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Managing Database Storage Structures

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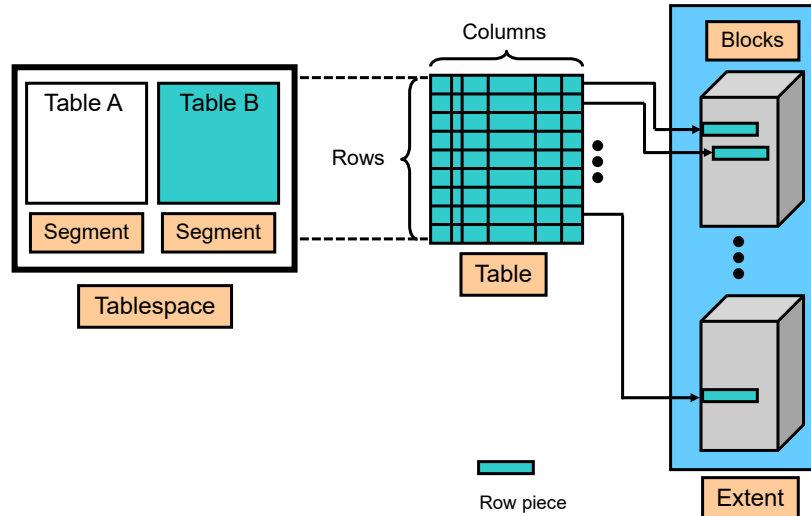
Objectives

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

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How Table Data Is Stored



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Exploring the Storage Structure

The screenshot shows the Oracle Enterprise Manager Database Express 12c interface. The top navigation bar includes tabs for Configuration, Storage, Security, and Performance. The main content area displays the **Tablespaces** configuration page. A table lists the tablespaces and their properties:

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

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Creating a New Tablespace

ORACLE Enterprise Manager Database Express 12c

ORCL (12.1.0.1.0) Configuration Storage Security

Tablespaces

Actions View Create Drop Add Datafile

Name	Size	Free Space
EXAMPLE	358MB	35MB

Create Tablespace

General Add Datafiles Space Logging Segments

Name * Inventory

Tablespace Type ☒ Permanent ☐ Temporary ☐ Undo

Set As Default ☐

Bigfile ☒ Smallfile ☐ Bigfile

Status ☒ Online ☐ Offline

Show SQL OK Cancel

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Creating a New Tablespace

Create Tablespace

General Add Datafiles Space Logging Segments

Using Oracle-Managed Files ☐ *i*

Datafiles * /u01/app/oracle/oradata/orcl/inventory01.dbf *+*

File Name *x*

/u01/app/oracle/oradata/orcl/inventory01.d

File Size * 100M *i*

Reuse Existing File ☐

Auto Extend ☒ *i*

Increment 100M

Maximum File Size Unlimited

Show SQL OK Cancel

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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)'. Under 'Extent Allocation', 'Automatic' is selected. The 'Extent Size' field is empty. Navigation buttons include '<<', 'Show SQL', 'OK', 'Cancel', and '>>'.

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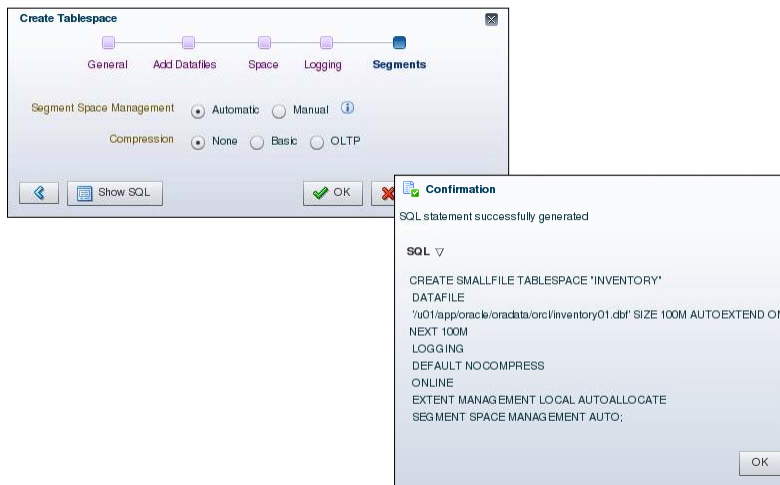
Creating a New Tablespace

The 'Create Tablespace' dialog box is shown with the 'Logging' tab selected. Under 'Logging', 'Logging' is selected. The 'Force Logging' checkbox is unchecked. Navigation buttons include '<<', 'Show SQL', 'OK', 'Cancel', and '>>'.

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Creating a New Tablespace



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Overview of Tablespaces Created by Default

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

ORACLE Enterprise Manager Database Express 12c

ORCL (12.1.0.1.0) Configuration Storage Security Performance

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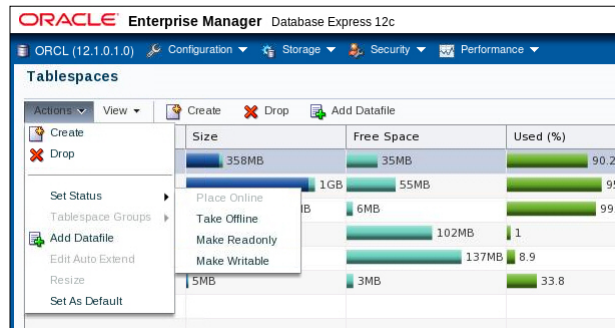
Tablespaces

Name	Size	Free Space	Used (%)	Auto...	Max...	Status	Type	Group ...	Auto...	Directory
EXAMPLE	350MB	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	0.9	✓	Unlimit	✓	✓	✓	✓	/u01/app/oracle/oradata/...
USERS	5MB	3MB	33.6	✓	Unlimit	✓	✓	✓	✓	/u01/app/oracle/oradata/...

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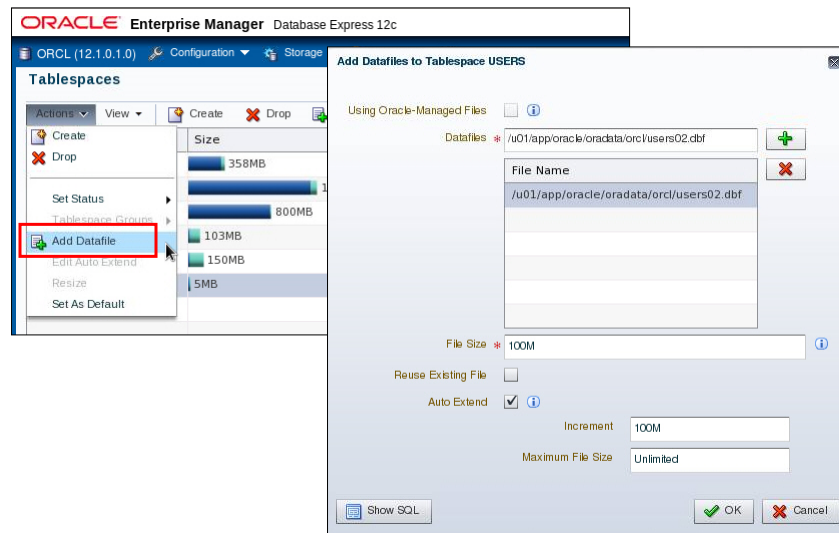
Altering a Tablespace



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Adding a Data File to a Tablespace



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Making Changes to a Data File

Tablespaces

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

Auto Extend Setting of Datafile users01.dbf

Auto Extend: ☒
 Increment: 1.25M
 Maximum File Size: Unlimited

Resize Datafile users01.dbf

Size: 5M

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Dropping Tablespaces

Tablespaces

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

Drop Tablespace EXAMPLE

☒ Drop Contents
☒ Drop Datafiles
☒ Drop Constraints

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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
SYS_AUX	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	SYS_AUX
/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;
```

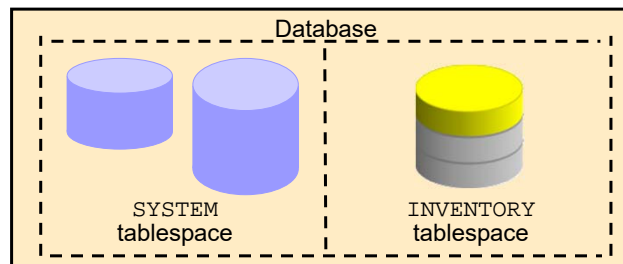
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Enlarging the Database

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

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