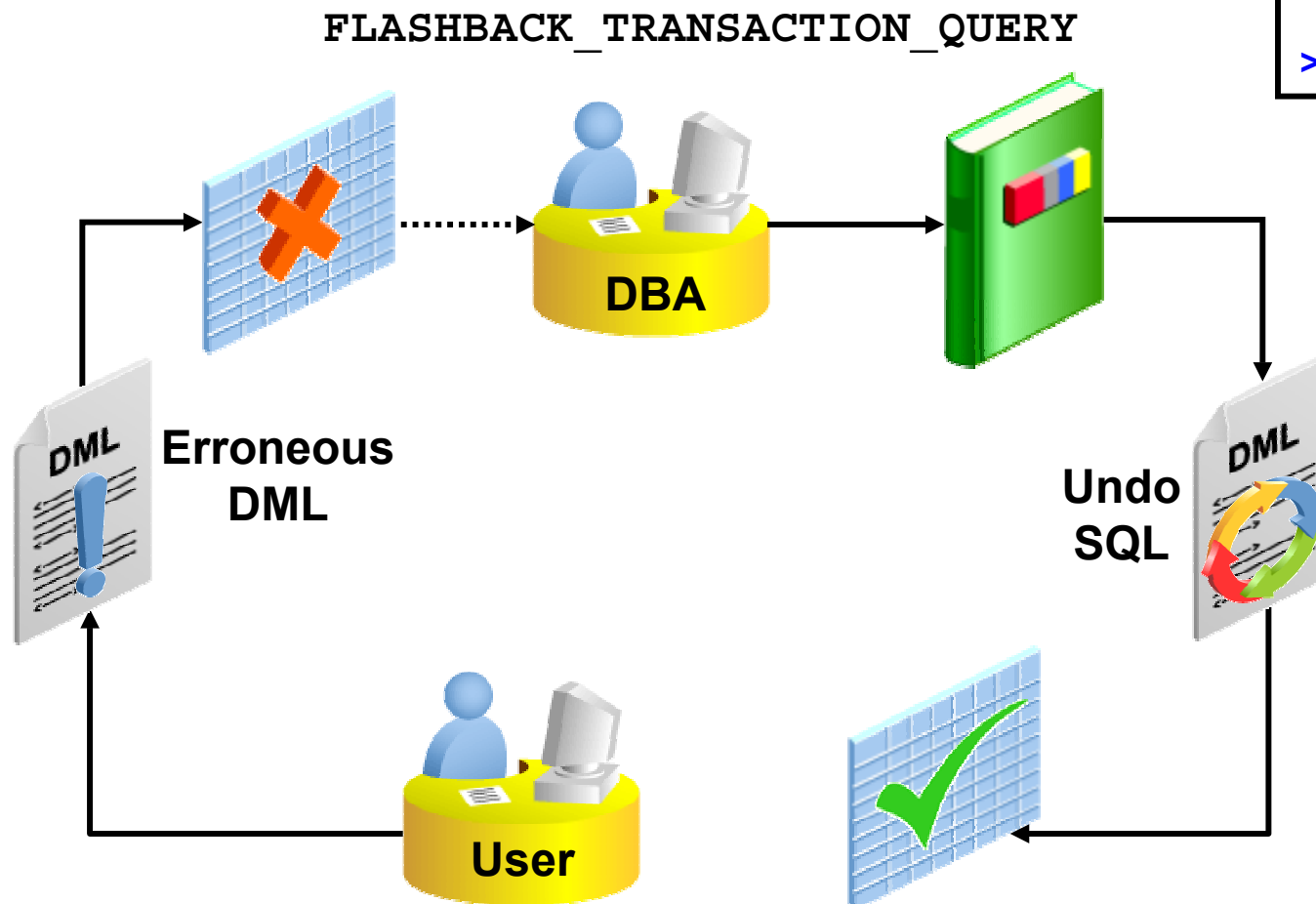
# Flashback Versions Query: Considerations

- **The VERSIONS clause cannot be used to query:**
  - **External tables**
  - **Temporary tables**
  - **Fixed tables**
  - **Views**
- **The VERSIONS clause cannot span DDL commands.**
- **Segment shrink operations are filtered out.**



# Flashback Transaction Query: Overview

Overview  
Database  
Table  
Drop  
Query  
Versions  
> [Transaction](#)



# Flashback Transaction Query Through Enterprise Manager

## Flashback Versions Query Result

Select	Flashback SCN	Flashback Timestamp	Transaction ID	Operation	JOB_ID	MIN_SALARY
	489358	Aug 5, 2005 11:54:29 AM	090003002D010000	UPDATE	AD_PRES	30000
	489347	Aug 5, 2005 11:54:11 AM	0A001C00CF000000	UPDATE	AD_PRES	25000
	489318	Aug 5, 2005 11:53:17 AM	0800110002010000	UPDATE	AD_PRES	22000

## Choose SCN: Transaction Details

Transaction ID **0A001C00CF000000**  
 User **HR**  
 Commit SCN **489348**  
 Commit Time **Aug 5, 2005 12:00:00 AM**

OK

Operation	Table Owner	Table Name	Undo SQL
UPDATE	HR	JOBS	update "HR"."JOBS" set "MIN_SALARY" = '22000' where ROWID = 'AAAMg1AAFAAAABIAAA';
UPDATE	HR	EMPLOYEES	update "HR"."EMPLOYEES" set "SALARY" = '4400' where ROWID = 'AAAMg3AAFAAAABUAAC';

# Flashback Transaction Query: Considerations

- **DDLs are seen as dictionary updates.**
- **Dropped objects appear as object numbers.**
- **Dropped users appear as user identifiers.**

# Summary

**In this lesson, you should have learned how to:**

- **Describe Flashback Database**
- **Restore the table content to a specific point in the past with Flashback Table**
- **Recover from a dropped table**
- **View the contents of the database as of any single point in time with Flashback Query**
- **See versions of a row over time with Flashback Versions Query**
- **View transaction history or a row with Flashback Transaction Query**

# **Practice Overview: Using Flashback**

**This practice covers the following topics:**

- **Using Flashback to recover a dropped table**
- **Performing Flashback Versions Query**