

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**
 - **PRIMARY KEY**
 - **FOREIGN KEY**
 - **CHECK**

Constraint Guidelines

- **Name a constraint or the Oracle Server will generate a name by using the SYS_Cn 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.**

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, ...),
```

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 can contain a null value for this column)

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

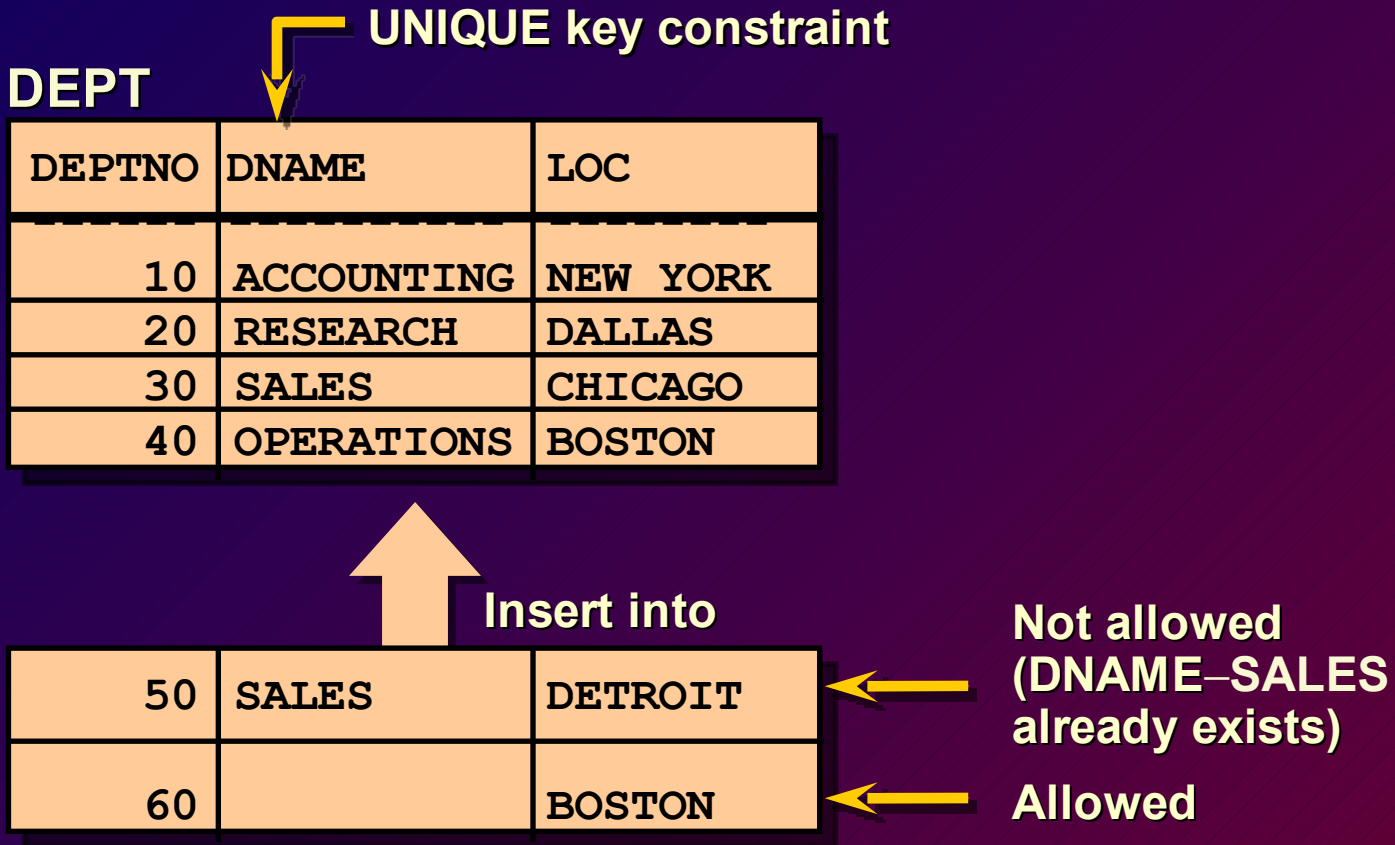
NOT NULL constraint

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




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

DEPT  **PRIMARY KEY**

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

 **Insert into**

20	MARKETING	DALLAS
	FINANCE	NEW YORK

**Not allowed (DEPTNO
–20 already exists)**

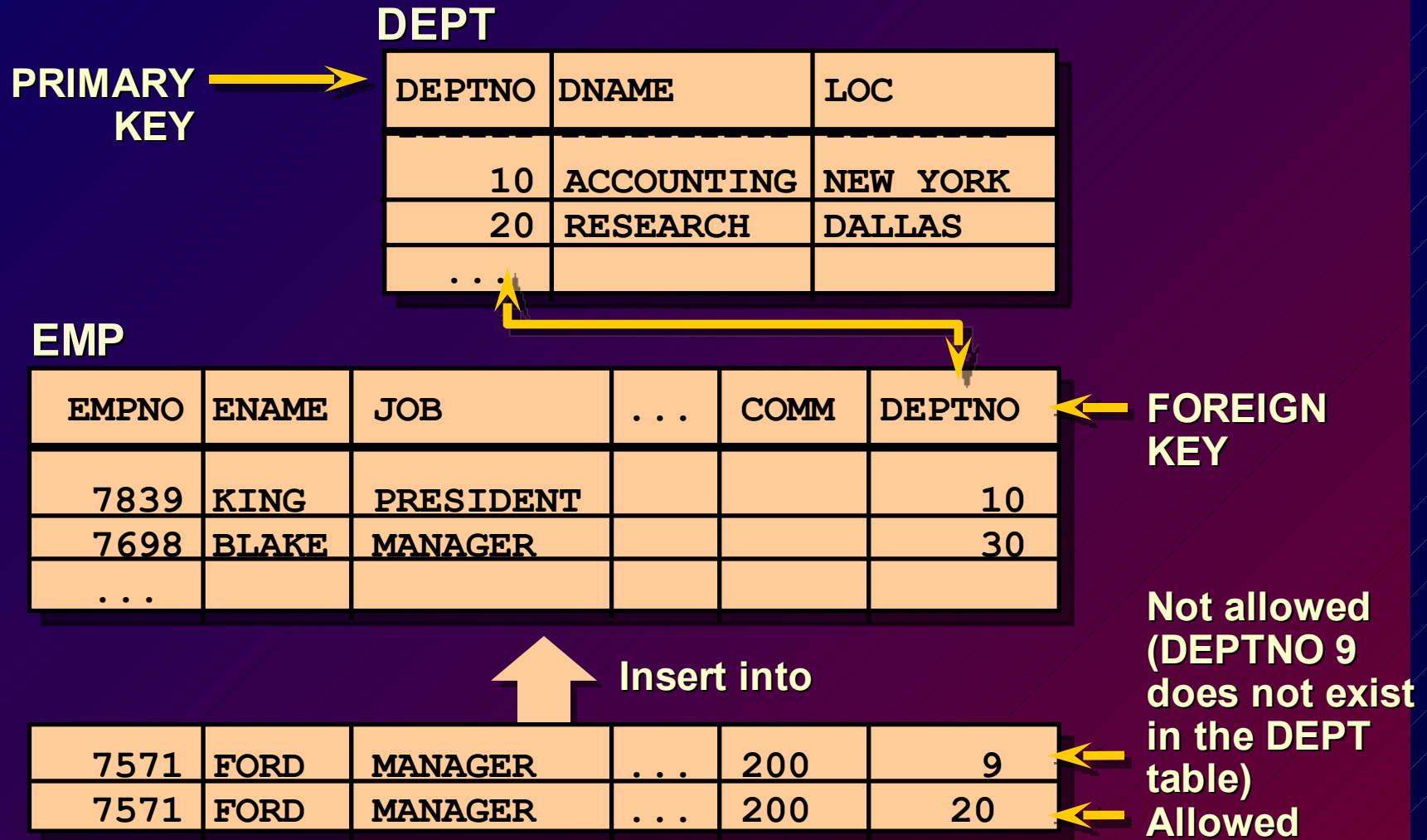
**Not allowed
(DEPTNO is null)**

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));
```

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

The CHECK Constraint

- Defines a condition that each row must satisfy
- Expressions that are not allowed:
 - References to CURRVAL, NEXTVAL, LEVEL, and ROWNUM pseudocolumns
 - 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) , ...
```


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.
```

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.
```

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**
 - **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 more columns to a table**
- **Displaying information in data dictionary views**