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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

- 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

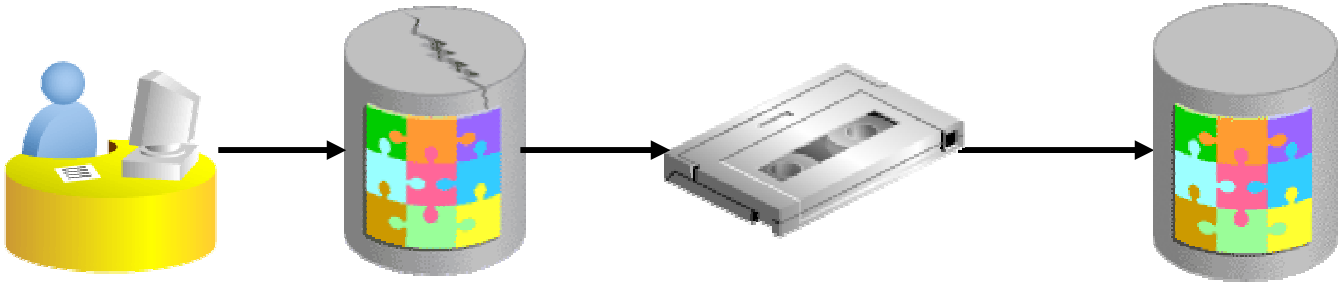
Flashing Back Any Error

- 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.

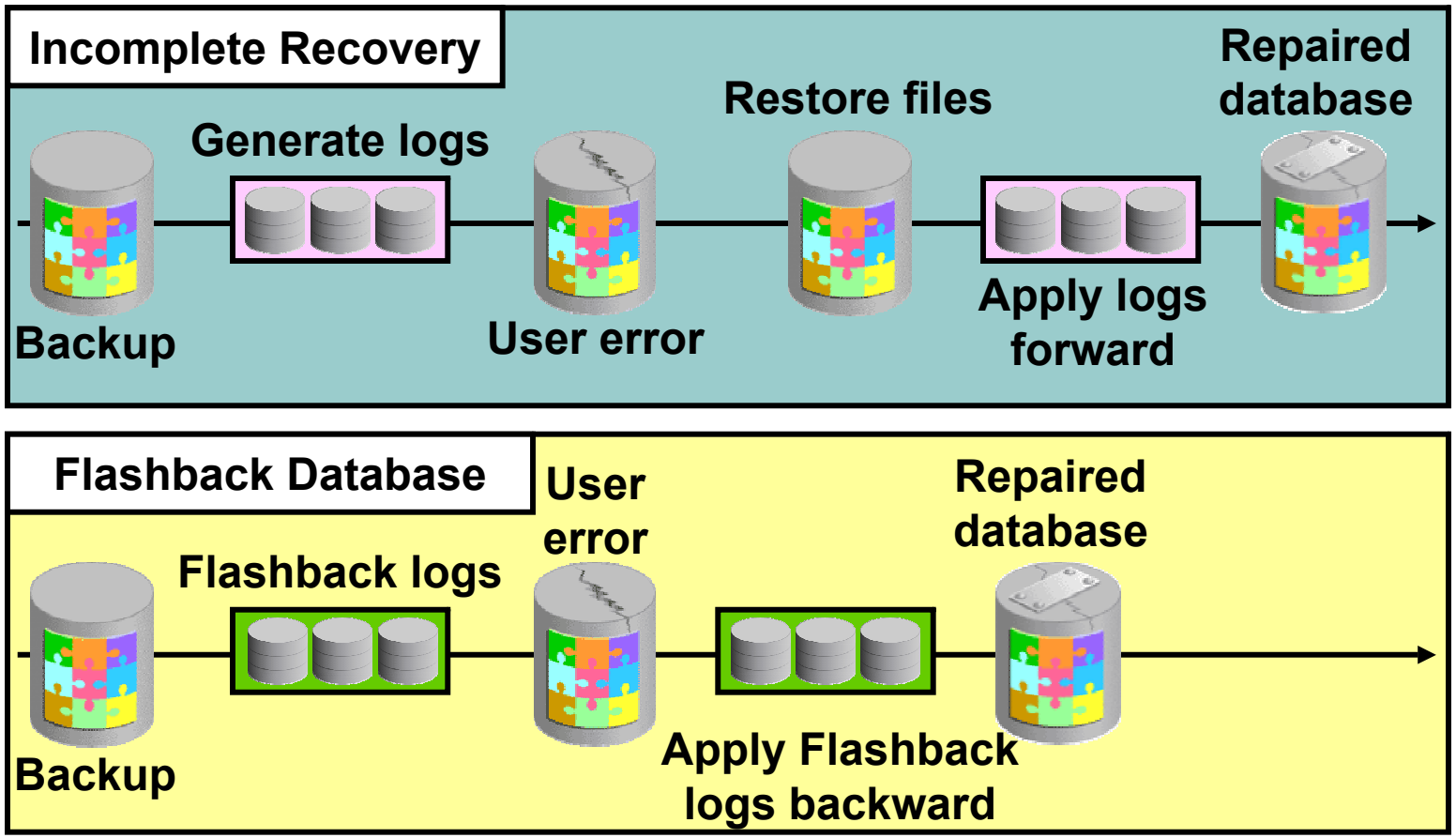
Flashback Database: Overview

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



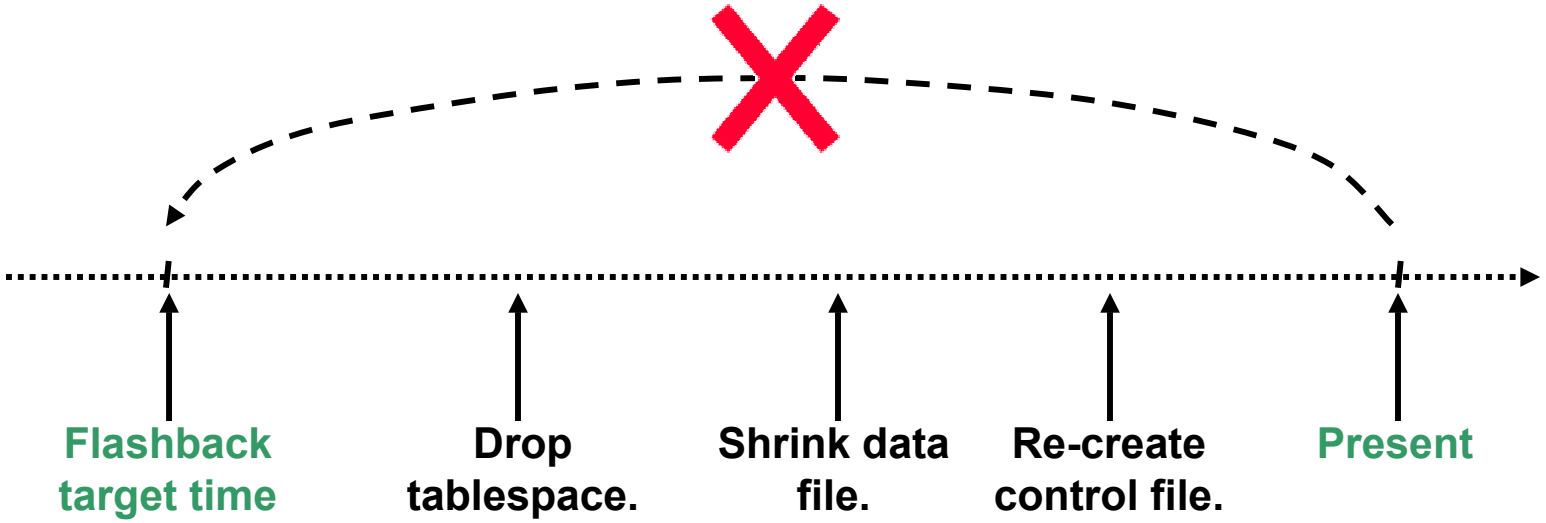
Flashback Database: Considerations

- 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.

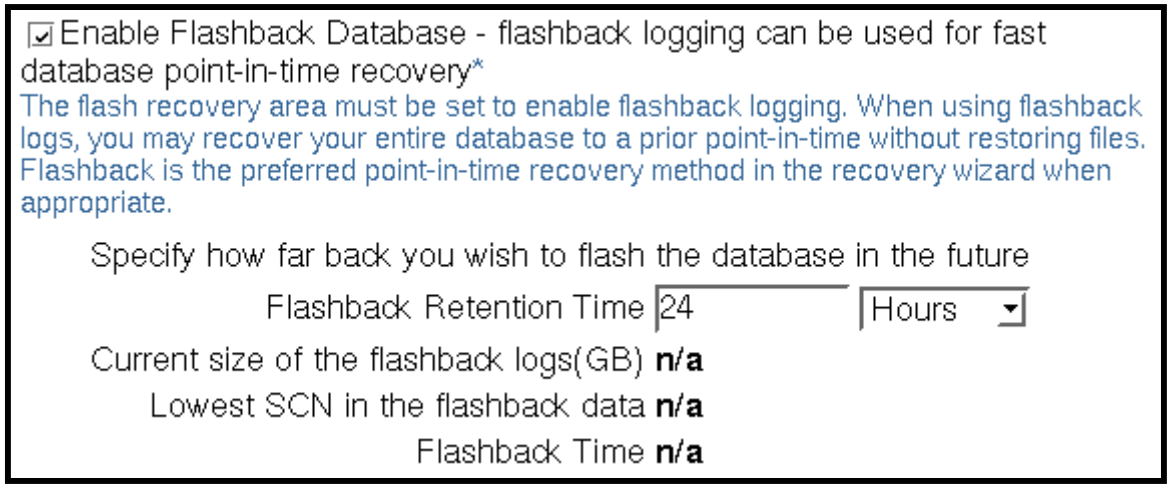
Flashback Database: Limitations

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.**

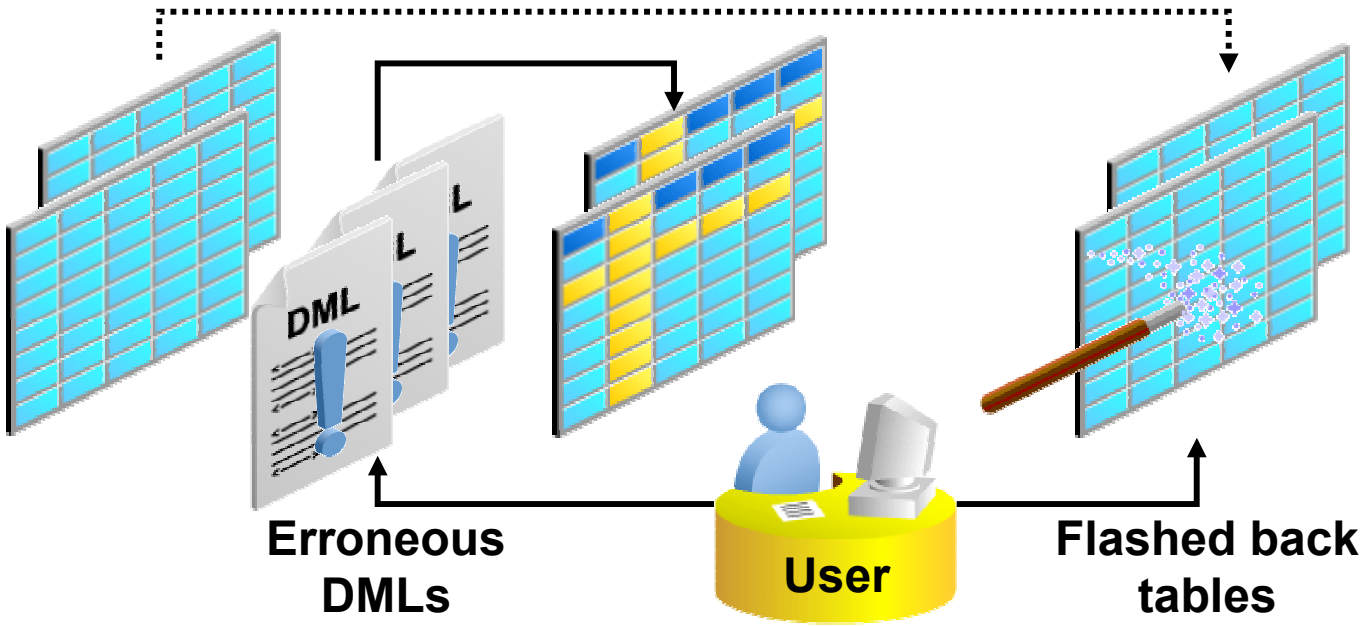


Enabling Flashback Database



Flashback Table: Overview

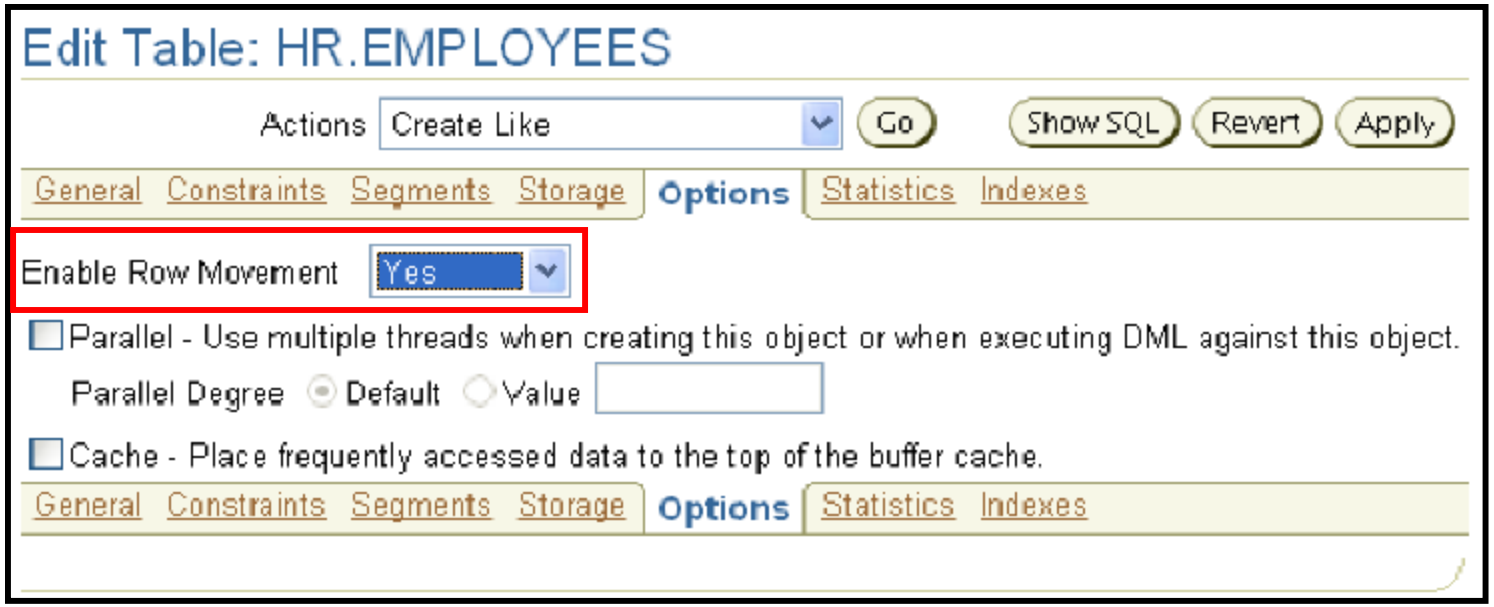
- Flashback Table recovers tables to a specific point in time.
- Flashback Table is an in-place operation.
- The database stays online.



Flashback Table

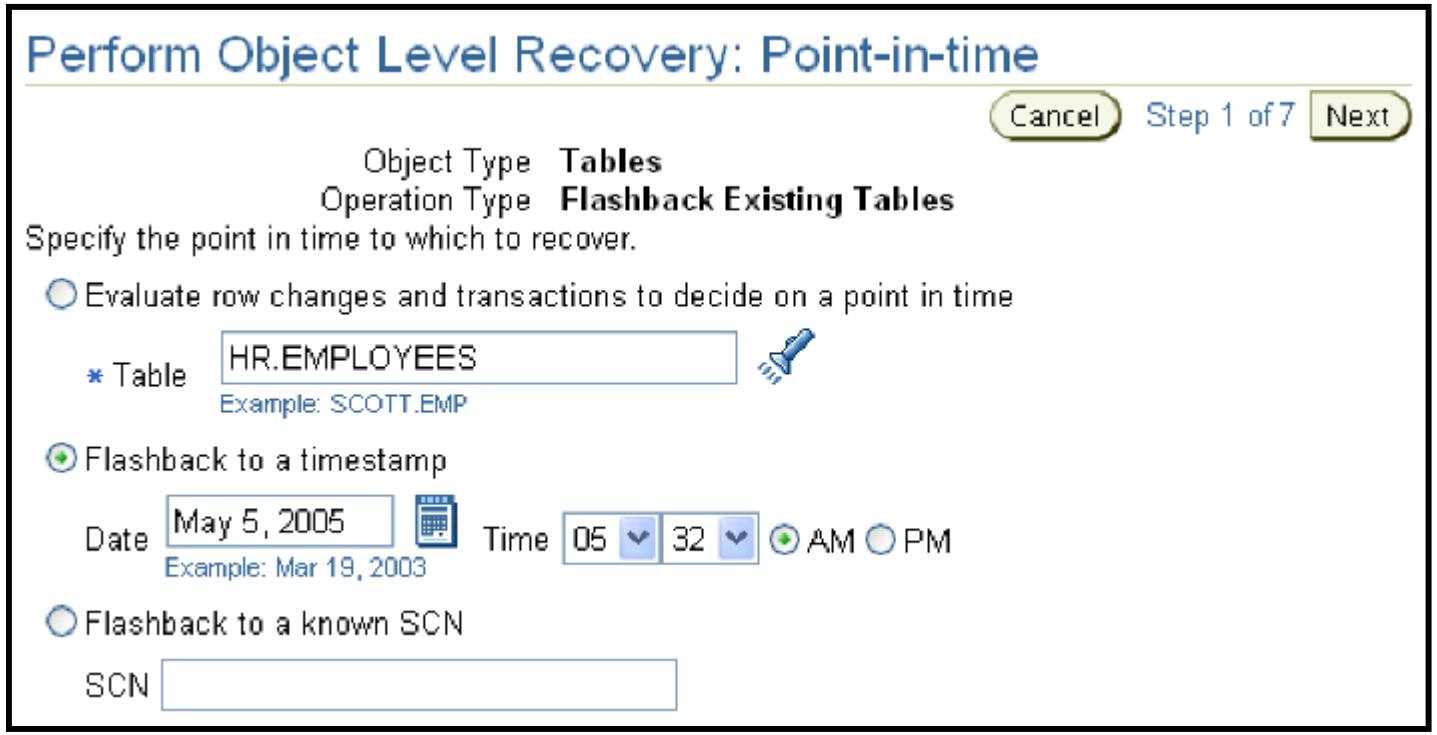
- Using Flashback Table, you can recover a table or tables to a specific point in time without restoring a backup.
- Data is retrieved from the undo tablespace to perform a Flashback Table operation.
- The `FLASHBACK` object privilege and the `FLASHBACK ANY TABLE` system privilege can be granted to allow 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




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

Performing Flashback Table

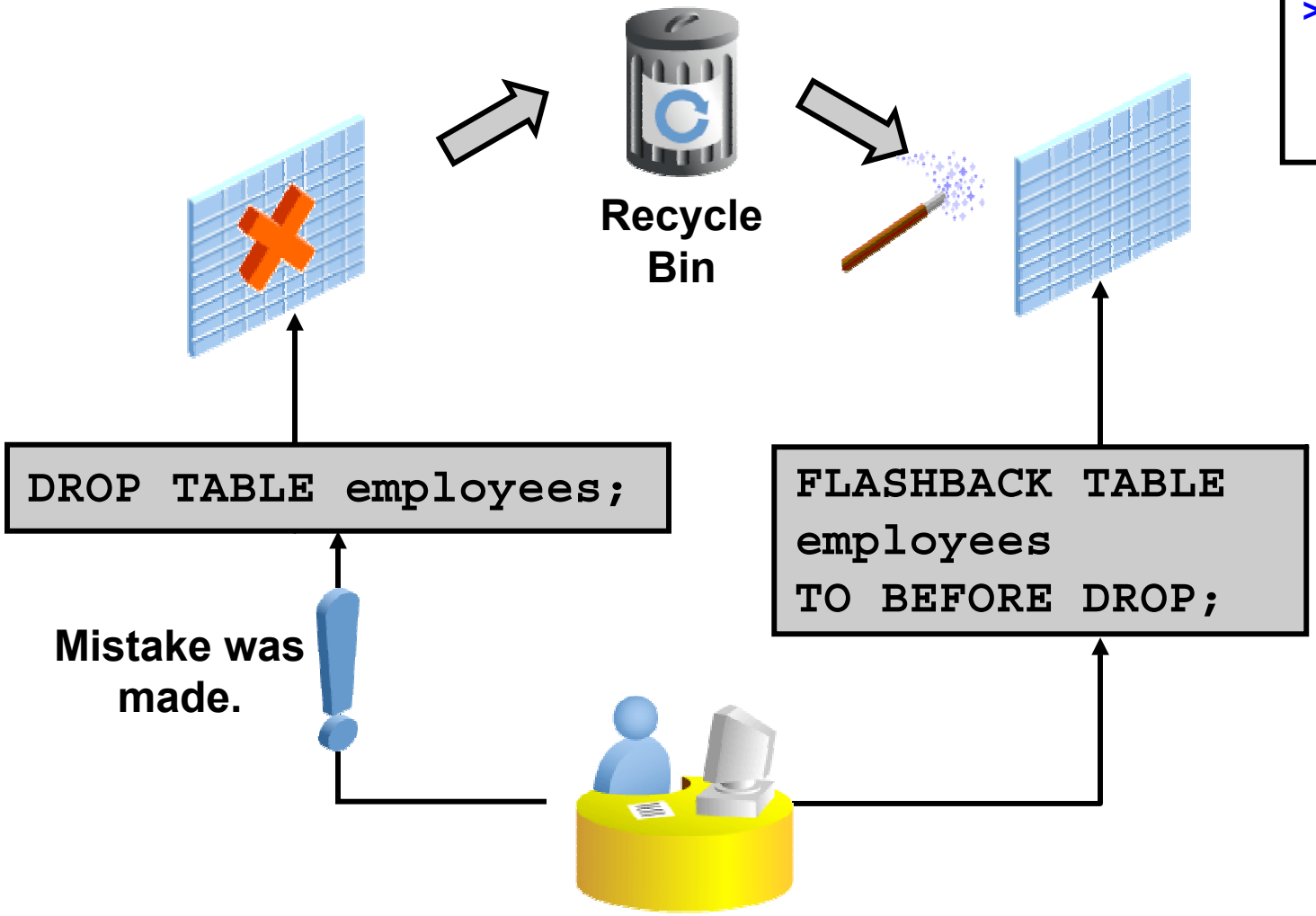



```
FLASHBACK TABLE hr.employees TO TIMESTAMP
TO_TIMESTAMP('2005-05-05 05:32:00',
'YYYY-MM-DD HH24:MI:SS');
```

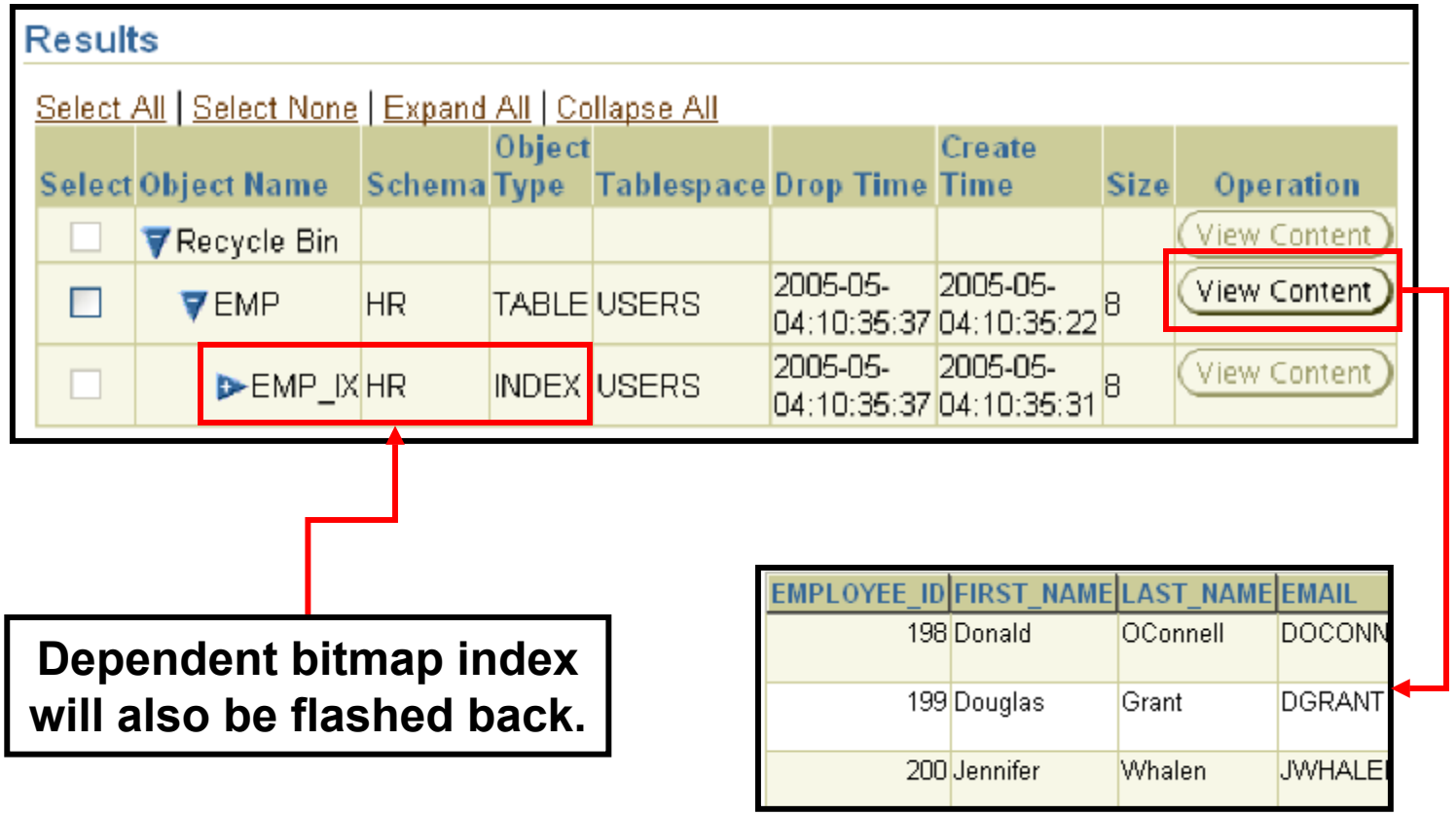
Flashback Table: Considerations

- 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



Flashing Back Dropped Tables Through Enterprise Manager

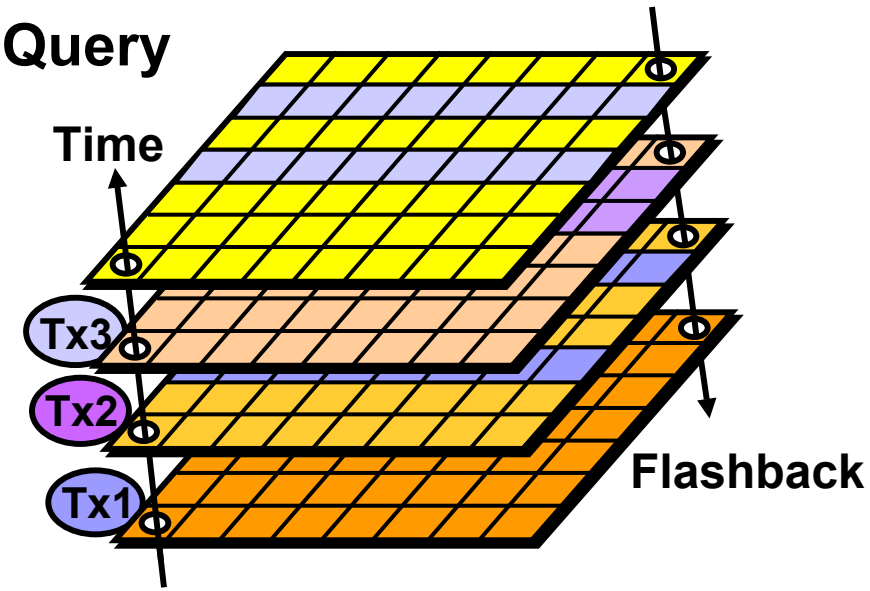


Flashback Drop: Considerations

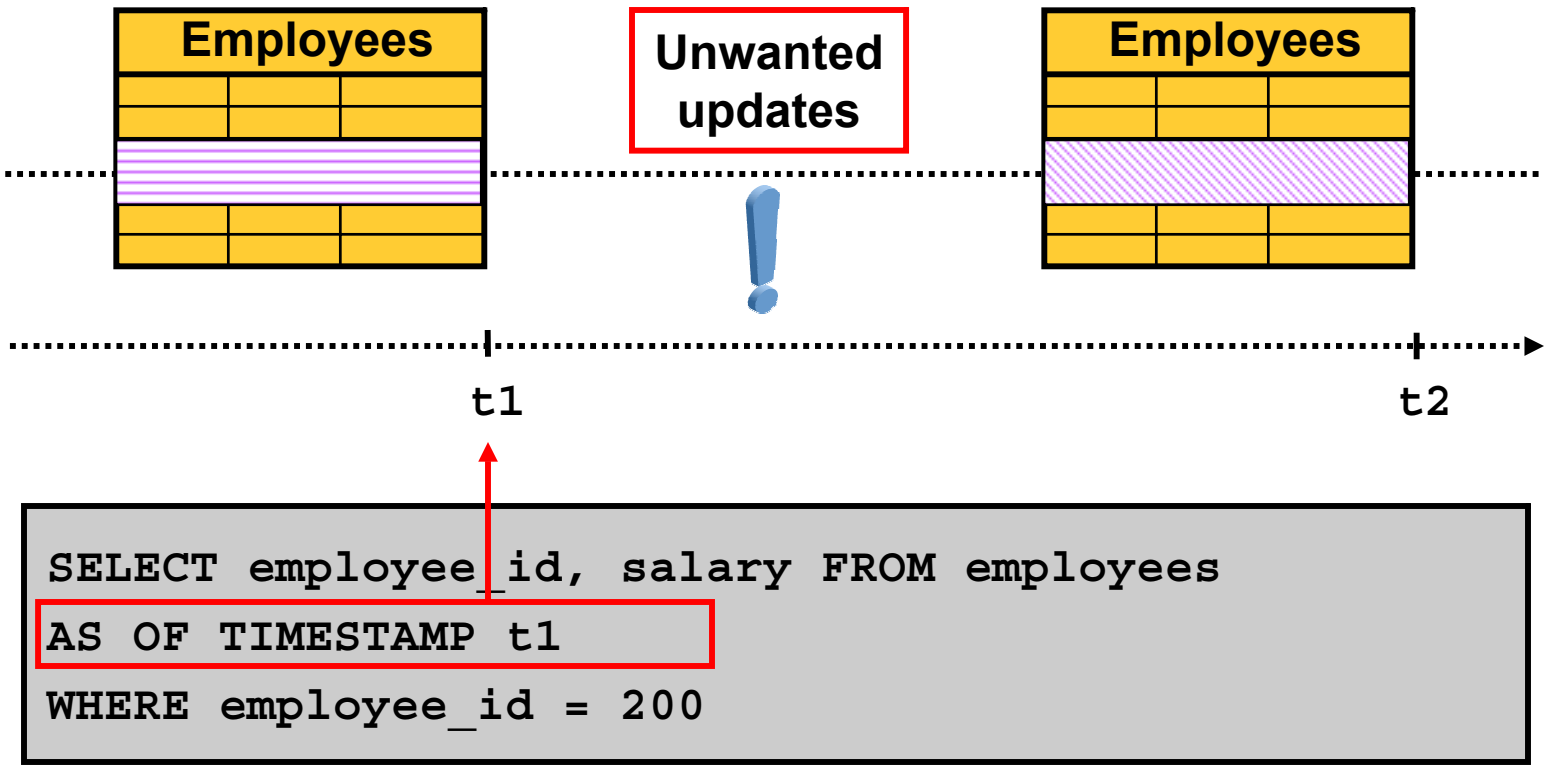
- Flashback Drop does not work for tables that:
  - Reside in the `SYSTEM` tablespace
  - Use fine-grained auditing or Virtual Private Database
  - Reside in a dictionary-managed tablespace
  - Have been purged, either by manual purging or automatic purging under space pressure
- The following dependencies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

Flashback Time Navigation

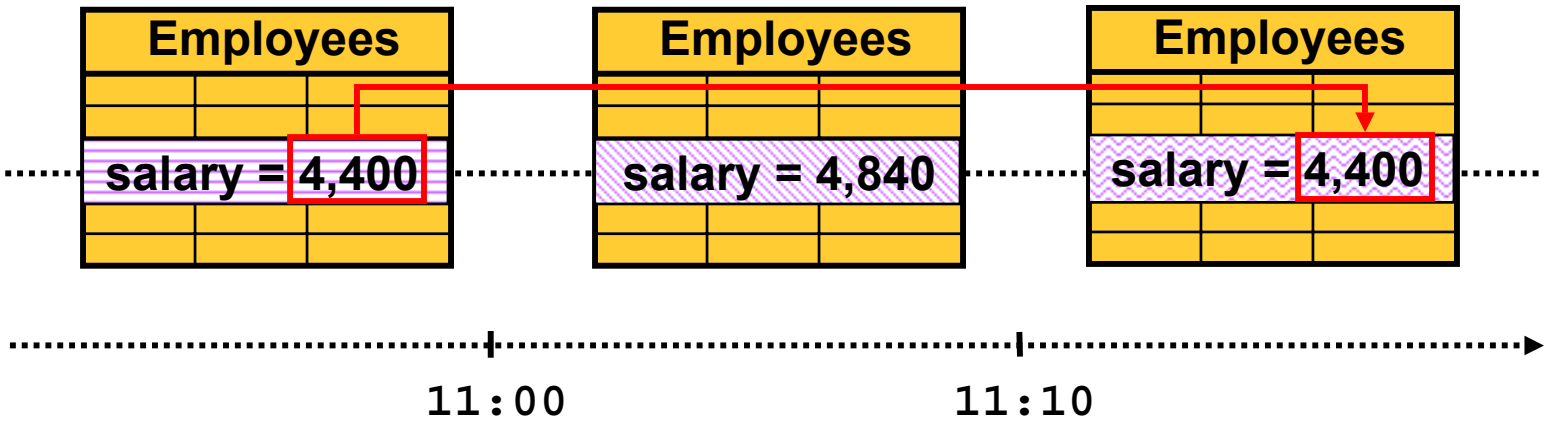
- **Flashback Query**
  - Query all data at a specified point in time.
- **Flashback Versions Query**
  - See all versions of a row between two times.
  - See the transactions that changed the row.
- **Flashback Transaction Query**
  - See all changes made by a transaction.



Flashback Query: Overview



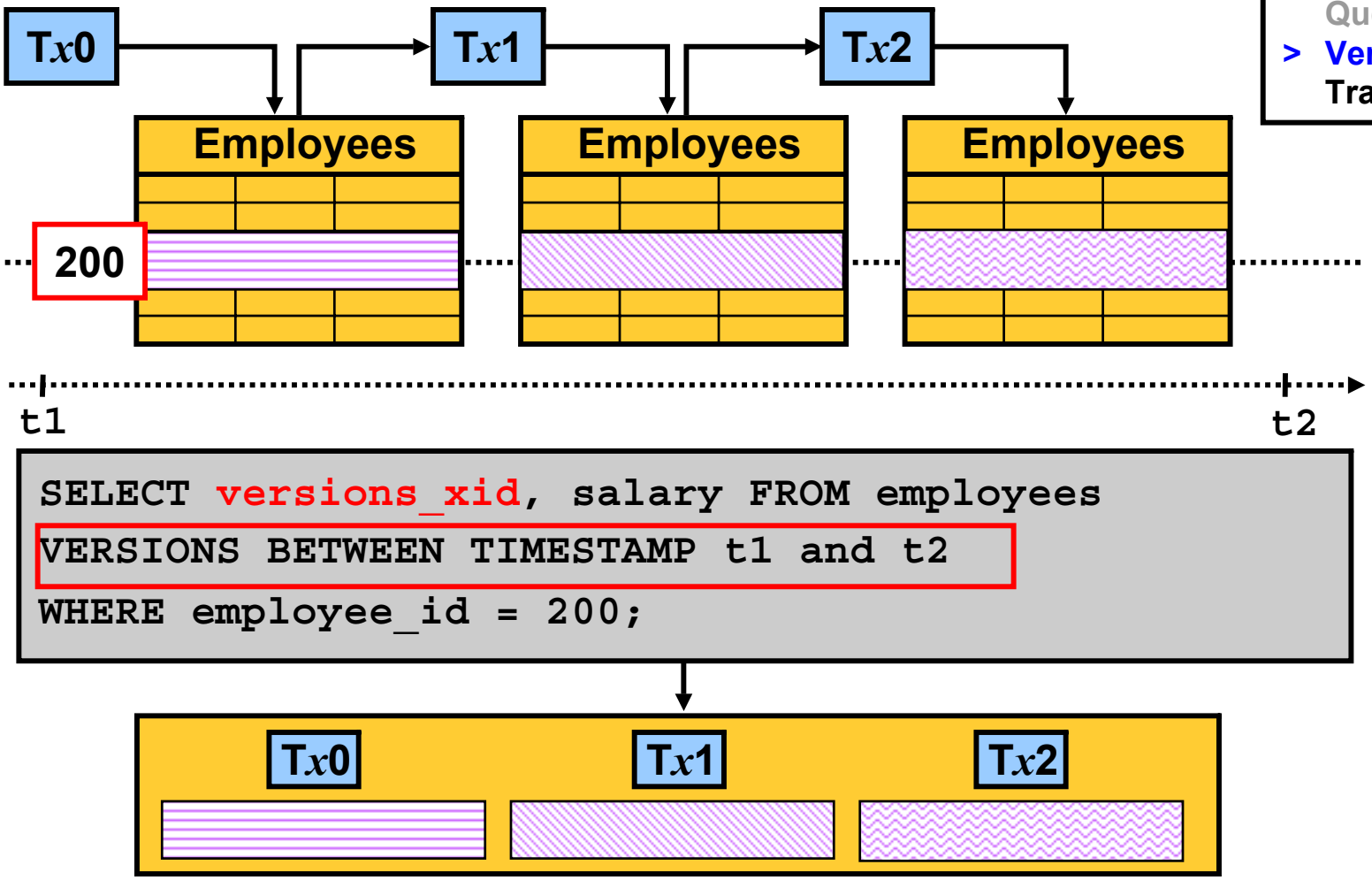
Flashback Query: Example




```
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
- > Versions
- Transaction



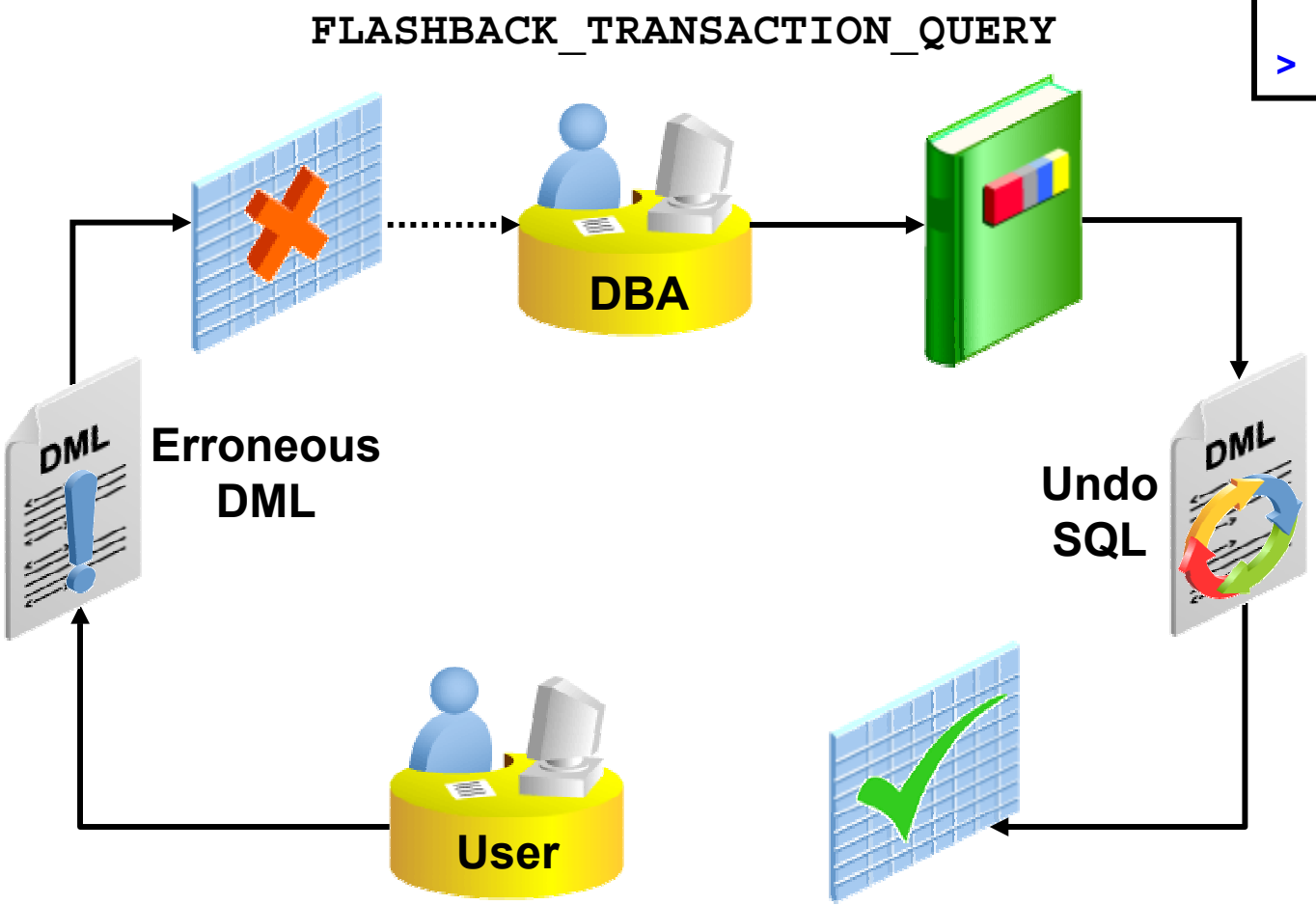

```
SELECT versions_xid, salary FROM employees
VERSIONS BETWEEN TIMESTAMP t1 and t2
WHERE employee_id = 200;
```

Flashback Versions Query Through Enterprise Manager

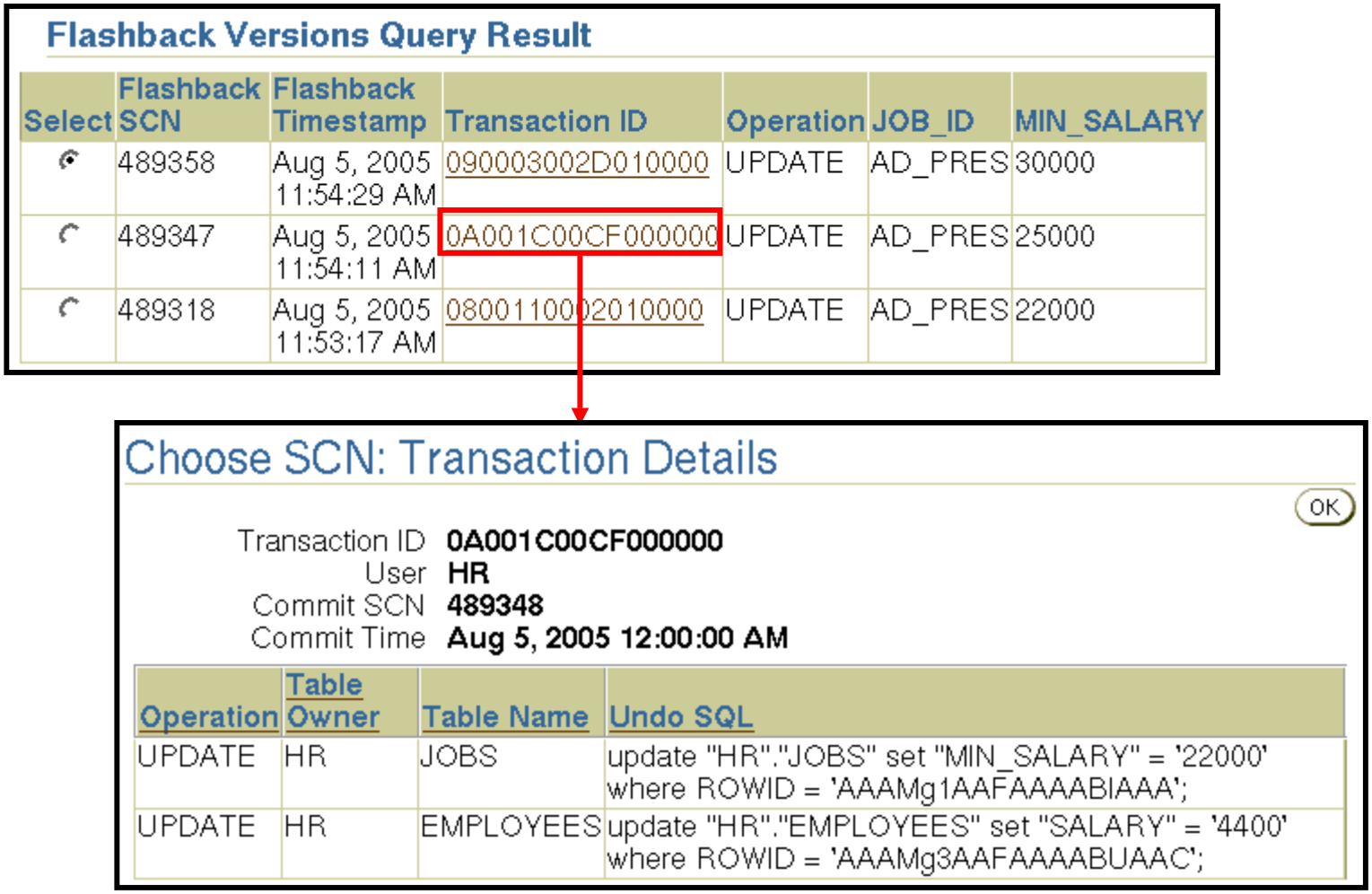
Flashback Versions Query: Considerations

- 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



Flashback Transaction Query Through Enterprise Manager



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