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Other Database Objects

Objectives

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

- Describe some database objects and their uses
- Create, maintain, and use sequences
- Create and maintain indexes
- Create private and public synonyms

Database Objects

Object	Description
Table	Basic unit of storage; composed of rows and columns
View	Logically represents subsets of data from one or more tables
Sequence	Generates primary key values
Index	Improves the performance of some queries
Synonym	Alternative name for an object

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What Is a Sequence?

- Automatically generates unique numbers
- Is a sharable object
- Is typically 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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The CREATE SEQUENCE Statement

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}];
```


Creating a Sequence

- Create a sequence named DEPT_DEPTNO to be used for the primary key of the DEPT table.
- Do not use the CYCLE option.

```
SQL> CREATE SEQUENCE dept_deptno
  2      INCREMENT BY 1
  3      START WITH 91
  4      MAXVALUE 100
  5      NOCACHE
  6      NOCYCLE;
Sequence created.
```

Confirming Sequences

- Verify your sequence values in the USER_SEQUENCES data dictionary table.

```
SQL> SELECT   sequence_name, min_value, max_value,
  2           increment_by, last_number
  3  FROM     user_sequences;
```

- The LAST_NUMBER column displays the next available sequence number.

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 "MARKETING" in San Diego.

```
SQL> INSERT INTO     dept(deptno, dname, loc)
  2  VALUES          (dept_deptno.NEXTVAL,
  3                   'MARKETING', 'SAN DIEGO');
1 row created.
```

- View the current value for the DEPT_DEPTNO sequence.

```
SQL> SELECT   dept_deptno.CURRVAL
  2  FROM     dual;
```

Using a Sequence

- Caching sequence values in memory allows 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
- View the next available sequence, if it was created with NOCACHE, by querying the USER_SEQUENCES table.

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Modifying a Sequence

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

```
SQL> ALTER SEQUENCE dept_deptno
  2         INCREMENT BY 1
  3         MAXVALUE 999999
  4         NOCACHE
  5         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.

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Removing a Sequence

- Remove a sequence from the data dictionary by using the DROP SEQUENCE statement.
- Once removed, the sequence can no longer be referenced.

```
SQL> DROP SEQUENCE dept_deptno;
Sequence dropped.
```


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What Is an Index?

- Schema object
- Used by the Oracle Server to speed up the retrieval of rows by using a pointer
- Reduces disk I/O by using rapid path access method to locate the data quickly
- Independent of the table it indexes
- Automatically used and maintained 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 key constraint in a table definition.
- Manually
  - Users can create nonunique indexes on columns to speed up access time 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 on the ENAME column in the EMP table

```
SQL> CREATE INDEX    emp_ename_idx
  2  ON              emp(ename);
Index created.
```


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Guidelines to Creating an Index

- The column is used frequently in the WHERE clause or in a join condition.
- The column contains a wide range of values.
- The column contains a large number of null values.
- Two 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 2–4% of the rows.

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Guidelines to Creating an Index

Do not create an index if:

- The table is small
- The columns are not often used as a condition in the query
- Most queries are expected to retrieve more than 2–4% of the rows
- The table is updated frequently

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Confirming Indexes

- The USER_INDEXES data dictionary view contains the name of the index and its uniqueness.
- The USER_IND_COLUMNS view contains the index name, the table name, and the column name.

```
SQL> SELECT   ic.index_name, ic.column_name,
  2           ic.column_position col_pos,ix.uniqueness
  3  FROM     user_indexes ix, user_ind_columns ic
  4  WHERE    ic.index_name = ix.index_name
  5  AND      ic.table_name = 'EMP';
```


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Removing an Index

- Remove an index from the data dictionary.

```
SQL> DROP INDEX index;
```

- Remove the EMP_ENAME_IDX index from the data dictionary.

```
SQL> DROP INDEX emp_ename_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

Simplify access to objects by creating a synonym (another name for an object).

- Refer to a table 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.

```
SQL> CREATE SYNONYM d_sum
  2  FOR            dept_sum_vu;
Synonym Created.
```

- Drop a synonym.

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


Summary

- Automatically generate sequence numbers by using a sequence generator.
- View sequence information in the USER_SEQUENCES data dictionary table.
- Create indexes to improve query retrieval speed.
- View index information in the USER_INDEXES dictionary table.
- Use synonyms to provide alternative names for objects.

Practice Overview

- Creating sequences
- Using sequences
- Creating nonunique indexes
- Display data dictionary information about sequences and indexes
- Dropping indexes

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