# Oracle 11g DBA Fundamentals Overview

Lesson 04: Maintaining the Control File

# Objectives

- After completing this lesson, you should be able to do the following:
  - Explain the uses of the control file
  - List the contents of the control file
  - Multiplex and manage the control file
  - Obtain control file information

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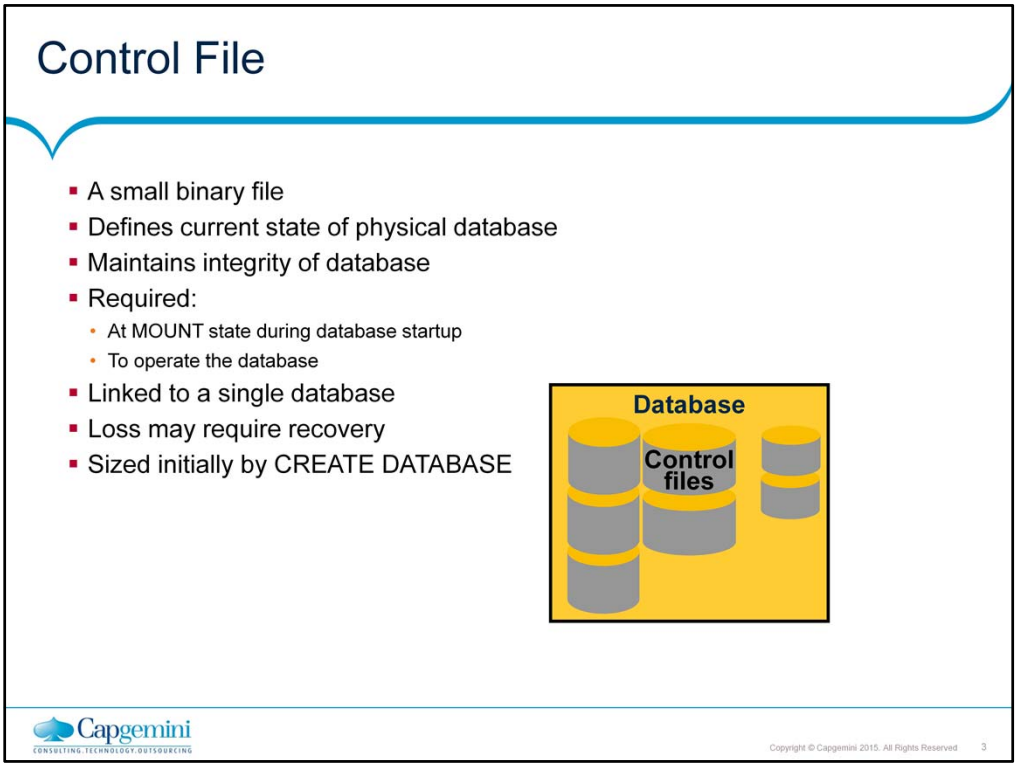



Control File

The control file is a small binary file necessary for the database to start and operate successfully. Each control file is associated with only one Oracle database. Before a database is opened, the control file is read to determine if the database is in a valid state to use.

A control file is updated continuously by the Oracle server during database use, so it must be available for writing whenever the database is open. The information in the control file can be modified only by the Oracle server; no database administrator or end user can edit the control file.

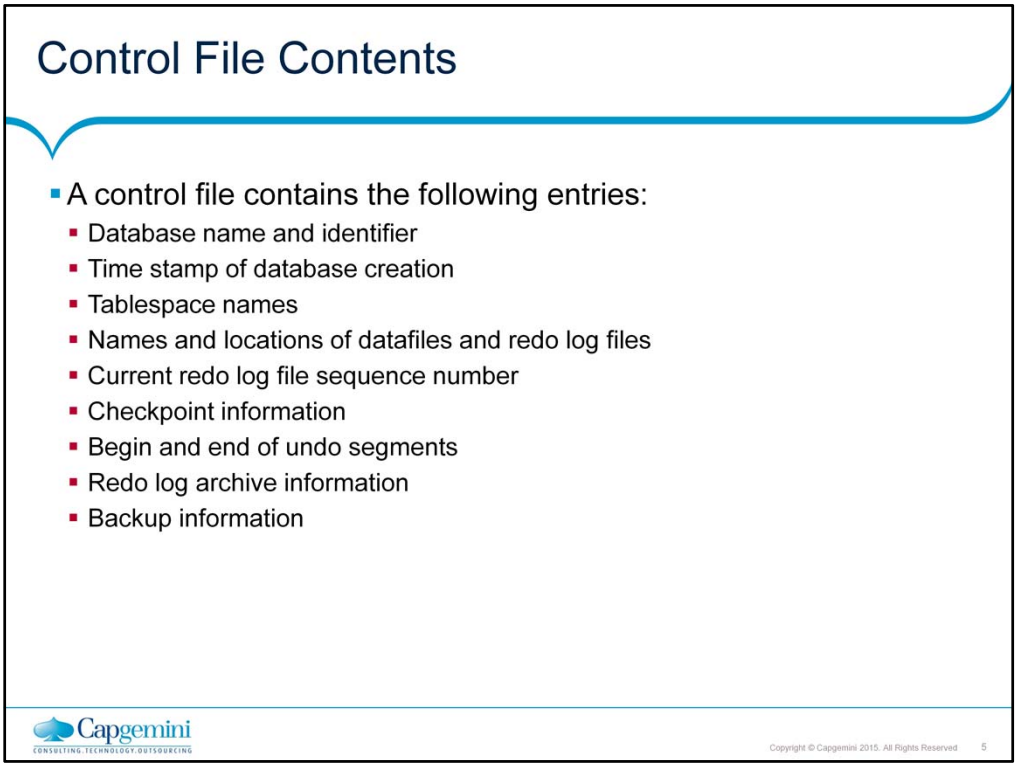
If for some reason the control file is not accessible, the database does not function properly. If all copies of a database's control files are lost, the database must be recovered before it can be opened.


Control File (continued)

Sizing the control file:

Keywords specified during the creation of the database affect the size of the control file. This is particularly significant when the parameters have large values. The size of the control file is influenced by the following keywords in the CREATE DATABASE or CREATE CONTROLFILE commands:

- MAXLOGFILES
- MAXLOGMEMBERS
- MAXLOGHISTORY
- MAXDATAFILES
- MAXINSTANCES




Control File Contents

The information in the control file includes the following:

Database name is taken from either the name specified by the initialization parameter DB_NAME or the name used in the CREATE DATABASE statement.

Database identifier is recorded when the database is created.

Time stamp of database creation is also recorded at database creation.

Names and locations of associated datafiles and online redo log files are updated when a datafile or redo log is added to, renamed in, or dropped from the database.

Tablespace information is updated as tablespaces are added or dropped.

Redo log history is recorded during log switches.

Location and status of archived logs are recorded when archiving occurs.

Location and status of backups are recorded by the Recovery Manager utility.

Current log sequence number is recorded when log switches occur.

Checkpoint information is recorded as checkpoints are made.

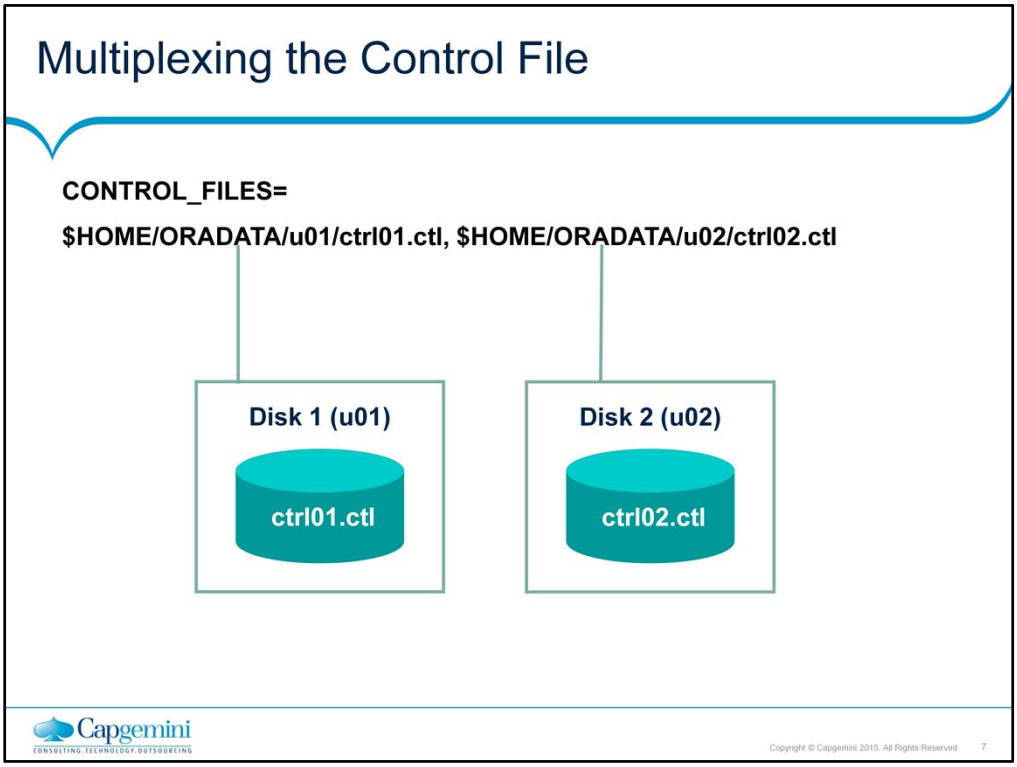

Contents of the Control File (continued)

The control file consists of two types of sections:

- Reusable
- Not reusable

Reusable sections store Recovery Manager information, such as backup datafile names and backup redo log file names. They are used in a circular manner and can be reused only by Recovery Manager.

Note: Recovery Manager is covered in more detail in the course Oracle9i Database Administration Fundamentals II.




Multiplexing the Control File

To safeguard against a single point of failure of the control file, it is strongly recommended that the control file be multiplexed, storing each copy on a different physical disk. If a control file is lost, a multiplexed copy of the control file can be used to restart the instance without database recovery.

Control files can be multiplexed up to eight times by:

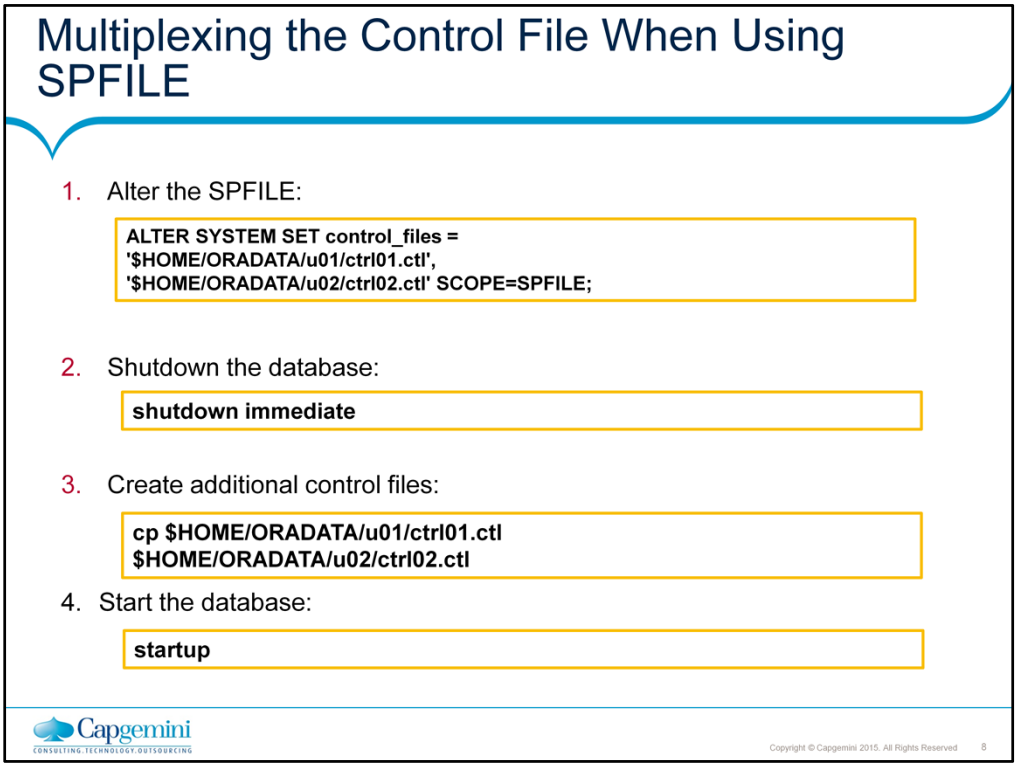
- Creating multiple control files when the database is created by including the control file names and full path in the initialization parameter file:

  CONTROL_FILES=$HOME/ORADATA/u01/ctrl01.ctl,
  $HOME/ORADATA/u02/ctrl02.ctl

- Adding a control file after the database is created

Backing up the control files:

Because the control file records the physical structure of the database, you should immediately make a backup of your control file after making changes to the physical structure of the database. Backup and recovery of the control file is covered in the course Oracle9i Database Administration Fundamentals II.



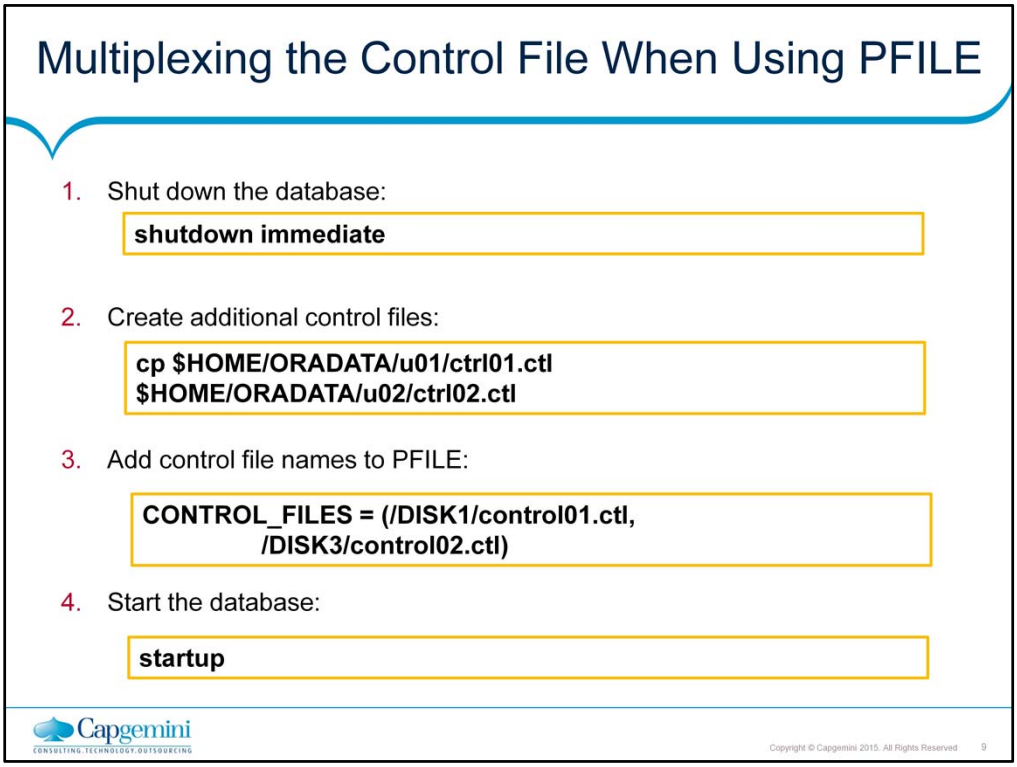

Multiplexing the Control File When Using SPFILE

Alter the SPFILE: Using the ALTER SYSTEM SET command alter the SPFILE to include a list of all control files to be used: main control file and multiplexed copies.

Shutdown the database: Shutdown the database in order to create the additional control files on the operating system.

Create additional control files: Using the operating system copy command, create the additional control files as required and verify that the files have been created in the appropriate directories.

Start the database: When the database is started the SPFILE will be read and the Oracle server will maintain all the control files listed in the CONTROL_FILES parameter.



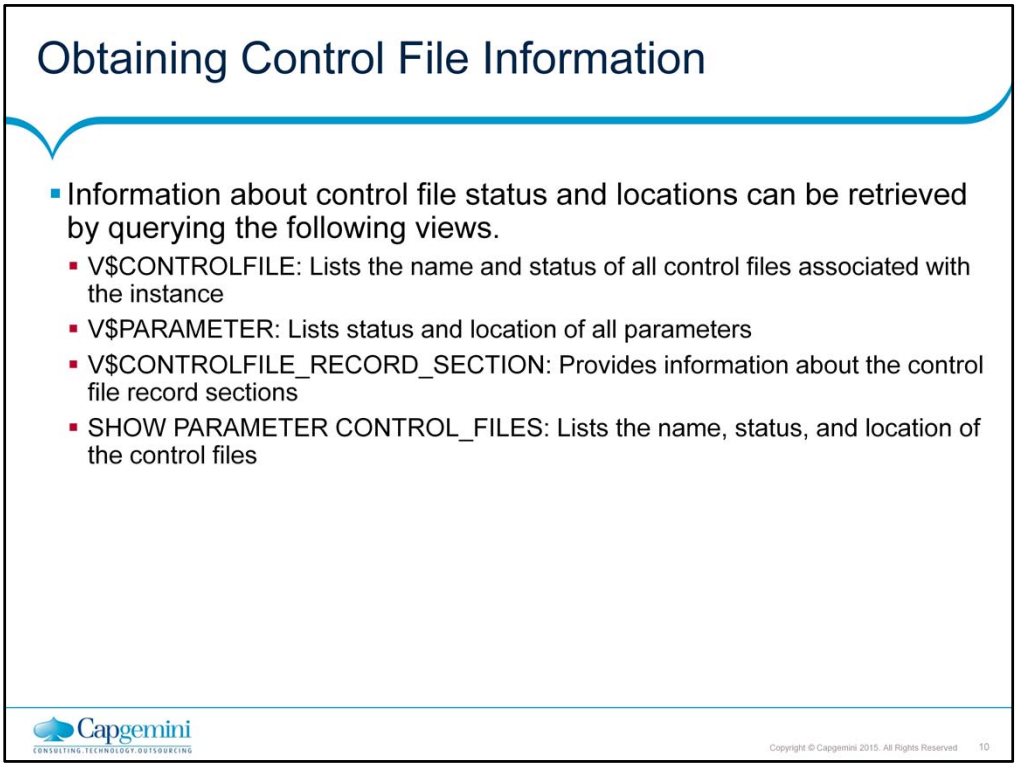

Multiplexing the Control File When Using PFILE

Shut down the database: Shutdown the database in order to create the additional control files on the operating system.

Create additional control files: Using the operating system copy command, create the additional control files as required and verify that the files have been created in the appropriate directories.

Add control file names to PFILE: Alter the PFILE to include a listing of all of the control files.

Start the database: When the database is started the PFILE will be read and the Oracle server will maintain all the control files listed in the CONTROL_FILES parameter.




Obtaining Control File Information

To obtain the location and names of the control files, query the V$CONTROLFILE view.

```
SELECT name FROM V$CONTROLFILE;
NAME
-----------------------------------
/u01/home/db03/ORADATA/u01/ctrl01.ctl
/u01/home/db03/ORADATA/u01/ctrl01.ctl
2 rows selected.
```

The V$PARAMETER view can also be used.

```
SELECT name, value from V$PARAMETER
WHERE name = 'control_files';
NAME                                 Value
-------------   ----------------------------
control_files       /u01/home/db03/ORADATA/u01/ctrl01.ctl
```

Obtaining Control File Information (continued)

To obtain information about the different sections of the control files, query the V$CONTROLFILE_RECORD_SECTION view.

```
SQL> SELECT type, record_size, records_total, records_used
2  FROM v$controlfile_record_section
3  WHERE TYPE='DATAFILE';

TYPE            RECORD_SIZE RECORDS_TOTAL RECORDS_USED
----------------- ----------- ------------- ------------
DATAFILE              180          40          10
1 row selected.
```

The column RECORDS_TOTAL specifies the number of records allocated for a special section. For example, you can view the maximum number of datafiles in our example 30, which is determined by the MAXDATAFILES parameter in the CREATE DATABASE command.

The SHOW PARAMETER command can also be used to find the location of the control files.

```
SQL>  SHOW PARAMETER control_files;
NAME        TYPE        VALUE
-------------- ----------- ------------------------------
control_files  string      $HOME/ORADATA/u01/ctrl01.ctl,

$HOME/ORADATA/u02/ctrl02.ctl
```

Information in several dynamic performance views is obtained from the control file. Below is a list of examples:

- V$BACKUP
- V$DATAFILE
- V$TEMPFILE
- V$TABLESPACE
- V$ARCHIVE
- V$LOG
- V$LOGFILE
- V$LOGHIST
- V$ARCHIVED_LOG
- V$DATABASE

# Summary

- In this lesson, you should have learned how to:
  - Multiplex the control file when using an SPFILE
  - Multiplex the control file when using an init.ora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