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# AGENDA

- Presentation – approximately 45 minutes
- Q&A Session – approximately 15 minutes
  - Web attendees can ask questions via Q&A panel
  - Phone attendees can ask questions via Q&A panel or phone (operator assisted)

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# ORACLE®

## How to create in 5 minutes a SQL Tuning Test Case using SQLTXPLAIN

Carlos Sierra  
Consulting Technical Advisor

ORACLE®

# AGENDA

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- Advisor Webcast Archived Recordings DocID 740964.1

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Participants Chat ? Q&A

Participants

Panelists: 1

Jens Voigt (Host)

Attendees:

Jens Voigt (me)

Q&A

All (0)

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Jens Voigt (me)

Q&A

All (0)

Ask: All Panelists

Send

Full Screen 96% View

Cisco WebEx Event number: 599 118 940

Connected

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# ORACLE®

## How to create in 5 minutes a SQL Tuning Test Case using SQLTXPLAIN

Carlos Sierra  
Consulting Technical Advisor

ORACLE®

# About SQLTXPLAIN (SQLT)

- Tool to diagnose SQL statements performing poorly
  - Comprehensive and consistent set of diagnostics reports
  - **Automatic Test Case (TC) extraction on each use**
  - Provides a SQLT repository for further SQL tuning actions
- Not a product but an add-on tool
  - Needs to be installed before its first use
  - Very fast life cycle (monthly?)
  - Used by Oracle Support since 1999 (as coe\_xplain.sql)
- Works on 10.2+ (UNIX, Linux and Windows)
  - Prior versions for 8.1, 9i and 10.1 exist

# Topics

- **A Test Case (TC) for SQL Tuning?**
- How SQLTXPLAIN (SQLT) helps with a TC?
- What is included in a SQLT TC?
- Demo of SQLT TC implementation
- Troubleshooting a SQLT TC
- Beyond a SQLT TC

# A Test Case (TC) for SQL Tuning?

- First Objective
  - Reproduce an Execution Plan from a Source into a Target system
    - Source and Target are usually different systems
    - Target is usually a Test system or an Oracle box
- What for?
  - Apply WHAT-IF scenarios which are not feasible to test in Source system
  - Investigate “unexpected results”
    - This type of analysis usually requires a subset of data
- Two-phases (extraction and implementation)

# What is needed to put together a TC?

- A similar system in terms of database release
  - Be aware of possible one-offs
  - In some cases a TC can be implemented on same system
- SQL text including binds declaration and values
- Metadata “create” SQL commands
  - Tables, Indexes, Views, Functions, Packages, Constraints...
  - Schema owner(s) re-map (common but not required)
- CBO Statistics
  - For schema objects and System Statistics
- CBO Environment
  - Parameters and Fix Control



# Common Methods to extract a TC

- Manual
  - Easy if Target contains same schema objects
  - Export and Import of CBO schema object statistics
  - Difficult to synchronize CBO environment and System stats
- 11g Test Case Builder (TCB)
  - Overloaded `DBMS_SQLDIAG.EXPORT_SQL_TESTCASE`
  - Inputs SQL from Memory, Text or Incident
- SQLTXPLAIN (SQLT) Test Case (TC)
  - Available for 9i, 10g and 11g
  - Inputs SQL from Memory, AWR or Text

# Topics

- A Test Case (TC) for SQL Tuning?
- **How SQLTXPLAIN (SQLT) helps with a TC?**
- What is included in a SQLT TC?
- Demo of SQLT TC implementation
- Troubleshooting a SQLT TC
- Beyond a SQLT TC

# How SQLTXPLAIN helps with a TC?

- SQLT XTRACT, XECUTE and XTRXEC
  - Automatic 11g **TCB** export on every 11g execution
    - Only if SQL still resides in memory
  - Automatic SQLT **TC** extraction on every 9i-11g execution
    - When SQL is found in memory or AWR
    - SQLT TC is also extracted with XPLAIN method
- SQLT TC provides two implementation modes
  - XPRESS
    - One driver script for a faster TC implementation
  - CUSTOM
    - Seven steps for better control during TC implementation

# Where do I find the SQL TC?

- XTRACT, XECUTE, XTRXEC and XPLAIN generate a `sqlt_sNNNNNN.zip` which includes a SQLT TC
- Review first `sqlt_sNNNNNN_main.html` diagnostics report
- For SQLT TC implementation you will need two files
  - Readme file `sqlt_sNNNNNN_readme.html`
  - SQLT TC zip file `sqlt_sNNNNNN_tc.zip`
- Look for “Implement SQLT Test Case (TC)” on readme file
  - Proceed with “Preparation” then with XPRESS or CUSTOM

# SQLT TC implementation files

script2.sql  
sqlt\_s93124\_10046\_10053\_execute.trc  
sqlt\_s93124\_10046\_execute.trc  
sqlt\_s93124\_10053\_execute.trc  
sqlt\_s93124\_10053\_explain.trc  
sqlt\_s93124\_driver.zip  
sqlt\_s93124\_lite.html  
sqlt\_s93124\_log.zip  
sqlt\_s93124\_main.html  
sqlt\_s93124\_p1262578993\_sqlprof.sql  
sqlt\_s93124\_px\_trca\_62457.html  
sqlt\_s93124\_px\_trca\_62457.log  
sqlt\_s93124\_px\_trca\_62457.txt  
sqlt\_s93124\_readme.html  
sqlt\_s93124\_sql\_detail\_active.html  
sqlt\_s93124\_sql\_monitor.html  
sqlt\_s93124\_sql\_monitor.txt  
sqlt\_s93124\_sql\_monitor\_active.html  
sqlt\_s93124\_sta\_report\_mem.txt  
sqlt\_s93124\_sta\_report\_txt.txt  
sqlt\_s93124\_tc.zip  
sqlt\_s93124\_tcb.zip  
sqlt\_s93124\_tkprof\_nosort.txt  
sqlt\_s93124\_tkprof\_sort.txt  
sqlt\_s93124\_trc.zip  
sqlt\_s93124\_trca\_e62458.html  
sqlt\_s93124\_trca\_e62458.log  
sqlt\_s93124\_trca\_e62458.txt

**XECUTE**

sqlt\_s93122\_10053\_explain.trc  
sqlt\_s93122\_10053\_j1\_c3\_extract.trc  
sqlt\_s93122\_driver.zip  
sqlt\_s93122\_lite.html  
sqlt\_s93122\_log.zip  
sqlt\_s93122\_main.html  
sqlt\_s93122\_p1262578993\_sqlprof.sql  
sqlt\_s93122\_readme.html  
sqlt\_s93122\_sql\_detail\_active.html  
sqlt\_s93122\_sql\_monitor.html  
sqlt\_s93122\_sql\_monitor.txt  
sqlt\_s93122\_sql\_monitor\_active.html  
sqlt\_s93122\_sta\_report\_mem.txt  
sqlt\_s93122\_sta\_script\_mem.sql  
sqlt\_s93122\_tc.zip  
sqlt\_s93122\_tc\_script.sql  
sqlt\_s93122\_tc\_sql.sql  
sqlt\_s93122\_tcb.zip  
sqlt\_s93122\_trc.zip

**XTRACT**

sql1.sql  
sqlt\_s93127\_10053\_explain.trc  
sqlt\_s93127\_driver.zip  
sqlt\_s93127\_lite.html  
sqlt\_s93127\_log.zip  
sqlt\_s93127\_main.html  
sqlt\_s93127\_p3892588660\_sqlprof.sql  
sqlt\_s93127\_readme.html  
sqlt\_s93127\_tc.zip  
sqlt\_s93127\_trc.zip

**XPLAIN**

**readme**

**sqlt tc**

# SQLT TC implementation steps

- Requirements
  - A `sqlt_sNNNNN.zip` file from Source system
  - A Target system with same database version (or higher)
    - Be aware of possible one-offs
  - SQLTXPLAIN installed on Target system
- Preparation
  - Unzip `sqlt_sNNNNN.zip`
  - Review “main” diagnostics report and “readme”
    - Find “Implement SQLT Test Case (TC)” section in readme
  - Copy `sqlt_sNNNNN_tc.zip` file to Target server
  - Follow Preparation then XPRESS or CUSTOM mode

# Typical menu from a SQLT readme

## 215187.1 SQLT XTRACT 11.4.4.1 Report: sqlt\_s93896\_readme.html

Instructions to perform the following:

- [Export SQLT repository](#)
- [Import SQLT repository](#)
- [Using SQLT COMPARE](#)
- [Restore CBO schema statistics](#)
- [Restore CBO system statistics](#)
- [Implement SQLT Test Case \(TC\)](#)
- [Create TC with no SQLT dependencies](#)
- [Restore SQL Set](#)
- [Create SQL Plan Baseline from SQL Set](#)
- [Gather CBO statistics without Histograms](#)
- [Gather CBO statistics with Histograms](#)
- [List generated files](#)



# SQLT TC Preparation

## Implement SQLT Test Case (TC)

SOURCE and TARGET systems should be similar. Proceed with Preparation followed by Express or Custom mode.

### Preparation

1. Unzip `sqlt_s93896_tc.zip` in server and navigate to TC directory.

```
unzip sqlt_s93896_tc.zip -d TC93896
```

```
cd TC93896
```



# XPRESS implementation mode

## Express (XPRESS) mode

1. Review and execute `xpress.sh` from OS or `xpress.sql` from sqlplus.

Option 1: `./xpress.sh`

Option 2: `sqlplus / as sysdba @xpress.sql`

# CUSTOM implementation mode

## Custom mode

1. Create test case user and schema objects connecting as SYSDBA:

```
sqlplus / as sysdba  
  
START sqlt_s93896_metadata.sql
```

2. Purge pre-existing s93896 from local SQLT repository connected as SYSDBA:

```
START sqlt_s93896_purge.sql
```

3. Import SQLT repository for s93896 (provide SQLTXPLAIN password):

```
HOS imp sqltxplain FILE=sqlt_s93896_exp.dmp TABLES=sqlt% IGNORE=Y
```

4. Restore CBO schema statistics for test case user connected as SYSDBA:

```
START sqlt_s93896_restore.sql
```

5. Restore CBO system statistics connected as SYSDBA:

```
START sqlt_s93896_system_stats.sql
```

6. Set the CBO environment connecting as test case user TC93896 (include optional test case user suffix):

```
CONN TC93896/TC93896  
  
START sqlt_s93896_set_cbo_env.sql
```

7. Execute test case:

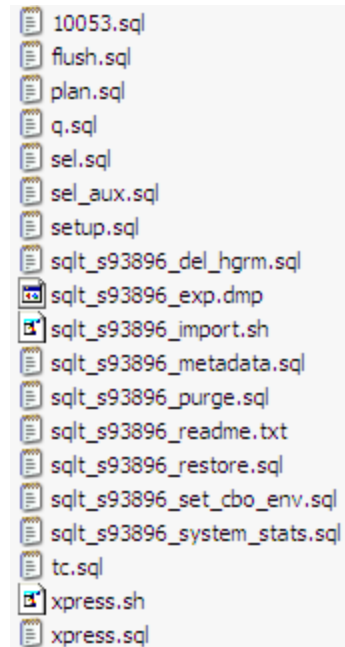
```
START tc.sql
```

# Topics

- A Test Case (TC) for SQL Tuning?
- How SQLTXPLAIN (SQLT) helps with a TC?
- **What is included in a SQLT TC?**
- Demo of SQLT TC implementation
- Troubleshooting a SQLT TC
- Beyond a SQLT TC

# What is included in a SQLT TC?

- TC zip contains several files
  - Most are used for the TC implementation
  - Some miscellaneous utilities
  - A readme file in text format



A screenshot of a file explorer window showing the contents of a SQLT TC zip file. The files listed are:

- 10053.sql
- flush.sql
- plan.sql
- q.sql
- sel.sql
- sel\_aux.sql
- setup.sql
- sqlt\_s93896\_del\_hgrm.sql
- sqlt\_s93896\_exp.dmp
- sqlt\_s93896\_import.sh
- sqlt\_s93896\_metadata.sql
- sqlt\_s93896\_purge.sql
- sqlt\_s93896\_readme.txt
- sqlt\_s93896\_restore.sql
- sqlt\_s93896\_set\_cbo\_env.sql
- sqlt\_s93896\_system\_stats.sql
- tc.sql
- xpress.sh
- xpress.sql

# What is included in a SQLT TC?

- Metadata script to create schema objects
- Purge script to avoid collisions on `statement_id`
- Export DMP file with SQLT repository from Source
- Restore script to map and import CBO schema stats
- System Statistics script to set them in Target
- Set CBO environment script to set CBO Parameters and Fix Control
- Test Case script to execute Query and produce Plan
- XPRESS shell and sql scripts
- Miscellaneous utilities and a readme file

# About Metadata script

- Performs a schema owner re-map into TCNNNNNN
  - Re-map can be avoided by modifying “Customization Section”
- Test Case user defaults to TCNNNNNN
  - A suffix can be specified to branch one TC into M cases
    - TC12345CS, TC12345A...
- Most times both defaults are fine (re-map no-suffix)
- Always review “Invalid” section at end of execution
  - Invalid synonyms are common and mostly safe to ignore
  - Invalid libraries are common and sometimes require attention
  - Invalid views require attention
    - Eliminate references to schema names on FROM

# Metadata Customization Section

```
42
43 /*****
44 /* CUSTOMIZATION - BEGIN
45 /*****
46
47 -- Use line below to define a NULL test case user suffix, or a specific value within the double-quotes.
48 DEF TC_USER_SUFFIX = "";
49
50 -- Remove "accept" command below if you dont need to ask for a test case user suffix. It will use the DEF above.
51 REM
52 REM Test case user suffix. Enter your initials or hit "Enter" for NULL.
53 REM
54 ACC TC_USER_SUFFIX PROMPT 'TC user suffix (opt): ';
55
56 -- Uppercase test case user suffix and remove special characters including space, quotes, etc.
57 COL TC_USER_SUFFIX NEW_V TC_USER_SUFFIX FOR A100;
58 SELECT TRANSLATE(UPPER('^^TC_USER_SUFFIX'), 'ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 ''~!@#%&^*()-_+=[]{}~\|;: ",.<>
59
60 -- Create test case user.
61 DEF TC_USER = TC93896^^TC_USER_SUFFIX.;
62 GRANT DBA TO ^^TC_USER. IDENTIFIED BY ^^TC_USER.;
63 GRANT CTXAPP TO ^^TC_USER.;
64
65 -- Use DEF command(s) below if you want to consolidate objects into one test case user (recommended).
66 DEF SCHEMA_SH = '^^TC_USER.'
67
68 -- Un-comment DEF command(s) below ONLY if you want to create objects into original owner(s). (not recommended).
69 -- DEF SCHEMA_SH = 'SH'
70
71 /*****
72 /* CUSTOMIZATION - END
73 /*****
74
```

# About Purge script

- SQLT repository for `statement_id` (NNNNN) is about to be imported
- Purge script deletes prior repository entries for `statement_id` NNNNN
  - Avoids possible but very infrequent collisions on NNNNN
- Purge script becomes important when TC is refreshed
  - In such case manually drop user TCNNNNN before hand
- Purge script only executes a SQLT library

```
EXEC sqltxplain.sqlt$a.purge_repository(93896,  
93896);
```



# About Exported DMP file

- An export DMP file is created on Source when SQLT is executed (XTRACT/XECUTE/XTRXEC/XPLAIN)
- This DMP file contains the entries on SQLT repository for `statement_id` NNNNN
- No application data is included into the DMP file
- Import command gets all entries for NNNNN including a STATTAB staging table

```
imp sqltxplain FILE=sqlt_s93896_exp.dmp TABLES=sqlt% IGNORE=Y
```

- Default utility is original export/import
  - SQLT can be configured to use Data Pump instead

# About Restore script

- Restore (import) schema object CBO statistics for all tables identified by SQLT
- Re-maps CBO statistics into TCNNNNNN user
- Re-maps extended statistics columns as per expression or column group
- Uses `DBMS_STATS.IMPORT_TABLE_STATS`
- If re-map of “owner” is not desired use `sqlt/utl/sqltimp.sql` instead

# About System Statistics script

- Deletes CBO System Statistics on Target then restores (imports) using values from Source
- Calls `DBMS_STATS.DELETE_SYSTEM_STATS` first
- Calls then `DBMS_STATS.SET_SYSTEM_STATS`

# About Set CBO Environment script

- Contains CBO Environment from SQLT session in Source
- Executed after connecting as TC user
- Sets Optimizer Features Enable (OFE)
- Sets non-default CBO Parameters
  - Using `ALTER SESSION` and `ALTER SYSTEM` commands
- Sets non-default Bug Fix Control
- Sets default CBO Parameters
- Sets default Bug Fix Control

# About TC script

- Executes SQL statement script `q.sql` followed by plan script `plan.sql`
- Script `q.sql` contains
  - Optimizer environment for particular SQL when captured from memory
  - Bind variables
    - Declaration and values assignment (if applicable)
  - SQL text for SQL statement being analyzed
- Script `plan.sql` displays execution plan calling `DBMS_XPLAN.DISPLAY_CURSOR`

# About XPRESS sql and sh scripts

- Shell script xpress.sh executes SQL script xpress.sql connected as SYSDBA

```
1 # Implements SQLT TC Express Mode.  
2 # Just execute ". xpress.sh" from OS.  
3 sqlplus / as sysdba @xpress.sql  
4
```

- Script xpress.sql executes all same 7 steps from CUSTOM mode
- TC implementation can be restarted from intermediate steps

# XPRESS script xpress.sql

```
1 REM Implements SQLT TC Express Mode.
2 REM Just execute "/xpress.sh" or "sqlplus / as sysdba @xpress.sql" from OS.
3 SET ECHO OFF;
4 CL SCR
5 PAU 1/7 Press ENTER to create TC user and schema objects for statement_id 93896.
6 SET ECHO ON;
7 @@sqlt_s93896_metadata.sql
8 SET ECHO OFF;
9 PRO
10 PAU 2/7 Press ENTER to purge statement_id 93896 from SQLT repository.
11 SET ECHO ON;
12 @@sqlt_s93896_purge.sql
13 SET ECHO OFF;
14 PRO
15 PAU 3/7 Press ENTER to import SQLT repository for statement_id 93896.
16 SET ECHO ON;
17 HOS imp sqltxplain FILE=sqlt_s93896_exp.dmp TABLES=sqlt% IGNORE=Y
18 SET ECHO OFF;
19 PRO
20 PAU 4/7 Press ENTER to restore schema object stats for &&tc_user..
21 SET ECHO ON;
22 @@sqlt_s93896_restore.sql
23 SET ECHO OFF;
24 PRO
25 PAU 5/7 Press ENTER to restore system statistics.
26 SET ECHO ON;
27 @@sqlt_s93896_system_stats.sql
28 SET ECHO OFF;
29 PRO
30 PAU 6/7 Press ENTER to connect as &&tc_user. and set CBO env.
31 SET ECHO ON;
32 CONN &&tc_user./&&tc_user.
33 @@sqlt_s93896_set_cbo_env.sql
34 SET ECHO OFF;
35 PRO
36 PAU 7/7 Press ENTER to execute test case.
37 SET ECHO ON;
38 @@tc.sql
39
```

- 10053.sql
- flush.sql
- plan.sql
- q.sql
- sel.sql
- sel\_aux.sql
- setup.sql
- sqlt\_s93896\_del\_hgrm.sql
- sqlt\_s93896\_exp.dmp
- sqlt\_s93896\_import.sh
- sqlt\_s93896\_metadata.sql
- sqlt\_s93896\_purge.sql
- sqlt\_s93896\_readme.txt
- sqlt\_s93896\_restore.sql
- sqlt\_s93896\_set\_cbo\_env.sql
- sqlt\_s93896\_system\_stats.sql
- tc.sql
- xpress.sh
- xpress.sql

# CUSTOM implementation mode

## Custom mode

1. Create test case user and schema objects connecting as SYSDBA:

```
sqlplus / as sysdba
```

```
START sqlt_s93896_metadata.sql
```

2. Purge pre-existing s93896 from local SQLT repository connected as SYSDBA:

```
START sqlt_s93896_purge.sql
```

3. Import SQLT repository for s93896 (provide SQLTXPLAIN password).

```
HOS imp sqltxplain FILE=sqlt_s93896_exp.dmp TABLES=sqlt% IGNORE=Y
```

4. Restore CBO schema statistics for test case user connected as SYSDBA:

```
START sqlt_s93896_restore.sql
```

5. Restore CBO system statistics connected as SYSDBA:

```
START sqlt_s93896_system_stats.sql
```

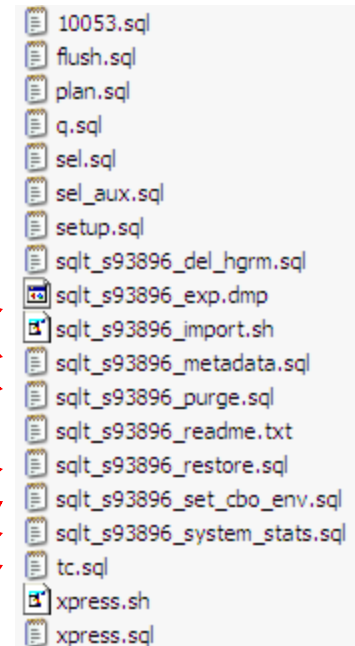
6. Set the CBO environment connecting as test case user TC93896 (include optional test case user suffix):

```
CONN TC93896/TC93896
```

```
START sqlt_s93896_set_cbo_env.sql
```

7. Execute test case:

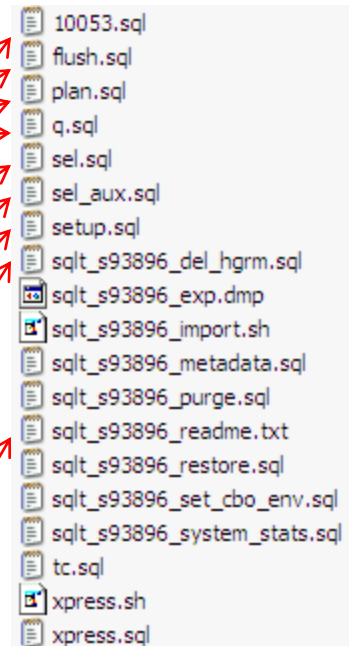
```
START tc.sql
```





# About Miscellaneous Utilities and Files

- SQL statement script `q.sql`
- Display plan script `plan.sql`
- Flush shared pool script `flush.sql`
- EVENT 10053 script `10053.sql`
- Selectivity script `sel.sql`
- Auxiliary selectivity script `sel_aux.sql`
- Delete TC Histograms script  
`sqlt_sNNNNN_del_hgrm.sql`
- Text readme `sqlt_sNNNNN_readme.txt`
- Setup script `setup.sql` for stand-alone TC



# Topics

- A Test Case (TC) for SQL Tuning?
- How SQLTXPLAIN (SQLT) helps with a TC?
- What is included in a SQLT TC?
- **Demo of SQLT TC implementation**
- Troubleshooting a SQLT TC
- Beyond a SQLT TC



D E M O N S T R A T I O N

# Plan from source

Execution Plan **phv:2874174940 [B] [W]** sqlt\_phv:43213 sqlt\_phv2:79490 source:GV\$SQL\_PLAN

SQL Text: [-]

```
SELECT /*+ gather_plan_statistics monitor */
       SUBSTR(NVL(r.country_name, 'GRAND'))||' - '||
       NVL(c.cust_state_province, 'TOTAL'), 1, 50) place,
       SUM(p.total_cost) total_cost
FROM   countries r,
       customers c,
       profits p
WHERE  r.country_region = :b1
       AND r.country_id = c.country_id
       AND c.cust_id = p.cust_id
GROUP BY ROLLUP
        (r.country_name, c.cust_state_province)
```

SQL: [+]

ID	Exec Ord	Operation	Go To	More	Peek Bind	Capt Bind	Cost <sup>2</sup>	Estim Card	LAST Starts	LAST Output Rows	Over Est
0	10	SELECT STATEMENT					1432	411	1	0	
1	9	SORT GROUP BY ROLLUP		[+]			1432	411	1	0	
2	8	HASH JOIN		[+]			1430	16566	1	0	
3	1	.. TABLE ACCESS FULL <u>COUNTRIES</u>	[+]	[+]	[+]	[+]	3	4	1	1	
4	7	.. HASH JOIN		[+]			1426	82112	1	916039	
5	2	... TABLE ACCESS FULL <u>CUSTOMERS</u>	[+]	[+]			406	55500	1	55500	
6	6	... PARTITION RANGE ALL		[+]			687	82112	1	916039	
7	5	.... HASH JOIN		[+]			687	82112	28	916039	
8	3	....+ TABLE ACCESS FULL <u>COSTS</u>	[+]	[+]			137	82112	28	82112	
9	4	....+ TABLE ACCESS FULL <u>SALES</u>	[+]	[+]			530	918843	16	918843	

# Follow Preparation and XPRESS mode

## Implement SQLT Test Case (TC)

SOURCE and TARGET systems should be similar. Proceed with Preparation followed by Express or Custom mode.

### Preparation

1. Unzip `sqlt_s93896_tc.zip` in server and navigate to TC directory.

```
unzip sqlt_s93896_tc.zip -d TC93896  
cd TC93896
```

### Express (XPRESS) mode

1. Review and execute `xpress.sh` from OS or `xpress.sql` from sqlplus.

Option 1: `./xpress.sh`

Option 2: `sqlplus / as sysdba @xpress.sql`

# Copy TC zip file and unzip it

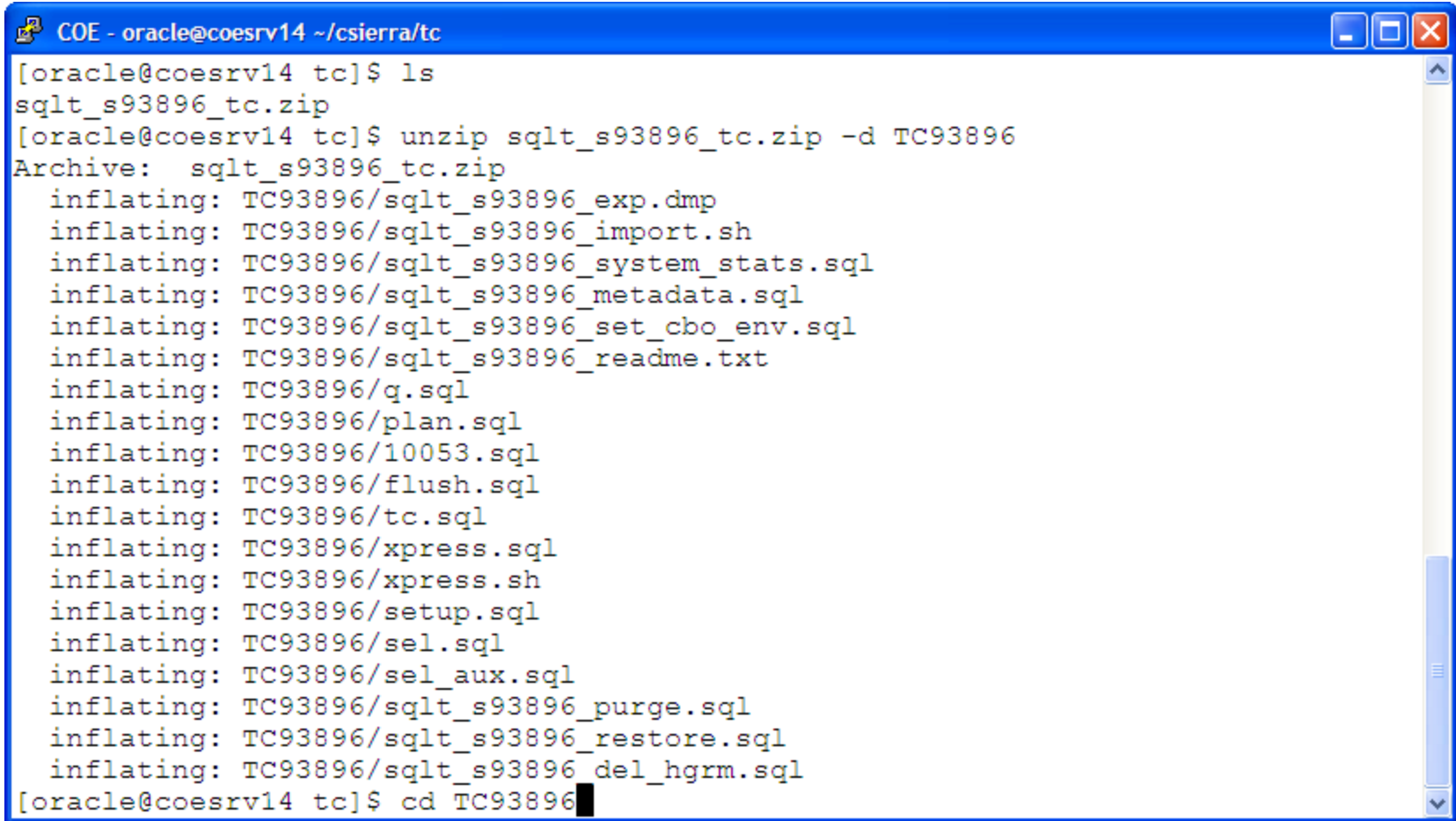
```
COE - oracle@coesrv14 ~/csierra/tc
|      'sdb'          - Connect as SQLDBA
|
| * 'dp'             - System problems or issues contact Dennis Pitman
+-----+

The following databases are available:

Version      ORACLE_SID  ORACLE_HOME                                Running?
-----
11.2.0.2.0    V1122       /u01/app/oracle/product/11.2.0.2.0        Yes
10.2.0.5.0    V1025       /u01/app/oracle/product/10.2.0.5.0        Yes

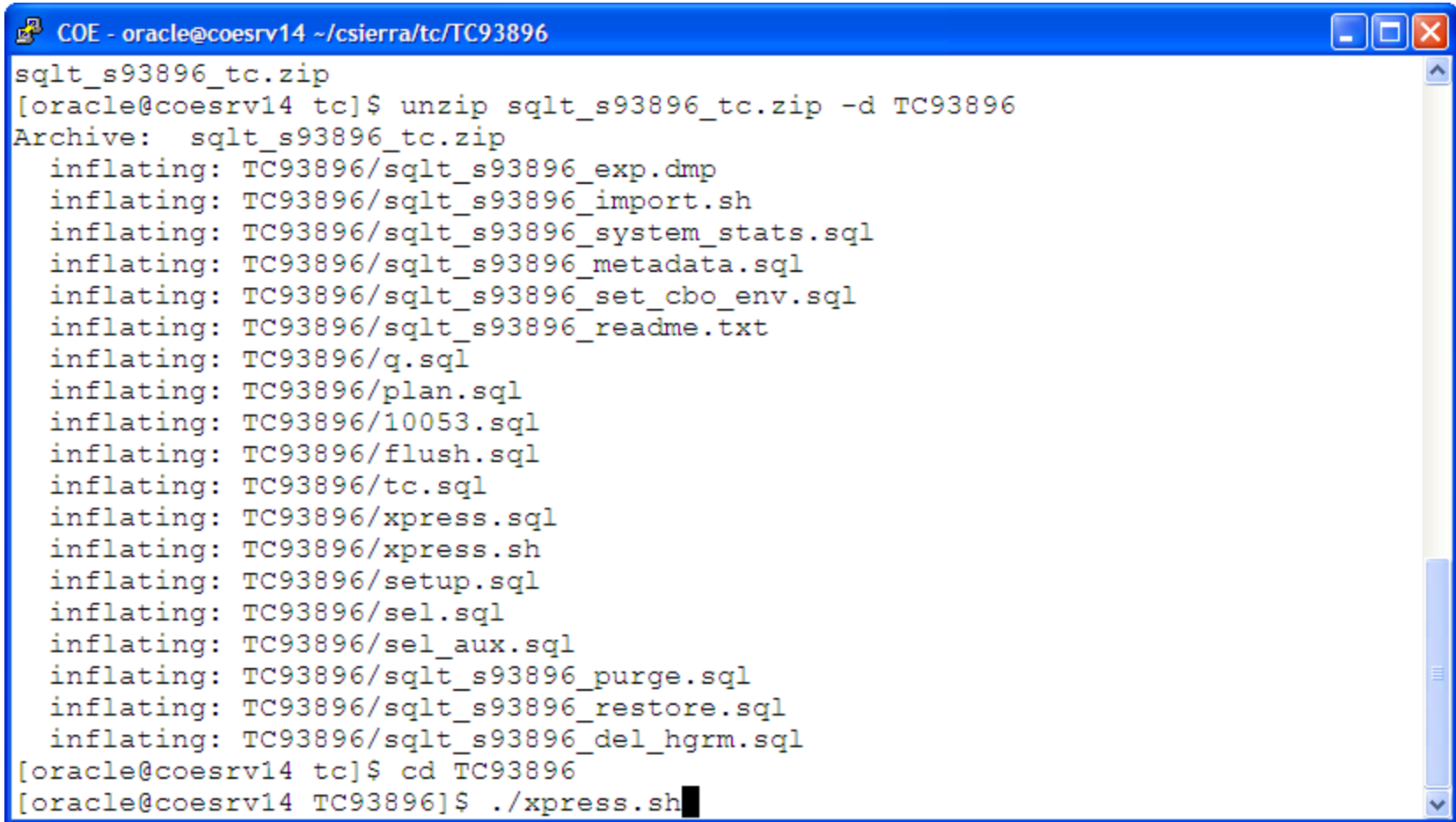
ORACLE_SID = [V1122] ?
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0.2.0 is /u01/app/o
racle
[oracle@coesrv14 ~]$ cd csierra
[oracle@coesrv14 csierra]$ mkdir tc
[oracle@coesrv14 csierra]$ cd tc
[oracle@coesrv14 tc]$ pwd
/home/oracle/csierra/tc
[oracle@coesrv14 tc]$ ls
sqlt_s93896_tc.zip
[oracle@coesrv14 tc]$ unzip sqlt_s93896_tc.zip -d TC93896
```

# Navigate to TC directory



```
COE - oracle@coesrv14 ~/csierra/tc
[oracle@coesrv14 tc]$ ls
sqlt_s93896_tc.zip
[oracle@coesrv14 tc]$ unzip sqlt_s93896_tc.zip -d TC93896
Archive:  sqlt_s93896_tc.zip
  inflating: TC93896/sqlt_s93896_exp.dmp
  inflating: TC93896/sqlt_s93896_import.sh
  inflating: TC93896/sqlt_s93896_system_stats.sql
  inflating: TC93896/sqlt_s93896_metadata.sql
  inflating: TC93896/sqlt_s93896_set_cbo_env.sql
  inflating: TC93896/sqlt_s93896_readme.txt
  inflating: TC93896/q.sql
  inflating: TC93896/plan.sql
  inflating: TC93896/10053.sql
  inflating: TC93896/flush.sql
  inflating: TC93896/tc.sql
  inflating: TC93896/xpress.sql
  inflating: TC93896/xpress.sh
  inflating: TC93896/setup.sql
  inflating: TC93896/sel.sql
  inflating: TC93896/sel_aux.sql
  inflating: TC93896/sqlt_s93896_purge.sql
  inflating: TC93896/sqlt_s93896_restore.sql
  inflating: TC93896/sqlt_s93896_del_hgrm.sql
[oracle@coesrv14 tc]$ cd TC93896
```

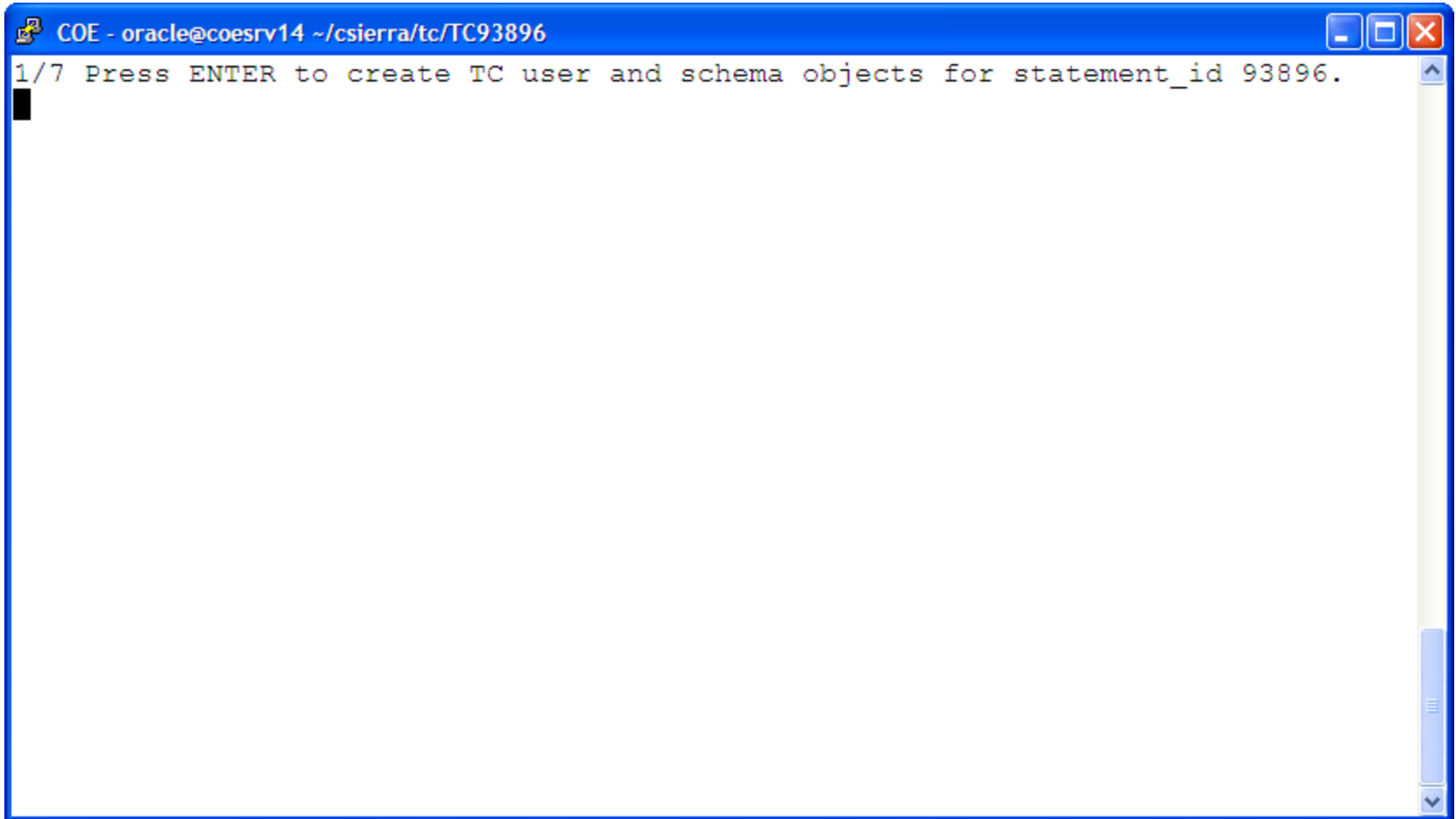
# Execute xpress.sh

A terminal window titled "COE - oracle@coesrv14 ~/csierra/tc/TC93896" with standard window controls. The terminal shows the process of unzipping a file and then running a script. The output of the unzip command lists 18 files being inflated into the TC93896 directory. The final command shown is the execution of ./xpress.sh.

```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
sqlt_s93896_tc.zip
[oracle@coesrv14 tc]$ unzip sqlt_s93896_tc.zip -d TC93896
Archive:  sqlt_s93896_tc.zip
  inflating: TC93896/sqlt_s93896_exp.dmp
  inflating: TC93896/sqlt_s93896_import.sh
  inflating: TC93896/sqlt_s93896_system_stats.sql
  inflating: TC93896/sqlt_s93896_metadata.sql
  inflating: TC93896/sqlt_s93896_set_cbo_env.sql
  inflating: TC93896/sqlt_s93896_readme.txt
  inflating: TC93896/q.sql
  inflating: TC93896/plan.sql
  inflating: TC93896/10053.sql
  inflating: TC93896/flush.sql
  inflating: TC93896/tc.sql
  inflating: TC93896/xpress.sql
  inflating: TC93896/xpress.sh
  inflating: TC93896/setup.sql
  inflating: TC93896/sel.sql
  inflating: TC93896/sel_aux.sql
  inflating: TC93896/sqlt_s93896_purge.sql
  inflating: TC93896/sqlt_s93896_restore.sql
  inflating: TC93896/sqlt_s93896_del_hgrm.sql
[oracle@coesrv14 tc]$ cd TC93896
[oracle@coesrv14 TC93896]$ ./xpress.sh
```



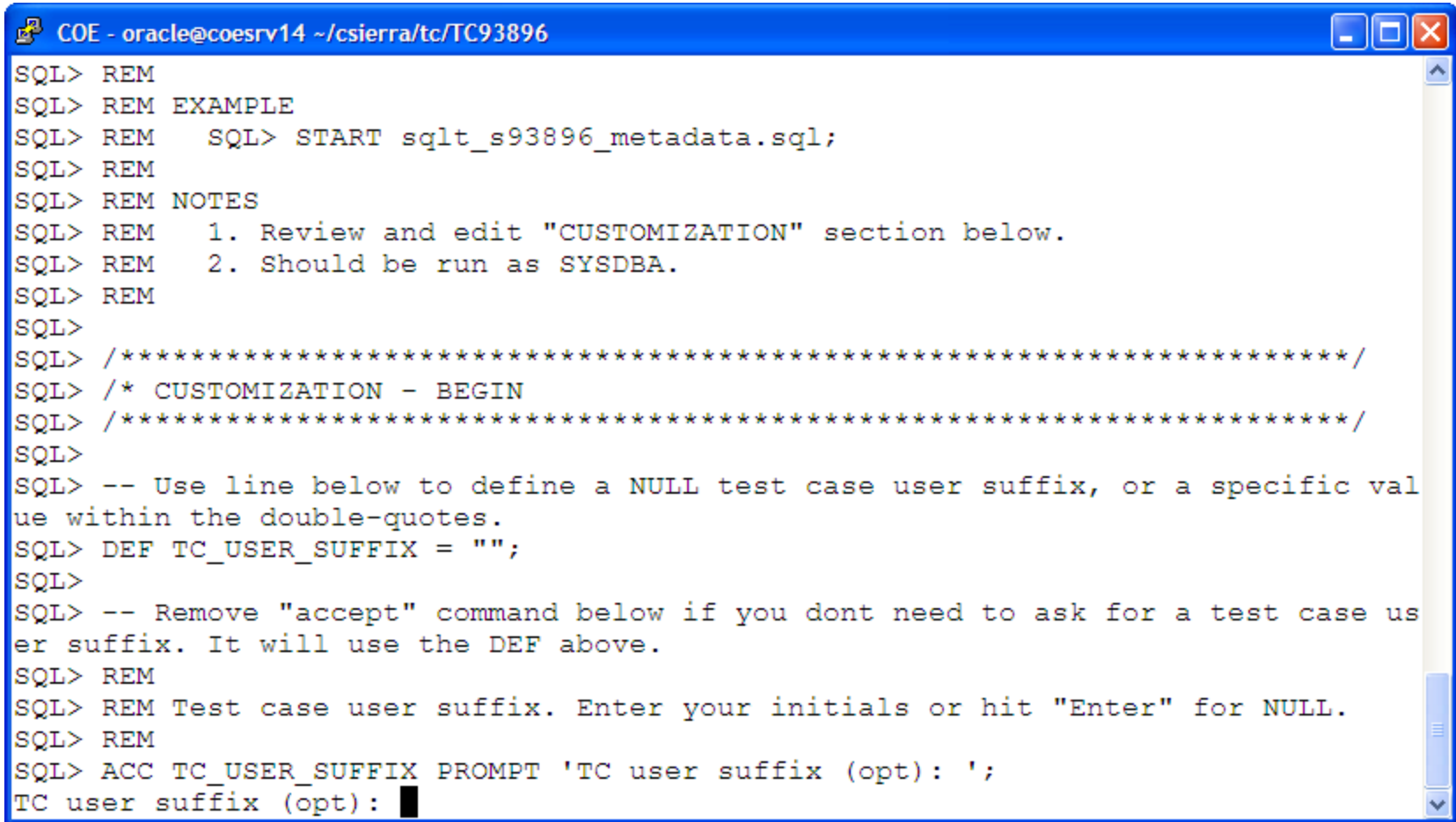
# Step 1: Create TC user and schema objects



A terminal window titled "COE - oracle@coesrv14 ~/csierra/tc/TC93896" is shown. The window has a blue title bar with standard window controls (minimize, maximize, close). The main area is white with a black cursor. The text "1/7 Press ENTER to create TC user and schema objects for statement\_id 93896." is displayed in a monospaced font. A black cursor is positioned at the start of the line below the text.

```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
1/7 Press ENTER to create TC user and schema objects for statement_id 93896.
█
```

# Leave TC user suffix empty and hit enter



```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
SQL> REM
SQL> REM EXAMPLE
SQL> REM   SQL> START sqlt_s93896_metadata.sql;
SQL> REM
SQL> REM NOTES
SQL> REM   1. Review and edit "CUSTOMIZATION" section below.
SQL> REM   2. Should be run as SYSDBA.
SQL> REM
SQL>
SQL> /*****
SQL> /* CUSTOMIZATION - BEGIN
SQL> *****/
SQL>
SQL> -- Use line below to define a NULL test case user suffix, or a specific value within the double-quotes.
SQL> DEF TC_USER_SUFFIX = "";
SQL>
SQL> -- Remove "accept" command below if you dont need to ask for a test case user suffix. It will use the DEF above.
SQL> REM
SQL> REM Test case user suffix. Enter your initials or hit "Enter" for NULL.
SQL> REM
SQL> ACC TC_USER_SUFFIX PROMPT 'TC user suffix (opt): ';
TC user suffix (opt):
```

## Step 2: Purge statement\_id from SQLT repository

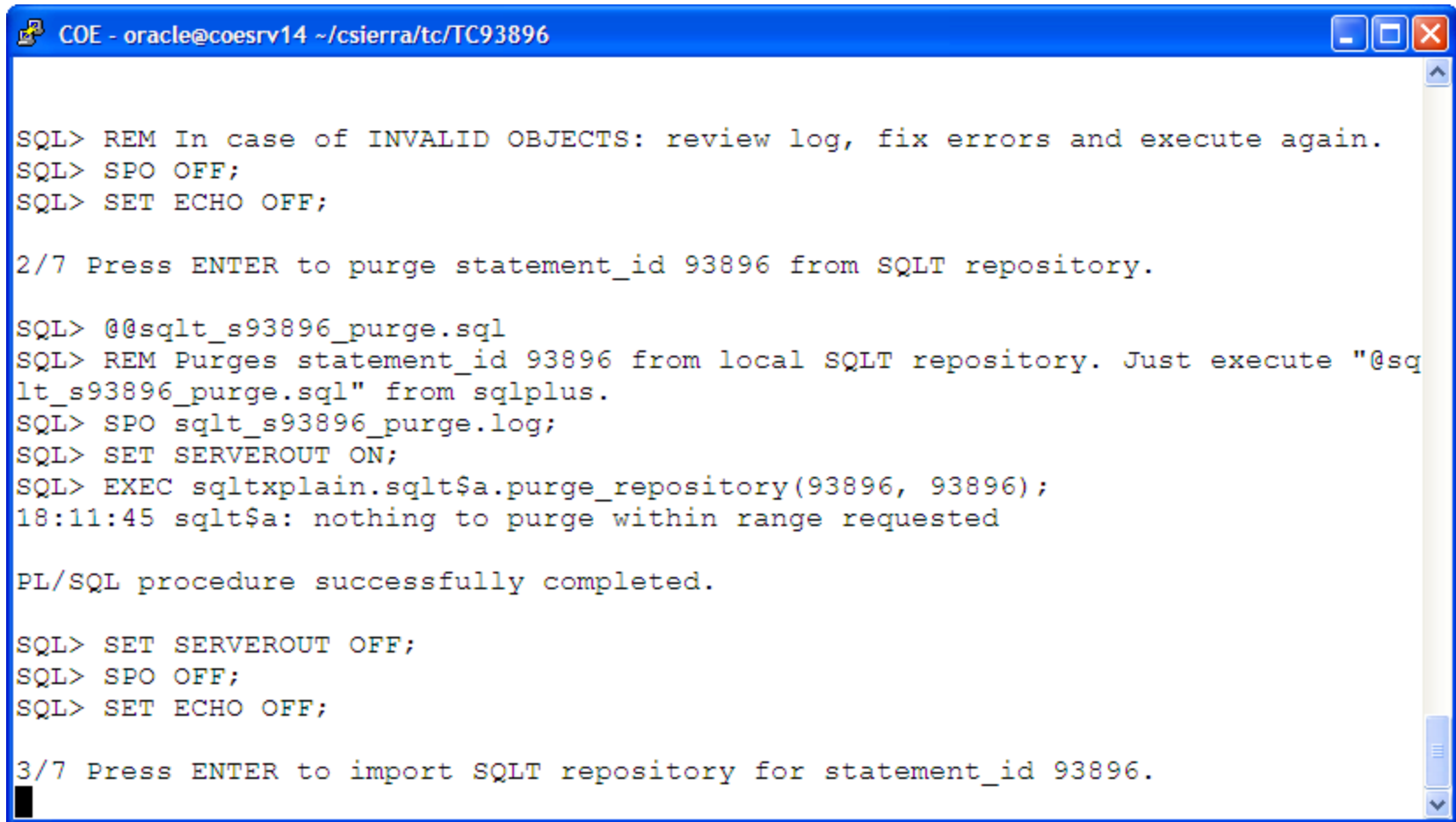
```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
VALID INDEX TC93896 COUNTRIES_PK
VALID INDEX TC93896 CUSTOMERS_GENDER_BIX
VALID INDEX TC93896 CUSTOMERS_MARITAL_BIX
VALID INDEX TC93896 CUSTOMERS_PK
VALID INDEX TC93896 CUSTOMERS_YOB_BIX
VALID INDEX TC93896 SALES_CHANNEL_BIX
VALID INDEX TC93896 SALES_CUST_BIX
VALID INDEX TC93896 SALES_PROD_BIX
VALID INDEX TC93896 SALES_PROMO_BIX
VALID INDEX TC93896 SALES_TIME_BIX
VALID VIEW TC93896 PROFITS

:INVALID_OBJECTS
-----

SQL> REM In case of INVALID OBJECTS: review log, fix errors and execute again.
SQL> SPO OFF;
SQL> SET ECHO OFF;

2/7 Press ENTER to purge statement_id 93896 from SQLT repository.
```

# Step 3: Import SQLT repository



```
COE - oracle@coesrv14 ~/csierra/tc/TC93896

SQL> REM In case of INVALID OBJECTS: review log, fix errors and execute again.
SQL> SPO OFF;
SQL> SET ECHO OFF;

2/7 Press ENTER to purge statement_id 93896 from SQLT repository.


SQL> @@sqlt_s93896_purge.sql
SQL> REM Purges statement_id 93896 from local SQLT repository. Just execute "@sqlt_s93896_purge.sql" from sqlplus.
SQL> SPO sqlt_s93896_purge.log;
SQL> SET SERVEROUT ON;
SQL> EXEC sqltxplain.sqlt$a.purge_repository(93896, 93896);
18:11:45 sqlt$a: nothing to purge within range requested

PL/SQL procedure successfully completed.

SQL> SET SERVEROUT OFF;
SQL> SPO OFF;
SQL> SET ECHO OFF;

3/7 Press ENTER to import SQLT repository for statement_id 93896.
```

# Provide SQLTXPLAIN password



```
COE - oracle@coesrv14 ~/csierra/tc/TC93896

SQL> @@sqlt_s93896_purge.sql
SQL> REM Purges statement_id 93896 from local SQLT repository. Just execute "@sqlt_s93896_purge.sql" from sqlplus.
SQL> SPO sqlt_s93896_purge.log;
SQL> SET SERVEROUT ON;
SQL> EXEC sqltxplain.sqlt$a.purge_repository(93896, 93896);
18:11:45 sqlt$a: nothing to purge within range requested

PL/SQL procedure successfully completed.

SQL> SET SERVEROUT OFF;
SQL> SPO OFF;
SQL> SET ECHO OFF;

3/7 Press ENTER to import SQLT repository for statement_id 93896.

SQL> HOS imp sqltxplain FILE=sqlt_s93896_exp.dmp TABLES=sqlt% IGNORE=Y

Import: Release 11.2.0.2.0 - Production on Sat Jan 28 18:12:39 2012

Copyright (c) 1982, 2009, Oracle and/or its affiliates. All rights reserved.

Password: █
```

# Step 4: Restore CBO schema statistics

```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
. . importing table      "SQLT$_GV$SQLAREA_PLAN_HASH"          1 rows imported
. . importing table      "SQLT$_GV$SQLSTATS"                  1 rows imported
. . importing table      "SQLT$_GV$SQLSTATS_PLAN_HASH"         1 rows imported
. . importing table      "SQLT$_GV$SQLTEXT_WITH_NEWLINES"      7 rows imported
. . importing table      "SQLT$_GV$SYSTEM_PARAMETER"          344 rows imported
. . importing table      "SQLT$_LOG"                          1448 rows imported
. . importing table      "SQLT$_METADATA"                     149 rows imported
. . importing table      "SQLT$_NLS_DATABASE_PARAMETERS"       20 rows imported
. . importing table      "SQLT$_OUTLINE_DATA"                 212 rows imported
. . importing table      "SQLT$_PEEKED_BINDS"                 10 rows imported
. . importing table      "SQLT$_PLAN_EXTENSION"               51 rows imported
. . importing table      "SQLT$_PLAN_INFO"                    36 rows imported
. . importing table      "SQLT$_SQL_PLAN_TABLE"               10 rows imported
. . importing table      "SQLT$_STATTAB"                      3636 rows imported
. . importing table      "SQLT$_STGTAB_SQLSET"                10 rows imported
. . importing table      "SQLT$_V$SESSION_FIX_CONTROL"        551 rows imported
. . importing table      "SQLT$_WRI$_ADV_RATIONALE"            22 rows imported
. . importing table      "SQLT$_WRI$_ADV_TASKS"                2 rows imported
Import terminated successfully without warnings.

SQL> SET ECHO OFF;

4/7 Press ENTER to restore schema object stats for TC93896.
```

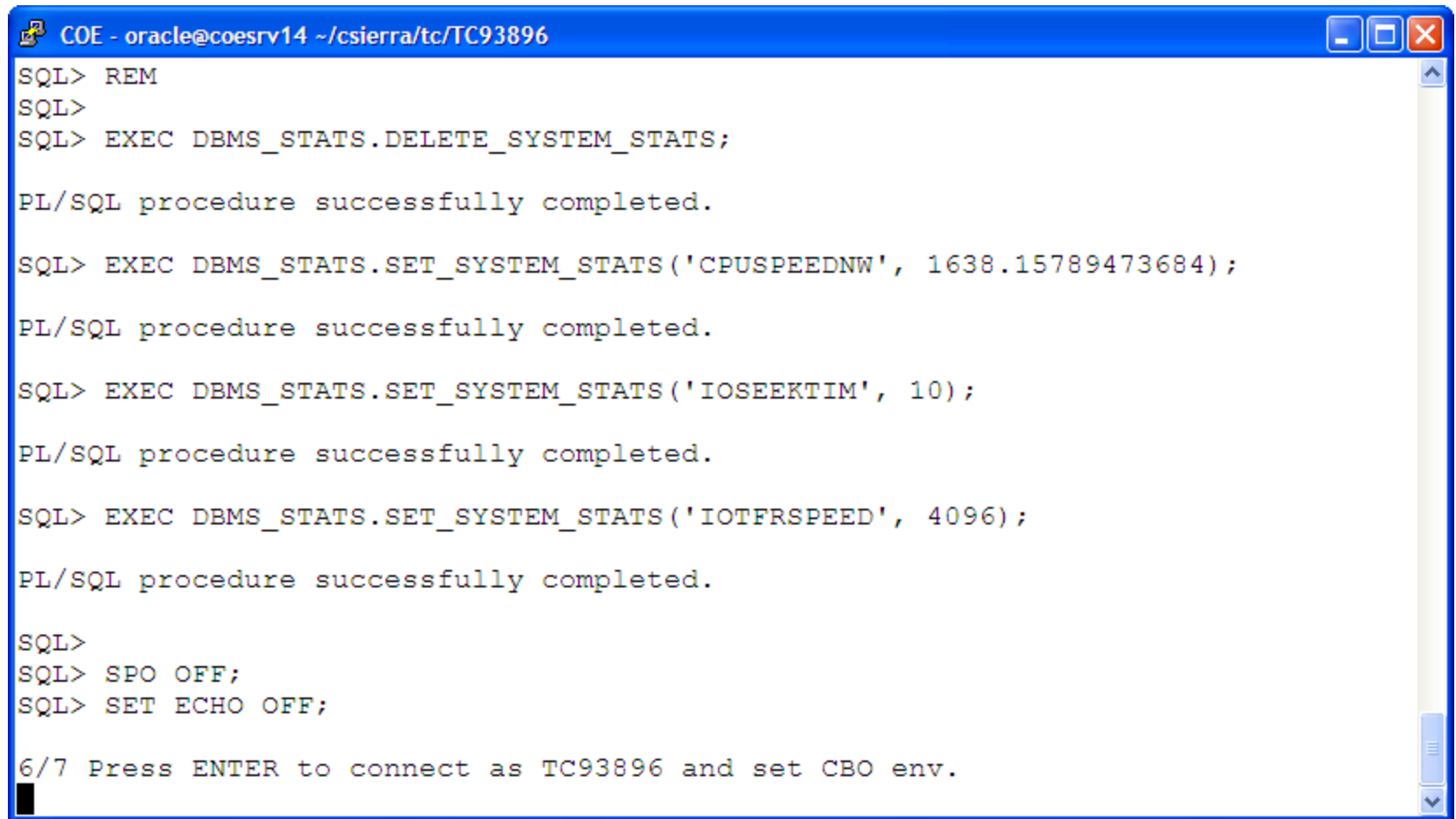
# Step 5: Restore System Statistics

```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
```

METRIC	IN STATTAB	RESTORED	OK
STATS ROWS:	3636	3636	OK
TABLES:	4	4	OK
TABLE PART:	56	56	OK
TABLE SUBPART:	0	0	OK
INDEXES:	12	12	OK
INDEX PART:	196	196	OK
INDEX SUBPART:	0	0	OK
COLUMNS:	502	502	OK
COLUMN PART:	2866	2866	OK
COLUMN SUBPART:	0	0	OK
AVG AGE DAYS:	429.9	429.9	OK

```
+  
  
PL/SQL procedure successfully completed.  
  
SQL> SET SERVEROUT OFF;  
SQL> SPO OFF;  
SQL> SET ECHO OFF;  
  
5/7 Press ENTER to restore system statistics.  
█
```

# Step 6: Connect as TC user and set CBO environment



```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
SQL> REM
SQL>
SQL> EXEC DBMS_STATS.DELETE_SYSTEM_STATS;

PL/SQL procedure successfully completed.

SQL> EXEC DBMS_STATS.SET_SYSTEM_STATS('CPUSPEEDNW', 1638.15789473684);

PL/SQL procedure successfully completed.

SQL> EXEC DBMS_STATS.SET_SYSTEM_STATS('IOSEEKTIM', 10);

PL/SQL procedure successfully completed.

SQL> EXEC DBMS_STATS.SET_SYSTEM_STATS('IOTFRSPEED', 4096);

PL/SQL procedure successfully completed.

SQL>
SQL> SPO OFF;
SQL> SET ECHO OFF;

6/7 Press ENTER to connect as TC93896 and set CBO env.
```



# Acknowledge ALTER SYSTEM commands



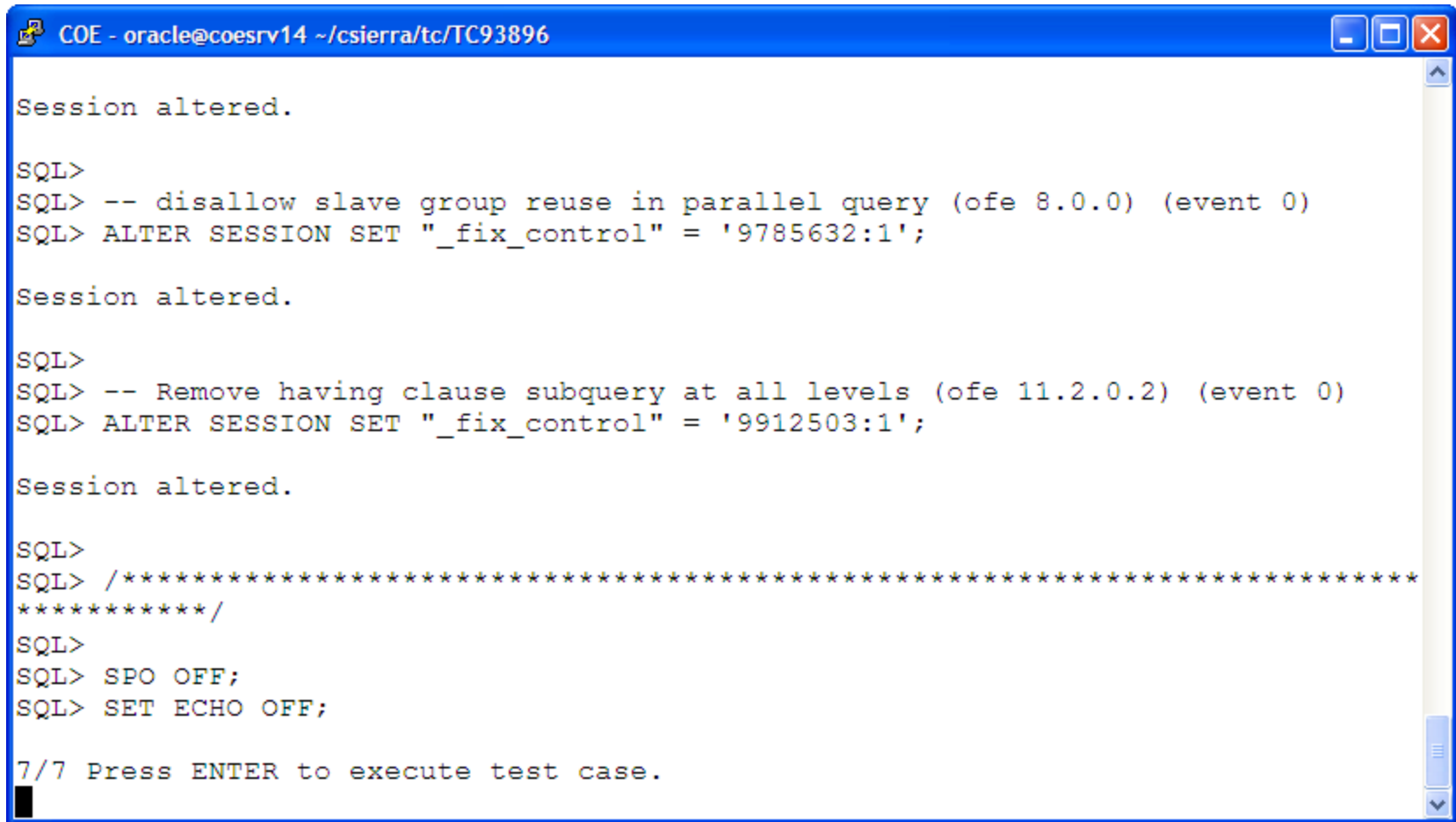
```
COE - oracle@coesrv14 ~/csierra/tc/TC93896
SQL> REM
SQL> REM PARAMETERS
SQL> REM   None.
SQL> REM
SQL> REM EXAMPLE
SQL> REM   SQL> START sqlt_s93896_set_cbo_env.sql;
SQL> REM
SQL> REM NOTES
SQL> REM   1. Review and edit if needed.
SQL> REM   2. Should be run as the test case user.
SQL> REM
SQL>
SQL> /*****
*****/
SQL>
SQL> ALTER SESSION SET optimizer_features_enable = '11.2.0.2';

Session altered.

SQL>
SQL> SET ECHO OFF;

Press ENTER to execute ALTER SYSTEM/SESSION commands to set CBO env.
```

# Step 7: Execute Test Case statement and get Plan



```
COE - oracle@coesrv14 ~/csierra/tc/TC93896

Session altered.

SQL>
SQL> -- disallow slave group reuse in parallel query (ofe 8.0.0) (event 0)
SQL> ALTER SESSION SET "_fix_control" = '9785632:1';

Session altered.

SQL>
SQL> -- Remove having clause subquery at all levels (ofe 11.2.0.2) (event 0)
SQL> ALTER SESSION SET "_fix_control" = '9912503:1';

Session altered.

SQL>
SQL> /*****
*****/
SQL>
SQL> SPO OFF;
SQL> SET ECHO OFF;

7/7 Press ENTER to execute test case.
```

# Review Plan

```
COE - oracle@coesrv14 ~/csierra/tc/TC93896

|* 7 |          HASH JOIN          |          | 82112 | 4089K|          | 687 (5)
| 00:00:01 |          |          |
| 8 |          TABLE ACCESS FULL| COSTS      | 82112 | 1924K|          | 137 (1)
| 00:00:01 |          1 |          28 |
| 9 |          TABLE ACCESS FULL| SALES      | 918K| 23M|          | 530 (3)
| 00:00:01 |          1 |          28 |
-----
-----

Predicate Information (identified by operation id):
-----

  2 - access("R"."COUNTRY_ID"="C"."COUNTRY_ID")
  3 - filter("R"."COUNTRY_REGION"=:B1)
  4 - access("C"."CUST_ID"="S"."CUST_ID")
  7 - access("C"."TIME_ID"="S"."TIME_ID" AND "C"."PROD_ID"="S"."PROD_ID" AND
        "C"."CHANNEL_ID"="S"."CHANNEL_ID" AND "C"."PROMO_ID"="S"."PROMO_ID"
")

36 rows selected.

SQL> SPO OFF;
SQL> █
```

# Plan on target

Plan hash value: 2874174940

Id	Operation	Name	Rows	Bytes	TempSpc	Cost (%CPU)	Time	Pstart	Pstop
0	SELECT STATEMENT					1432 (100)			
1	SORT GROUP BY ROLLUP		411	39045		1432 (3)	00:00:01		
* 2	HASH JOIN		16566	1536K		1430 (3)	00:00:01		
* 3	TABLE ACCESS FULL	COUNTRIES	4	92		3 (0)	00:00:01		
* 4	HASH JOIN		82112	5773K	1792K	1426 (3)	00:00:01		
5	TABLE ACCESS FULL	CUSTOMERS	55500	1138K		406 (1)	00:00:01		
6	PARTITION RANGE ALL		82112	4089K		687 (5)	00:00:01	1	28
* 7	HASH JOIN		82112	4089K		687 (5)	00:00:01		
8	TABLE ACCESS FULL	COSTS	82112	1924K		137 (1)	00:00:01	1	28
9	TABLE ACCESS FULL	SALES	918K	23M		530 (3)	00:00:01	1	28

Predicate Information (identified by operation id):

```

2 - access("R"."COUNTRY_ID"="C"."COUNTRY_ID")
3 - filter("R"."COUNTRY_REGION"=:B1)
4 - access("C"."CUST_ID"="S"."CUST_ID")
7 - access("C"."TIME_ID"="S"."TIME_ID" AND "C"."PROD_ID"="S"."PROD_ID" AND
          "C"."CHANNEL_ID"="S"."CHANNEL_ID" AND "C"."PROMO_ID"="S"."PROMO_ID")

```



D E M O N S T R A T I O N

end

# Topics

- A Test Case (TC) for SQL Tuning?
- How SQLTXPLAIN (SQLT) helps with a TC?
- What is included in a SQLT TC?
- Demo of SQLT TC implementation
- **Troubleshooting a SQLT TC**
- Beyond a SQLT TC

# Troubleshooting a SQLT TC

- Known issues
  - Missing SQLT repository
  - Invalid view
  - Invalid package
  - Invalid SQL statement
  - Distributed SQL
  - SQL statement references identical table names from multiple owners
- SQLT TC can be restarted from intermediate steps

# Missing SQLT repository

- When using SQLT XTRACT/XECUTE/XPLAIN password for SQLTXPLAIN was not passed
  - Export SQLT repository as per dynamic readme

## Export SQLT repository

Steps:

1. Unzip `sqlt_s93896_driver.zip` in order to get `sqlt_s93896_export_parfile.txt`.
2. Copy `sqlt_s93896_export_parfile.txt` to SOURCE server (TEXT).
3. Execute export on server:

```
exp sqltxplain parfile=sqlt_s93896_export_parfile.txt
```



# Invalid view

- View references tables including schema name
  - Modify metadata script removing schema name
  - Re-execute metadata script

# Invalid package

- Isolate function and compile it individually
- If package is small and number of errors is small then fix package in metadata script and re-execute

# Invalid SQL statement

- If SQL statement is an INSERT and inserted table is missing from metadata then convert statement into a SELECT by removing INSERT clause
  - Be aware that SELECT part may be parsed differently by the CBO than when part of a DML
    - Some Query Transformations (QT) are not applied to DML
- Remove schema names on FROM clause

# Distributed SQL

- Implement TC in local and remote
  - You may need to process export from remote Source
    - Refer to readme for instructions
- Create database links manually

# SQL references identical tables from multiple owners

- Metadata script maps multiple instances of same table into only one TC user
- Consider customizing metadata to preserve original schema names
  - Then use `sqlt/utl/sqltimp.sql` to restore CBO schema statistics to these multiple schema owners

# Topics

- A Test Case (TC) for SQL Tuning?
- How SQLTXPLAIN (SQLT) helps with a TC?
- What is included in a SQLT TC?
- Demo of SQLT TC implementation
- Troubleshooting a SQLT TC
- **Beyond a SQLT TC**

# Beyond a SQLT TC

- SQLT TC enabled a SQL Tuning environment on a test system
- What is next after Execution Plan from Source system has been reproduced in Target?
  - If dealing with a regression test OFE to pre-upgrade
    - If OFE produces a prior “good” plan consider then using SQLT XPLORE
  - If suspecting schema object statistics consider using SQLT XHUME on your disposable test system
  - If suspecting histograms consider using SQLT XGRAM

# Removing SQLTXPLAIN dependencies from Test Case

- To isolate the TC from any SQLTXPLAIN dependencies refer to “Create TC with no SQLT dependencies” on readme



## Create TC with no SQLT dependencies

After creating a local test case using SQLT files, you can create a stand-alone TC with no dependencies on SQLT.

Steps:

1. Export TC schema object statistics to staging table within TC schema:

```
EXEC DBMS_STATS.EXPORT_SCHEMA_STATS('TC93896','CBO_STAT_TAB_4TC',NULL,'TC93896');
```

2. Export TC schema object statistics from staging table:

```
HOS exp TC93896/TC93896 FILE=cbo_stat_tab_4tc.dmp TABLES=cbo_stat_tab_4tc STATISTICS=NONE
```

3. Review and adjust `sqlt_s93896_metadata.sql` script. You may want to set the `TC_USER_SUFFIX` as a constant and remove the `ACCEPT` command.
4. Review and adjust `setup.sql` (may remove comment on `set_cbo_env`) and `sqlt_s93896_set_cbo_env.sql` (remove pause).
5. Create a new `readme.txt` file with simple instructions, like example below:

```
connect as sys and execute setup.sql
```

6. Create and zip a new directory with the following files:

```
CBO schema object statistics dump: cbo_stat_tab_4tc.dmp
Plan script:                       plan.sql
Query script:                     q.sql
Instructions:                      readme.txt
Setup script:                      setup.sql
Metadata script:                  sqlt_s93896_metadata.sql
OPatch (if needed):              sqlt_s93896_opatch.zip
Set CBO env script (if needed):   sqlt_s93896_set_cbo_env.sql
System statistics setup:          sqlt_s93896_system_stats.sql
Test case script:                 tc.sql
```

7. Test your new stand-alone TC following your own `readme.txt` in another system.



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Jens Voigt (Host)

Attendees:

Jens Voigt (me)

Q&A

All (0)

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Send

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- **Advisor Webcast Archived Recordings (Doc ID 740964.1)**
- **Advisor Webcast Current Schedule (Doc ID 740966.1)**
- **DB Newsletter (Doc ID 1284265.1)**
- **MOS Community [Database Tuning](#)**

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