

# **Oracle Academy**

## **Database Programming with SQL**

### **Instructor Resource Guide**

#### **Notes For PowerPoint Slides:**

#### **SECTION 8 LESSON 1 – Creating Tables**

##### **Slide 1: Creating Tables**

###### **Lesson Preparation**

The practice exercises for this section are based on tables that students create exclusively for this lesson. Tell students to be careful not to alter the other tables in their schema. Students should begin the name of each new table they create with their name or initials - - for example, "gg\_emp" or "marie\_dept."

###### **What to Watch For**

Encourage students to use naming conventions. Show them examples of good naming conventions.

Students will want to create all kinds of tables. Encourage appropriate business applications. Give extra credit for tables such as Personal CD Collection, Addresses, Rental Car Company, Collections, or tables noted in "Connections."

###### **Connections**

Using examples from data modeling, students should be able to create individual tables, add data, and execute queries. Suggested examples include: Entity Animals from Animal Shelter Activity, Entity Movies from Video Store, or Entity Members from International Oracle User's Group. There are endless examples of tables that students could make that can be found on the Internet. Ask students to bring in examples. This is a great way to practice DML and DDL statements. Encourage students to bring in interesting table ideas.

##### **Slide 2: What Will I Learn?**

**No instructor notes for this slide**

##### **Slide 3: Why Learn It?**

Point out that although the DBA will create "production" tables (tables to store real business data), application developers may also need to create their own "test" tables to hold smaller samples of data used in testing their application code.

##### **Slide 4: Tell Me / Show Me – All data in a relational database...**

Point out that although \_ (underscore) is allowed, - (hyphen or dash) is not.

Reserved words: for example, SELECT is not a valid table or column name.

##### **Slide 5: Tell Me / Show Me – It is best to use descriptive names...**

When students begin creating their own tables, it is important to reinforce naming conventions in SQL. Responsible programmers use best practices by keeping quality, performance, and maintainability in mind. It helps make code more readable and

understandable by others. To prevent frivolous examples, demonstrate to students your policy for proper naming.

**Slide 6: Tell Me / Show Me – CREATE TABLE**

Remind students that their **schema** contains all the database objects which they own (because they created them).

**Slide 7: Tell Me / Show Me – To create a new table consider the...**

Briefly review the commonly used datatypes CHAR (fixed-length character data), VARCHAR2 (variable-length character data), DATE, and NUMBER. Students will learn more datatypes in the next lesson.

**Slide 8: Tell Me / Show Me – Creating A Table Using A Subquery**

**A second method for creating a table is to ...**

Point out that parentheses can optionally be used to enclose the subquery. The first example uses them, the second does not.

The column alias ANNSAL is needed because salary\*12 is not a valid column name.

In the previous section (DML) this method was used to create the COPY\_\* tables.

**Slide 9: Tell Me / Show Me – Creating A Table Using A Subquery**

**When a copy of a table is made using ...**

**No instructor notes for this slide**

**Slide 10: Tell Me / Show Me – DATA DICTIONARY**

**What if you forget the name of one of your tables?**

**No instructor notes for this slide**

**Slide 11: Tell Me / Show Me – DATA DICTIONARY**

**The tables and views in the data dictionary...**

Metadata is a component of data that describes the data. It is "data about data." Metadata describes the content, quality, condition, and other characteristics of data. Without proper documentation, a data set is incomplete.

Students will learn about Views later in the course. For now, tell them that a View is like a pointer to a table (or a subset of a table). Use the analogy of a shortcut in Microsoft Windows.

**Slide 12: Tell Me / Show Me – DATA DICTIONARY**

Explain that the graphic shows only a very small part of the data dictionary.

**Slide 13: Tell Me / Show Me – You can query the data dictionary**

Students can use DICTIONARY like an Internet search engine. For example, to see the name and description of all dictionary views about your own tables: `SELECT * FROM DICTIONARY WHERE TABLE_NAME LIKE 'USER%TAB%';`

**Slide 14: Tell Me / Show Me – To access these tables, use the following...**

Ask students to query the data dictionary using the SQL query syntax.

**Slide 15: Tell Me /Show Me - Terminology**

Data dictionary-Created and maintained by the Oracle Server and contains information about the database

Schema-A collection of objects that are the logical structures that directly refers to the data in the database

DEFAULT-specifies a preset value if a value is omitted in the INSERT statement

Table-stores data, basic unit of storage, composed of rows and columns

CREATE TABLE-Command to create tables to store data

**Slide 16: Summary – In this lesson you have learned to:**

**No instructor notes for this slide**

**Slide 17: Summary - Practice Guide**

**No instructor notes for this slide**

## **SECTION 8 LESSON 2 – Using Data Types**

### **Slide 1: Using Data Types**

#### **What to Watch For**

The time stamp and time zone data type needs strong emphasis and repetition in coding because the concept is confusing to some students.

#### **Connections**

Relate data types to data-modeling entities. Ask students to identify the data types that would be associated with the attributes, if these attributes were those defined in a table. Use the Internet resource <http://databaseanswers.com> for examples of many different ERDs.

### **Slide 2: What Will I Learn?**

**No instructor notes for this slide**

### **Slide 3: Why Learn It?**

**No instructor notes for this slide**

### **Slide 4: Tell Me / Show Me – Each value manipulated by Oracle...**

**No instructor notes for this slide**

### **Slide 5: Tell Me / Show Me – The most commonly used column data...**

Ask a question from previous material: How do you create a table called "MyTable" with the following columns: Id, Name, Hobbies, Favorite Book, Favorite Song, and Lucky Number?

Answer: CREATE TABLE myTable  
(id NUMBER (4),  
name VARCHAR2 (15),  
hobbies VARCHAR2(30),  
favorite\_book VARCHAR2(15),  
favorite\_song VARCHAR2(15),  
lucky\_num NUMBER (3));

The list of data types may be overwhelming. Briefly review them with students. Concentrate on the most common ones: VARCHAR2, NUMBER, and DATE. The TIMESTAMP and INTERVAL data types will be explained in the rest of this lesson.

### **Slide 6: Tell Me / Show Me – DATE-TIME DATA TYPES**

Another example: TIMESTAMP(6) allows values with a precision of 1 microsecond, for example '21-AUG-2003 17:25:30.123456'.

### **Slide 7: Tell Me / Show Me – TIMESTAMP...WITH [LOCAL] ...**

**Think about the time value '17:30'.**

Discuss with students how an organization might use time stamps and time zones. Ask students the following questions to stimulate their thinking about time and its significance in business transactions. Give extra credit to students who can find a definitive answer to any one of the questions.

How do airlines schedule international flights across time zones?

If a baby is born on a ship somewhere on the ocean, how is the time recorded in an official birth database?

If you are in a rocket traveling at the speed of light, what time is it on your watch? What time is it on earth? (Possible answer: Your space clock will slow down; the earth clock remains the same.)

When is time important and when is time not important?

**Slide 8: Tell Me / Show Me – TIMESTAMP...WITH [LOCAL] ...  
TIMESTAMP WITH TIME ZONE**

**No instructor notes for this slide**

**Slide 9: Tell Me / Show Me – TIMESTAMP...WITH [LOCAL] ...  
CREATE TABLE time\_example**

You may want to demonstrate the LOCAL TIME ZONE conversion. You can simulate being in different places by altering your session's time zone. Do this by: ALTER SESSION SET TIME\_ZONE = 'EST';

**Slide 10: Tell Me / Show Me – INTERVAL DATA TYPES  
No instructor notes for this slide**

**Slide 11: Tell Me / Show Me – INTERVAL YEAR...TO MONTH  
No instructor notes for this slide**

**Slide 12: Tell Me / Show Me – INTERVAL DAY ... TO SECOND**

The DAY component can be maximum 9 digits, ie up to 999,999,999 days, so the interval value can be very large. Students may ask: so why do we need INTERVAL YEAR ... TO MONTH? Answer: because not all months contain the same number of days. If today's date is 14-Feb-2005, SYSDATE + INTERVAL '30' DAY(2) returns 16-Mar-2005, while SYSDATE + INTERVAL '1' MONTH(1) returns 14-Mar-2005, because there are 28 days in February (2005 was not a leap year).

**Slide 13: Tell Me / Show Me - Terminology**

INTERVAL YEAR TO MONTH-Allows time to be stored as an interval of years and months

BLOB-Binary large object data up to 4 gigabytes

INTERVAL DAY TO SECOND-Allows time to be stored as an interval of days to hours, minutes, and seconds

TIMESTAMP-Allows the time to be stored as a date with fractional seconds

**Slide 14: Summary – In this lesson you have learned to:  
No instructor notes for this slide**

**Slide 15: Summary - Practice Guide  
No instructor notes for this slide**

## **SECTION 8 LESSON 3 – Modifying a Table**

### **Slide 1: Modifying a Table**

**No instructor notes for this slide**

### **Slide 2: What Will I Learn?**

**No instructor notes for this slide**

### **Slide 3: Why Learn It?**

Ask students how many of them have tables in their schema that they created but no longer want or would like to change. Explain that this lesson shows them how to make changes to tables.

#### **Why Learn It?**

Students may become confused about the different effects of DDL statements versus DML statements. What's the difference between ALTER TABLE tablename and UPDATE tablename? Between DROP TABLE and DELETE FROM TABLE? It may help them to think of a table as a container (for example a bucket) and the row data as the contents (water in the bucket). DML statements change the water, but DDL statements change the container. The single exception to this analogy is TRUNCATE.

### **Slide 4: Tell Me / Show Me – ALTER TABLE**

**No instructor notes for this slide**

### **Slide 5: Tell Me / Show Me – ALTER TABLE: ADDING A COLUMN**

Point out that two or more columns can be added using a single ALTER statement.

### **Slide 6: Tell Me / Show Me – ALTER TABLE: MODIFYING A COLUMN**

**Modifying a column can include changes...**

Why can't we decrease the width of a column if it contains data? Answer: suppose a VARCHAR2(20) column could be modified to VARCHAR2(5). What would happen to data values of more than 5 characters? We would accidentally lose the later characters of the value: 'Chicago' would become 'Chica'. The Oracle database will not allow this to happen.

### **Slide 7: Tell Me / Show Me – ALTER TABLE: MODIFYING A COLUMN**

**Example: a table has been created with two columns**

Answers: 1, 3 and 4 would be allowed. 2 would not be allowed unless the last\_name column contained null values in every row or the table contained no rows.

Ask students: if the table was very large, for example 1 million rows, how long would these ALTER commands take to execute? Answer: most DDL statements execute very quickly because Oracle does not need to check or modify the row data. But 2. (reducing the size of a column) would take a long time because Oracle has to check every row to see if it contains a non-null value.

### **Slide 8: Tell Me / Show Me – ALTER TABLE: DROPPING A COLUMN**

Again, on a large table, DROP COLUMN may take a long time because the Oracle database has to modify every row to delete the column value. On the next slide, SET UNUSED shows how to avoid this delay.

### **Slide 9: Tell Me / Show Me – SET UNUSED COLUMNS**

**Dropping a column from a large table can ...**

**Demonstrate this by using SET UNUSED on a column from one of the COPY\_\* tables, then doing DESCRIBE tablename and SELECT \* FROM tablename. The unused column is invisible.**

### **Slide 10: Tell Me / Show Me – SET UNUSED COLUMNS**

#### **Example:**

Ask students: in the slide example, why couldn't we reclaim the extra disk space by ALTER TABLE copy\_f\_staffs DROP UNUSED COLUMN (manager\_budget)?

Answer: because as soon as we SET the column UNUSED, it is not visible anymore, so we cannot refer to it's (former) column name in any way.

The dictionary view USER\_UNUSED\_COL\_TABS lists tables which have had one or more of their columns SET UNUSED:

```
SELECT * FROM user_unused_col_tabs ;
```

TABLE_NAME	COUNT
-----	-----
COPY_F_STAFFS	1

### **Slide 11: Tell Me / Show Me – ALTER TABLE**

**No instructor notes for this slide**

### **Slide 12: Tell Me / Show Me – DROP TABLE**

**No instructor notes for this slide**

### **Slide 13: Tell Me / Show Me – RENAME**

**No instructor notes for this slide**

### **Slide 14: Tell Me / Show Me – TRUNCATE**

Logically, TRUNCATE TABLE tablename has exactly the same effect as DELETE FROM tablename: all the rows are deleted. And yes, TRUNCATE is much quicker than DELETE if the table contains many rows. But an unwanted DELETE can be rolled back while a TRUNCATE is irreversible.

### **Slide 15: Tell Me / Show Me – COMMENT ON TABLE**

Stress the importance of good documentation once again.

### **Slide 16: Tell Me / Show Me – COMMENT ON TABLE: EXAMPLES**

**No instructor notes for this slide**

**Slide 17: Summary – In this lesson you have learned to:**  
**No instructor notes for this slide**



## **Notes For Practice Activities:**

### **Creating Tables S08 L01**

#### ***Vocabulary***

<u>Data dictionary</u>	Created and maintained by the Oracle Server and contains information about the database
<u>Schema</u>	A collection of objects that are the logical structures that directly refers to the data in the database
<u>DEFAULT</u>	Specifies a preset value if a value is omitted in the INSERT statement
<u>Table</u>	Stores data, basic unit of storage, composed of rows and columns
<u>CREATE TABLE</u>	Command to create tables to store data

#### ***Try It / Solve It***

1.

Column Name	student_id	last_name	first_name	credits	graduation_date
Key Type	pk				
Nulls/Unique	uk				
FK Column				fk	
Data Type	NUMBER	VARCHAR2	VARCHAR2	NUMBER	DATE
Length	6	15	15	3	

2. CREATE TABLE grad\_candidates

(student\_id NUMBER(6),  
last\_name VARCHAR2(15),  
first\_name VARCHAR2(15),  
credits NUMBER (3),  
graduation\_date DATE);

3. DESCRIBE grad\_candidates;

4. CREATE TABLE smith\_table AS  
(SELECT student\_id,last\_name,  
first\_name,  
credits,  
graduation\_date  
FROM grad\_candidates);

5. INSERT INTO smith\_table (student\_id,last\_name,first\_name,credits,graduation\_date)  
VALUES ( ANSWERS WILL VARY...)

6. Make these questions that the students must answer, i.e. “what code would you use to see the names of all tables owned by you?”

To see the names of tables owned by the user (you):

```
SELECT table_name  
FROM user_tables
```

To view distinct object types owned by the user:

```
SELECT DISTINCT object_type  
FROM user_objects;
```

To view all objects owned by the user:

```
SELECT *  
FROM user_catalog;
```

## Using Datatypes S08 L02

### *Vocabulary*

<u>INTERVAL YEAR TO MONTH</u>	Allows time to be stored as an interval of years and months
<u>BLOB</u>	Binary large object data up to 4 gigabytes
<u>INTERVAL DAY TO SECOND</u>	Allows time to be stored as an interval of days to hours, minutes, and seconds
<u>TIMESTAMP</u>	Allows the time to be stored as a date with fractional seconds

### *Try It / Solve It*

Syntax for Question 1. Answers will vary.

```
1a. CREATE TABLE time_example
(order_date TIMESTAMP WITH LOCAL TIME ZONE);
INSERT INTO time_example VALUES('15-NOV-03 09:34:28 AM');
SELECT *
FROM time_example;
```

```
1b. CREATE TABLE time_example2
(loan_duration INTERVAL YEAR (3) TO MONTH);
INSERT INTO time_example2 (loan_duration)
VALUES (INTERVAL '120' month(3));
SELECT TO_CHAR(sysdate+loan_duration, 'dd-mon-yyyy')
FROM time_example2;
```

```
1c. CREATE TABLE time_example3
(day_duration INTERVAL DAY (3) TO SECOND);
INSERT INTO time_example3 (day_duration)
VALUES (INTERVAL '180' day(3));
SELECT sysdate + day_duration "Half Year"
FROM time_example3;
```

3 Answers may vary – Airlines and departure and arrival times.  
Phoning home from abroad – knowing whether you will disturb some ones sleep!.  
Investment banking – knowing when other markets are opening and closing.

## Modifying A Table S08 L03

### *Try It / Solve It*

If students have not already created the o\_employees, o\_departments, and o\_jobs tables they should create them using the four steps outlined in the practice.

1. Create the three o\_tables -- jobs, employees, and departments -- using the syntax:

```
CREATE TABLE o_jobs AS (SELECT * FROM jobs);
CREATE TABLE o_employees AS (SELECT * FROM employees);
CREATE TABLE o_departments AS (SELECT * FROM departments);
```

2. Add the Human Resources job to the jobs table:

```
INSERT INTO o_jobs (job_id, job_title, min_salary, max_salary)
VALUES('HR_MAN', 'Human Resources Manager', 4500, 5500);
```

3. Add the three new employees to the employees table:

```
INSERT INTO o_employees (employee_id, first_name, last_name, email, hire_date,
job_id)
VALUES(210, 'Ramon', 'Sanchez', 'RSANCHEZ', SYSDATE, 'HR_MAN');
```

4. Add Human Resources to the departments table:

```
INSERT INTO o_departments(department_id, department_name)
VALUES (210,'Human Resources');
```

1. It is important to be able to modify a table because the requirements of a business may change or to remedy mistakes that may have been made.

2. Explain to students how you want the DJ on Demand artist's table assignment to be completed. Students should be able to list the term followed by the SQL statement they used. For example:

```
CREATE TABLE artists
(artist_id NUMBER(4),
first_name VARCHAR2 (15),
last_name VARCHAR2 (15),
band_name VARCHAR2 (15),
email VARCHAR2(15),
hourly_rate NUMBER (8),
song_id NUMBER(5));
```

a, b & c answers may vary

3. ALTER TABLE o\_employees

```
ADD (termination VARCHAR2(20) DEFAULT TO_CHAR(SYSDATE, 'Month
ddth, YYYY'));
```

4. ALTER TABLE o\_employees

ADD start\_date TIMESTAMP WITH LOCAL TIME ZONE;

5. TRUNCATE TABLE o\_job\_description;

The TRUNCATE TABLE command removes all rows from the table and releases storage space used by the table.

6. TRUNCATE removes the data from a table and releases storage space, but it does not create any rollback information.

DELETE removes the data from a table but *does* generate rollback information

DROP removes the table.

7.

- You can increase the width or precision of a numeric column.

- You can increase the width of a character column.

- You can decrease the width of a column only if the column contains only null values or if the table has no rows.

- You can change the data type only if the column contains null values.

- You can convert a CHAR column to VARCHAR2 or convert a VARCHAR2 column to CHAR only if the column contains null values or if you do not change the size.

- A change to the DEFAULT value of a column affects only later insertions to the table.

8. COMMENT ON TABLE o\_jobs

IS 'New job description added';

SELECT \*

FROM USER\_TAB\_COMMENTS;

9. RENAME o\_jobs to o\_job\_description;