

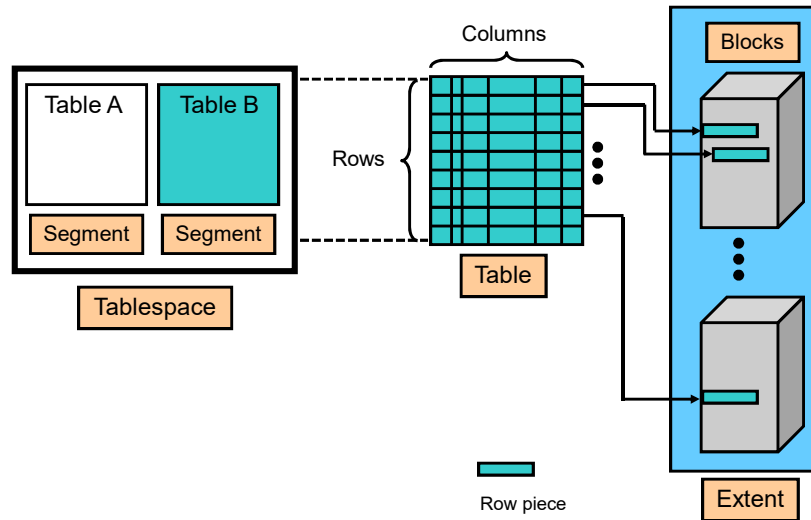
Managing Database Storage Structures

Objectives

After completing this lesson, you should be able to:

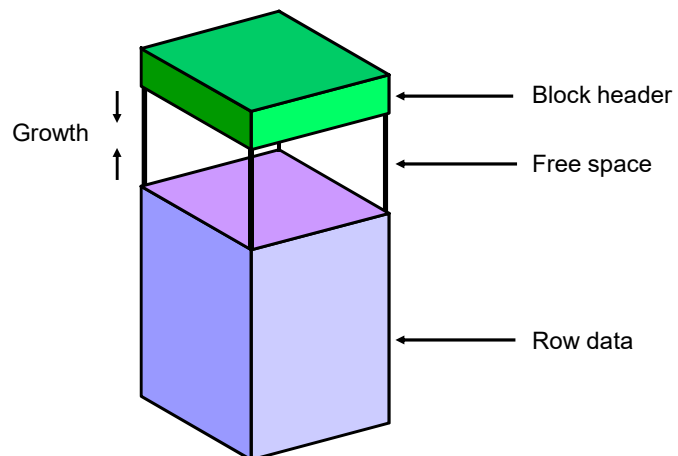
- Describe the storage of table row data in blocks
- Create and manage tablespaces
- Obtain tablespace information

How Table Data Is Stored



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Database Block: Contents



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Exploring the Storage Structure

The screenshot shows the Oracle Enterprise Manager Database Express 12c interface. The top navigation bar includes 'ORCL (12.1.0.1.0)', 'Configuration', 'Storage', 'Security', and 'Performance'. The 'Storage' menu is open, showing options: 'Tablespaces', 'Undo Management', 'Redo Log Groups', 'Archive Logs', and 'Control Files'. The 'Tablespaces' option is selected.

Below the menu, the 'Tablespaces' page is displayed. It shows a table of tablespaces with columns: Name, Size, Free Space, Used (%), Auto, Max..., Status, Type, Group..., Auto..., and Directory. The table lists several tablespaces: EXAMPLE, SYSAUX, SYSTEM, TEMP, UNDOTBS1, and USERS.

Name	Size	Free Space	Used (%)	Auto	Max...	Status	Type	Group ...	Auto...	Directory
EXAMPLE	358MB	35MB	90.2	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
SYSAUX	1GB	55MB	95	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
SYSTEM	800MB	6MB	99.3	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
TEMP	103MB	102MB	1	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
UNDOTBS1	150MB	137MB	8.9	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
USERS	5MB	3MB	33.8	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...

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Creating a New Tablespace

The screenshot shows the 'Create Tablespace' dialog box in Oracle Enterprise Manager Database Express 12c. The dialog has tabs: 'General', 'Add Datafiles', 'Space', 'Logging', and 'Segments'. The 'General' tab is active.

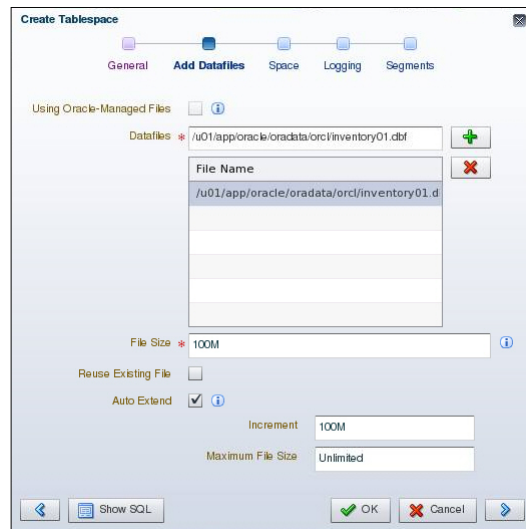
The 'General' tab contains the following fields and options:

- Name:** Inventory
- Tablespace Type:** Permanent (selected), Temporary, Undo
- Set As Default:** ☐
- Bigfile:** Smallfile (selected), Bigfile
- Status:** Online (selected), Offline

At the bottom of the dialog, there are buttons for '<', 'Show SQL', 'OK', 'Cancel', and '>'.

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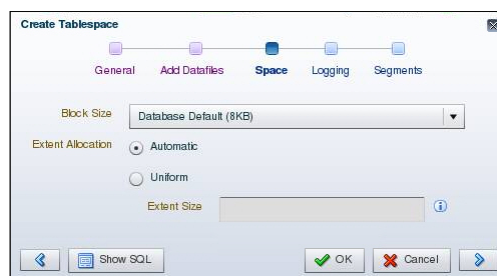
Creating a New Tablespace



The 'Create Tablespace' dialog box is shown with the 'Add Datafiles' tab selected. The 'Using Oracle-Managed Files' checkbox is unchecked. The 'Datafiles' list contains one entry: '/u01/app/oracle/oradata/orcl/inventory01.dbf'. Below this, a 'File Name' input field contains the same path. The 'File Size' is set to '100M'. The 'Reuse Existing File' checkbox is unchecked. The 'Auto Extend' checkbox is checked, with an 'Increment' of '100M' and a 'Maximum File Size' of 'Unlimited'. The 'Show SQL' button is visible at the bottom left, and 'OK', 'Cancel', and a navigation arrow are at the bottom right.

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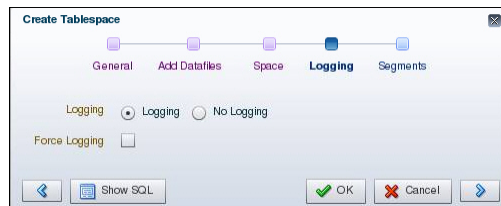
Creating a New Tablespace



The 'Create Tablespace' dialog box is shown with the 'Space' tab selected. The 'Block Size' is set to 'Database Default (8KB)'. The 'Extent Allocation' is set to 'Automatic'. The 'Extent Size' is set to a default value. The 'Show SQL' button is visible at the bottom left, and 'OK', 'Cancel', and a navigation arrow are at the bottom right.

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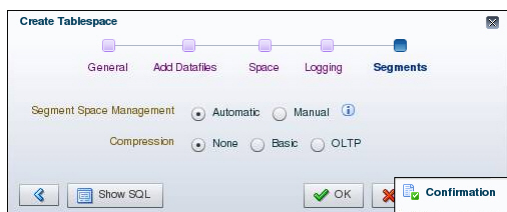
Creating a New Tablespace



The 'Create Tablespace' dialog box is shown with the 'Logging' tab selected. The 'Logging' section has the 'Logging' radio button selected. The 'Force Logging' checkbox is unchecked. At the bottom, there are buttons for '< Back', 'Show SQL', 'OK', 'Cancel', and '> Next'.

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Creating a New Tablespace



The 'Create Tablespace' dialog box is shown with the 'Segments' tab selected. The 'Segment Space Management' section has the 'Automatic' radio button selected. The 'Compression' section has the 'None' radio button selected. At the bottom, there are buttons for '< Back', 'Show SQL', 'OK', and 'Cancel'.

Confirmation

SQL statement successfully generated

SQL ▾

```
CREATE SMALLFILE TABLESPACE 'INVENTORY'  
DATAFILE  
  '/u01/app/oracle/oradata/orcl/inventory01.dbf' SIZE 100M AUTOEXTEND ON  
NEXT 100M  
LOGGING  
DEFAULT NOCOMPRESS  
ONLINE  
EXTENT MANAGEMENT LOCAL AUTOALLOCATE  
SEGMENT SPACE MANAGEMENT AUTO;
```

OK

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Overview of Tablespaces Created by Default

- EXAMPLE (optional)
- SYSAUX
- SYSTEM
- TEMP
- UNDOTBS1
- USERS

Name	Size	Free Space	Used (%)	Auto...	Max...	Status	Type	Group ...	Auto...	Directory
EXAMPLE	358MB	35MB	90.2	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
SYSAUX	1GB	55MB	95	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...
SYSTEM	800MB	6MB	99.3	✓	Unlimit	●				/u01/app/oracle/oradata/...
TEMP	103MB	102MB	1	✓	Unlimit	●				/u01/app/oracle/oradata/...
UNDOTBS1	150MB	137MB	8.9	✓	Unlimit	●				/u01/app/oracle/oradata/...
USERS	5MB	3MB	33.8	✓	Unlimit	●			✓	/u01/app/oracle/oradata/...

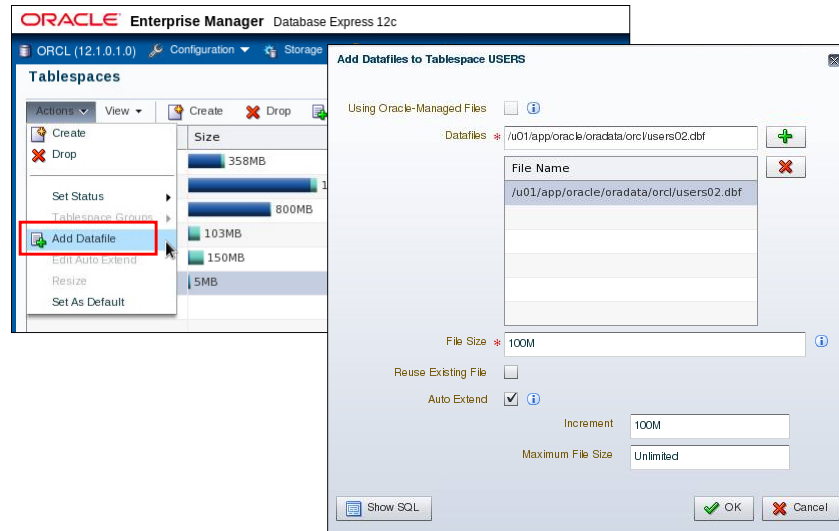
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Altering a Tablespace

Name	Size	Free Space	Used (%)
EXAMPLE	358MB	35MB	90.2
SYSAUX	1GB	55MB	95
SYSTEM	800MB	6MB	99.3
TEMP	103MB	102MB	1
UNDOTBS1	150MB	137MB	8.9
USERS	5MB	3MB	33.8

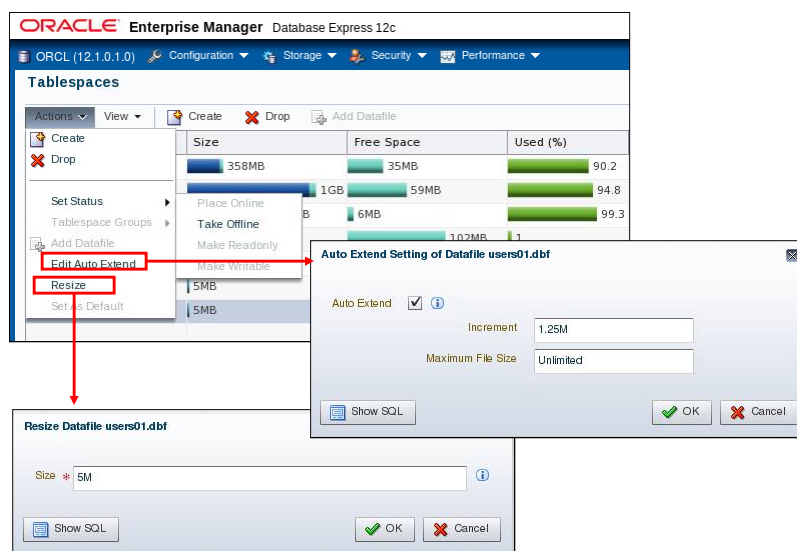
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Adding a Data File to a Tablespace



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Making Changes to a Data File



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Dropping Tablespaces

The screenshot shows the Oracle Enterprise Manager interface for Database Express 12c. The 'Tablespaces' page is active, displaying a table of tablespaces. The 'Drop' button in the 'Actions' menu is highlighted with a red box. A red arrow points from this button to a 'Drop Tablespace EXAMPLE' dialog box. The dialog box has three checked options: 'Drop Contents', 'Drop Datafiles', and 'Drop Constraints'. It also includes a 'Show SQL' button and 'OK'/'Cancel' buttons.

Name	Size	Free Space	Used (%)
EXAMPLE	358MB	35MB	90.2
SYSAUX	1GB	59MB	94.8
SYSTEM	800MB	6MB	99.3
TEMP	103MB	102MB	1
UNDOTBS1	150MB	120MB	20.3
USERS	5MB	3MB	33.8

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Viewing Tablespace Information

```
SQL> SELECT tablespace_name, status, contents, logging,
2  extent_management, allocation_type,
3  segment_space_management
4  FROM dba_tablespaces;
```

TABLESPACE_NAME	STATUS	CONTENTS	LOGGING	EXTENT_MAN	ALLOCATIO	SEGMENT
SYSTEM	ONLINE	PERMANENT	LOGGING	LOCAL	SYSTEM	MANUAL
SYSAUX	ONLINE	PERMANENT	LOGGING	LOCAL	SYSTEM	AUTO
UNDOTBS1	ONLINE	UNDO	LOGGING	LOCAL	SYSTEM	MANUAL
TEMP	ONLINE	TEMPORARY	NOLOGGING	LOCAL	UNIFORM	MANUAL
USERS	ONLINE	PERMANENT	LOGGING	LOCAL	SYSTEM	AUTO
EXAMPLE	ONLINE	PERMANENT	NOLOGGING	LOCAL	SYSTEM	AUTO

```
SQL> SELECT file_name, file_id, tablespace_name
2  FROM dba_data_files;
```

FILE_NAME	FILE_ID	TABLESPACE_NAME
/u01/app/oracle/oradata/orcl/system01.dbf	1	SYSTEM
/u01/app/oracle/oradata/orcl/sysaux01.dbf	3	SYSAUX
/u01/app/oracle/oradata/orcl/users01.dbf	6	USERS
/u01/app/oracle/oradata/orcl/example01.dbf	2	EXAMPLE
/u01/app/oracle/oradata/orcl/undotbs01.dbf	4	UNDOTBS1

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Oracle Managed Files (OMF)

Specify file operations in terms of database objects rather than file names.

Parameter	Description
DB_CREATE_FILE_DEST	Defines the location of the default file system directory for data files and temporary files
DB_CREATE_ONLINE_LOG_DEST_n	Defines the location for redo log files and control file creation
DB_RECOVERY_FILE_DEST	Default location for the fast recovery area

Example:

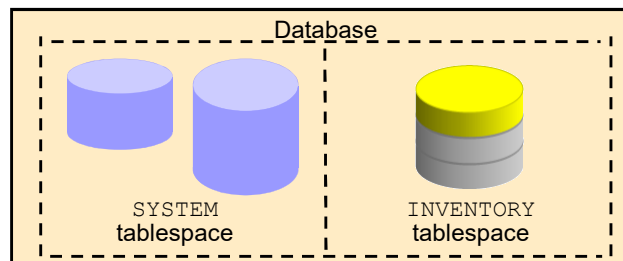
```
SQL> ALTER SYSTEM
      2  SET DB_CREATE_FILE_DEST='/u01/app/oracle/oradata';
SQL> CREATE TABLESPACE tbs_1;
```

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Enlarging the Database

You can enlarge the database in the following ways:

- Create a new tablespace.
- Add a data file to an existing smallfile tablespace.
- Increase the size of a data file.
- Provide for the dynamic growth of a data file.



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Summary

In this lesson, you should have learned how to:

- Describe the storage of table row data in blocks
- Create and manage tablespaces
- Obtain tablespace information