

# Execution of a SELECT statement

- SELECT col1 FROM Tab1 WHERE col2 = ...

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

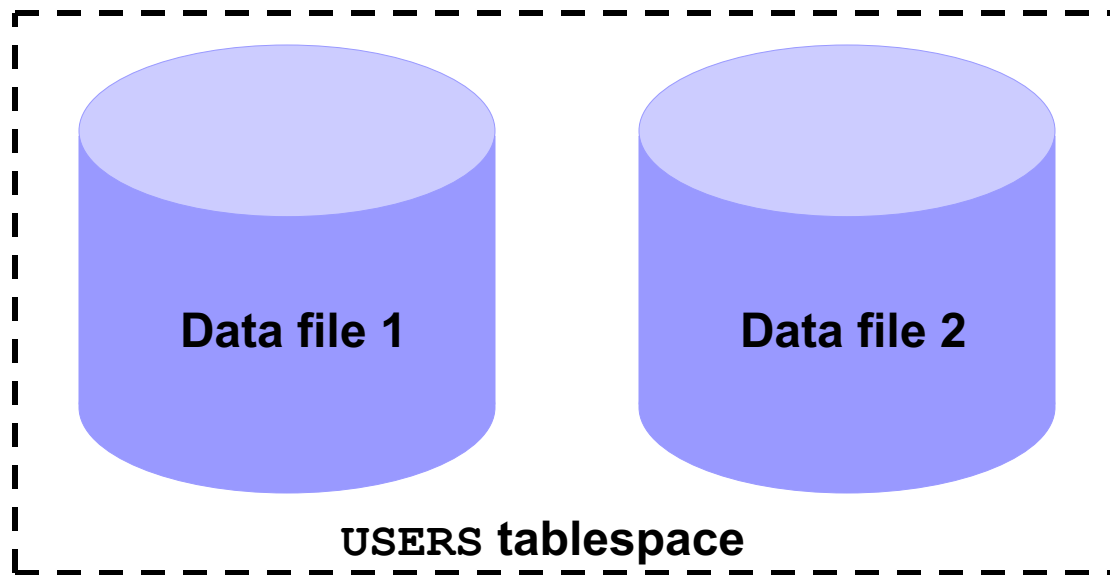
Data blocks

Records

Fields

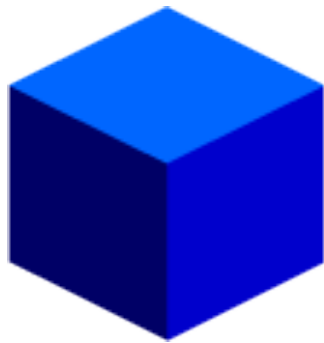
# Tablespaces and Data Files

- 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**

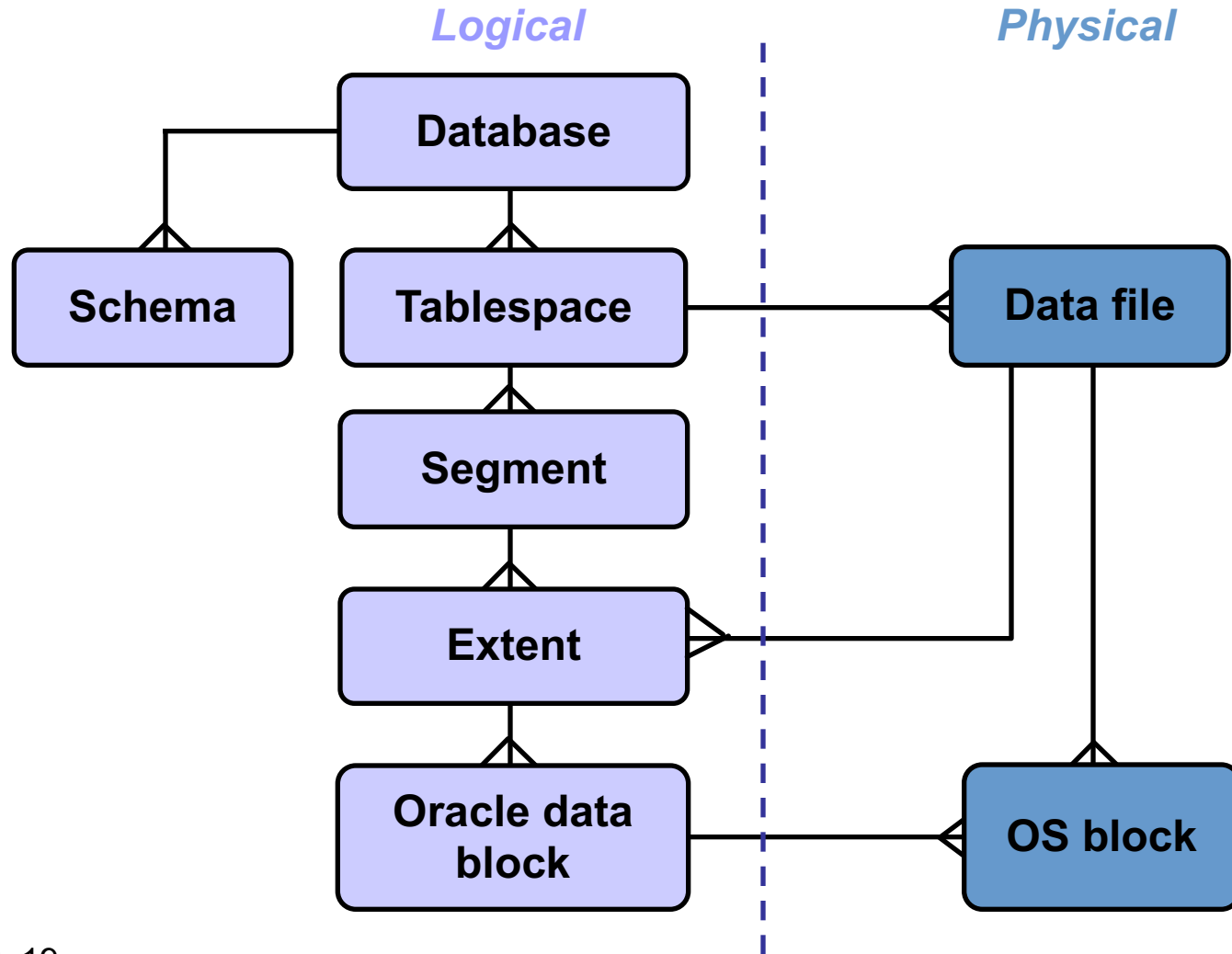


**Data  
blocks**

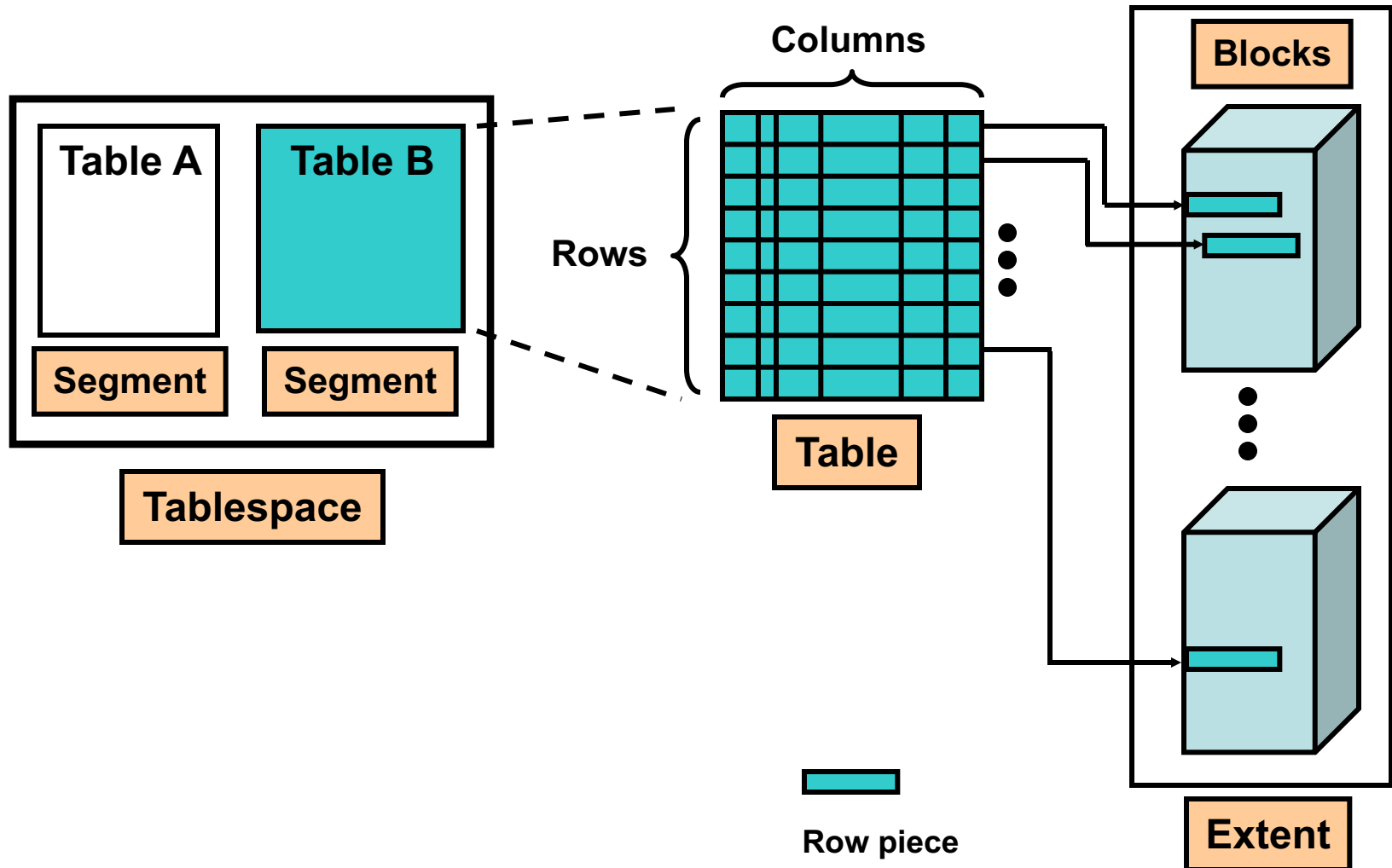


**Disk  
blocks**

# Logical and Physical Database Structures

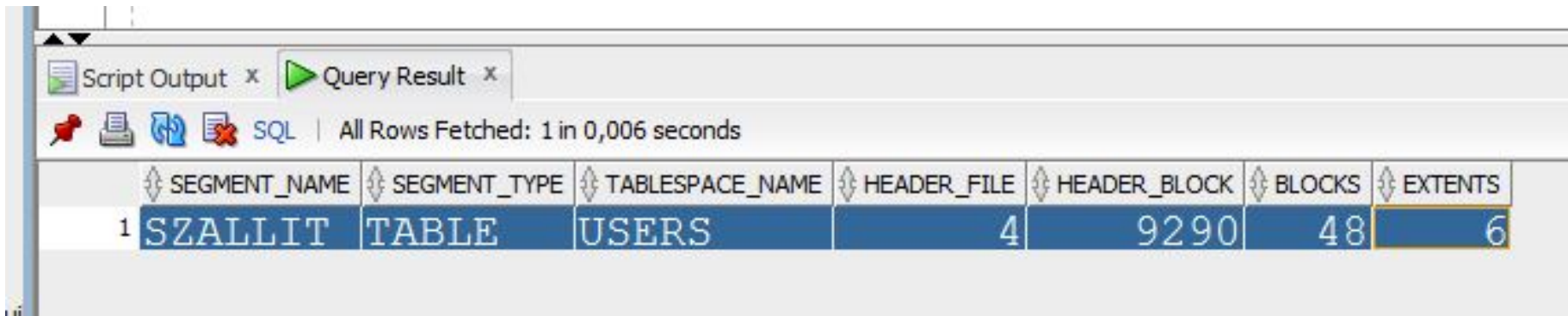


# How Table Data Is Stored



# 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';
```

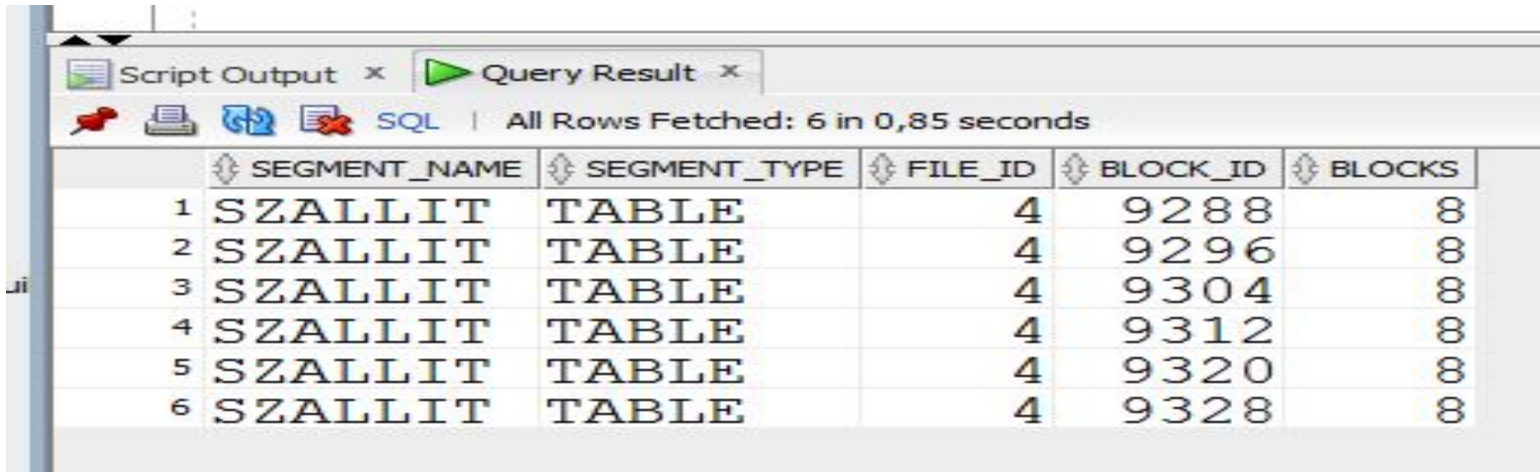


The screenshot shows a database query result window with two tabs: 'Script Output' and 'Query Result'. The 'Query Result' tab is active, displaying a table with 7 columns: SEGMENT\_NAME, SEGMENT\_TYPE, TABLESPACE\_NAME, HEADER\_FILE, HEADER\_BLOCK, BLOCKS, and EXTENTS. The table contains one row of data for the segment named 'SZALLIT'.

	SEGMENT_NAME	SEGMENT_TYPE	TABLESPACE_NAME	HEADER_FILE	HEADER_BLOCK	BLOCKS	EXTENTS
1	SZALLIT	TABLE	USERS	4	9290	48	6

# 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';
```



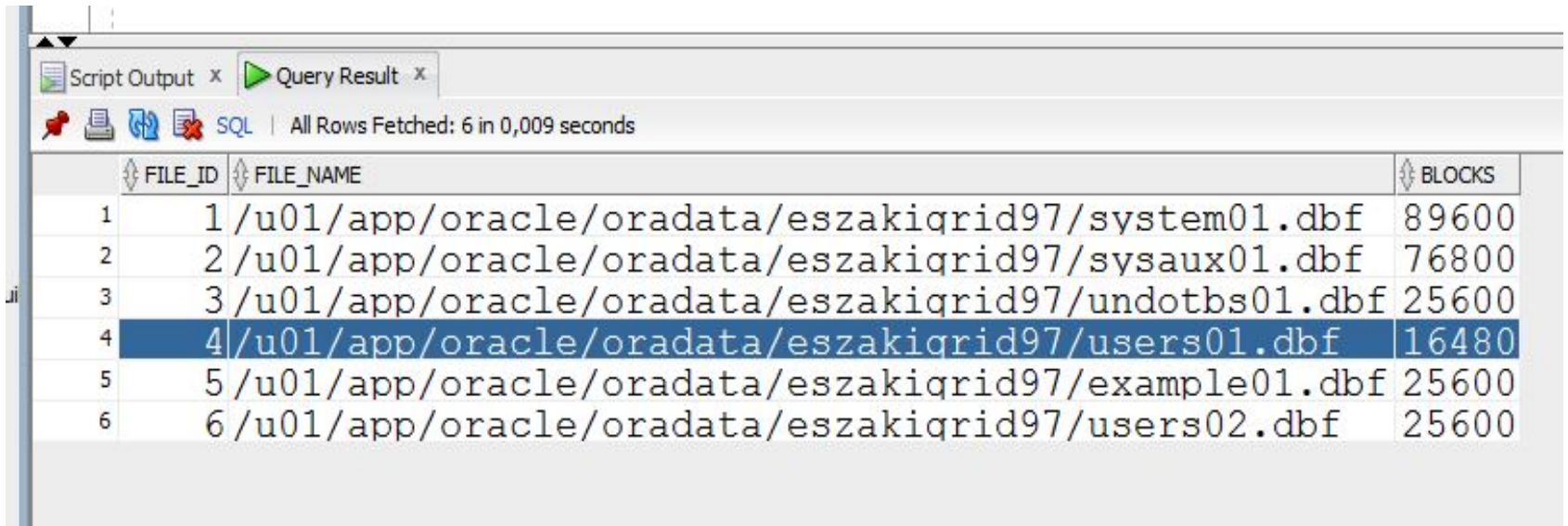
The screenshot shows a database query result window with the following details:

- Script Output x
- Query Result x
- SQL | All Rows Fetched: 6 in 0,85 seconds

	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;
```



The screenshot shows a query result window with the following data:

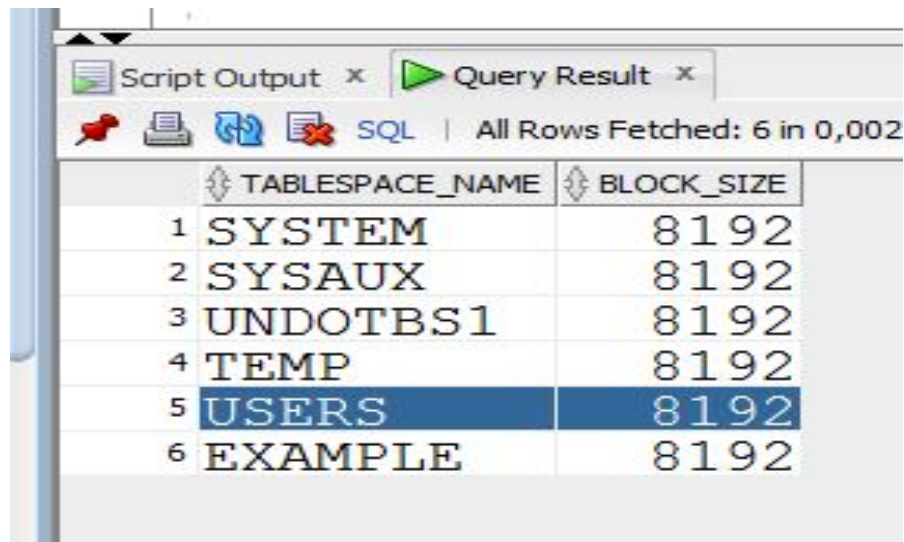
	FILE_ID	FILE_NAME	BLOCKS
1	1	/u01/app/oracle/oradata/eszakiqrid97/system01.dbf	89600
2	2	/u01/app/oracle/oradata/eszakiqrid97/sysaux01.dbf	76800
3	3	/u01/app/oracle/oradata/eszakiqrid97/undotbs01.dbf	25600
4	4	/u01/app/oracle/oradata/eszakiqrid97/users01.dbf	16480
5	5	/u01/app/oracle/oradata/eszakiqrid97/example01.dbf	25600
6	6	/u01/app/oracle/oradata/eszakiqrid97/users02.dbf	25600



# Which part of the Datafile?

(What is the block size?)

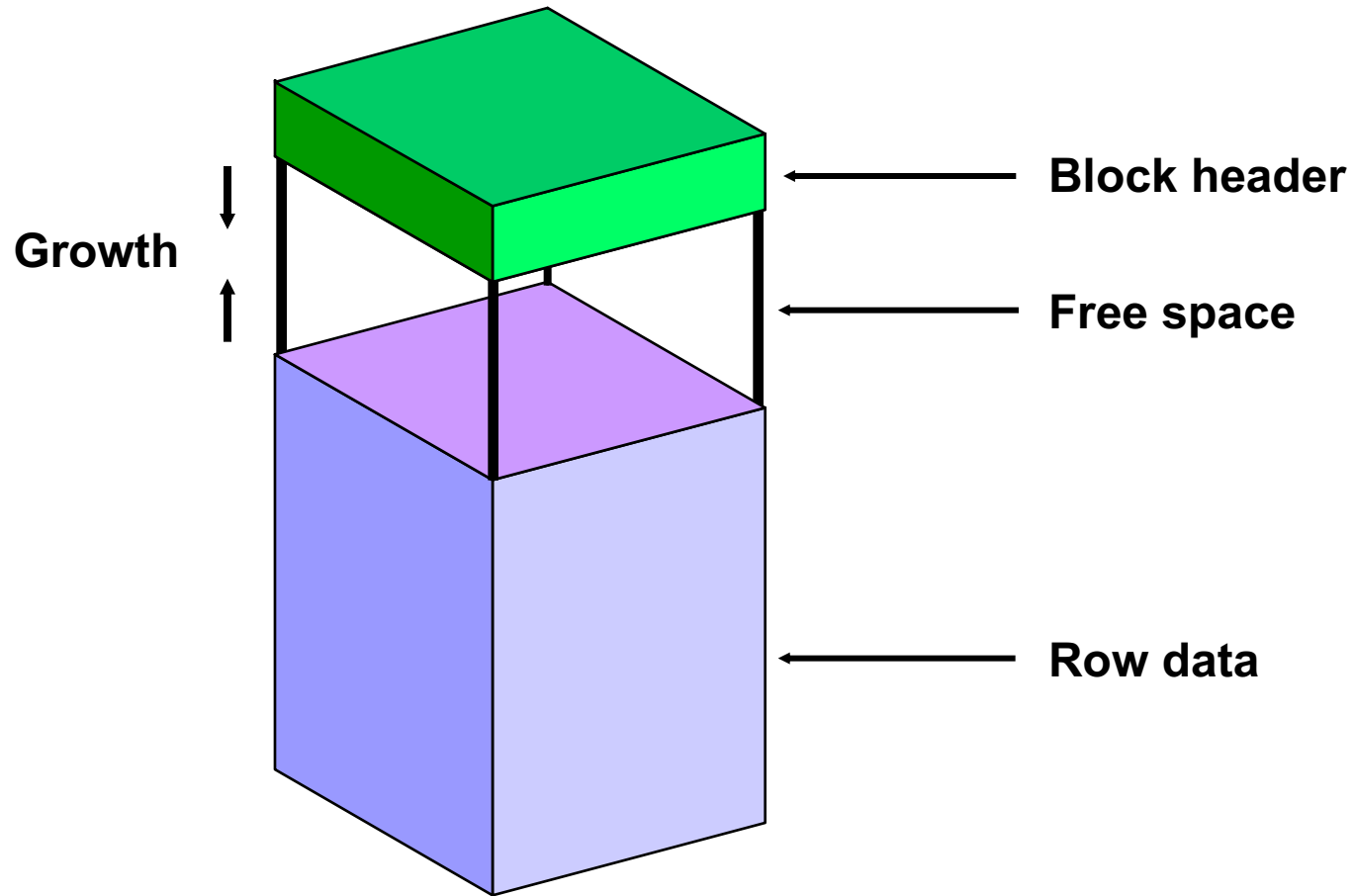
```
SELECT tablespace_name, block_size  
FROM dba_tablespaces;
```



The screenshot shows a SQL query result window with two tabs: 'Script Output' and 'Query Result'. The 'Query Result' tab is active, displaying a table with two columns: 'TABLESPACE\_NAME' and 'BLOCK\_SIZE'. The table contains six rows of data. The fifth row, 'USERS', is highlighted in blue. The status bar at the top indicates 'All Rows Fetched: 6 in 0,002'.

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

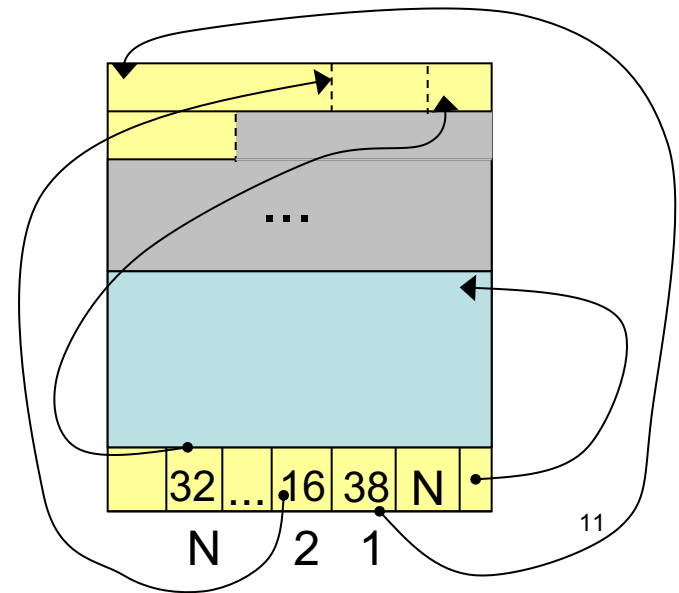
# Anatomy of a Database Block



# 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

