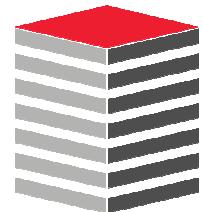


Database 12c: Things to Know and 'Gotchas'

Tuesday: September 29, 2015

Daniel A. Morgan
email: dmorgan@forsythe.com
mobile: +1 206-669-2949
skype: damorgan11g



Introduction

Class Topics

- Introduction
- Physical Architecture
- Servers
- Startup and Shutdown ... Open and Close
- System Management
- DBMS_PREUP
- Miscellaneous
 - Tools
 - cron jobs -> DBMS_SCHEDULER



Instructor

- Daniel Morgan
- Oracle ACE Director
- More than 45 years technology experience
 - First computer was an IBM 360/40 mainframe in 1970
 - Fortran IV and Punch Cards
- Curriculum author and primary Oracle instructor at University of Washington
- Guest lecturer on Oracle at Harvard University
- Decades of hands-on SQL, PL/SQL, and DBA experience
- The "Morgan" behind Morgan's Library on the web
www.morganslibrary.org
- 10g, 11g, and 12c Beta tester
- Contact email: dmorgan@forsythe.com



My Websites: Morgan's Library

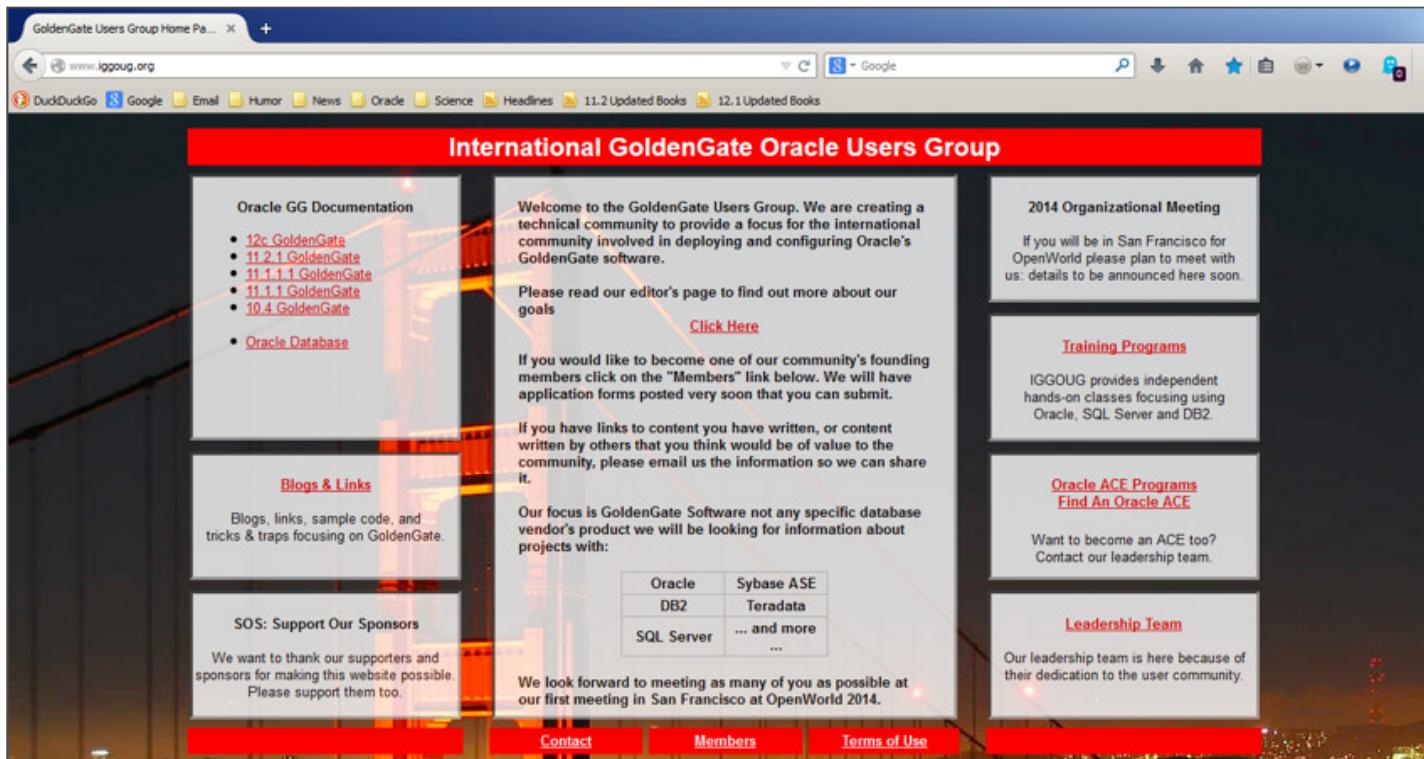
Morgan's Library

[www.library](#) [Search](#)

International Oracle Events 2015-2016 Calendar

Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
The Library											
The library is a spam-free on-line resource with code demos for DBAs and Developers. If you would like to see new Oracle database functionality added to the library ... just email us. Oracle 12.1.0.2.0 has been released and new features will be showing up for many weeks. The first updates have already been made.											
Home			Training Events and Travels			Oracle Events					
Resources Library How Can I? Code Samples Presentations Links Book Reviews Downloads User Groups Blog Humor			 MadDog Morgan Morgan's Library Volume 1: Oracle Database 12c Volume 2: Oracle Database 12c Performance Tuning Volume 3: Oracle Database 12c Security Volume 4: Oracle Database 12c Data Protection Volume 5: Oracle Database 12c Grid Infrastructure Volume 6: Oracle Database 12c Real Application Clusters Volume 7: Oracle Database 12c In-Memory Volume 8: Oracle Database 12c Big Data			<ul style="list-style-type: none">IOUG, Chicago, Illinois - Mar 10UTOUG, Salt Lake City, Utah - Mar 11-12OUGN, Oslo, Norway - Mar 12-14Collaborate, Las Vegas, Nevada - Apr 12-16IIYOUNG, New York, NY - May 19GLOC, Cleveland, Ohio - May 19-20 <p>Next Event: 27 January, Redwood Shores, CA</p>			 Click on the map to find an event near you		
General Contact About Services Legal Notice & Terms of Use Privacy Statement			Morgan  aboard USA-71			Library News <ul style="list-style-type: none">Morgan's BlogJoin the Western Washington OUGMorgan's Oracle PodcastUS Govt. Mil. STIGS (Security Checklists)Bryn Llewellyn's PL/SQL White PaperBryn Llewellyn's Editioning White PaperExplain Plan White Paper  MEDECINS SANS FRONTIERES DOCTORS WITHOUT BORDERS			ACE News Would you like to become an Oracle ACE?  Learn more about becoming an ACE  <ul style="list-style-type: none">ACE DirectoryACE Google MapACE ProgramStanley's Blog <p>Congratulations to our newest ACE Director Jim Czuprynski</p>		

My Websites: International GoldenGate Oracle Users Group



Travel Log: 2010



Flight status board showing numerous flight cancellations and delays at 17:44. The board lists flights from 0630 to 1920, mostly to European destinations like Malaga, Gateborg, London/Heathrow, Zurich, Helsinki, Billund, Paris/Orly, Amsterdam, and København, with many entries showing 'Cancelled' or 'Gate closed'.

Tuesday, April 20, 2010

TOURIS tour booking - Step 1

Top Packages



The Full Circle Express.



Grand tour around Iceland including the Westfjords.

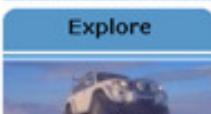


A real 4x4 highland adventure.



South Iceland at leisure.

Explore



::Tour Information

Tour: TT45
Volcano in Action - This tour is currently not available!

Season: All year
Departures: Daily
Departure times: 17:30
Duration: 6,5

Price info:

- Adults: € 55,00
- Age 12-17: € 27,50
- Age 3-11: € 0,00
- Age 0-2: € 0,00

* All prices are per person.
* Please select your details here to the right and click next to determine your total price.

Included in the price:

- Bus tour with English speaking guidance

::Your details

Date of tour:

Adults: Youth (12-17): Children (3-11): Infants (0-2):

Comments or special wishes:

<< Previous **Next >>**





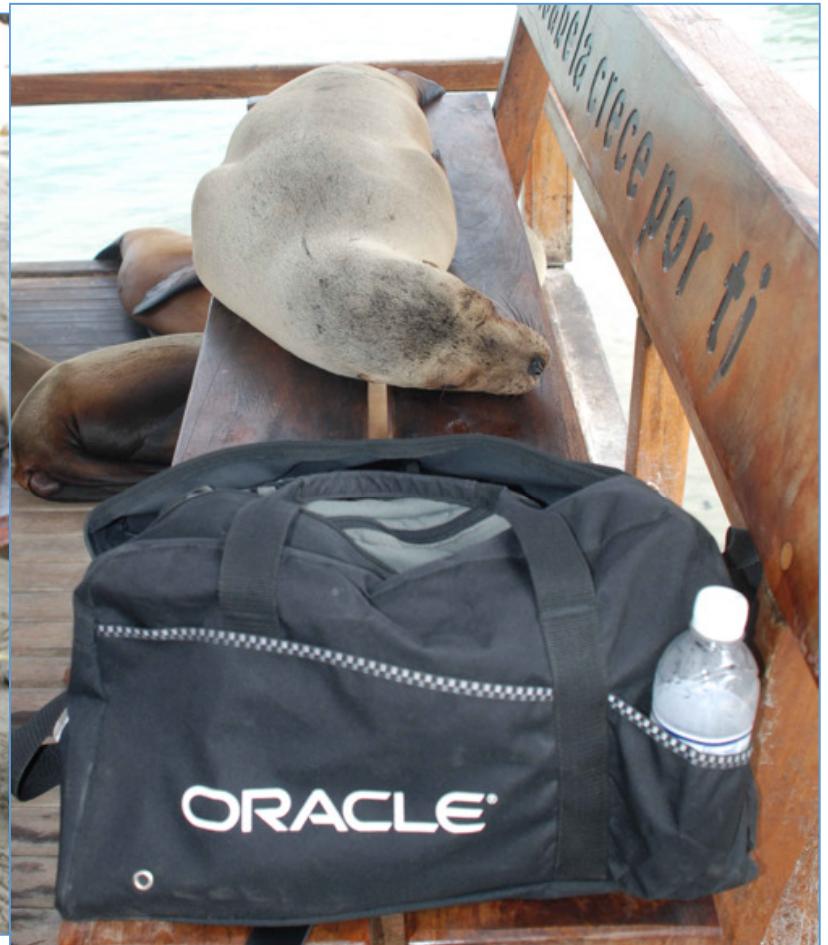

META7™ Solutions for the Red Stack

7

Travel Log: 2010



Travel Log: 2014



Why Meta7

- The Oracle Only division of Forsythe dedicated to the Oracle Red Stack
 - Highly skilled consultants with extensive experience across multiple industries
 - Internationally recognized experts in
 - Oracle Database
 - Oracle GoldenGate
 - Oracle Engineered Systems
 - Reliable on-time and on-budget delivery
 - A professional and agile team of Oracle technical experts
 - New, State of the Art Technology Evaluation Center
 - Secure hosting and Managed Services
 - Flexible financial support



Content Warning



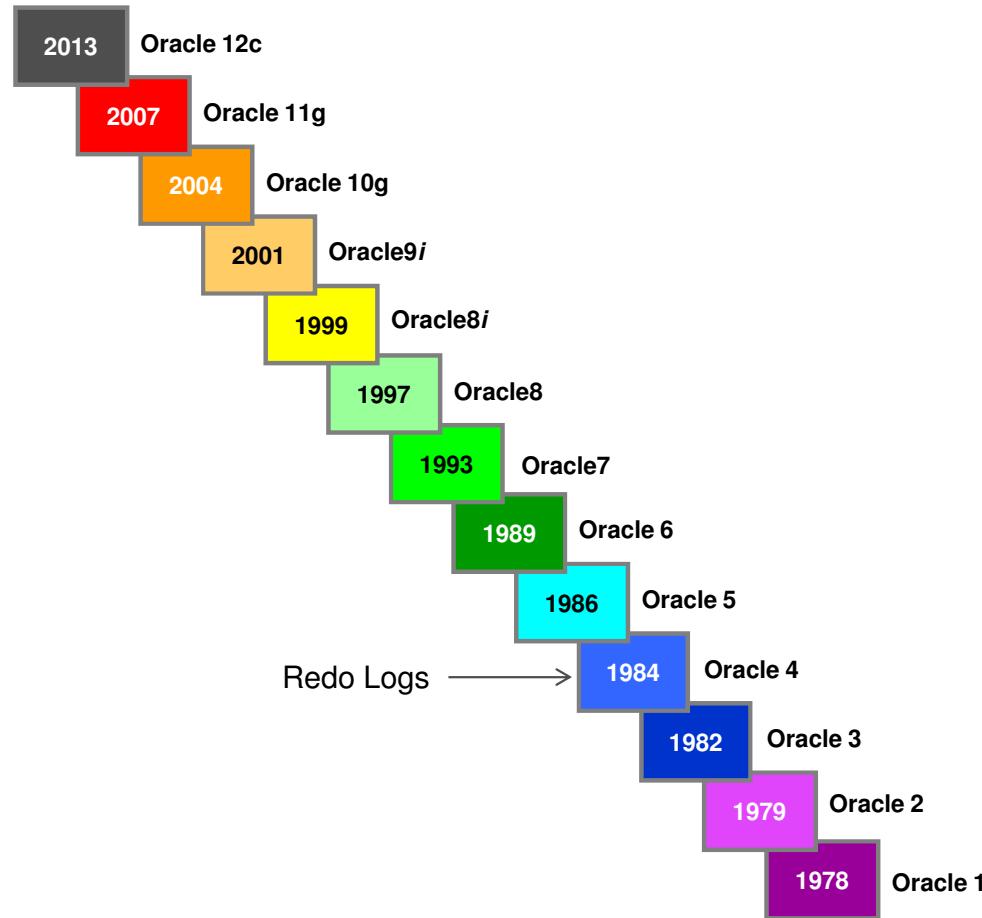
Content Density Warning



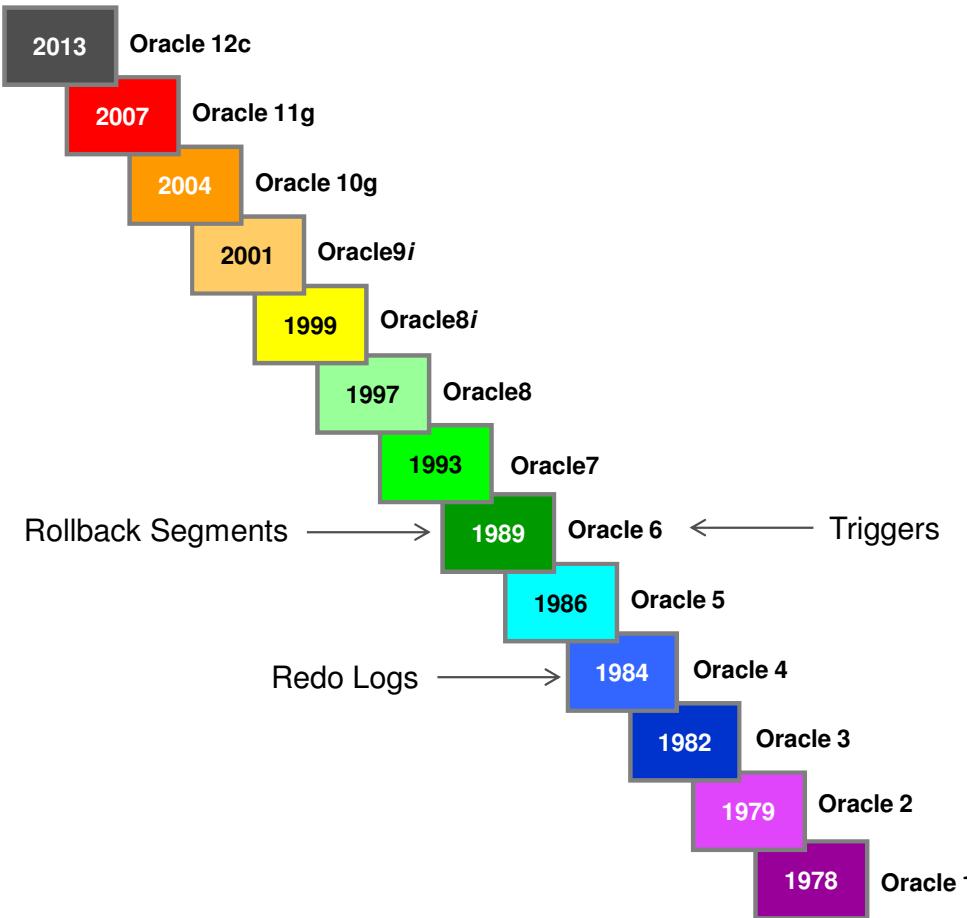
Take Notes ... Ask Questions

Introduction

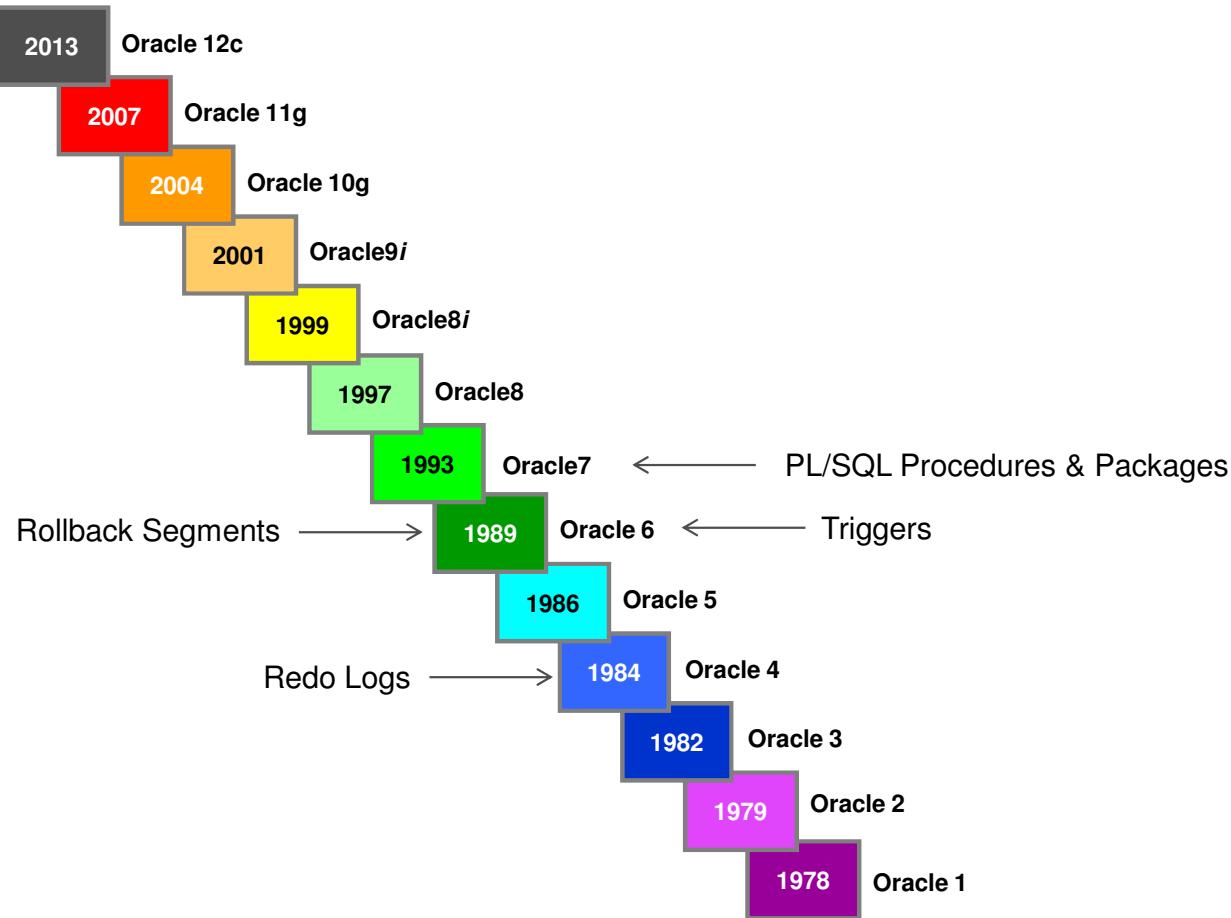
A Brief History of the Oracle Database



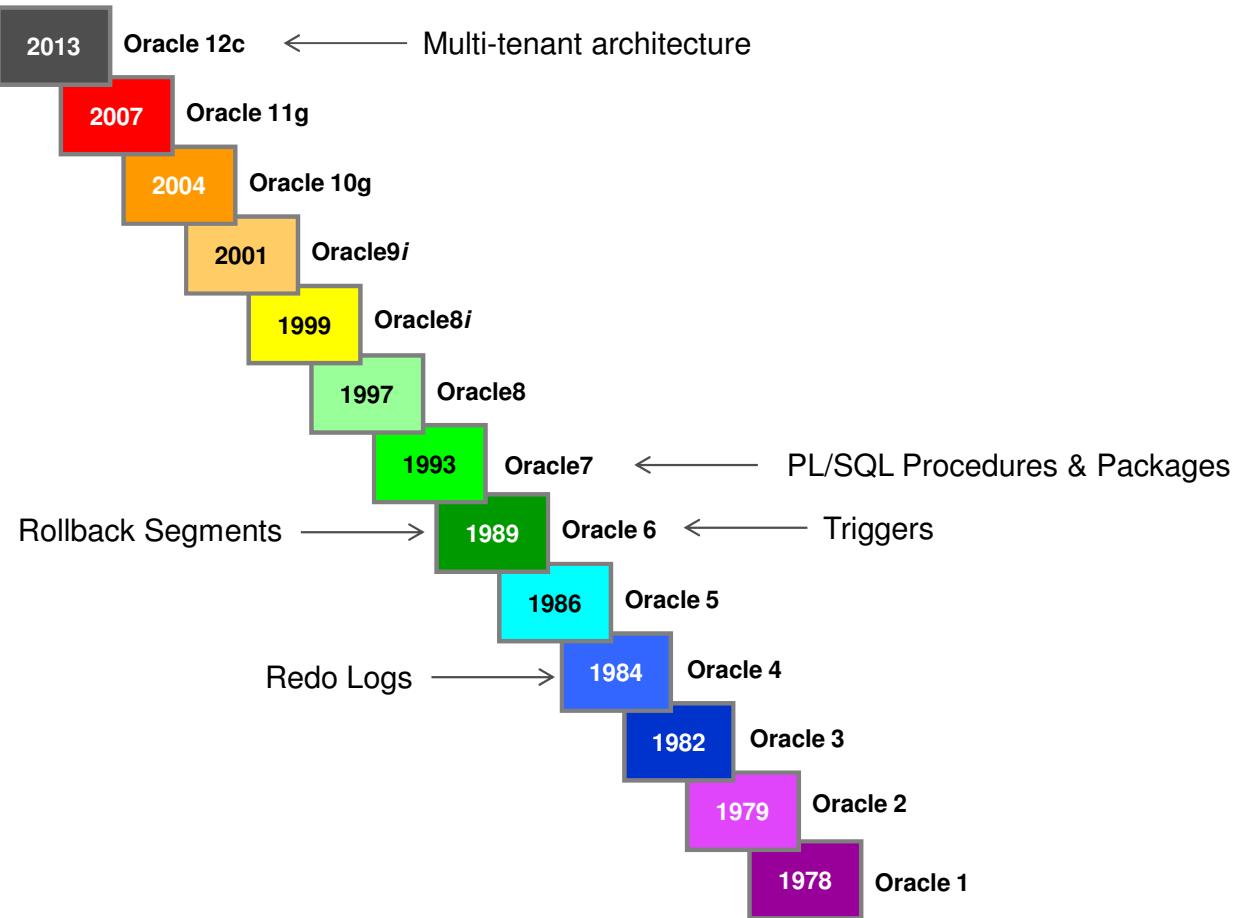
A Brief History of the Oracle Database



A Brief History of the Oracle Database

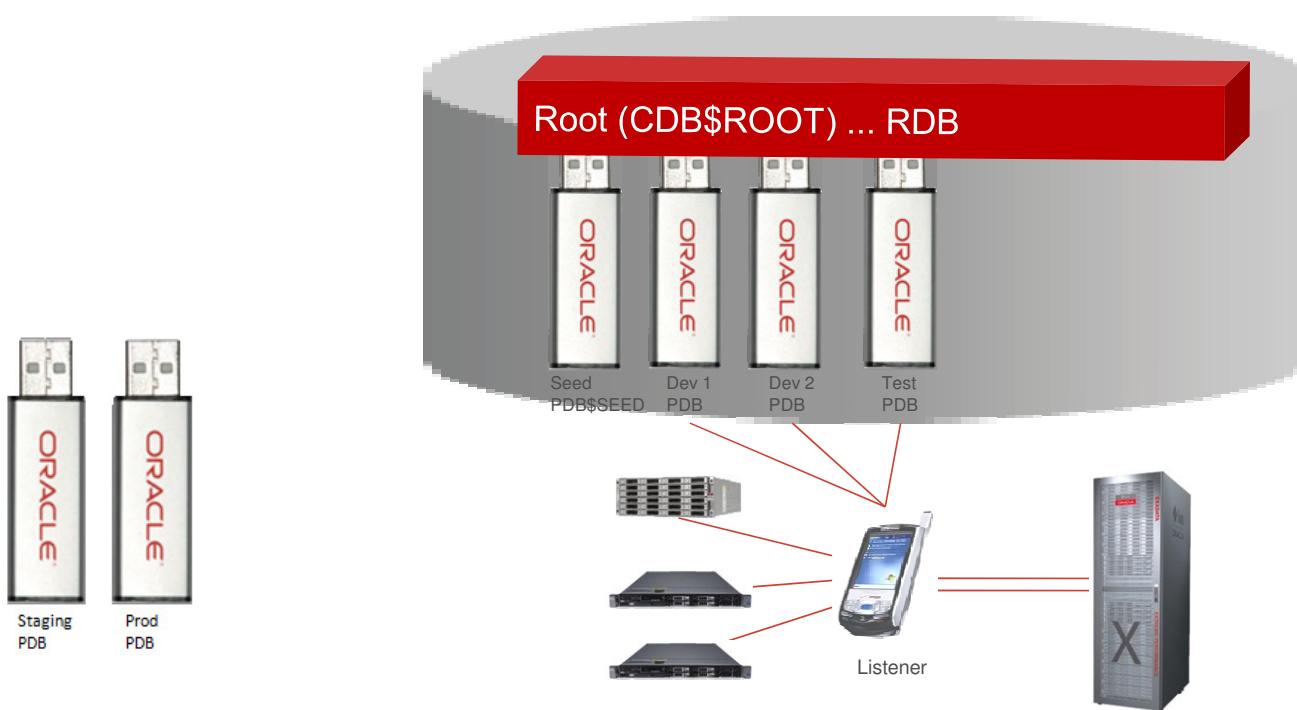


A Brief History of the Oracle Database

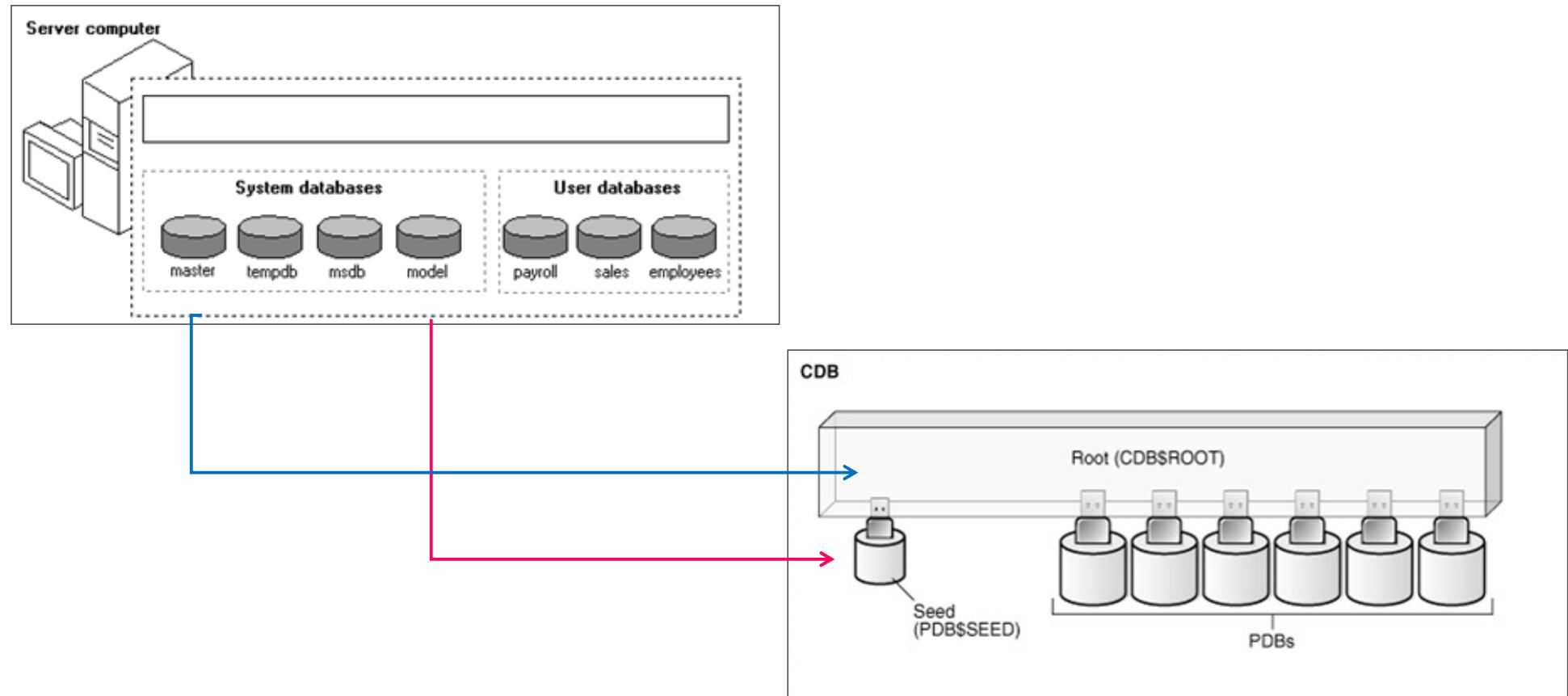


Physical Architecture

What Is Different: Container Architecture



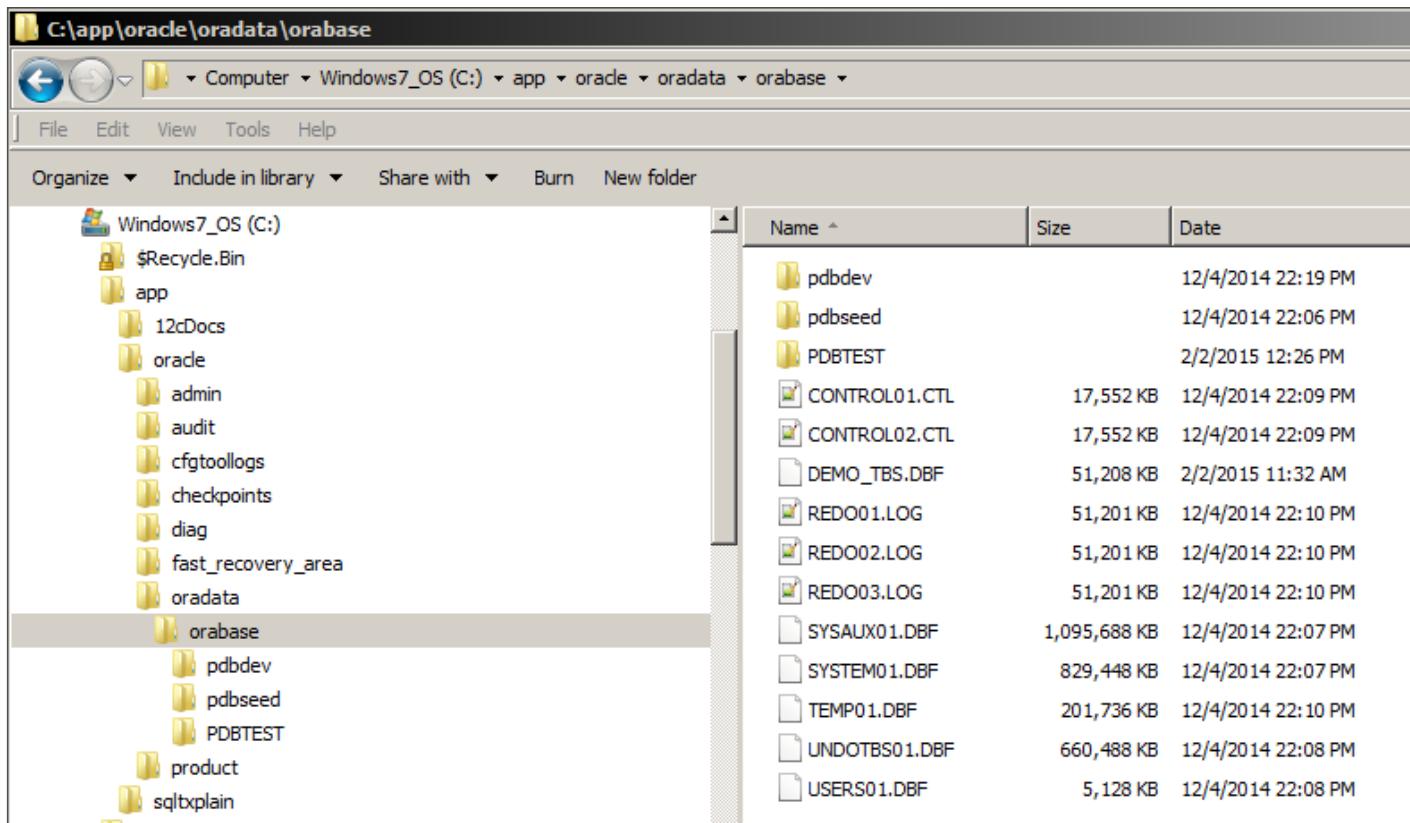
New 12c Container Database Architecture



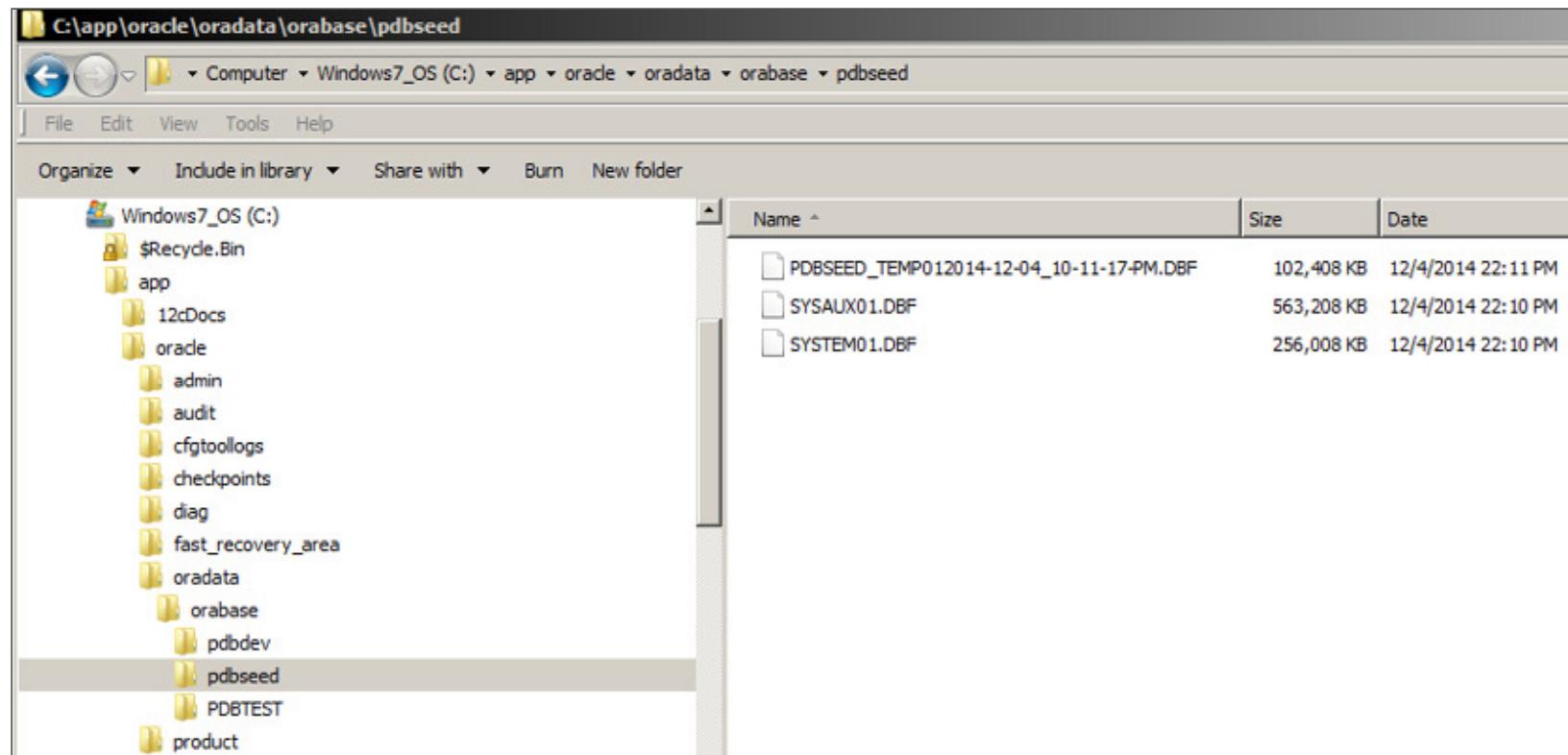
Storage Changes

- The control files are owned by the instance ... not the database ... one set for a container database
- The redo logs are owned by the instance ... not the database ... one set of groups and members for a container database
- The UNDO tablespace is owned by the instance ... not the database ... one, and only one, for a CDB
- Every container contains a SYSTEM and SYSAUX tablespace
- A single TEMP tablespace can be shared among all containers or each container can have its own TEMP tablespace or multiple dedicated TEMP tablespaces

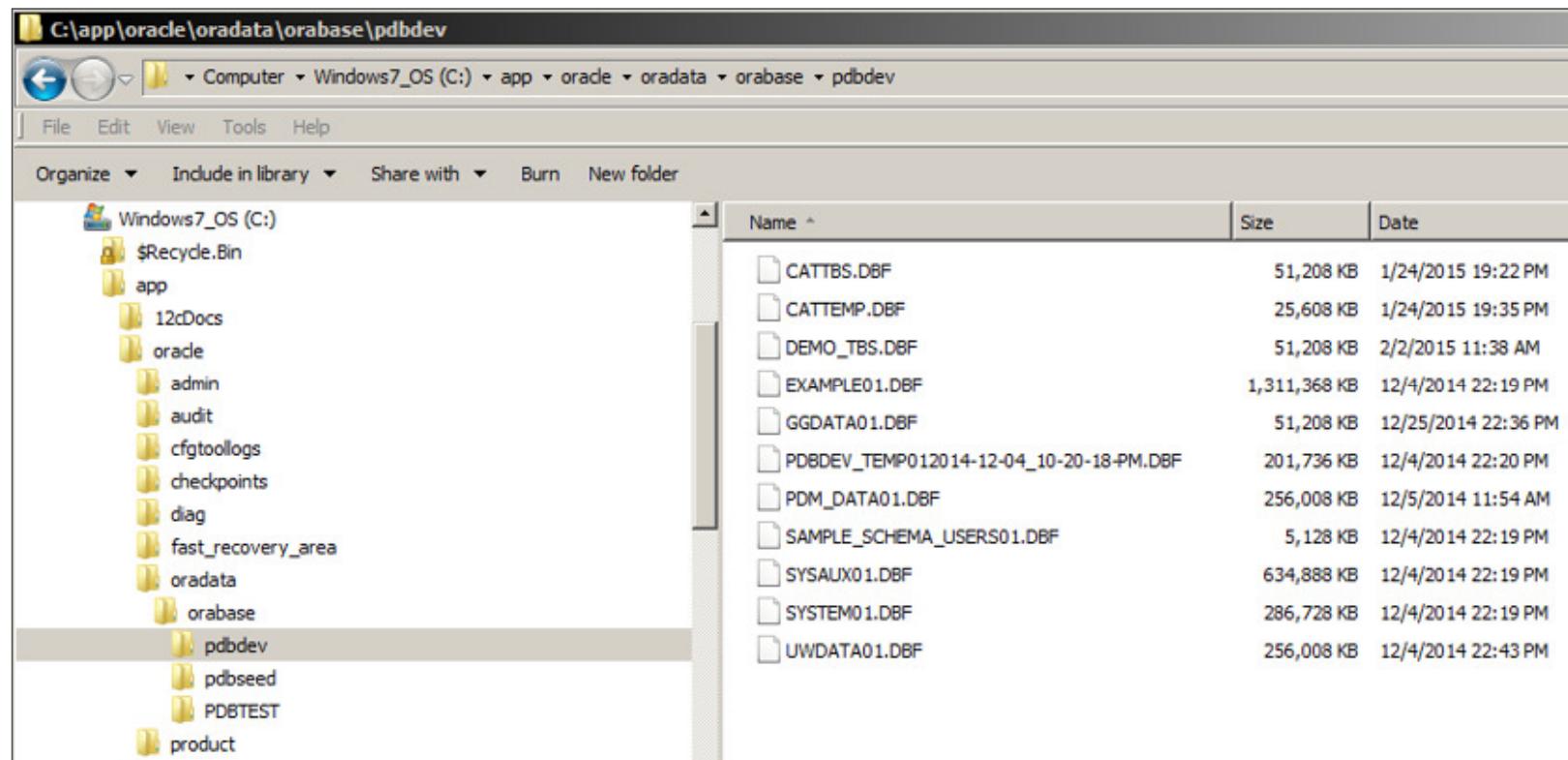
Root Physical Architecture



PDB\$SEED Physical Architecture



PDB Physical Architecture



Tablespaces and Users

```
SQL> SELECT tablespace_name, COUNT(*)  
  2  FROM cdb tablespaces  
  3  GROUP BY tablespace_name  
  4  ORDER BY 1;
```

TABLESPACE_NAME	COUNT (*)
CATTBSP	1
CATTEMP	1
EXAMPLE	1
ORADATA	1
SYSAUX	4
SYSTEM	4
TEMP	4
UNDOTBS1	1
USERS	2
UWDATA	1

10 rows selected.

```
SQL> SELECT username, COUNT(*)  
  2  FROM cdb users  
  3  GROUP BY username  
  4  ORDER BY 1;
```

USERNAME	COUNT (*)
APEX_040200	4
AUDSYS	4
BI	1
HR	1
MDSYS	4
MLIB	1
OE	1
PDBADMIN	1
PM	1
SCOTT	1
SH	1
SYS	4
SYSBACKUP	4
SYSDG	4
SYSKM	4
SYSTEM	4
UWCLASS	2

Storage Architecture Summary

- What you touch matters ... it is very easy to create, alter, and drop the wrong thing with substantial consequences
- The word "database" can get you into trouble ... specify the container
- To understand what has been created you must be clear about the difference between an instance and a container

Servers

What Is Different? Multitenant Consolidation

- What are the implications of consolidation?
 - Processes
 - Transactions
 - Connections
 - Memory
 - CPU
 - I/O
 - Do you really want to use only one TEMP tablespace?
 - How do you calculate space allocation for UNDO?
 - What is size and distribution of the AWR data in the SYSAUX tablespace?
 - Networks Latency and Bandwidth
 - Backups and Restores
 - DataGuard Replication
 - Resource Management

What Is Different? Multitenant Consolidation

- Can we use our current servers for consolidation ... or more importantly "should" we use our current servers?
 - Pizza Boxes (1U, 2U, 3U)
 - Blades (H/P and Cisco UCS) ... the best servers I know for making unstable RAC clusters
 - M10 (Fujitsu)
 - P Series (IBM)
 - Z Series (IBM)
 - T Series (Sun-Oracle)
 - M Series (Sun-Oracle)
 - Fujitsu M10
 - ODA
 - Sparc SuperCluster (T5-8)
 - Exadata

Don't Take Your Eye Off The Network

- It is easy to quantify and consolidate things you can easily count
 - GB and TB
 - Processes
 - Transactions
 - Simultaneous Users
 - CPU
 - Memory
- It is far more difficult to quantity and consolidate what you can't easily observe
 - HBA Card Traffic
 - SAN Switch Traffic
 - NIC Card Traffic
 - TCP/IP Switch Traffic
 - Real bandwidth resulting from the ubiquitous deployment of VLANs

Startup and Shutdown ... Open and Close

Startup (1:4)

```
C:\Users\oracle>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Wed Sep 16 04:14:51 2015
Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

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

Total System Global Area 2550136832 bytes
Fixed Size                  3048872 bytes
Variable Size                671091288 bytes
Database Buffers            1862270976 bytes
Redo Buffers                 13725696 bytes
Database mounted.
Database opened.

SQL>
```

Startup (2:4)

```
SQL> conn sys@pdbdev as sysdba
Enter password:
Connected.

SQL> conn uwclass/uwclass@pdbdev
ERROR:
ORA-01033: ORACLE initialization or shutdown in progress
Process ID: 0
Session ID: 0 Serial number: 0

SQL> conn sys@pdbdev as sysdba
Enter password:
Connected.

SQL> alter pluggable database open;

Pluggable database altered.

SQL> conn uwclass/uwclass@pdbdev
Connected.

SQL>
```

Startup (3:4)

```
SQL> conn sys@pdbdev as sysdba
Enter password:
Connected.

SQL> shutdown abort;
Pluggable Database closed.

SQL> conn / as sysdba
Connected.

SQL> select count(*) from obj$;

  COUNT(*)
-----
  91367

CON_NAME
-----
CDB$ROOT

SQL> SELECT COUNT(*) FROM dba_objects;

  COUNT(*)
-----
  91287
```

Startup (4:4)

```
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;

Pluggable database altered.

SQL> SELECT COUNT(*) FROM dba_objects;

  COUNT(*)
-----
  91287

SQL> SELECT COUNT(*) FROM cdb_objects;

  COUNT(*)
-----
 275850
```

System Management

Data Dictionary

▪ Container DataBase Views

- **USER_** ... owned by a schema within a single container
- **ALL_** ... owned by a schema or granted to a schema within a single container
- **DBA_** ... everything within a single container
- **CDB_** ... everything in every container
 - **Provided the container is open!**

```
CON_NAME
-----
CDB$ROOT

SQL> SELECT COUNT(*) FROM dba_objects;

  COUNT(*)
-----
         91287

SQL> SELECT COUNT(*) FROM cdb_objects;

  COUNT(*)
-----
         91287

SQL> ALTER PLUGGABLE DATABASE ALL OPEN;

Pluggable database altered.

SQL> SELECT COUNT(*) FROM dba_objects;

  COUNT(*)
-----
         91287

SQL> SELECT COUNT(*) FROM cdb_objects;

  COUNT(*)
-----
        275850
```

Data Dictionary: GV\$ and V\$ Views

- What is shown in the dynamic performance view depends on the container in which the query is executed

```
SQL> sho con_name
CON_NAME
-----
PDBDEV

SQL> SELECT COUNT(*) FROM v$session;
COUNT(*)
-----
 38
```

```
SQL> sho con_name
CON_NAME
-----
CDB$ROOT

SQL> SELECT COUNT(*) FROM v$session;
COUNT(*)
-----
 37
```

- Background sessions such as PMON, SMON, LGWR, DBWR are visible in all containers
- Foreground sessions in all containers are visible in CDB\$ROOT
- Foreground sessions in a PDB are only visible within that PDB

Data Dictionary: Object Sizes

Connected to:
Oracle Database 12c Enterprise Edition Release 11.2.0.4.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> desc dba_objects

Name	Null?	Type
OWNER		VARCHAR2 (30)
OBJECT_NAME		VARCHAR2 (128)
SUBOBJECT_NAME		VARCHAR2 (30)
OBJECT_ID		NUMBER
DATA_OBJECT_ID		NUMBER
OBJECT_TYPE		VARCHAR2 (19)
CREATED		DATE
LAST_DDL_TIME		DATE
TIMESTAMP		VARCHAR2 (19)
STATUS		VARCHAR2 (7)
TEMPORARY		VARCHAR2 (1)
GENERATED		VARCHAR2 (1)
SECONDARY		VARCHAR2 (1)
NAMESPACE		NUMBER
EDITION_NAME		VARCHAR2 (30)

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> desc dba_objects

Name	Null?	Type
OWNER		VARCHAR2 (128)
OBJECT_NAME		VARCHAR2 (128)
SUBOBJECT_NAME		VARCHAR2 (128)
OBJECT_ID		NUMBER
DATA_OBJECT_ID		NUMBER
OBJECT_TYPE		VARCHAR2 (23)
CREATED		DATE
LAST_DDL_TIME		DATE
TIMESTAMP		VARCHAR2 (19)
STATUS		VARCHAR2 (7)
TEMPORARY		VARCHAR2 (1)
GENERATED		VARCHAR2 (1)
SECONDARY		VARCHAR2 (1)
NAMESPACE		NUMBER
EDITION_NAME		VARCHAR2 (128)
SHARING		VARCHAR2 (13)
EDITIONABLE		VARCHAR2 (1)
ORACLE_MAINTAINED		VARCHAR2 (1)

User Management

```
SQL> conn / as sysdba
Connected.

SQL> alter pluggable database all open;
Pluggable database altered.

SQL> SELECT username, COUNT(*) FROM cdb_users
  2 GROUP BY username ORDER BY 1;
```

USERNAME	COUNT (*)
ANONYMOUS	3
APEX_040200	3
APEX_PUBLIC_USER	3
APPQOSSYS	3
AUDSYS	3
BI	2
CTXSYS	3
DBSNMP	3
DIP	3
DVF	3
DVSYS	3
FLOW_FILES	3
GSMADMIN_INTERNAL	3
GSMCATUSER	3
GSMUSER	3
HR	2
IX	2

USERNAME	COUNT (*)
LBACSYS	3
MDDATA	3
MDSYS	3
OE	2
OJVMSYS	3
OLAPSYS	3
ORACLE_OCM	3
ORDDATA	3
ORDPLUGINS	3
ORDSYS	3
OUTLN	3
PDBADMIN	2
PM	2
SCOTT	2
SH	2
SI_INFORMTN_SCHEMA	3
SPATIAL_CSW_ADMIN_USR	3
SPATIAL_WFS_ADMIN_USR	3
SYS	3
SYSBACKUP	3
SYSDG	3
SYSKM	3
SYSTEM	3
UWCLASS	1
WMSYS	3
XDB	3
XS\$NULL	3

Common Users, Roles, and Profiles

```
SQL> SELECT username FROM dba_users ORDER BY 1;
```

USERNAME

ANONYMOUS
APEX_040200
APEX_PUBLIC_USER
APPQOSSYS
AUDSYS
CTXSYS
DBSNMP
DIP
DVF
DVSYS
FLOWS_FILES
GSMADMIN_INTERNAL
GSMCATUSER
GSMUSER
LBACSYS
MDDATA
MDSYS

USERNAME

OJVMSYS
OLAPSYS
ORACLE_OCM
ORDDATA
ORDPLUGINS
ORDSYS
OUTLN
SI_INFORMTN_SCHEMA
SPATIAL_CSW_ADMIN_USR
SPATIAL_WFS_ADMIN_USR
SYS
SYSBACKUP
SYSDG
SYSKM
SYSTEM
WMSYS
XDB
XS\$NULL

Common Users, Roles, and Profiles

```
SQL> SELECT * FROM dba_roles ORDER BY 1;
```

ROLE	PASSWORD	AUTHENTICAT	COM	O
ADM_PARALLEL_EXECUTE_TASK	NO	NONE	YES	Y
APEX_ADMINISTRATOR_ROLE	NO	NONE	YES	Y
APEX_GRANTS_FOR_NEW_USERS_ROLE	NO	NONE	YES	Y
AQ_ADMINISTRATOR_ROLE	NO	NONE	YES	Y
AUDIT_ADMIN	NO	NONE	YES	Y
CDB_DBA	NO	NONE	YES	Y
DBA	NO	NONE	YES	Y
DBFS_ROLE	NO	NONE	YES	Y
GATHER_SYSTEM_STATISTICS	NO	NONE	YES	Y
GSMADMIN_ROLE	NO	NONE	YES	Y
GSMUSER_ROLE	NO	NONE	YES	Y
GSM_POOLADMIN_ROLE	NO	NONE	YES	Y
HS_ADMIN_EXECUTE_ROLE	NO	NONE	YES	Y
HS_ADMIN_ROLE	NO	NONE	YES	Y
HS_ADMIN_SELECT_ROLE	NO	NONE	YES	Y
LBAC_DBA	NO	NONE	YES	Y
LOGSTDBY_ADMINISTRATOR	NO	NONE	YES	Y
OLAP_DBA	NO	NONE	YES	Y
OLAP_XS_ADMIN	NO	NONE	YES	Y
OPTIMIZER_PROCESSING_RATE	NO	NONE	YES	Y
ORDADMIN	NO	NONE	YES	Y
PDB_DBA	NO	NONE	YES	Y
PROVISIONER	NO	NONE	YES	Y
RECOVERY_CATALOG_OWNER	NO	NONE	YES	Y
SCHEDULER_ADMIN	NO	NONE	YES	Y
SPATIAL_CSW_ADMIN	NO	NONE	YES	Y
SPATIAL_WFS_ADMIN	NO	NONE	YES	Y
WM_ADMIN_ROLE	NO	NONE	YES	Y
XDBADMIN	NO	NONE	YES	Y
XS_CACHE_ADMIN	NO	NONE	YES	Y
XS_NAMESPACE_ADMIN	NO	NONE	YES	Y
XS_SESSION_ADMIN	NO	NONE	YES	Y

Common Users, Roles, and Profiles

```
SQL> SELECT name
  2  FROM system_privilege_map
  3  ORDER BY 1;

NAME
-----
ALTER ANY SQL TRANSLATION PROFILE
CREATE ANY CREDENTIAL
CREATE ANY SQL TRANSLATION PROFILE
CREATE CREDENTIAL
CREATE PLUGGABLE DATABASE
CREATE SQL TRANSLATION PROFILE
DROP ANY SQL TRANSLATION PROFILE
EXEMPT DDL REDACTION POLICY
EXEMPT DML REDACTION POLICY
REDEFINE ANY TABLE
SET CONTAINER
USE ANY SQL TRANSLATION PROFILE
```

Feature Usage Reports (1:3)

- The following are new in 12c
 - DBMS_FEATURE_ACTIVE_DATA_GUARD (Active Data Guard)
 - DBMS_FEATURE_ADAPTIVE_PLANS (Adaptive Execution Plans)
 - DBMS_FEATURE_ADV_IDXCMP (Advanced Index Compression)
 - DBMS_FEATURE_ADV_TABCMP (Advanced Table Compression)
 - DBMS_FEATURE_AUDIT_OPTIONS (Audit Trail Type and Audit Options Chosen)
 - DBMS_FEATURE_AUTO_REOPT (Adaptive Reoptimization)
 - DBMS_FEATURE_BA_OWNER (Oracle Database Logging Recovery Appliance)
 - DBMS_FEATURE_CONCURRENT_STATS (Concurrent Stats Gathering)
 - DBMS_FEATURE_DATABASE_ODM (Oracle Data Mining)
 - DBMS_FEATURE_DATA_REDACTION (Data Masking)
 - DBMS_FEATURE_DBFS_CONTENT (Use of DBFS_CONTENT to display data stores)
 - DBMS_FEATURE_DBFS_HS (Detects Usage of Hierarchical Content Stores)
 - DBMS_FEATURE_DBFS_SFS (Content Storage Administration Sample Implementation)
 - DBMS_FEATURE_EMX (Enterprise Manager Express Usage)

Feature Usage Reports (2:3)

- DBMS_FEATURE_FGA_AUDIT (Fine Grained Auditing)
- DBMS_FEATURE_GATEWAYS (Oracle Database Gateways)
- DBMS_FEATURE_GOLDENGATE (Oracle GoldenGate)
- DBMS_FEATURE_HCCRLL (Hybrid Columnar Compress Row Level Locking)
- DBMS_FEATURE_HEATMAP (ADO, ILM)
- DBMS_FEATURE_IDH (In-Database Hadoop)
- DBMS_FEATURE_ILM (Information Lifecycle Management)
- DBMS_FEATURE_IMA (In-Memory Aggregation)
- DBMS_FEATURE_IMC (In-Memory Column Store)
- DBMS_FEATURE_IOT (Index Organized Table Usage)
- DBMS_FEATURE_JSON (Java Script Object Notation)
- DBMS_FEATURE_LABEL_SECURITY (Advanced Security Option)
- DBMS_FEATURE_MOVE_DATAFILE (Online Move Datafile)
- DBMS_FEATURE_ONLINE_REDEF (DBMS_REDEFINITION Package)
- DBMS_FEATURE_PILLAR_EHCC (Pillar Hybrid Columnar Compression)

Feature Usage Reports (3:3)

- DBMS_FEATURE_PILLAR_STORAGE (Pillar Axiom SAN)
- DBMS_FEATURE_PRIV_CAPTURE (DBMS_PRIVILEGE_CAPTURE)
- DBMS_FEATURE_RAS (Real Application Security)
- DBMS_FEATURE_ROND (RAC One-Node)
- DBMS_FEATURE_SEG_MAIN_ONL_COMP (Partition Maintenance Segment Compression)
- DBMS_FEATURE_SPD (Statistical Incremental Maintenance)
- DBMS_FEATURE_STREAMS (Streams)
- DBMS_FEATURE_TSDP (Transparent Sensitive Data Protection Policy)
- DBMS_FEATURE_UNIFIED_AUDIT (Unified Audit Policies)
- DBMS_FEATURE_XSTREAM_IN (XStreams Input)
- DBMS_FEATURE_XSTREAM_OUT (XStreams Output)
- DBMS_FEATURE_XSTREAM_STREAMS (XStreams Usage)
- DBMS_FEATURE_ZFS_EHCC (ZFS Hybrid Columnar Compression)
- DBMS_FEATURE_ZFS_STORAGE (ZFS File System Usage)
- DBMS_FEATURE_ZMAP (Zone Maps)

DBMS_PREUP

DBMS_PREUP (1:2)

- A new undocumented PL/SQL package owned by SYS and used by the Database Upgrade Assistant
- Constants and subprograms listed here are only those that are publicly accessible. Additional constants and subprograms are private to the package body.
A list of all CHECK_NAME values can be found in the INIT_PREUPCHECKS procedure local to the package body (see source code)
- Do not run this yourself ... but read the information about it on the Morgan's Library website to learn what can and cannot be upgraded successfully
- Contains 206 separate objects and overloads

http://www.morganslibrary.org/reference/pkgs/dbms_preup.html

DBMS_PREUP (2:2)

```
DECLARE
  OutVal VARCHAR2(1024);
  RetVal NUMBER;
BEGIN
  RetVal := dbms_prep_audit_viewer_check(OutVal);
  dbms_output.put_line(OutVal);
  dbms_output.put_line(TO_CHAR(RetVal));
END;
/
ERROR: --> A user or role with the name "AUDIT_VIEWER" found in the database. This is an Oracle defined role.
You must drop this role or user prior to upgrading.
0
```

- OLAP Catalog(AMD) exists in database Starting with Oracle Database 12c, OLAP is desupported
- "APPQOSSYS" user found in database. This is an internal account used by Oracle Application Quality of Service Management. Please drop this user prior to upgrading.
- A user or role with the name "AUDIT_VIEWER" found in the database. This is an Oracle defined role. You must drop this role or user prior to upgrading.
- A user or role with the name "AUDSYS" found in the database. This is an internal account used by Oracle Database Auditing. You must drop this user or role prior to upgrading.
- Inactive DBIDs found in AWR AWR contains inactive DBIDs which may need additional updating

- A user or role with the name "CAPTURE_ADMIN" found in the database. This is an Oracle defined role. You must drop this user or role prior to upgrading.
- Compatible set too low "compatible" currently set at and must be set to at least 11.0.0 prior to upgrading the database. Update your init.ora or spfile to make this change.
- Database contains schemas with objects dependent on DBMS_LDAP package.
- Database Vault is enabled in this database. Starting with release 12.1, it is REQUIRED that Database Vault be disabled prior to database upgrade.
- Enterprise Manager Database Control repository found in the database. In Oracle Database 12c, Database Control is removed during the upgrade.

TNSNAMES.ORA

TNSNAMES Configuration

- Every time you add a new PDB ... you must also make a manual entry to TNSNAMES.ORA

```
# tnsnames.ora Network Configuration File:
C:\app\oracle\product\12.1.0\dbhome_1\network\admin\tnsnames.ora
# Generated by Oracle configuration tools.

PDBDEV =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = 127.0.0.1) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = pdbdev)
    )
  )

PDBTEST =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = 127.0.0.1) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = pdbtest)
    )
  )

ORACLR_CONNECTION_DATA =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = IPC) (KEY = EXTPROC1521))
    )
    (CONNECT_DATA =
      (SID = CLRExtProc)
      (PRESENTATION = RO)
    )
  )
```

```
PDBPROD =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = 127.0.0.1) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = pdbprod)
    )
  )

ORABASE =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = 127.0.0.1) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orabase)
    )
  )
```

Miscellaneous

Tools

- Verify that any tools you are using are capable of understanding the container architecture
 - PLSQL Developer
 - SolarWind
 - TOAD
- As of today some of them, even the latest versions, do not
- And older versions will definitely not do so

Cron Jobs (1:2)

- Not all shell scripts are going to survive unedited the change to a CDB
- If a script uses slash "/" to connect it is going to see CDB\$ROOT
- If a script needs to connect to a PDB it is going to have to run in a carefully constructed environment or be modified to include the PDB name
- If PDBs are truly used as intended, and are portable, and can be unplugged from one place and plugged into another
 - How does the shell script or cron job know about it?
 - How does TNSNAMES.ORA know about it?

```
#!/bin/bash rman target / <<EOF
  shutdown immediate;
  startup mount;
  backup spfile;
  backup database;
  alter database open;
  delete noprompt obsolete;
quit;
EOF
```

```
#!/bin/bash
cd
. ./profile
sqlplus -s / @/home/oracle/sql/gather_sysstat.sql
sqlplus -s / @/home/oracle/sql/gather_latch.sql
sqlplus -s / @/home/oracle/sql/gather_rlimit.sql
sqlplus -s / @/home/oracle/sql/gather_system_event.sql
sqlplus -s / @/home/oracle/sql/gather_waitstat.sql
```

Cron Jobs (2:2)

```
C:\Users\oracle>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Wed Sep 16 20:45:38 2015

Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> show con_name

CON_NAME
-----
CDB$ROOT

SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

C:\Users\oracle>set ORACLE_SID=PDBDEV
C:\Users\oracle>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Wed Sep 16 20:46:01 2015

Copyright (c) 1982, 2014, Oracle. All rights reserved.

ERROR:
ORA-12560: TNS:protocol adapter error
```

DBMS_SCHEDULER

```
BEGIN
  dbms_scheduler.create_job(
    job_name    => 'EXT_LOAD',
    job_type    => 'EXECUTABLE',
    job_action  => 'c:\oracle\product\11.2.0\db_1\bin\sqlldr.exe',
    number_of_arguments => 1,
    start_date  => SYSTIMESTAMP,
    enabled      => FALSE,
    comments     => 'SQL*Loader Job Demo');
END;
/

BEGIN
  dbms_scheduler.set_job_argument_value('EXT_LOAD',
                                         1,
                                         argument_value=>'userid=uwclass/uwclass@pdbdev
                                         control=c:\temp\sqlldr02.ctl
                                         log=c:\temp\sqlldr02.log');
END;
/

exec dbms_scheduler.enable('EXT_LOAD');
```

Wrap Up

Conclusion

- Oracle Database 12c is different
- And in essentially every respect it is better
- But the cost to you in moving to the new container architecture is that you must do something you haven't had to do in 20+ years ... learn new architecture
- Database 12.2 is in Beta
 - And I cannot talk about what I know
 - But the non-container architecture is very likely a thing of the past
 - So your planning cycle should include deep hands-on experience or bringing in a consultant to help your organization understand the challenges and help you meet them successfully

*

**ERROR at line 1:
ORA-00028: your session has been killed**

Thank You

Daniel A. Morgan
email: dmorgan@forsythe.com
mobile: +1 206-669-2949
skype: damorgan11g

