Creating Other Schema Objects

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Objectives

After completing this lesson, you should be able to do the following:

- **Create simple and complex views**
- **Retrieve data from views**
- **Create, maintain, and use sequences**
- **Create and maintain indexes**
- **Create private and public synonyms**

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Database Objects

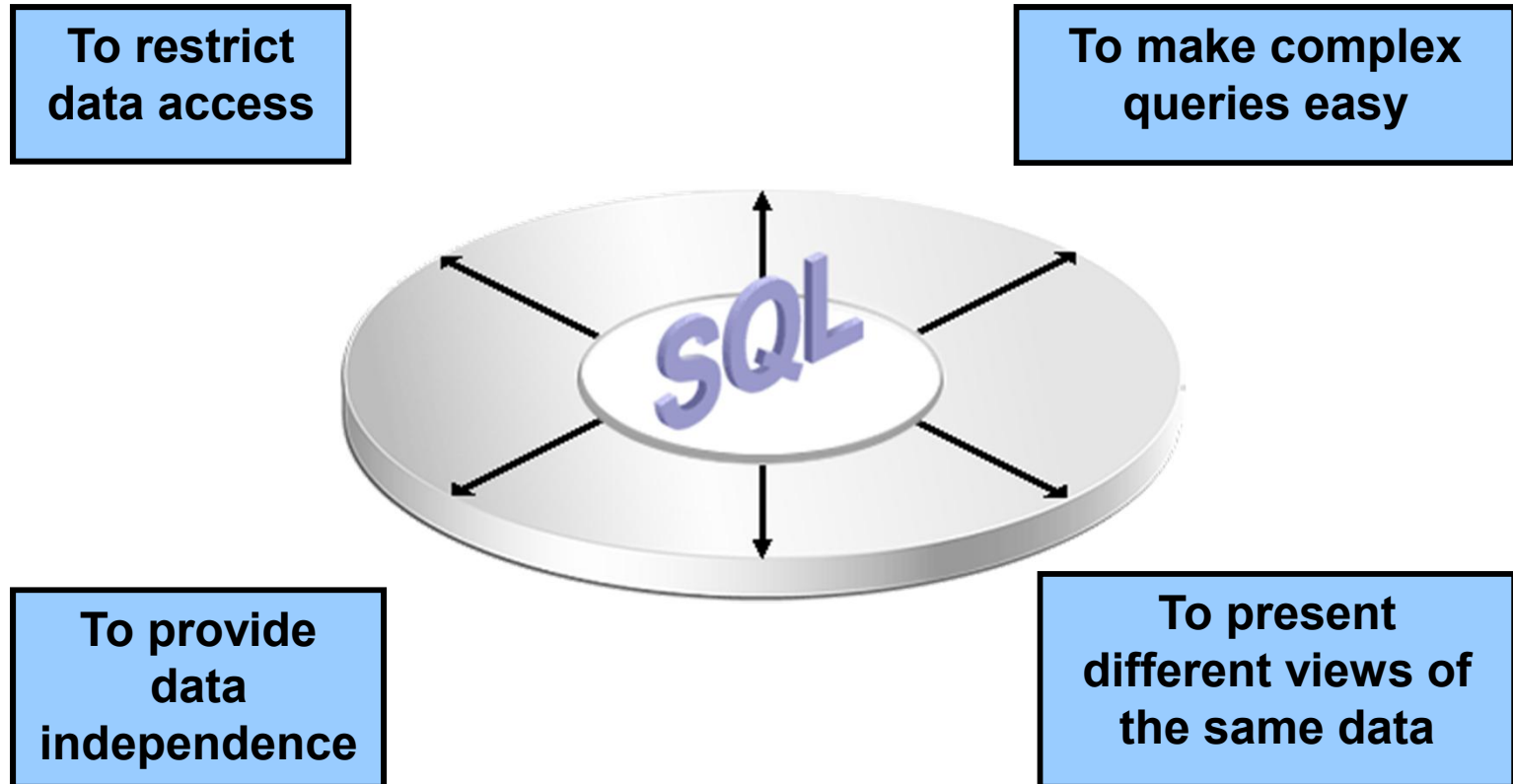| Object	Description
Table	Basic unit of storage; composed of rows
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Synonym	Gives alternative names to objects

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What Is a View?

EMPLOYEES table

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALA
100	Steven	King	SKING	515.123.4567	17-JUN-87	AD_PRES	240
101	Neena	Kochhar	NKOCHHAR	515.123.4568	21-SEP-89	AD_VP	170
102	Lex	De Haan	LDEHAAN	515.123.4569	13-JAN-93	AD_VP	170
103	Alexander	Hunold	AHUNOLD	590.423.4567	03-JAN-90	IT_PROG	90
104	Bruce	Ernst	BERNST	590.423.4568	21-MAY-91	IT_PROG	60
107	Diana	Lorentz	DLORENTZ	590.423.5567	07-FEB-99	IT_PROG	42
124	Kevin	Mourgos	KMOURGOS	650.123.5234	16-NOV-99	ST_MAN	58
141	Trenna	Rajs	TRAJS	650.121.8009	17-OCT-95	ST_CLERK	35
142	Curtis	Davies	CDAVIES	650.121.2994	29-JAN-97	ST_CLERK	31
143	Randall	Matos	RMATOS	650.121.2874	15-MAR-98	ST_CLERK	26
					JUL-96	ST_CLERK	25
					JAN-00	SA_MAN	105
					MAY-96	SA_REP	110
					MAR-98	SA_REP	86
178	Kimberely	Grant	KGRANT	011.44.1644.429263	24-MAY-99	SA_REP	70
200	Jennifer	Whalen	JWHALEN	515.123.4444	17-SEP-87	AD_ASST	44
201	Michael	Hartstein	MHARTSTE	515.123.5555	17-FEB-96	MK_MAN	130
202	Pat	Fay	PFAY	603.123.6666	17-AUG-97	MK_REP	60
205	Shelley	Higgins	SHIGGINS	515.123.8080	07-JUN-94	AC_MGR	120
206	William	Gietz	WGIETZ	515.123.8181	07-JUN-94	AC_ACCOUNT	83

EMPLOYEE_ID	LAST_NAME	SALARY
149	Zlotkey	10500
174	Abel	11000
176	Taylor	8600

20 rows selected.

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Advantages of Views

To restrict data access

To make complex queries easy

To provide data independence

To present different views of the same data

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Simple Views and Complex Views

Feature	Simple Views	Complex Views
Number of tables	One	One or more
Contain functions	No	Yes
Contain groups of data	No	Yes
DML operations through a view	Yes	Not always

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Creating a View

- **You embed a subquery in the `CREATE VIEW` statement:**

```
CREATE [OR REPLACE] [FORCE|NOFORCE] VIEW view
  [(alias[, alias]...)]
 AS subquery
[WITH CHECK OPTION [CONSTRAINT constraint]]
[WITH READ ONLY [CONSTRAINT constraint]];
```

- **The subquery can contain complex `SELECT` syntax.**

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Creating a View

- **Create the `EMPVU80` view, which contains details of employees in department 80:**

```
CREATE VIEW    empvu80
 AS SELECT    employee_id, last_name, salary
    FROM      employees
    WHERE     department_id = 80;
View created.
```

- **Describe the structure of the view by using the *i*SQL*Plus `DESCRIBE` command:**

```
DESCRIBE empvu80
```

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Creating a View

- **Create a view by using column aliases in the subquery:**

```
CREATE VIEW   salvu50
 AS SELECT   employee_id ID_NUMBER, last_name NAME,
             salary*12 ANN_SALARY
    FROM     employees
    WHERE    department_id = 50;
View created.
```

- **Select the columns from this view by the given alias names:**

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Retrieving Data from a View

```
SELECT *
FROM    salvu50;
```

ID_NUMBER	NAME	ANN_SALARY
124	Mourgos	69600
141	Rajs	42000
142	Davies	37200
143	Matos	31200
144	Vargas	30000

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Modifying a View

- **Modify the `EMPVU80` view by using a `CREATE OR REPLACE VIEW` clause. Add an alias for each column name:**

```
CREATE OR REPLACE VIEW empvu80
  (id_number, name, sal, department_id)
AS SELECT  employee_id, first_name || ' '
           || last_name, salary, department_id
  FROM     employees
  WHERE    department_id = 80;
View created.
```

- **Column aliases in the `CREATE OR REPLACE VIEW` clause are listed in the same order as the columns in the subquery.**

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Creating a Complex View

Create a complex view that contains group functions to display values from two tables:

```
CREATE VIEW   dept_sum_vu
   (name, minsal, maxsal, avgsal)
AS SELECT       d.department_name, MIN(e.salary),
              MAX(e.salary),AVG(e.salary)
   FROM        employees e, departments d
   WHERE       e.department_id = d.department_id
   GROUP BY  d.department_name;
View created.
```

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Rules for Performing
DML Operations on a View

- **You can usually perform DML operations on simple views.** ✓

- **You cannot remove a row if the view contains the following:**

  - **Group functions**

  - **A `GROUP BY` clause**

  - **The `DISTINCT` keyword**

  - **The pseudocolumn `ROWNUM` keyword**

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Rules for Performing
DML Operations on a View

You cannot modify data in a view if it contains:

- **Group functions**

- **A `GROUP BY` clause**

- **The `DISTINCT` keyword**

- **The pseudocolumn `ROWNUM` keyword**

- **Columns defined by expressions**

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Rules for Performing
DML Operations on a View

You cannot add data through a view if the view includes:

- **Group functions**
- **A `GROUP BY` clause**
- **The `DISTINCT` keyword**
- **The pseudocolumn `ROWNUM` keyword**
- **Columns defined by expressions**
- **`NOT NULL` columns in the base tables that are not selected by the view**

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Using the WITH CHECK OPTION Clause

- **You can ensure that DML operations performed on the view stay in the domain of the view by using the WITH CHECK OPTION clause:**

```
CREATE OR REPLACE VIEW empvu20
AS SELECT      *
   FROM       employees
   WHERE      department_id = 20
   WITH CHECK OPTION CONSTRAINT empvu20_ck ;
View created.
```

- **Any attempt to change the department number for any row in the view fails because it violates the WITH CHECK OPTION constraint.**

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Denying DML Operations

- You can ensure that no DML operations occur by adding the `WITH READ ONLY` option to your view definition.

- Any attempt to perform a DML operation on any row in the view results in an Oracle server error.

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Denying DML Operations

```
CREATE OR REPLACE VIEW empvu10
    (employee_number, employee_name, job_title)
AS SELECT     employee_id, last_name, job_id
   FROM       employees
   WHERE      department_id = 10
   WITH READ ONLY ;
View created.
```

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Removing a View

**You can remove a view without losing data because a
view is based on underlying tables in the database.**

```
DROP VIEW view;
```

```
DROP VIEW empvu80;
View dropped.
```

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Practice 10: Overview of Part 1

This practice covers the following topics:

- **Creating a simple view**
- **Creating a complex view**
- **Creating a view with a check constraint**
- **Attempting to modify data in the view**
- **Removing views**

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Sequences

Object	Description
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Sequences

A sequence:

- **Can automatically generate unique numbers**
- **Is a sharable object**
- **Can be used to create a primary key value**
- **Replaces application code**
- **Speeds up the efficiency of accessing sequence values when cached in memory**

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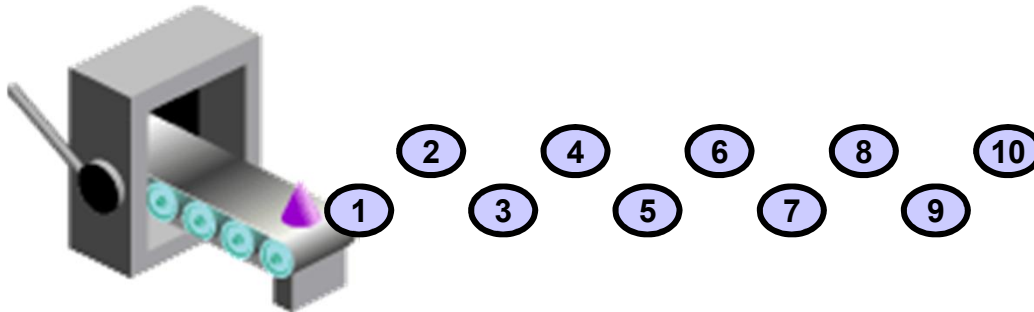
CREATE SEQUENCE Statement: Syntax

Define a sequence to generate sequential numbers automatically:

```
CREATE SEQUENCE sequence
       [INCREMENT BY n]
       [START WITH n]
       [{MAXVALUE n | NOMAXVALUE}]
       [{MINVALUE n | NOMINVALUE}]
       [{CYCLE | NOCYCLE}]
       [{CACHE n | NOCACHE}];
```

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Creating a Sequence

- **Create a sequence named `DEPT_DEPTID_SEQ` to be used for the primary key of the `DEPARTMENTS` table.**

- **Do not use the `CYCLE` option.**

```
CREATE SEQUENCE dept_deptid_seq
                INCREMENT BY 10
                START WITH 120
                MAXVALUE 9999
                NOCACHE
                NOCYCLE;
Sequence created.
```

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NEXTVAL and CURRVAL Pseudocolumns

- **NEXTVAL returns the next available sequence value. It returns a unique value every time it is referenced, even for different users.**

- **CURRVAL obtains the current sequence value.**

- **NEXTVAL must be issued for that sequence before CURRVAL contains a value.**

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Using a Sequence

- **Insert a new department named "Support" in location ID 2500:**

```
INSERT INTO departments(department_id,
          department_name, location_id)
VALUES       (dept_deptid_seq.NEXTVAL,
          'Support', 2500);
1 row created.
```

- **View the current value for the DEPT_DEPTID_SEQ sequence:**

```
SELECT    dept_deptid_seq.CURRVAL
FROM      dual;
```

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Caching Sequence Values

- **Caching sequence values in memory gives faster access to those values.**

- **Gaps in sequence values can occur when:**
  - **A rollback occurs**
  - **The system crashes**
  - **A sequence is used in another table**

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Modifying a Sequence

Change the increment value, maximum value, minimum value, cycle option, or cache option:

```
ALTER SEQUENCE dept_deptid_seq
               INCREMENT BY 20
               MAXVALUE 999999
               NOCACHE
               NOCYCLE;
Sequence altered.
```

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Guidelines for Modifying a Sequence

- You must be the owner or have the `ALTER` privilege for the sequence.

- Only future sequence numbers are affected.

- The sequence must be dropped and re-created to restart the sequence at a different number.

- Some validation is performed.

- To remove a sequence, use the `DROP` statement:

```
DROP SEQUENCE dept_deptid_seq;
Sequence dropped.
```

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Indexes

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Indexes

An index:

- **Is a schema object**
- **Is used by the Oracle server to speed up the retrieval of rows by using a pointer**
- **Can reduce disk I/O by using a rapid path access method to locate data quickly**
- **Is independent of the table that it indexes**
- **Is used and maintained automatically by the Oracle server**

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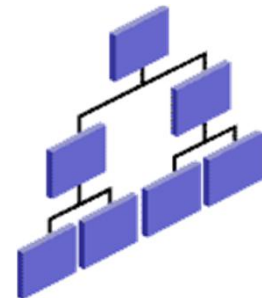
How Are Indexes Created?

- **Automatically: A unique index is created automatically when you define a `PRIMARY KEY` or `UNIQUE` constraint in a table definition.**

- **Manually: Users can create nonunique indexes on columns to speed up access to the rows.**

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Creating an Index

- **Create an index on one or more columns:**

```
CREATE INDEX index
ON table (column[, column]...);
```

- **Improve the speed of query access to the LAST_NAME column in the EMPLOYEES table:**

```
CREATE INDEX  emp_last_name_idx
ON            employees(last_name);
Index created.
```

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Index Creation Guidelines

Create an index when:	
☑	**A column contains a wide range of values**
☑	**A column contains a large number of null values**
☑	**One or more columns are frequently used together in a `WHERE` clause or a join condition**
☑	**The table is large and most queries are expected to retrieve less than 2% to 4% of the rows in the table**
Do not create an index when:	
☒	**The columns are not often used as a condition in the query**
☒	**The table is small or most queries are expected to retrieve more than 2% to 4% of the rows in the table**
☒	**The table is updated frequently**
☒	**The indexed columns are referenced as part of an expression**

Removing an Index

- **Remove an index from the data dictionary by using the `DROP INDEX` command:**

```
DROP INDEX index;
```

- **Remove the `UPPER_LAST_NAME_IDX` index from the data dictionary:**

```
DROP INDEX emp_last_name_idx;
Index dropped.
```

- **To drop an index, you must be the owner of the index or have the `DROP ANY INDEX` privilege.**

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Synonyms

Object	Description
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Synonyms

Simplify access to objects by creating a synonym (another name for an object). With synonyms, you can:

- **Create an easier reference to a table that is owned by another user**
- **Shorten lengthy object names**

```
CREATE [PUBLIC] SYNONYM synonym
FOR     object;
```

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Creating and Removing Synonyms

- **Create a shortened name for the `DEPT_SUM_VU` view:**

```
CREATE SYNONYM  d_sum
FOR  dept_sum_vu;
Synonym Created.
```

- **Drop a synonym:**

```
DROP SYNONYM d_sum;
Synonym dropped.
```

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Summary

In this lesson, you should have learned how to:

- Create, use, and remove views
- Automatically generate sequence numbers by using a sequence generator
- Create indexes to improve query retrieval speed
- Use synonyms to provide alternative names for objects

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Practice 10: Overview of Part 2

This practice covers the following topics:

- **Creating sequences**
- **Using sequences**
- **Creating nonunique indexes**
- **Creating synonyms**

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