CSE 4409: Database Management Systems II

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Chapter Outline

Storage: Tables and objects in general

So far..

Upto now the user has **no idea where** the object is stored and **how** the storage is maintained. Now we will explore how a database designer can **control** it precisely.

Tablespace, Datafiles and Objects

The following block-diagram shows the relationship.

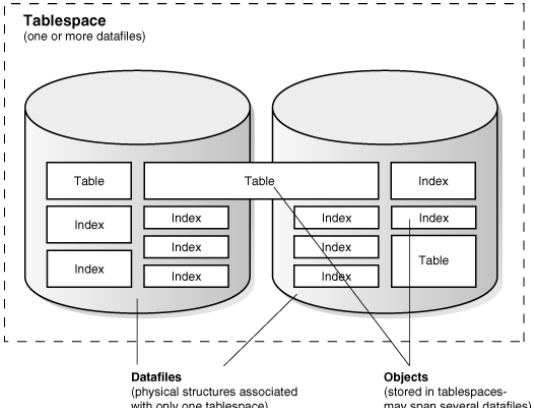

Figure 1: Tablespace, Datafiles and Objects

Tablespace, Datafiles and Objects (Cont.)

Although databases, tablespaces, datafiles, and segments are **closely related**, they have important **differences**:

- **Databases and tablespaces.** An Oracle database is comprised of one or more **logical storage units** called **tablespaces**. The database also has a lot more (background process). The database's data is collectively stored in the database's tablespaces.
- **Tablespaces and datafiles.** Each tablespace in an Oracle database is comprised of one or more **operating system files** called **datafiles**. A tablespace's datafiles physically store the associated database data on disk.

Tablespace, Datafiles and Objects (Cont. 2)

Although databases, tablespaces, datafiles, and segments are **closely related**, they have important **differences**:

- **Databases and datafiles.** A database's data is collectively stored in the datafiles that constitute each tablespace of the database. For example, the simplest Oracle database would have one tablespace and one datafile. A more complicated database might have three tablespaces, each comprised of two datafiles (for a total of six datafiles).
- **Tablespace.** Tablespaces are the **bridge** between certain physical and logical components of the Oracle database.

  (Tablespaces are where you store Oracle database objects such as tables, indexes and rollback segments. [A Rollback Segment is a database object containing before-images of data written to the database. Rollback segments are used to: i) Undo changes when a transaction is rolled back ii) Recover the database to a consistent state in case of failures])

Basic Operations on Tablespace

Basics of Space Management: Introduction to Data Blocks, Extents, and Segments:

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Note:

*Oracle allocates space for segments in units of one **extent**. When the existing extents of a segment are full, Oracle allocates another extent for that segment.*

Blocks, Extents and Segments

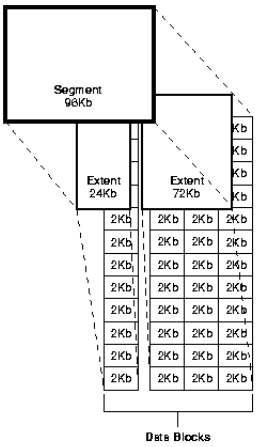

Figure 2: Oracle Storage Management

Mapping between user, object and tablespace: Example

Step 1: Create a Tablespace first.

```
1  CREATE TABLESPACE mytspace
2  DATAFILE '/u02/oracle/data/lmtbsb01.dbf' SIZE 50M
3  EXTENT MANAGEMENT LOCAL AUTOALLOCATE;
```

AUTOALLOCATE causes the tablespace to be system managed with a minimum extent size of 64K.

Mapping between user, object and tablespace: Example (Cont.)

Step 2 (a): Create an user and assign that user to a specific tablespace.

```
1
2       CREATE USER iutlearner
3       IDENTIFIED BY test123
4       DEFAULT TABLESPACE mytspace;
```

Mapping between user, object and tablespace: Example (Cont.)

Step 2 (b): Create a specific table and assign a tablespace with it (this will overrule previous).

```
1
2   create table students
3   (ID number primary key,
4   Name varchar2(50),
5   DOB date,
6   Program varchar2(30)
7   ) tablespace NEW_TBSPACE;
```

- Use *DBA_FREE_SPACE* data-dictionary to find out the free space for a tablespace.
- Use *ALL_TABLES* data-dictionary to find information of each table along with its tablespace.

Mapping between user, object and tablespace: Example (Cont.)

Step 3: How to get information about free available space for a tablespace. Use `DBA_FREE_SPACE` data-dictionary.

```
1  SELECT TABLESPACE_NAME,
2  SUM(BYTES)/1024/1024/1024 "FREE SPACE(GB)"
3  FROM DBA_FREE_SPACE GROUP BY TABLESPACE_NAME;
```

Tablespace: Adding space

You can add data-files to an existing tablespace:

```
ALTER TABLESPACE
users
ADD DATAFILE
'/ora01/oracle/oradata/booktst_users_02.dbf'
size 500m
```

More Operations on Tablespace

- Online and Offline Tablespaces
- Read-Only Tablespaces

```
1  ALTER TABLESPACE mytspace READ ONLY; ---No insert,update,delete allowed
2  ALTER TABLESPACE mytspace READ WRITE;
3
4  ALTER TABLESPACE mytspace OFFLINE; --all data will be non-visible
5  ALTER TABLESPACE mytspace ONLINE;
```