11

Including Constraints

Objectives

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

- Describe constraints
- Create and maintain constraints

What Are Constraints?

- Constraints enforce rules at the table level.
- Constraints prevent the deletion of a table if there are dependencies.
- The following constraint types are valid in Oracle:
  - NOT NULL
  - UNIQUE Key
  - PRIMARY KEY
  - FOREIGN KEY
  - CHECK

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Constraint Guidelines

- Name a constraint or the Oracle Server will generate a name by using the SYS_C*n* format.
- Create a constraint:
  - At the same time as the table is created
  - After the table has been created
- Define a constraint at the column or table level.
- View a constraint in the data dictionary. (USER_CONSTRAINTS)

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Defining Constraints

```
CREATE TABLE [schema.]table
             (column datatype [DEFAULT expr]
             [column_constraint],
             …
             [table_constraint]);
```

```
CREATE TABLE emp(
             empno   NUMBER(4),
             ename   VARCHAR2(10),
             …
             deptno   NUMBER(7,2) NOT NULL,
             CONSTRAINT emp_empno_pk
                          PRIMARY KEY (EMPNO));
```

Defining Constraints

- Column constraint level

```
column [CONSTRAINT constraint_name] constraint_type,
```

- Table constraint level

```
column,...
  [CONSTRAINT constraint_name] constraint_type
  (column, ...),
```


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The NOT NULL Constraint

Ensures that null values are not permitted for the column

EMP

EMPNO	ENAME	JOB	...	COMM	DEPTNO
7839	KING	PRESIDENT			10
7698	BLAKE	MANAGER			30
7782	CLARK	MANAGER			10
7566	JONES	MANAGER			20
...					

NOT NULL constraint (no row may contain a null value for this column)

Absence of NOT NULL constraint (any row can contain null for this column)

NOT NULL constraint

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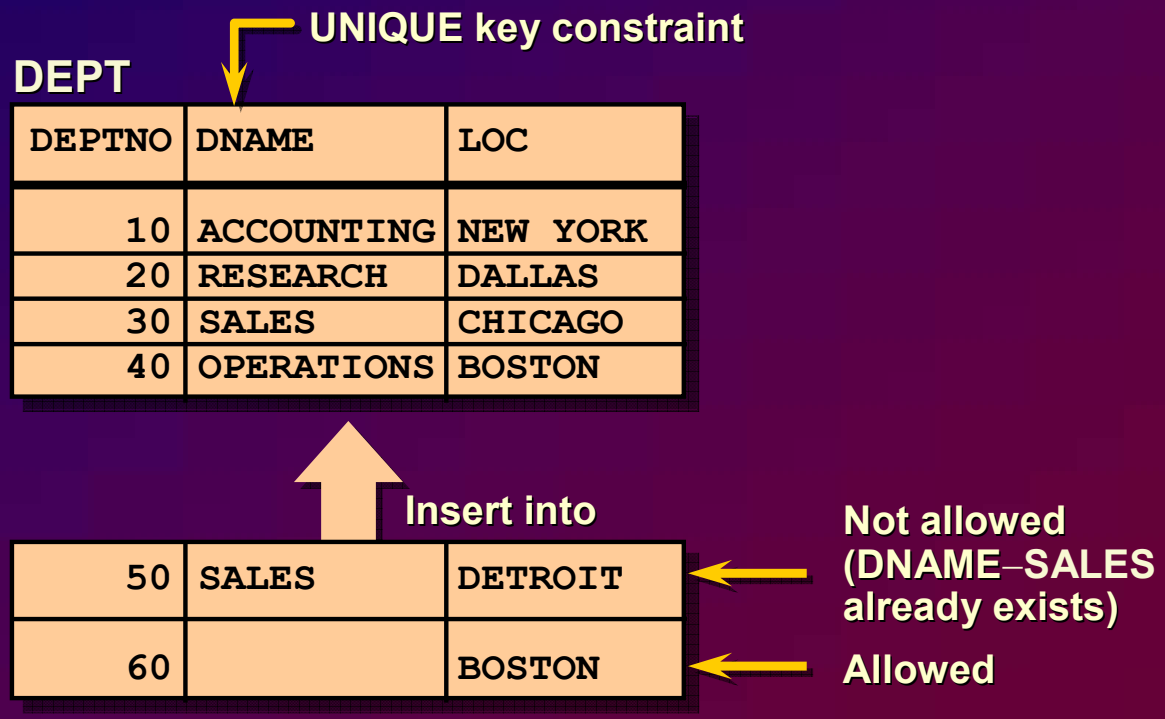
The NOT NULL Constraint

Defined at the column level

```
SQL> CREATE TABLE emp(
  2       empno     NUMBER(4),
  3       ename     VARCHAR2(10) NOT NULL,
  4       job       VARCHAR2(9),
  5       mgr       NUMBER(4),
  6       hiredate  DATE,
  7       sal       NUMBER(7,2),
  8       comm      NUMBER(7,2),
  9       deptno    NUMBER(7,2) NOT NULL);
```

The UNIQUE Key Constraint



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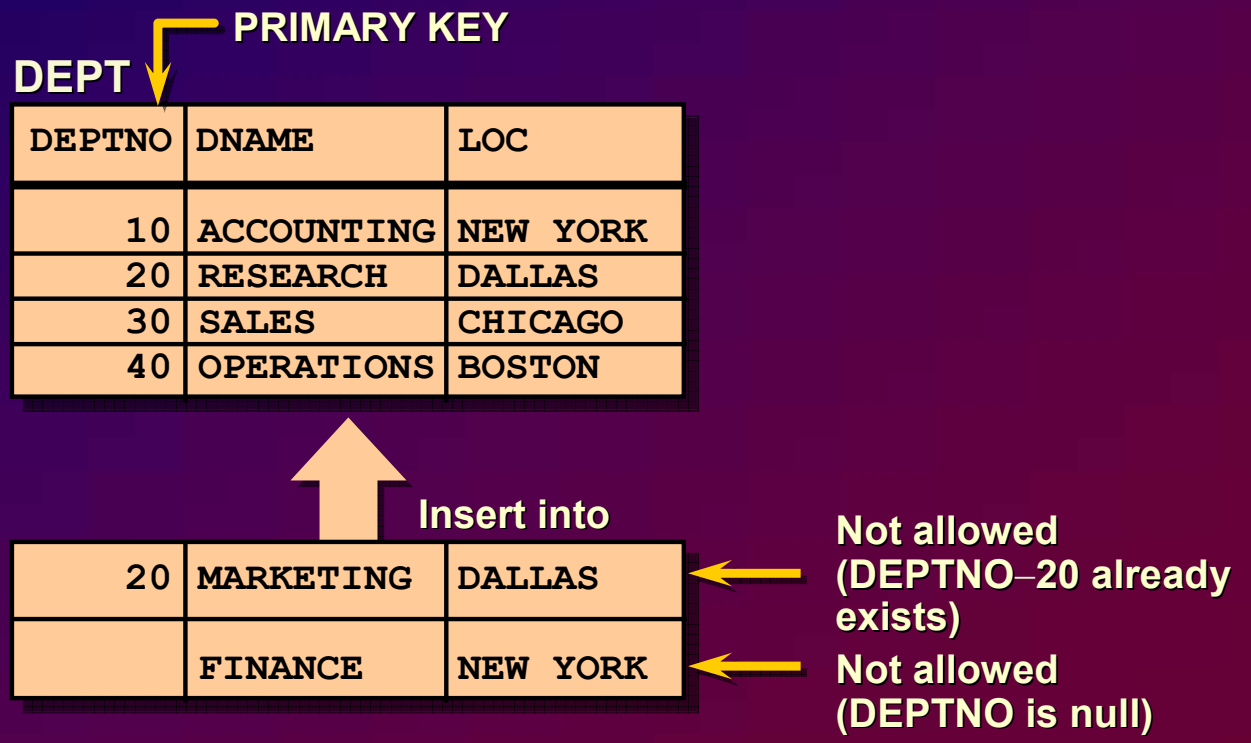
The UNIQUE Key Constraint

Defined at either the table level or the column level

```
SQL> CREATE TABLE   dept(
  2       deptno      NUMBER(2),
  3       dname       VARCHAR2(14),
  4       loc         VARCHAR2(13),
  5       CONSTRAINT dept_dname_uk UNIQUE(dname));
```

The PRIMARY KEY Constraint

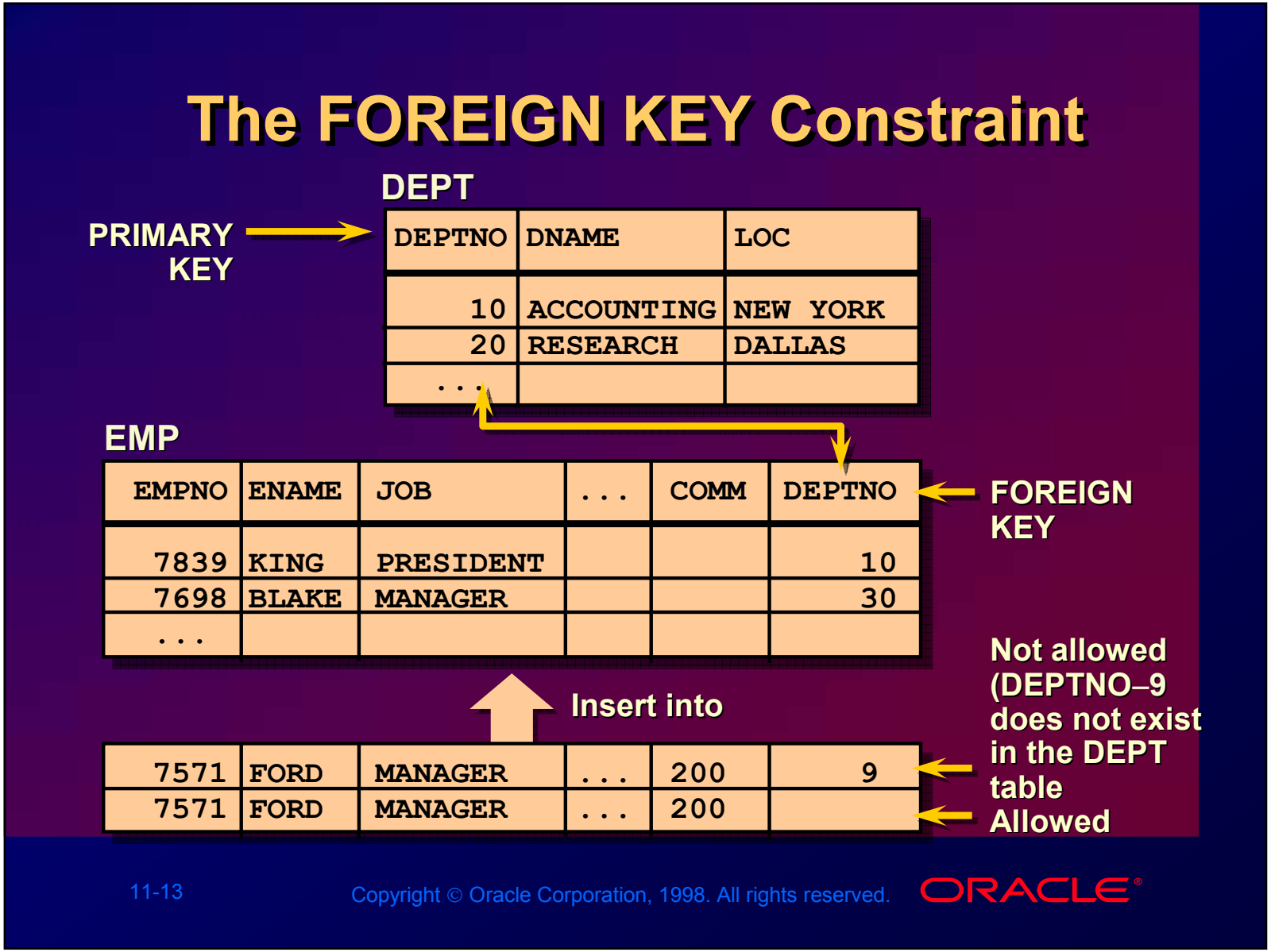


The PRIMARY KEY Constraint

Defined at either the table level or the column level

```
SQL> CREATE TABLE   dept(
  2       deptno      NUMBER(2),
  3       dname       VARCHAR2(14),
  4       loc         VARCHAR2(13),
  5       CONSTRAINT dept_dname_uk UNIQUE (dname),
  6       CONSTRAINT dept_deptno_pk PRIMARY KEY(deptno));
```

The FOREIGN KEY Constraint



The FOREIGN KEY Constraint

Defined at either the table level or the column level

```
SQL> CREATE TABLE emp(
  2       empno     NUMBER(4),
  3       ename     VARCHAR2(10) NOT NULL,
  4       job       VARCHAR2(9),
  5       mgr       NUMBER(4),
  6       hiredate  DATE,
  7       sal       NUMBER(7,2),
  8       comm      NUMBER(7,2),
  9       deptno    NUMBER(7,2) NOT NULL,
 10       CONSTRAINT emp_deptno_fk FOREIGN KEY (deptno)
 11                 REFERENCES dept (deptno));
```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FOREIGN KEY Constraint Keywords

- **FOREIGN KEY**

  Defines the column in the child table at the table constraint level

- **REFERENCES**

  Identifies the table and column in the parent table

- **ON DELETE CASCADE**

  Allows deletion in the parent table and deletion of the dependent rows in the child table

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The CHECK Constraint

- Defines a condition that each row must satisfy
- Expressions that are not allowed:
  - References to pseudocolumns CURRVAL, NEXTVAL, LEVEL, and ROWNUM
  - Calls to SYSDATE, UID, USER, and USERENV functions
  - Queries that refer to other values in other rows

```
..., deptno   NUMBER(2),
      CONSTRAINT emp_deptno_ck
           CHECK (DEPTNO BETWEEN 10 AND 99),...
```


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Adding a Constraint

```
ALTER TABLE  table
ADD [CONSTRAINT constraint] type (column);
```

- Add or drop, but not modify, a constraint
- Enable or disable constraints
- Add a NOT NULL constraint by using the MODIFY clause

Adding a Constraint

Add a FOREIGN KEY constraint to the EMP table indicating that a manager must already exist as a valid employee in the EMP table.

```
SQL> ALTER TABLE      emp
  2  ADD CONSTRAINT   emp_mgr_fk
  3           FOREIGN KEY(mgr) REFERENCES emp(empno);
Table altered.
```

Dropping a Constraint

- Remove the manager constraint from the EMP table.

```
SQL> ALTER TABLE       emp
  2  DROP CONSTRAINT   emp_mgr_fk;
Table altered.
```

- Remove the PRIMARY KEY constraint on the DEPT table and drop the associated FOREIGN KEY constraint on the EMP.DEPTNO column.

```
SQL> ALTER TABLE     dept
  2  DROP PRIMARY KEY CASCADE;
Table altered.
```

```
ALTER TABLE  table
DROP  PRIMARY KEY | UNIQUE (column) |
      CONSTRAINT  constraint  [CASCADE];
```

Disabling Constraints

- Execute the DISABLE clause of the ALTER TABLE statement to deactivate an integrity constraint.
- Apply the CASCADE option to disable dependent integrity constraints.

```
SQL> ALTER TABLE           emp
  2  DISABLE CONSTRAINT    emp_empno_pk CASCADE;
Table altered.
```

```
ALTER TABLE    table
  DISABLE  CONSTRAINT constraint [CASCADE];
```

Enabling Constraints

- Activate an integrity constraint currently disabled in the table definition by using the ENABLE clause.

```
SQL> ALTER TABLE            emp
  2  ENABLE CONSTRAINT      emp_empno_pk;
Table altered.
```

- A UNIQUE or PRIMARY KEY index is automatically created if you enable a UNIQUE key or PRIMARY KEY constraint.

Viewing Constraints

Query the USER_CONSTRAINTS table to view all constraint definitions and names.

```
SQL>  SELECT  constraint_name, constraint_type,
  2           search_condition
  3   FROM    user_constraints
  4   WHERE   table_name = 'EMP';
```

```
CONSTRAINT_NAME           C SEARCH_CONDITION
------------------------- - -------------------------
SYS_C00674                C EMPNO IS NOT NULL
SYS_C00675                C DEPTNO IS NOT NULL
EMP_EMPNO_PK              P
...
```

Viewing the Columns Associated with Constraints

View the columns associated with the constraint names in the USER_CONS_COLUMNS view

```
SQL> SELECT   constraint_name, column_name
  2  FROM     user_cons_columns
  3  WHERE    table_name = 'EMP';
```

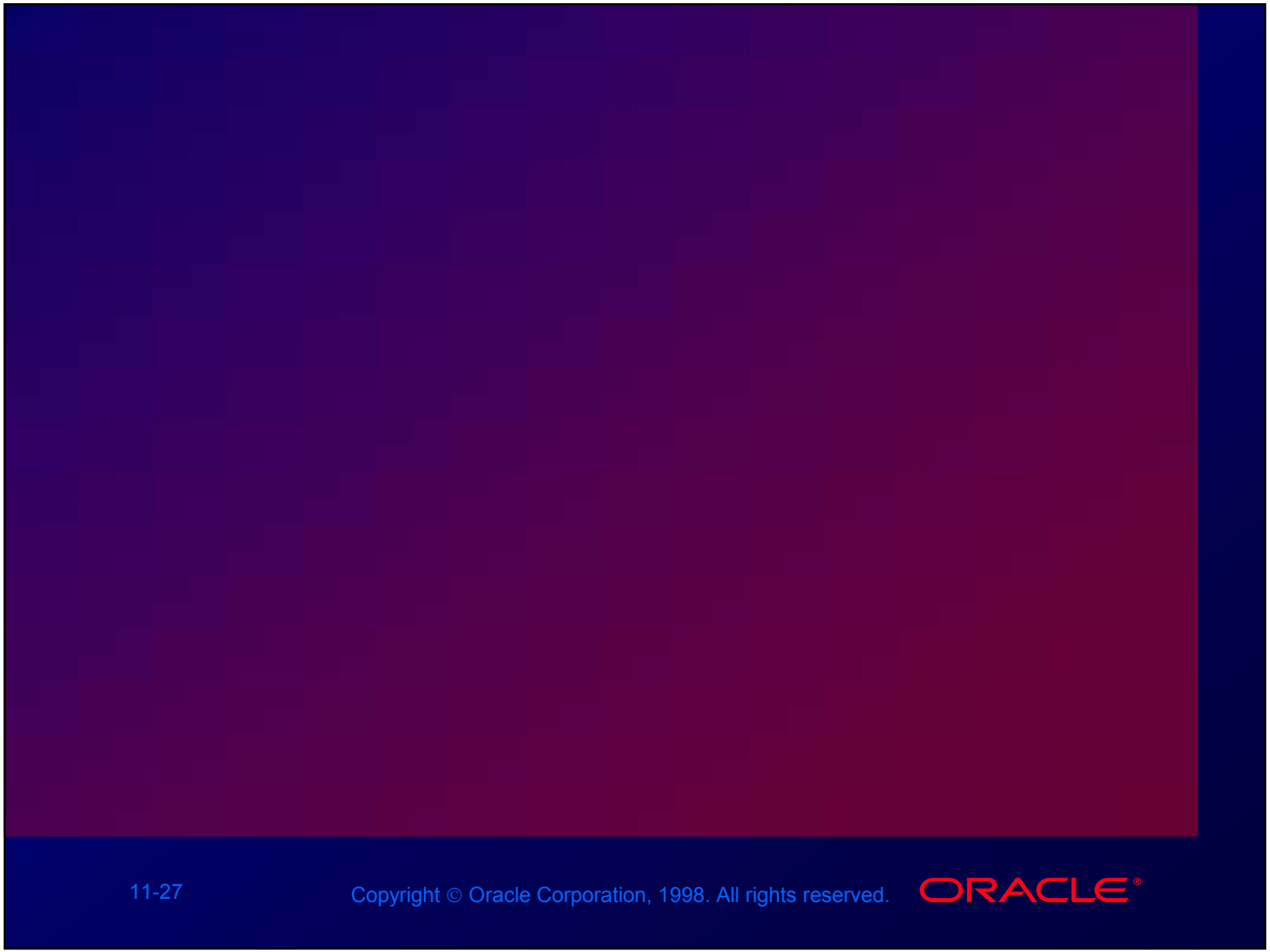
```
CONSTRAINT_NAME              COLUMN_NAME
---------------------------- --------------------
EMP_DEPTNO_FK                DEPTNO
EMP_EMPNO_PK                 EMPNO
EMP_MGR_FK                   MGR
SYS_C00674                   EMPNO
SYS_C00675                   DEPTNO
```

Summary

- Create the following types of constraints:
  - NOT NULL
  - UNIQUE key
  - PRIMARY KEY
  - FOREIGN KEY
  - CHECK
- Query the USER_CONSTRAINTS table to view all constraint definitions and names.

Practice Overview

- Adding constraints to existing tables
- Adding additional columns to a table
- Displaying information in data dictionary views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