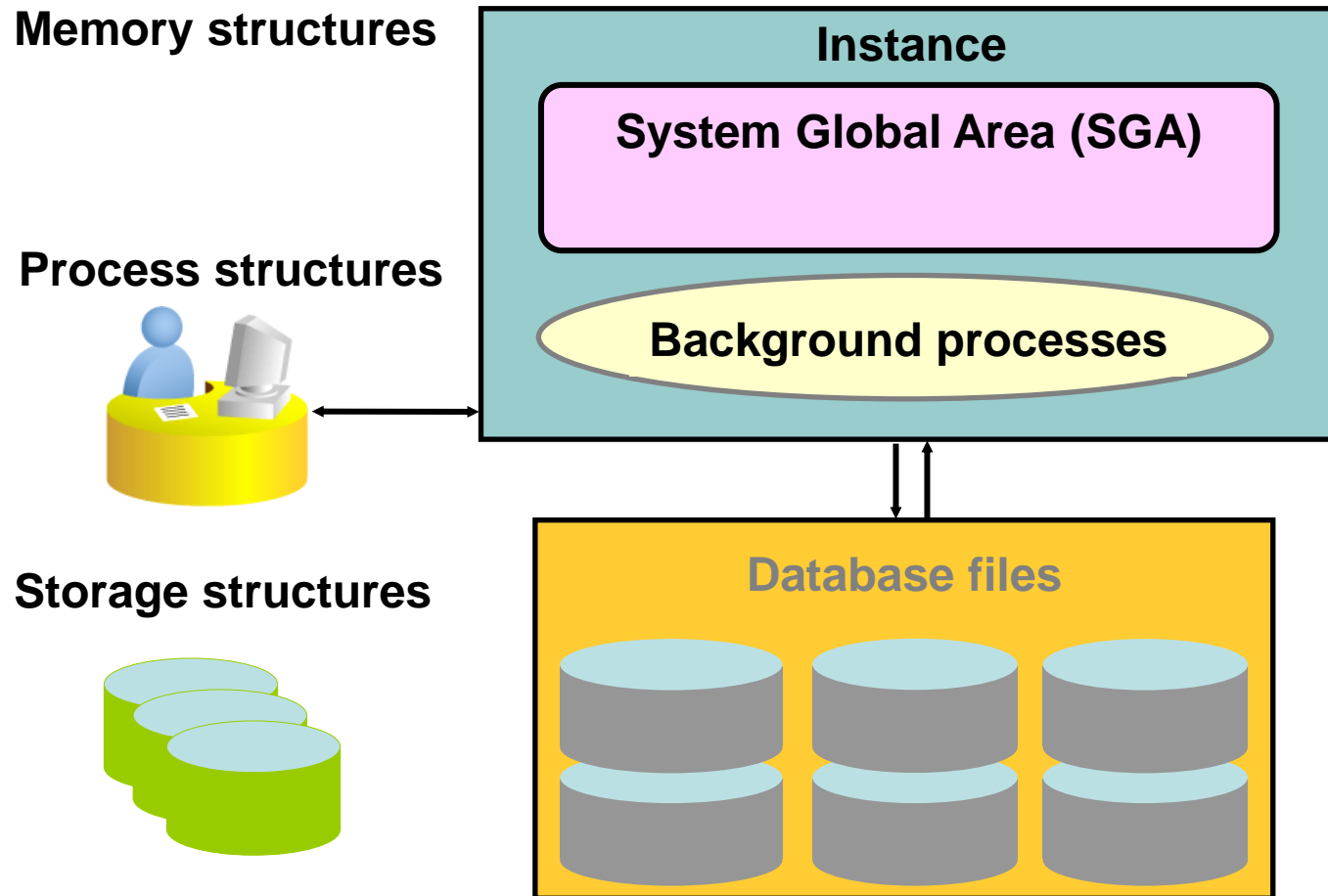


Oracle Database Architecture

- 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**



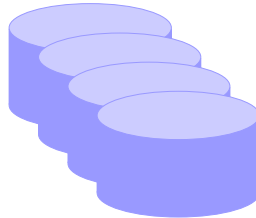
Database Structures



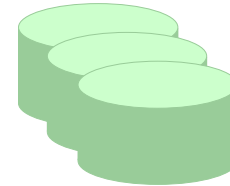
Physical Database Structure



Control files



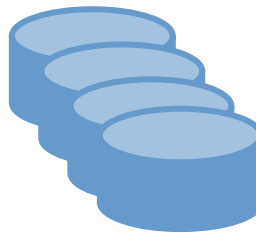
•Data files



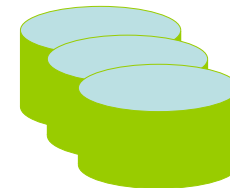
•Online redo log files



•Parameter file



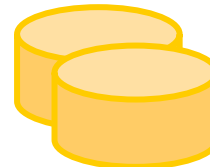
•Backup files



•Archive log files



•Password file



•Alert and trace log files

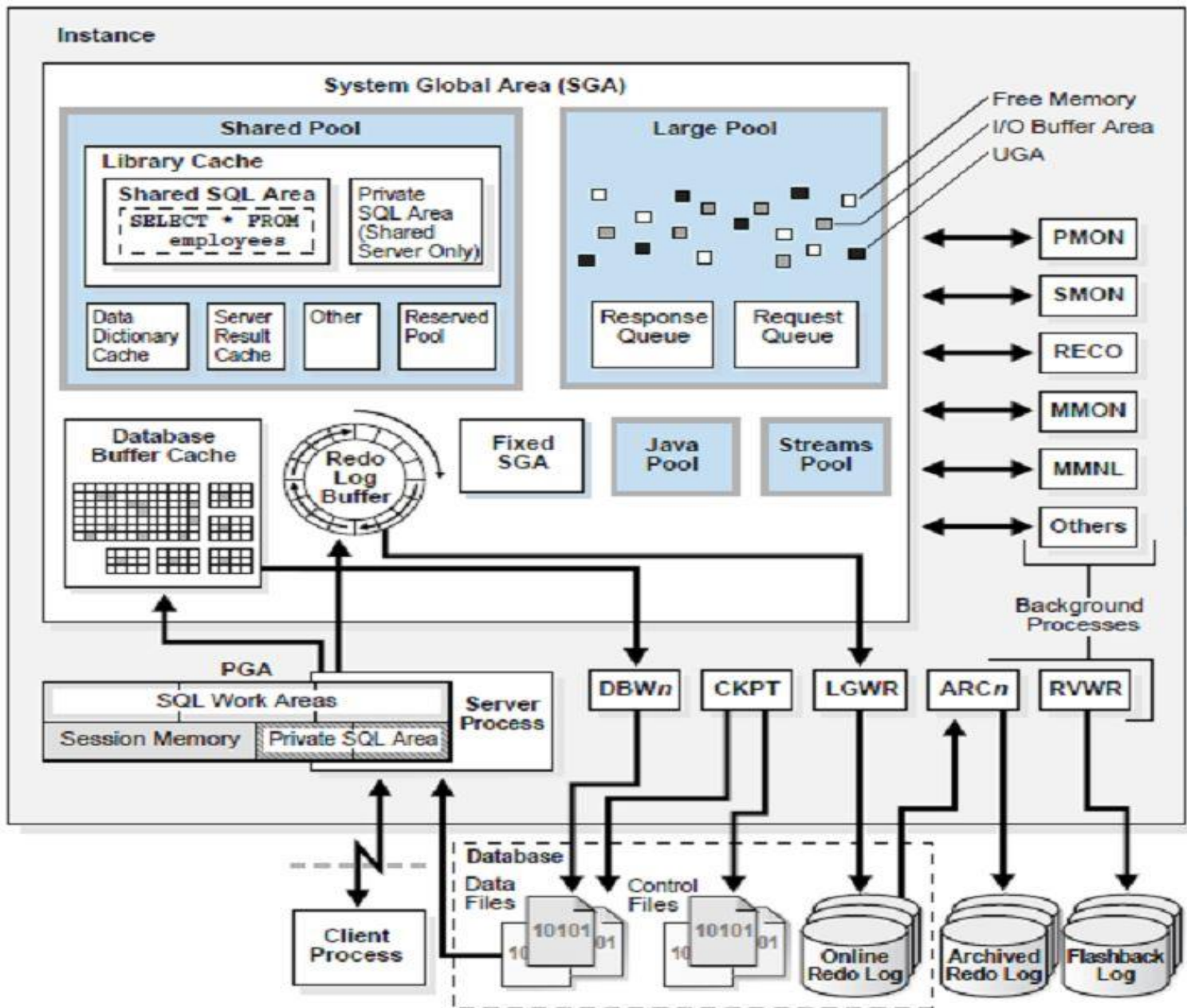
Files of a database

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 files. 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');
```

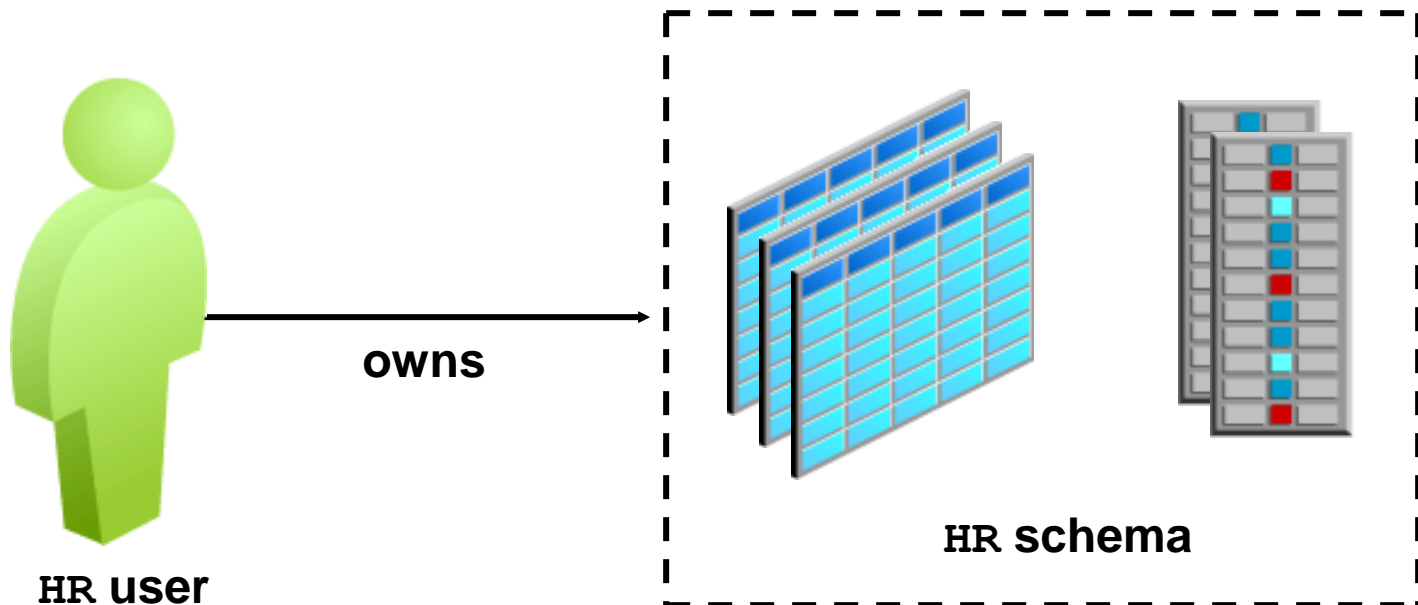
c

```
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		
Home Performance Administration Maintenance		
Schema		
Database Objects	Programs	XML Database
Tables	Packages	Configuration
Indexes	Package Bodies	Resources
Views	Procedures	Access Control Lists
Synonyms	Functions	XML Schemas
Sequences	Triggers	XMLType Tables
Database Links	Java Classes	XMLType Views
Directory Objects	Java Sources	
Reorganize Objects		
Users & Privileges	Materialized Views	BI & OLAP
Users	Materialized Views	Dimensions
Roles	Materialized View Logs	Cubes
Profiles	Refresh Groups	OLAP Dimensions
Audit Settings		Measure Folders

Tables

```
CREATE TABLE dept
```

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

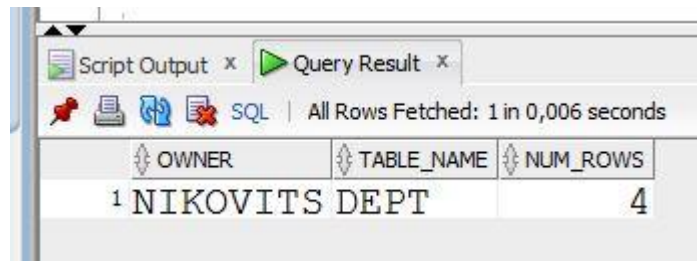
```
SELECT owner, table_name, num_rows
```

```
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

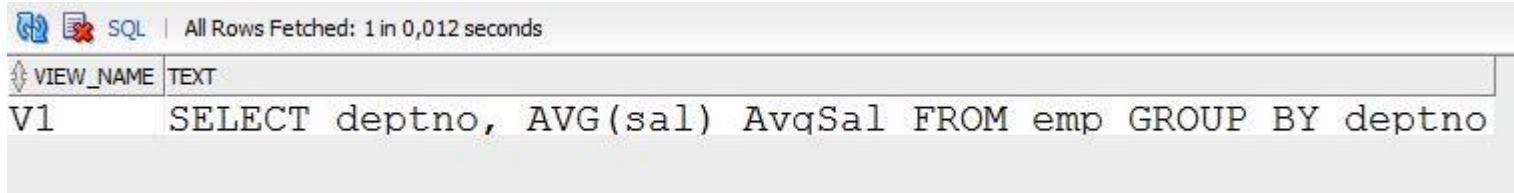
```
CREATE VIEW v1 AS
```

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

```
SELECT view_name, text
```

```
FROM DBA_VIEWS
```

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



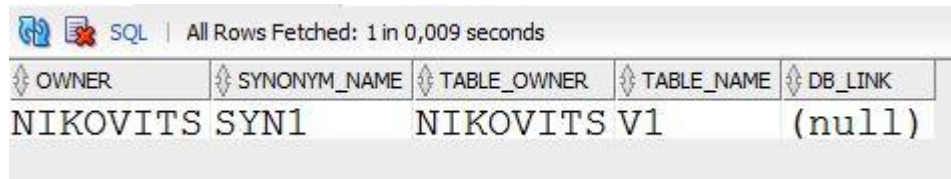
The screenshot shows a SQL query result in a database client. The top bar indicates 'All Rows Fetched: 1 in 0,012 seconds'. The result is displayed in a table with two columns: 'VIEW_NAME' and 'TEXT'. The first row shows the view name 'V1' and its definition: 'SELECT deptno, AVG(sal) AvgSal FROM emp GROUP BY deptno'.

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;
```



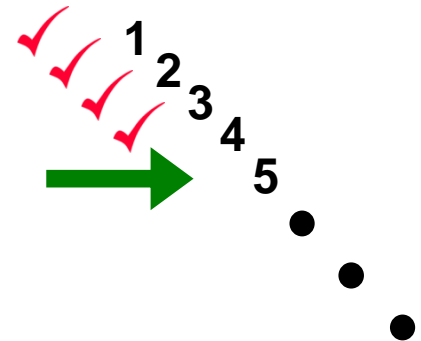
A screenshot of a SQL query result window. The title bar shows a blue icon, a red 'X' icon, and the text 'SQL | All Rows'. The table has two columns: DEPTNO and AVGSAL. The data rows show: 30, 1800 and 20, 2175.

DEPTNO	AVGSAL
30	1800
20	2175

Sequences

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

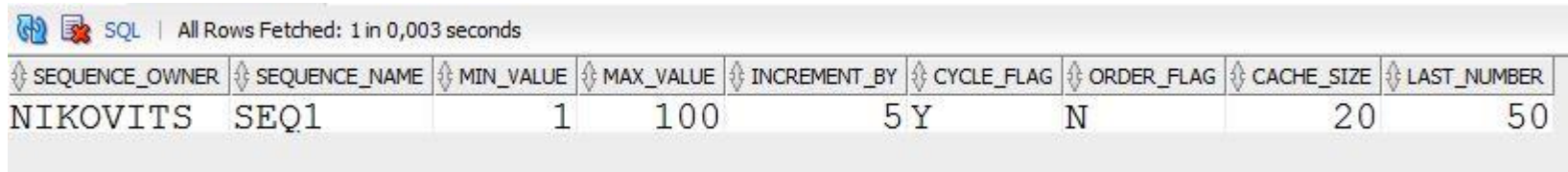
- A sequence has a name, which is how it is referenced when the next value is requested.
- A sequence is not associated with any particular table or column.
- The progression can be ascending or descending.
- The interval between numbers can be of any size.
- A sequence can cycle when a limit is reached.



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:

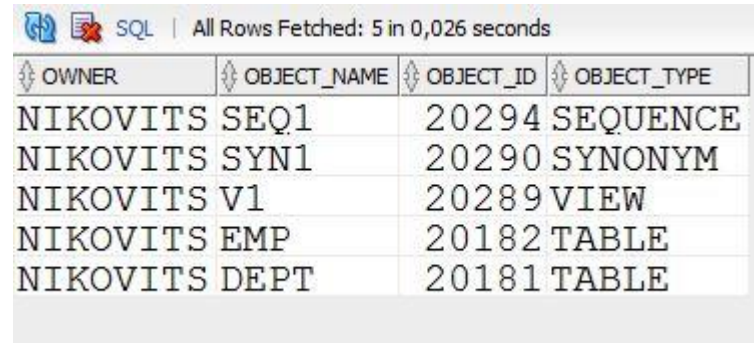
```
INSERT INTO emp(deptno, empno, ename, job, sal)
VALUES(seq1.CURRVAL, 1, 'Tailor', 'SALESMAN', 100);
```

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;
```



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