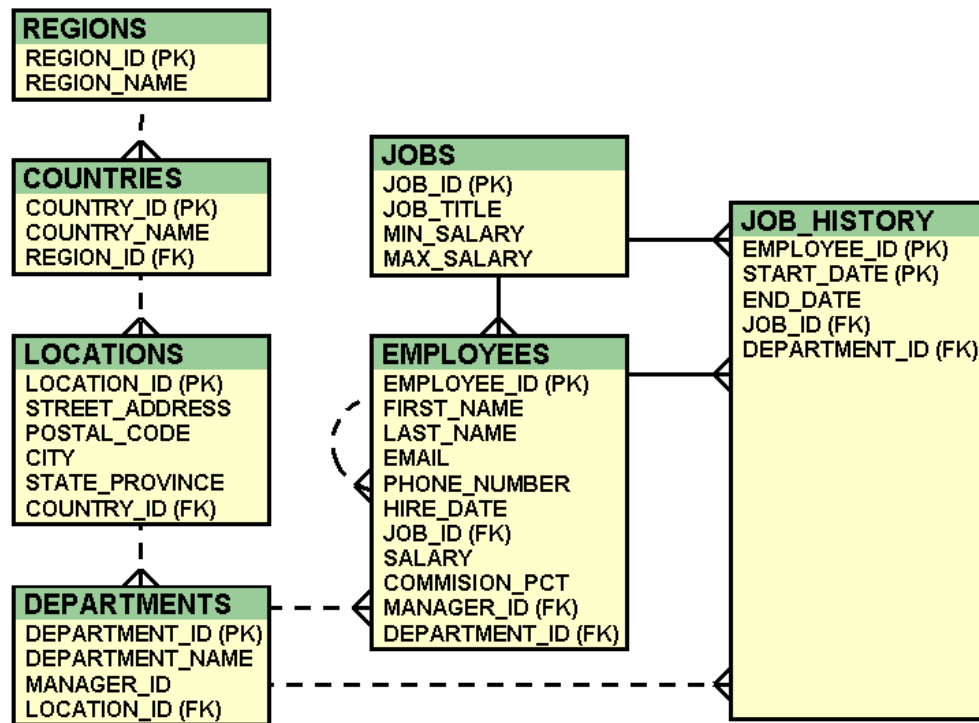

Appendix A

Practices

Practice Sessions: Overview

The HR schema:



Data Definition Language (DDL) Scripts

DDL scripts can be used to create the initial HR schema.

Table Definitions

```
PROMPT Creating Table 'REGIONS'
CREATE TABLE REGIONS
  (REGION_ID FLOAT(53) NOT NULL
  ,REGION_NAME VARCHAR2(25)
  )
/
```

```
PROMPT Creating Table 'JOBS'
CREATE TABLE JOBS
  (JOB_ID VARCHAR2(10) NOT NULL
  ,JOB_TITLE VARCHAR2(35) NOT NULL
  ,MIN_SALARY NUMBER(10,0)
  ,MAX_SALARY NUMBER(10,0)
  )
/
```

```
PROMPT Creating Table 'LOCATIONS'
CREATE TABLE LOCATIONS
  (LOCATION_ID NUMBER(5,0) NOT NULL
  ,STREET_ADDRESS VARCHAR2(40)
  ,POSTAL_CODE VARCHAR2(12)
  ,CITY VARCHAR2(30) NOT NULL
  )
/
```

```
  ,STATE_PROVINCE VARCHAR2(25)
  ,COUNTRY_ID CHAR(2)
  )
/
```

```
PROMPT Creating Table 'JOB_HISTORY'
CREATE TABLE JOB_HISTORY
  (EMPLOYEE_ID NUMBER(10,0) NOT NULL
  ,START_DATE DATE NOT NULL
  ,END_DATE DATE NOT NULL
  ,JOB_ID VARCHAR2(10) NOT NULL
  ,DEPARTMENT_ID NUMBER(5,0)
  )
/
```

```
PROMPT Creating Table 'DEPARTMENTS'
CREATE TABLE DEPARTMENTS
  (DEPARTMENT_ID NUMBER(5,0) NOT NULL
  ,DEPARTMENT_NAME VARCHAR2(30) NOT
  NULL
  ,MANAGER_ID NUMBER(10,0)
  ,LOCATION_ID NUMBER(5,0)
  )
/
```

Practice Sessions: Overview (continued)

```
PROMPT Creating Table 'EMPLOYEES'
CREATE TABLE EMPLOYEES
  (EMPLOYEE_ID NUMBER(10,0) NOT NULL
  ,FIRST_NAME VARCHAR2(20)
  ,LAST_NAME VARCHAR2(25) NOT NULL
  ,EMAIL VARCHAR2(25) NOT NULL
  ,PHONE_NUMBER VARCHAR2(20)
  ,HIRE_DATE DATE NOT NULL
  ,JOB_ID VARCHAR2(10) NOT NULL
  ,SALARY NUMBER(8,2)
  ,COMMISSION_PCT NUMBER(2,2)
  ,MANAGER_ID NUMBER(10,0)
  ,DEPARTMENT_ID NUMBER(5,0)
  )
/
```

```
PROMPT Creating Table 'COUNTRIES'
CREATE TABLE COUNTRIES
  (COUNTRY_ID CHAR(2) NOT NULL
  ,COUNTRY_NAME VARCHAR2(40)
  ,REGION_ID FLOAT(53)
  )
/
```

Constraint Definitions

```
PROMPT Creating Primary Key on
'Regions'
ALTER TABLE REGIONS
  ADD (CONSTRAINT
PK__REGIONS__76CBA758 PRIMARY KEY
  (REGION_ID))
/
```

```
PROMPT Creating Primary Key on 'JOBS'
ALTER TABLE JOBS
  ADD (CONSTRAINT PK__JOBS__023D5A04
PRIMARY KEY
  (JOB_ID))
/
```

```
PROMPT Creating Primary Key on
'LOCATIONS'
ALTER TABLE LOCATIONS
```

```
  ADD (CONSTRAINT
PK__LOCATIONS__7B905C75 PRIMARY KEY
  (LOCATION_ID))
/
```

```
PROMPT Creating Primary Key on
'JOB_HISTORY'
```

```
ALTER TABLE JOB_HISTORY
  ADD (CONSTRAINT
PK__JOB_HISTORY__0AD2A005 PRIMARY KEY
  (EMPLOYEE_ID
  ,START_DATE))
/
```

```
PROMPT Creating Primary Key on
'DEPARTMENTS'
ALTER TABLE DEPARTMENTS
  ADD (CONSTRAINT
PK__DEPARTMENTS__7E6CC920 PRIMARY KEY
  (DEPARTMENT_ID))
/
```

```
PROMPT Creating Primary Key on
'EMPLOYEES'
ALTER TABLE EMPLOYEES
  ADD (CONSTRAINT
PK__EMPLOYEES__0425A276 PRIMARY KEY
  (EMPLOYEE_ID))
/
```

```
PROMPT Creating Primary Key on
'COUNTRIES'
ALTER TABLE COUNTRIES
  ADD (CONSTRAINT
PK__COUNTRIES__78B3EFCA PRIMARY KEY
  (COUNTRY_ID))
/
```

```
PROMPT Creating Unique Key on
'EMPLOYEES'
ALTER TABLE EMPLOYEES
  ADD (CONSTRAINT
UQ__EMPLOYEES__0519C6AF UNIQUE
  (EMAIL))
/
```

```
PROMPT Creating Check Constraint on
'JOB_HISTORY'
ALTER TABLE JOB_HISTORY
  ADD (CONSTRAINT
CK__JOB_HISTORY__0EA330E9 CHECK
  (END_DATE > START_DATE))
/
```

Practice Sessions: Overview (continued)

```
PROMPT Creating Check Constraint on  
'EMPLOYEES'  
ALTER TABLE EMPLOYEES  
ADD (CONSTRAINT  
CK__EMPLOYEES__SALAR__08EA5793 CHECK  
(SALARY > 0))  
/
```

```
PROMPT Creating Foreign Key on  
'LOCATIONS'  
ALTER TABLE LOCATIONS ADD (CONSTRAINT  
FK__LOCATIONS__COUNT__7C8480AE  
FOREIGN KEY  
    (COUNTRY_ID) REFERENCES COUNTRIES  
    (COUNTRY_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'JOB_HISTORY'  
ALTER TABLE JOB_HISTORY ADD  
(CONSTRAINT  
FK__JOB_HISTO__DEPAR__0BC6C43E  
FOREIGN KEY  
    (DEPARTMENT_ID) REFERENCES  
DEPARTMENTS  
    (DEPARTMENT_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'JOB_HISTORY'  
ALTER TABLE JOB_HISTORY ADD  
(CONSTRAINT  
FK__JOB_HISTO__JOB_I__0DAF0CB0  
FOREIGN KEY  
    (JOB_ID) REFERENCES JOBS  
    (JOB_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'JOB_HISTORY'  
ALTER TABLE JOB_HISTORY ADD  
(CONSTRAINT  
FK__JOB_HISTO__EMPLO__0CBAE877  
FOREIGN KEY  
    (EMPLOYEE_ID) REFERENCES EMPLOYEES  
    (EMPLOYEE_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'DEPARTMENTS'  
ALTER TABLE DEPARTMENTS ADD  
(CONSTRAINT  
FK__DEPARTMEN__LOCAT__7F60ED59  
FOREIGN KEY  
    (LOCATION_ID) REFERENCES LOCATIONS  
    (LOCATION_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'EMPLOYEES'  
ALTER TABLE EMPLOYEES ADD (CONSTRAINT  
FK__EMPLOYEES__MANAG__07F6335A  
FOREIGN KEY  
    (MANAGER_ID) REFERENCES EMPLOYEES  
    (EMPLOYEE_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'EMPLOYEES'  
ALTER TABLE EMPLOYEES ADD (CONSTRAINT  
FK__EMPLOYEES__JOB_I__07020F21  
FOREIGN KEY  
    (JOB_ID) REFERENCES JOBS  
    (JOB_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'EMPLOYEES'  
ALTER TABLE EMPLOYEES ADD (CONSTRAINT  
FK__EMPLOYEES__DEPAR__060DEAE8  
FOREIGN KEY  
    (DEPARTMENT_ID) REFERENCES  
DEPARTMENTS  
    (DEPARTMENT_ID) ON DELETE CASCADE)  
/
```

```
PROMPT Creating Foreign Key on  
'COUNTRIES'  
ALTER TABLE COUNTRIES ADD (CONSTRAINT  
FK__COUNTRIES__REGIO__79A81403  
FOREIGN KEY  
    (REGION_ID) REFERENCES REGIONS  
    (REGION_ID) ON DELETE CASCADE)
```

Practice 2: Installing the Oracle Database Software

Background: In the practices of this course, you assume the role of a database administrator (DBA). The operating system (OS) accounts on your computer are:

- The `oracle` user with a password of `oracle`
- The `root` user with a password of `oracle`

The system administrator has set up the OS so that it is ready for the installation, and the installation media is staged at `/stage/Disk1`. Perform the following tasks as the default `oracle` OS user, unless otherwise indicated.

Use the Oracle Universal Installer (OUI) to begin your software installation of the Enterprise Edition of Oracle Database 10g Release 2. This is a “Basic Installation” of the Oracle software.

After installing the software, execute the `lab_02_05.sh` script, which creates a listener for you.

Note: Completing this practice is critical for all following practice sessions.

Your Tasks

1. Install the Oracle database software as the `oracle` user. Navigate to the `/stage/Disk1` directory, and start the OUI by entering `./runInstaller`.
2. Select your installation method by entering and accepting the following settings:

Object	Setting
Installation Method	Basic Installation
Database Home Location	<code>/u01/app/oracle/product/10.2.0/db_1</code>
Installation Type	Enterprise Edition
UNIX DBA Group	<code>oinstall</code>
Create Starter Database	<i>Deselected</i>
Inventory Directory	<code>/u01/app/oracle/oraInventory</code>

3. After entering the initial settings, OUI checks product-specific prerequisites for you. When these checks are finished, install the Oracle software.

Estimated installation time is 10–15 minutes. However, varying environments can greatly influence this estimate.

Practice 2: Installing the Oracle Database Software (continued)

4. When the Execute Configuration scripts page appears, follow the instructions on that page, accept the default for the local `bin` directory, and then finish your installation with OUI.

Make a note of your End of Installation URLs. You will use them in later practice sessions.

iSQL*PlusURL:_____

iSQL*Plus DBA URL:_____

Optionally, review the product inventory, and then exit.

5. Execute the `lab_02_05.sh` script, which is in the `/home/oracle/labs` directory. This script uses the `netca` utility to create a listener for you. If you create your first database with OUI (as part of your installation), then OUI invokes the network configuration assistant, which creates the first listener for you. For more details on listeners, see the lesson titled “Configuring the Oracle Network Environment.”

You see an activity log, which should end with a success message. If not, resolve any errors that might have occurred.

Practice 3: Creating an Oracle Database

Background: You are about to begin creating your first Oracle database. You anticipate that several similar databases will be needed in the near future. Therefore, you decide to create your ORCL database, as well as a database template and the database creation scripts. Locate the scripts in the `/home/oracle/labs` directory (which is the directory that you use most often throughout this course).

Note: Completing the database creation is critical for all following practice sessions.

Your Tasks

1. Start the Database Configuration Assistant (DBCA) by entering `dbca` in a terminal window.
2. Begin the ORCL database creation. Use the General Purpose database template. Review the template's details and answer the following questions.

Question 1: How many control files are created?

Question 2: Would it maximize database availability to multiplex them?

Question 3: How many redo log groups are created?

Question 4: Would it maximize database availability to mirror them?

Question 5: What is the database block size (`db_block_size`)?

Question 6: What is the value of Sample Schemas?

Note: You will change this setting later in this practice to create and unlock the HR sample schema.

Practice 3: Creating an Oracle Database (continued)

Question 7: What is the template default for the Database Character Set?

Note: You will change this setting later in this practice to use a Unicode database character set.

3. Create the ORCL database, as well as the ORCL template and the database generation scripts.

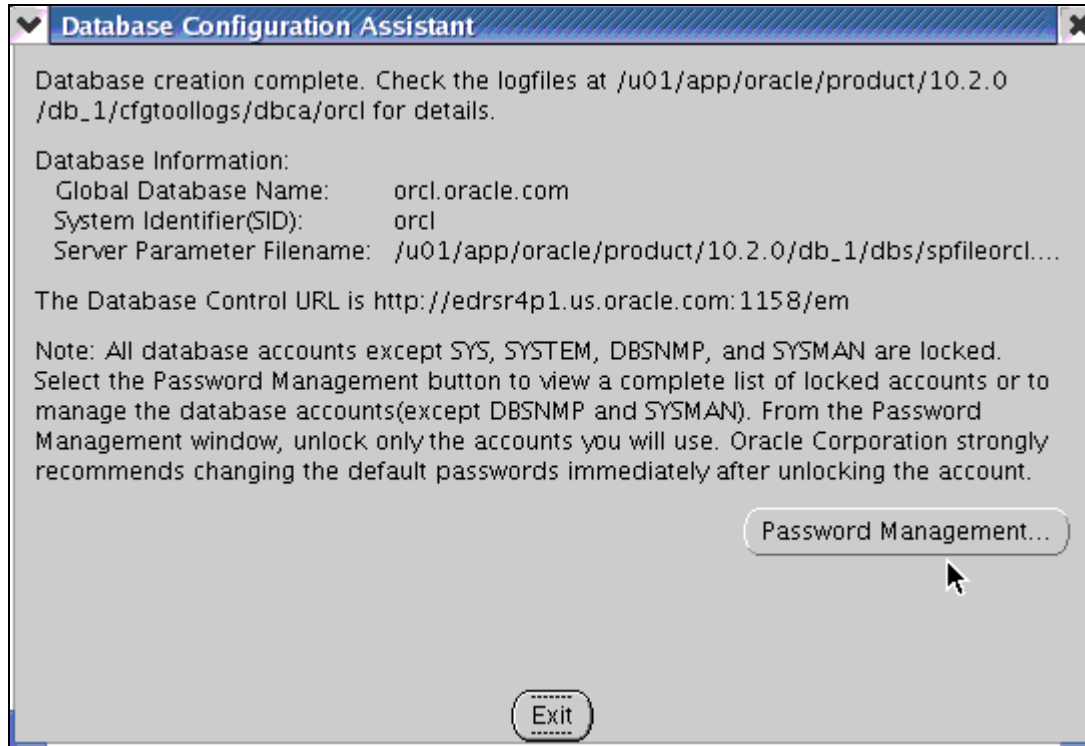
Create a database with the following settings:

Object	Setting
Global Database Name	orcl.oracle.com
SID	orcl
Configuration	Configure the Database with Enterprise Manager
Database Management	Use Database Control for Database Management
Enable Email Notifications	<i>deselect</i>
Enable Daily Backup	<i>deselect</i>
Password for All Accounts	oracle
Storage Options	File System
File Location	Use Oracle-Managed Files
Recovery Configuration	Specify Flash Recovery Area
Enable Archiving	<i>deselect</i>
Database Content	Sample Schemas enabled
Initialization Parameters Memory	Custom and Automatic Shared Memory Management
Character Sets	Use Unicode (AL32UTF8)
Creation Options:	Select all: <ul style="list-style-type: none">- Create Database- Save as a Database Template (optional)- Generate Database Creation Scripts (optional)
Template Name	orcl
Description	ORCL Database template
Destination Directory	/home/oracle/labs

Review and confirm options and parameters, such as Sample Schemas (true), db_block_size (8KB), sga_target (270MB), undo_management (AUTO), and Database Character Set (AL32UTF8).

Practice 3: Creating an Oracle Database (continued)

The DBCA displays the progress of the various installation steps. When the database itself has been created, the DBCA displays essential information about the database. Make note of this information. The Database Control URL will be used in several of the following practice sessions.



Unlock the HR user with HR as password.

You completed your task to create a database and (optionally) a database template and database generation scripts.

Practice 4: Managing the Oracle Instance

Background: You have just installed the Oracle software and created a database. You want to ensure that you can start and stop the database and see the application data.

Your Tasks

1. Invoke Enterprise Manager with Mozilla and the `oracle` profile. Enter the URL that you wrote down in Practice 3, and log in as the `SYS` user with the `oracle` password and `SYSDBA` as “Connect As.” Which port number does this database use? You noted this in Practice 3.

The first time you log in after installing the software, the “Oracle Database 10g Licensing Information” page appears. Acknowledge this information.

2. View the initialization parameters (Navigation aid: Administration > All Initialization Parameters). Set the `JOB_QUEUE_PROCESSES` parameter to 15. What SQL statement is run to do this?

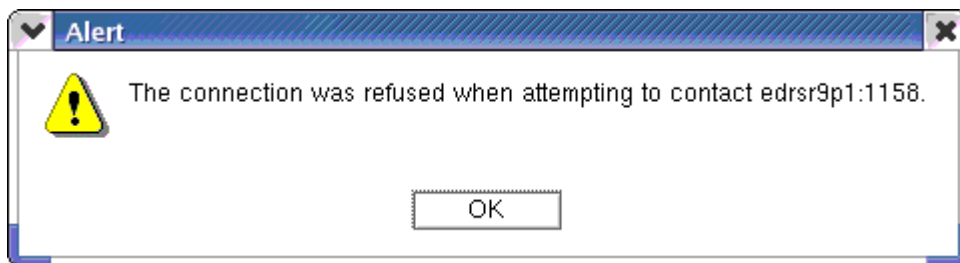
3. *Question:* What is the significance of a check in the Dynamic column?

4. Shut down the database instance by using Enterprise Manager.

For Host Credentials, enter `oracle` as Username and `oracle` as Password.

Question: What SQL is executed to shut down the database instance?

If you click Refresh during the shutdown operation, you may see the following error: Click **OK** and continue to refresh. The error will resolve itself.



Click **OK** and continue to click Refresh. Note that the Status of the instance is now “Down.”

Practice 4: Managing the Oracle Instance (continued)

5. When you note that the Status of the instance is “Down,” use SQL*Plus to verify that you are **not** able to connect as the HR user.
 6. Use Enterprise Manager to restart the database instance with the `oracle` host credentials.
Question: What SQL is run to accomplish the database startup?
-

7. In the alert log, view the phases that the database went through during startup. (Navigation aid: Database > Alert Log Content).
Question: What are the database instance startup phases?
-

8. Test access to *iSQL*Plus* for your HR application developers. (Navigation aid: Database > *iSQL*Plus*). Use the `Normal` role, `hr` username and password, and the default setting as Connect Identifier. If there is an error accessing *iSQL*Plus*, then start the `isqlplus` process using the `isqlplusctl start` command at the OS prompt, and then reattempt. After connecting, select the contents of the `EMPLOYEES` table.

When you have finished reviewing the information, log out of *iSQL*Plus* and close the *iSQL*Plus* window.

Practice 5: Managing Database Storage Structures

Background: You need to create a new tablespace for the INVENTORY application. You also need to create a database user that is not as privileged as the SYS user.

Your Tasks

1. Enter `./lab_05_01.sh` to run a script that creates the DBA1 user. It is located at `/home/oracle/labs`. The password for DBA1 is `oracle`. Leave the command shell window open. You will use it again later.
2. Use the Setup link in the top-right corner of Enterprise Manager (EM) to define the DBA1 user as one who can perform administrative tasks in EM. Use the following settings:

Object	Setting
Name	dba1
Password	Oracle
Confirm Password	Oracle
Super Administrator	<i>Selected</i>

When the non-SYS user is configured, log out as SYS user and log in as DBA1 user. Use the DBA1 user to perform the rest of these tasks, unless otherwise indicated.

3. Using Enterprise Manager, view information about the EXAMPLE tablespace (Navigation aid: Administration > Tablespaces). Answer the following questions about it:

Question 1: What percentage of free space can be used up before the Warning threshold is reached?

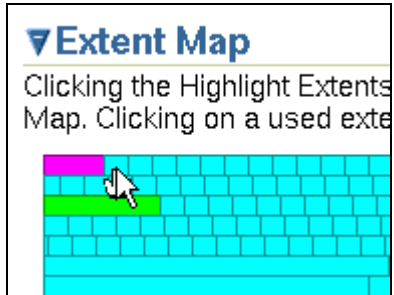
Question 2: How many segments are there in the EXAMPLE tablespace? (Navigation aid: “Show Tablespace Contents” Actions drop-down list selection).

Question 3: Which index in the EXAMPLE tablespace takes up the most space? (Navigation aid: Search type “INDEX”)

Practice 5: Managing Database Storage Structures (continued)

Question 4: Which segment is stored physically first in the tablespace? That is, which one is stored right after the tablespace header?

Look at all extent types on the Extent Map. Note the extent just to the right of the tablespace header extent.



Scroll to the top of the page again, and note the segment that is being pointed to.

-
4. Create a new, locally managed tablespace (LMT) called INVENTORY (Navigation aid: Administration > Tablespaces). Use the following specifications:

Object	Setting
Tablespace name	INVENTORY
Extent Management	Locally Managed
Type	Permanent
Status	Read Write
Use Bigfile tablespace	<i>deselected</i>
Data File Name	inventory01.dbf
File Size	5 MB
Extent Allocation	Automatic
Segment Space Management	Automatic
Enable Logging	<i>selected</i>

Review the SQL that will be run to create this tablespace.

Note: The INVENTORY tablespace will be used in later practice sessions during this class.

5. Run the lab_05_05.sql script to create and populate a table (called X) in the INVENTORY tablespace. What error do you eventually see?
-

Practice 5: Managing Database Storage Structures (continued)

6. Go to the Enterprise Manager window and define space for 50 MB in the tablespace instead of 5 MB, while keeping the same single data file in the tablespace. What is the ALTER statement that is executed to make this change?
-

7. Go back to the terminal window and run the `lab_05_07.sql` script that drops the table and reexecutes the original script that previously returned the space error.

Note that the same number of row inserts are attempted, and there is no error because of the increased size of the tablespace.

8. In a terminal window, run the `lab_05_08.sql` script to clean up the tablespace for later practice sessions.

Practice 6: Administering User Security

Background: You need to create a user account for Jenny Goodman, the new human resources department manager. There are also two new clerks in the human resources department, David Hamby and Rachel Pandya. All three of them must be able to log in to the ORCL database, select data from, and update records in the HR.EMPLOYEES table. The manager also needs to be able to insert and delete new employee records. Ensure that if the new users forget to log out at the end of the day, they will automatically be logged out after 15 minutes. You also need to create a new user account for the inventory application that you are installing.

Your Tasks

1. **Mandatory:** Review and run the lab_06_01.sh script (located in the /home/oracle/labs directory) to create the INVENTORY schema user, which you will use in the next practice.
2. Create a profile named HRPFILE, allowing 15 minutes idle time (Navigation aid: Administration > Profiles). Optionally, review the underlying SQL statement.
3. Set the RESOURCE_LIMIT initialization parameter to TRUE, so that your profile limits will be enforced time (Navigation aid: Administration > All Initialization Parameters).
4. Use EM to create the role named HRCLERK that has permission to select from and update the HR.EMPLOYEES table (Navigation aid: Administration > Roles). Review your underlying SQL statement:

```
CREATE ROLE "HRCLERK" NOT IDENTIFIED
GRANT SELECT ON "HR"."EMPLOYEES" TO "HRCLERK"
GRANT UPDATE ON "HR"."EMPLOYEES" TO "HRCLERK"
```

5. Use EM to create the role named HRMANAGER that has permissions to insert into and delete from the HR.EMPLOYEES table. Grant the HRCLERK role to the HRMANAGER role. Review your underlying SQL statement:

```
CREATE ROLE "HRMANAGER" NOT IDENTIFIED
GRANT DELETE ON "HR"."EMPLOYEES" TO "HRMANAGER"
GRANT INSERT ON "HR"."EMPLOYEES" TO "HRMANAGER"
GRANT "HRCLERK" TO "HRMANAGER"
```

Practice 6: Administering User Security (continued)

6. Use EM to create an account for David Hamby, a new HR clerk (Navigation aid: Administration > Users). Use the following specifications:

Object	Setting
Name	DHAMBY
Profile	HRPROFILE
Password Authentication	<i>selected</i>
Password	newuser
Expire Password now	<i>selected</i>
Roles	CONNECT and HRCLERK

7. Use EM to create an account for Rachel Pandya, another new HR clerk. Repeat the steps from step 6 with RPANDYA as the username.
8. Use EM to create an account for Jenny Goodman, the new HR manager. Repeat the steps from step 6 with JGOODMAN as the username and selecting the HRMANAGER role instead of the HRCLERK role. Review your underlying SQL statement:

```
CREATE USER "JGOODMAN" PROFILE "HRPROFILE" IDENTIFIED BY "*****" PASSWORD
EXPIRE ACCOUNT UNLOCK
GRANT "CONNECT" TO "JGOODMAN"
GRANT "HRMANAGER" TO "JGOODMAN"
```

9. Test the new users in SQL*Plus. Connect to the ORCL database as the DHAMBY user. Use oracle as the new password. Select the row with EMPLOYEE_ID=197 from the HR.EMPLOYEES table. Then, attempt to delete it. (You should get the “insufficient privileges” error.)
10. Repeat the delete attempt as the JGOODMAN user. After deleting the row, issue a rollback, so that you still have the original 107 rows.

Question 1: Where was the row stored after deletion?

Question 2: When you created the new users, you did not select a default or temporary tablespace. What determines the tablespaces that the new users will use?

Question 3: You did not grant the CREATE SESSION system privilege to any of the new users, but they can all connect to the database. Why?

11. Review the lab_05_01.sql script and the lab_05_01.txt log file that it generated when you created the DBA1 user.

Practice 6: Administering User Security (continued)

12. Use SQL*Plus to connect to the ORCL database as the RPANDYA user. Change the password to `oracle`. (You must change the password, because this is the first connection as RPANDYA.) Leave RPANDYA connected during the next lesson or at the end of the day. HRPROFILE specifies that users whose sessions are inactive for more than 15 minutes will automatically be logged out. Verify that the user was automatically logged out by trying to select from the `HR.EMPLOYEES` table again.

```
ERROR at line 1:  
ORA-02396: exceeded maximum idle time, please connect again
```

Practice 7: Managing Schema Objects

Background: You need to create schema objects for the new inventory application. Work as DBA1 user in the SYSDBA role for your ORCL database.

Your Tasks

1. Return to the Enterprise Manager browser session, or invoke EM as the DBA1 user in the SYSDBA role for your ORCL database.
2. In the INVENTORY tablespace, create the PRODUCT_MASTER table in the INVENTORY schema. The specifications of the table are:
 - PRODUCT_ID number(7). This is the primary key field. (Constraint name: PK_INV)
 - PRODUCT_NAME varchar2(50) with a Not NULL constraint
 - CODE varchar2(10) with a Not NULL constraint
 - REORDER_THRESHOLD number(5) with a check constraint ensuring that the number is always greater than zero (Constraint name: CHK_REORDER)
 - COST number(5,2)
 - PRICE number(5,2)
3. In the INVENTORY tablespace, create the PRODUCT_ON_HAND table in the INVENTORY schema. You have been given the lab_07_03.sql script to create the table, but there is a problem with it (*intentionally created to enhance your learning experience*). Fix the problem, and run the script. If you cannot find the error right away, then go ahead and run the original script in SQL*Plus to see the error message. This helps you discover and solve the problem. The specifications of the table are:
 - PRODUCT_ID number(7). This field should have a foreign key constraint linking it to the PRODUCT_ID field in the PRODUCT_MASTER table.
 - QUANTITY number(5)
 - WAREHOUSE_CITY varchar2(30)
 - LAST_UPDATE date
4. In the INVENTORY tablespace, create the OBSOLETE_PRODUCTS table in the INVENTORY schema. This table definition is very much like that of the PRODUCT_MASTER table, so you can use Enterprise Manager's ability to "Define Using SQL" rather than using "Column Specification." The specifications of the table are:
 - PRODUCT_ID number(7). This is the primary key field.
 - PRODUCT_NAME varchar2(50) with a Not Null constraint
 - CODE varchar2(20) with a Not Null constraint
 - COST number(5,2)
 - PRICE number(5,2)

Practice 7: Managing Schema Objects (continued)

5. In the INVENTORY tablespace, create an index called OBS_CODE on the CODE column of the OBSOLETE_PRODUCTS table in the INVENTORY schema. Choose an appropriate index type: either B-tree or Bitmap. Explain the reason for your choice.

Question: Which type of index is appropriate, and why?

6. In the INVENTORY tablespace, create an index called PROD_NAME_CODE on the combined PRODUCT_NAME and CODE columns of the PRODUCT_MASTER table. Use the lab_07_06.sql script (*which contains an error, intentionally created to enhance your learning experience*). Correct the error and run the script. If you cannot find the error right away, then run the original script in SQL*Plus to see the error message. This will help you discover and solve the problem.
 7. In the INVENTORY tablespace, use SQL*Plus to create a combined index on the PRODUCT_ID and QUANTITY columns of the PRODUCT_ON_HAND table. The index name should be POH_PROD_ID_QTY.
 8. You receive an update for the inventory application that requires you to add two columns to the PRODUCT_MASTER table. Add a column called PRIMARY_SOURCE of the data type varchar2(50). Add another column called SECONDARY_SOURCE of the data type varchar2(50). What is the SQL that executes to do this?
-
-

9. You receive another update for the inventory application. This change request instructs you to drop the OBSOLETE_PRODUCTS table and add the OBSOLETED column to the PRODUCT_MASTER table, with data type DATE. Do this using EM. What clause is added to the end of the DROP TABLE statement to also remove the table constraints?
-

10. Another change request to the inventory application instructs you to create a view called WAREHOUSE_VW (Navigation aid: Administration > Views). The view is in the INVENTORY schema and displays (in this order):

- The name of the product
- The amount of “product on hand”
- The warehouse city name

You will have to join two tables together to create this view.

Practice 7: Managing Schema Objects (continued)

11. You receive a notice from developers that there is a certain type of query that will be run very frequently, and they want to be sure that it runs in less than one second. You need to run the query and see how it performs. First, run the `lab_07_11_a.sql` script to generate some test data of the volume indicated in the request. Then, run the query in the `lab_07_11_b.sql` script several times to see the average run time. Note that it takes several seconds to run each time. Create a function-based index on the `CODE` column that will improve the performance of this query.

12. Use *iSQL*Plus* to identify the data dictionary view name that you would use to list all constraints that the `INVENTORY` user can see. What is the view name?

13. How many indexes are owned by the `INVENTORY` user? You are looking for database objects owned by the `INVENTORY` user, so you know that the data dictionary view begins with the “`USER_`” prefix. The view name is `USER_INDEXES`.

Practice 8: Managing Data and Concurrency

Background: The Help desk just received a call from Susan Mavris, an HR representative, complaining that the database is “frozen.” Upon questioning the user, you find that she was trying to update John Chen’s personnel record with his new phone number, but when she entered the new data, her session froze and she could not do anything else. SQL script files are provided for you in the `/home/oracle/labs` directory.

Your Tasks

1. Make an uncommitted update to the row in question by running the `lab_08_01.sql` script. Do not worry if the session seems to “hang”—this is the condition you are trying to create.
 2. Make an attempt to update the same row in a separate session by running, in a separate terminal window, the `lab_08_02.sql` script. Make sure you see the message “Update is being attempted now” before moving on.
 3. Using the **Blocking Sessions** link on the Performance page, detect which session is causing the locking conflict.
 4. What was the last SQL statement that the blocking session executed?
 5. Resolve the conflict in favor of the user who complained, by killing the *blocking* session. What SQL statement resolves the conflict?
-
6. Return to the SQL*Plus command window, and note that SMAVRIS’s update has now completed successfully. It may take a few seconds for the success message to appear.

Practice 9: Managing Undo Data

Background: A new version of your application will include several reports based on very long-running queries. Configure your system to support these reports.

Your Tasks

1. Use the Undo Advisor to calculate the amount of undo space required to support a report that takes two days to run, on the basis of an analysis period of the last seven days.
(Navigation aid: Administration > Advisor Central > Undo Management > Undo Advisor).

Question: What does the analysis recommend as “Required Tablespace Size for New Undo Retention”?

2. Resize the undo tablespace to support the retention period required by the new reports (or 1 GB, whichever is smaller). Do this by increasing the size of the existing data file.

Question: What are the two ways to add space to a tablespace?

Practice 10: Implementing Oracle Database Security

Background: You have just been informed of suspicious activities in the `HR.JOBS` table in your `ORCL` database. All maximum salaries seem to fluctuate in a strange way. You decide to enable standard database auditing and monitor data manipulation language (DML) activities in this table.

Log in as the `DBA1` user (with `oracle` password, connect as `SYSDBA`) and perform the necessary tasks either through Enterprise Manager Database Control or through `SQL*Plus`. All scripts for this practice are in the `/home/oracle/labs` directory.

Your Tasks

1. Use Enterprise Manager to enable database auditing. Set the `AUDIT_TRAIL` parameter to `XML`. This setting should be stored in the `SPFILE`.
2. Because you changed a static parameter, you must restart the database. Do so by running the `lab_10_02.sh` script.

Continue with the next step when you see that the database is restarted and the script has exited out of `SQL*Plus`.

3. Back in Enterprise Manager, select `HR.JOBS` as the audited object and `DELETE`, `INSERT`, and `UPDATE` as **Selected Statements**. Gather audit information by session. (Navigation aid: Administration > Audit Settings).
4. Provide input for the audit, by executing the `lab_10_04.sh` script. This script creates the `AUDIT_USER` user, connects to `SQL*Plus` as this user, and multiplies the values in the `MAX_SALARY` column by 10. Then, the `HR` user connects and divides the column values by 10. Finally, the `AUDIT_USER` user is dropped again.
5. In Enterprise Manager, review the audited objects. Use the **Audited Objects** tab.
6. Undo your audit settings for `HR.JOBS`, disable database auditing, and then restart the database by using the `lab_10_06.sh` script.
7. Maintain your audit trail: Because you are completely finished with this task, delete all audit files from the `/u01/app/oracle/admin/orcl/adump` directory.

Practice 11: Configuring the Oracle Network Environment

Background: Users need to connect to your ORCL database. Work with them to enable connections by using different methods. Ensure that users can use connect-time failover to take advantage of a backup listener.

Your Tasks

1. Make a copy of your `listener.ora` and `tnsnames.ora` files. They are in the `$ORACLE_HOME/network/admin` directory.
2. Navigate to the Net Services Administration page. Start by clicking the **Listener** link on the Database home page.
3. Modify your local Names Resolution file so that you can connect to another database. (Navigation aid: Listener link > Net Services Administration > Administer > Local Naming). Use the following information to define the connection:

Object	Setting
Connection name	Testorcl
DB ID Method	SID
SID value	Orcl
Protocol	TCP/IP
Port	1521
Host	IP or name of other student's computer

4. In Enterprise Manager, test access to your partner's ORCL database as the **system** user with the **oracle** password by using the **testorcl** Local Naming.

The Processing page displays status information. Then, it is followed by a success message. *If you receive any errors or warnings, resolve them.*

Login Information

Provide username and password for the testing the connection.

* Username

* Password

Log

Attempting to connect using userid:system

The test was successful.

Practice 11: Configuring the Oracle Network Environment (continued)

5. Test your changes to the network configuration by using SQL*Plus or iSQL*Plus. Again, use: `system/oracle@testorcl`. To see your partner's information, select the `instance_name` and `host_name` columns from the `v$instance` table. You should see your partner's host name.
6. Create a LISTENER2 listener to support connect-time failover. Use port 1561 for this listener. First, log out of Enterprise Manager and run the `lab_11_06.sh` script to configure the `NetProperties` file. (Navigation aid: Listener link > Net Services Administration > Administer > Listeners). Use the **Static Database Registration** tab on the Create Listener page to connect the listener to your database. Use the following information:

Object	Setting
Listener name	LISTENER2
Host	<your computer's name>
Service name	orcl
Protocol	TCP/IP
Port	1561
SID	orcl
Oracle Home Directory	/u01/app/oracle/product/10.2.0/db_1

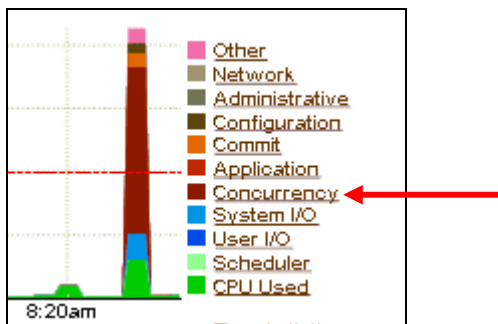
7. Start the LISTENER2 listener.

Practice 12: Proactive Maintenance

Background: You want to proactively monitor your ORCL database so that common problems can be fixed before they affect users. This practice session invents some issues so that you can familiarize yourself with the tools that are available. First, execute scripts to set up your Automatic Database Diagnostic Management (ADDM) environment.

Your Tasks

1. Create a new locally managed tablespace called TBSADDM. Its addm1.dbf data file is 50 MB. Ensure that the TBSADDM tablespace does not use Automatic Segment Space Management (ASSM). Execute the lab_12_01.sh script to perform these tasks.
2. Create a new ADDM user, identified by ADDM. Assign the TBSADDM tablespace as default tablespace. Assign the TEMP tablespace as temporary tablespace. Grant the following roles to the ADDM user: CONNECT, RESOURCE, and DBA. Execute the lab_12_02.sh script to perform these tasks.
3. Use the DBMS_ADVISOR package to set the database activity time to 30 minutes. As an ADDM user, drop and create the ADDM table and gather statistics for this table. Create a snapshot in Automatic Workload Repository (AWR). Execute the lab_12_03.sh script to perform these tasks.
4. Create activity to be analyzed. Execute the lab_12_04.sh script to perform these tasks.
5. In Enterprise Manager, review the Performance page as a user connected as SYSDBA. View performance data in real time with a 15-seconds refresh cycle. After a while, you should see a spike on the “Average Active Sessions” graph. This is your activity to be analyzed. Looking at the graph, you can already determine that this instance is suffering from concurrency problems. If this is the first time that you accessed the Performance page, you need to accept the Adobe license agreement. Follow the directions in the pop-up window to accept the agreement.



Note: Depending on when you run the workload, you may see differences between your graph and the one provided as a possible solution.

After the spike is finished, execute the lab_12_05.sh script. This script forces the creation of a new snapshot and gathers statistics on your ADDM table.

Practice 12: Proactive Maintenance (continued)

6. Look at the **Performance Analysis** findings in order of their impact. There are several access paths to this information.

Looking at the Performance Analysis section, you see that the first finding (in the SQL Tuning Recommendations category) has a 100% impact on the system. So your first impulse is to look at this finding in more detail. However, looking at this SQL statement does not yet help you to understand the concurrency problem of your database.

Research the next finding under Schema Recommendations: **Read and write contention of database blocks was consuming significant database time**. Here, you are advised to use the Automatic Segment Space Management (ASSM) feature for your ADDM table.

7. To implement the recommendation, you must re-create the object. Create a new locally managed tablespace, called TBSADDM2 with a 50 MB data file, called addm2_1.dbf. Ensure that the TBSADDM2 tablespace uses the the ASSM feature. Then, execute the lab_12_07.sh script to drop the ADDM table, to re-create it in the new tablespace, to gather statistics and to take a new snapshot.
8. Execute your workload again by running the lab_12_08.sh script. (The lab_12_08.sh script is identical to the lab_12_04.sh script.)
9. In Enterprise Manager, review the Performance page as a user connected as SYSDBA. View performance data in real time with a 15-seconds refresh cycle. After a while, you should see a spike on the “Average Active Sessions” graph.

Note: Depending on when you run the workload, you may see differences between your graph and the one provided as a possible solution.

After the spike is finished, execute the lab_12_09.sh script. (The lab_12_09.sh script is identical to the lab_12_05.sh script.) This script forces the creation of a new snapshot and gathers statistics on your ADDM table.

10. Review the Performance Analysis on the Database home page. View the information for this last ADDM task.

You see that there are no longer any schema-related recommendations. By moving the ADDM table to the locally managed TBSADDM2 tablespace, which uses the Automatic Autoextend Segment feature, you obviously fixed the root cause of this problem.

11. To not affect other practice session, execute the lab_12_11.sh script to clean up your environment.

Practice 13: Performance Management

Background: Users are complaining about slower-than-normal performance for operations involving the human resources and order-entry applications. When you question other members of the DBA staff, you find that maintenance was recently performed on some of the tables belonging to the HR schema. You need to troubleshoot and make changes as appropriate to resolve the performance problems. SQL script files are provided for you in the `/home/oracle/labs` directory. Other directories are individually named.

Your Tasks

1. Log in to SQL*Plus as the DBA1 user and perform maintenance on tables in the HR schema by running the `lab_13_01.sql` script.
 2. You get calls from HR application users saying that a particular query is taking longer than normal to execute. The query is in the `lab_13_02.sql` script. As the HR user, run it.
 3. Using Enterprise Manager (EM), locate the HR session in which the above statement was just executed, and view the execution plan for that statement. (Navigation aid: Performance > Search Sessions).
 4. Using EM, check to see the status of the EMPLOYEE table's index on EMPLOYEE_ID. See if it is VALID. (Navigation aid: Administration > Indexes).
 5. Now that you have seen one index with a non-VALID status, you decide to check all indexes. Using SQL*Plus, as the HR user, find out which HR schema indexes do not have STATUS of VALID. To do this, you can query a data dictionary view with a condition on the STATUS column.
 6. Using EM, reorganize all the indexes in the HR schema that are marked as UNUSABLE.
 7. Return to the SQL*Plus session where the HR user is logged in, and run the `lab_13_07.sql` script to execute the same kind of query. Then, repeat the steps to see the plan of the last SQL statement executed by this session, to see if the plan has changed.
 8. What is the difference in execution plans, and why?
-

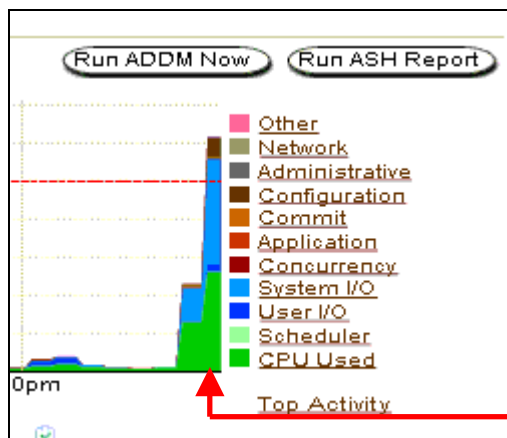
Practice 13: Performance Management (continued)

9. Simulate a working load on your instance by running the `lab_13_09.sql` script as the DBA1 user. Note the SID value for task 10.

This script takes about 20 minutes to complete. So, run it in a separate terminal window and continue with this practice exercise while it runs.

Note: Because this script generates a fairly heavy load in terms of CPU and disk I/O, you will notice that response time for Database Control is slower.

Use EM to view overall instance performance and answer the following questions:



Wait to see the beginning of a spike in the **Average Active Sessions** graph before proceeding.

Question 1: In the **Average Active Sessions** graph, which are the two main categories that active sessions are waiting for?

Question 2: In the Configuration category of waits, what is one of the contributors to the wait time? Click **Configuration** to see the graph.

Question 3: Review the **Physical Writes** on the **Instance Disk I/O** graph. Determine which process is doing the most writing to the disk.

Question 4: Review the **Top Activity** under **Additional Monitoring Links**. Which SQL statement is causing the most waits?

-
10. Kill the session that is generating the load. Use the SID value from step 9 in Enterprise Manager's **Search Sessions** link on the **Performance** tab to locate and kill the session.

Practice 14: Backup and Recovery Concepts

Background: Your ORCL database is ready to move from test or development into production. Configure your database to reduce the chances of failure or data loss.

Your Tasks

1. Verify that you have two control files to ensure redundancy. (Navigation aid: Administration > Control Files).

Question 1: How would you add another control file if you needed to?

2. Check how many members each redo log group has. Ensure that there are at least two redo log members in each group. In what directory or directories are the redo log files stored?

Note: In a production database, you want to ensure that the two members are on different hard drives, preferably with different disk controllers, to minimize the risk of any single hardware failure destroying an entire log group.

3. You notice that, for each log group, the Archived column has a value of No. This means that your database is not retaining copies of redo logs to use for database recovery, and in the event of a failure, you will lose all data since your last backup. Place your database in ARCHIVELOG mode, so that redo logs will be archived.

In the OS, create a new directory /u01/app/oracle/archive as the destination for the redo log files. In Enterprise Manager, verify that Log Archive Filename Format contains %t, %s, and %r.

Notice that the database is preconfigured to save archived logs to the Flash Recovery Area by default (Archive Log Destination 10).

Practice 14: Backup and Recovery Concepts (continued)

4. Configure redundant archive log destinations—one to the Flash Recovery Area and the other to /u01/app/oracle/archive/. Do not forget the trailing slash. Leave **Quota** blank.

Optionally, review the underlying SQL statement:

Show SQL

```
ALTER SYSTEM SET log_archive_dest_1 =  
"LOCATION=/u01/app/oracle/archive/ OPTIONAL REOPEN=300" SCOPE=BOTH  
ALTER SYSTEM SET log_archive_dest_10 =  
"LOCATION=USE_DB_RECOVERY_FILE_DEST OPTIONAL REOPEN=300" SCOPE=BOTH
```

When prompted, restart your database with oracle Host Credentials and the SYS user.

Now that your database is in ARCHIVELOG mode, it will continually archive a copy of each online redo log file before reusing it for additional redo data.

Note: Remember that this consumes space on the disk and that you must regularly back up older archive logs to some other storage.

Practice 15: Performing Database Backups

Background: Your database is ready to move from development and test into production. Ensure that your database is configured so that recovery is possible without loss of data.

Your Tasks

1. What is the difference between a backup set and an image copy?

2. What is the destination of any disk backups that are done?

3. Test making a backup to disk, as a backup set, with `oracle` for Host Credentials. (Navigation aid: Maintenance > Backup Settings)
4. Back up your entire database, without archived logs, while the database is open for user activity. This backup should be the base for an incremental backup strategy (Navigation aid: Maintenance > Schedule Backup).

Question: What prerequisite *must* be met to create a valid backup of a database without shutting it down?

Use the following specifications to perform the backup:

Object	Setting
Object(s)	Whole Database
Host Credentials Username	oracle
Host Credentials Password	oracle
Backup Type	Full Backup
Use as the base of an incremental backup strategy	<i>selected</i>
Backup Mode	Online Backup
Backup Location	Disk
Disk Backup Location	Flash Recovery Area
Also backup all archived logs on disk	<i>deselected</i>
Schedule	<i>Defaults selected</i>

Submit and monitor the job. This backup takes approximately 15 minutes to complete.

Practice 15: Performing Database Backups (continued)

5. Schedule nightly disk-based incremental online backups for your whole database, without archived logs backup (Navigation aid: Maintenance > Schedule Backup). Schedule it for 11:00 p.m.. The schedule should be in effect indefinitely.

Use the following specifications:

Object	Setting
Object(s)	Whole Database
Host Credentials Username	oracle
Host Credentials Password	oracle
Backup Type	Incremental Backup (Level 1)
Use as the base of an incremental backup strategy	<i>selected</i>
Backup Mode	Online Backup
Also backup all archived logs on disk	<i>deselected</i>
Backup Location	Disk – Flash Recovery Area
Job Name	Nightly_Backup
Job Description	<i>Default selected</i>
Start	Later
Time	11:00 p.m.
Repeat	Interval
Frequency	1 Days

Practice 16: Performing Database Recovery

Background: Many failures of the Oracle database can be traced to some sort of media failure, such as disk or controller failure. Recover your database from a variety of simulated media failures. SQL script files are provided for you in the `/home/oracle/labs` directory. If needed, use appendix C for Linux and appendix D for SQL syntax. Note that where OS file names are mentioned, your system may possibly have different file names than shown here.

Your Tasks

1. Recover from the loss of a control file.
 - a) As the DBA1 user, run the `lab_16_01_a.sql` script to prepare some procedures to be called by the rest of this practice.
 - b) Now run the `lab_16_01_b.sql` script. This script deletes one of your control files.
 - c) The Help desk begins receiving calls saying that the database appears to be down. Troubleshoot and recover as necessary. Use Enterprise Manager's Database page to attempt to start up the database, and use SQL*Plus, if needed.
 - d) The startup of the instance fails with Enterprise Manager, and you can get no other information to explain the failure. So use the command-line tools.
 - Connect to the instance with SQL*Plus as `sysdba` and check the current status of the instance.
 - Attempt to mount the database.
 - e) The instance cannot move to the mount stage because it cannot find one of the control files. Check the last 10 rows of the alert log to see which control file is the problem.
 - f) The control file in the Flash Recovery Area is missing. Restore the missing control file by copying the existing control file, and then mount and open the database.

Question 1: Why did you have to use two commands to move the instance state from NOMOUNT to OPEN?

Question 2: Why did you use operating system commands to restore the control file instead of using Oracle Recovery Manager?

Practice 16: Performing Database Recovery (continued)

2. Recover from the loss of an application data file.

- a) Start a SQL*Plus session as the DBA1 user, and run the `lab_16_02.sql` script. This script deletes one of your application data files.
- b) The Help desk has received a call from a user who is unable to access the `COUNTRIES` table in the `HR` application schema. Count the rows in the table to see whether there is a problem.
- c) Troubleshoot and recover as necessary. The error message suggests that the data file for the `EXAMPLES` tablespace is corrupt or missing. Using operating system commands, verify that there is a problem with the file.
- d) Recover the data file to the current time, specifying the missing data file to be recovered. (Navigation aid: Maintenance > Perform recovery > Object Type > Datafiles).
- e) Verify that the `COUNTRIES` table is now accessible.

3. Recover from the loss of a system data file.

- a) *Question 3:* Why is recovery from the loss of a system data file or a data file belonging to an undo tablespace different from recovering an application data file?

- b) As `SYSDBA`, run the `lab_16_03.sql` script. This script deletes the system data file.
- c) In Enterprise Manager, review the Database home page. The database is shut down, so you click **Startup** to try to open it.
 - Enter the host credentials as `oracle` and `oracle` for the host **Username** and **Password**, and enter `DBA1` and `oracle` for the database credentials, and then click **OK**.
- d) This command will fail with the database left in the `MOUNT` state, because there is a data file missing from the `SYSTEM` tablespace.
- e) Recover the missing data file.
- f) Open the database.
- g) Verify that the database is open and operating normally, by logging into EM as `DBA1/oracle`, as `SYSDBA`, and reviewing the Database home page.

Practice 17: Performing Flashback




Background: You decide to gain hands-on experience in some of the flashback functionality. To avoid impacting other users, you will first copy the DEPARTMENTS table of the HR schema to DEPARTMENTS2.

Your Tasks

1. Log in to SQL*Plus as DBA1 user and create a new HR.DEPARTMENTS2 table based on the HR.DEPARTMENTS table. Count the rows in the DEPARTMENTS2 table. There should be 27 rows.
2. Drop the HR.DEPARTMENTS2 table, and then verify that it has indeed been dropped.
3. Use the FLASHBACK TABLE command to restore the table. Count the rows in the DEPARTMENTS2 table.
4. Run the lab_17_04.sql script to insert three rows into the HR.DEPARTMENTS2 table by using three separate transactions. The new rows have DEPARTMENT_ID values of 280, 290, and 300.
5. Use Enterprise Manager to perform flashback to the version of the table where only the first of the three new rows is present (with DEPARTMENT_ID = 280). (Navigation aid: Maintenance > Perform Recovery). First, evaluate row changes to decide on a point in time. Limit your analysis to the new rows just added: where department_id >= 280. If you receive an error while performing the flashback, you may need to enable row movement on the table. See the next step. Use the following specifications:

Object	Setting
Object Type	Tables
Operation Type	Flashback Existing Tables
Evaluate row changes and transactions to decide on a point in time	<i>selected</i>
Table	HR.DEPARTMENTS2
Choose Columns > Selected Columns	DEPARTMENT_ID
Bind The Row Value	where department_id >= 280

Review the Flashback Versions Query Result.

Flashback Versions Query Result					
Select	Flashback SCN	Flashback Timestamp	Transaction ID	Operation	DEPARTMENT_ID
	6800080	Jun 9, 2005 5:15:32 PM	0A002B00A6030000	INSERT	300
	6800061	Jun 9, 2005 5:15:15 PM	03002400CB030000	INSERT	290
	6800049	Jun 9, 2005 5:14:53 PM	05000600FA030000	INSERT	280

Select the row with the DEPARTMENT_ID = 290 and continue your flashback operation. Review the SQL statement that you are about to execute and submit your operation.

Practice 17: Performing Flashback (continued)

6. You find that the operation fails because row movement is not enabled for the table. You may recall from the lesson that row movement must be enabled for this feature to work.

Enable row movement (Navigation aid: Administration > Tables). Review the underlying SQL statement:

```
ALTER TABLE "HR"."DEPARTMENTS2" ENABLE ROW MOVEMENT
```

After the table modification is confirmed, you can perform the flashback operation.

Repeat step 5 to perform the version flashback of the table. Because row movement has been enabled, it should succeed this time.

Then, in SQL*Plus, count the rows of the HR.DEPARTMENTS2 table to confirm the flashback operation. Note that there is only one additional row now, not three. Then, display the rows where DEPARTMENT_ID >= 280. Note that only one of the original three is remaining.

```
SQL> select count(*) from hr.departments2;

COUNT(*)
-----
        28

SQL> select * from hr.departments2 where department_id >= 280;

DEPARTMENT_ID DEPARTMENT_NAME          MANAGER_ID LOCATION_ID
-----
          280 DUMMY1
```

Practice 18: Moving Data

Background: In the recent past, you received a number of questions about the HR schema. To analyze them, without interfering in the daily activities, you decide to use the Data Pump Wizard to export the HR schema to file. When you perform the export, you are not sure into which database you will be importing this schema.

In the end, you find out that the only database for which management approves an import, is the ORCL database. So, you perform the import with the Data Pump Wizard, remapping the HR schema to a newly created HR_TEST schema in the HR_TEST tablespace. To follow best practice guidelines, you also decide to create a DP user who will be a DBA performing Data Pump jobs. For your convenience in class, the creation of the DP user is included in the lab_18_01.sql script. SQL scripts are in the /home/oracle/labs directory. However, there is one step missing.

Then you receive two data load requests for which you decide to use SQL*Loader.

Your Tasks

1. Review the lab_18_01.sql script, which creates the HR_TEST tablespace, the HR_TEST_ROLE role, and the HR_TEST and DP users. Note the passwords for these users.

HR_TEST password: _____

DP password: _____

Which additional step do you need to perform to allow the DP user access to Enterprise Manager as Administrator?

2. Execute the lab_18_02.sh script. Then, perform the required step to make the DP user an EM administrator.

Practice 18: Moving Data (continued)

3. Log in to Enterprise Manager as the DP user in the Normal role and export the HR schema (Navigation aid: Maintenance > Export to Export Files). Use the following specifications:

Object	Setting
Username	oracle
Password	oracle
Save as Preferred Credential	<i>selected</i>
Export: Schemas	HR
Export Options: Directory Objects	DATA_PUMP_DIR
Log File	hrexpl.log
Export Files: Directory Objects	DATA_PUMP_DIR
File Name	HREXP%U.DMP
Export Schedule: Job Name	hrexpl
Description	Export HR schema
Job Start Time	Immediate

Review the PL/SQL that the Export Wizard helped you to create and submit the job. A processing message appears, and then a success message. If not, resolve any errors, which may have occurred.

Note: Please wait, not only for the job to be created, but also for the job to complete execution. (It may take two minutes.)

4. As the DP user, import the exported HR schema back into the ORCL database, remapping it to the previously created HR_TEST schema. (Navigation aid: Maintenance > Import from Export Files). Use the following import specifications:

Object	Setting
Import Files: Directory Objects	DATA_PUMP_DIR
File Name	HREXP%U.DMP
Import Type	Schemas
Host credentials	oracle

The Data Pump Wizard reads the specified import file and gives you a success message. If not, resolve any errors that may have occurred.

Practice 18: Moving Data (continued)

Use the following import remapping specifications:

Object	Setting
Re-Map Schemas: Source Schema	HR
Re-Map Schemas: Destination Schema	HR_TEST
Re-Map Tablespaces: Destination Tablespace	HR_TEST
Import Options: Directory Objects	DATA_PUMP_DIR
Log file	hrimport.log
Import Schedule: Job Name	hrimp
Description	Import HR schema for test purposes
Start	Later
Time	Enter a time between 2 and 5 minutes from now (to give yourself time for submitting and monitoring the job)

(Navigation aid: Maintenance > Monitor Export and Import Jobs) Monitor the job while it is executing.

Optional, as this requires quick action: Suspend and resume the job.

In the end, you want to see that your job executed 100% without any errors.

Verify the import succeeded by viewing the log file.

```
$ cat </u01/app/oracle/product/10.2.0/db_1/rdbms/log/hrimport.log
```

Note: You may see an error saying that the hr_test object already exists. This is because that user existed when you did the export, and still exists. This is not a problem.

Select data from tables in the hr_test schema, for verification of the import.

Practice 18: Moving Data (continued)

5. As the DP user, load data into the PRODUCT_MASTER table by using SQL*Loader via Enterprise Manager Database Control. (Navigation aid: Maintenance > Load Data from User Files). Use the following loading specifications:

Object	Setting
Use Existing Control File	<i>selected</i>
Username	oracle
Password	oracle
Save as Preferred Credential	<i>selected</i>
Load Data Control File Name	/home/oracle/labs/lab_18_05.ctl
Data File: Provide the full path and name on the database server machine	<i>selected</i>
Data File Name	/home/oracle/labs/lab_18_05.dat
Load Method	Conventional Path
Load Data Options: Log File Name	/home/oracle/labs/lab_18_05.log
Load Data Schedule: Job Name	lab_18_05
Description	Load data into the PRODUCT_MASTER table
Start	Immediately

Submit your job and confirm your results by viewing your lab_18_05.log file.

6. As the INVENTORY user, load data into the PRODUCT_ON_HAND table by using SQL*Loader command line. (Enter the command in continuation, without pressing [Enter] before reaching the end of the command: **sqlldr**
userid=inventory/verysecure control=lab_18_06.ctl log=lab-_18_06.log data=lab_18_06.dat).

Confirm your results by viewing your lab_18_06.log file in your /home/oracle/labs directory.

