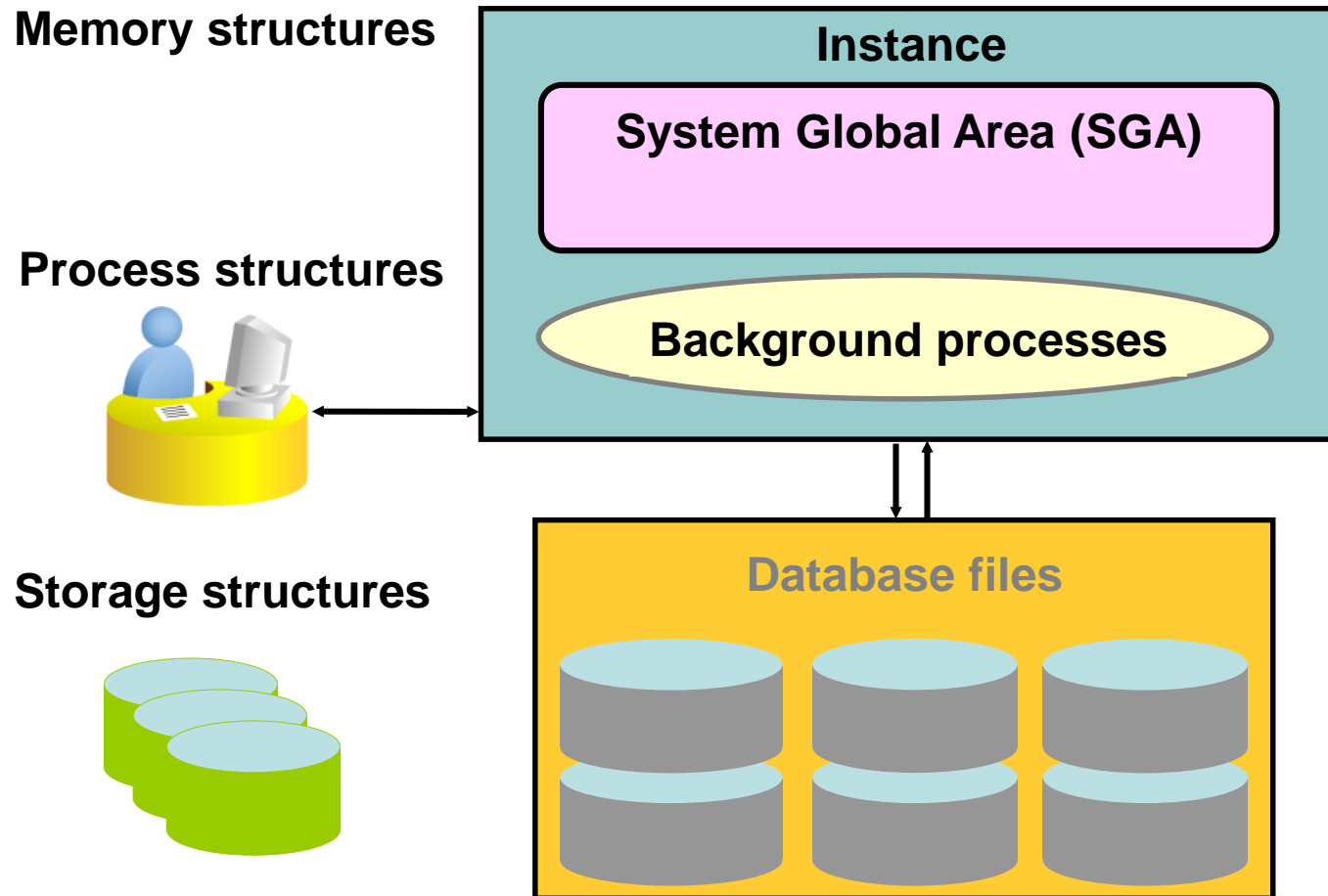


# Oracle Database Architecture

- An Oracle server:
  - Is a database management system that provides an open, comprehensive, integrated approach to information management
  - Consists of an **Oracle instance** and an **Oracle database**



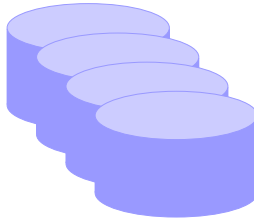
# Database Structures



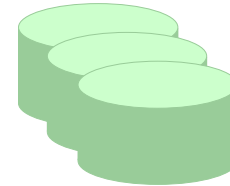
# Physical Database Structure



**Control files**



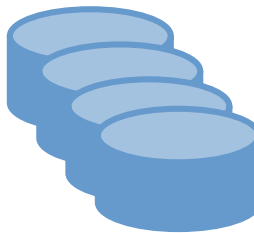
•Data files



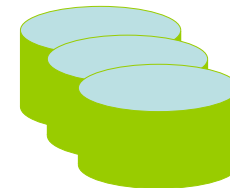
•Online redo log files



•Parameter file



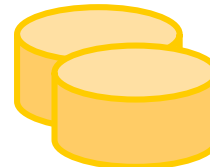
•Backup files



•Archive log files



•Password file



•Alert and trace log files

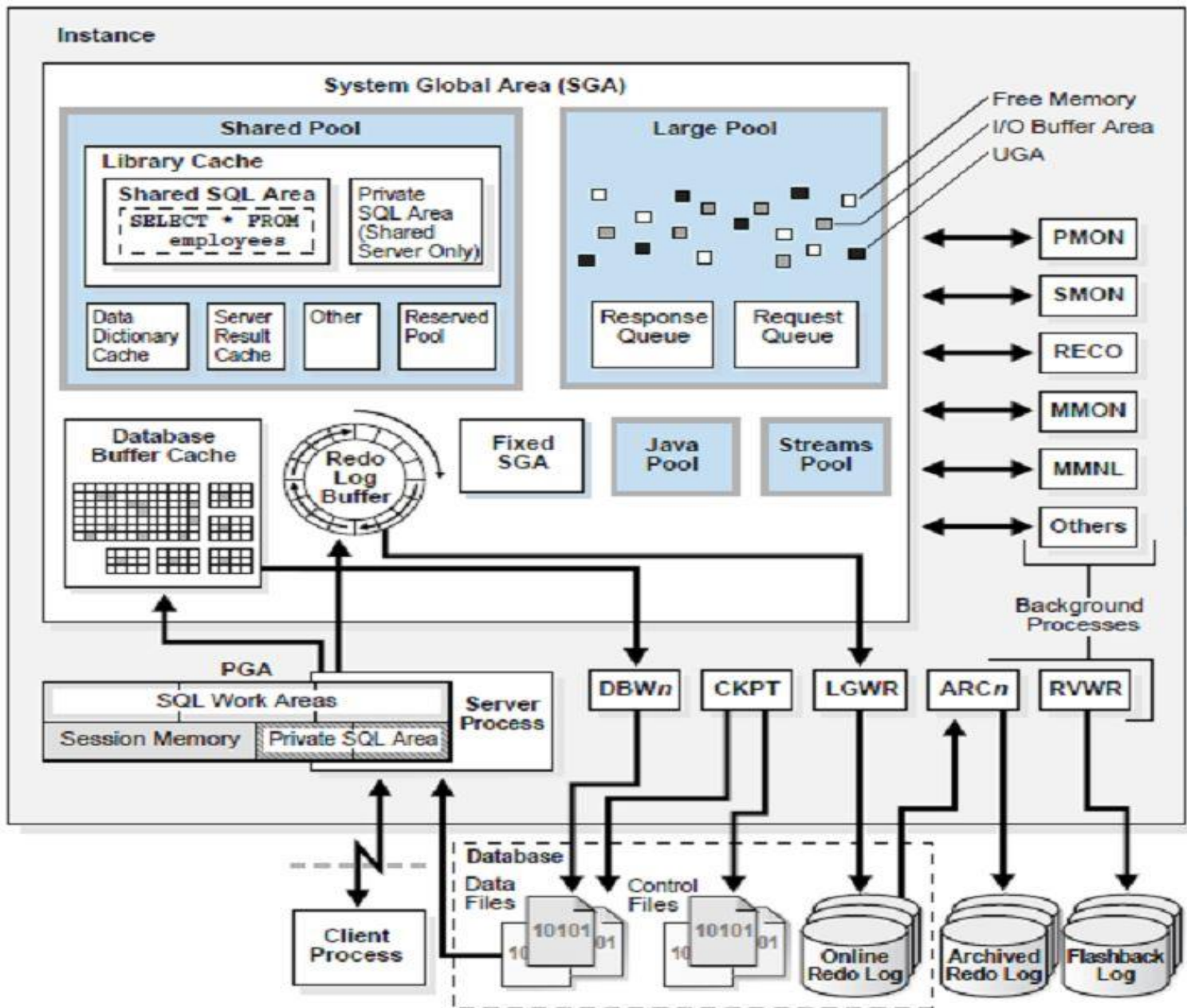
# Files of a database

A **data file** is a physical file on disk that was created by Oracle Database and contains data structures such as tables and indexes.

A **control file** contains information such as the following: the database name, information about data files, online redo log files, tablespace information, etc.

The **online redo log** is a set of files containing records of changes made to data. Online redo log is the most crucial structure for recovery.

**Alert log** is a file that provides a chronological log of database messages and errors.



# Data Dictionary Views

	Who Can Query	Contents	Subset of	Notes
DBA_	DBA	Everything	N/A	May have additional columns meant for DBA use only
ALL_	Everyone	Everything that the user has privileges to see	DBA_views	Includes user's own objects
USER_	Everyone	Everything that the user owns	ALL_views	Is usually the same as ALL_ except for the missing OWNER column. Some views have abbreviated names as PUBLIC synonyms.

# Data Dictionary: Usage Examples

a

```
SELECT table_name, tablespace_name FROM  
user_tables;
```

b

```
SELECT sequence_name, min_value, max_value,  
increment_by FROM all_sequences WHERE  
sequence_owner IN ('MDSYS', 'XDB');
```

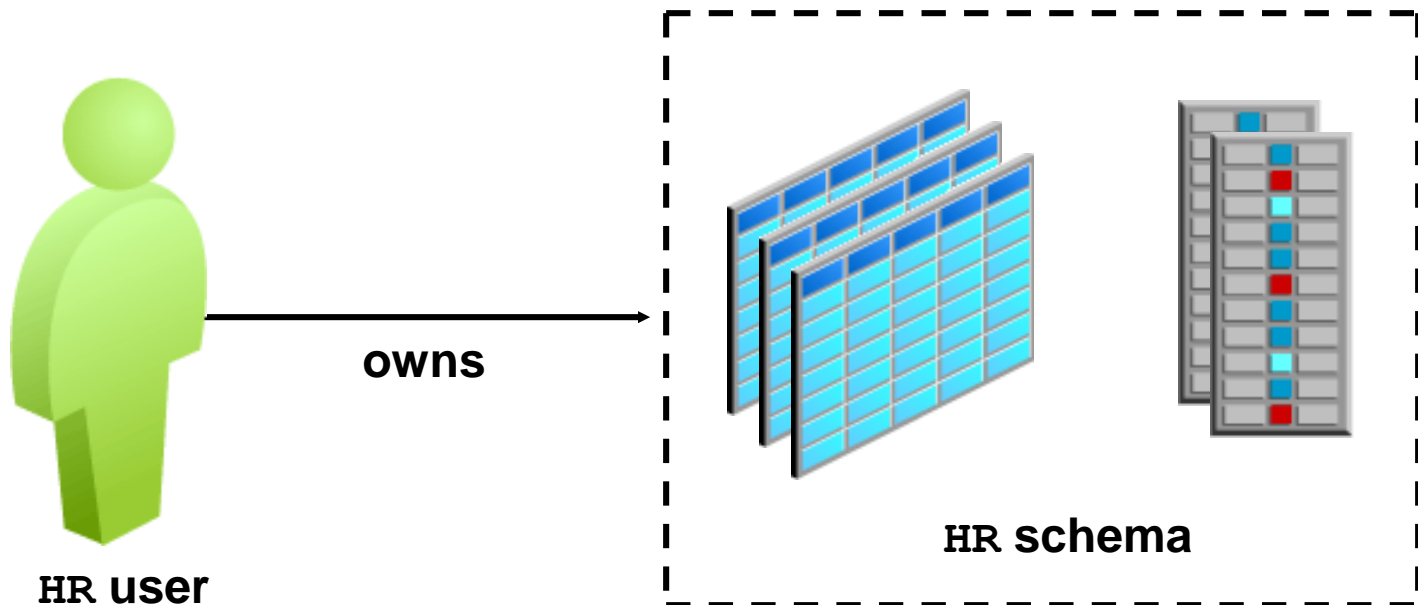
c

```
SELECT USERNAME, ACCOUNT_STATUS FROM  
dba_users WHERE ACCOUNT_STATUS = 'OPEN';
```

d

```
DESCRIBE dba_indexes;
```

# What Is a Schema?





# Schema Objects

- In Oracle Database, a database **schema** is a collection of logical data structures, or **schema objects**. A database schema is owned by a database user and has the same name as the **username**.

# Accessing Schema Objects

Database Instance: orcl.oracle.com		
<a href="#">Home</a> <a href="#">Performance</a> <a href="#">Administration</a> <a href="#">Maintenance</a>		
Schema		
<b>Database Objects</b>	<b>Programs</b>	<b>XML Database</b>
<a href="#">Tables</a>	<a href="#">Packages</a>	<a href="#">Configuration</a>
<a href="#">Indexes</a>	<a href="#">Package Bodies</a>	<a href="#">Resources</a>
<a href="#">Views</a>	<a href="#">Procedures</a>	<a href="#">Access Control Lists</a>
<a href="#">Synonyms</a>	<a href="#">Functions</a>	<a href="#">XML Schemas</a>
<a href="#">Sequences</a>	<a href="#">Triggers</a>	<a href="#">XMLType Tables</a>
<a href="#">Database Links</a>	<a href="#">Java Classes</a>	<a href="#">XMLType Views</a>
<a href="#">Directory Objects</a>	<a href="#">Java Sources</a>	
<a href="#">Reorganize Objects</a>		
<b>Users &amp; Privileges</b>	<b>Materialized Views</b>	<b>BI &amp; OLAP</b>
<a href="#">Users</a>	<a href="#">Materialized Views</a>	<a href="#">Dimensions</a>
<a href="#">Roles</a>	<a href="#">Materialized View Logs</a>	<a href="#">Cubes</a>
<a href="#">Profiles</a>	<a href="#">Refresh Groups</a>	<a href="#">OLAP Dimensions</a>
<a href="#">Audit Settings</a>		<a href="#">Measure Folders</a>

# Tables

```
CREATE TABLE dept
```

```
(deptno NUMBER(2), dname VARCHAR2(42), loc VARCHAR2(39));
```

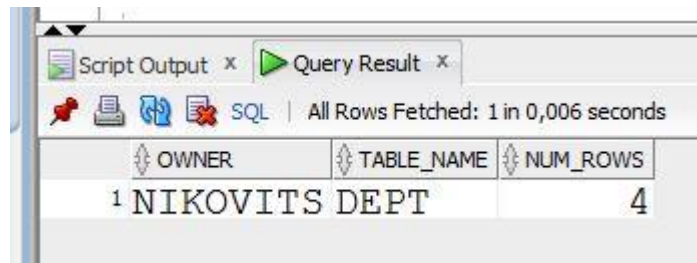
```
SELECT owner, table_name, num_rows
```

```
FROM DBA_TABLES
```

```
WHERE owner='NIKOVITS' AND table_name='DEPT';
```

```
(!) ANALYZE TABLE DEPT COMPUTE STATISTICS;
```

```
(!) ANALYZE TABLE DEPT DELETE STATISTICS;
```



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 three columns: OWNER, TABLE\_NAME, and NUM\_ROWS. The table contains one row with the values 'NIKOVITS', 'DEPT', and '4'. The status bar at the top indicates 'All Rows Fetched: 1 in 0,006 seconds'.

OWNER	TABLE_NAME	NUM_ROWS
1 NIKOVITS	DEPT	4

# Tables

```
CREATE TABLE dept
```

```
(deptno NUMBER(2), dname VARCHAR2(42), loc VARCHAR2(39));
```

```
SELECT column_id, column_name, data_type, data_length,  
       data_precision, data_scale
```

```
FROM DBA_TAB_COLUMNS
```

```
WHERE owner='NIKOVITS' AND table_name='DEPT';
```

COLUMN_ID	COLUMN_NAME	DATA_TYPE	DATA_LENGTH	DATA_PRECISION	DATA_SCALE
1	DEPTNO	NUMBER	22	2	0
2	DNAME	VARCHAR2	42	(null)	(null)
3	LOC	VARCHAR2	39	(null)	(null)

# Views

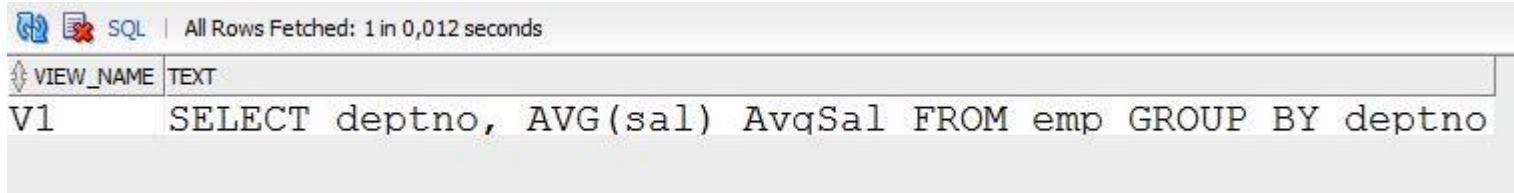
```
CREATE VIEW v1 AS
```

```
SELECT deptno, AVG(sal) AvgSal FROM emp GROUP BY deptno;
```

```
SELECT view_name, text
```

```
FROM DBA_VIEWS
```

```
WHERE owner='NIKOVITS' AND view_name='V1';
```



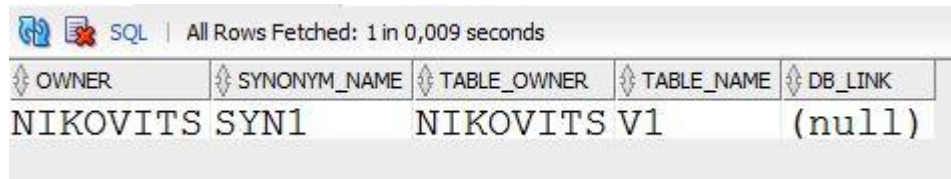
The screenshot shows a SQL query result in a database client. The top bar indicates 'All Rows Fetched: 1 in 0,012 seconds'. The result is displayed in a table with two columns: 'VIEW\_NAME' and 'TEXT'. The first row shows 'V1' as the view name and its definition as the text.

VIEW_NAME	TEXT
V1	SELECT deptno, AVG(sal) AvgSal FROM emp GROUP BY deptno

# Synonyms

```
CREATE SYNONYM syn1 FOR v1;
```

```
SELECT * FROM DBA_SYNONYMS  
WHERE owner='NIKOVITS' AND synonym_name='SYN1';
```



A screenshot of a SQL query result window. The title bar shows a blue icon, a red 'X' icon, and the text 'SQL | All Rows Fetched: 1 in 0,009 seconds'. The table has five columns: OWNER, SYNONYM\_NAME, TABLE\_OWNER, TABLE\_NAME, and DB\_LINK. The data row shows NIKOVITS, SYN1, NIKOVITS, V1, and (null).

OWNER	SYNONYM_NAME	TABLE_OWNER	TABLE_NAME	DB_LINK
NIKOVITS	SYN1	NIKOVITS	V1	(null)

```
SELECT * FROM syn1 WHERE deptno > 10;
```



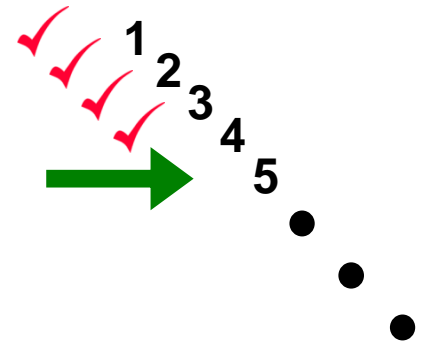
A screenshot of a SQL query result window. The title bar shows a blue icon, a red 'X' icon, and the text 'SQL | All Rows'. The table has two columns: DEPTNO and AVGSAL. The data rows show 30, 1800 and 20, 2175.

DEPTNO	AVGSAL
30	1800
20	2175

# Sequences

- A sequence is a mechanism for automatically generating integers that follow a pattern.

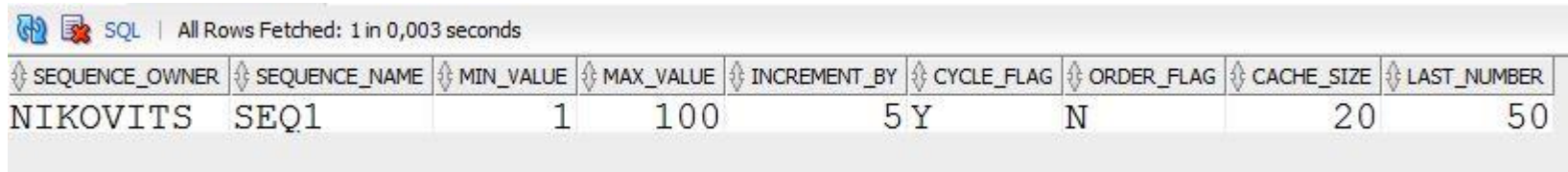
- A sequence has a name, which is how it is referenced when the next value is requested.
- A sequence is not associated with any particular table or column.
- The progression can be ascending or descending.
- The interval between numbers can be of any size.
- A sequence can cycle when a limit is reached.



# Sequences

```
CREATE SEQUENCE seq1  
MINVALUE 1 MAXVALUE 100 INCREMENT BY 5  
START WITH 50 CYCLE;
```

```
SELECT * FROM DBA_SEQUENCES  
WHERE sequence_name='SEQ1';
```



SEQUENCE_OWNER	SEQUENCE_NAME	MIN_VALUE	MAX_VALUE	INCREMENT_BY	CYCLE_FLAG	ORDER_FLAG	CACHE_SIZE	LAST_NUMBER
NIKOVITS	SEQ1	1	100	5	Y	N	20	50



# Using a Sequence

Next value from sequence:

```
INSERT INTO dept VALUES(seq1.NEXTVAL, 'IT', 'Budapest');
```

Current value from sequence:

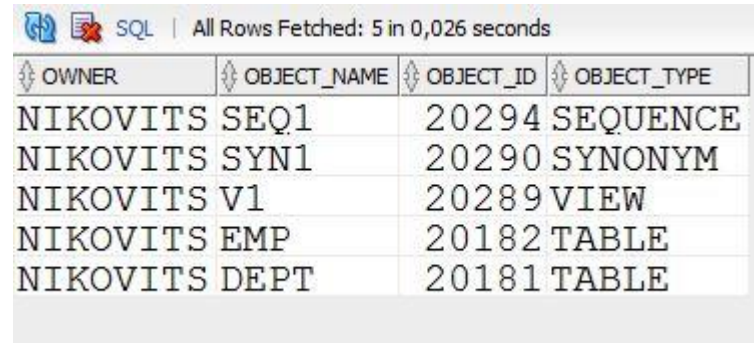
```
INSERT INTO emp(deptno, empno, ename, job, sal)
VALUES(seq1.CURRVAL, 1, 'Tailor', 'SALESMAN', 100);
```

Current value from sequence:

```
INSERT INTO emp(deptno, empno, ename, job, sal)
VALUES(seq1.CURRVAL, 2, 'Sailor', 'SALESMAN', 200);
```

# ANY Object

```
SELECT owner, object_name, object_id, object_type  
FROM DBA_OBJECTS  
WHERE owner='NIKOVITS, and created > sysdate - 1;
```



The screenshot shows a database client window with a toolbar at the top containing icons for SQL, a document, and a red 'X'. The text 'SQL | All Rows Fetched: 5 in 0,026 seconds' is displayed. Below the toolbar is a table with four columns: OWNER, OBJECT\_NAME, OBJECT\_ID, and OBJECT\_TYPE. The table contains five rows of data, all for the owner 'NIKOVITS'.

OWNER	OBJECT_NAME	OBJECT_ID	OBJECT_TYPE
NIKOVITS	SEQ1	20294	SEQUENCE
NIKOVITS	SYN1	20290	SYNONYM
NIKOVITS	V1	20289	VIEW
NIKOVITS	EMP	20182	TABLE
NIKOVITS	DEPT	20181	TABLE