Execution of a SELECT statement

- SELECT col1 FROM Tab1 WHERE col2 = …

How does the DBMS find the pieces of Data on disk?

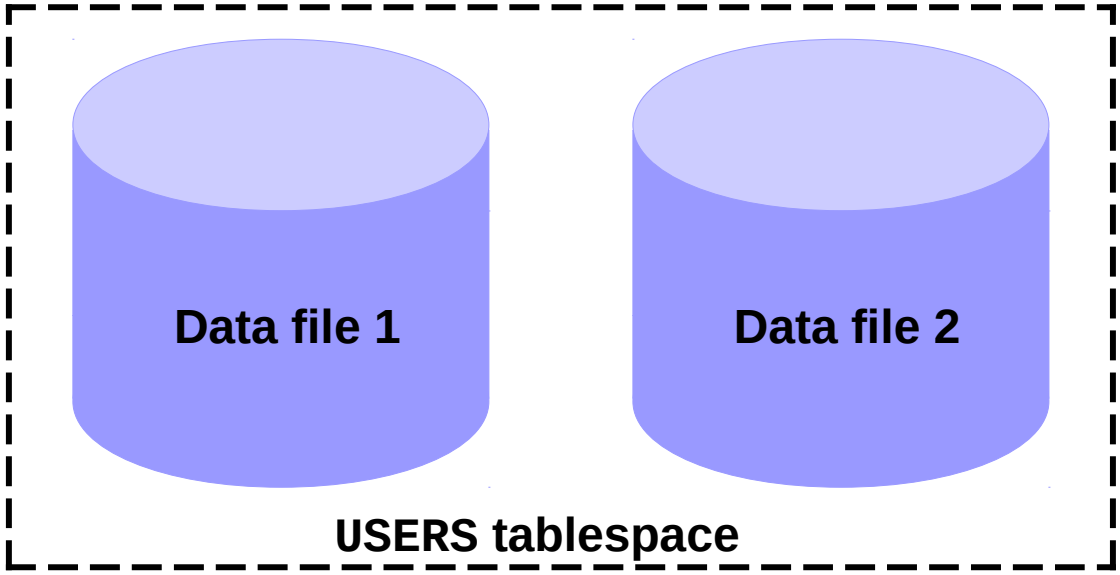
Data blocks

Records

Fields

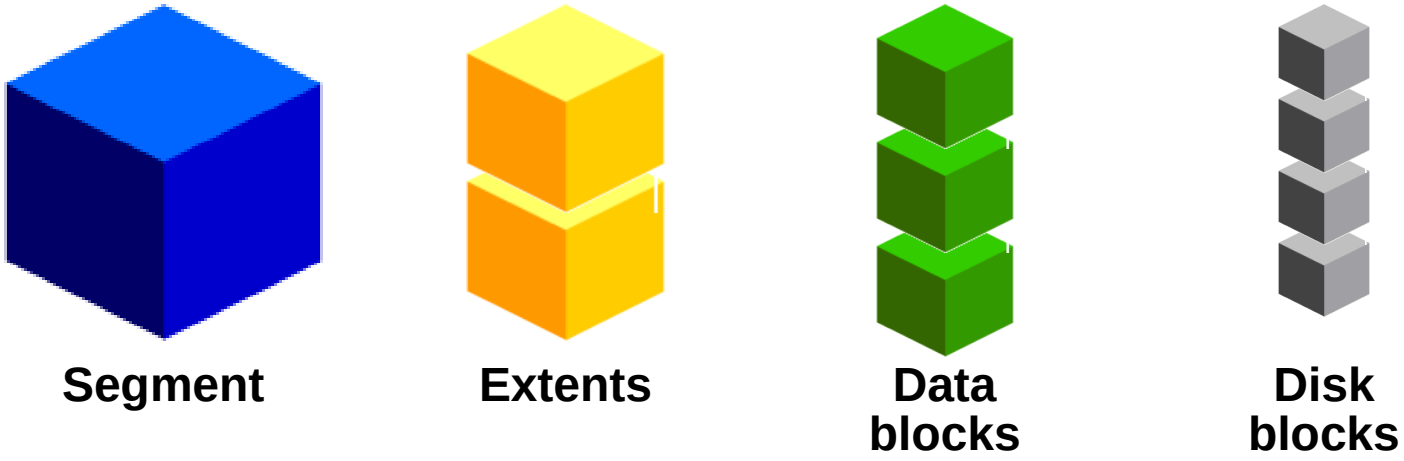
Tablespaces and Data Files

- Tablespaces consist of one or more data files.
- Data files belong to only one tablespace.



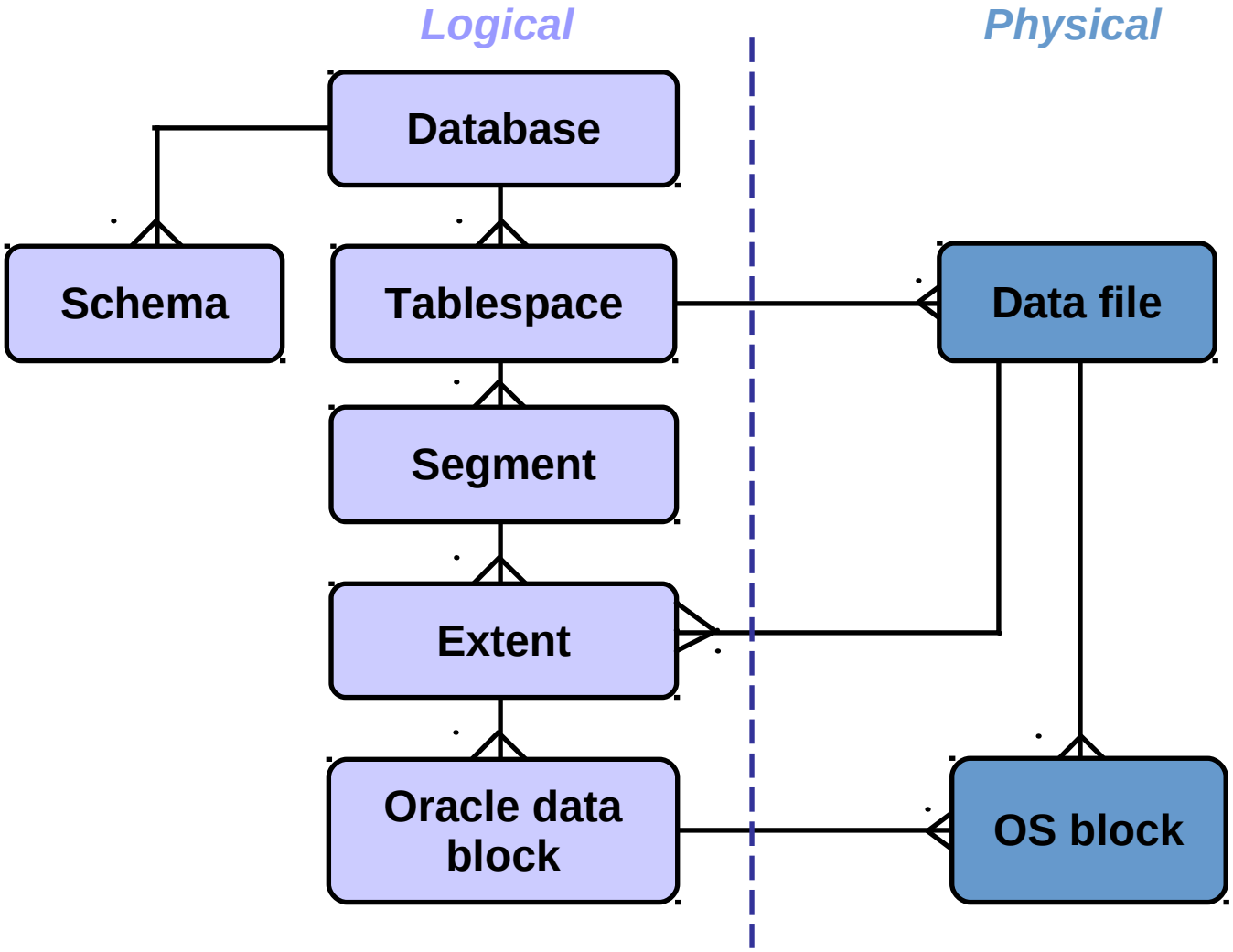
Segments, Extents, and Blocks

- Segments exist within a tablespace.
- Segments are made up of a collection of extents.
- Extents are a collection of data blocks.
- Data blocks are mapped to disk blocks.

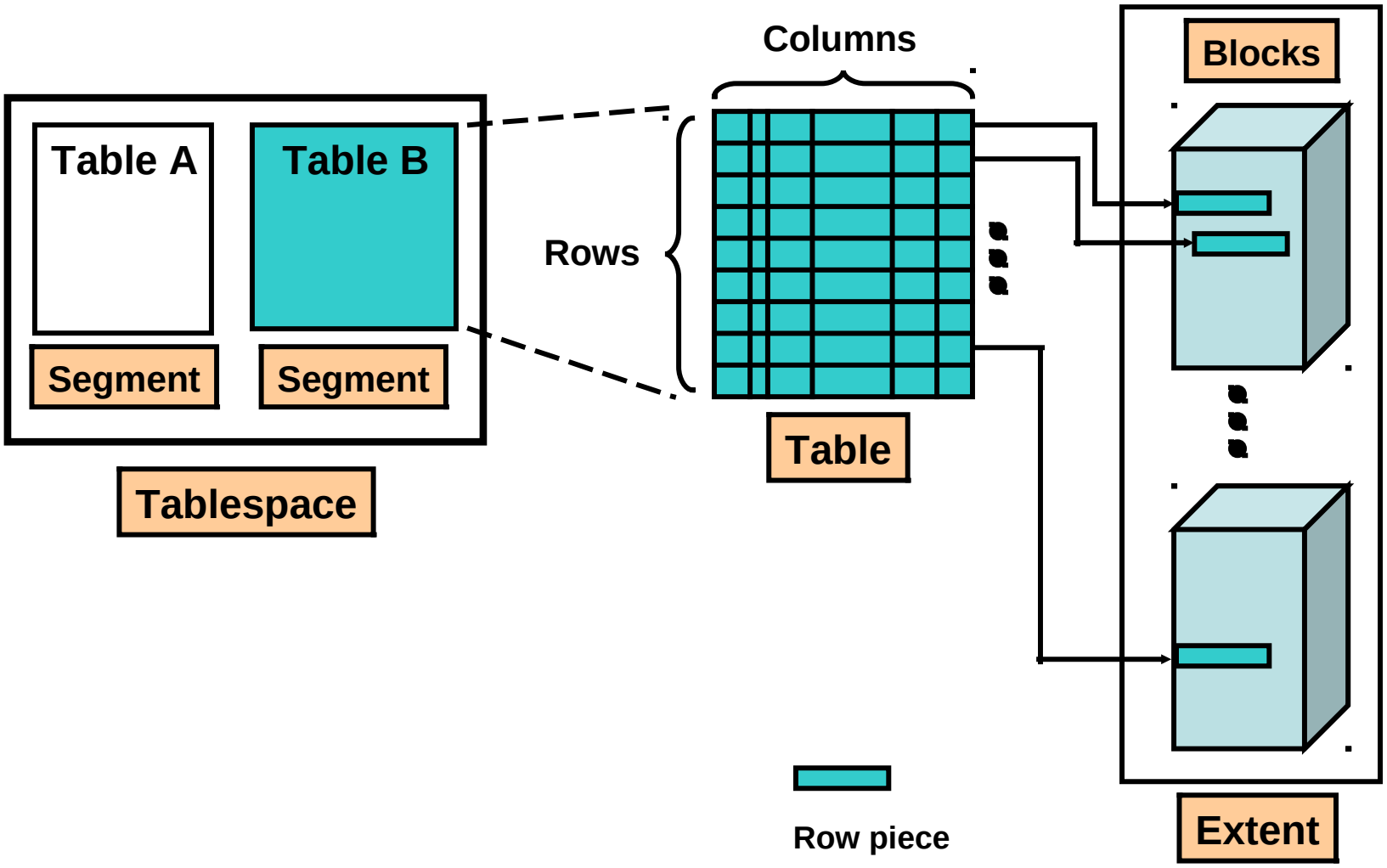


Segment **Extents** **Data blocks** **Disk blocks**

Logical and Physical Database Structures

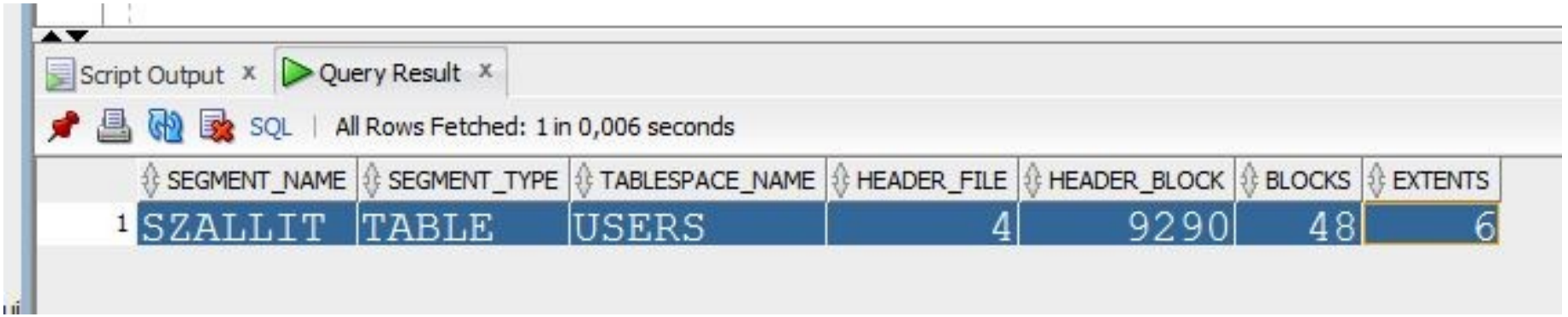


How Table Data Is Stored



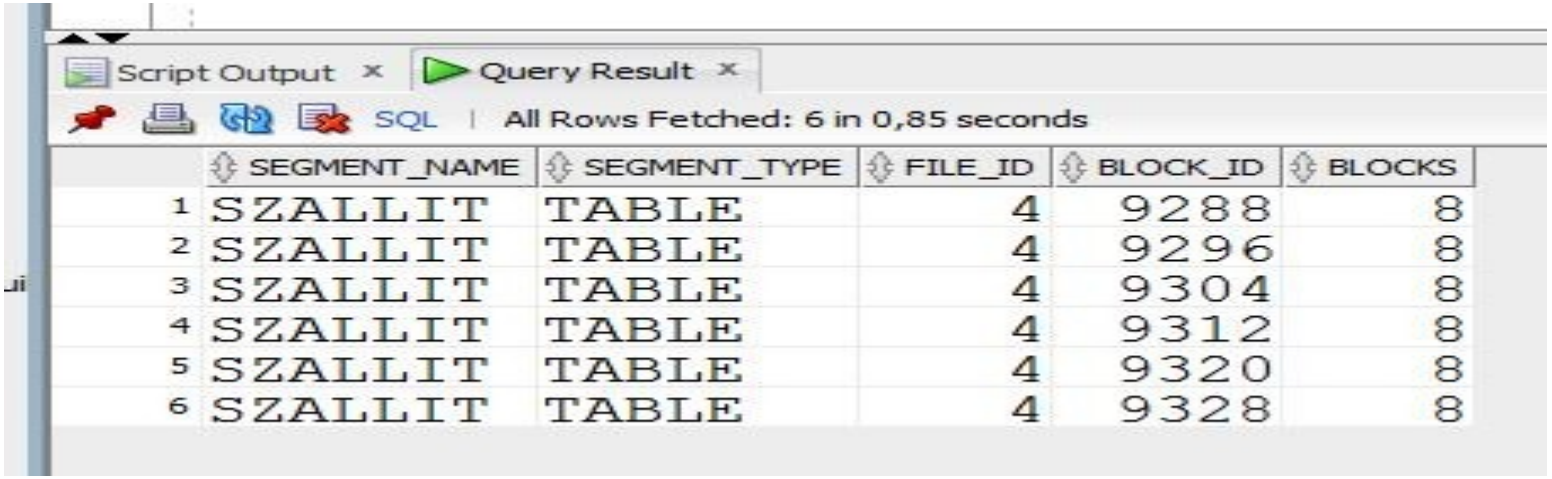
Where Table Data is Stored?

```
SELECT segment_name, segment_type, tablespace_name,
       header_file, header_block, blocks, extents
FROM dba_segments where owner='NIKOVITS'
AND segment_name='SZALLIT' AND
segment_type='TABLE';
```



Where Table Data is Stored?

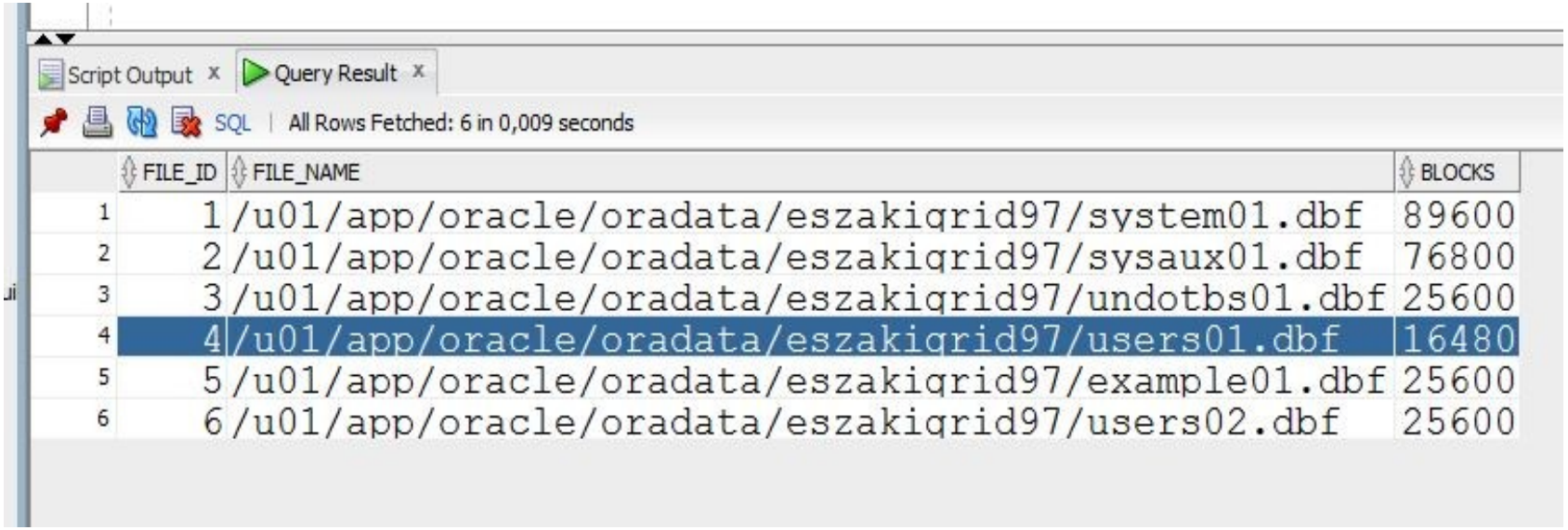
```
SELECT segment_name, segment_type,
        file_id, block_id, blocks
FROM dba_extents where owner='NIKOVITS'
AND segment_name='SZALLIT' AND
segment_type='TABLE';
```



	SEGMENT_NAME	SEGMENT_TYPE	FILE_ID	BLOCK_ID	BLOCKS
1	SZALLIT	TABLE	4	9288	8
2	SZALLIT	TABLE	4	9296	8
3	SZALLIT	TABLE	4	9304	8
4	SZALLIT	TABLE	4	9312	8
5	SZALLIT	TABLE	4	9320	8
6	SZALLIT	TABLE	4	9328	8

Where Table Data is Stored?

```
SELECT file_id, file_name, blocks
FROM dba_data_files;
```



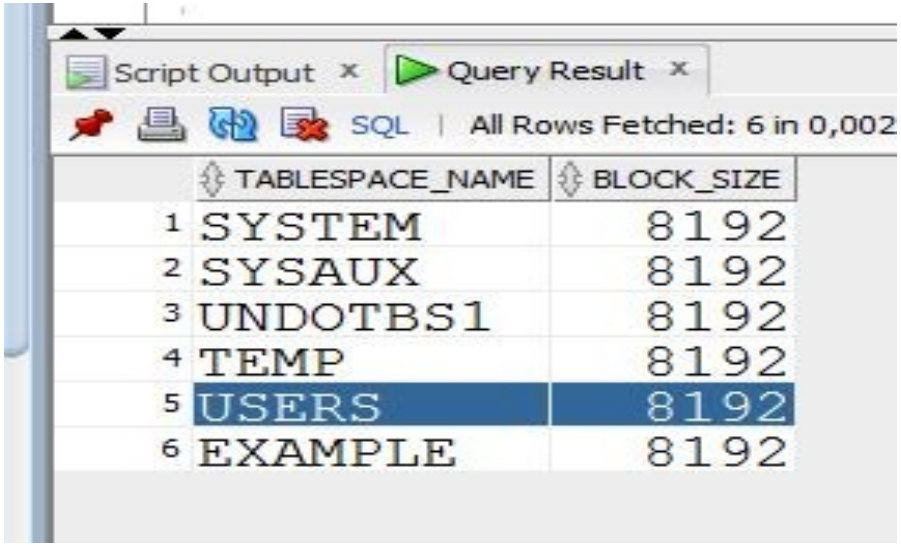
Script Output | Query Result

SQL | All Rows Fetched: 6 in 0,009 seconds

	FILE_ID	FILE_NAME	BLOCKS
1	1	/u01/app/oracle/oradata/eszakigrid97/system01.dbf	89600
2	2	/u01/app/oracle/oradata/eszakigrid97/sysaux01.dbf	76800
3	3	/u01/app/oracle/oradata/eszakigrid97/undotbs01.dbf	25600
4	4	/u01/app/oracle/oradata/eszakigrid97/users01.dbf	16480
5	5	/u01/app/oracle/oradata/eszakigrid97/example01.dbf	25600
6	6	/u01/app/oracle/oradata/eszakigrid97/users02.dbf	25600

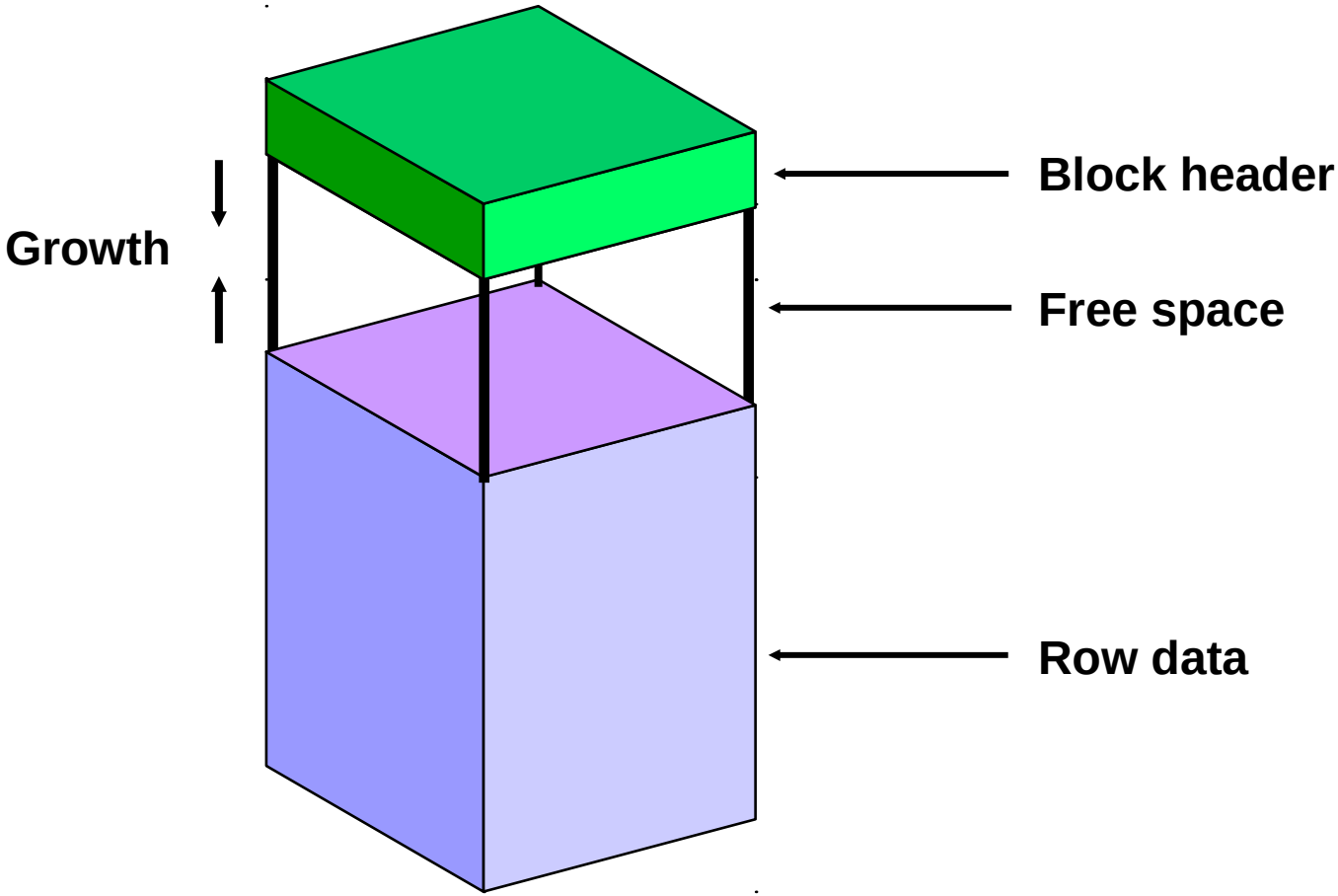
Which part of the Datafile?
(What is the block size?)

```
SELECT tablespace_name, block_size
FROM dba_tablespaces;
```



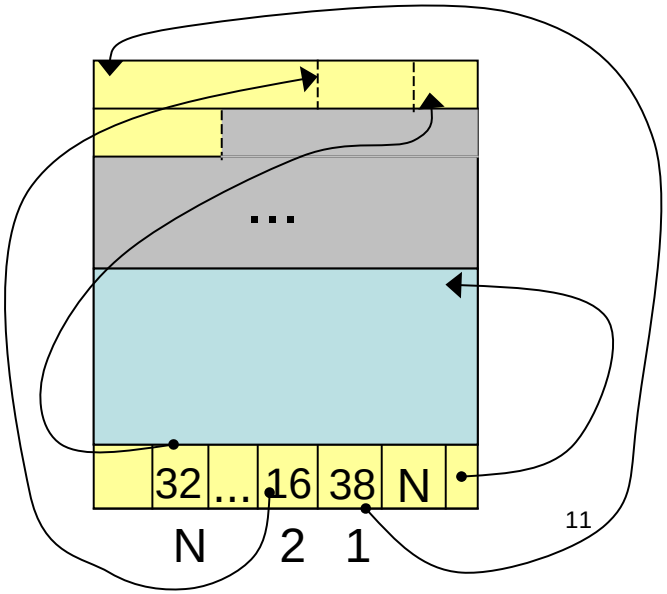
	TABLESPACE_NAME	BLOCK_SIZE
1	SYSTEM	8192
2	SYSAUX	8192
3	UNDOTBS1	8192
4	TEMP	8192
5	USERS	8192
6	EXAMPLE	8192

Anatomy of a Database Block



Variable-length records
(finding records within blocks)

- When do we have a file with variable-length records?
  - file contains records of multiple tables
  - create table t (field1 int, field2 varchar2(n))
- Problems:
  - Holes created upon deletion have variable size
  - Find large enough free space for new record
- Could use previous approaches: maximum record size
  - a lot of space wasted
- Use slotted page structure
  - Slot directory
  - Each slot storing offset, size of record
  - Record IDs: page number, slot number



Record Organization
(finding fields within records)

- Fixed-length record formats
  - Fields stored consecutively
- Variable-length record formats
  - Array of offsets
  - NULL values when start offset = end offset