Session 5-3 Constraints

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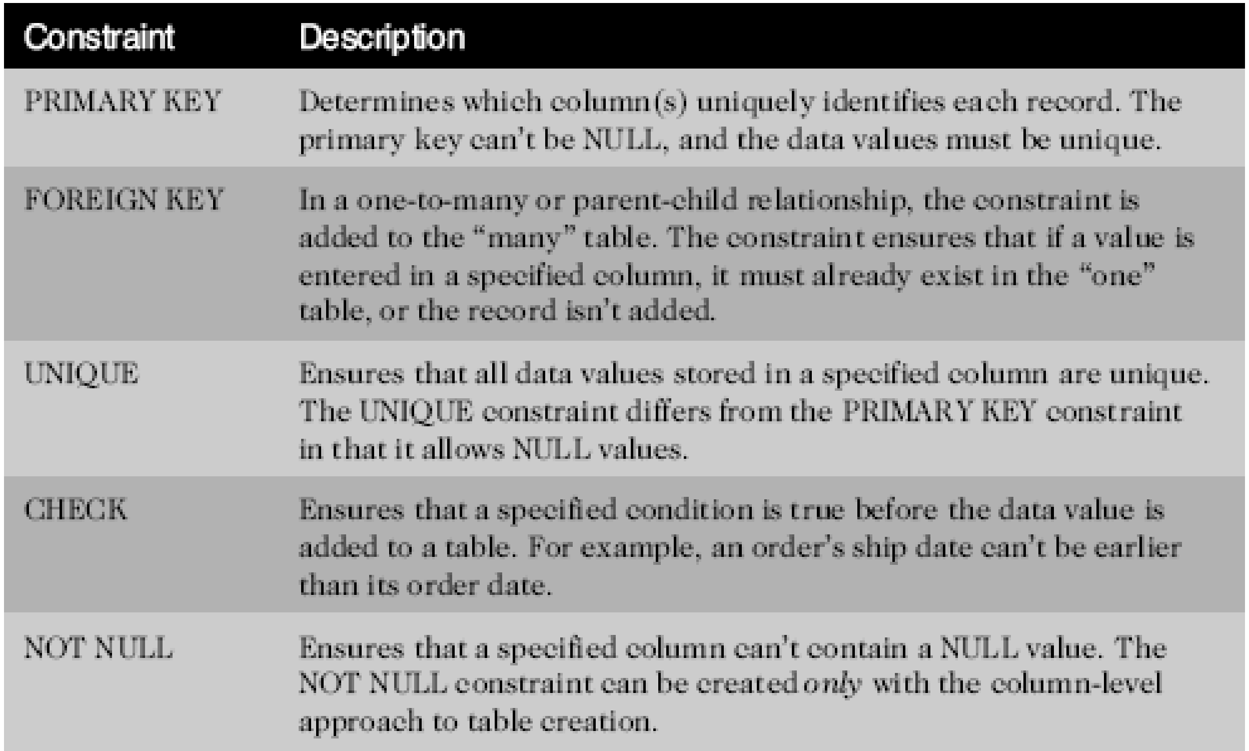
Constraints

- Rules used to enforce business rules, practices, and policies
- Rules used to ensure accuracy and integrity of data
- If a data value violates a constraint, the entire row is rejected

Constraint Types



Constraint	Description
PRIMARY KEY	Determines which column(s) uniquely identifies each record. The primary key can't be NULL, and the data values must be unique.
FOREIGN KEY	In a one-to-many or parent-child relationship, the constraint is added to the "many" table. The constraint ensures that if a value is entered in a specified column, it must already exist in the "one" table, or the record isn't added.
UNIQUE	Ensures that all data values stored in a specified column are unique. The UNIQUE constraint differs from the PRIMARY KEY constraint in that it allows NULL values.
CHECK	Ensures that a specified condition is true before the data value is added to a table. For example, an order's ship date can't be earlier than its order date.
NOT NULL	Ensures that a specified column can't contain a NULL value. The NOT NULL constraint can be created *only* with the column-level approach to table creation.

Creating Constraints

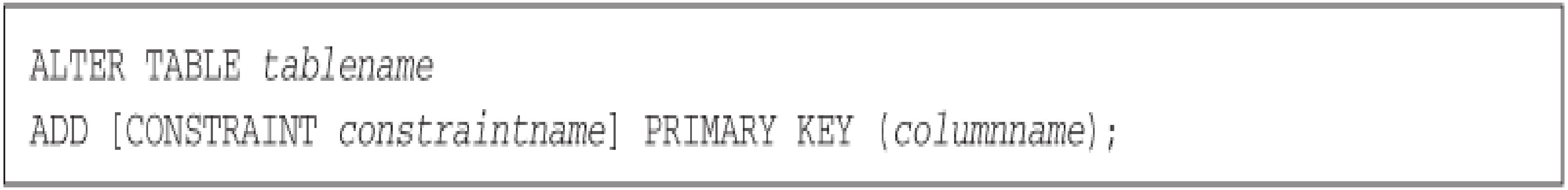
- When
  - During table creation
  - After table creation, by modifying the existing table
- How
  - Column level approach
  - Table level approach

Adding Constraints to Existing Tables

- Constraints are added to an existing table with the ALTER TABLE command
- Add a NOT NULL constraint using MODIFY clause
- All other constraints are added using ADD clause

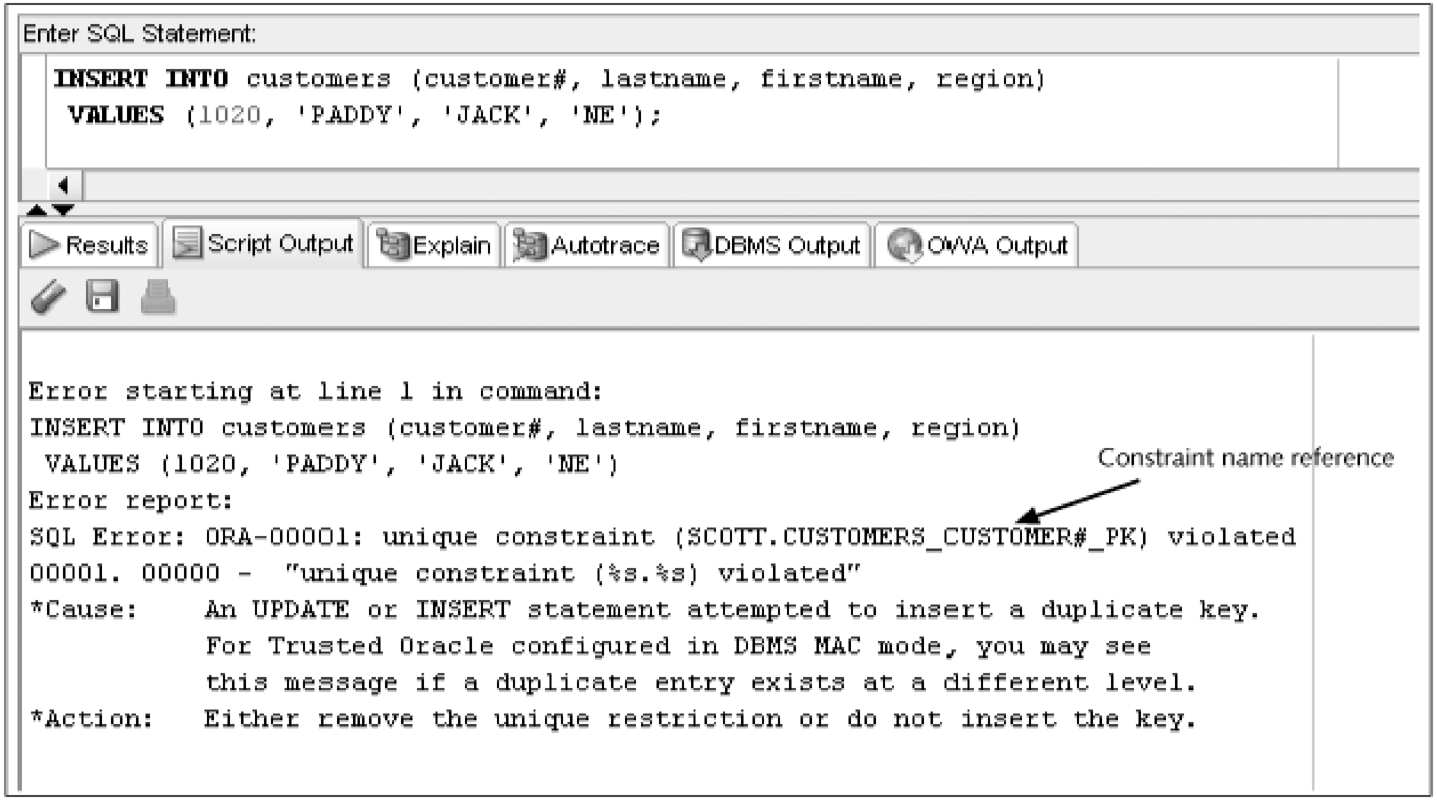
Using the PRIMARY KEY Constraint

- Ensures that columns do not contain duplicate or NULL values
- Only one per table is allowed



```
ALTER TABLE tablename
ADD [CONSTRAINT constraintname] PRIMARY KEY (columnname);
```

PRIMARY KEY Constraint Checked with Data Input



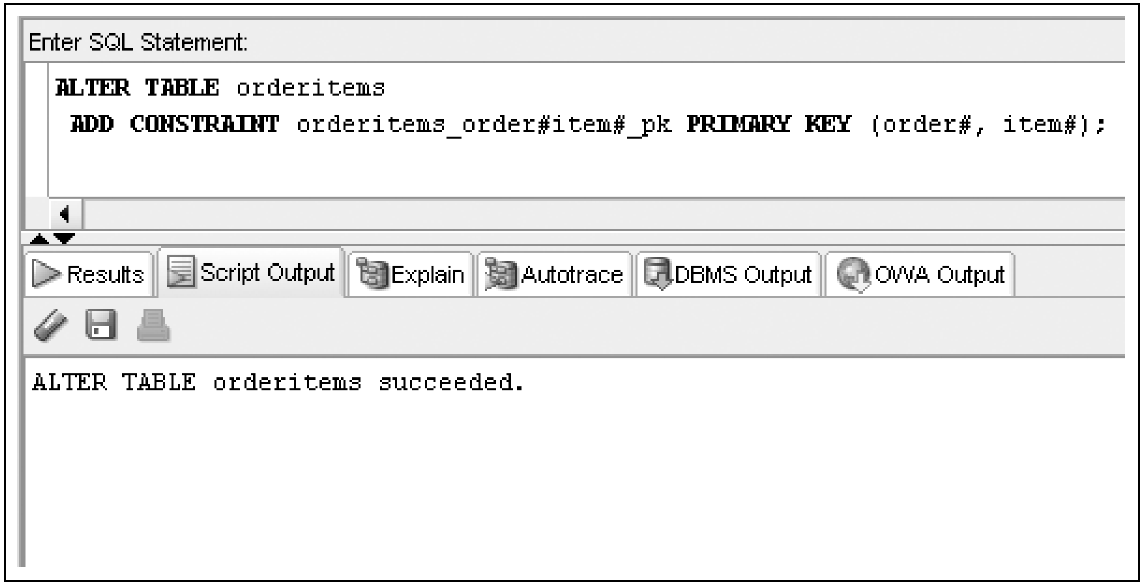
```
INSERT INTO customers (customer#, lastname, firstname, region)
 VALUES (1020, 'PADDY', 'JACK', 'NE');
```

```
Error starting at line 1 in command:
INSERT INTO customers (customer#, lastname, firstname, region)
 VALUES (1020, 'PADDY', 'JACK', 'NE')
Error report:
SQL Error: ORA-00001: unique constraint (SCOTT.CUSTOMERS_CUSTOMER#_PK) violated
00001. 00000 -  "unique constraint (%s.%s) violated"
*Cause:    An UPDATE or INSERT statement attempted to insert a duplicate key.
           For Trusted Oracle configured in DBMS MAC mode, you may see
           this message if a duplicate entry exists at a different level.
*Action:   Either remove the unique restriction or do not insert the key.
```

Constraint name reference

PRIMARY KEY Constraint for Composite Key

- List column names within parentheses separated by commas

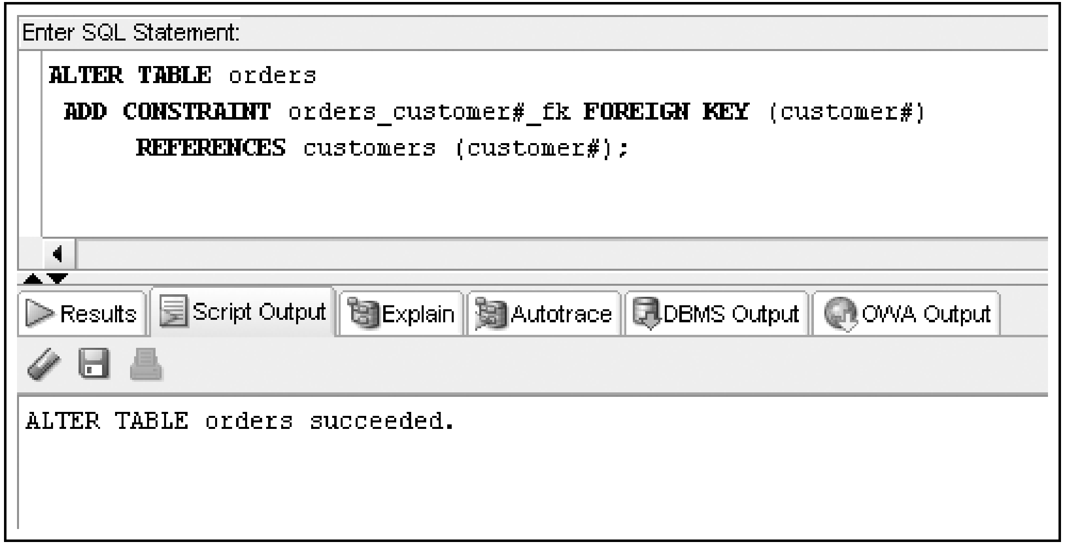


```
ALTER TABLE orderitems
 ADD CONSTRAINT orderitems_order#item#_pk PRIMARY KEY (order#, item#);
```

```
ALTER TABLE orderitems succeeded.
```

Using the FOREIGN KEY Constraint

- Enforces referential integrity (a value to exist in the referenced column of another table)
- NULL values are allowed
- Maps to the PRIMARY KEY in parent table



```
ALTER TABLE orders
 ADD CONSTRAINT orders_customer#_fk FOREIGN KEY (customer#)
      REFERENCES customers (customer#);
```

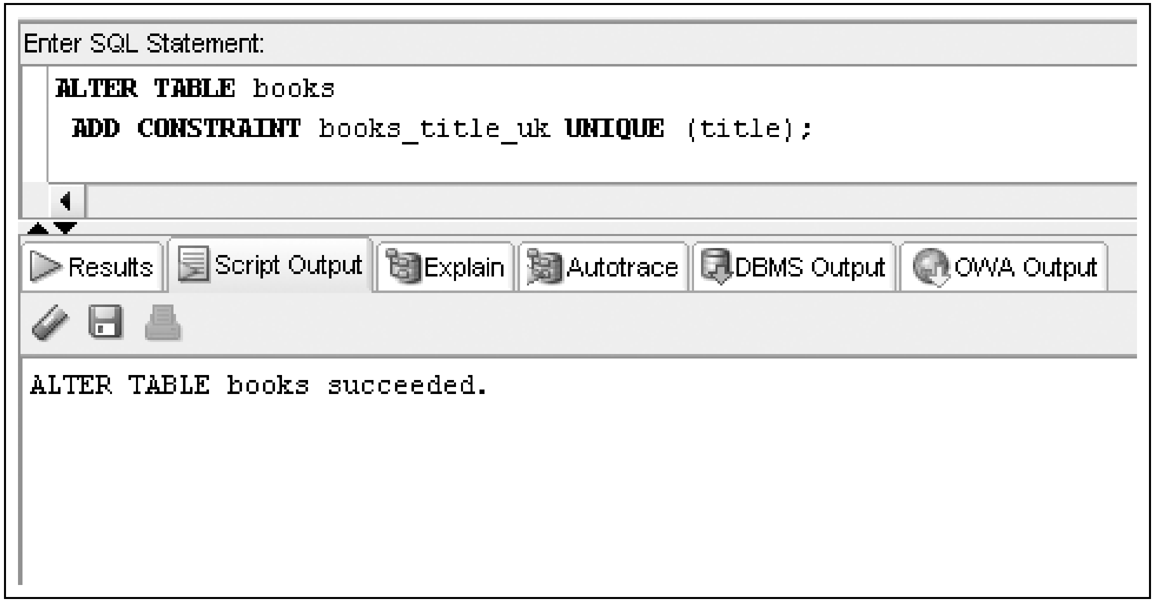
```
ALTER TABLE orders succeeded.
```

Deletion of Foreign Key Values

- You cannot delete a value in a parent table referenced by a row in a child table
- Use ON DELETE CASCADE keywords when creating FOREIGN KEY constraint – it automatically deletes a parent row when the row in a child table is deleted

Using the UNIQUE Constraint

- No duplicates are allowed in the referenced column
- NULL values are permitted

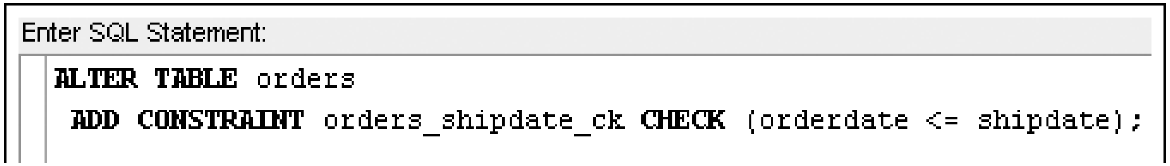


```
ALTER TABLE books
 ADD CONSTRAINT books_title_uk UNIQUE (title);
```

```
ALTER TABLE books succeeded.
```

Using the CHECK Constraint

- Updates and additions must meet specified condition



Enter SQL Statement:

```
ALTER TABLE orders
 ADD CONSTRAINT orders_shipdate_ck CHECK (orderdate <= shipdate);
```

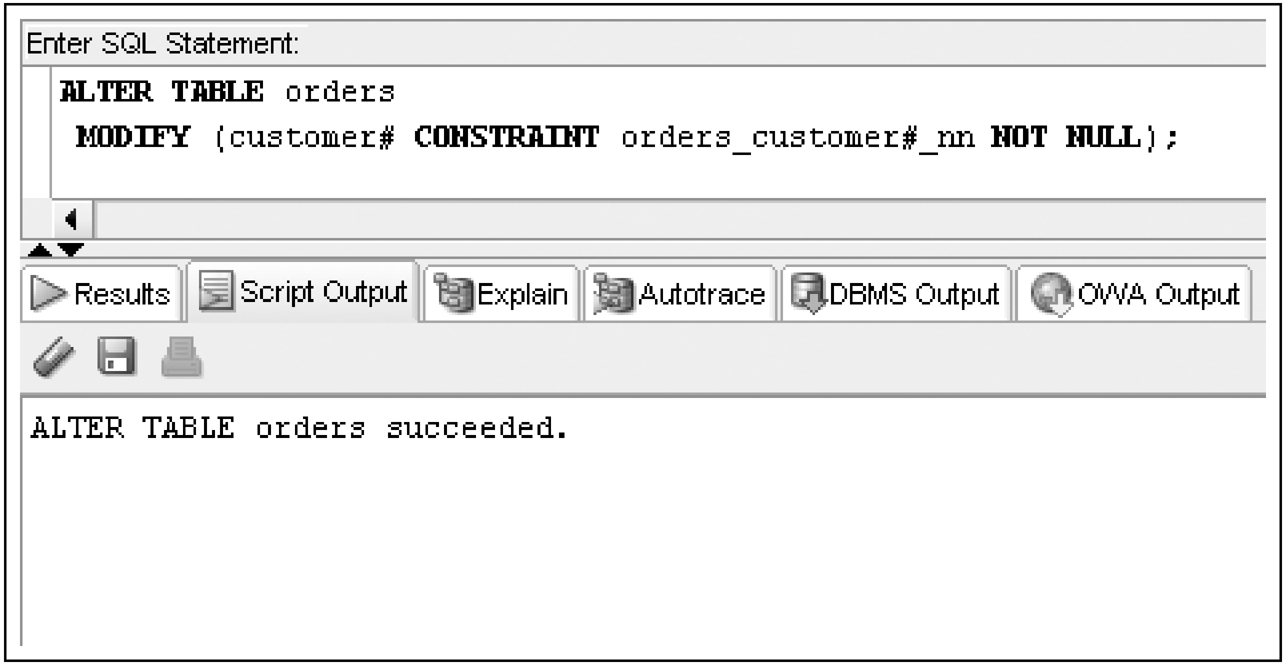
Limit possible values in a column

```
ALTER TABLE customers
ADD CONSTRAINT customers_region_ck CHECK
(region IN (‘S’, ‘W’, ’E’, ‘N’))
```

Using the NOT NULL Constraint

- The NOT NULL constraint is a special CHECK constraint with IS NOT NULL condition
- Can only be created at column level
- Included in output of DESCRIBE command
- Can only be added to an existing table using ALTER TABLE…MODIFY command

NOT NULL Constraint Example



```
ALTER TABLE orders
 MODIFY (customer# CONSTRAINT orders_customer#_nn NOT NULL);
```

```
ALTER TABLE orders succeeded.
```

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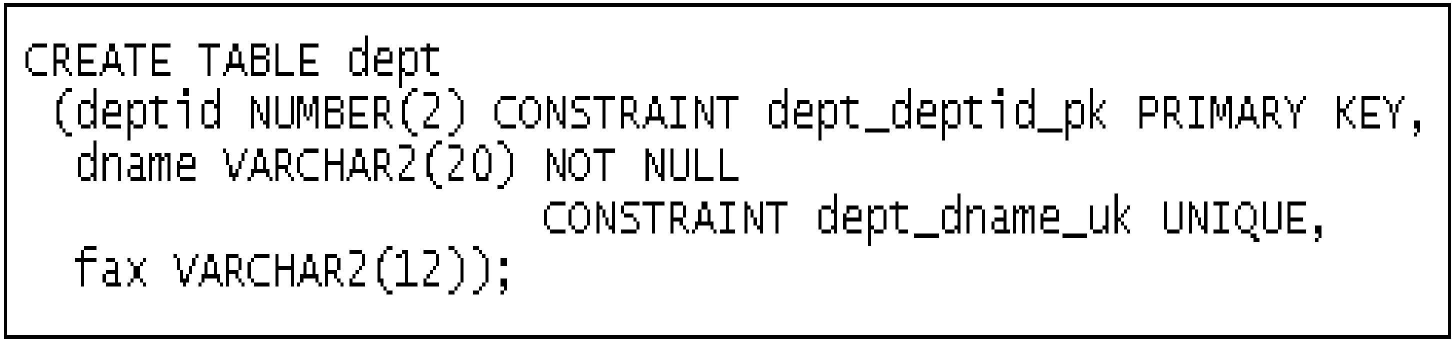
Including Constraints during Table Creation – Column Level

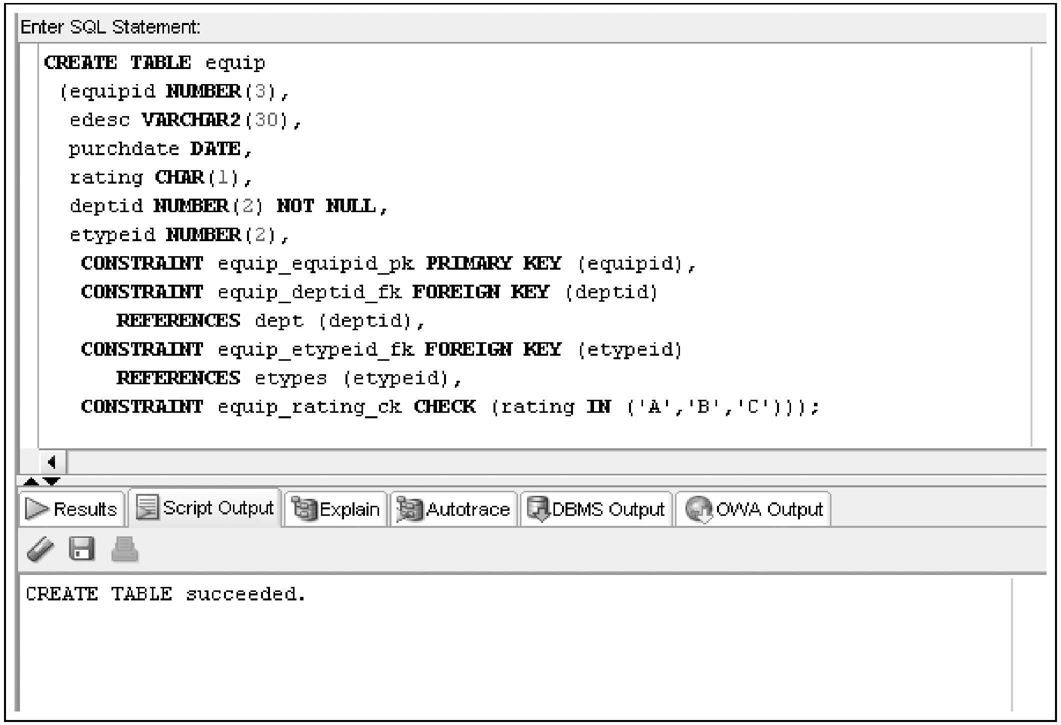
- Include in column definition



```
CREATE TABLE dept
 (deptid NUMBER(2) CONSTRAINT dept_deptid_pk PRIMARY KEY,
  dname VARCHAR2(20) NOT NULL
                     CONSTRAINT dept_dname_uk UNIQUE,
  fax VARCHAR2(12));
```

Including Constraints during Table Creation – Table Level

- Include at end of column list

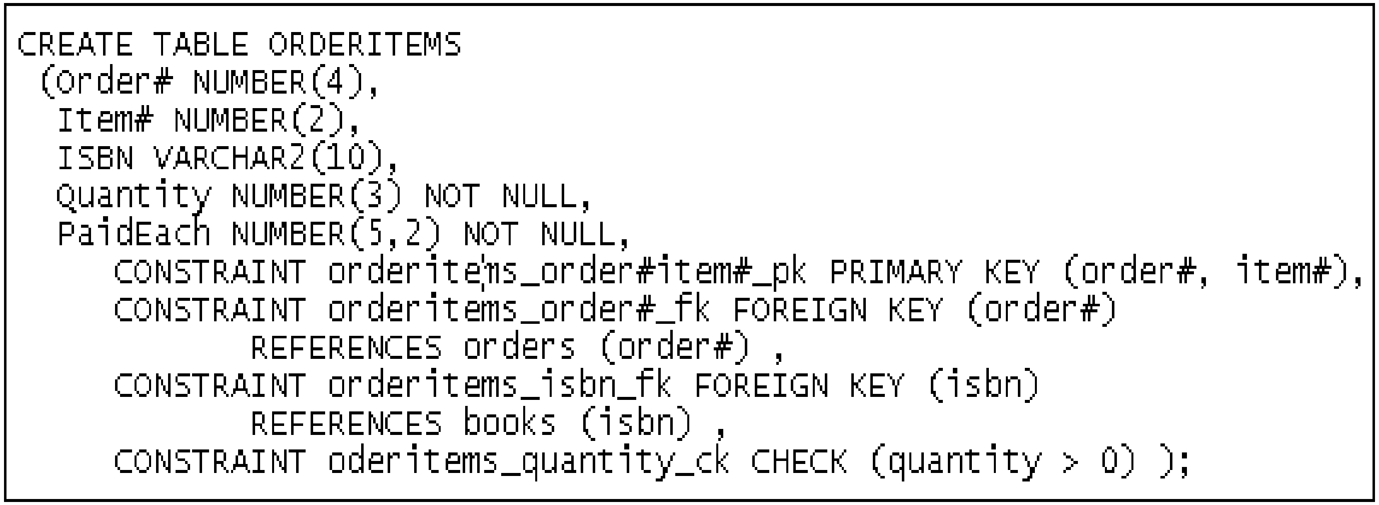


```
CREATE TABLE equip
 (equipid NUMBER(3),
  edesc VARCHAR2(30),
  purchdate DATE,
  rating CHAR(1),
  deptid NUMBER(2) NOT NULL,
  etypeid NUMBER(2),
   CONSTRAINT equip_equipid_pk PRIMARY KEY (equipid),
   CONSTRAINT equip_deptid_fk FOREIGN KEY (deptid)
      REFERENCES dept (deptid),
   CONSTRAINT equip_etypeid_fk FOREIGN KEY (etypeid)
      REFERENCES etypes (etypeid),
   CONSTRAINT equip_rating_ck CHECK (rating IN ('A','B','C')));
```

```
CREATE TABLE succeeded.
```

Multiple Constraints on a Single Column

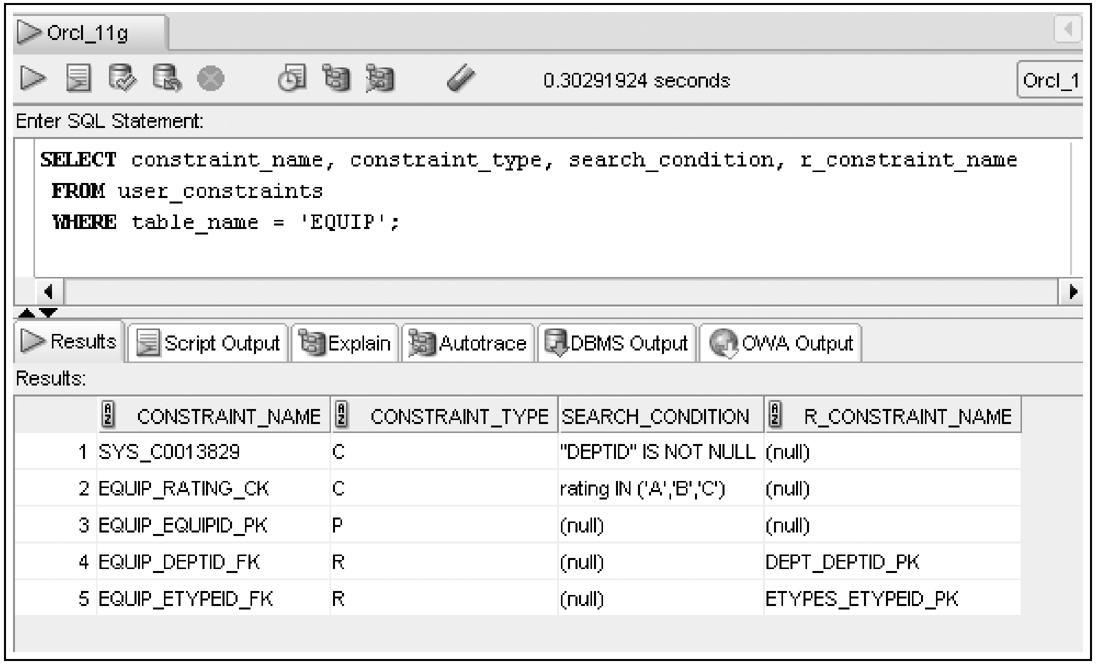
- A column may be included in multiple constraints
- The order# column is included in a primary key and a foreign key constraint



```
CREATE TABLE ORDERITEMS
 (Order# NUMBER(4),
  Item# NUMBER(2),
  ISBN VARCHAR2(10),
  Quantity NUMBER(3) NOT NULL,
  PaidEach NUMBER(5,2) NOT NULL,
     CONSTRAINT orderitems_order#item#_pk PRIMARY KEY (order#, item#),
     CONSTRAINT orderitems_order#_fk FOREIGN KEY (order#)
            REFERENCES orders (order#) ,
     CONSTRAINT orderitems_isbn_fk FOREIGN KEY (isbn)
            REFERENCES books (isbn) ,
     CONSTRAINT oderitems_quantity_ck CHECK (quantity > 0) );
```

Viewing Constraints – USER_CONSTRAINTS

- Display constraint listing for a specific table

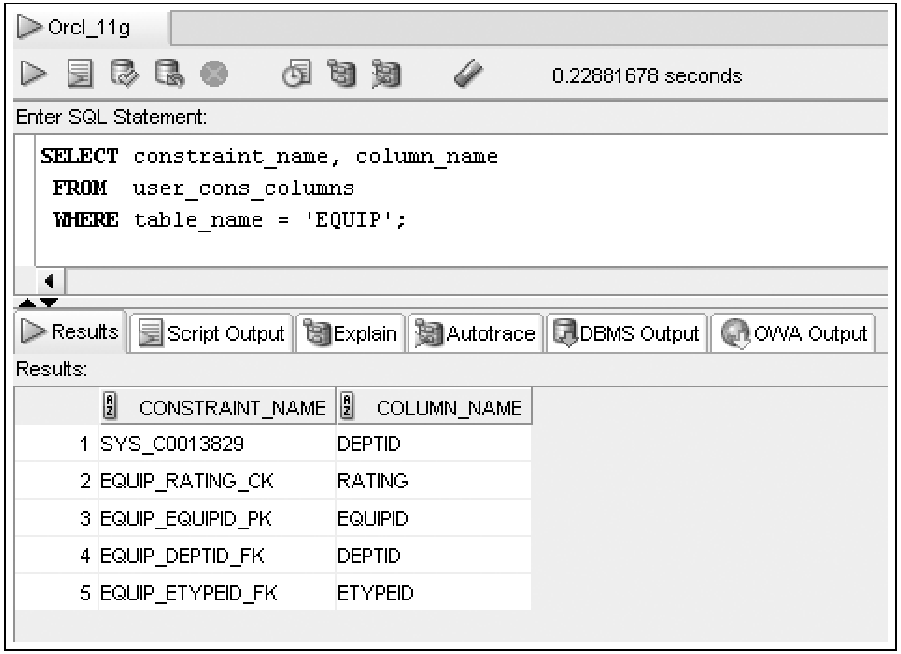


```
SELECT constraint_name, constraint_type, search_condition, r_constraint_name
 FROM user_constraints
 WHERE table_name = 'EQUIP';
```

	CONSTRAINT_NAME	CONSTRAINT_TYPE	SEARCH_CONDITION	R_CONSTRAINT_NAME
1	SYS_C0013829	C	"DEPTID" IS NOT NULL	(null)
2	EQUIP_RATING_CK	C	rating IN ('A','B','C')	(null)
3	EQUIP_EQUIPID_PK	P	(null)	(null)
4	EQUIP_DEPTID_FK	R	(null)	DEPT_DEPTID_PK
5	EQUIP_ETYPEID_FK	R	(null)	ETYPES_ETYPEID_PK

Viewing Constraints – USER_CONS_COLUMNS

- Display constraint listing by column

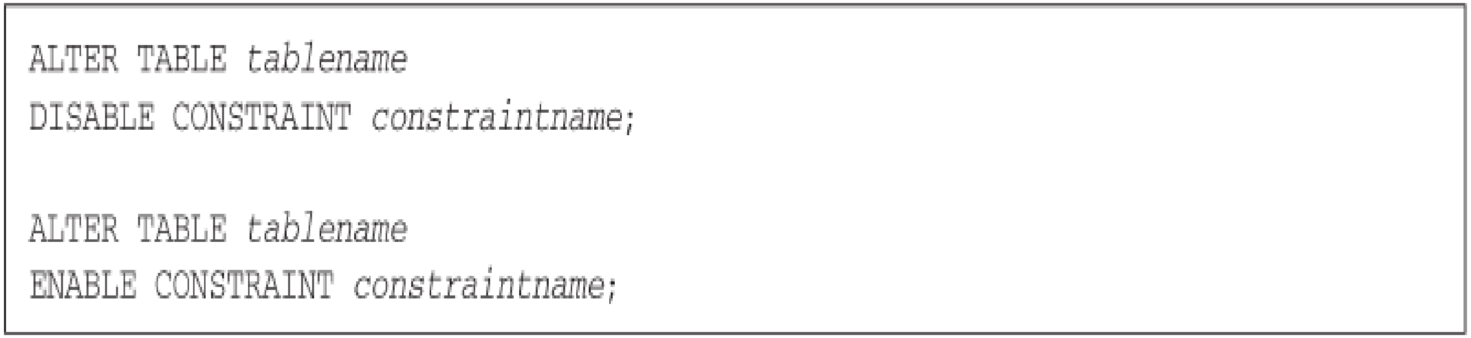


```
SELECT constraint_name, column_name
 FROM  user_cons_columns
 WHERE table_name = 'EQUIP';
```

	CONSTRAINT_NAME	COLUMN_NAME
1	SYS_C0013829	DEPTID
2	EQUIP_RATING_CK	RATING
3	EQUIP_EQUIPID_PK	EQUIPID
4	EQUIP_DEPTID_FK	DEPTID
5	EQUIP_ETYPEID_FK	ETYPEID

DISABLE/ENABLE Constraints

- Use DISABLE or ENABLE clause of ALTER TABLE command

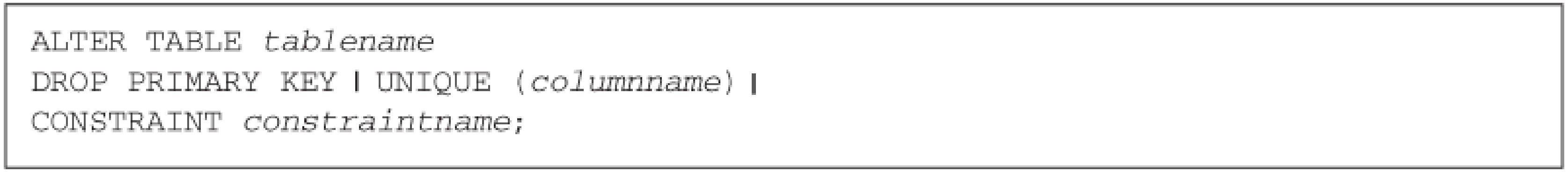


```
ALTER TABLE tablename
DISABLE CONSTRAINT constraintname;

ALTER TABLE tablename
ENABLE CONSTRAINT constraintname;
```

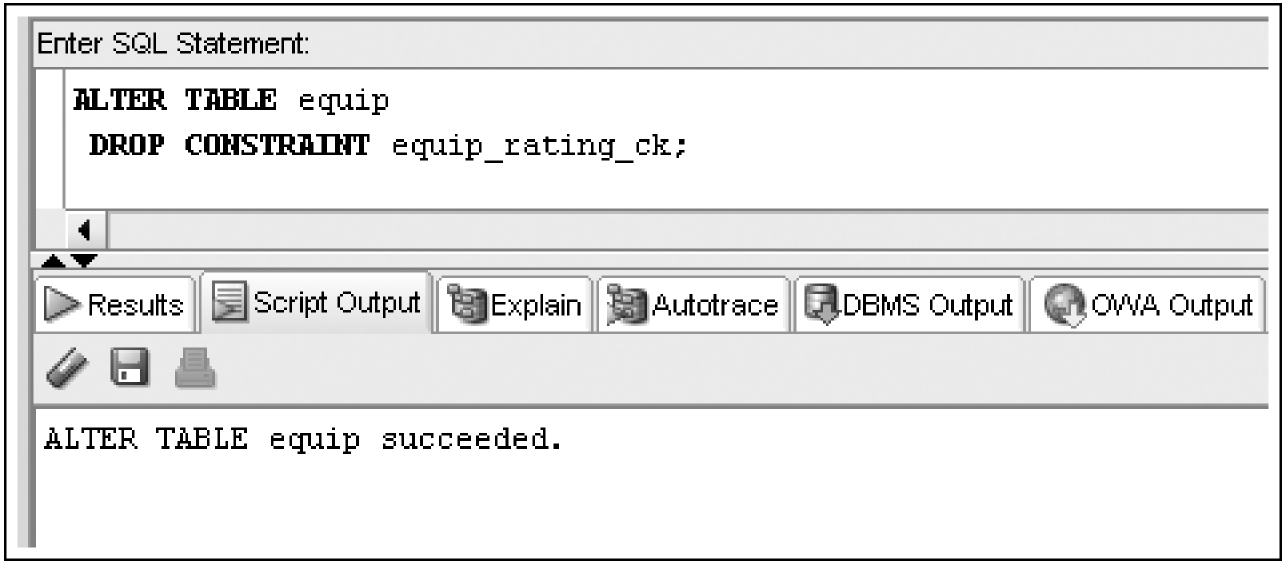
Dropping Constraints

- Constraints cannot be modified; they must be dropped and recreated
- Actual syntax depends on type of constraint
  - PRIMARY KEY – just list type of constraint
  - UNIQUE – include column name
  - All others – reference constraint name



```
ALTER TABLE tablename
DROP PRIMARY KEY | UNIQUE (columnname) |
CONSTRAINT constraintname;
```

Drop Constraint Example



```
ALTER TABLE equip
 DROP CONSTRAINT equip_rating_ck;
```

```
ALTER TABLE equip succeeded.
```

Wrap-up

- Adding constraints to columns/tables
  - Primary key
  - Foreign key
  - Unique
  - Check
  - Not null