DATABASE ADMINISTRATION

Lab 5 – Blockades, monitoring

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Part 1 - Locks

1. Connect to the base as an administrator.

```
SQL> conn
Enter user-name: sys as sysdba
Enter password:
Connected.
SQL>
```

2. Verify that a role named hremployee exists in the system. If so, remove it.

```
SQL> SELECT * FROM dba_roles WHERE role IN ('hremployee');

no rows selected

SQL>
```

3. Verify that there are users named smavris and NGREENBERG in the system. If so, delete them.

```
SQL> SELECT username FROM dba_users WHERE username IN ('smavris', 'NGREENBERG');

no rows selected

SQL>
```

4. Create the hremployee role and give it the privilege of connecting to the base.

```
SQL> CREATE ROLE hremployee;

Role created.

SQL> GRANT connect TO hremployee;

Grant succeeded.

SQL>
```

5. Give the role select and update privileges on the employees table in the hr user schema.

```
SQL> GRANT select, update ON hr.employees to hremployee;

Grant succeeded.

SQL>
```

6. Give the hremployee role identified by the password oracle_4U to SMARVIS and NGREENBERG users. Note that the grant command will create a new user (!).

```
SQL> GRANT hremployee TO SMARVIS, NGREENBERG IDENTIFIED BY oracle_4U, oracle_4U;

Grant succeeded.

SQL>
```

7. Connect to the base as the NGREENBERG user and update the telephone number of employee 110 (John Chen) in the hr.employees table. Leave the session open in this state.

```
[oracle@localhost ~]$ sqlplus

SQL*Plus: Release 11.2.0.2.0 Production on Fri Nov 12 05:16:20 2021

Copyright (c) 1982, 2010, Oracle.  All rights reserved.

Enter user-name: NGREENBERG
Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> SELECT employee_id, first_name, last_name, phone_number FROM hr.employees WHERE emp
loyee_id IN ('110');

EMPLOYEE_ID FIRST_NAME           LAST_NAME                 PHONE_NUMBER
----------- -------------------- ------------------------- --------------------
        110 John                 Chen                      515.124.4269

SQL> UPDATE hr.employees SET phone_number='123.456.7890' WHERE employee_id IN ('110');

1 row updated.

SQL> SELECT employee_id, first_name, last_name, phone_number FROM hr.employees WHERE emp
loyee_id IN ('110');

EMPLOYEE_ID FIRST_NAME           LAST_NAME                 PHONE_NUMBER
----------- -------------------- ------------------------- --------------------
        110 John                 Chen                      123.456.7890

SQL>
```

8. Open a new SQL * Plus terminal window. As administrator, execute the sleep command (this way you will be sure that the NGREENBERG session is the first to get a lock. Code:

```
begin
sys.dbms_lock.sleep (20);
end;
/
```

```
[oracle@localhost ~]$ sqlplus

SQL*Plus: Release 11.2.0.2.0 Production on Fri Nov 12 05:20:37 2021

Copyright (c) 1982, 2010, Oracle.  All rights reserved.

Enter user-name: sys as sysdba
Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> begin
  2  sys.dbms_lock.sleep(20);
  3  end;
  4  /

PL/SQL procedure successfully completed.

SQL>
```

9. Wait for the end of sleep and log into the SMARVIS user. Perform the same update on the Users table (employee_id = 110) from his session. What have you noticed?

```
[oracle@localhost ~]$ sqlplus

SQL*Plus: Release 11.2.0.2.0 Production on Fri Nov 12 05:22:30 2021

Copyright (c) 1982, 2010, Oracle.  All rights reserved.

Enter user-name: SMARVIS
Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> SELECT employee_id, first_name, last_name, phone_number FROM hr.employees where emp
loyee_id IN ('110');

EMPLOYEE_ID FIRST_NAME           LAST_NAME                 PHONE_NUMBER
----------- -------------------- ------------------------- --------------------
        110 John                 Chen                      515.124.4269

SQL> UPDATE hr.employees SET phone_number='098.765.4321' WHERE employee_id IN ('110');
```

The operation for this session is blocked, so it is waiting.

10. Using the Blocking Sessions Enterprise Manager option, determine which session is causing the block conflict (Performance | Additional Monitoring Links | Blocking Sessions option).

Database Instance: orcl > Logged in As SYS

Blocking Sessions

Page Refreshed **Nov 12, 2021 6:13:43 AM PST** Refresh

View Session | Kill Session

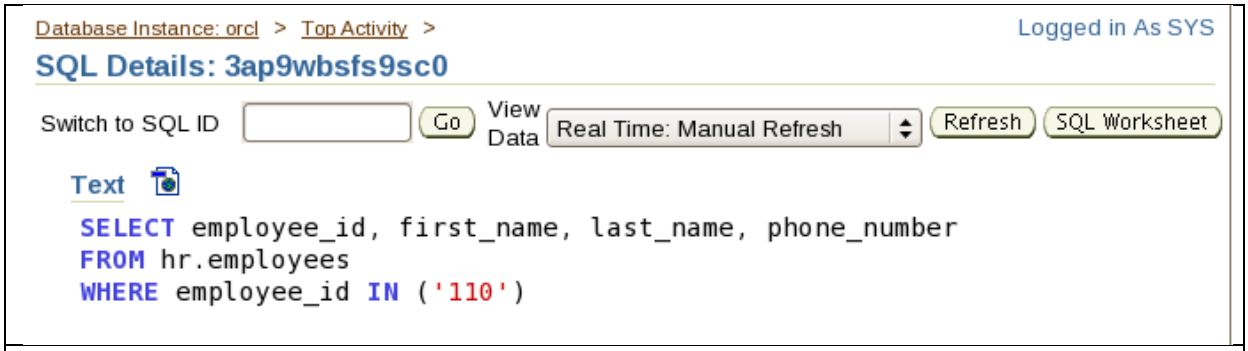
Expand All | Collapse All

Select	Username	Sessions Blocked	Session ID	Serial Number	SQL ID	Wait Class	Wait Event	P1 Value	P2 Value	P3 Value	Seconds in Wait
	Blocking Sessions										
◉	NGREENBERG	1	29	139	3ap9wbsfs9sc0	Idle	SQL*Net message from client	1650815232	1	0	3297
○	SMARVIS	0	151	289		Application	enq: TX - row lock contention	1415053318	327690	9482	2928

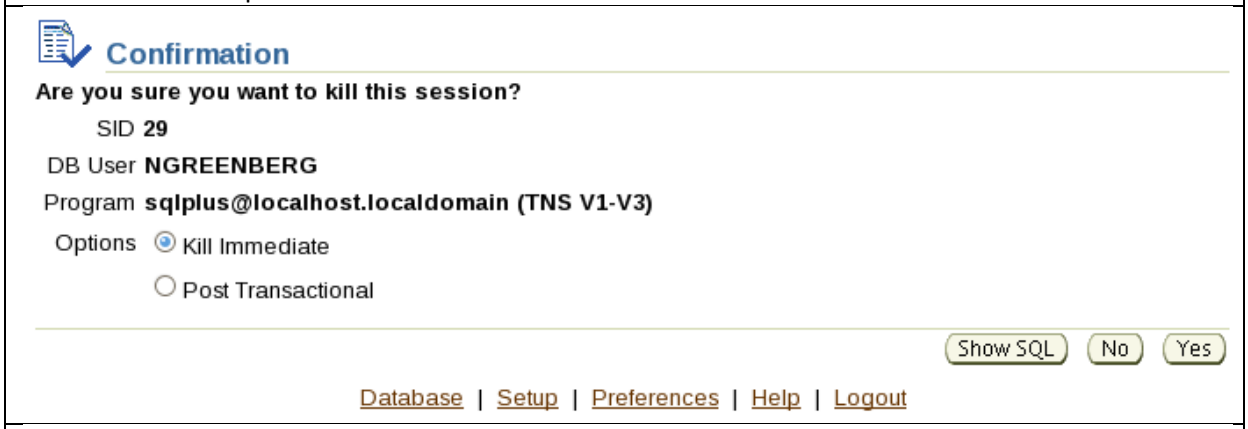
11. Check which command caused the lock conflict. To do this, select the NGREENBERG session and choose the View Session option. Then click the hash link for Previous SQL.

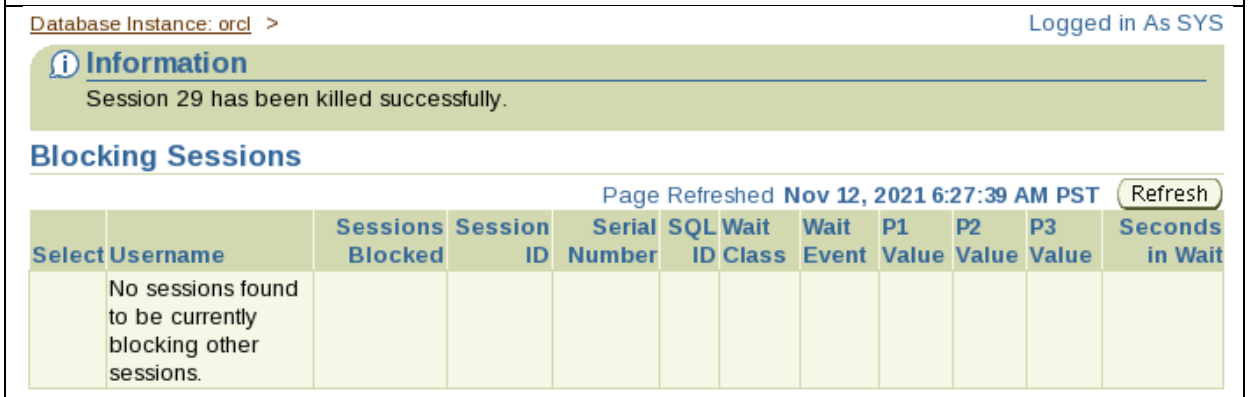
Application

Current SQL	3ap9wbsfs9sc0
Current SQL Command	**SELECT**
Last Call Duration	**1:6:30 (hh:mm:ss)**
SQL Trace	**DISABLED**
Current SQL Trace Level	1
Trace With Wait Information	**DISABLED**
Trace With Bind Information	**DISABLED**
Open Cursors	31
Program	**sqlplus@localhost.localdomain (TNS V1-V3)**
Service	SYS$USERS
Current Module	SQL*Plus
Current Action	**Unavailable**

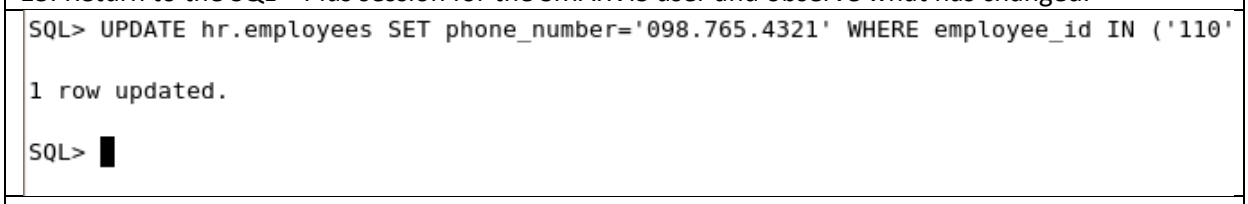


12. Go back to the previous view and kill NGREENBERG's session.





13. Return to the SQL * Plus session for the SMARVIS user and observe what has changed.



14. Try to execute any SQL command in the NGREENBERG user session window. What you see?

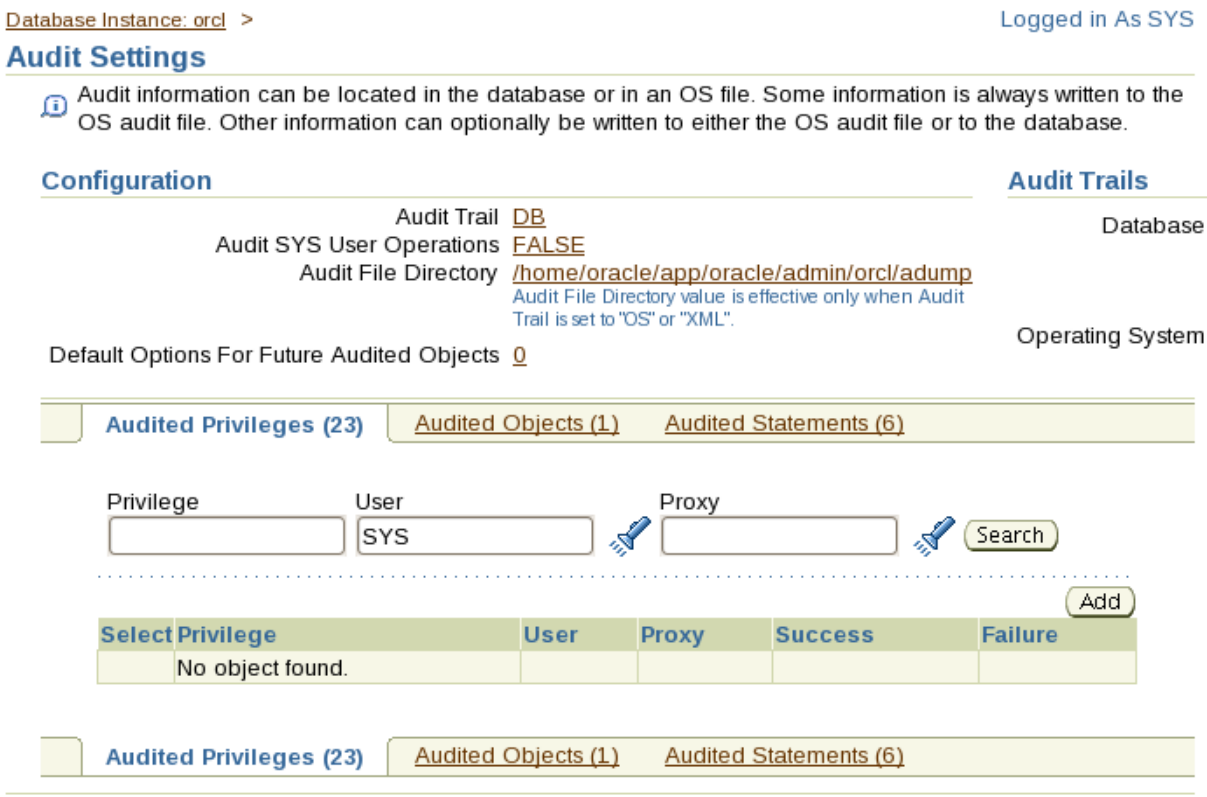
```
SQL> SELECT * FROM hr.employees WHERE employee_id IN ('110');
SELECT * FROM hr.employees WHERE employee_id IN ('110')
*
ERROR at line 1:
ORA-12571: TNS:packet writer failure


SQL> select * from hr.employees;
ERROR:
ORA-03114: not connected to ORACLE


SQL>
```

Not connected to Oracle.

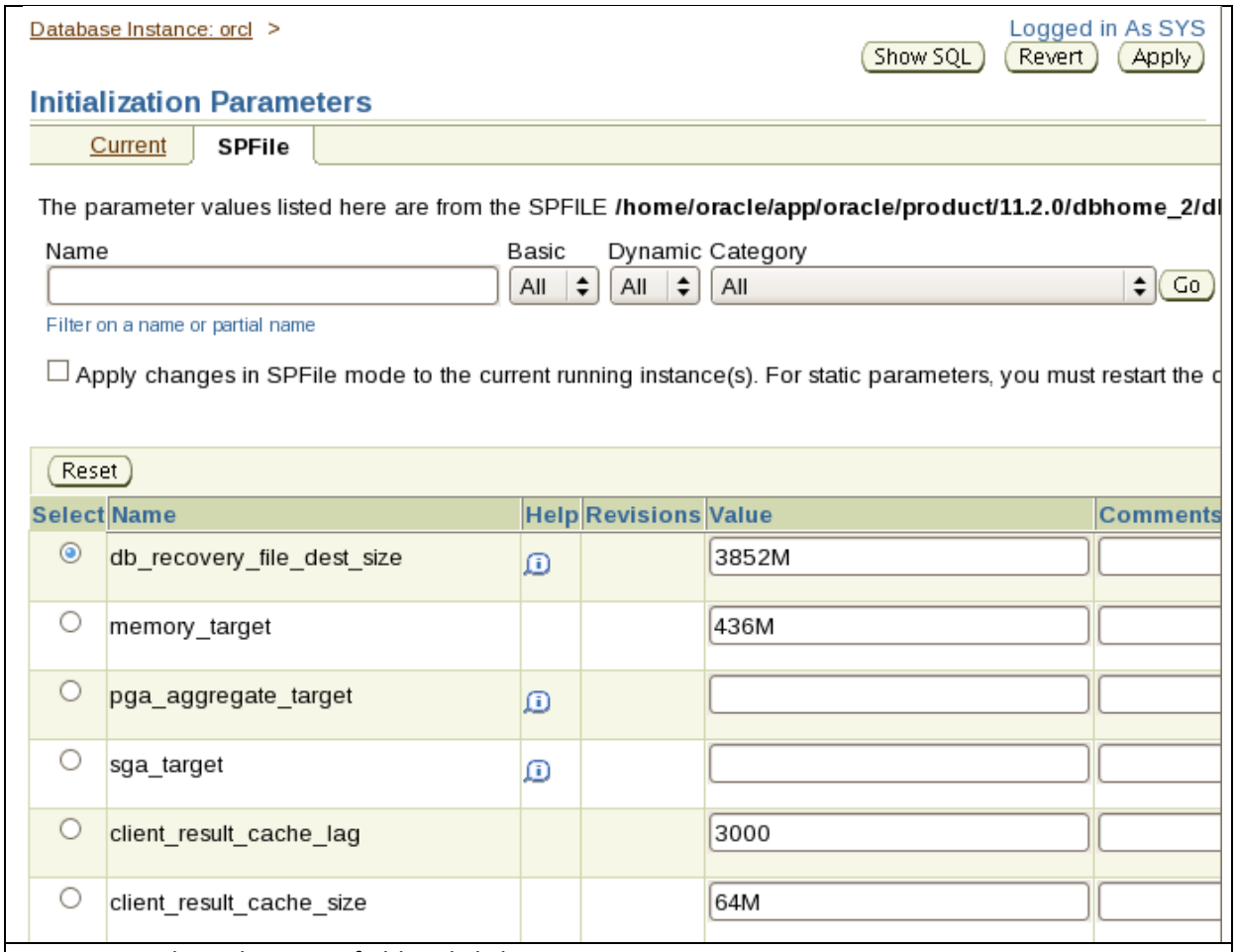
15. Close all sessions.

Part 2 - User activity monitoring

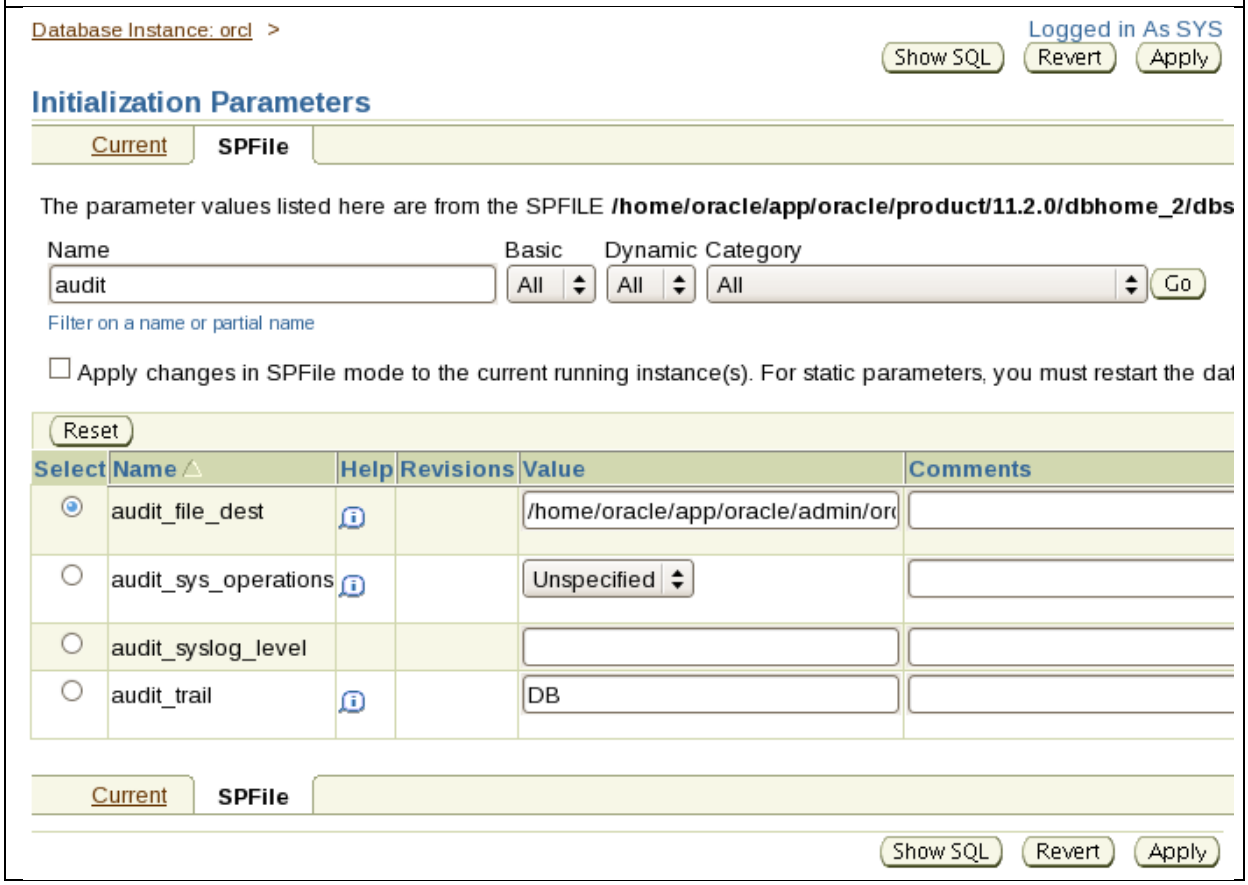
16. Start Enterprise Manager and log in as an administrator with the SYSDBA role. On the Server tab, select Audit Settings from the Security section.



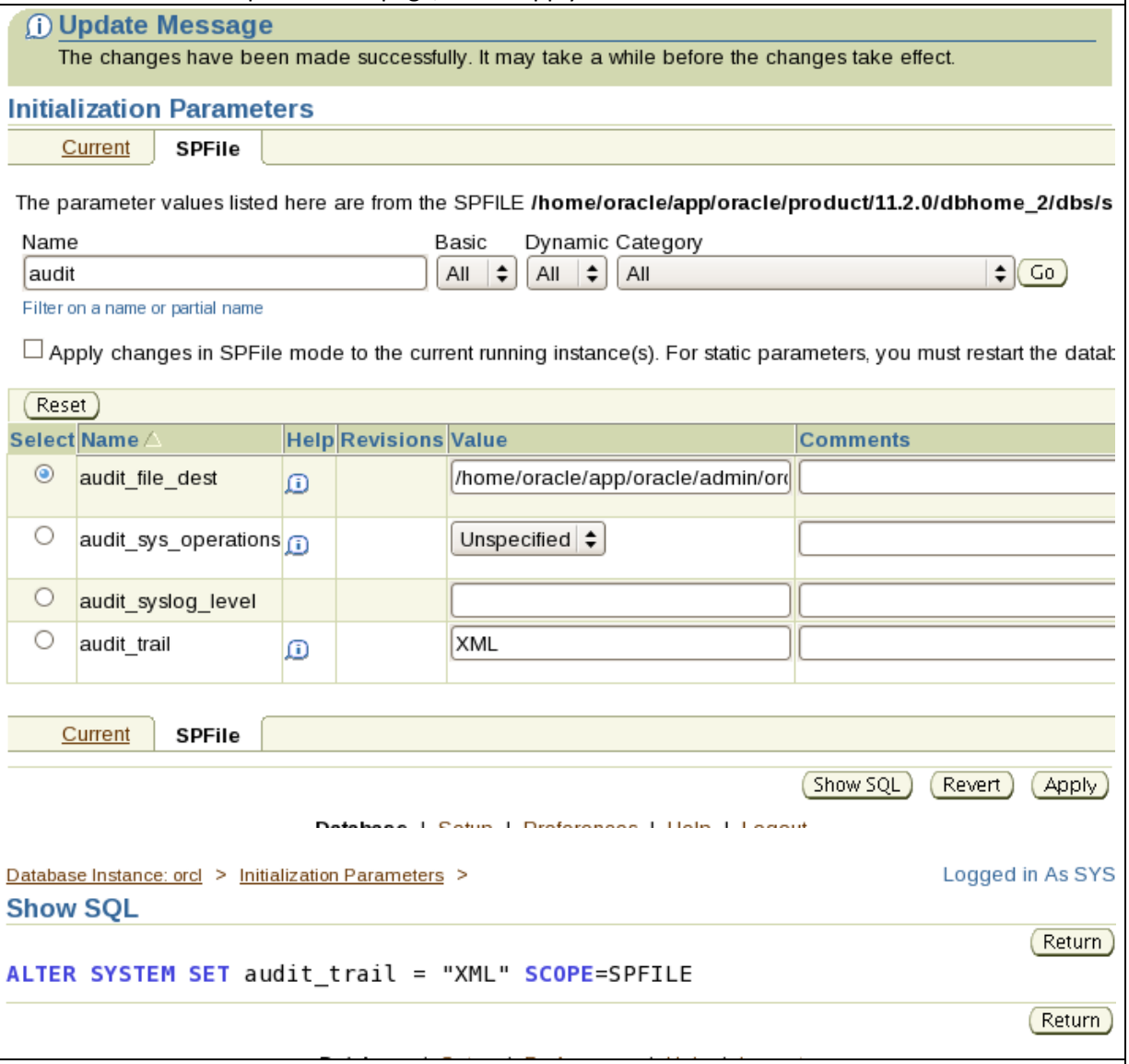
17. Click the DB link from the Audit Trail option, then the SPFile tab.



18. Enter audit in the Name field and click Go.



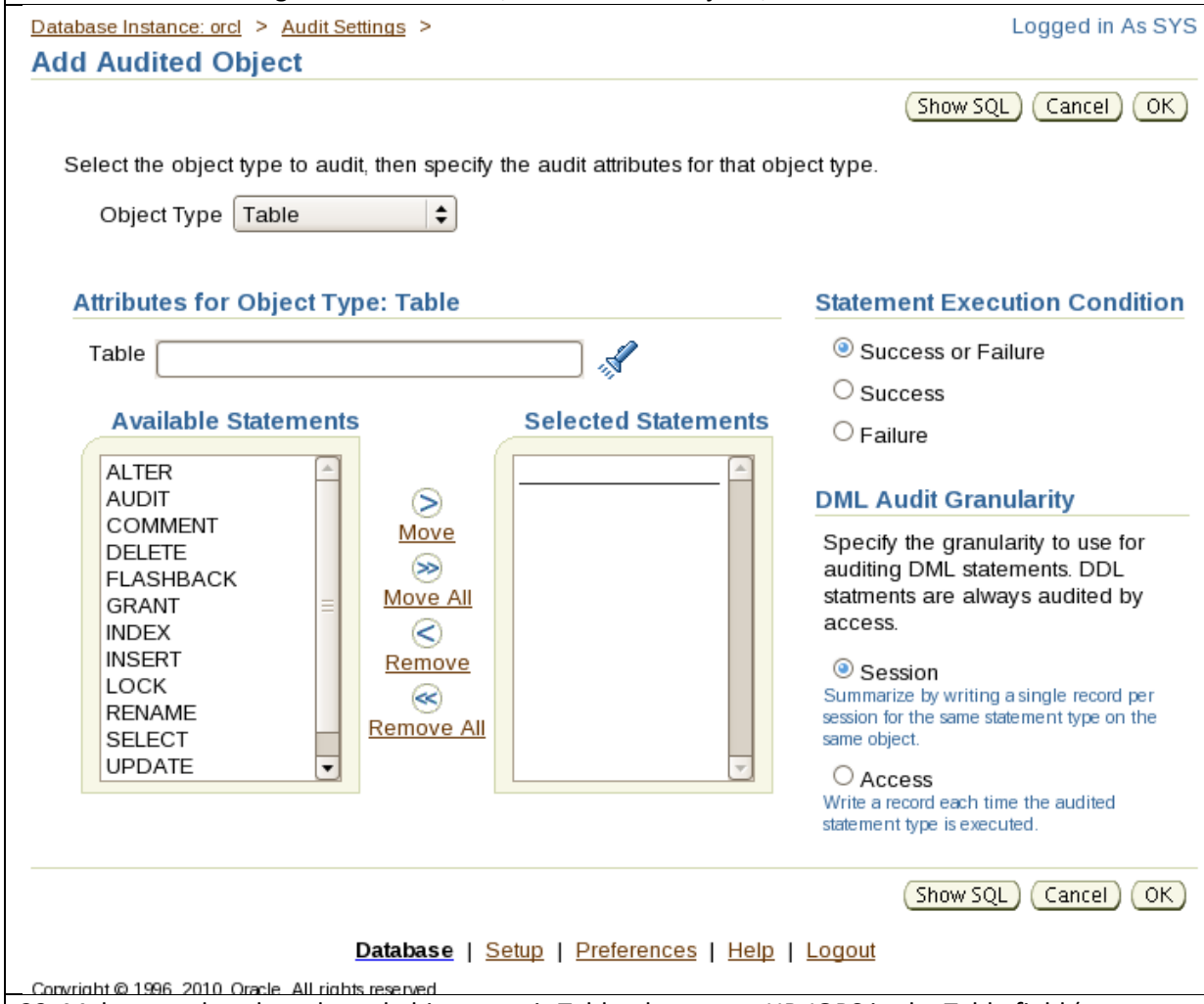
19. From the list of parameters displayed as search results, select audit_trail and change its value to XML. View the SQL code corresponding to the command by selecting Show SQL - return using the Return button. On the parameters page, select Apply.



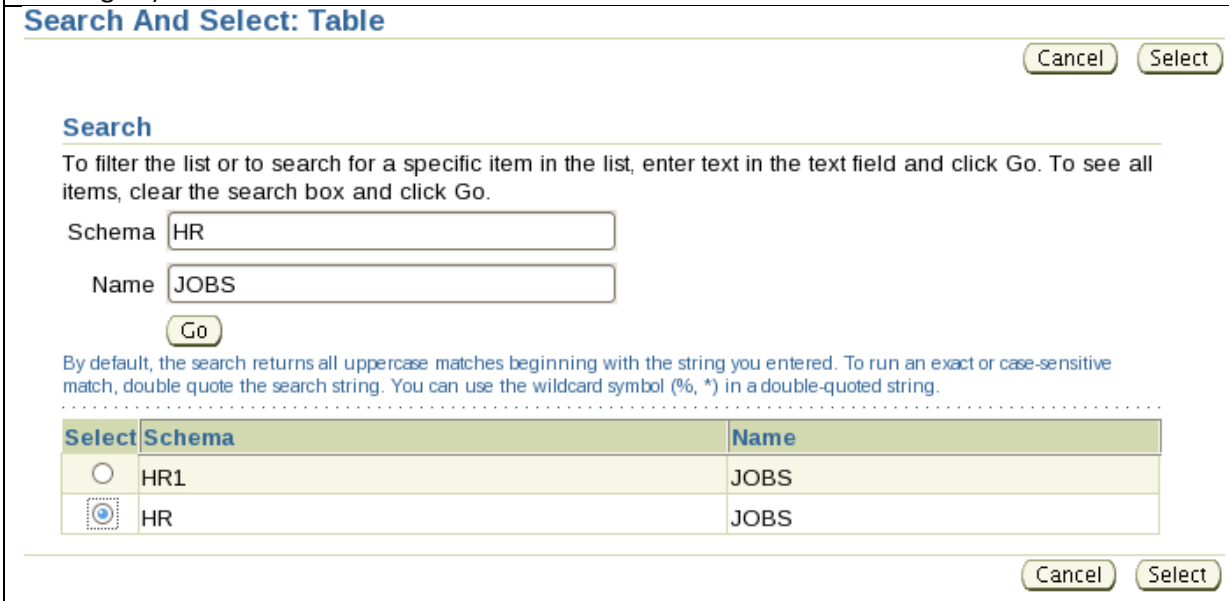
20. Restart the database - necessary, because the static database parameter has changed. Wait until all processes are running and log in to Enterprise Manager again.

```
SQL> shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> startup
ORACLE instance started.

Total System Global Area  456146944 bytes
Fixed Size                  1344840 bytes
Variable Size             352324280 bytes
Database Buffers           96468992 bytes
Redo Buffers                6008832 bytes
Database mounted.
Database opened.
SQL>
```

21. In the Audit Settings of the Server tab, select Audite Objects, then Add.

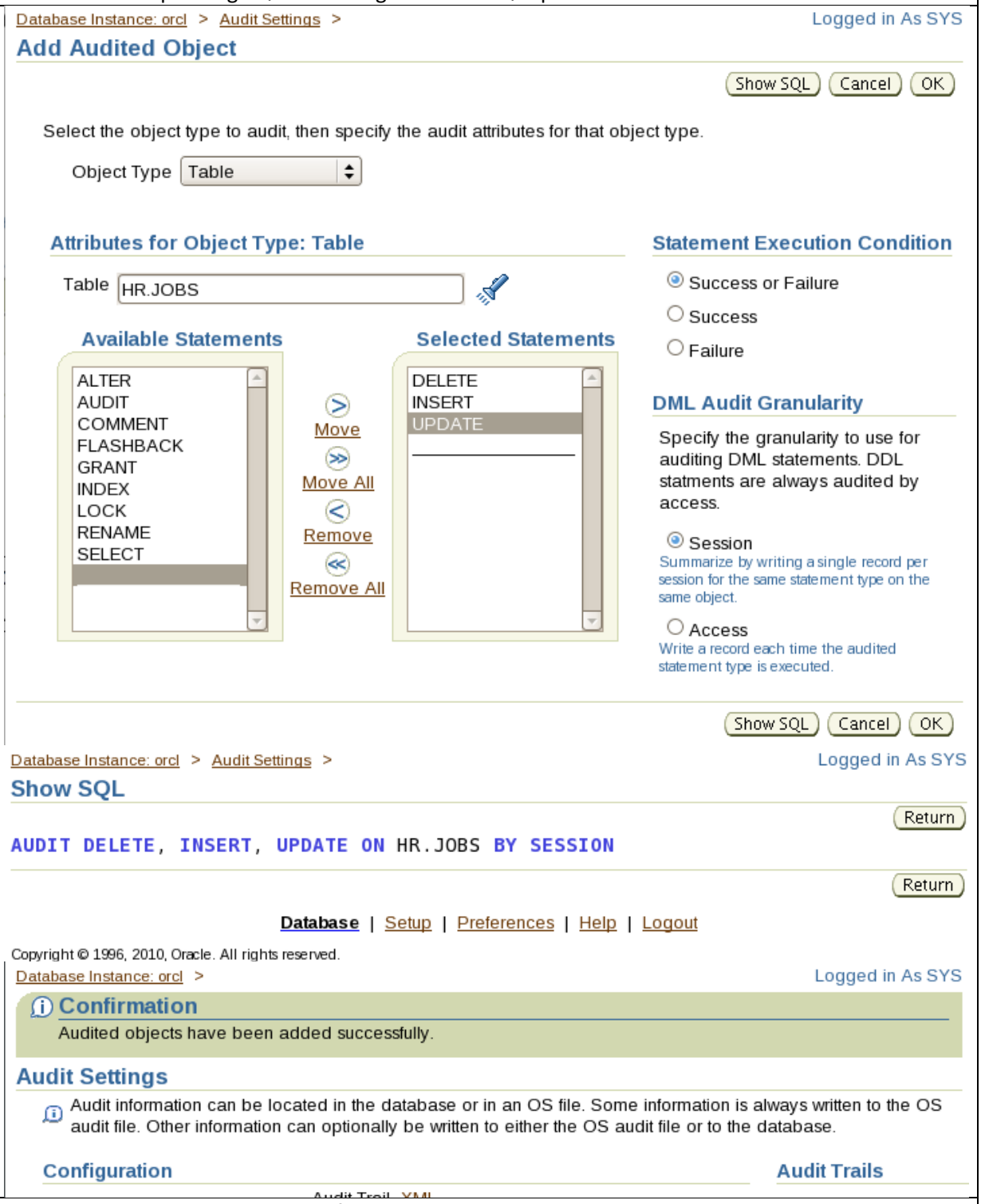


22. Make sure that the selected object type is Table, then enter HR.JOBS in the Table field (or use a "flashlight").



23. Move the DELETE, INSERT and UPDATE actions by double clicking from the left to the right pane.

Check the corresponding SQL code using the Show SQL option. Click OK to activate the audit.



24. Follow the next steps to check if the audit worked later.

25. Check if the audit_user user exists, if so, remove it cascade (at the end you should give the cascade option)

```
SQL> SELECT username FROM dba_users WHERE username IN ('audit_user');

no rows selected

SQL>
```

26. Create a new audit_user identified by the password oracle_4U

```
SQL> CREATE USER audit_user IDENTIFIED BY oracle_4U;

User created.

SQL>
```

27. Give the user the role connect and all privileges (GRANT ALL) on the hr.jobs table

```
SQL> GRANT connect TO audit_user;

Grant succeeded.

SQL> GRANT ALL ON hr.jobs TO audit_user;

Grant succeeded.

SQL>
```

28. Connect from the SQL * Plus session as audit_user and execute the following commands: select from the hr.jobs table, update the max_salary column by multiplying it by 10 (confirm the transaction) and re-select.

```
[oracle@localhost ~]$ sqlplus

SQL*Plus: Release 11.2.0.2.0 Production on Sun Nov 14 19:18:15 2021

Copyright (c) 1982, 2010, Oracle.  All rights reserved.

Enter user-name: audit_user
Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> SELECT * FROM hr.jobs;

JOB_ID    JOB_TITLE                     MIN_SALARY MAX_SALARY
---------- ----------------------------------- ---------- ----------
AD_PRES    President                        20000     40000
AD_VP      Administration Vice President         15000     30000
AD_ASST    Administration Assistant              3000      6000
FI_MGR     Finance Manager                       8200     16000
FI_ACCOUNT Accountant                            4200      9000
AC_MGR     Accounting Manager                    8200     16000
AC_ACCOUNT Public Accountant                     4200      9000
SA_MAN     Sales Manager                        10000     20000
SA_REP     Sales Representative                  6000     12000
PU_MAN     Purchasing Manager                    8000     15000
PU_CLERK   Purchasing Clerk                      2500      5500

JOB_ID    JOB_TITLE                     MIN_SALARY MAX_SALARY
---------- ----------------------------------- ---------- ----------
ST_MAN     Stock Manager                         5500      8500
ST_CLERK   Stock Clerk                           2000      5000
SH_CLERK   Shipping Clerk                        2500      5500
IT_PROG    Programmer                            4000     10000
MK_MAN     Marketing Manager                     9000     15000
MK_REP     Marketing Representative              4000      9000
HR_REP     Human Resources Representative        4000      9000
PR_REP     Public Relations Representative       4500     10500

19 rows selected.

SQL> UPDATE hr.jobs SET max_salary=10*max_salary;

19 rows updated.

SQL> SELECT * FROM hr.jobs;

JOB_ID    JOB_TITLE                     MIN_SALARY MAX_SALARY
```

```
---------- ---------------------------------------- ---------- ----------
AD_PRES    President                      20000    400000
AD_VP      Administration Vice President          15000    300000
AD_ASST    Administration Assistant               3000     60000
FI_MGR     Finance Manager                        8200     160000
FI_ACCOUNT Accountant                             4200     90000
AC_MGR     Accounting Manager                     8200     160000
AC_ACCOUNT Public Accountant                      4200     90000
SA_MAN     Sales Manager                          10000    200000
SA_REP     Sales Representative                   6000     120000
PU_MAN     Purchasing Manager                     8000     150000
PU_CLERK   Purchasing Clerk                       2500     55000

JOB_ID     JOB_TITLE                      MIN_SALARY MAX_SALARY
---------- ---------------------------------------- ---------- ----------
ST_MAN     Stock Manager                          5500     85000
ST_CLERK   Stock Clerk                            2000     50000
SH_CLERK   Shipping Clerk                         2500     55000
IT_PROG    Programmer                             4000     100000
MK_MAN     Marketing Manager                      9000     150000
MK_REP     Marketing Representative               4000     90000
HR_REP     Human Resources Representative         4000     90000
PR_REP     Public Relations Representative        4500     105000

19 rows selected.

SQL> COMMIT;

Commit complete.

SQL>
```

29. Switch to user hr and make another change - divide max_salary by 10. Confirm and check the result of the change.

```
[oracle@localhost ~]$ sqlplus

SQL*Plus: Release 11.2.0.2.0 Production on Sun Nov 14 19:20:45 2021

Copyright (c) 1982, 2010, Oracle.  All rights reserved.

Enter user-name: hr
Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> UPDATE hr.jobs SET max_salary=max_salary/10;

19 rows updated.

SQL> SELECT * FROM hr.jobs;

JOB_ID     JOB_TITLE                      MIN_SALARY MAX_SALARY
---------- ---------------------------------------- ---------- ----------
AD_PRES    President                      20000     40000
AD_VP      Administration Vice President          15000     30000
AD_ASST    Administration Assistant               3000      6000
FI_MGR     Finance Manager                        8200      16000
FI_ACCOUNT Accountant                             4200      9000
AC_MGR     Accounting Manager                     8200      16000
AC_ACCOUNT Public Accountant                      4200      9000
SA_MAN     Sales Manager                          10000     20000
SA_REP     Sales Representative                   6000      12000
PU_MAN     Purchasing Manager                     8000      15000
PU_CLERK   Purchasing Clerk                       2500      5500

JOB_ID     JOB_TITLE                      MIN_SALARY MAX_SALARY
---------- ---------------------------------------- ---------- ----------
ST_MAN     Stock Manager                          5500      8500
ST_CLERK   Stock Clerk                            2000      5000
SH_CLERK   Shipping Clerk                         2500      5500
IT_PROG    Programmer                             4000      10000
MK_MAN     Marketing Manager                      9000      15000
MK_REP     Marketing Representative               4000      9000
HR_REP     Human Resources Representative         4000      9000
PR_REP     Public Relations Representative        4500      10500

19 rows selected.
```

```
SQL> COMMIT;

Commit complete.

SQL>
```

30. Switch to administrator and delete the audit_user cascade

```
SQL> DROP USER audit_user CASCADE;

User dropped.

SQL>
```

31. Using Enterprise Manager, check information about audited objects - Server | tab Audit Settings | Audited Objects. Additional note: Can it be deduced from the information displayed which user has lowered the salary?

Audit Settings

Audit information can be located in the database or in an OS file. Some information is always written to the OS audit file. Other information can optionally be written to either the OS audit file or to the database.

Configuration

Audit Trail XML
Audit SYS User Operations FALSE
Audit File Directory /home/oracle/app/oracle/admin/orcl/adump
Audit File Directory value is effective only when Audit Trail is set to "OS" or "XML".
Default Options For Future Audited Objects 0

Audit Trails

Database Au
Operating System Au

Audited Privileges (23) | **Audited Objects (2)** | Audited Statements (6)

Schema: HR Object Name: JOBS Object Type: Search

Add | Remove

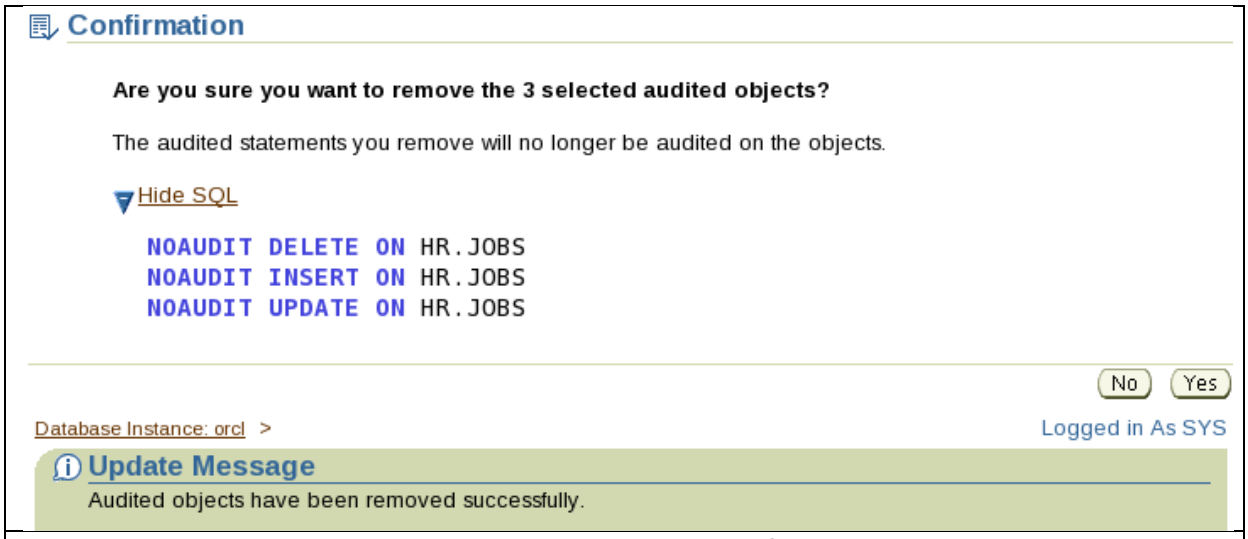
Select All | Select None

Select	Schema	Object Name	Audited Statement	Success	Failure	Object Type
☐	HR	JOBS	DELETE	BY SESSION	BY SESSION	TABLE
☐	HR	JOBS	INSERT	BY SESSION	BY SESSION	TABLE
☐	HR	JOBS	UPDATE	BY SESSION	BY SESSION	TABLE

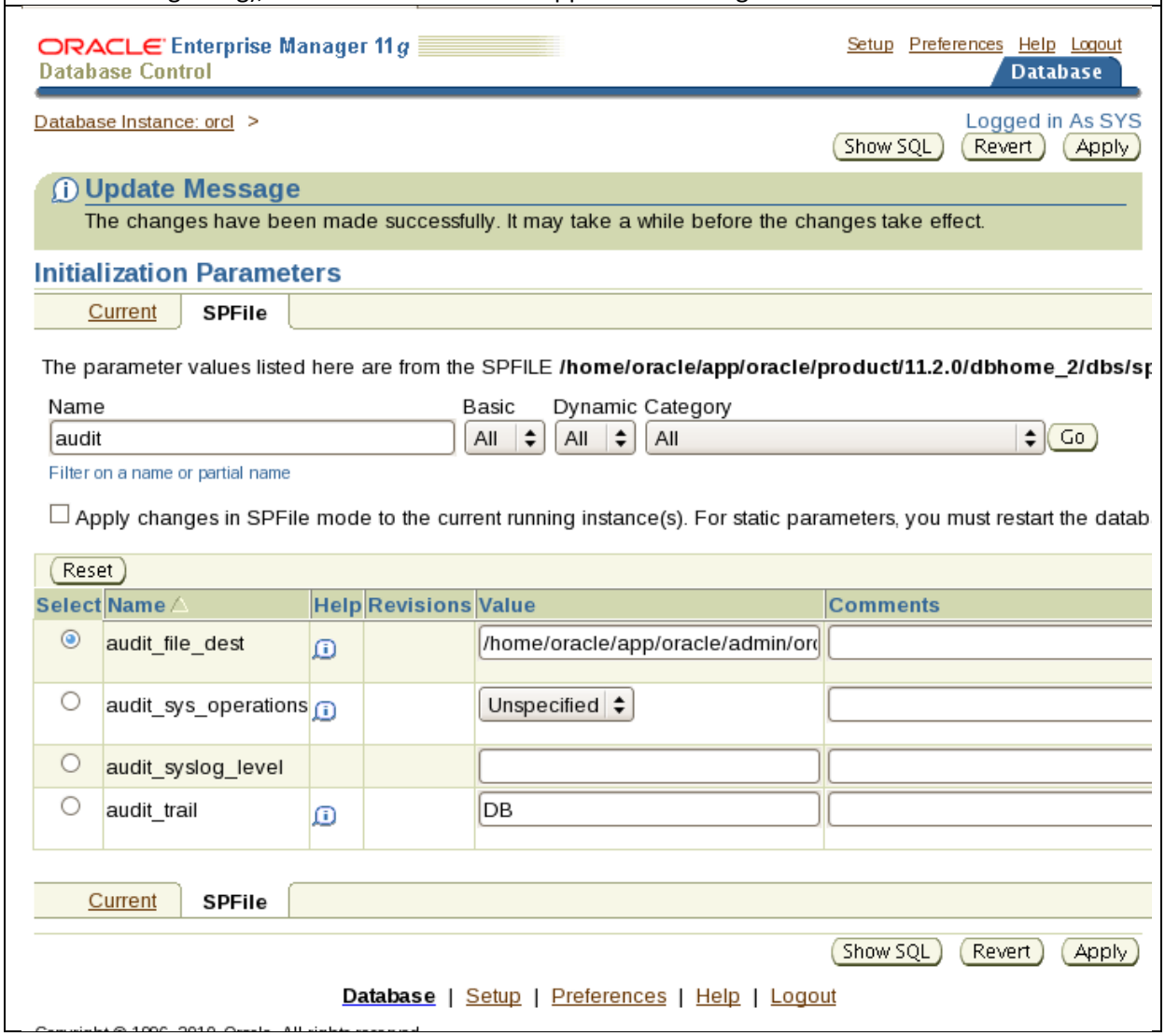
Audited Privileges (23) | **Audited Objects (2)** | Audited Statements (6)

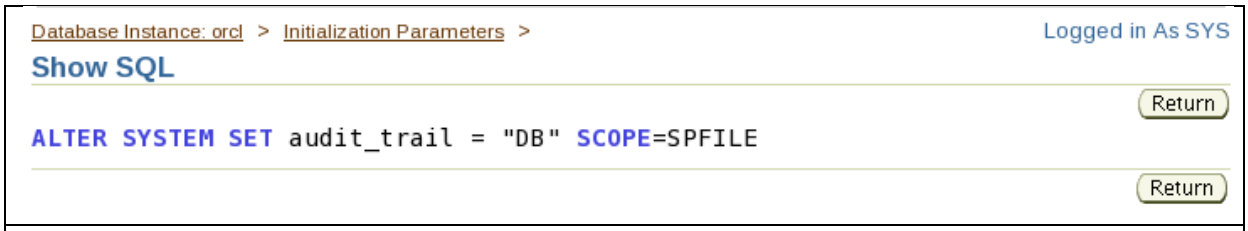
No.

32. Revert all changes related to the previously set audit: in Audited Objects go to the HR diagram and click Search, select all three lines and click Remove. On the confirmation page, click Show SQL. Confirm YES.



33. On the Audit Settings page, select XML. On the SPFile tab of the Initialization Parameters page, enter the audit search name in the field and click Go. Rename the audit_trail parameter to DB (as it was at the beginning), check the SQL code and approve the changes.





34. The static initialization parameter has changed, ie ... restart the database.

```
SQL> shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> startup
ORACLE instance started.

Total System Global Area  456146944 bytes
Fixed Size                  1344840 bytes
Variable Size             356518584 bytes
Database Buffers           92274688 bytes
Redo Buffers                6008832 bytes
Database mounted.
Database opened.
SQL>
```