



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

**SCHOOL OF COMPUTING**  
**SESSION 2023/2024, SEMESTER 3**  
**SECD2523 - DATABASE**  
**SECTION 10**

**SQL LAB 4 - DML3 PART1 & 2**

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## Section 6 Lesson 9 Exercise 1: Joining Tables Using JOIN

Write SELECT Statements Using Data From Multiple Tables Using Equijoins and Non-Equijoins (S6L9 Objective 1)

In this exercise you will write SELECT statements to access data from more than one table.

### Part 1: Creating Natural Joins.

1. Display all of the information about sales representatives and their addresses using a natural join.

The screenshot shows the APEX SQL Workshop interface. The SQL command entered is:

```
1 SELECT *
2 FROM sales_representatives
3 NATURAL JOIN sales_rep_addresses;
```

The results tab shows the following data:

| ID   | EMAIL           | FIRST_NAME | LAST_NAME | PHONE_NUMBER | COMMISSION_RATE | SUPERVISOR_ID | ADDRESS_LINE_1  | ADDRESS_LINE_2 | CITY    | ZIP_CODE |
|------|-----------------|------------|-----------|--------------|-----------------|---------------|-----------------|----------------|---------|----------|
| sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   | 10              | sr01          | 12 Cherry Lane  | Denton         | Detroit | DT48211  |
| sr02 | vwright@obl.com | Victoria   | Wright    | 0134598762   | 5               | sr01          | 87 Blossom Hill | Uptown         | Detroit | DT52314  |
| sr03 | bspeed@obl.com  | Barry      | Speed     | 0134598763   | 5               | sr01          | 12 Junction Row | Skinflats      | Detroit | DT52564  |

4 rows returned in 0.05 seconds. Download

2. Adapt the query from the previous question to only show the id, first name, last name, address line 1, address line 2, city, email and phone\_number for the sales representatives.

The screenshot shows the APEX SQL Workshop interface. The SQL command entered is:

```
1 SELECT id, first_name, last_name, address_line_1, address_line_2, city, email, phone_number
2 FROM sales_representatives
3 NATURAL JOIN sales_rep_addresses;
```

The results tab shows the following data:

| ID   | FIRST_NAME | LAST_NAME | ADDRESS_LINE_1  | ADDRESS_LINE_2 | CITY    | EMAIL           | PHONE_NUMBER |
|------|------------|-----------|-----------------|----------------|---------|-----------------|--------------|
| sr01 | Charles    | Raymond   | 12 Cherry Lane  | Denton         | Detroit | chray@obl.com   | 0134598761   |
| sr02 | Victoria   | Wright    | 87 Blossom Hill | Uptown         | Detroit | vwright@obl.com | 0134598762   |
| sr03 | Barry      | Speed     | 12 Junction Row | Skinflats      | Detroit | bspeed@obl.com  | 0134598763   |

4 rows returned in 0.05 seconds. Download

### Part 2: Creating Joins with the USING Clause

1. Adapt the previous query answer to use the USING clause instead of a natural join.

The screenshot shows the APEX SQL Workshop interface. The SQL command entered is:

```
1 SELECT id, first_name, last_name, address_line_1, address_line_2, city, email, phone_number
2 FROM sales_representatives
3 JOIN sales_rep_addresses USING(id);
```

The results tab shows the following data:

| ID   | FIRST_NAME | LAST_NAME | ADDRESS_LINE_1  | ADDRESS_LINE_2 | CITY    | EMAIL           | PHONE_NUMBER |
|------|------------|-----------|-----------------|----------------|---------|-----------------|--------------|
| sr01 | Charles    | Raymond   | 12 Cherry Lane  | Denton         | Detroit | chray@obl.com   | 0134598761   |
| sr02 | Victoria   | Wright    | 87 Blossom Hill | Uptown         | Detroit | vwright@obl.com | 0134598762   |
| sr03 | Barry      | Speed     | 12 Junction Row | Skinflats      | Detroit | bspeed@obl.com  | 0134598763   |

4 rows returned in 0.05 seconds. Download

2. Display all of the information about items and their price history by joining the items and price\_history tables.

```

1 SELECT*
2 FROM items
3 JOIN price_history
4 USING (itm number);

```

| ITEM_NUMBER | NAME        | DESCRIPTION                 | CATEGORY  | COLOR | Size | ILT_ID      | START_DATE | START_TIME | PRICE | END_DATE   | END_TIME   |
|-------------|-------------|-----------------------------|-----------|-------|------|-------------|------------|------------|-------|------------|------------|
| im01101044  | gloves      | catcher mitt                | clothing  | brown | m    | il010230124 | 06/17/2017 | 06/17/2016 | 4.99  | -          | -          |
| im01101045  | under shirt | top worn under the game top | clothing  | white | s    | il010230125 | 11/25/2016 | 11/25/2016 | 14.99 | 01/25/2017 | 01/25/2017 |
| im01101045  | under shirt | top worn under the game top | clothing  | white | s    | il010230125 | 01/25/2017 | 01/25/2017 | 8.99  | 01/25/2017 | 01/25/2017 |
| im01101045  | under shirt | top worn under the game top | clothing  | white | s    | il010230125 | 01/26/2017 | 01/26/2017 | 15.99 | -          | -          |
| im01101046  | socks       | team socks with emblem      | clothing  | range | l    | il010230126 | 02/12/2017 | 02/12/2017 | 7.99  | -          | -          |
| im01101047  | game top    | team shirt with emblem      | clothing  | range | m    | il010230127 | 04/25/2017 | 04/25/2017 | 24.99 | -          | -          |
| im01101048  | premium bat | high quality basball bat    | equipment | -     | -    | il010230128 | 05/31/2017 | 05/31/2017 | 149   | 12/30/2023 | 12/30/2023 |
| im01101048  | premium bat | high quality basball bat    | equipment | -     | -    | il010230128 | 12/30/2023 | 12/30/2023 | 99.99 | -          | -          |

### Part 3: Creating Joins with the ON Clause

1. Use an ON clause to join the customer and sales representative table so that you display the customer number, customer first name, customer last name, customer phone number, customer email, sales representative id, sales representative first name, sales representative last name and sales representative email. You will need to use a table alias in your answer as both tables have columns with the same name.

```

1 SELECT c.ctr_number AS "Customer Number", c.first_name AS "Customer First Name", c.last_name AS "Customer Last Name", c.phone_number AS "Customer Phone Number",
2 c.email AS "Customer Email", s.id AS "Sales Rep Number", s.first_name AS "Sales Rep First Name", s.last_name AS "Sales Rep Last Name", s.email AS "Sales Rep Email"
3 FROM customers c
4 JOIN sales_representatives s ON c.sre_id=s.id;

```

| Customer Number | Customer First Name | Customer Last Name | Customer Phone Number | Customer Email              | Sales Rep Number | Sales Rep First Name | Sales Rep Last Name | Sales Rep Email |
|-----------------|---------------------|--------------------|-----------------------|-----------------------------|------------------|----------------------|---------------------|-----------------|
| c00001          | Robert              | Thornberry         | 01234567898           | bob.thornberry@heatmail.com | sr01             | Charles              | Raymond             | chray@obl.com   |
| c00101          | John                | Doe                | 03216547808           | unknown@here.com            | sr01             | Charles              | Raymond             | chray@obl.com   |
| c01986          | Maria               | Galant             | 01442736589           | margal87@delphiview.com     | sr03             | Barry                | Speed               | bspeed@obl.com  |

### Part 4- Creating Three-Way Joins with the ON Clause

1. Using the answer to Task 3 add a join that will allow the team name that the customer represents to be included in the results.

```

1 SELECT c.ctr_number AS "Customer Number", c.first_name AS "Customer First Name", c.last_name AS "Customer Last Name", c.phone_number AS "Customer Phone Number",
2 c.email AS "Customer Email", s.id AS "Sales Rep Number", s.first_name AS "Sales Rep First Name", s.last_name AS "Sales Rep Last Name", s.email AS "Sales Rep Email"
3 FROM customers c
4 JOIN sales_representatives s ON c.sre_id=s.id
5 JOIN teams t ON c.tem_id=t.id;

```

| Customer Number | Customer First Name | Customer Last Name | Customer Phone Number | Customer Email              | Sales Rep Number | Sales Rep First Name | Sales Rep Last Name | Sales Rep Email |
|-----------------|---------------------|--------------------|-----------------------|-----------------------------|------------------|----------------------|---------------------|-----------------|
| c00001          | Robert              | Thornberry         | 01234567898           | bob.thornberry@heatmail.com | sr01             | Charles              | Raymond             | chray@obl.com   |
| c00101          | John                | Doe                | 03216547808           | unknown@here.com            | sr01             | Charles              | Raymond             | chray@obl.com   |
| c01986          | Maria               | Galant             | 01442736589           | margal87@delphiview.com     | sr03             | Barry                | Speed               | bspeed@obl.com  |

## Part 5: Applying Additional Conditions to a Join

1. Using the answer to Task 4 add an additional condition to only show the results for the customer that has the number - c00001.

```
1 SELECT c.ctr_number AS "Customer Number", c.first_name AS "Customer First Name", c.last_name AS "Customer Last Name", c.phone_number AS "Customer Phone Number",  
2 c.email AS "Customer Email", s.id AS "Sales Rep Number", s.first_name AS "Sales Rep First Name", s.last_name AS "Sales Rep Last Name", s.email AS "Sales Rep Email"  
3 FROM customers c  
4 JOIN sales_representatives s ON c.sre_id=s.id  
5 JOIN teams t ON c.tem_id=t.id  
6 WHERE ctr_number='c00001';
```

| Customer Number | Customer First Name | Customer Last Name | Customer Phone Number | Customer Email              | Sales Rep Number | Sales Rep First Name | Sales Rep Last Name | Sales Rep Email |
|-----------------|---------------------|--------------------|-----------------------|-----------------------------|------------------|----------------------|---------------------|-----------------|
| c00001          | Robert              | Thornberry         | 01234567898           | bob.thornberry@heatmail.com | sr01             | Charles              | Raymond             | chray@obl.com   |

1 rows returned in 0.01 seconds [Download](#)

## Part 6: Retrieving Records with Nonequijoins

1. Write a query that will display name and cost of the item with the number im01101045 on the 12th of December 2016. The output of the query should look like this:

The cost of the under shirt on this day was 14.99.

```
1 SELECT 'The cost of the '||i.name||' on this day was' ||y.price AS "Output"  
2 FROM items i  
3 JOIN price_history y ON i.itm_number=y.itm_number  
4 WHERE i.itm_number='im01101045'  
5 AND TO_DATE('12-DEC-2016', 'DD-MM-YYYY') BETWEEN y.start_date  
6 AND y.end_date;
```

| Output   |
|--|
| The cost of the under shirt on this day was14.99 |

## Section 6 Lesson 9 Exercise 2: Joining Tables Using JOIN

Write SELECT Statements Using Data From Multiple Tables Using Equijoins and Non-Equijoins (S6L9 Objective 1)

### Part 1 : Use a Self-Join to Join a Table to Itself (S6L9 Objective 2)

1. Write a query that will display who the supervisor is for each of the sales representatives. The information should be displayed in two columns, the first column will be the first name and last name of the sales representative and the second will be the first name and last name of the supervisor. The column aliases should be Rep and Supervisor.

**APEX** App Builder SQL Workshop Team Development Gallery

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Schema: WKSP\_SQL2DML1

Language: SQL Rows: 10 Clear Command Find Tables Save Run

```

1 SELECT sr.first_name || '||' || sr.last_name AS "Rep",
2 sv.first_name || '||' || sv.last_name AS "Supervisor"
3 FROM sales_representatives sr JOIN sales_representatives sv
4 ON sr.supervisor_id=sv.id;

```

**Results** Explain Describe Saved SQL History

| Rep            | Supervisor     |
|----------------|----------------|
| CharlesRaymond | CharlesRaymond |
| VictoriaWright | CharlesRaymond |
| BarrySpeed     | CharlesRaymond |

## Part 2 : Use OUTER joins (S6L9 Objective 3)

- Write a query that will display all of the team and customer information even if there is no match with the table on the left (team).

```

1 SELECT *
2 FROM teams t LEFT OUTER JOIN customers c
3 ON t.id=c.tem_id;

```

**Results** Explain Describe Saved SQL History

| ID   | NAME    | NUMBER_OF_PLAYERS | DISCOUNT | CTR_NUMBER | EMAIL                       | FIRST_NAME | LAST_NAME  | PHONE_NUMBER | CURRENT_BALANCE | SRE_ID | TEM_ID | LOYALTY_CARD_NUMBER |
|------|---------|-------------------|----------|------------|-----------------------------|------------|------------|--------------|-----------------|--------|--------|---------------------|
| t001 | Rockets | 25                | 10       | c00001     | bob.thornberry@heatmail.com | Robert     | Thornberry | 01234567898  | 150             | sr01   | t001   | -                   |
| t002 | Celtics | 42                | 20       | c00101     | unknown@here.com            | John       | Doe        | 03216547808  | 987.5           | sr01   | t002   | -                   |
| t003 | Rovers  | 8                 | -        | c01986     | margal87@delphiview.com     | Maria      | Galand     | 01442736589  | 125.65          | sr03   | t003   | -                   |
| t004 | Jets    | 10                | 5        | -          | -                           | -          | -          | -            | -               | -      | -      | -                   |

## Part 3 : Generating a Cartesian Product (S6L9 Objective 4)

- Create a Cartesian product between the customer and sales representative tables.

```

1 SELECT *
2 FROM customers
3 CROSS JOIN sales_representatives;

```

**Results** Explain Describe Saved SQL History

| CTR_NUMBER | EMAIL                       | FIRST_NAME | LAST_NAME  | PHONE_NUMBER | CURRENT_BALANCE | SRE_ID | TEM_ID | LOYALTY_CARD_NUMBER | ID   | EMAIL           | FIRST_NAME | LAST_NAME | PHONE_NUMBER |
|------------|-----------------------------|------------|------------|--------------|-----------------|--------|--------|---------------------|------|-----------------|------------|-----------|--------------|
| c00001     | bob.thornberry@heatmail.com | Robert     | Thornberry | 01234567898  | 150             | sr01   | t001   | -                   | sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   |
| c00002     | ljones@freemail.com         | Jennifer   | Jones      | 01505214598  | 0               | -      | -      | lc1015              | sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   |
| c00101     | unknown@here.com            | John       | Doe        | 03216547808  | 987.5           | sr01   | t002   | -                   | sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   |
| c00103     | MurciaA@globaltech.com      | Andrew     | Murcia     | 0775246890   | 85              | -      | -      | lc2341              | sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   |
| c01986     | margal87@delphiview.com     | Maria      | Galand     | 01442736589  | 125.65          | sr03   | t003   | -                   | sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   |
| c02001     | brianrog@hootech.com        | Brian      | Rogers     | 01654564898  | 50              | -      | -      | lc4587              | sr01 | chray@obl.com   | Charles    | Raymond   | 0134598761   |
| c00001     | bob.thornberry@heatmail.com | Robert     | Thornberry | 01234567898  | 150             | sr01   | t001   | -                   | sr02 | vwright@obl.com | Victoria   | Wright    | 0134598762   |
| c00012     | ljones@freemail.com         | Jennifer   | Jones      | 01505214598  | 0               | -      | -      | lc1015              | sr02 | vwright@obl.com | Victoria   | Wright    | 0134598762   |
| c00101     | unknown@here.com            | John       | Doe        | 03216547808  | 987.5           | sr01   | t002   | -                   | sr02 | vwright@obl.com | Victoria   | Wright    | 0134598762   |
| c00103     | MurciaA@globaltech.com      | Andrew     | Murcia     | 0775246890   | 85              | -      | -      | lc2341              | sr02 | vwright@obl.com | Victoria   | Wright    | 0134598762   |