Reclaim Unused Space in Oracle

Over a period of time, updates and deletes on objects within a tablespace can create pockets of empty space that individually are not large enough to be reused for new data. This type of empty space is referred to as fragmented free space.

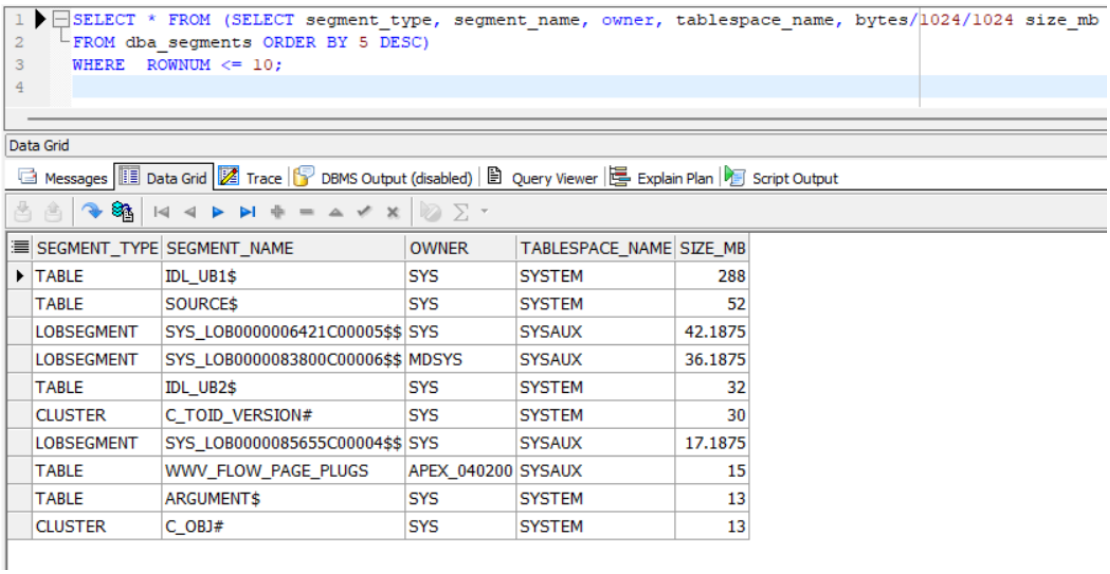
- Reclaim Space from Table Segment
- Reclaim Space from Index Segment
- Reclaim Space from LOB Segment
- Reclaim Space from Datafile
- Reclaim Space from Undo Tablespace

A DBA must reclaim this unused space inside Oracle so that they do not continue to extend datafiles to accommodate new data

Reclaim Space from Table Segment

Run below query to find top 10 largest segments inside a database.

```
COLUMN owner FORMAT A30
COLUMN segment_name FORMAT A30
COLUMN tablespace_name FORMAT A30
SELECT * FROM (SELECT segment_type, segment_name, owner, tablespace_name,
bytes/1024/1024 size_mb
FROM dba_segments ORDER BY 5 DESC)
WHERE  ROWNUM <= 10;
```



```
SELECT * FROM (SELECT segment_type, segment_name, owner, tablespace_name, bytes/1024/1024 size_mb
  FROM dba_segments ORDER BY 5 DESC)
  WHERE  ROWNUM <= 10;
```

Data Grid

Messages | Data Grid | Trace | DBMS Output (disabled) | Query Viewer | Explain Plan | Script Output

SEGMENT_TYPE	SEGMENT_NAME	OWNER	TABLESPACE_NAME	SIZE_MB
TABLE	IDL_UB1$	SYS	SYSTEM	288
TABLE	SOURCE$	SYS	SYSTEM	52
LOBSEGMENT	SYS_LOB0000006421C00005$$	SYS	SYSAUX	42.1875
LOBSEGMENT	SYS_LOB0000083800C00006$$	MDSYS	SYSAUX	36.1875
TABLE	IDL_UB2$	SYS	SYSTEM	32
CLUSTER	C_TOID_VERSION#	SYS	SYSTEM	30
LOBSEGMENT	SYS_LOB0000085655C00004$$	SYS	SYSAUX	17.1875
TABLE	WWV_FLOW_PAGE_PLUGS	APEX_040200	SYSAUX	15
TABLE	ARGUMENT$	SYS	SYSTEM	13
CLUSTER	C_OBJ#	SYS	SYSTEM	13

To reclaim unused space from a table segment, first enable row movement
ALTER TABLE hr.employees ENABLE ROW MOVEMENT;

Recover the unused space and reset the high water mark (HWM)
ALTER TABLE hr.employees SHRINK SPACE;

In case table has dependent objects then use CASCADE
ALTER TABLE hr.employees SHRINK SPACE CASCADE;

Reclaim Space from Index Segment

First analyze if an index segment requires rebuild because its resource intensive process
ANALYZE INDEX idx_empid VALIDATE STRUCTURE;

SQL> SELECT name, height,lf_rows,lf_blks,del_lf_rows FROM INDEX_STATS;

NAME	HEIGHT	LF_ROWS	LF_BLKS	DEL_LF_ROW
IDX_EMPID	2	1	3	6

1 row selected.

Rebuild index only if you see **HEIGHT** is above 4 and **Deleted Leaf Row** is less than 20. You can simply rebuild an index to reclaim space

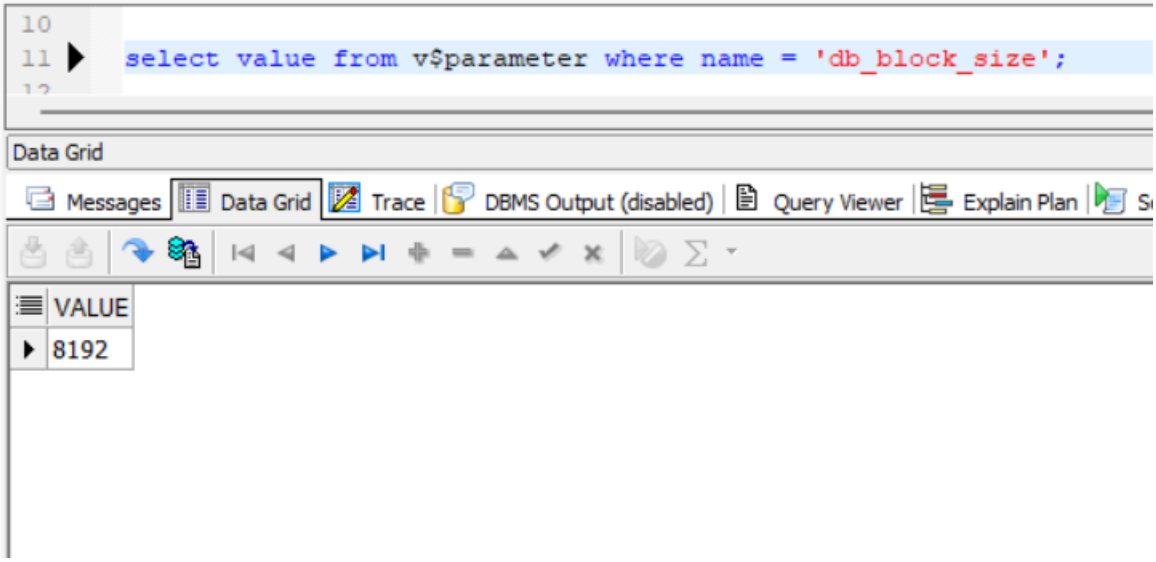
ALTER INDEX idx_empid REBUILD ONLINE;

Reclaim Space from Datafile

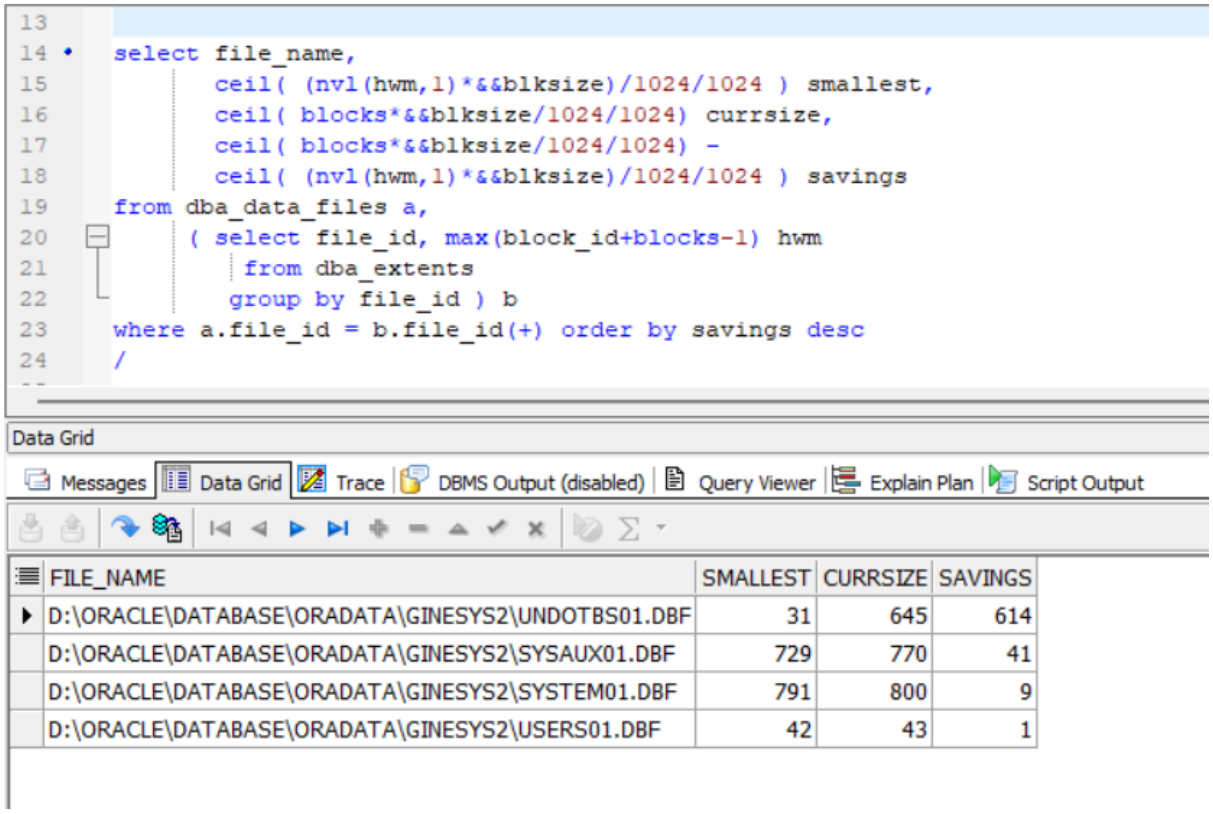
We will first run **Possible Saving Report** that will list out the data files along with possible savings in MBs.

```
set verify off
column file_name format a50 word_wrapped
column smallest format 999,990 heading "Smallest|Possible Size(MB)"
column currsize format 999,990 heading "Current|Size(MB)"
```

```
column savings  format 999,990 heading "Possible|Savings(MB)"
break on report
compute sum of savings on report
column value new_val blksize
select value from v$parameter where name = 'db_block_size';
/
```



```
select file_name,
      ceil( (nvl(hwm,1)*&&blksize)/1024/1024 ) smallest,
      ceil( blocks*&&blksize/1024/1024) currsize,
      ceil( blocks*&&blksize/1024/1024) -
      ceil( (nvl(hwm,1)*&&blksize)/1024/1024 ) savings
from dba_data_files a,
    ( select file_id, max(block_id+blocks-1) hwm
       from dba_extents
      group by file_id ) b
where a.file_id = b.file_id(+) order by savings desc
/
```



FILE_NAME	SMALLEST	CURRSIZE	SAVINGS
D:\ORACLE\DATABASE\ORADATA\GINESYS2\UNDOTBS01.DBF	31	645	614
D:\ORACLE\DATABASE\ORADATA\GINESYS2\SYSAUX01.DBF	729	770	41
D:\ORACLE\DATABASE\ORADATA\GINESYS2\SYSTEM01.DBF	791	800	9
D:\ORACLE\DATABASE\ORADATA\GINESYS2\USERS01.DBF	42	43	1

Alter Tablespace Coalesce: Even though SMON performs tablespace coalesce time to time, still our first step is to try it out and see if it works for us.

```
SQL> alter tablespace users coalesce;
```

Now try to shrink the datafile.

```
SQL> ALTER DATABASE DATAFILE 72 RESIZE 1G;
ALTER DATABASE DATAFILE 72 RESIZE 1G
*
ERROR at line 1:
ORA-03297: file contains used data beyond requested RESIZE value
```

Purge Tablespace: Objects belonging to a tablespace might reside under Recyclebin which does not allow you to shrink the datafile. We must remove the tablespace specific segments from recycle bin first

```
SQL> purge tablespace users;
```

Lets try to shrink the datafile

```
SQL> ALTER DATABASE DATAFILE 72 RESIZE 1G;
ALTER DATABASE DATAFILE 72 RESIZE 1G
*
ERROR at line 1:
ORA-03297: file contains used data beyond requested RESIZE value
```

Purge Recyclebin: The PURGE TABLESPACE command only removes recyclebin segments belonging to the currently connected user. There might be other users who have deleted objects from the tablespace that reside in recyclebin. Its a good idea to purge recyclebin as **sysdba**

```
SQL purge recyclebin;
```

Let's resize the datafile

```
SQL> ALTER DATABASE DATAFILE 72 RESIZE 1G;
Database altered.
```

Reclaim Space from Undo Tablespace

Reclaiming space from UNDO tablespace is very simple. Create a new undo tablespace and drop the old one.

```
CREATE UNDO TABLESPACE undo2 DATAFILE '/u01/orcl/undo02.dbf' SIZE 1G;

ALTER SYSTEM SET UNDO_TABLESPACE=undo2;

DROP TABLESPACE undo1 INCLUDING CONTENTS AND DATAFILES;
```