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Oracle Database Administration Tips and Techniques
For the PDMLink Administrator

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## Julio Aguilar-Chang

- Oracle Database Administrator
- 18+ years managing Oracle databases
- Solaris, Windows, Linux
- 6+ years supporting PDMLink

#### Lanorra Sena

- Windchill Administrator
- 8+ years managing PTC® solutions

## White paper available on the PTC Conference web site, or via email:

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## Our PDMLink and Oracle deployments

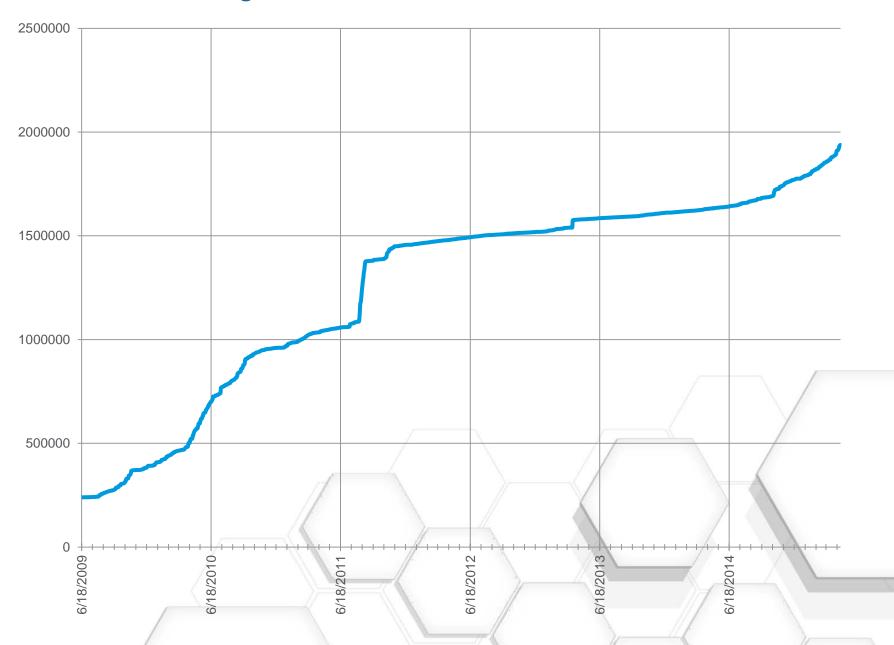
#### PDMLink

- Version 10.2
- 2 production servers
- 10 devl / qual servers
- Windows Server 2008
- Multi-tier installation
- Approx.1800 users
- 8+ million vault files
- Approx. 5 TBytes of used disk space

#### Oracle

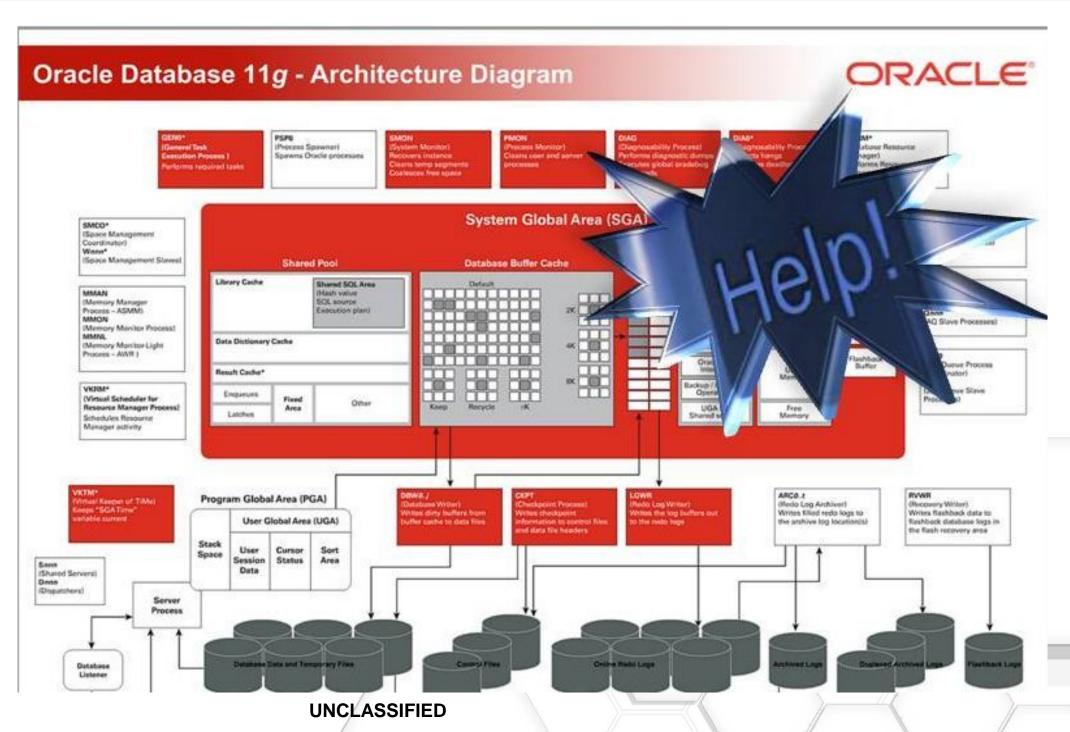
- Version 11gR2 (11.2.0.4)
- 2 production servers
- 10 devl / qual servers
- Windows Server 2008

## Vault file growth since initial installation in 2009



## YOU are now in charge of the production database

- What do you do?
- Where do you start?



## Your first day as the interim DBA

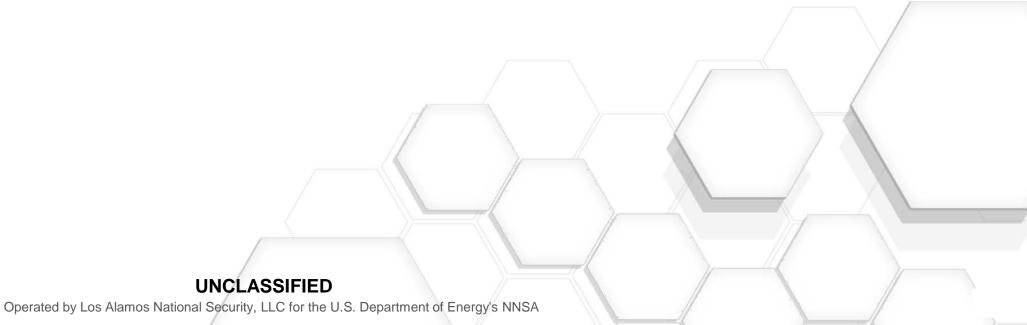
Objective

Take you through some of the steps that you will need to follow on your first day after you have been told that YOU must now take care of the production Oracle database



## Typical daily activities of a database administrator

- Check the nightly Oracle database backups
- Check the Oracle alert.log file for errors in the database
- Help troubleshoot PDMLink



## The Basics

Server / host information, user log in names, passwords

- Oracle database installation: where is it?
  - Server / host name
- Local account information: how do I log in?
  - Local "oracle" user name and password
    - The local user who owns the Oracle database installation
- Database administrative account information: how do I log in?
  - Database user "SYS" and "SYSTEM" passwords
    - SYS and SYSTEM are privileged database users
    - Manage the database through these database accounts
    - If not documented, find "hidden" passwords in backup scripts



## The Basics

#### Review environment variables

- Log into the Oracle database server/host as local user "oracle"
- Review and familiarize yourself with Oracle-specific variables
  - Windows:

set | find "oracle"

– UNIX/Linux:

setenv | grep ORA

- Important Oracle variables to know and remember
  - ORACLE\_BASE
    - Top level directory for all Oracle software on the host
  - ORACLE\_HOME
    - Inside ORACLE\_BASE directory
    - Oracle products are installed in their own ORACLE\_HOME directory structure
    - Multiple ORACLE\_HOMEs can exist
  - ORACLE\_SID
    - Unique identifier on the current host for a database

#### The Basics

#### Review environment variables

On Windows: On Unix:

set | find "oracle" setenv | grep -I ora

```
C:\Windows\System32>
C:\Windows\System32>
C:\Windows\System32>set | find "oracle"
oracle_base=c:\oracle
oracle_home=c:\oracle\product\11.2.0\dbhome_2
oracle_sid=test
Path=C:\ProgramData\Oracle\Java\javapath;c:\oracle\product\11.2.0\dbhome_2\bin;C:\or
ws\system32;C:\Windows;C:\Windows\System32\Wbem;C:\Windows\System32\WindowsPowerShel
xio Shared\DLLShared\;C:\Program Files (x86)\Common Files\Roxio Shared\9.0\DLLShared
:\Windows\System32\WindowsPowerShell\v1.0\
```

## Logging into the database

Ensure that you can log in as a database administrator

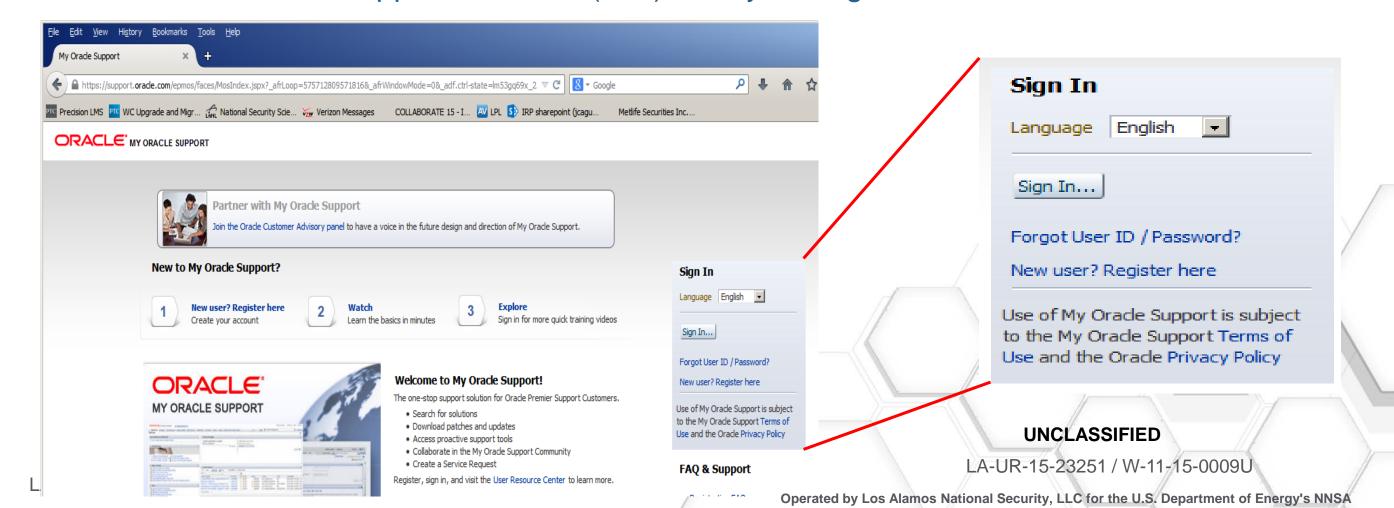
- Log into the database host as the local user "oracle"
- From a command prompt:

```
C:\Windows\System32
C:\Windows\System32\sqlplus / as sysdba
SQL*Plus: Release 11.2.0.4.0 Production on Tue Feb 24 16:35:08 2015
Copyright (c) 1982, 2013, Oracle. All rights reserved.
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 - 64bit Production
    show user
    is "SYS"
SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 -
C:\Windows\System32>
C:\Windows\Sustem32>
```

## Oracle Support: support.oracle.com

## Create your own account with Oracle Support

- Create tickets to troubleshoot database issues
- Huge amount of technical documents, how-to, reference guides, community support
- Must have Customer Support Identifier (CSI) from your organization



## The alert.log file

File containing chronological output of messages and activity from the database

In a typical database installation:

ORACLE\_BASE/diag/rdbms/<SID>/<SID>/trace/alert\_<SID>.log

```
c:\oracle\diag\rdbms\test\test\trace
c:\oracle\diag\rdbms\test\test\trace\sqlplus / as sysdba
SQL*Plus: Release 11.2.0.4.0 Production on Mon Mar 2 15:41:10 2015
Copyright (c) 1982, 2013, Oracle. All rights reserved.
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 - 64bit Production
SQL> show parameter background_dump_dest
                                           VALUE
NAME
                                TYPE
background_dump_dest
                                           C:\ORACLE\diag\rdbms\test\test
                                string
                                           \trace
SQL>
03/02/2015 01:10 PM
                           130,715 alert_test.log
```

## Inspecting the alert.log file

#### Oracle database errors

- Windows: find "ORA-" alert\_test.log
- UNIX/Linux: grep ORA- alert\_test.log

#### TIP:

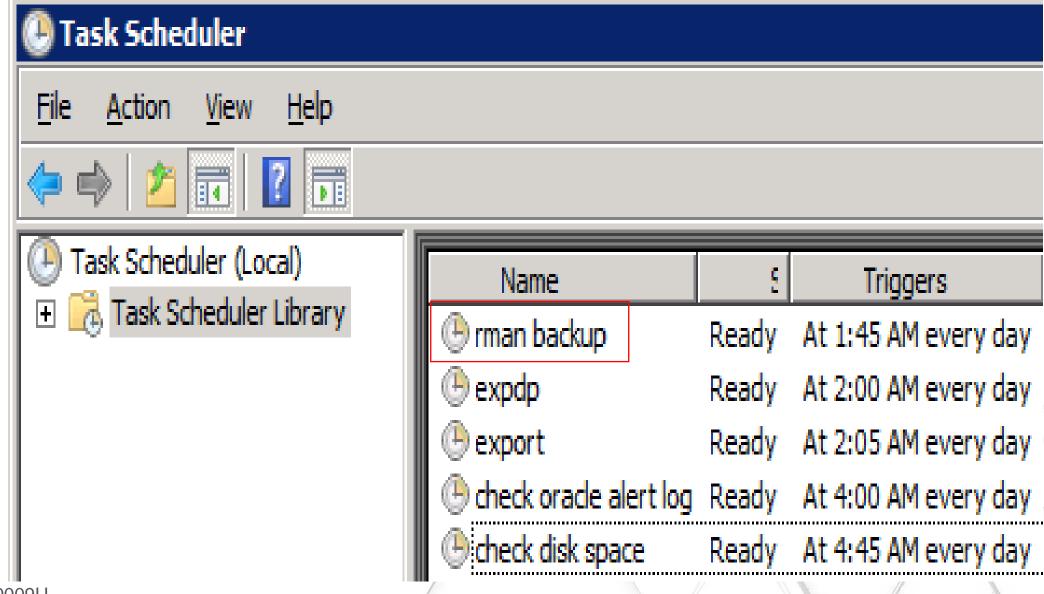
Read the alert.log file from the bottom up; the most recent activity shows up at the bottom of the file.

```
T:\oracle\diag\rdbms\test\test\trace>
T:\oracle\diag\rdbms\test\test\trace\find "ORA-" alert_test.log
          ALERT_TEST.LOG
opiodr aborting process unknown ospid (9492) as a result of ORA-609
opiodr aborting process unknown ospid (6992) as a result of ORA-609
opiodr aborting process unknown ospid (6960) as a result of ORA-609
opiodr aborting process unknown ospid (7744) as a result of ORA-609
opiodr aborting process unknown ospid (9092) as a result of ORA-609
opiodr aborting process unknown ospid (4524) as a result of ORA-609
opiodr aborting process unknown ospid (1684) as a result of ORA-609
opiodr aborting process unknown ospid (10172) as a result of ORA-609
ORA-1653: unable to extend table JULIO.T1 by 128 in
                                                                    tablespace USERS
opiodr aborting process unknown ospid (1248) as a result of ORA-609
opiodr aborting process unknown ospid (13012) as a result of ORA-609
opiodr aborting process unknown ospid (10180) as a result of ORA-609
opiodr aborting process unknown ospid (9408) as a result of ORA-609
opiodr aborting process unknown ospid (13660) as a result of ORA-609
```

## Oracle database backups

Find the backup jobs (possibly "hidden" passwords too!)

#### Windows Task Scheduler



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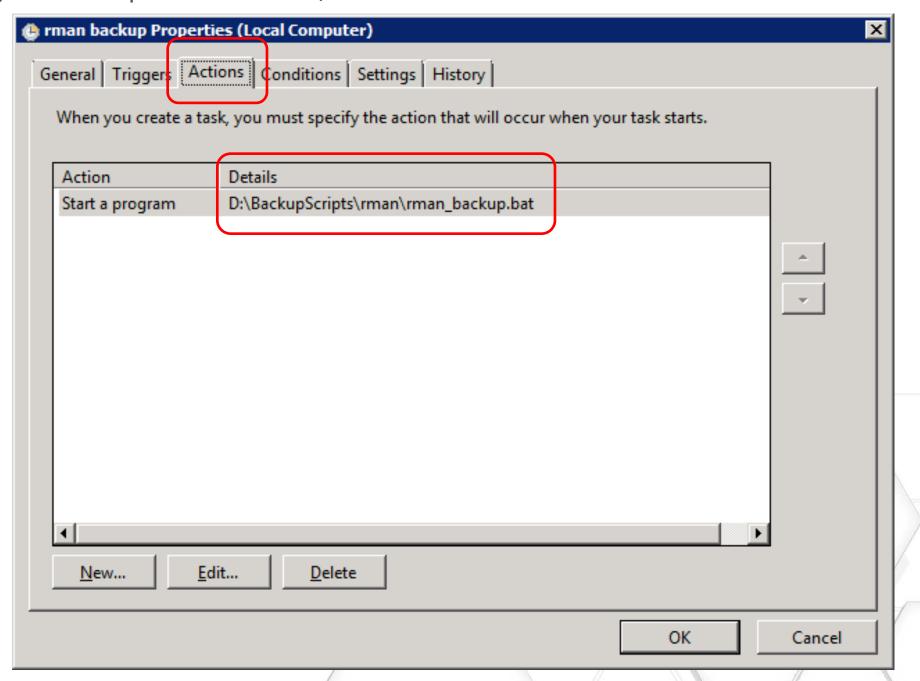
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## Oracle database backups

Find the backup jobs (possibly "hidden" passwords too!)

Windows Task Scheduler



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## Oracle database backups

Find the backup jobs (possibly "hidden" passwords too!)

UNIX/Linux crontab file

crontab -l

```
Command
      H0UR
              \mathsf{DoM}
                      MoY
                              DoW
(0-59)(0-23) (1-31) (1-12) (0-6)
                               (0 = Sunday)
Manual startup and shutdown of databases
                   csh /oracle/DB_Backup/db_shut_all.csh
                   csh /oracle/DB_Backup/db_start_all.csh
22 18 23 05 *
Daily hot backups
                * csh /oracle/DB_Backup/hotbackup.csh
RMAN backups
00 20 * * 2,4 csh /oracle/DB_Backup/RMAN/incremental_backup.csh
```

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# Oracle database backups – output log files

Find, inspect, and familiarize yourself with backup log files

Daily inspection of logs from nightly backups

• If you can do only one thing ... THIS is what you need to do!

 Find the location of the output backup log files by reading the contents of the backup scripts

Where are the RMAN (Recovery Manager) log files?

## RMAN (Recovery Manager)

Built-in backup utility to perform hot, online, backups of the physical database files

```
C:\Windows\System32>
C:\Windows\System32>
C:\Windows\System32>type
                                     \d$\BackupScripts\rman\rman.bat
set oracle_home=D:\oracle\nroduct\11.2.0\dbhome_2.
set oracle_sid=TEST
%oracle_home%/bin/rman target '/ as sysdba'
                cmdfile D:\BackupScripts\rman\rman_backup.run
                log D:\BackupScripts\rman\rman_backup.log.temp
```

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## Oracle database backups – RMAN log files errors

#### What does an RMAN error look like?

```
Recovery Manager: Release 11.2.0.4.0 - Production on Fri Mar 13 01:45:01 2015
Copyright (c) 1982, 2011, Oracle and/or its affiliates. All rights reserved.
connected to target database: TEST
using target database control file instead of recovery catalog
RMAN>
RMAN>#
Starting backup at 13-MAR-15
current log archived
allocated channel: ORA DISK 1
channel ORA_DISK_1: SID=398 device type=DISK
                                                        channel ORA_DISK_4: starting piece 1 at 13-MAR-15
allocated channel: ORA_DISK_2
channel ORA_DISK_2: SID=465 device type=DISK
                                                        channel ORA_DISK_5: starting archived log backup set
allocated channel: ORA_DISK_3
                                                        channel ORA_DISK_5: specifying archived log(s) in backup set
channel ORA_DISK_3: SID=622 device type=DISK
allocated channel: ORA_DISK_4
channel ORA_DISK_4: SID=708 device type=DISK
                                                        RMAN-00571:
allocated channel: ORA DISK 5
                                                        channel ORA_DISK_5: SID=779 device type=DISK
                                                        RMAN-00571: =
allocated channel: ORA DISK 6
                                                        RMAN-03002: failure of backup plus archivelog command at 08/01/2012 23:00:09
channel ORA_DISK_6: SID=855 device type=DISK
allocated channel: ORA_DISK_7
                                                        ORA-19563: beader validation failed for file
```

#### Where are the EXP or EXPDP log files?

- EXPDP is the "newer" export data pump utility
- EXP command is the "traditional" export utility

```
#!/bin/csh
setenv ORACLE HOME /oracle/product/11.2.0/dbhome 1
setenv ORACLE SID test
$ORACLE_HOME/bin/expdp expuser/expuser full=y content=all \
estimate=blocks job name=dpexp full parallel=12 \
directory=dpump_dir \
dumpfile=full %U.dmp filesize=16G \
logfile=expdp full.log
```

Find the path to the DPUMP\_DIR directory

```
[oracle@
                        ~/DB Backup]$
                        ~/DB_Backup]$ sqlplus / as sysdba
[oracle@
SQL*Plus: Release 11.2.0.4.0 Production on Thu Apr 9 19:19:40
Copyright (c) 1982, 2013, Oracle. All rights reserved.
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 - 6
With the Partitioning option
Session altered.
           > column directory_path format a50
SYS@
SYS@
            > select directory_name,directory_path
SYS@
  2 from dba directories
    where directory_name='DPUMP_DIR'
DIRECTORY NAME
                               DIRECTORY PATH
DPUMP DIR
                               /oraback/dpdir
1 row selected.
```

What does a Data Pump Export error look like?

```
. . exported "USER1"."TABL1_NOCOMPRESS" 797.9 MB 6749198 rows
. . exported "USER1"."TABL1_COMPRESS" 797.9 MB 6749198 rows
. . exported "USER1"_EXPONDESS" 797.9 MB 6749198 rows
. exported "USER1"_EXPONDESS PORTED P
```

Job "SYS"."EXPDP\_TEST\_1" successfully completed at Fri Mar 6 02:16:23 2015 elapsed 0 00:16:16

"Traditional" Export utility

## Typical EXP script

```
set oracle_home=D:\oracle\product\11.2.0\dbhome_2
set oracle_sid=test

%oracle_home%/bin/exp '/ as sysdba' \
file=\oracle\backups\full.dmp \
log=\oracle\backups\exp_full.log \
full=y compress=y statistics=none direct=n
```

What does a "traditional" Export error look like?

\_exporting table FIX\_ASSOC

EXP-00008: ORACLE error 1008 encountered

ORA-01008: not all variables bound

EXP-00056: ORACLE error 1013 encountered

ORA-01013: user requested cancel of current operation

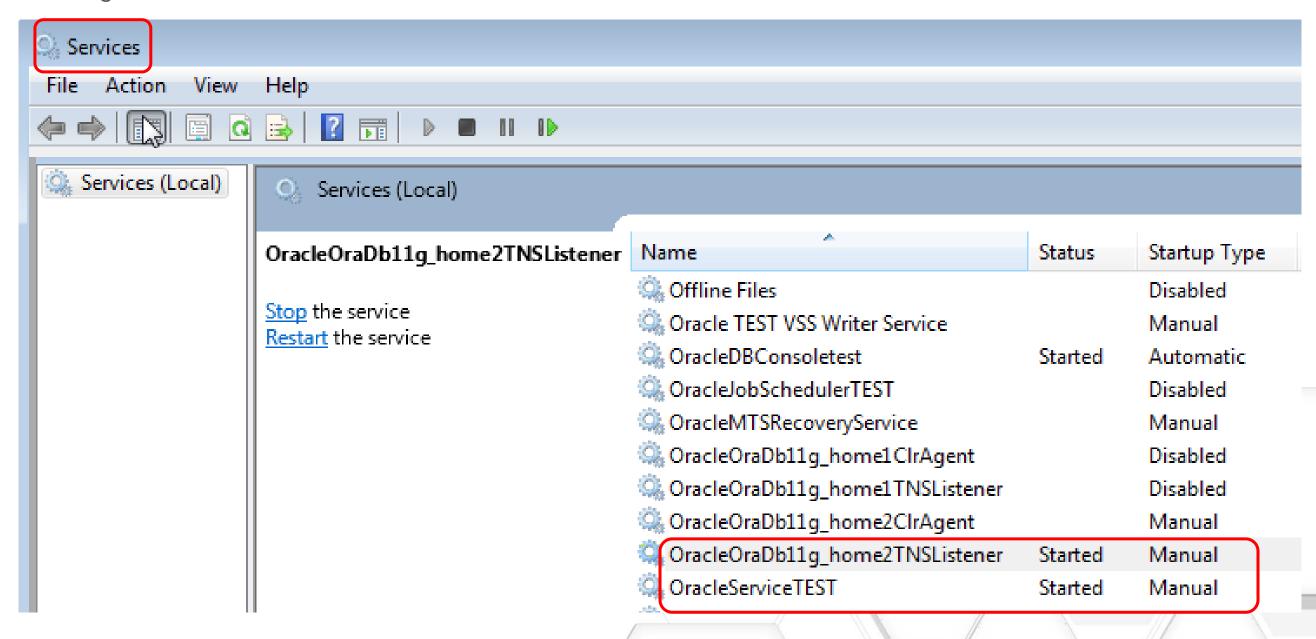
EXP-00000: Export terminated unsuccessfully

- . exporting user history table
- . exporting default and system auditing options
- . exporting statistics

Export terminated successfully without warnings

## Oracle services and processes

Services running on a Windows server



## Oracle services and processes

Processes running on a UNIX/Linux server

ps -ef | grep ora\_

ps –ef | grep tnslsnr

```
00:08:31 ora pmon
                      11g
00:10:07 ora psp0
                      11g
13:14:05 ora_vktm_
                      11g
00:01:22 ora gen0
                      11g
00:02:22 ora diag
                      11g
00:02:39 ora dbrm
                      11g
00:38:32 ora dia0
                      11g
00:01:26 ora mman
                      11g
00:14:55 ora dbw0
                      11g
00:17:03 ora dbwl
                      11g
00:16:41 ora dbw2
                      11g
00:15:28 ora dbw3
                      11g
00:32:11 ora lgwr
                      11g
00:13:30 ora ckpt
                      11g
00:36:58 ora smon
                      11g
00:00:31 ora reco
                      11g
00:41:53 ora mmon
                      11g
00:27:46 ora mmnl
                      11g
00:12:37 ora arc0
                      11g
00:00:55 ora arcl
                      11g
00:12:54 ora arc2
                      11g
00:12:43 ora arc3
                      11g
00:22:36 ora ctwr
                      11g
00:00:42 ora qmnc
                      11g
00:09:06 ora cjq0
                      11g
00:00:42 ora q001
                      11g
00:01:43 ora smco
                      11g
00:00:00 ora w000
                      11g
00:00:00 ora q000
                      11g
00:00:21 ora vkrm
                      11q
00:44:16 /lclhome/oracle/product/11.2.0/dbhome 1/bin/emagent
00:26:38 /lclhome/oracle/product/11.2.0/dbhome 1/bin/tnslsnr LISTENER -inherit
```

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## Shutting down and starting up the database

#### Shut down the database

```
C:\Windows\System32>
C:\Windows\System32\sqlplus / as sysdba
SQL*Plus: Release 11.2.0.4.0 Production on Tue Feb 24 17:13:12 2015
Copyright (c) 1982, 2013, Oracle. All rights reserved.
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 - 64bit Production
    shutdown immediate;
Database closed.
Database dismounted.
ORACLE instance shut down.
   > exit
Disconnected from Oracle Database 11g Enterprise Edition Release 11.2.0.4.0
```

#### Start up the database

```
C:\Windows\System32>
C:\Windows\System32>sqlplus / as sysdba

SQL*Plus: Release 11.2.0.4.0 Production on Tue Feb 24 17

Copyright (c) 1982, 2013, Oracle. All rights reserved.

Connected to an idle instance.

SQL>
```

```
C:\Windows\System32>
C:\Windows\System32>sqlplus / as sysdba

SQL*Plus: Release 11.2.0.4.0 Production on Tue Feb 24 17:14:01 2015

Copyright (c) 1982, 2013, Oracle. All rights reserved.

Connected to an idle instance.

SQL>
SQL>
SQL> startup;
ORACLE instance started.

Total System Global Area 1937457152 bytes
Fixed Size 2282456 bytes
Uariable Size 469765160 bytes
Database Buffers 1459617792 bytes
Redo Buffers 5791744 bytes
Database opened.

Database opened.

Database opened.
```

#### Stopping the LISTENER

Isnrctl status
Isnrctl stop < listener alias>

```
C:\Windows\System32<mark></mark>>
C:\Windows\System32<mark></mark>>%oracle_home%/bin/lsnrctl status
LSNRCTL for 64-bit Windows: Version 11.2.0.4.0 - Production on 11-APR-2015 10:46:25
Copyright (c) 1991, 2013, Oracle. All rights reserved.
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=
                                                                     .lanl.gov)(PORT=1521))
STATUS of the LISTENER
Alias
                           LISTENER
                           TNSLSNR for 64-bit Windows: Version 11.2.0.4.0 - Production
Version
Start Date
                           30-MAR-2015 14:52:01
Uptime
                           11 days 19 hr. 54 min. 24 sec
Trace Level
                           nff
                           ON: Local OS Authentication
Security
SNMP
                           OFF
                           c:\oracle\product\11.2.0\dbhome_2\network\admin\listener.ora
Listener Parameter File
                           c:\oracle\diag\tnslsnr\ \listener\alert\log.xml
Listener Log File
Listening Endpoints Summary...
 (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST= .lan1.gov)(PORT=1521);
(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(PIPENAME=\\.\pipe\EXTPROC1521ipc))
                                                         .lanl.gov)(PORT=1521))
Services Summary...
Service "CLRExtProc" has 1 instance(s).
 Instance "CLRExtProc", status UNKNOWN, has 1 handler(s) for this service...
Service "test" has 1 instance(s).
 Instance "test", status READY, has 1 handler(s) for this service...
The command completed successfully
C:\Windows\System32>
C:\Windows\System32>%oracle_home%/bin/lsnrctl stop LISTENER
LSNRCTL for 64-bit Windows: Version 11.2.0.4.0 - Production on 11-APR-2015 10:47:27
Copyright (c) 1991, 2013, Oracle. All rights reserved.
                                                                     .lanl.gov>(PORT=1521>)
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=
The command completed successfully
C:\Windows\System32>
C:\Windows\System32>
```

## Stopping and starting the LISTENER process

#### Starting the LISTENER

Isnrctl status
Isnrctl start < listener alias>

```
C:\Windows\System32\
C:\Windows\System32\
C:\Windows\System32\
C:\Windows\System32\
C:\Windows\System32\
C:\Windows\System32\
CSNRCTL for 64-bit Windows: Version 11.2.0.4.0 - Froduc
Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to \(\text{DESCRIPTION=\(\text{ADDRESS=\(\text{CPROTOCOL=TCP\)\(\text{HOST}\)}\)

TNS-12541: TNS:no listener

TNS-12560: TNS:\text{protocol adapter error}

64-bit Windows Error: 61: Unknown error
Connecting to \(\text{OESCRIPTION=\(\text{ADDRESS=\(\text{CPROTOCOL=IPC\)\(\text{KEY=TNS-12541: TNS:no listener}\)

TNS-12541: TNS:\text{no listener}

TNS-12560: TNS:\text{protocol adapter error}

TNS-00511: No listener

64-bit Windows Error: 2: No such file or directory

C:\Windows\System32\\
C:\Windows\System32\
C:\
```

```
C:\Windows\System32}%oracle_home%/bin/lsnrctl start LISTENER
LSNRCTL for 64-bit Windows: Version 11.2.0.4.0 - Production on 11-APR-2015 10:
Copyright (c) 1991, 2013, Oracle. All rights reserved.
Starting tnslsnr: please wait...
TNSLSNR for 64-bit Windows: Version 11.2.0.4.0 - Production
System parameter file is c:\oracle\product\11.2.0\dbhome_2\network\admin\liste
Log messages written to c:\oracle\diag\tnslsnr\_
                                                     \listener\alert\log.xm
Listening on: (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=
                                                                        .lanl.gov>(P0
Listening on: (DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(PIPENAME=\\.\pipe\EXTPROC15
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=
                                                                        .lanl.gov>(P0
STATUS of the LISTENER
Alias
                            LISTENER
Version
                            TNSLSNR for 64-bit Windows: Version 11.2.0.4.0 - Pro
Start Date
                            11-APR-2015 10:47:55
                            0 days 0 hr. 0 min. 5 sec
Uptime
Trace Level
                            off
Security
                            ON: Local OS Authentication
SNMP
                            OFF
                            c:\oracle\product\11.2.0\dbhome_2\network\admin\list
Listener Parameter File
Listener Log File
                            c:\oracle\diag\tnslsnr\
                                                        \listener\alert\log.
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST= .lan1.gov)(PORT=1521)
(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(PIPENAME=\\.\pipe\EXTPROC1521ipc))
                                                          .lanl.gov)(PORT=1521)))
Services Summary...
Service "CLRExtProc" has 1 instance(s).
— <del>Instance "CLRExtProc", status UNK</del>NOWN, has 1 handler(s) for this service...
The command completed successfully
C:\Windows\System32>_
```

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C:\Windows\System32≯

## Summary: what you have learned so far ....

#### Basic information:

- Name of the Oracle database host machine (from System Administrator)
- "Oracle" user name and password on the host machine (from System Administrator)
- Database users SYS and SYSTEM passwords ( %> sqlplus / as sysdba; or from backup scripts!!)
- ORACLE\_HOME (Windows: %> set | find "oracle"; \*NIX: %> setenv | grep -i ORA)
- ORACLE\_SID (Windows: %> set | find "oracle"; \*NIX: %> setenv | grep -i ORA)

#### Troubleshooting:

- <u>support.oracle.com</u> user name and password
- Location of the database alert.log file (SQL> show parameter background\_dump\_dest)
- Location of the LISTENER log file (%> Isnrctl status)

## Summary: what you have learned so far ....

#### Backups:

- RMAN backup script name, log file location, execution times (from Task Scheduler or crontab)
- Data Pump Export script name, log file location, execution times (from Task Scheduler or crontab)
- Traditional Export script name, log file location, execution times (from Task Scheduler or crontab)

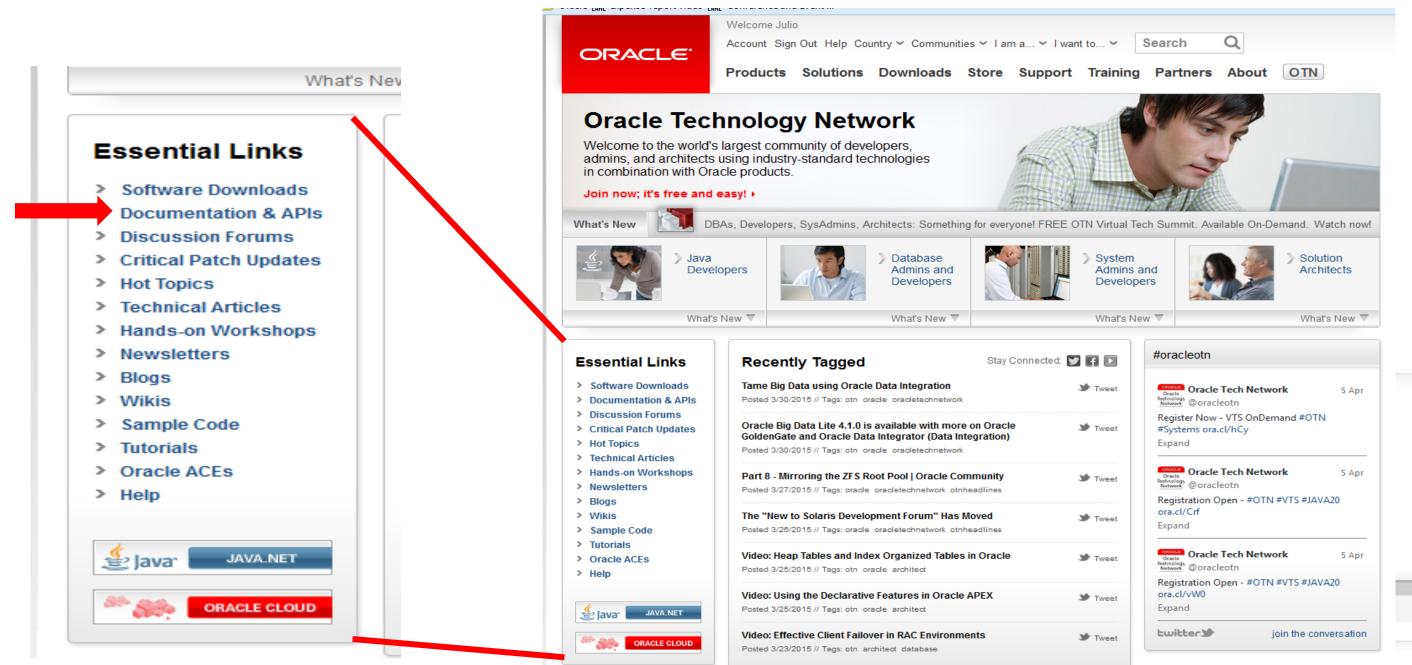
#### Instance and LISTENER status and restart:

- On Windows name of the database instance service (e.g OracleService<SID>)
- On Windows name of the LISTENER service (e.g. OracleOraDb11g\_home1TNSListener)
- Start up the database instance (on Windows or \*NIX: %> sqlplus / as sysdba; SQL> startup)
- Start up the listener process (on Windows or \*NIX: %> \$ORACLE\_HOME/bin/lsnrctl start)

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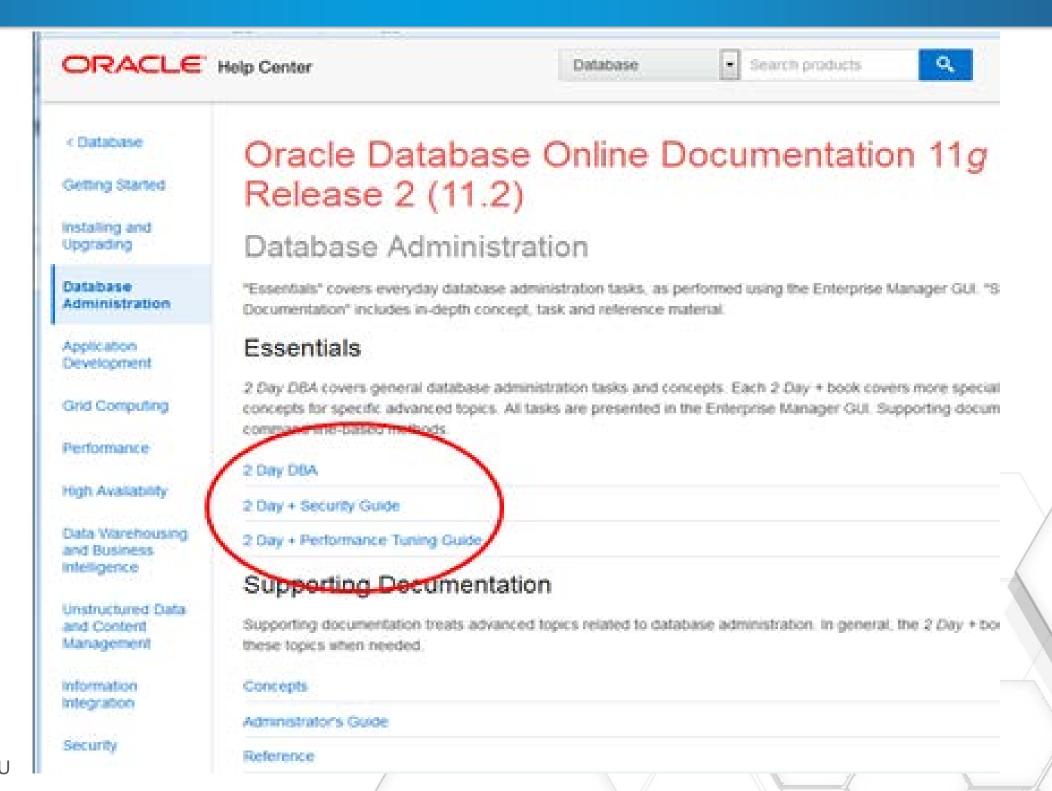
## Resources - Oracle Technology Network

#### http://www.oracle.com/technetwork/index.html



## Resources - Oracle Technology Network

"2 Day" documents:
DBA
Security Guide
Performance Tuning



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