Managing Resumable Space Allocation

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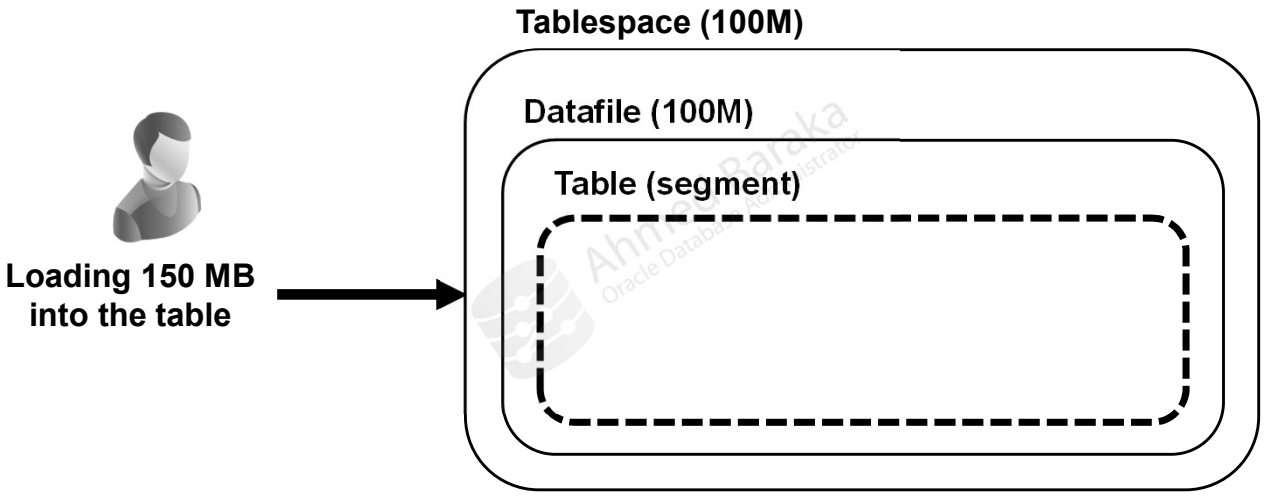
Objectives

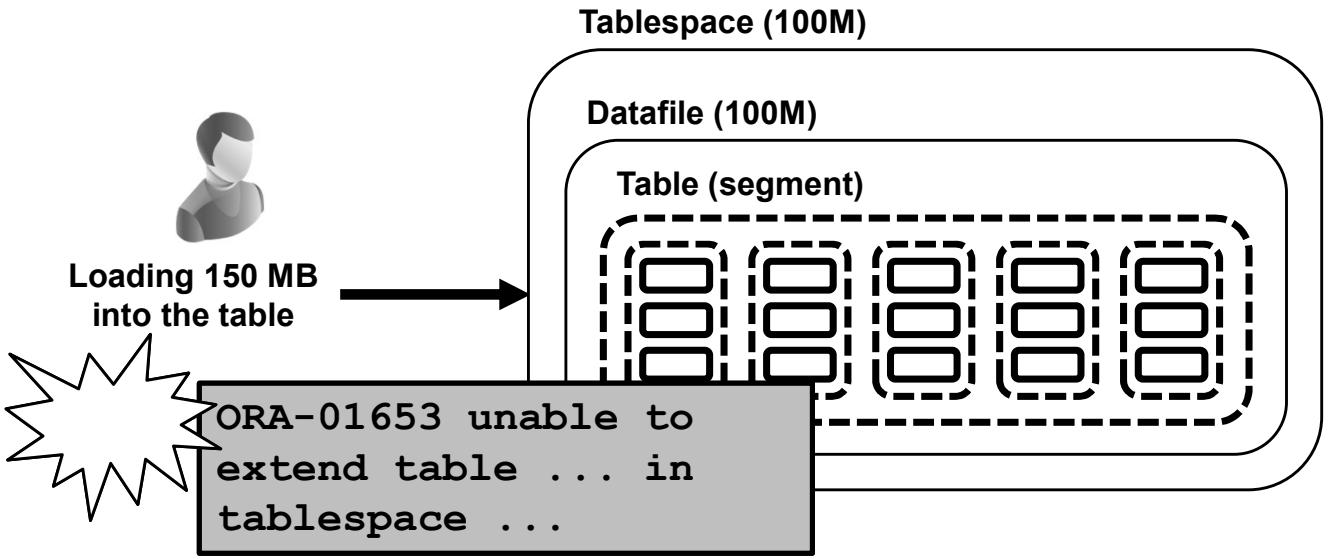
By the end of this lecture, you should be able to perform the following:

- Describe the resumable space allocation
- Enable the resumable space allocation
- Describe which operations could be resumable
- Specify the resumable space allocation timeout interval
- Use the LOGON trigger to set the default resumable mode
- Use AFTER SUSPEND trigger
- Describe resumable space allocation general practice

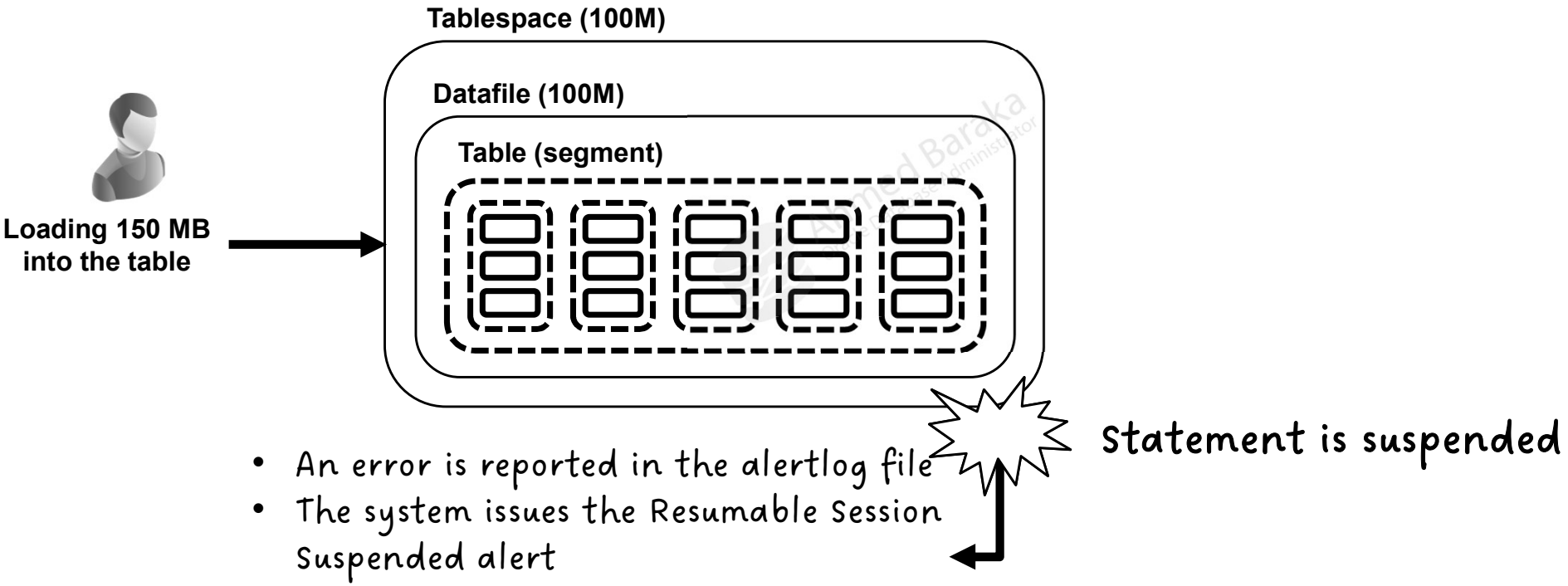
A User Loading Data



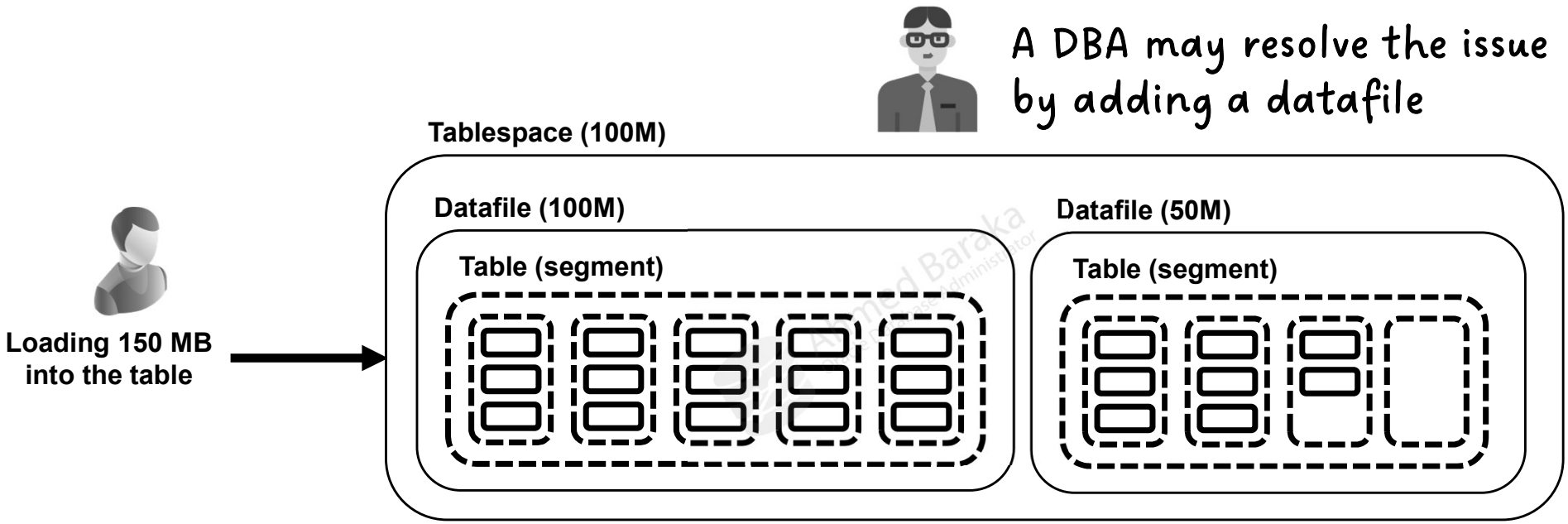
A User Loading Data



Resumable Space Allocation Overview



Resumable Space Allocation Overview



About Resumable Space Allocation

- A mechanism to suspend, and later resume, the execution of database operations that consume large space
- DBA can take an action to resolve the issue or abort the suspended session
- After resolving the issue, the suspended statement resumes
- The user must have the system privilege **`RESUMABLE`**

What Errors are Correctable?

- Out of space condition

```
ORA-01653 unable to extend table ... in tablespace ...
ORA-01654 unable to extend index ... in tablespace ...
```

- Maximum extents reached condition

```
ORA-01631 max # extents ... reached in table ...
```

- Space quota exceeded condition

```
ORA-01536: space quota exceeded for tablespace "string"
```

How Resumable Space Allocation Works

1. A statement executes in resumable mode only if one of the following is true:
   - The **`RESUMABLE_TIMEOUT`** is set to a nonzero value and the **`ALTER SESSION ENABLE RESUMABLE`** is issued in the session before the statement executes
   - The **`ALTER SESSION ENABLE RESUMABLE TIMEOUT <n>`** is issued in the session before the statement executes, and the *n* is a nonzero value.
2. A resumable statement is suspended when one of the following occurs:
   - Out of space condition
   - Maximum extents reached
   - Space quota exceeded
3. When a resumable statement is suspended the following actions are taken:
   - The error is reported in the alert log
   - The system issues the Resumable Session Suspended alert
   - The registered **`AFTER SUSPEND`** is executed (if any)

How Resumable Space Allocation Works

4. The DBA and/or user is notified about the issue (should be developed or configured in advance)
5. The DBA resolves the issue, and the suspended statement resumes
6. The suspended statement can be forced to abort (may be because the issue cannot be resolved) using **`DBMS_RESUMABLE.ABORT()`** procedure
7. If the issue is not resolved within the timeout period, the suspended statement returns an exception

- A resumable statement can be suspended and resumed multiple times during execution.
- We can enable the resumable space for a statement and disable it for another
  - **`ALTER SESSION DISABLE RESUMABLE`**

What are the Resumable Operations?

- DML
- DDL that creates segments, like **`CREATE TABLE`**, **`INDEX`**, **`MATERIALIZED VIEW`**
- Data Pump Import utility
- SQL Loader: a command line parameter controls whether a load operation is resumable
- Queries that run out of temporary space

Specifying a Timeout Interval

- The **RESUMABLE_TIMEOUT** parameter can be set at the system level and/or at the session level.
- If it is set to zero, the resumable space allocation is disabled.
- Can also be with the statement that enables the resumable space allocation:

```
ALTER SESSION ENABLE RESUMABLE TIMEOUT 3600;
```

Using a LOGON Trigger to Set Default Resumable Mode

- A database level **LOGON** trigger can be used to set the default resumable mode:

```
CREATE OR REPLACE TRIGGER trg_resumable
 AFTER LOGON
 ON hr.SCHEMA
 BEGIN
  EXECUTE IMMEDIATE 'ALTER SESSION ENABLE RESUMABLE TIMEOUT 600';
 END;
/
```

Notifying Users: The AFTER SUSPEND System Event and Trigger

- Use the **AFTER SUSPEND** trigger to manage how the database should respond to a suspended statement (send email, SMS, or change timeout):

```
CREATE OR REPLACE TRIGGER resumable_trg
AFTER SUSPEND ON DATABASE
BEGIN

 /*
   put the code here to notify the user and/or DBA
 */

 -- change the timeout of the suspended session
 DBMS_RESUMABLE.SET_TIMEOUT(900);

END;
/
```

Obtaining Information about Suspended Statements

Column	Description
DBA/USER_RESUMABLE	Retrieves the currently executing or suspended resumable statements.
V$SESSION_WAIT	When a statement is suspended the session invoking the statement is put into a wait state. A row is inserted into this view for the session with the **EVENT** column containing "**statement suspended, wait error to be cleared**".

Using the DBMS_RESUMABLE Package

Procedure	Description
ABORT(sessionID)	This procedure terminates a suspended resumable statement.
GET_SESSION_TIMEOUT (sessionID)	Returns the current timeout value of resumable space allocation for the session with sessionID.
GET_TIMEOUT()	Returns the current timeout value of resumable space allocation for the current session.
SET_TIMEOUT(timeout)	Sets a timeout value for resumable space allocation for the current session.

Resumable Space Allocation General Practice

- Make it as a second line of defense
  - Monitoring the free space in tablespaces proactively is the first line of defense
  - Learn lessons for future
- Consider it when there is long loading processes
- Use the dictionary views to check if the suspended statement is executing or suspended

Summary

In this lecture, you should have learnt how to perform the following:

- Describe the resumable space allocation
- Enable the resumable space allocation
- Describe which operations could be resumable
- Specify the resumable space allocation timeout interval
- Use the LOGON trigger to set the default resumable mode
- Use AFTER SUSPEND trigger
- Describe resumable space allocation general practice