TWIN CITIES ORACLE USERS GROUP

Database 12c:
Things to Know and 'Gotchas'

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Introduction

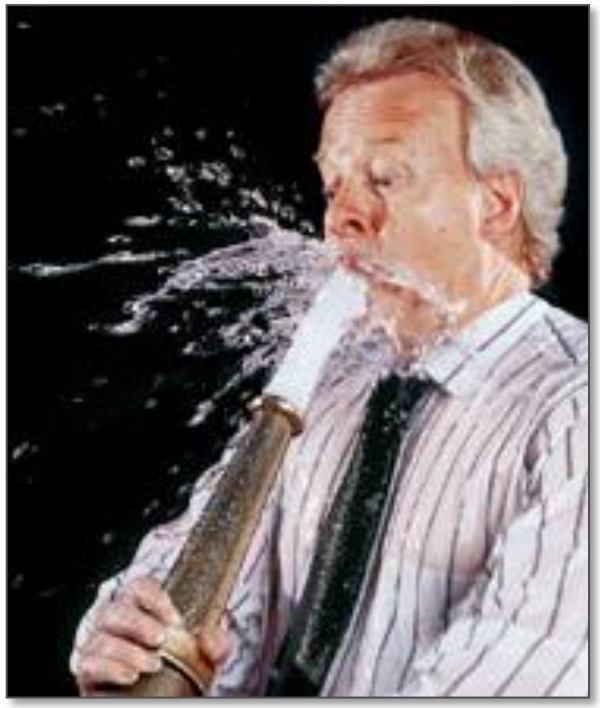
Class Topics

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

Content Warning

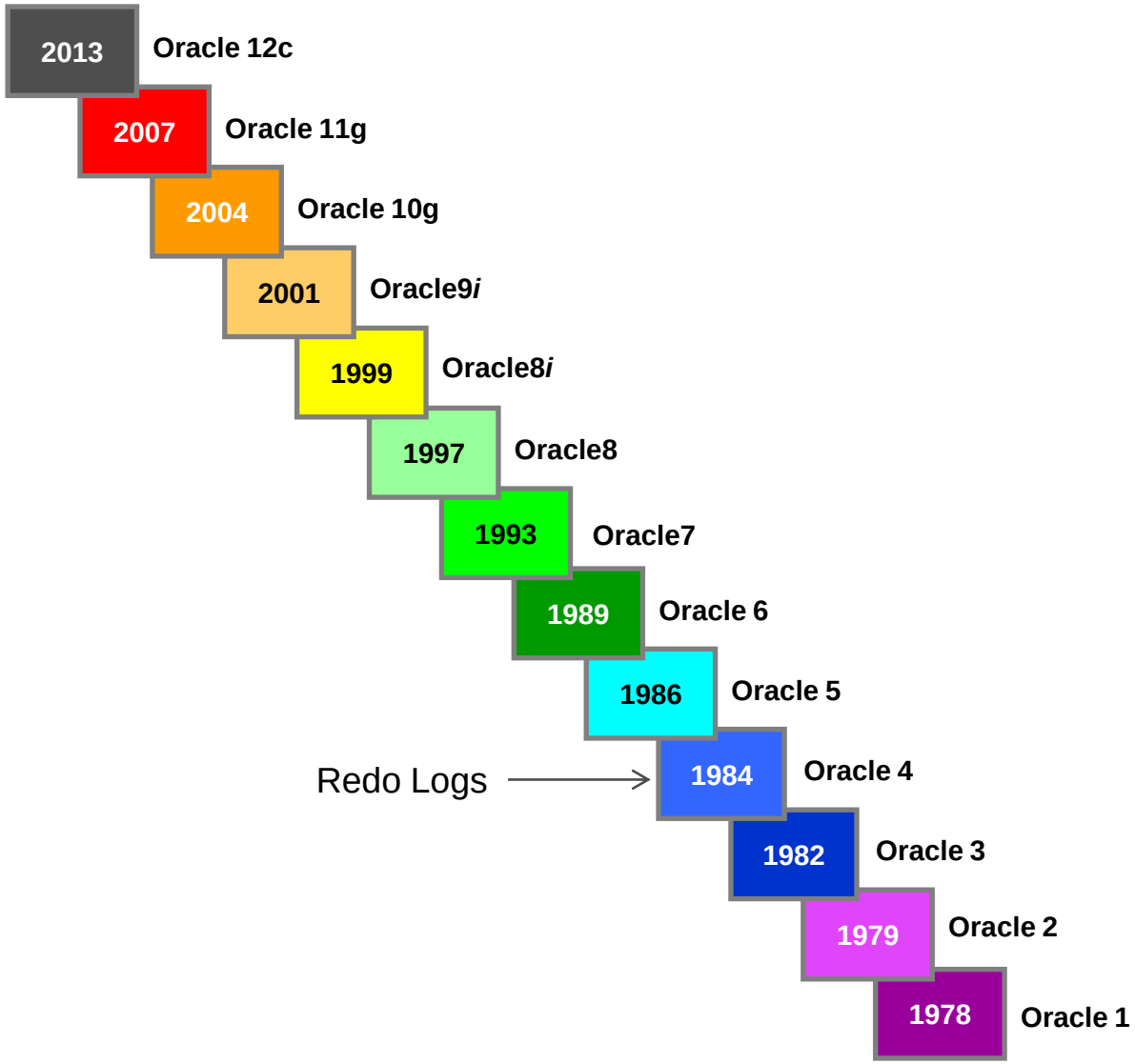
Content Density Warning

Take Notes ... Ask Questions



Introduction

A Brief History of the Oracle Database



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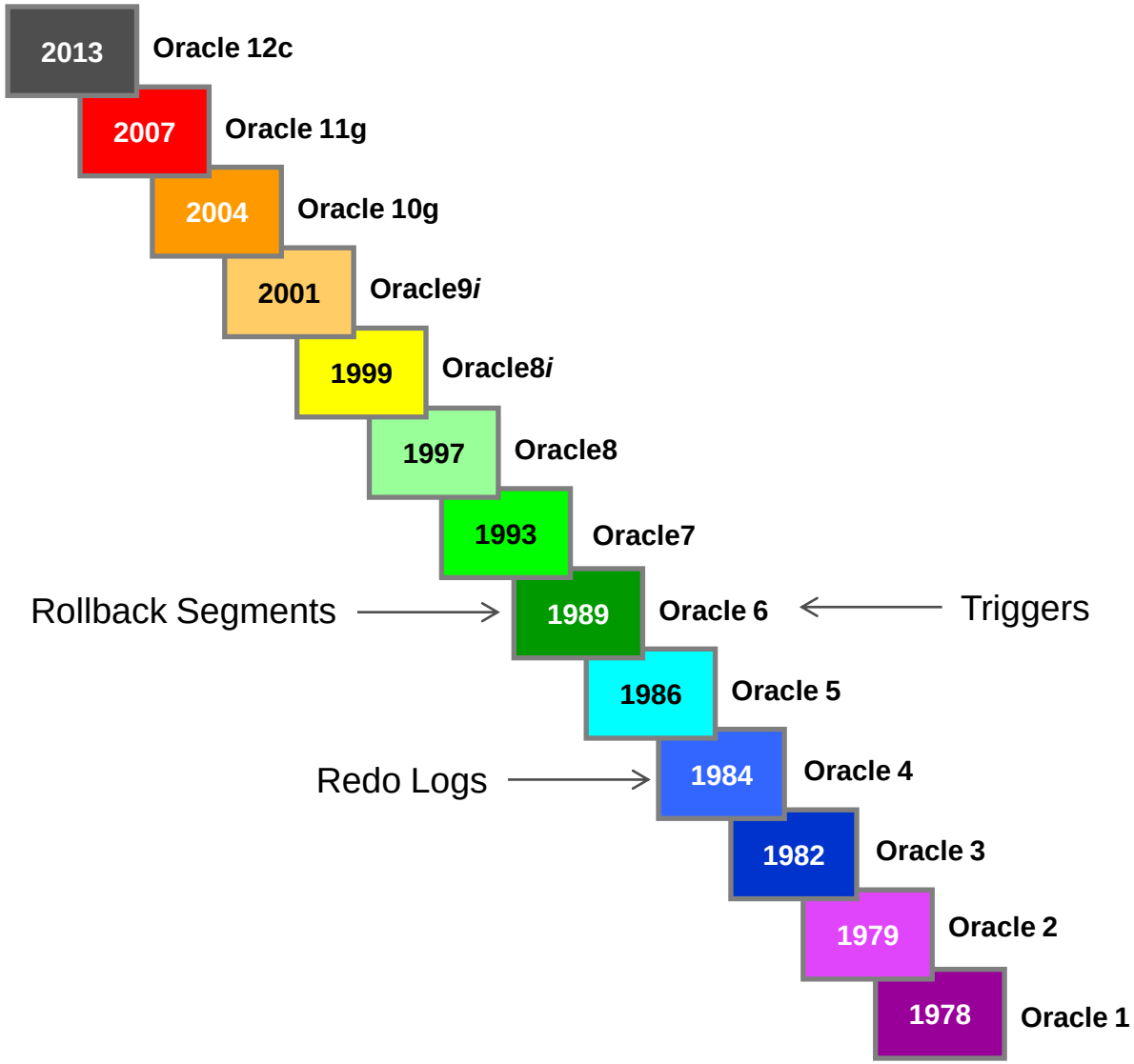

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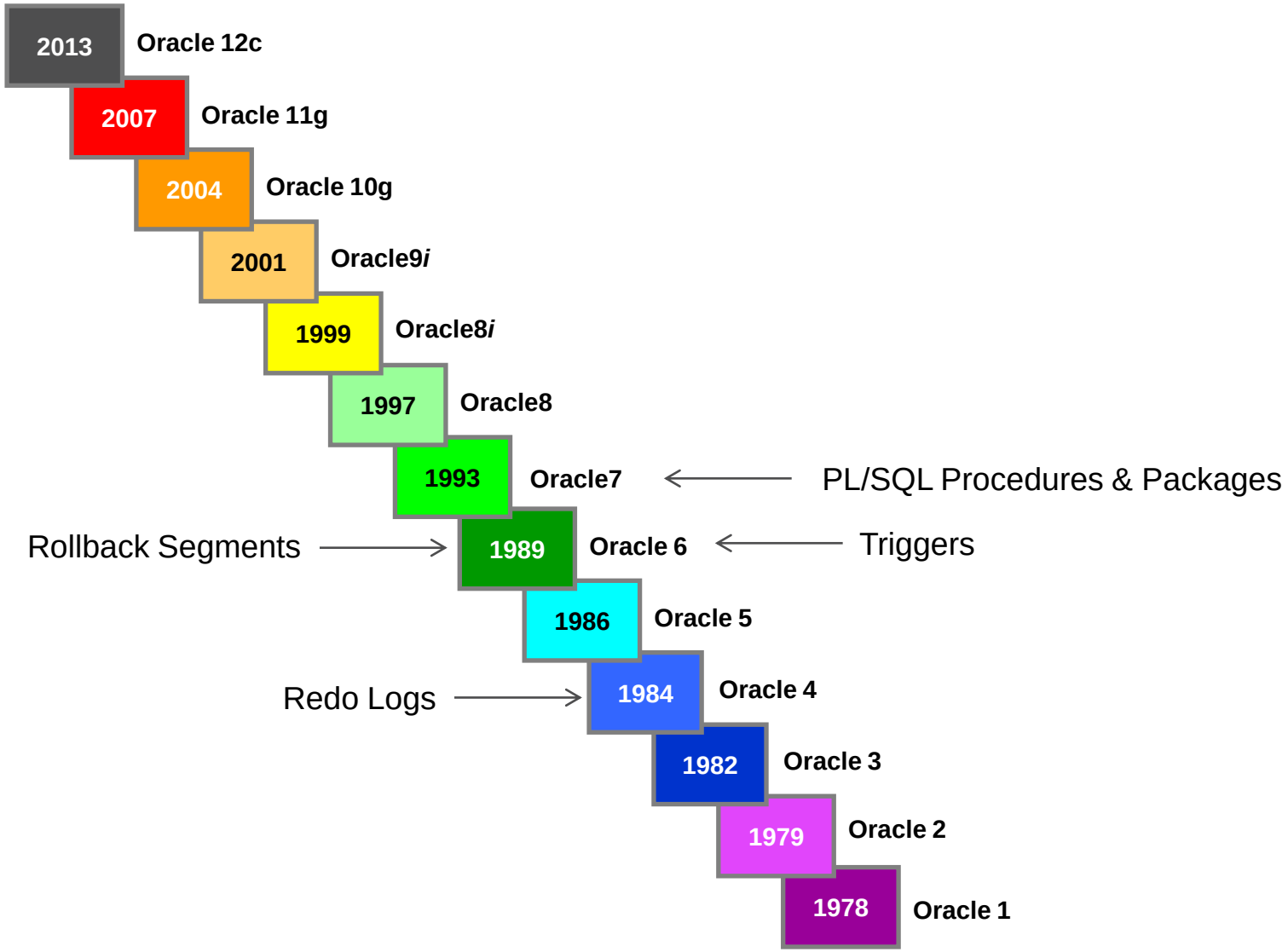

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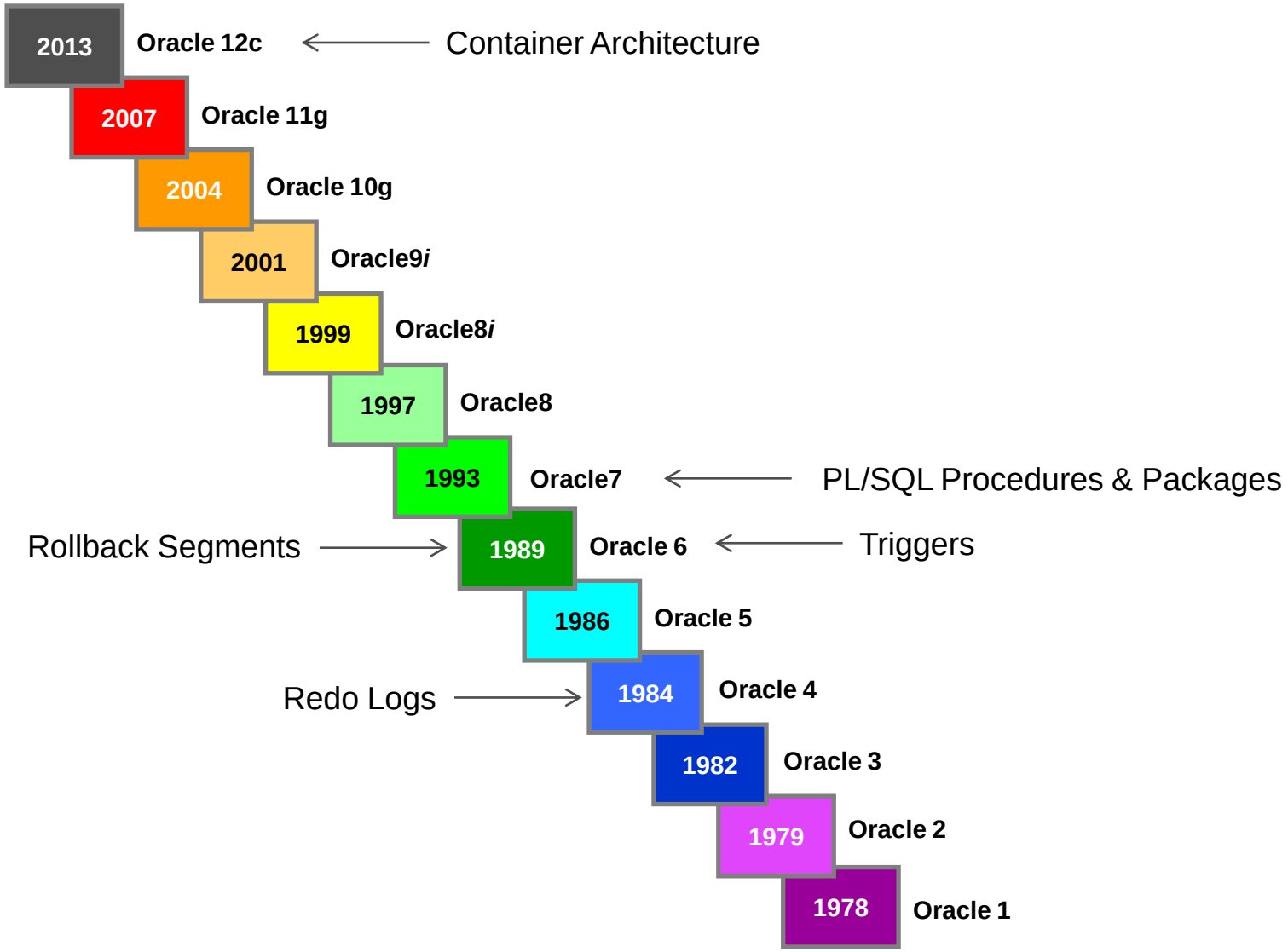
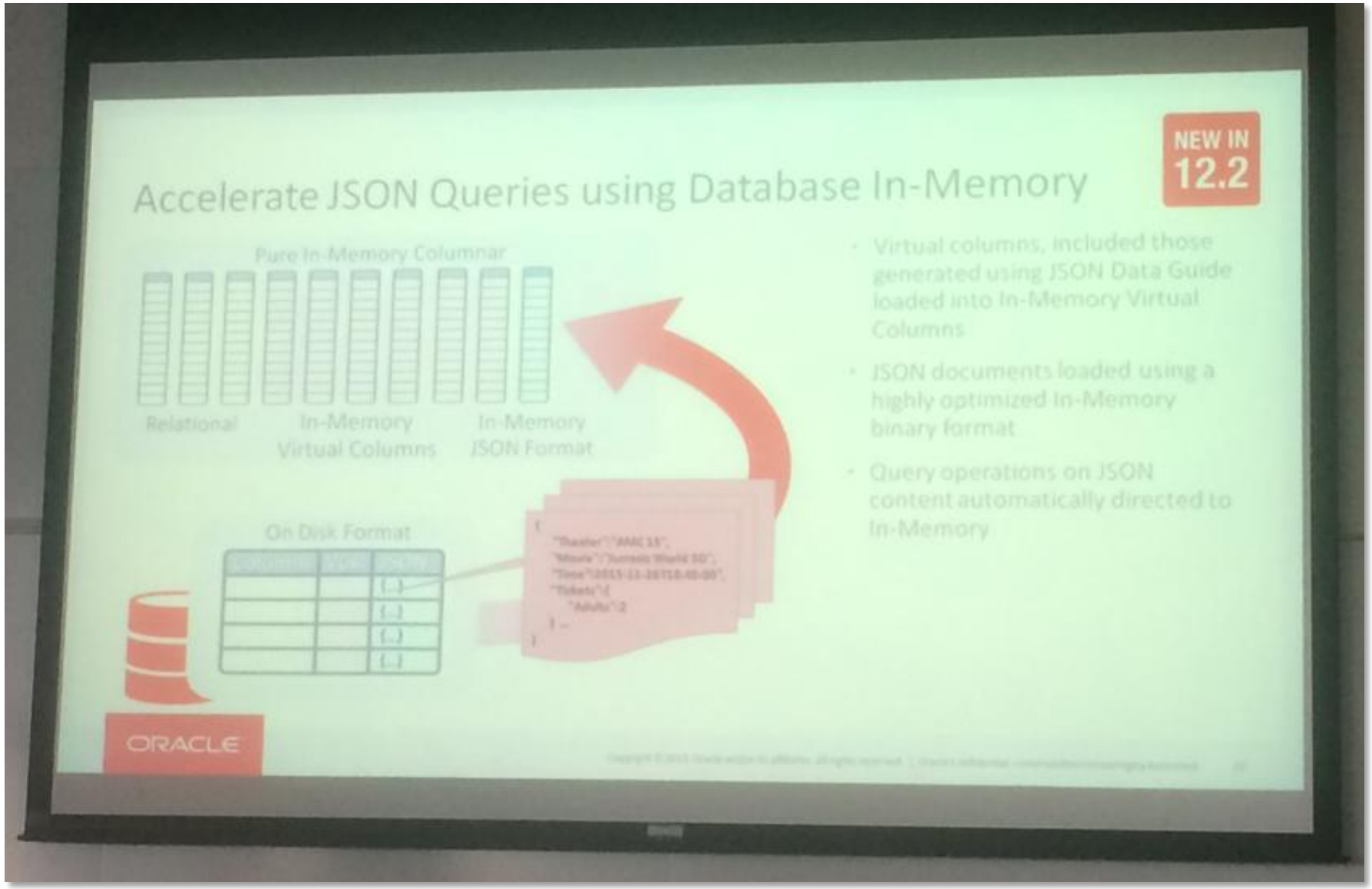
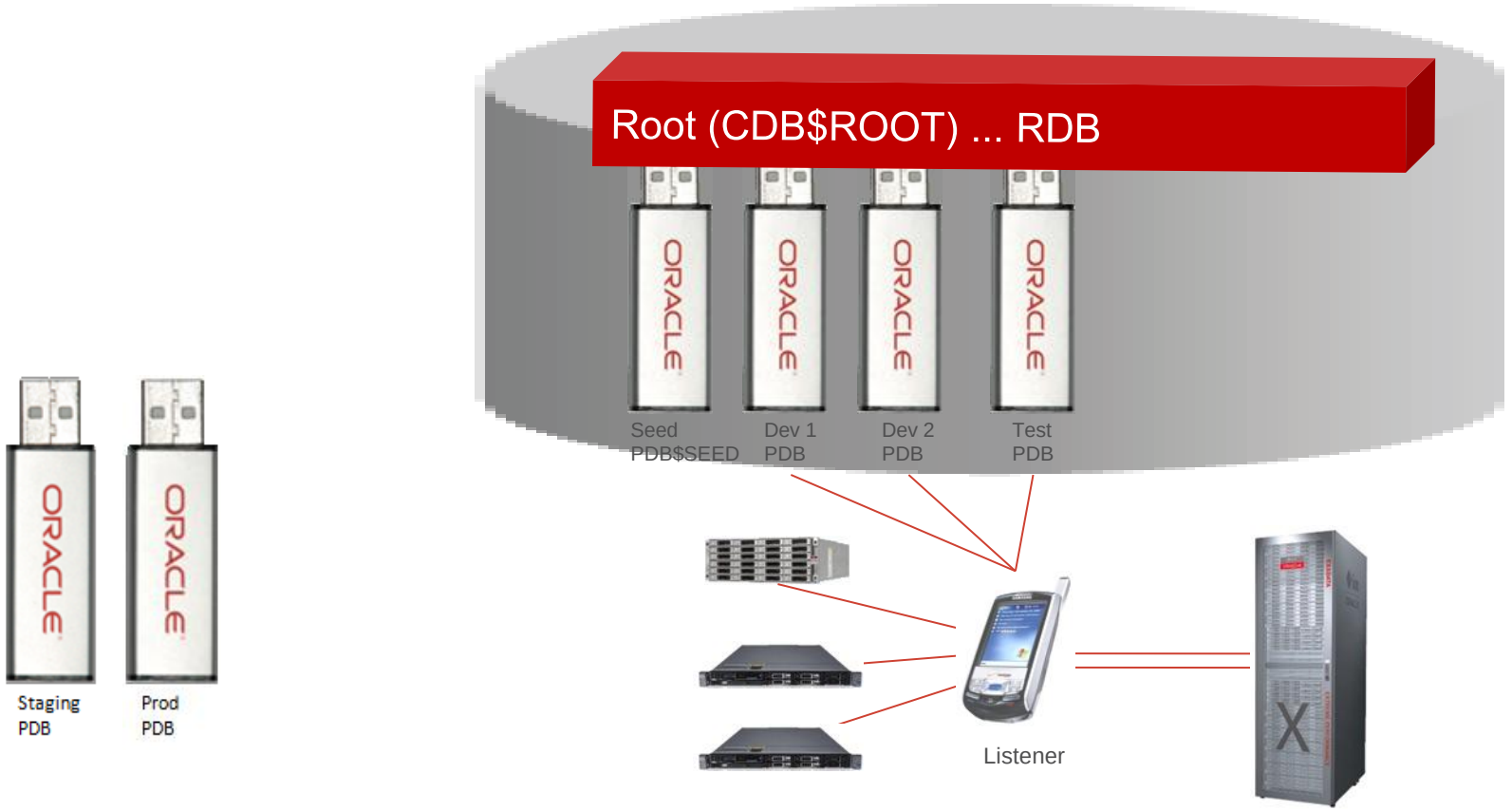


12.2 Is Coming: Soon

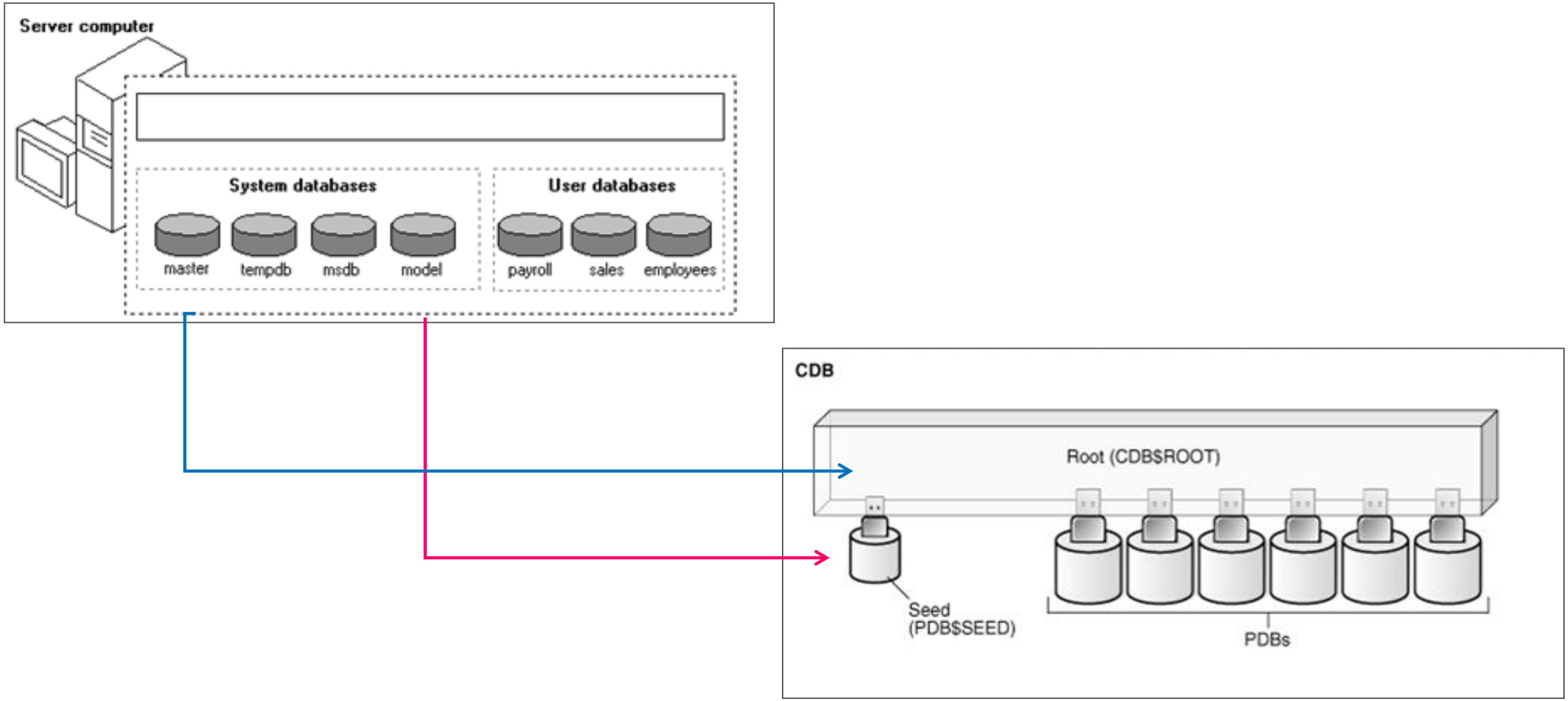


Physical Architecture

What Is Different: Container Architecture



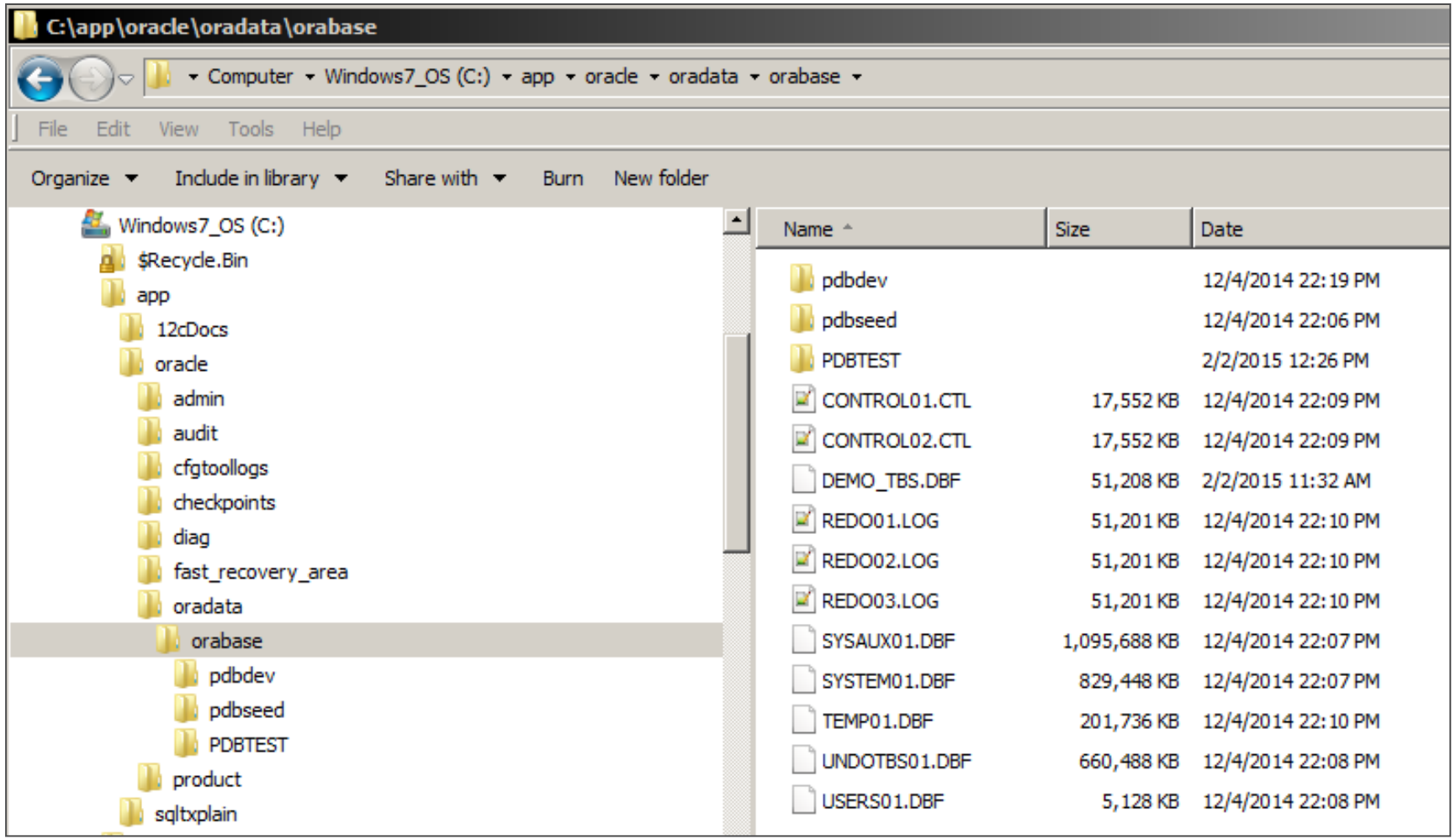
New 12c Container Database Architecture



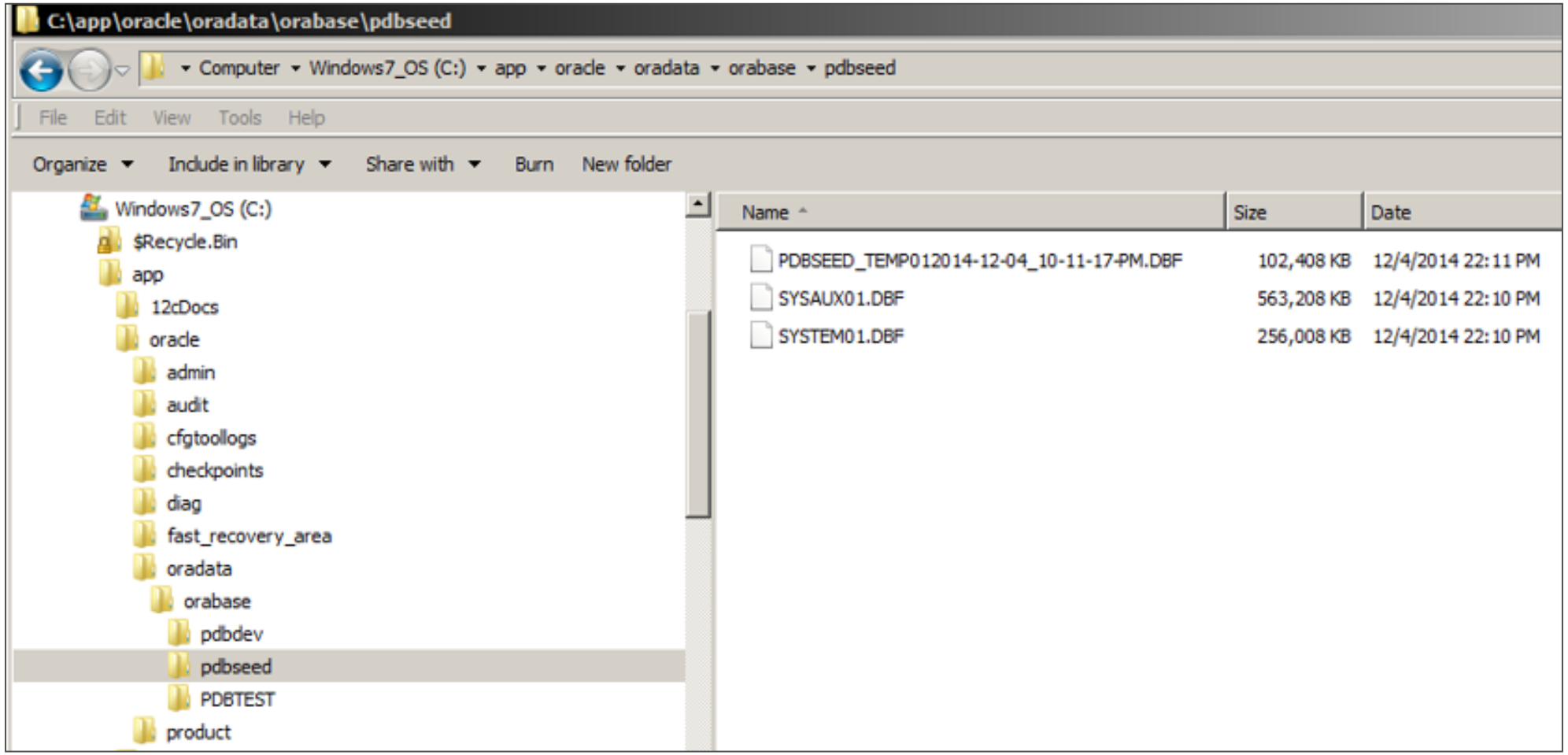
Storage Changes

- 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

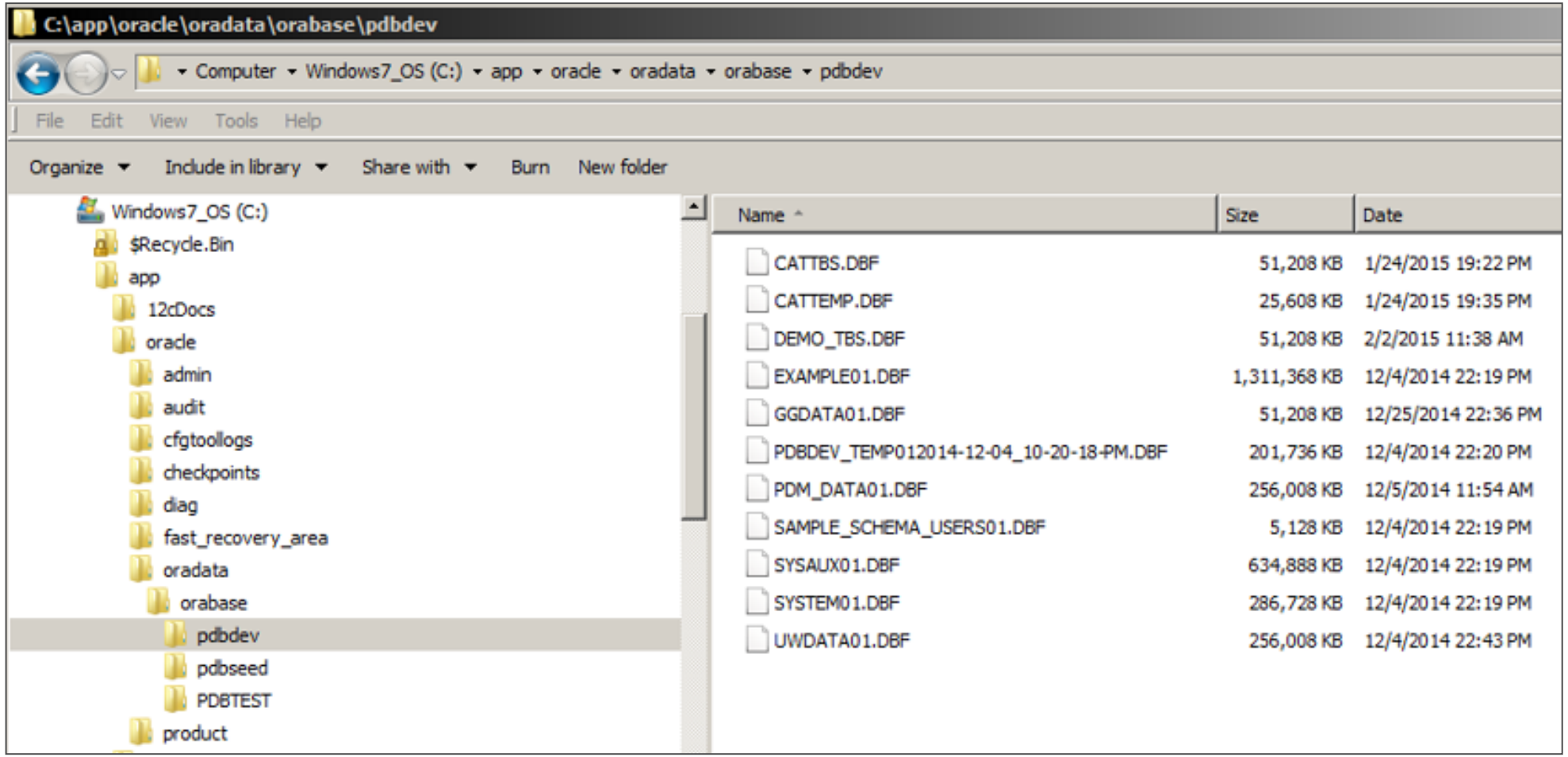
Root Physical Architecture



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, Cisco UCS, VCE Vblock) ... 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

- **C**ontainer **D**ata**B**ase 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 11g 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
FLOWS_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_preup.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

- 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/psql/gather_sysstat.sql
sqlplus -s / @/home/oracle/psql/gather_latch.sql
sqlplus -s / @/home/oracle/psql/gather_rlimit.sql
sqlplus -s / @/home/oracle/psql/gather_system_event.sql
sqlplus -s / @/home/oracle/psql/gather_waitstat.sql
```

Cron Jobs

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

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

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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

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

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 most of 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

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