

21C - Why? Why not?

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Me



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youtube.com/ConnorMcDonaldOracle



The Podcast is live!



<https://connormcdonald.podbean.com/>



before we begin



communities will be back !

#GetVaccinated



two important messages

YOU **MUST** USE 21C

YOU MUST NOT USE 21C



no 😊

YOU SHOULD NOT USE 21C

TODAY



Is 21c being covered in this session?

11:4



Can we look at all the 21c features?



Release date

← Reply

← Reply All

Hi Connor,

ell us about 21c?



Can you explain 21c upgrade?

5:06 PM

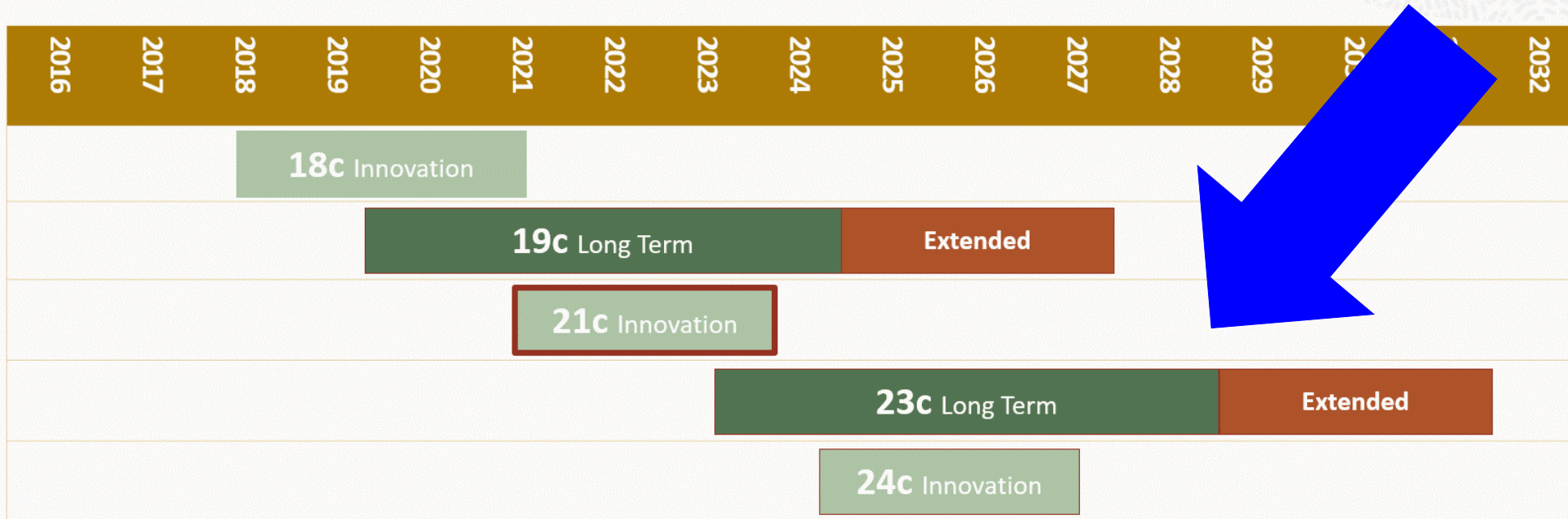


Should we use 21c? Blockchain?



Projected Database Release and Support Timeline

(subject to change)



database releases

11^g

RELEASE 2

11.2.0.4

12^c

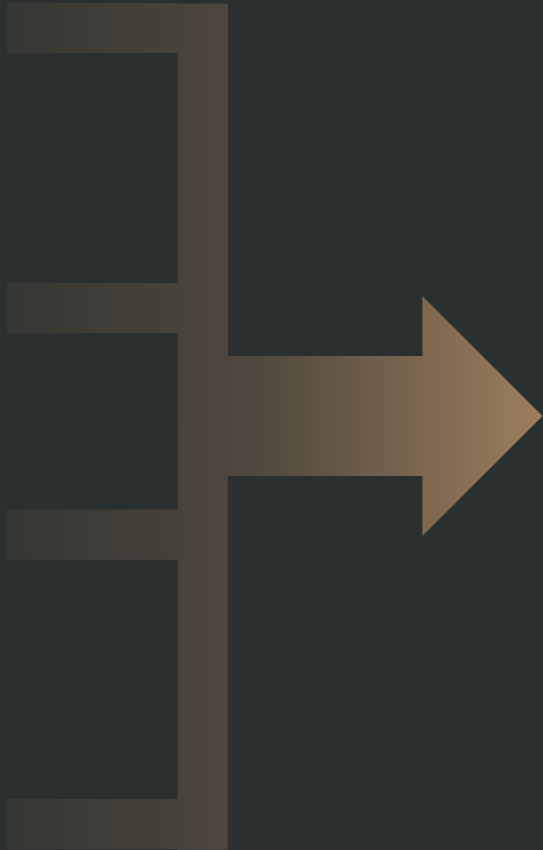
12.1.0.2

12^c

RELEASE 2

12.2.0.1

18^c



19^c

not all platforms will have 21c

YOU MUST USE 21C

example 1

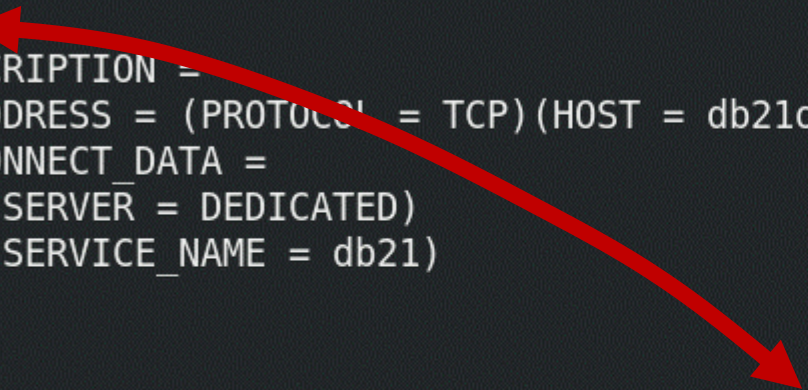
File Edit View Search Terminal Help

```
[oracle@db21oel8 ~]$ cd $ORACLE_HOME/network/admin
```



```
[oracle@db21oel8 admin]$ cat tnsnames.ora
```

```
MYDB =  
  (DESCRIPTION =  
    (ADDRESS = (PROTOCOL = TCP)(HOST = db21oel8.localdomain)(PORT = 1521))  
    (CONNECT_DATA =  
      (SERVER = DEDICATED)  
      (SERVICE_NAME = db21)  
    )  
  )
```



```
[oracle@db21oel8 admin]$ sqlplus scott/tiger@mydb
```

bit.ly/21cR00H

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> _ ?

Free

ORA-12154: Can't Connect to Default Oracle XE 21c Database on Windows 10

Asked today Active today Viewed 14 times



0



I've had it. I just can't get this to work. I installed Oracle XE 21c on my Windows 10 desktop. The installation went ok, once I ran the Setup file as an administrator. I basically chose all the defaults.

So now it is running, and there was a default database XE create for me. But I get this when attempting to connect as SYSTEM using SQLPlus:

```
SQL*Plus: Release 21.0.0.0.0 - Production on Mon Nov 1 19:08:25 2021
Version 21.3.0.0.0
```

```
Copyright (c) 1982, 2021, Oracle. All rights reserved.
```

```
Enter user-name: SYSTEM
```

```
Enter password:
```

```
ERROR:
```

```
ORA-12154: TNS:could not resolve the connect identifier specified
```

I looked and there is no tnsnames.ora or listern.ora file, so I attempted to create them, though I am not sure they are correct.

```
C:\app\sysde\product\21c\dbhomeXE\network\admin\listener.ora
```

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example 2

```
$ orapwd file=$ORACLE_BASE/dbs/orapwDB21 ignorecase=y
```

```
Enter password for SYS: MySecretPassword
```

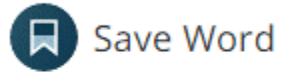
```
SQL> conn sys/mysecretpassword as sysdba
```

the best way to learn 21c


```
oracle@db21c:~  
File Edit View Search Terminal Help  
[oracle@db21c ~]$ sqlplus / as sysdba  
SQL*Plus: Release 21.0.0.0.0 - Production on Wed Aug 18 03:42:30 2021  
Version 21.3.0.0.0  
Copyright (c) 1982, 2021, Oracle. All rights reserved.  
  
Connected to:  
Oracle Database 21c Express Edition Release 21.0.0.0.0 - Production  
Version 21.3.0.0.0  
  
SQL> select banner from v$version;  
  
BANNER  
-----  
Oracle Database 21c Express Edition Release 21.0.0.0.0 - Production  
  
SQL>
```

Express Edition

degustation noun



de·gus·ta·tion | \ ,dē-,gə-'stā-shən  \

Definition of *degustation*

: the action or an instance of tasting especially in a series of small portions

sampler

1





NEWS

Oracle Autonomous Data

INTEGRITY

Effectively Using Oracle Blockchain Tables

Blockchain Tables in Oracle Database What, Why, and Who are they for?

dbi



Oracle

By Christia



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Blockchain Tables in Oracle Database 21c

Details: Oracle Blockchain Table

This page provide more detailed information about blockchain tables and chained rows by row hash tables.

Rows in a Single Chain of a Blockchain Table

```
SQL> CREATE BLOCKCHAIN TABLE my_ledger_bank (...)
```

Row Data

Row Hash



SQL Maria®

Oracle Database Product Manager with a passion for SQL, the Optimizer and performance.

Why Oracle Implement Blockchain in the Database

Search



DBA



```
SQL> update EMP  
2  set SAL = SAL * 1.2  
3  where job = 'DBA';
```

1 row updated.



Oracle Database Vault

immutable table


```
SQL> create immutable table NO_MESSING (  
2     empno          number,  
3     ename          varchar2(20) ,  
4     sal            number,  
5     hiredate       date,  
6     constraint NO_MESSING_PK primary key (empno)  
7 )  
8 no drop until 1 days idle  
9 no delete until 16 days after insert;
```

Table created.

```
SQL> select * from no_messing;
```

EMPNO	ENAME	SAL	HIREDATE
7369	SMITH	800	17-DEC-80
7499	ALLEN	1600	20-FEB-81
7521	WARD	1250	22-FEB-81
...			

```
SQL> update no_messing
      2 set sal = 1000
      3 where ename = 'SMITH';
update no_messing
      *
```

ERROR at line 1:

ORA-05715: operation not allowed on the blockchain or immutable table

```
SQL> sho user
USER is "SYS"
```

2

new plan tools

```
SQL> explain plan
  2  set statement_id = 'p1'
  3  for select /*+ full(e) */ * from scott.emp e
  4  where empno > 0 ;
```

Explained.

```
SQL> explain plan
  2  set statement_id = 'p2'
  3  for select /*+ index(e) */ * from scott.emp e
  4  where empno > 0 ;
```

Explained.

```
SQL> exec :c := dbms_xplan.compare_explain('p1','p2')
```

```
SQL> print c
```

COMPARE PLANS REPORT

```
-----  
Current user           : MCDONAC  
Total number of plans  : 2  
Number of findings     : 1  
-----
```

COMPARISON DETAILS

```
-----  
Plan Number           : 1 (Reference Plan)  
Plan Found            : Yes  
Plan Source           : Plan Table  
Plan Table Owner      : MCDONAC
```

```
Plan Table Name       : PLAN_TABLE  
Statement ID          : p1  
Plan ID               : 3  
Plan Database Version : 21.0.0.0
```

```
...
```

```
...
```


dbms_xplan.compare_explain

dbms_xplan.compare_cursor

3

SQL set extensions

```
SQL> create table emp  
2 as select * from scott.emp;
```

Table created.

```
SQL> create table emp_dept10  
2 as select * from scott.emp  
3 where deptno = 10;
```

Table created.

```
SQL> select * from emp
```

```
2 minus
```

```
3 select * from emp_dept10;
```

defines distinct-ness

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81	2975		20
7654	MARTIN	SALESMAN	7698	28-SEP-81	1250	1400	30
7698	BLAKE	MANAGER	7839	01-MAY-81	2850		30
7788	SCOTT	ANALYST	7566	09-DEC-82	3000		20
7844	TURNER	SALESMAN	7698	08-SEP-81	1500		30
7876	ADAMS	CLERK	7788	12-JAN-83	1100		20
7900	JAMES	CLERK	7698	03-DEC-81	950		30
7902	FORD	ANALYST	7566	03-DEC-81	3000		20

```
11 rows selected.
```

```
SQL> select deptno from emp
      2  minus
      3  select deptno from emp_dept10;
```

DEPTNO
20
30


```
SQL> select deptno from emp
      2  except
      3  select deptno from emp_dept10;
```

```
      DEPTNO
-----
          20
          30
```

```
SQL> select deptno from emp
2  except all
3  select deptno from emp_dept10;
```

DEPTNO
20
20
20
20
20
30
30
30
30
30
30

think UNION and UNION ALL

11 rows selected.

```
SQL> select deptno, checksum(ename)
  2   from emp
  3   group by deptno;
```

DEPTNO	CHECKSUM (ENAME)
20	217430
30	372622
10	105816

```
SQL> select deptno, checksum(ename), checksum(job)
2   from emp
3   group by deptno;
```

DEPTNO	CHECKSUM (ENAME)	CHECKSUM (JOB)
-----	-----	-----
20	217430	553698
30	372622	555779
10	105816	498998

```
SQL> select deptno, json_arrayagg(json_object(ename,empno,job)) j
      2  from emp
      3  group by deptno;
```

DEPTNO J

```
-----
10  [{"ename": "CLARK", "empno": 7782, "job": "MANAGER"},
      {"ename": "MILLER", "empno": 7934, "job": "CLERK"},
      {"ename": "KING", "empno": 7839, "job": "PRESIDENT"}]
20  [{"ename": "SMITH", "empno": 7369, "job": "CLERK"},
      {"ename": "FORD", "empno": 7902, "job": "ANALYST"},
      {"ename": "ADAMS", "empno": 7876, "job": "CLERK"},
      {"ename": "SCOTT", "empno": 7788, "job": "ANALYST"},
      {"ename": "JONES", "empno": 7566, "job": "MANAGER"}]
30  [{"ename": "ALLEN", "empno": 7499, "job": "SALESMAN"},
      {"ename": "JAMES", "empno": 7900, "job": "CLERK"},
      {"ename": "TURNER", "empno": 7844, "job": "SALESMAN"},
      {"ename": "BLAKE", "empno": 7698, "job": "MANAGER"},
      {"ename": "MARTIN", "empno": 7654, "job": "SALESMAN"},
      {"ename": "WARD", "empno": 7521, "job": "SALESMAN"}]
```

```
SQL> select deptno, checksum(j)
  2  from (
  3      select deptno, json_arrayagg(json_object(ename,empno,job)) j
  4      from emp
  5      group by deptno
  6  )
  7  group by deptno;
```

DEPTNO	CHECKSUM(J)
10	718032
20	976115
30	327919

4



```
SQL> alter system set max_idle_blocker_time = 1;
```

```
System altered.
```

minutes :-(

```
SQL> delete from t;
```

```
1 row deleted
```

```
SQL> select * from t for update ;
```

```
          X
```

```
-----
```

```
          1
```

```
[waiting]
```

```
SQL> select * from t;
```

```
select * from t
```

```
          *
```

```
ERROR at line 1:
```

```
ORA-03113: end-of-file on communication channel
```

```
Process ID: 3638
```

```
Session ID: 65 Serial number: 16907
```

5

gradual password rollover

```
SQL> create profile LETS_BE_GENTLE limit  
      2      password_rollover_time 4;
```

Profile created.

```
SQL> create user DEMO identified by MyCurrentPassword profile LETS_BE_GENTLE;
```

User created.

```
SQL> grant create session to DEMO;
```

Grant succeeded.

```
SQL> conn demo/MyCurrentPassword@db21
```

Connected.

```
SQL> conn / as sysdba  
Connected.
```

```
SQL> alter user DEMO identified by PeskyAuditorsNewPassword;  
  
User altered.
```

```
SQL> conn demo/PeskyAuditorsNewPassword@db21  
Connected.
```

```
SQL> conn demo/MyCurrentPassword@db21  
Connected.
```

```
SQL> select dbusername, authentication_type
2  from unified_audit_trail
3  where action_name='LOGON';
```

DBUSERNAME	AUTHENTICATION_TYPE
------------	---------------------

SYS	(TYPE=(OS)) ; (CLIENT ADDRESS=((PROTOCOL=tcp) (HOST=fe80::49b8:a7a1:d6d9:6c86%27) (PORT=64054))) ;
-----	--

DEMO	(TYPE=(DATABASE)) ; (CLIENT ADDRESS=((PROTOCOL=tcp) (HOST=fe80::49b8:a7a1:d6d9:6c86%27) (PORT=64002))) ; (LOGON_INFO=((VERIFIER=12C-NEW) ...
------	--

DEMO	(TYPE=(DATABASE)) ; (CLIENT ADDRESS=((PROTOCOL=tcp) (HOST=fe80::49b8:a7a1:d6d9:6c86%27) (PORT=64002))) ; (LOGON_INFO=((VERIFIER=12C-OLD) ...
------	--


```
SQL> select username, account_status
2   from dba_users
3  order by 1;
```

USERNAME	ACCOUNT_STATUS
ANONYMOUS	LOCKED
APPQOSSYS	LOCKED
AUDSYS	LOCKED
CTXSYS	LOCKED
DBSFUSER	LOCKED
DBSNMP	LOCKED
DEMO	OPEN & IN ROLLOVER
DGPDB_INT	LOCKED
DIP	LOCKED
DVF	LOCKED
DVSY	LOCKED
...	

"who cares?"



```
connect /@app
```



```
connect /@app
```



```
connect /@app
```



```
connect /@app
```

wallet:

APP = SCOTT/TIGER



```
SQL> alter user SCOTT identified by LEOPARD;  
User altered.
```

6

safer DataPump

```
[oracle]$ expdp system/*****@pdb1 directory=tmp dumpfile=scott schemas=scott
```

```
Export: Release 19.0.0.0.0 - Production on Mon Aug 16 11:30:42 2021  
Version 19.12.0.0.0
```

```
Copyright (c) 1982, 2019, Oracle and/or its affiliates. All rights reserved.
```

```
Connected to: Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production  
Processing object type SCHEMA_EXPORT/TABLE/TABLE_DATA  
Processing object type SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS  
Processing object type SCHEMA_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS  
...
```

. . exported "SCOTT"."EMP"	8.773 KB	14 rows
. . exported "SCOTT"."DEPT"	6.023 KB	4 rows
. . exported "SCOTT"."SALGRADE"	5.953 KB	5 rows
. . exported "SCOTT"."BONUS"	0 KB	0 rows

oracle@db192:/tmp

File Edit View Search Terminal Help

```
000e090: 2f43 4f4c 5f4c 4953 545f 4954 454d 3e3c /COL_LIST_ITEM><
000e0a0: 2f43 4f4c 5f4c 4953 543e 3c2f 5354 524d /COL_LIST></STRM
000e0b0: 5441 424c 455f 543e 3c2f 524f 573e 3c2f TABLE_T></ROW></
000e0c0: 524f 5753 4554 3e00 3c00 2708 03c2 4a46 ROWSET>.<.'...JF
000e0d0: 0553 4d49 5448 0543 4c45 524b 03c2 5003 .SMITH.CLERK..P.
000e0e0: 0777 b40c 1101 0101 02c2 09ff 02c1 153c .w.....<
000e0f0: 002c 0803 c24b 6405 414c 4c45 4e08 5341 ,...Kd.ALLEN.SA
000e100: 4c45 534d 414e 03c2 4d63 0777 b502 1401 LESMAN..Mc.w....
000e110: 0101 02c2 1102 c204 02c1 1f3c 002c 0803 .....<,...
000e120: c24c 1604 5741 5244 0853 414c 4553 4d41 .L..WARD.SALESMA
000e130: 4e03 c24d 6307 77b5 0216 0101 0103 c20d N..Mc.w.....
000e140: 3302 c206 02c1 1f3c 002a 0803 c24c 4305 3.....<.*...LC.
000e150: 4a4f 4e45 5307 4d41 4e41 4745 5203 c24f JONES.MANAGER..0
000e160: 2807 77b5 0402 0101 0103 c21e 4cff 02c1 (.w.....L...
000e170: 153c 002e 0803 c24d 3706 4d41 5254 494e .<.....M7.MARTIN
000e180: 0853 414c 4553 4d41 4e03 c24d 6307 77b5 .SALESMAN..Mc.w.
000e190: 091c 0101 0103 c20d 3302 c20f 02c1 1f3c .....3.....<
000e1a0: 002a 0803 c24d 6305 424c 414b 4507 4d41 .*...Mc.BLAKE.MA
000e1b0: 4e41 4745 5203 c24f 2807 77b5 0501 0101 NAGER..0(.w....
000e1c0: 0103 c21d 33ff 02c1 1f3c 002a 0803 c24e ....3.....<.*...N
000e1d0: 5305 434c 4152 4b07 4d41 4e41 4745 5203 S.CLARK.MANAGER.
000e1e0: c24f 2807 77b5 0609 0101 0103 c219 33ff .0(.w.....3.
000e1f0: 02c1 0b3c 0029 0803 c24e 5905 5343 4f54 ...<.)...NY.SCOT
000e200: 5407 414e 414c 5953 5403 c24c 4307 77b6 T.ANALYST..LC.w.
000e210: 0c09 0101 0102 c21f ff02 c115 3c00 2708 .....<.'
000e220: 03c2 4f28 044b 494e 4709 5052 4553 4944 ..0(.KING.PRESID
000e230: 454e 54ff 0777 b50b 1101 0101 02c2 33ff ENT..w.....3.
000e240: 02c1 0b3c 002b 0803 c24f 2d06 5455 524e ...<.+...0-.TURN
000e250: 4552 0853 414c 4553 4d41 4e03 c24d 6307 ER.SALESMAN..Mc.
```

3608, 61

13%

```
[oracle]$ impdp system/****@pdb1 directory=tmp dumpfile=scott schemas=scott
```

```
Import: Release 19.0.0.0.0 - Production on Mon Aug 16 11:40:06 2021  
Version 19.12.0.0.0
```

```
Copyright (c) 1982, 2019, Oracle and/or its affiliates. All rights reserved.
```

```
Connected to: Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 -  
Production
```

```
Master table "SYSTEM"."SYS_IMPORT_SCHEMA_01" successfully loaded/unloaded
```

```
Starting "SYSTEM"."SYS_IMPORT_SCHEMA_01":  userid=system/*****@pdb1
```

```
Processing object type SCHEMA_EXPORT/TABLE/TABLE
```

```
Processing object type SCHEMA_EXPORT/TABLE/TABLE_DATA
```

. . imported "SCOTT"."EMP"	8.773 KB	14 rows
. . imported "SCOTT"."DEPT"	6.023 KB	4 rows
. . imported "SCOTT"."SALGRADE"	5.953 KB	5 rows
. . imported "SCOTT"."BONUS"	0 KB	0 rows

```
Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/CONSTRAINT
```

```
Processing object type SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS
```

```
Job "SYSTEM"."SYS_IMPORT_SCHEMA_01" completed
```



```
SQL> select empno, ename, job, mgr from scott.emp;
```

EMPNO	ENAME	JOB	MGR
7369	SMITH	CLERK	7902
7499	ALLEN	SALESMAN	7698
7521	WARD	SALESMAN	7698
7566	JONES	MANAGER	7839
7654	CONNOR	SALESMAN	7698
7698	BLAKE	MANAGER	7839
7782	CLARK	MANAGER	7839
7788	SCOTT	ANALYST	7566
7839	KING	PRESIDENT	
7844	TURNER	SALESMAN	7698
7876	ADAMS	CLERK	7788
7900	JAMES	CLERK	7698
7902	FORD	ANALYST	7566
7934	MILLER	CLERK	7782

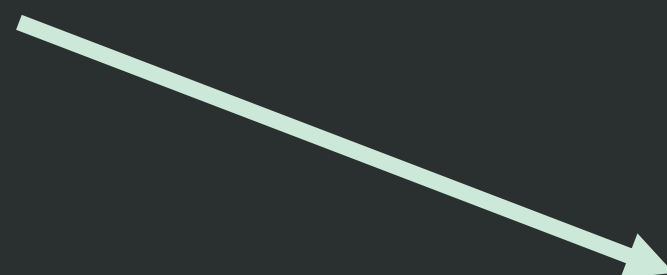
```
14 rows selected.
```

```
[oracle]$ expdp system/****@pdb1 ... schemas=scott checksum=yes
```

```
Export: Release 21.0.0.0.0 - Production on Fri Aug 13 04:11:34 2021  
Version 21.3.0.0.0
```

```
Connected to: Oracle Database 21c Enterprise Edition Release 21.0.0.0.0 - Production  
Starting "SYSTEM"."SYS_EXPORT_SCHEMA_01":  userid=system/*****@pdb1  
Processing object type SCHEMA_EXPORT/TABLE/TABLE_DATA  
Processing object type SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS
```

required for check



```
[oracle]$ impdp system/*****@pdb1 schemas=scott verify_checksum=yes
```

```
Import: Release 21.0.0.0.0 - Production on Sun Aug 15 23:53:29 2021  
Version 21.3.0.0.0
```

```
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```

```
Connected to: Oracle Database 21c Enterprise Edition Release 21.0.0.0.0 - Production
```

```
ORA-39412: file checksum error in dump file "/tmp/scott.dmp"
```

7

Data Guard is cool ...

but

3 Creating a Physical Standby Database



You can manually create a physical standby database in maximum performance mode using asynchronous redo transport

3.1 Preparing the Primary Database for Standby Database Creation

See t

3.1.1 Enable an Appropriate Logging Mode

3.1.2 Configure Redo Transport Authentication

3.1.3 Configure the Primary Database to Receive Redo Data

3.1.4 Set Primary Database Initialization Parameters

On the primary database, you define initialization parameters that control redo transport services while the database is in the standby role.

There are two types of standby databases:

SQL>

SQL>

See Cor
number

Databases

Primary

Physical

3.1.5 Enable Archiving

If archiving is not enabled, then you must put the primary database in ARCHIVELOG mode and enable automatic archiving.

Issue the following SQL statements:

```
SQL> SHUTDOWN IMMEDIATE;  
SQL> STARTUP MOUNT;  
SQL> ALTER DATABASE ARCHIVELOG;  
SQL> ALTER DATABASE OPEN;
```



Note:

The standby database must be in ARCHIVELOG mode for standby redo log archival to be performed.

3.2.1 Creating a Physical Standby Task 1: Create a Backup Copy of the Primary Database Data Files

You can use any backup copy of the primary database to create the physical standby database, as long as you have the necessary archive logs.

3.2.3 Creating a Physical Standby Task 3: Create a Parameter File for the Standby Database

Create a parameter file (PFILE) from the server parameter file (SPFILE) used by the primary database.

Perform the following steps:

1. Issue a SQL statement such as the following:

```
SQL> CREATE PFILE='/tmp/initboston.ora' FROM SPFILE;
```

3.2.4 Creating a Physical Standby Task 4: Copy Files from the Primary System to the Standby System

Ensure that the following files are copied to the standby system:

2. Make sure that the following files are copied to the standby system:

- Datafiles
- Standby redo logs
- Initialization parameters

3.2.5 Creating a Physical Standby Task 5: Set Up the Environment to Support the Standby Database

Set up the environment by creating a Windows-based service, a password file and an SPFILE, and setting up the Oracle Net environment.

Perform the following steps:

1. If the standby database is going to be hosted on a Windows system, then use the ORADIM utility to create a Windows service. For example:

```
oradim -NEW -SID boston -STARTMODE manual
```

The ORADIM utility automatically determines the username for which this service should be created and prompts for a password for that username (if that username needs a password). See [Oracle Database Platform Guide for Microsoft Windows](#) for more information about using the ORADIM utility.

2. Copy the remote login password file from the primary database system to the standby database system.

This step is optional if operating system authentication is used for administrative users and if SSL is used for redo transport authentication. If not, then copy the remote login password file from the primary database to the appropriate directory on the

21c, the easiest Data Guard ever

DGMGRL> PREPARE DATABASE FOR DATA GUARD

a few documentation issues 😊

File Edit View Search Terminal Help

[oracle@db21oel8 ~]\$ dgmgrl /

DGMGR for Linux: Release 21.0.0.0.0 - Production on Sun Nov 7 21:13:49 2021
Version 21.3.0.0.0

Copyright (c) 1982, 2021, Oracle and/or its affiliates. All rights reserved.

Welcome to DGMGR, type "help" for information.

Connected to "db21"

Connected as SYSDBA.

DGMGR> prepare database for data guard

> with db_unique_name is db21dg

> db_recovery_file_dest is '/u01/app/oracle/dg'

> db_recovery_file_dest_size is 20g

> dg_broker_config_file1 is '/u01/app/oracle/dg/file1.dat'

> dg_broker_config_file2 is '/u01/app/oracle/dg/file2.dat';

dg_broker_config_file1 is '/u01/app/oracle/dg/file1.dat'

^

Syntax error before or at "dg_broker_config_file1"

DGMGR>

~~dg_broker_config_file1~~

File Edit View Search Terminal Help

[oracle@db21oel8 ~]\$ dgmgrl /

DGMGRL for Linux: Release 21.0.0.0.0 - Production on Sun Nov 7 21:16:42 2021
Version 21.3.0.0.0

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Welcome to DGMGRL, type "help" for information.

Connected to "db21"

Connected as SYSDBG.

DGMGRL> prepare database for data guard

> with

> db_unique_name is db21dg

> db_recovery_file_dest is '/u01/app/oracle/dg'

> db_recovery_file_dest_size is 20g

> broker_config_file1 is '/u01/app/oracle/dg/file1.dat'

> broker_config_file2 is '/u01/app/oracle/dg/file2.dat';

broker_config_file1 is '/u01/app/oracle/dg/file1.dat'

^

Syntax error before or at "broker_config_file1"

DGMGRL>

~~broker_config_file1~~

File Edit View Search Terminal Help

DGMGRL for Linux: Release 21.0.0.0.0 - Production on Sun Nov 7 21:17:25 2021
Version 21.3.0.0.0

Copyright (c) 1982, 2021, Oracle and/or its affiliates. All rights reserved.

Welcome to DGMGRL, type "help" for information.

Connected to "db21"

Connected as SYSDBG.

DGMGRL> prepare database for data guard

> with

> db_unique_name is db21dg

> db_recovery_file_dest is '/u01/app/oracle/dg'

> db_recovery_file_dest_size is 20g

> broker_config_file_1 is '/u01/app/oracle/dg/file1.dat'

> broker_config_file_2 is '/u01/app/oracle/dg/file2.dat';

Preparing database "db21" for Data Guard.

Initialization parameter DB_UNIQUE_NAME set to 'db21dg'.

Initialization parameter DB_FILES set to 1024.

Initialization parameter LOG_BUFFER set to 268435456.

Primary database must be restarted after setting static initialization parameters.

Primary database must be restarted to enable archivelog mode.

Shutting down database "db21dg".

Database closed.

Database dismounted.

ORACLE instance shut down.

Starting database "db21dg" to mounted mode.


```
Database closed.
Database dismounted.
ORACLE instance shut down.
Starting database "db21dg" to mounted mode.
ORACLE instance started.
Database mounted.
Initialization parameter DB_FLASHBACK_RETENTION_TARGET set to 120.
Initialization parameter DB_LOST_WRITE_PROTECT set to 'TYPICAL'.
RMAN configuration archivelog deletion policy set to SHIPPED TO ALL STANDBY.
Initialization parameter DB_RECOVERY_FILE_DEST_SIZE set to '20g'.
Initialization parameter DB_RECOVERY_FILE_DEST set to '/u01/app/oracle/dg'.
Initialization parameter DG_BROKER_CONFIG_FILE1 set to '/u01/app/oracle/dg/file1.dat'.
Initialization parameter DG_BROKER_CONFIG_FILE2 set to '/u01/app/oracle/dg/file2.dat'.
LOG_ARCHIVE_DEST_n initialization parameter already set for local archival.
Initialization parameter LOG_ARCHIVE_DEST_2 set to 'location=use_db_recovery_file_dest valid_for=(all_logfiles, all_roles)'.
Initialization parameter LOG_ARCHIVE_DEST_STATE_2 set to 'Enable'.
Adding standby log group size 209715200 and assigning it to thread 1.
Adding standby log group size 209715200 and assigning it to thread 1.
Adding standby log group size 209715200 and assigning it to thread 1.
Initialization parameter STANDBY_FILE_MANAGEMENT set to 'AUTO'.
Initialization parameter DG_BROKER_START set to TRUE.
Database set to FORCE LOGGING.
Database set to ARCHIVELOG.
Database set to FLASHBACK ON.
Database opened.
DGMGRL>
```


8

JSON ... just easier

```
SQL> create table customers (
2     id          number,
3     created timestamp,
4     cdata       JSON);
```

Table created.

```
SQL> insert into customers
2 values (1, systimestamp,
3     '{"name": "Conner", "address": {"city": "Perth"}}');
```

```
SQL> desc customers
```

Name	Null?	Type
-----	-----	-----
ID		NUMBER
CREATED		TIMESTAMP (6)
CDATA		UNDEFINED <== sqlplus 19
		JSON <== sqlplus 21

```
SQL> select JSON_VALUE(cdata, '$.address.city') from customers;
```

```
JSON_VALUE(CDATA, '$.ADDRESS.CITY')
```

```
-----  
Perth
```

```
SQL> select c.cdata.address.city.string() from customers c;
```

```
C.CDATA.ADDRESS.CITY.STRING()
```

```
-----  
Perth
```

```
SQL> select JSON_SERIALIZE(c.cdata pretty) from customers c;
```

```
JSON_SERIALIZE(C.CDATAPRETTY)
```

```
-----  
{  
  "name" : "Conner",  
  "address" :  
  {  
    "city" : "Perth"  
  }  
}
```

```
SQL> create or replace
  2  function upgradeCustomer(customer JSON) return JSON as
  3      obj JSON_Object_T;
  4  begin
  5      obj := JSON_Object_T(customer);
  6      if obj.has('status') then
  7          obj.put('status','platinum with pink sprinkles');
  8      else
  9          obj.put('status','silver');
 10      end if;
 11      return obj.to_JSON;
 12  end;
 13  /
```

```
SQL> select JSON_Serialize(upgradeCustomer(cdata))
  2  from customers c
  3  where c.cdata.name.string() = 'Conner';
```

```
JSON_SERIALIZE(UPGRADECUSTOMER(CDATA))
```

```
-----
{"name": "Conner", "address": {"city": "Perth"}, "status": "silver"}
```

```
SQL> update customers
  2  set cdata =
  3      JSON_TRANSFORM (cdata,
  4          SET '$.lastUpdated' = SYSTIMESTAMP,
  5          SET '$.address.zip'   = 6001,
  6          SET '$.name'         = 'Connor',
  7          RENAME '$.name'      = 'firstname',
  8          APPEND '$.friends'   = 'Tom' CREATE ON MISSING)
  9  where id = 1;
```

```
SQL> select JSON_Serialize(cdata PRETTY) from customers;
```

```
JSON_SERIALIZE (CDATAPRETTY)
```

```
-----
{ "address" :
  {
    "city" : "Perth",
    "zip"  : 6001
  },
  "lastUpdated" : "2021-08-19T03:10:42.998126-04:00",
  "firstname"  : "Connor",
  "friends"   : [ "Tom" ]
}
```

```
SQL> insert into customers values (2, systimestamp,  
2      '{"firstName": "Nigel",  
3      "address": [{"type": "home", "city": "London", "zip": 1234},  
4      {"type": "work", "city": "Reading", "zip": 5678}]}');
```

1 row created.

```
SQL> create multivalue index cust_zip_idx  
2 on customers c(c.cdata.address.zip.number());
```

Index created.


```
SQL> select JSON_serialize(cdata)
       2  from customers c
       3  where JSON_Exists(cdata, '$.address?(@.zip == 1234)');
```

JSON_SERIALIZE(CDATA)

```
-----
{"firstName": "Nigel", "address": [{"type": "home", "city": "London", "zip"
```

```
-----
| Id  | Operation                                          | Name              | Rows  |
-----
|  0  | SELECT STATEMENT                                |                   |      1 |
|  1  | TABLE ACCESS BY INDEX ROWID BATCHED            | CUSTOMERS         |      1 |
|  2  | HASH UNIQUE                                      |                   |      1 |
|*  3  | INDEX RANGE SCAN (MULTI VALUE)                  | CUST_ZIP_IDX      |      1 |
-----
```

9

attention log

```
[oracle@db21c trace]$ ls -l a*  
-rw-r-----. 1 oracle oracle 339626 Aug 19 01:06 alert_db21.log  
-rw-r-----. 1 oracle oracle   9713 Aug 18 21:55 attention_db21.log
```

Database Characterset is AL32UTF8
No Resource Manager plan active
2021-08-18T21:55:55.693941-04:00
Starting background process RCBG
2021-08-18T21:55:55.702993-04:00
RCBG started with pid=48, OS id=5212
2021-08-18T21:55:55.704368-04:00
replication_dependency_tracking turned off (no async multimaster replication found)
Starting background process AQPC
2021-08-18T21:55:56.199285-04:00
AQPC started with pid=49, OS id=5214
PDB\$SEED(2):Pluggable database PDB\$SEED opening in read only
PDB\$SEED(2):Autotune of undo retention is turned on.
PDB\$SEED(2):Endian type of dictionary set to little
PDB\$SEED(2):Undo initialization finished serial:0 start:4162584 end:4162584 diff:0 ms (0.0 seconds)
PDB\$SEED(2):Database Characterset for PDB\$SEED is AL32UTF8
2021-08-18T21:55:56.502042-04:00
Using default pga_aggregate_limit of 2048 MB
2021-08-18T21:55:56.727278-04:00
PDB\$SEED(2):SUPLOG: Set PDB SUPLOG SGA at PDB OPEN, old 0x0, new 0x0 (no suplog)
PDB\$SEED(2):Opening pdb with no Resource Manager plan active
PDB1(3):Pluggable database PDB1 opening in read write
PDB1(3):SUPLOG: Initialize PDB SUPLOG SGA, old value 0x0, new value 0x18
PDB1(3):Autotune of undo retention is turned on.
PDB1(3):Endian type of dictionary set to little
PDB1(3):Undo initialization recovery: Parallel FPTR complete: start:4163375 end:4163377 diff:2 ms (0.0 seconds)
PDB1(3):Undo initialization recovery: err:0 start: 4163375 end: 4163377 diff: 2 ms (0.0 seconds)
PDB1(3):[5202] Successfully online Undo Tablespace 2.
PDB1(3):Undo initialization online undo segments: err:0 start: 4163377 end: 4163572 diff: 195 ms (0.2 seconds)
PDB1(3):Undo initialization finished serial:0 start:4163375 end:4163577 diff:202 ms (0.2 seconds)
PDB1(3):Database Characterset for PDB1 is AL32UTF8
2021-08-18T21:55:57.835123-04:00
PDB1(3):SUPLOG: Set PDB SUPLOG SGA at PDB OPEN, old 0x18, new 0x0 (no suplog)
PDB1(3):Opening pdb with no Resource Manager plan active

?



```
{
  "NOTIFICATION" : "Starting ORACLE instance (normal) (OS id: 26083)",
  "URGENCY"      : "INFO",
  "INFO"         : "Additional Information Not Available",
  "CAUSE"        : "A command to startup the instance was executed",
  "ACTION"       : "Check alert log for progress and completion of command",
  "CLASS"        : "CDB Instance / CDB ADMINISTRATOR / AL-1000",
  "TIME"         : "2021-07-14T05:30:41.642-04:00"
}
```

```
{
  "WARNING"      : "Heavy swapping observed on system",
  "URGENCY"      : "SOON",
  "INFO"         : "WARNING: Heavy swapping observed on system in last 5 mins. ",
  "CAUSE"        : "Memory usage by one more application is leading to heavy swapping",
  "ACTION"       : "Check alert log for more information, use tools to analyze memory usage ",
  "CLASS"        : "CDB Instance / SERVER ADMINISTRATOR / AL-2100",
  "TIME"         : "2021-07-14T08:46:21.251-04:00"
}
```

Type

Error
Warning
Notification

Urgency

Immediate
Soon
Deferable
Info

Scope

Session
Process
PDB-Instance
CDB-Instance
CDB-Cluster
PDB-Persistent
CDB-Persistent

Target

App-Dev
Sec-Admin
Net-Admin
Cluster-Admin
PDB-Admin
CDB-Admin
Server-Admin
Storage-Admin
DataOps-Admin

10

in-memory licensing



the in-memory feature **everyone** gets

```
SQL> show parameter inmemory_force
```

NAME	TYPE	VALUE
inmemory_force	string	BASE_LEVEL

16G of in-memory for free

```
SQL> create table cust_products as
  2  select rownum-1 product_id, 'Product name ' || rownum prod_name
  3  from dual
  4  connect by level <= 1200;
```

Table created.

```
SQL> create table cust_customers as
  2  select rownum-1 cust_id, 'Customer name ' || rownum cust_name
  3  from dual
  4  connect by level <= 10000;
```

Table created.

```
SQL> create table cust_sales as
  2  select
  3      mod(rownum,10000)      cust_id,
  4      rownum                trans_id,
  5      mod(rownum,5000)/100  amt,
  6      sysdate+rownum/1000000 trans_ts,
  7      mod(rownum,1234)      product_id,
  8      'Free is beautiful'   commentary
  9  from
10      ( select 1 from dual connect by level <= 1000 ),
11      ( select 1 from dual connect by level <= 1000 ),
12      ( select 1 from dual connect by level <= 250 )
13  /
```

Table created.


```
SQL> select round(blocks*8192/1024/1024/1024,2) gig  
2   from   user_tables  
3   where  table_name = 'CUST_SALES';
```

GIG

12.85

```
SQL> set timing on
SQL> with summary as
 2   ( select s.product_id, sum(s.amt) tot
 3     from   cust_sales s,
 4           cust_customers c
 5     where  s.product_id > 10
 6     and    s.cust_id = c.cust_id
 7     and    c.cust_id > 100
 8     and    s.amt between 0 and 24
 9     group by s.product_id
10   )
11   select p1.prod_name, sm.tot
12   from summary sm,
13        cust_products p1
14   where sm.product_id = p1.product_id;
```

1223 rows selected.

Elapsed: 00:01:15.18

```
SQL> alter table cust_sales inmemory;
```

```
Table altered.
```

```
SQL> alter table cust_products inmemory;
```

```
Table altered.
```

```
SQL> alter table cust_customers inmemory;
```

```
Table altered.
```

```
SQL> set timing on
SQL> with summary as
 2   ( select s.product_id, sum(s.amt) tot
 3     from   cust_sales s,
 4           cust_customers c
 5     where  s.product_id > 10
 6     and    s.cust_id = c.cust_id
 7     and    c.cust_id > 100
 8     and    s.amt between 0 and 24
 9     group by s.product_id
10   )
11   select p1.prod_name, sm.tot
12   from summary sm,
13        cust_products p1
14   where sm.product_id = p1.product_id;
```

1223 rows selected.

Elapsed: 00:00:02.67



11



analytics are cool but ... typing!

```
SQL> select
  2     empno ,
  3     deptno ,
  4     max(sal) over ( partition by deptno ) as hi_sal ,
  5     min(sal) over ( partition by deptno ) as lo_sal ,
  6     avg(sal) over ( partition by deptno ) as avg_sal ,
  7     max(comm) over ( partition by deptno ) as hi_comm ,
  8     min(comm) over ( partition by deptno ) as lo_comm ,
  9     avg(comm) over ( partition by deptno ) as avg_comm ,
      ...
      ...
 22     over ( partition by deptno ) as ...
 23     over ( partition by deptno ) as ...
 24     over ( partition by deptno ) as ...
 25     ...
      ...

 32 from emp;
```



```
SQL> select
      2     empno,
      3     deptno,
      4     max(sal)    over wdept as hi_sal,
      5     min(sal)    over wdept as lo_sal,
      6     avg(sal)    over wdept as lo_sal,
      7     max(comm)  over wdept as hi_comm,
      8     min(comm)  over wdept as lo_comm,
      9     avg(comm)  over wdept as avg_comm,
          ...
          ...
     32 from emp
     33 window wdept as ( partition by deptno )
```

```
SQL> select
  2     empno,
  3     deptno,
  4     max(sal)    over wdept as hi_sal,
  5     min(sal)    over wdept as lo_sal,
  6     avg(sal)    over wdept as lo_sal,
  7     max(comm)   over wdept as hi_comm,
  8     min(comm)   over wdept as lo_comm,
  9     avg(comm)   over wdept as avg_comm,
      ...
      ...
26     avg(sal) over ( wdept order by sal),

32 from emp
33 window wdept as ( partition by deptno )
```

```
SQL> select
  2     empno,
  3     deptno,
  4     max(sal)    over wdept as hi_sal,
  5     min(sal)    over wdept as lo_sal,
  6     avg(sal)    over wdept as lo_sal,
  7     max(comm)   over wdept as hi_comm,
  8     min(comm)   over wdept as lo_comm,
  9     avg(comm)   over wdept as avg_comm,
      ...
      ...
26     avg(sal) over ( wdept order by sal) ,
27     avg(sal) over ( wdept order by sal
                      rows between 1 preceding and 1 following)

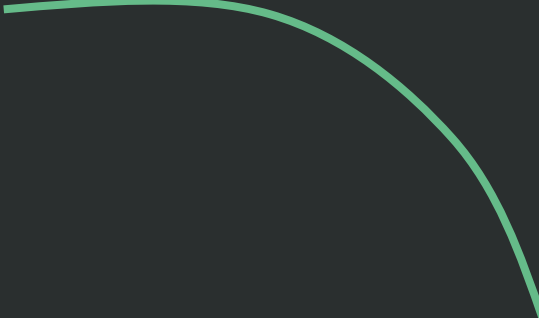
32 from emp
33 window wdept as ( partition by deptno )
```

plus more analytics



```
SQL> select empno, sal-round(avg(sal) over ()) as delta
2   from emp
3  order by 2;
```

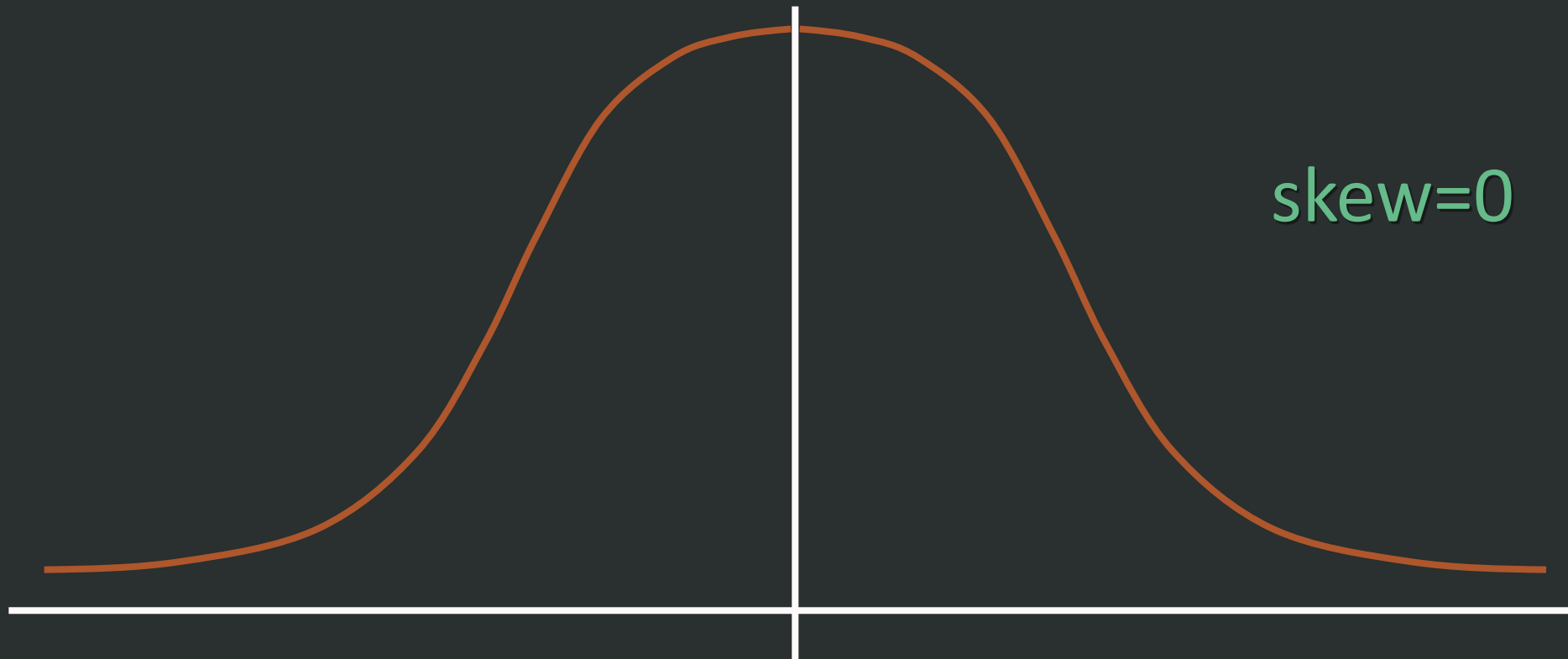
EMPNO	DELTA
7369	-1273
7900	-1123
7876	-973
7521	-823
7654	-823
7934	-773
7844	-573
7499	-473
7782	377
7698	777
7566	902
7788	927
7902	927
7839	2927



mainly under the average

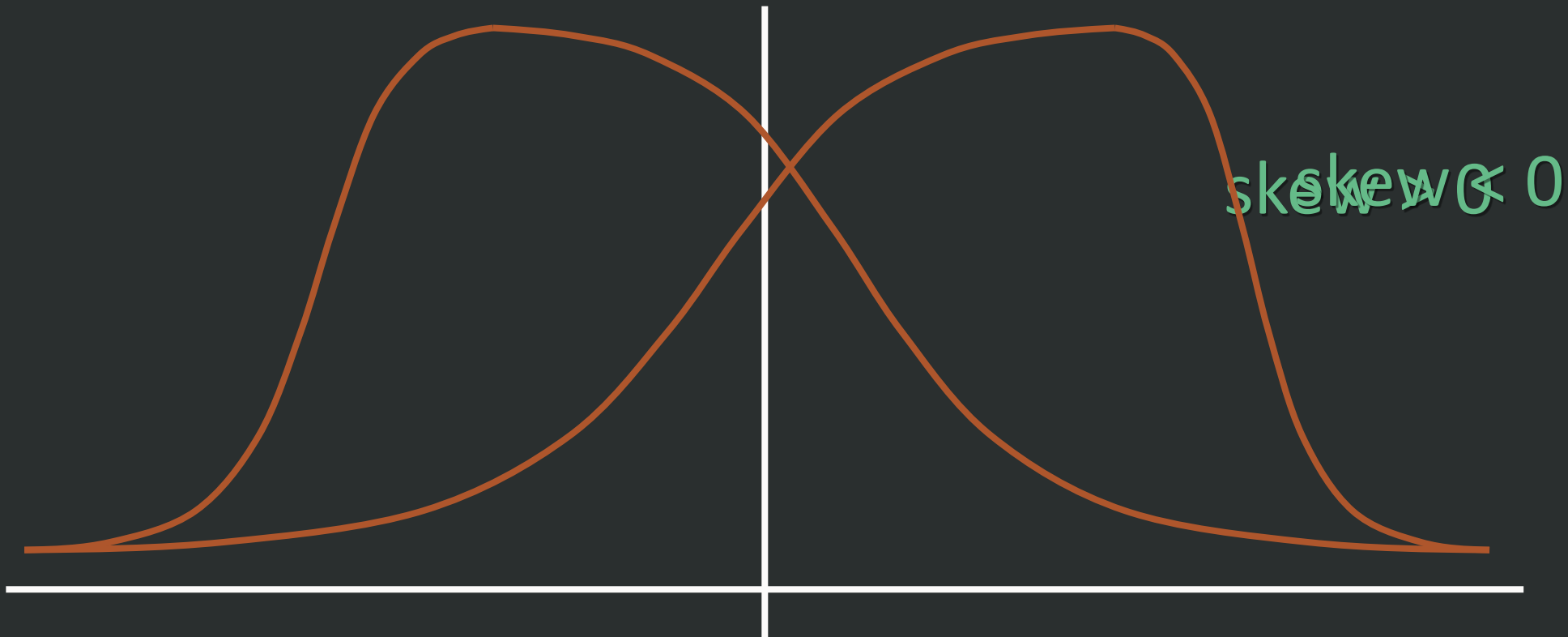
```
SQL> select round(avg(sal)), skewness_pop(sal)
       2 from emp;
```

ROUND (AVG (SAL))	SKEWNESS_POP (SAL)
2073	1.04489001



```
SQL> select round(avg(sal)), skewness_pop(sal)
       2 from emp;
```

ROUND (AVG (SAL))	SKEWNESS_POP (SAL)
2073	1.04489001



wrap up

21 major new features ?

- JDBC virtual threads
- zero downtime timezone
- rolling OJVM
- unified auditing immediacy
- mandatory profile
- pluggable DataGuard
- auto partitioning
- auto materialized views
- pluggable dynamic CPU scaling
- OML4SQL
- init.ora expressions
- in-memory spatial
- sdo_obj_tracing (contact tracing)
- data enrichment API
- etc etc etc

lots more ...

YOU MUST USE 21C

YOU MUST NOT USE 21C

Stay in touch



@connor_mc_d



connor-mcdonald.com



youtube.com/ConnorMcDonaldOracle