SESSION 6 UNDO TABLESPACES and UNDO ADVISOR

```
The Oracle base remains unchanged with value /opt/oracle
[oracle@oracloud12c ~]$ cd  /opt/oracle/admin/student/pfile
[oracle@oracloud12c pfile]$ ls -l
total 8
-rw-r-----. 1 oracle dba 1767 Jul 24  2017 init.ora.6242017113352
-rw-r-----. 1 oracle dba 1811 Jan 31 17:52 initstudent.ora

[oracle@oracloud12c pfile]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Tue Feb 13 11:25:43 2018

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Connected to an idle instance.
```
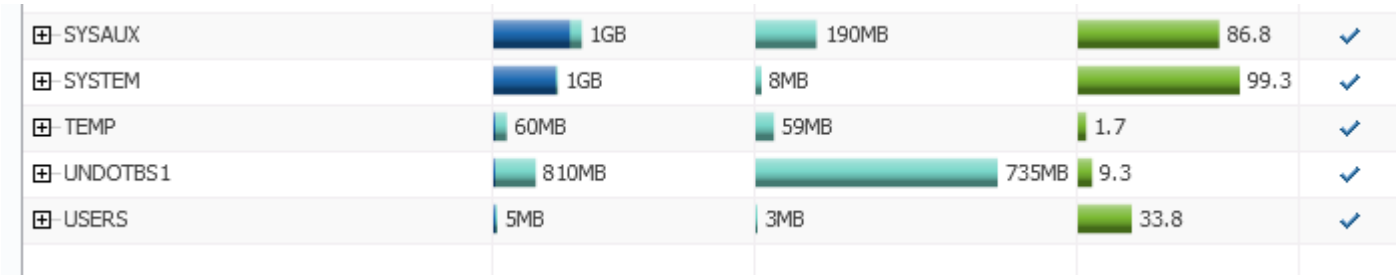

←**Our Instance is down, we will open it with PFILE**

```
SQL> set pagesize 120
SQL> set linesize 120

SQL> startup pfile=initstudent.ora;
ORACLE instance started.

Total System Global Area  843055104 bytes
Fixed Size                  2929984 bytes
Variable Size             327158464 bytes
Database Buffers          507510784 bytes
Redo Buffers                5455872 bytes
Database mounted.
Database opened.
```

If we open our **DB EXPRESS tool** with
http://myvmlab.senecacollege.ca:xxxx/em where xxxx is your Express Port# (one less than one posted on BB)
Then we go **Storage → Tablespaces →** look the chart below



*** Initially my Undo Tablespace UNDOTBS01 was 810M large and only 75M was in use (810-735) ***

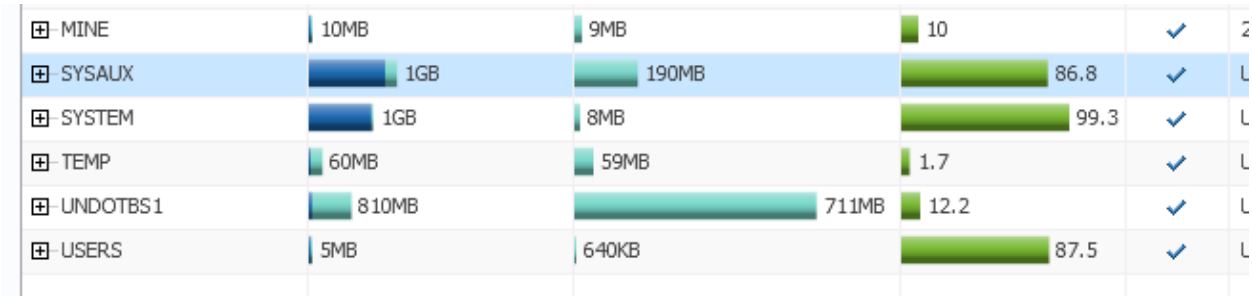
```
SQL> conn scott/tiger
Connected.
```

← **SCOTT has 4 tables in his account**

```
SQL> DESC EMP

     Name       Null?    Type
 ----------------------------------------------------------------
 EMPNO          NOT NULL NUMBER(4)
 ENAME                   VARCHAR2(10)
 JOB                     VARCHAR2(9)
 MGR                     NUMBER(4)
 HIREDATE                DATE
 SAL                     NUMBER(7,2)
 COMM                    NUMBER(7,2)
 DEPTNO                  NUMBER(2)

SQL> ALTER TABLE EMP MODIFY EMPNO NUMBER(6);

Table altered.

SQL> SELECT COUNT(*) FROM EMP;

  COUNT(*)
----------
        14
```

*** We are going to add 50000 rows, then remove all rows, then add again 50000 rows without Commit/Rollback, so that we use some Undo Space ***

```
SQL> BEGIN
  2  for i in 1..50000 loop
  3  INSERT INTO emp (EMPNO,ENAME,DEPTNO) VALUES(i+10000,'JONES',20);
  4  END LOOP;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> DELETE FROM EMP;

50014 rows deleted.

SQL> BEGIN
  2  for i in 1..50000 loop
  3  INSERT INTO emp (EMPNO,ENAME,DEPTNO) VALUES(i+10000,'JONES',20);
  4  END LOOP;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> SELECT COUNT(*) FROM EMP;
  COUNT(*)
----------
     50000
```



MINE	10MB	9MB	10	✓	
SYSAUX	1GB	190MB	86.8	✓	
SYSTEM	1GB	8MB	99.3	✓	
TEMP	60MB	59MB	1.7	✓	
UNDOTBS1	810MB	711MB	12.2	✓	
USERS	5MB	640KB	87.5	✓	

*** My transactions used around 24M of Undo Space (735-711) ***

```
SQL> ROLLBACK;

Rollback complete.

SQL> SELECT COUNT(*) FROM EMP;

  COUNT(*)
----------
        14


SQL> CONN / AS SYSDBA
Connected.
SQL> SHOW PARAMETER UNDO

NAME                                 TYPE        VALUE
------------------------------------ ----------- ------------------
temp_undo_enabled                    boolean     FALSE
undo_management                      string      AUTO
undo_retention                       integer     900
undo_tablespace                      string      UNDOTBS1
```

*** Default value for the UNDO RETENTION is 15 minutes (900 seconds) ***

```
SQL> SELECT contents, extent_management, allocation_type,
  2         initial_extent, retention
  3  FROM  dba_tablespaces
  4  WHERE  tablespace_name ='UNDOTBS1';

CONTENTS  EXTENT_MAN ALLOCATIO INITIAL_EXTENT RETENTION
--------- ---------- --------- -------------- -----------
UNDO      LOCAL      SYSTEM             65536 NOGUARANTEE
```

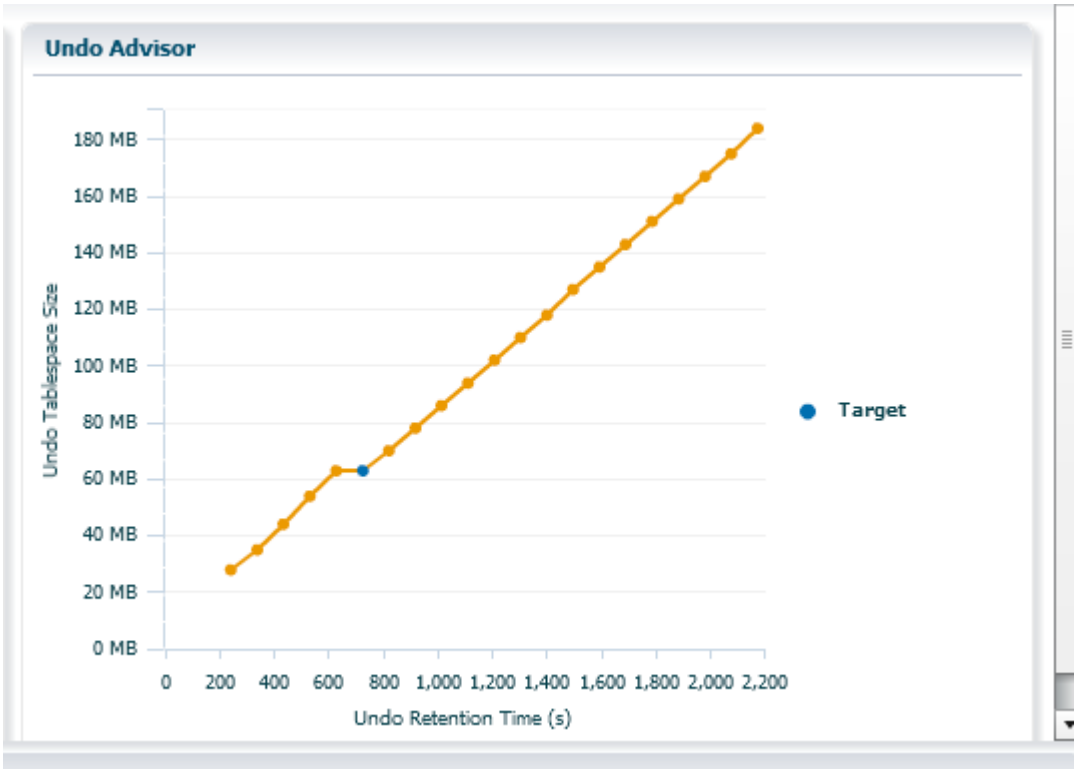
*** By default UNDO tablespace is created as LOCAL-AUTOALLOCATE and with NOT guaranteed retention time. It can NOT be created as UNIFORM tablespace ***

```
SQL> SELECT  file_name, bytes, blocks, status,
  2  autoextensible, increment_by, maxbytes
  3  FROM    dba_data_files
  4  WHERE  tablespace_name ='UNDOTBS1';

FILE_NAME
--------------------------------------------------------------------------------
     BYTES     BLOCKS STATUS    AUT INCREMENT_BY   MAXBYTES
---------- ---------- --------- --- ------------ ----------
/opt/oracle/oradata/student/undotbs01.dbf
 849346560     103680 AVAILABLE YES          640 3.4360E+10
```

*** Our UNDO tablespace is AUTOXTENDED with 640 installment Blocks (exactly 5M) and NO limit, and its total size is 810m (849346560 Bytes)***

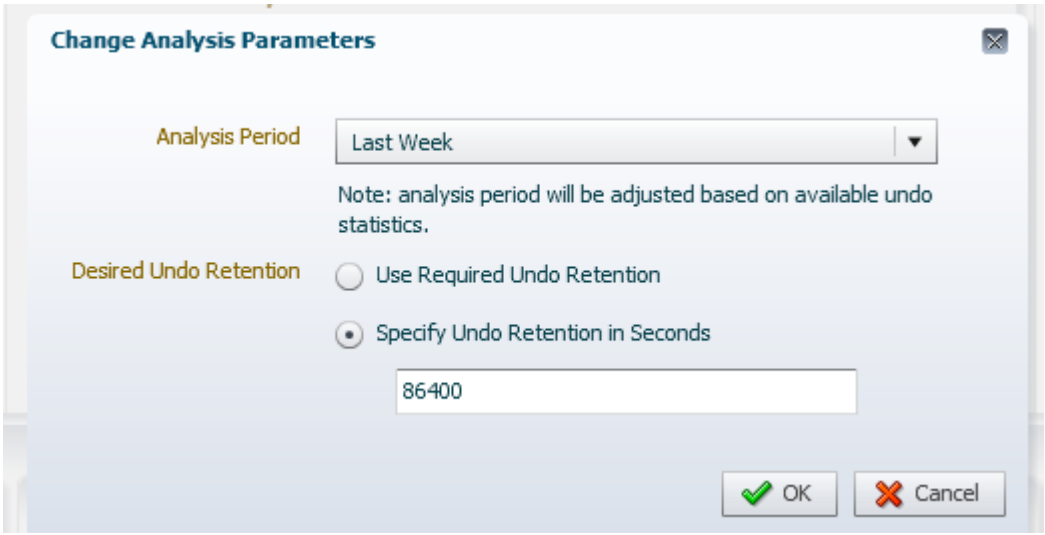
*** We will use Undo Advisor feature of DB Express to calculate Optimal size for Undo Tablespace for any given Retention Period (based on the given interval of past DB activity). Default settings are Last 24 hours and 15 minutes (90 seconds) ***

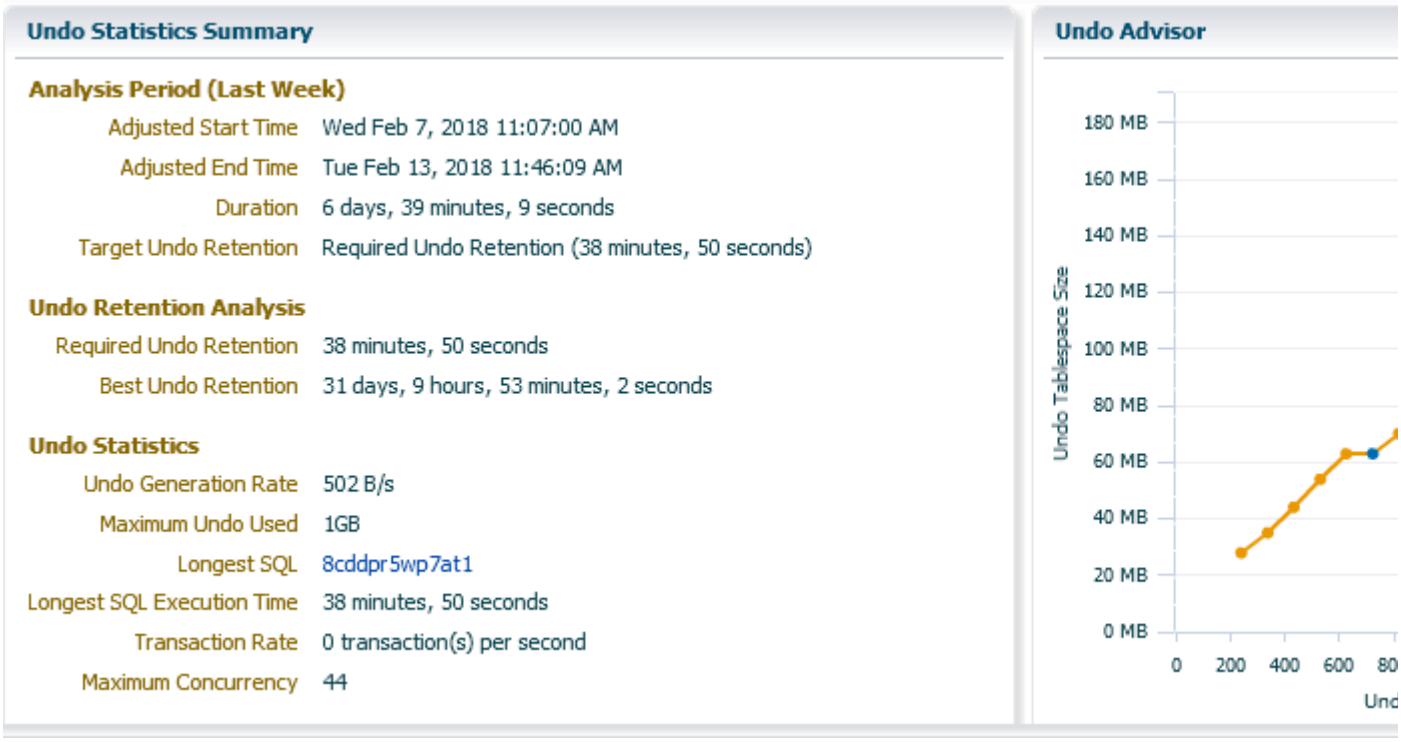
Then we go **Storage → Undo management →** look the graph below



*** We can see that BEST Retention period is around 800 sec, and for that we need at least 65M of Undo Space. In production these numbers will be WAY HIGHER ***

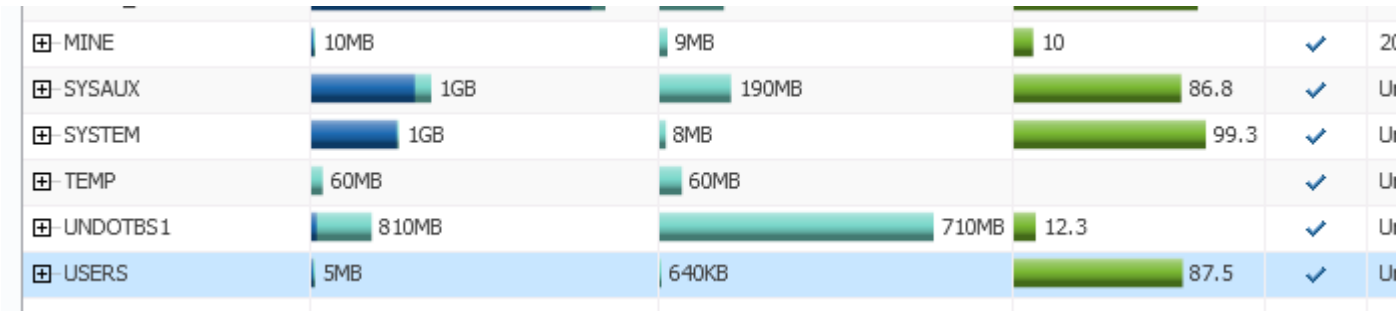
*** We will change parameters now to Last Week and 1 Day (86400 sec) ***





*** We can see that our graph is not changed, but Summary tells us that if spend 1G of Undo Space, we may have Retention of 31 days and 9 hours (this is unrealistic in Production), We are NOT going for this advice, but you got the picture how this works ***

Then we go **Storage → Tablespaces →** look the chart below



MINE	10MB	9MB	10	✓	2(
SYSAUX	1GB	190MB	86.8	✓	U(
SYSTEM	1GB	8MB	99.3	✓	U(
TEMP	60MB	60MB		✓	U(
UNDOTBS1	810MB	710MB	12.3	✓	U(
USERS	5MB	640KB	87.5	✓	U(

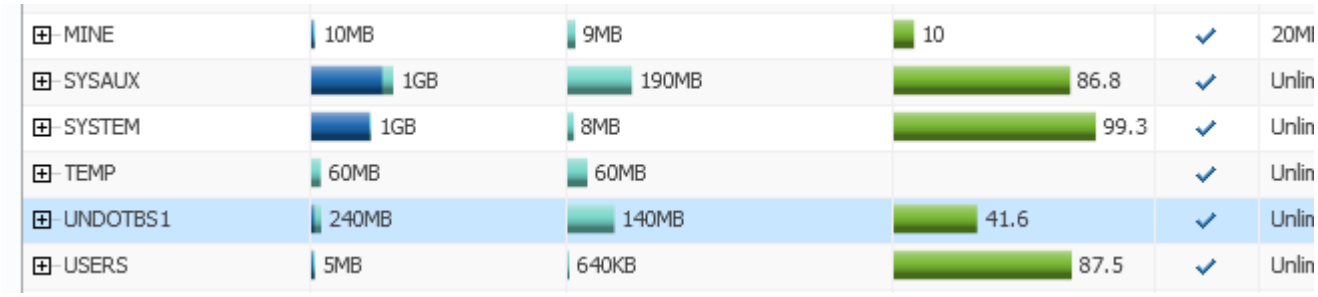
*** My Undo Space usage is around 100M , but as shown below we can not DESIZE it that much. It needs space to cover for Retention ***

```
SQL> ALTER DATABASE DATAFILE
'/opt/oracle/oradata/student/undotbs01.dbf' RESIZE 120M;
ALTER DATABASE DATAFILE '/opt/oracle/oradata/student/undotbs01.dbf'
RESIZE 120M
*
ERROR at line 1:
ORA-03297: file contains used data beyond requested RESIZE value

SQL>  ALTER DATABASE DATAFILE
'/opt/oracle/oradata/student/undotbs01.dbf' RESIZE 160M;
 ALTER DATABASE DATAFILE '/opt/oracle/oradata/student/undotbs01.dbf'
RESIZE 160M
*
ERROR at line 1:
ORA-03297: file contains used data beyond requested RESIZE value

SQL> ALTER DATABASE DATAFILE
'/opt/oracle/oradata/student/undotbs01.dbf' RESIZE 200M;
ALTER DATABASE DATAFILE '/opt/oracle/oradata/student/undotbs01.dbf'
RESIZE 200M
*
ERROR at line 1:
ORA-03297: file contains used data beyond requested RESIZE value

SQL> ALTER DATABASE DATAFILE
'/opt/oracle/oradata/student/undotbs01.dbf' RESIZE 240M;

Database altered.

SQL> ALTER SYSTEM SET undo_retention = 3600;
System altered.
```

← **Change it to 1 hour**

Then we go **Storage → Tablespaces →** look the chart below

*** It is using only 100M, and 140M is free ***



MINE	10MB	9MB	10	✓	20MI
SYSAUX	1GB	190MB	86.8	✓	Unlin
SYSTEM	1GB	8MB	99.3	✓	Unlin
TEMP	60MB	60MB		✓	Unlin
UNDOTBS1	240MB	140MB	41.6	✓	Unlin
USERS	5MB	640KB	87.5	✓	Unlin

```
SQL> SELECT * FROM V$ROLLNAME;

       USN NAME                                 CON_ID
---------- ------------------------------ ----------
         0 SYSTEM                                  0
         1 _SYSSMU1_2326716099$                    0
         2 _SYSSMU2_1582804868$                    0
         3 _SYSSMU3_3285411314$                    0
         4 _SYSSMU4_4250244621$                    0
         5 _SYSSMU5_750802473$                     0
         6 _SYSSMU6_3167659685$                    0
         7 _SYSSMU7_2435451351$                    0
         8 _SYSSMU8_1462975257$                    0
         9 _SYSSMU9_3739287458$                    0
        10 _SYSSMU10_4058727488$                   0
        11 _SYSSMU11_3910933242$                   0
        12 _SYSSMU12_2402740438$                   0
        13 _SYSSMU13_2432587534$                   0
        14 _SYSSMU14_988350032$                    0
        15 _SYSSMU15_4181152692$                   0
        16 _SYSSMU16_1485844840$                   0
        17 _SYSSMU17_3748163478$                   0
        18 _SYSSMU18_550065834$                    0
        19 _SYSSMU19_3431400813$                   0
        20 _SYSSMU20_2882014807$                   0
        21 _SYSSMU21_1061416231$                   0
        22 _SYSSMU22_3398525725$                   0
        23 _SYSSMU23_2344059631$                   0
        24 _SYSSMU24_1341711790$                   0
        25 _SYSSMU25_1418848933$                   0

26 rows selected.
```

*** In the AUTO management mode, we have 1+25 Undo Segments created by Server ***

```
SQL> set transaction name 'T1';

Transaction set.

SQL>  UPDATE scott.emp SET deptno = 40
  2  WHERE deptno = 10;

3 rows updated.
```

```
SQL> SELECT t.status, t.start_time, t.xidusn "Segment#",
             r.name "Segment name"
  2  FROM   v$transaction t JOIN v$rollname r
  3  ON     t.xidusn = r.usn
  4  WHERE  t.name = 'T1';

STATUS           START_TIME             Segment# Segment name
---------------- -------------------- ---------- ----------------------
ACTIVE           02/13/18 11:56:56             1 _SYSSMU1_2326716099$
```

*** We can see that our Update is using Segment 1 and that is still active ***

```
SQL> rollback;

Rollback complete.

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
[oracle@oracloud12c pfile]$
```