Applied Databases MySQL Functions and Procedures

HIGHER DIPLOMA IN DATA ANALYTICS

Functions

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- A function is a piece of code that performs some operation and returns a result.
- Some functions accept parameters, others do not.

Why use functions

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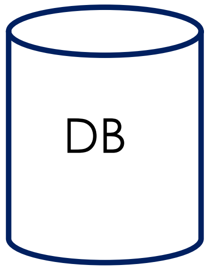

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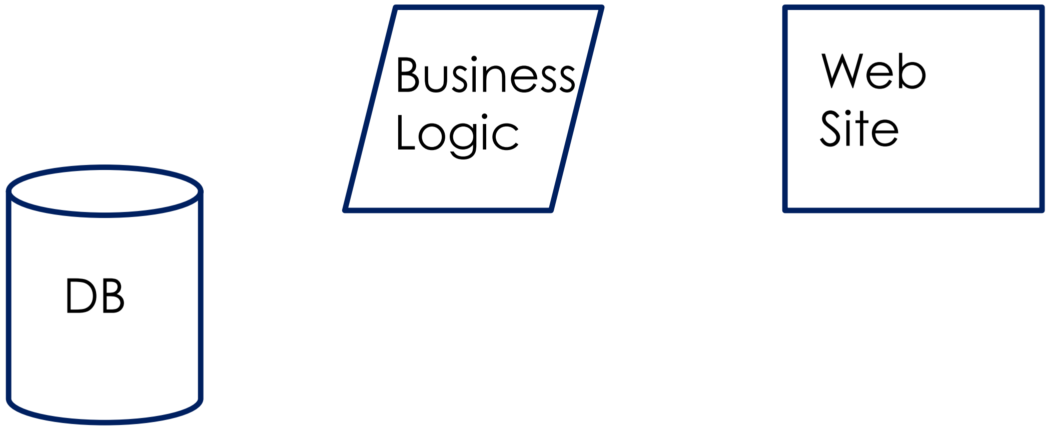

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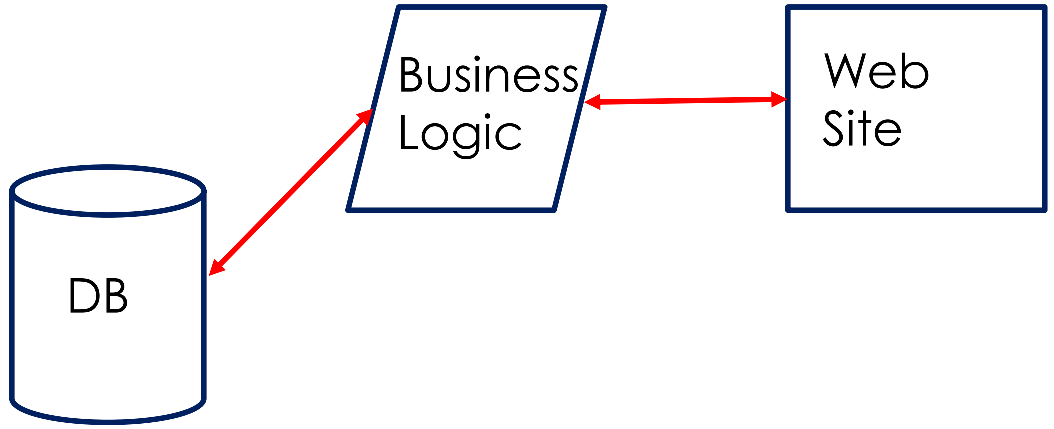

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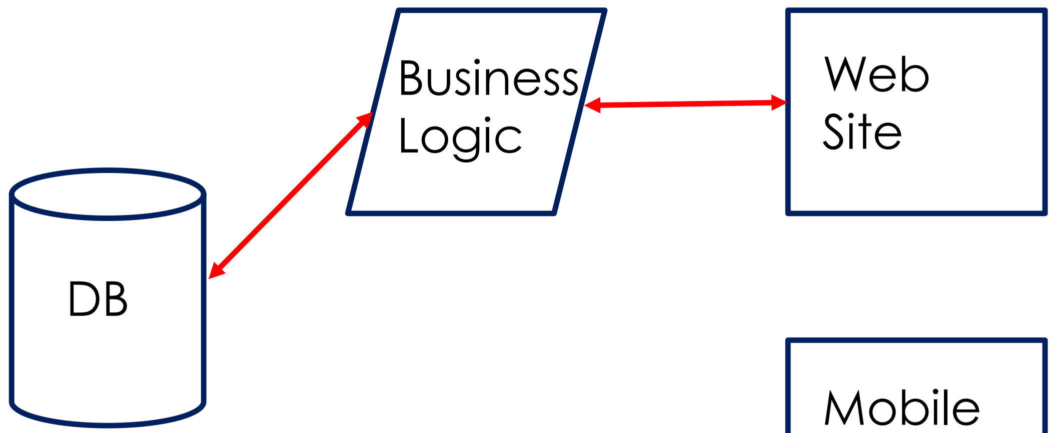

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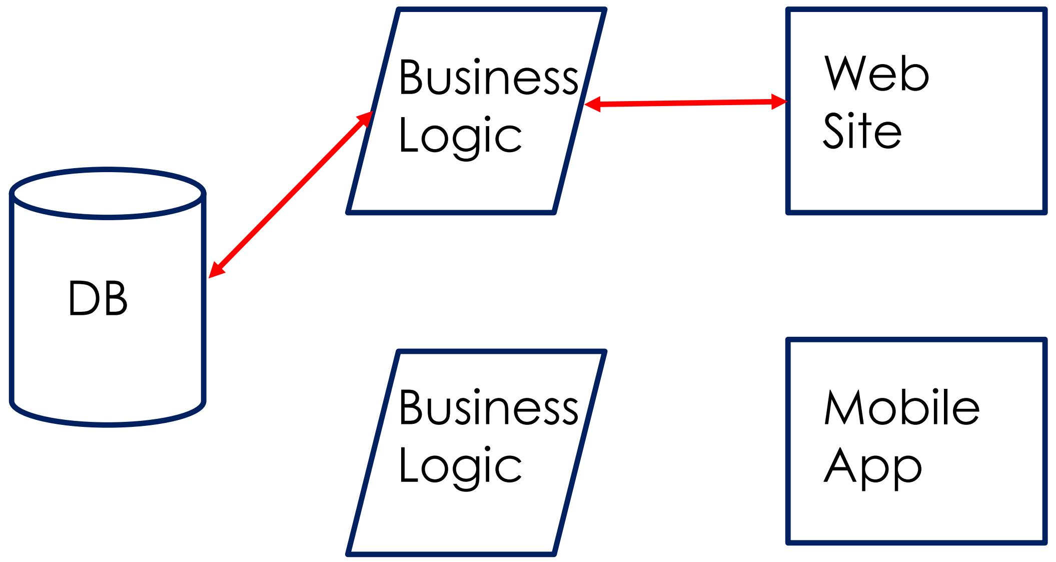

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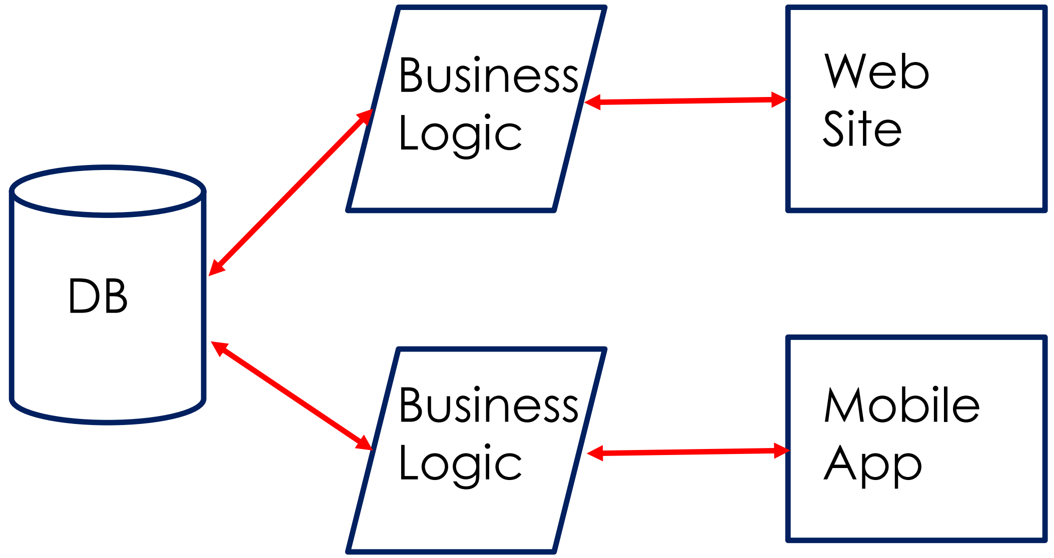

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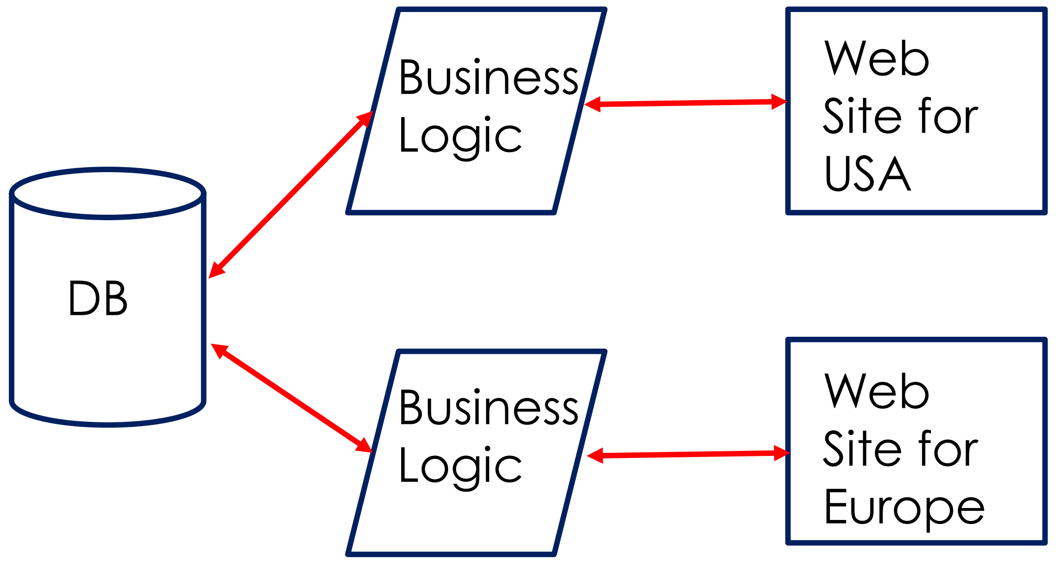

Built-in Functions

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String Functions

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  - Returns an uppercase version of a string

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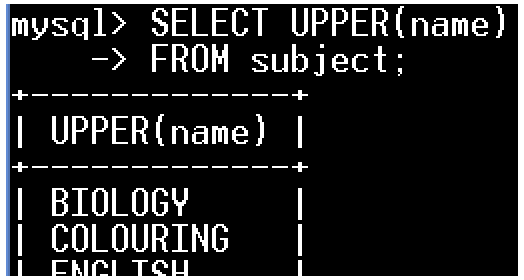

```
mysql> SELECT UPPER(name)
    -> FROM subject;
+-------------+
| UPPER(name) |
+-------------+
| BIOLOGY     |
| COLOURING   |
| ENGLISH     |
```

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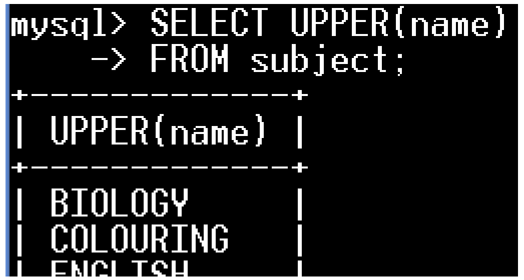

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+--------------+
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  - Compares two strings and returns:
    - 0 if string 1 = string 2
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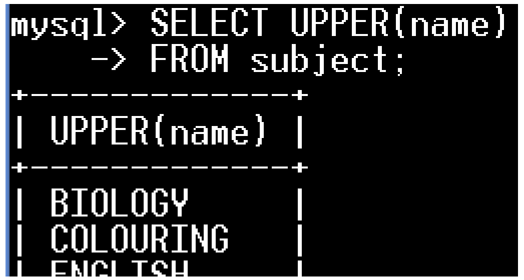

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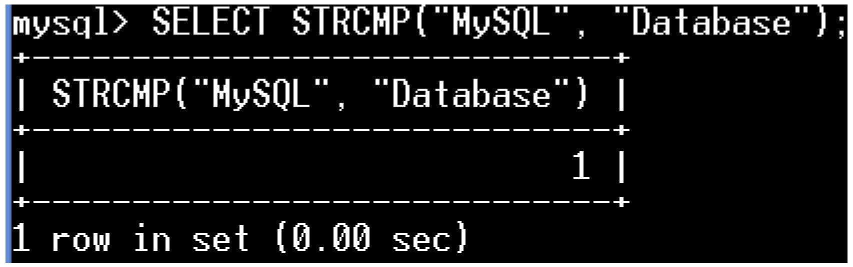
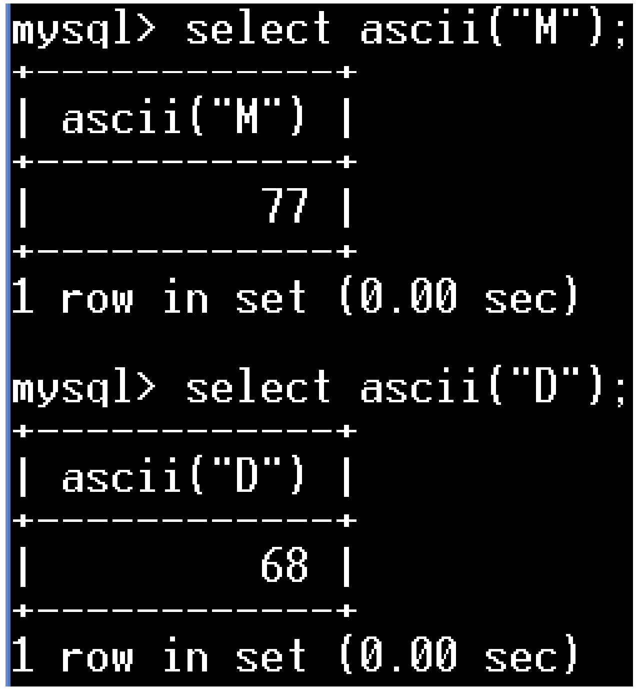


```
mysql> SELECT STRCMP("MySQL", "Database");
+-----------------------------+
| STRCMP("MySQL", "Database") |
+-----------------------------+
|                           1 |
+-----------------------------+
1 row in set (0.00 sec)
```

String Functions

- ASCII()
  - Returns the ASCII value of the first character in a string



```
mysql> select ascii("M");
+------------+
| ascii("M") |
+------------+
|         77 |
+------------+
1 row in set (0.00 sec)

mysql> select ascii("D");
+------------+
| ascii("D") |
+------------+
|         68 |
+------------+
1 row in set (0.00 sec)
```

String Functions

- REPLACE(*string, from_string, to_string)*
  - Replaces all occurrences of a substring within a string, with a new substring.
    - *string* – The original string
    - *from_string* – The substring to be replaced
    - *to_string* – The new replacement string

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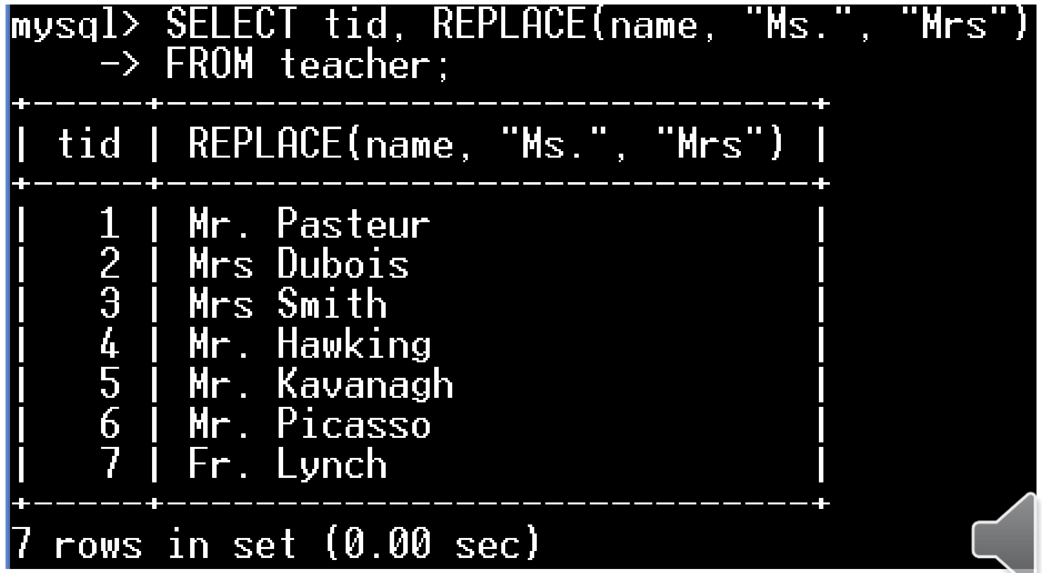

```
mysql> SELECT tid, REPLACE(name, "Ms.", "Mrs")
    -> FROM teacher;
+-----+-----------------------------+
| tid | REPLACE(name, "Ms.", "Mrs") |
+-----+-----------------------------+
|   1 | Mr. Pasteur                 |
|   2 | Mrs Dubois                  |
|   3 | Mrs Smith                   |
|   4 | Mr. Hawking                 |
|   5 | Mr. Kavanagh                |
|   6 | Mr. Picasso                 |
|   7 | Fr. Lynch                   |
+-----+-----------------------------+
7 rows in set (0.00 sec)
```

String Functions

- SUBSTR(*string, start, length*)
  - Extract a substring from a string
    - *string* – The string to extract from
    - *start* – The start position within the string
    - *length* – The number of characters to be extracted

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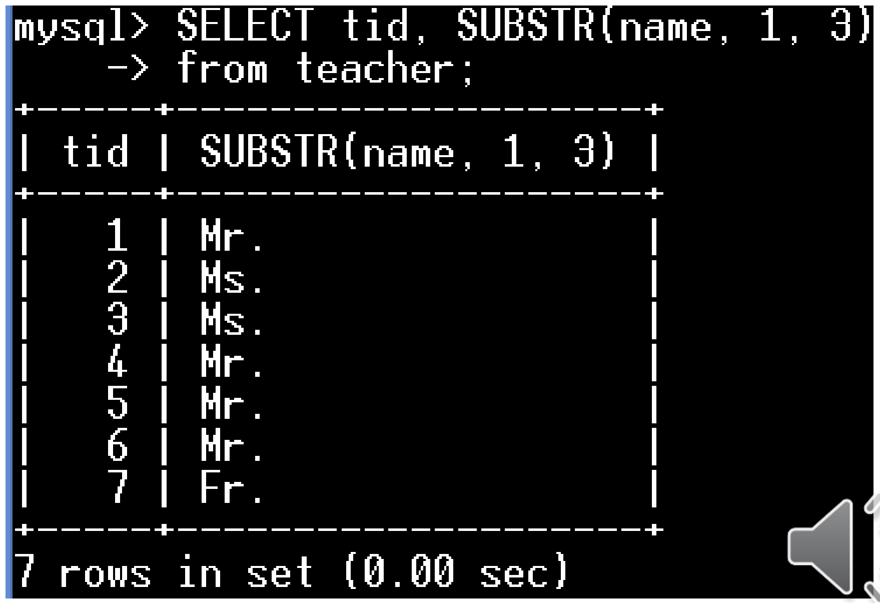
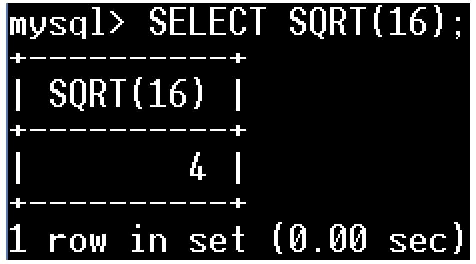


```
mysql> SELECT tid, SUBSTR(name, 1, 3)
    -> from teacher;
+------+--------------------+
| tid  | SUBSTR(name, 1, 3) |
+------+--------------------+
|    1 | Mr.                |
|    2 | Ms.                |
|    3 | Ms.                |
|    4 | Mr.                |
|    5 | Mr.                |
|    6 | Mr.                |
|    7 | Fr.                |
+------+--------------------+
7 rows in set (0.00 sec)
```

Numeric Functions

- SQRT(*number*)
  - Returns the square root of a number



```
mysql> SELECT SQRT(16);
+----------+
| SQRT(16) |
+----------+
|        4 |
+----------+
1 row in set (0.00 sec)
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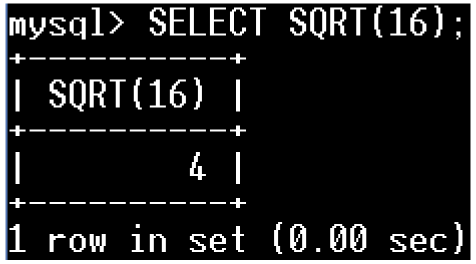

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  - Rounds a number to a specified number of decimal places

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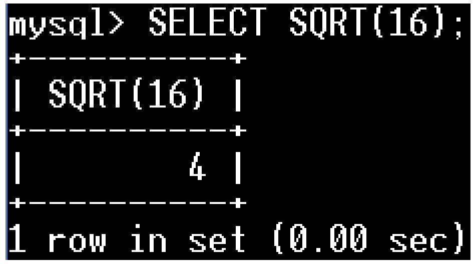

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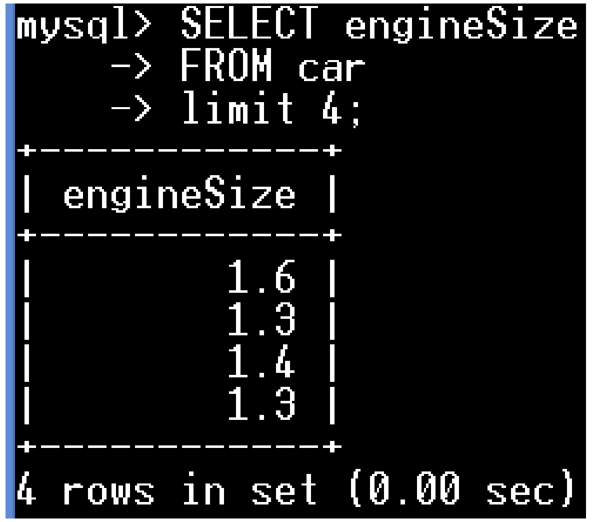

```
mysql> SELECT engineSize
    -> FROM car
    -> limit 4;
+------------+
| engineSize |
+------------+
|        1.6 |
|        1.3 |
|        1.4 |
|        1.3 |
+------------+
4 rows in set (0.00 sec)
```

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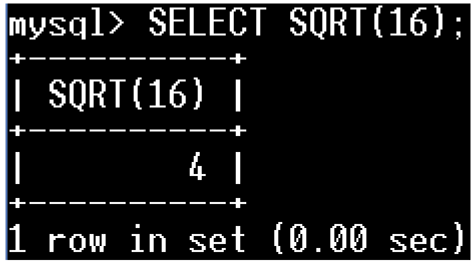

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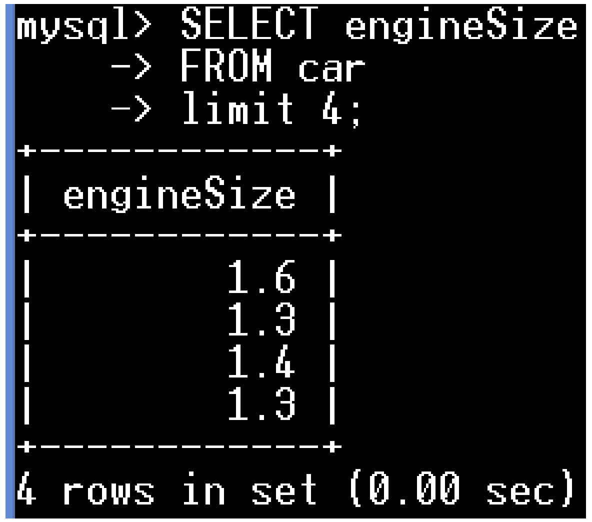

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    -> FROM car
    -> limit 4;
+------------+
| engineSize |
+------------+
|        1.6 |
|        1.3 |
|        1.4 |
|        1.3 |
+------------+
4 rows in set (0.00 sec)
```

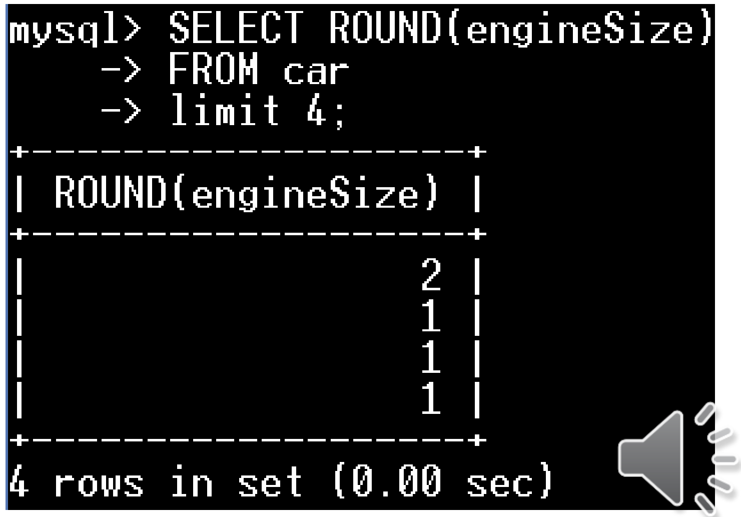

```
mysql> SELECT ROUND(engineSize)
    -> FROM car
    -> limit 4;
+-------------------+
| ROUND(engineSize) |
+-------------------+
|                 2 |
|                 1 |
|                 1 |
|                 1 |
+-------------------+
4 rows in set (0.00 sec)
```

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- DATEDIFF(*date1*, *date2*)
  - Returns the number of days between 2 dates

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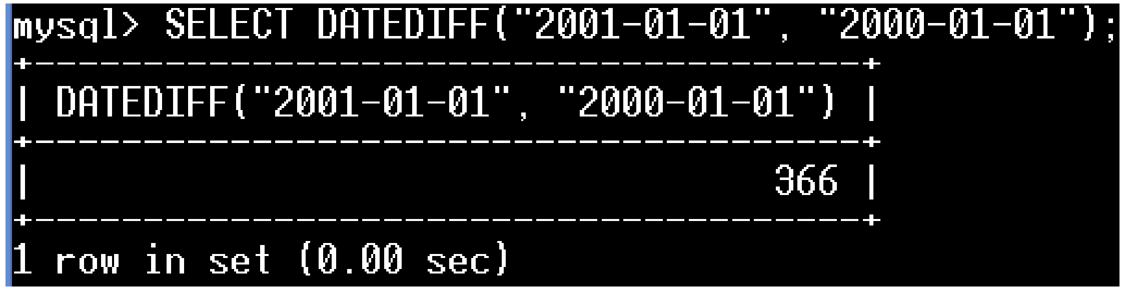

```
mysql> SELECT DATEDIFF("2001-01-01", "2000-01-01");
+--------------------------------------+
| DATEDIFF("2001-01-01", "2000-01-01") |
+--------------------------------------+
|                                  366 |
+--------------------------------------+
1 row in set (0.00 sec)
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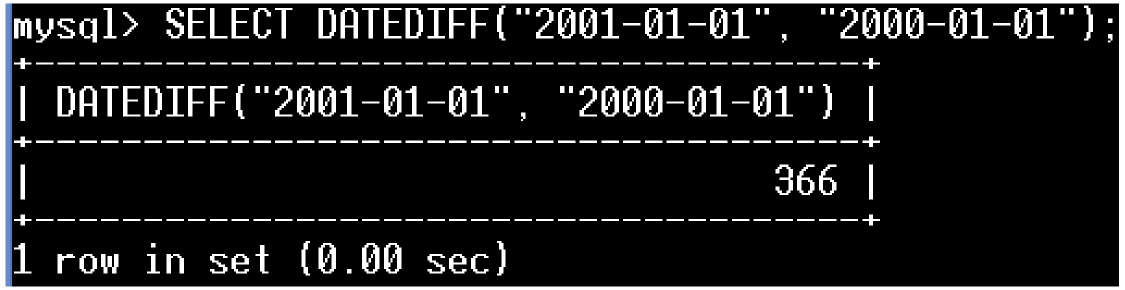

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mysql> SELECT DATEDIFF("2001-01-01", "2000-01-01");
+--------------------------------------+
| DATEDIFF("2001-01-01", "2000-01-01") |
+--------------------------------------+
|                                  366 |
+--------------------------------------+
1 row in set (0.00 sec)
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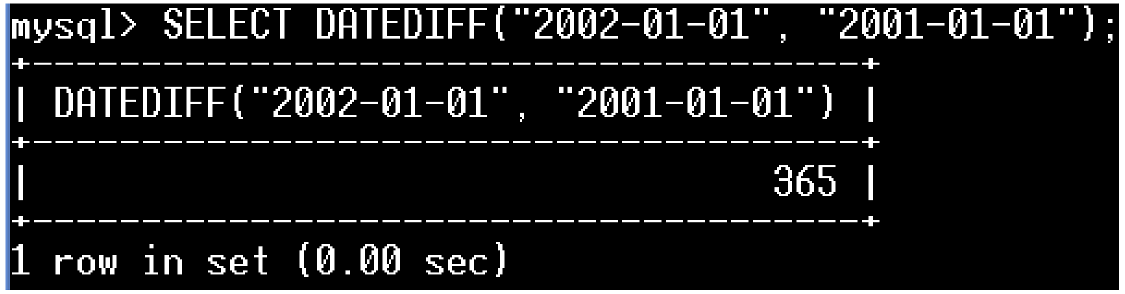
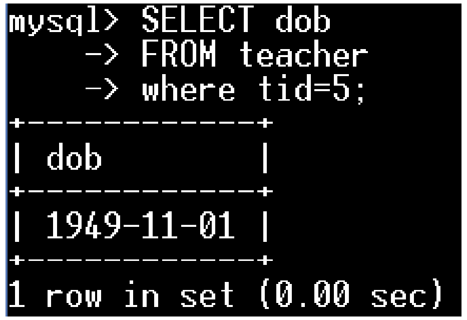


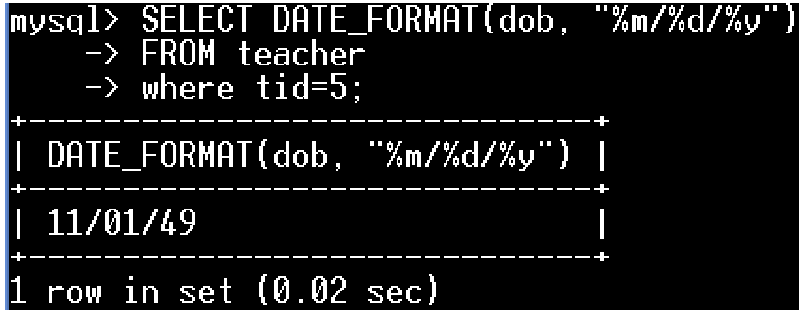
```
mysql> SELECT DATEDIFF("2002-01-01", "2001-01-01");
+--------------------------------------+
| DATEDIFF("2002-01-01", "2001-01-01") |
+--------------------------------------+
|                                  365 |
+--------------------------------------+
1 row in set (0.00 sec)
```

Date Functions

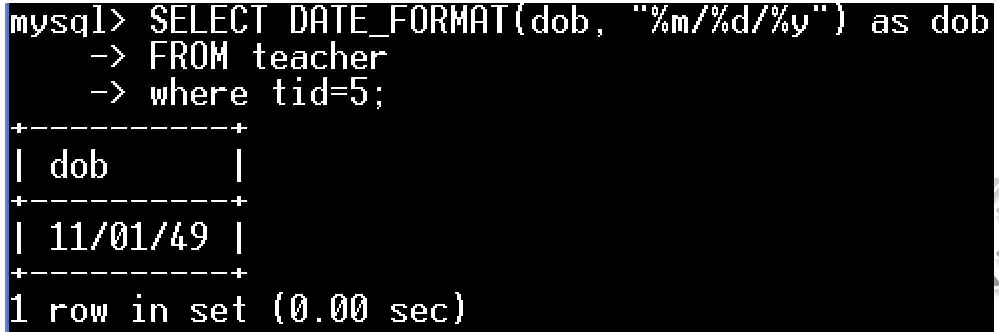
- DATE_FORMAT(*date, format*)
  - Formats a date



```
mysql> SELECT dob
    -> FROM teacher
    -> where tid=5;
+------------+
| dob        |
+------------+
| 1949-11-01 |
+------------+
1 row in set (0.00 sec)
```



```
mysql> SELECT DATE_FORMAT(dob, "%m/%d/%y")
    -> FROM teacher
    -> where tid=5;
+------------------------------+
| DATE_FORMAT(dob, "%m/%d/%y") |
+------------------------------+
| 11/01/49                     |
+------------------------------+
1 row in set (0.02 sec)
```



```
mysql> SELECT DATE_FORMAT(dob, "%m/%d/%y") as dob
    -> FROM teacher
    -> where tid=5;
+----------+
| dob      |
+----------+
| 11/01/49 |
+----------+
1 row in set (0.00 sec)
```

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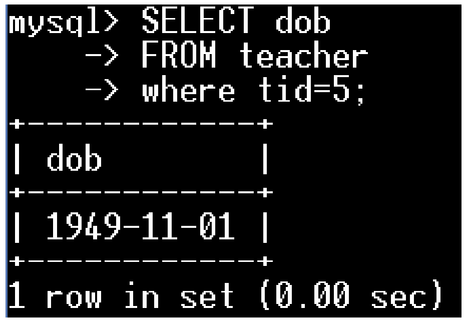

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| dob        |
+------------+
| 1949-11-01 |
+------------+
1 row in set (0.00 sec)
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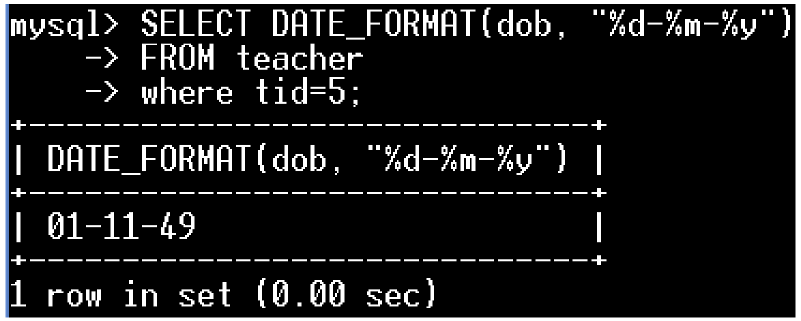
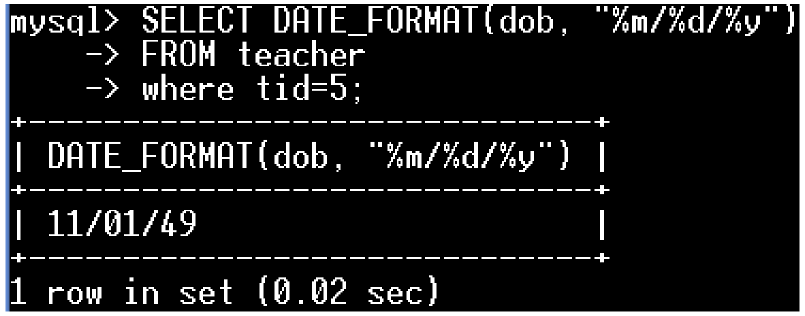


```
mysql> SELECT DATE_FORMAT(dob, "%d-%m-%y")
    -> FROM teacher
    -> where tid=5;
+------------------------------+
| DATE_FORMAT(dob, "%d-%m-%y") |
+------------------------------+
| 01-11-49                     |
+------------------------------+
1 row in set (0.00 sec)
```



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+------------------------------+
| 11/01/49                     |
+------------------------------+
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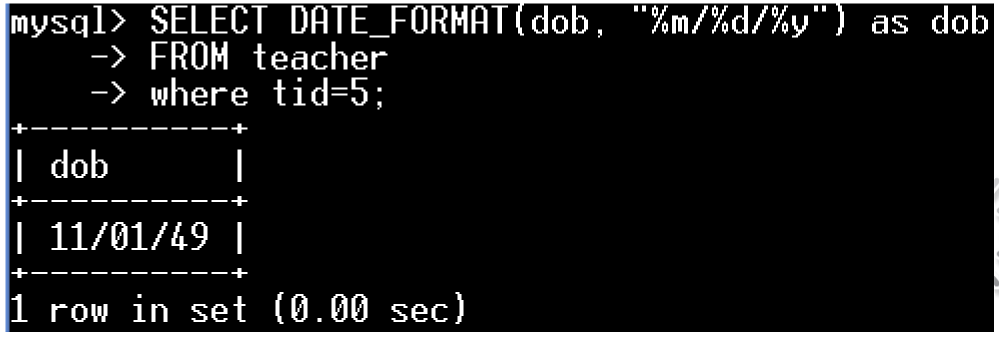

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+----------+
| dob      |
+----------+
| 11/01/49 |
+----------+
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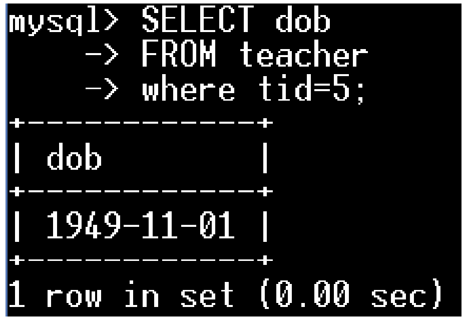

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+------------+
| dob        |
+------------+
| 1949-11-01 |
+------------+
1 row in set (0.00 sec)
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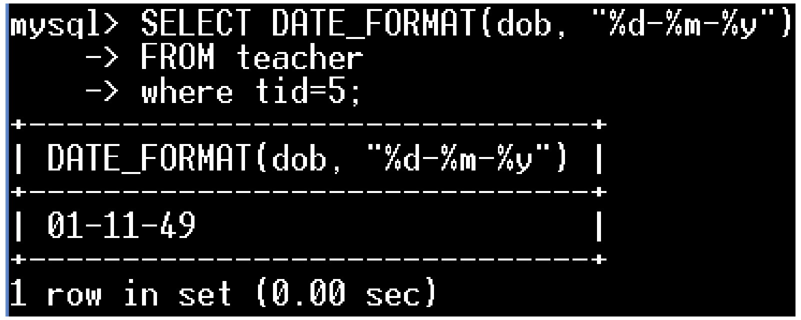

```
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+------------------------------+
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+------------------------------+
| 01-11-49                     |
+------------------------------+
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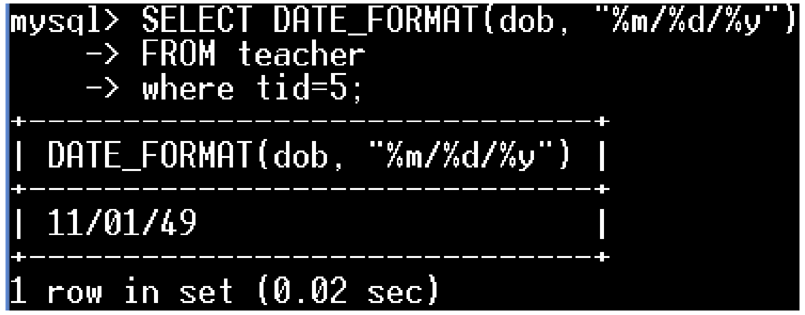

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    -> where tid=5;
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+------------------------------+
| 11/01/49                     |
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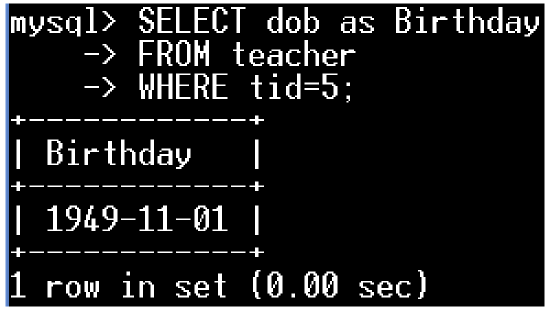
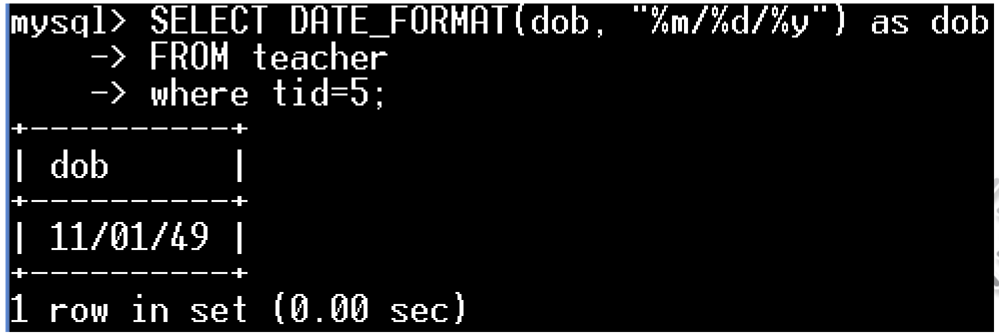


```
mysql> SELECT dob as Birthday
    -> FROM teacher
    -> WHERE tid=5;
+------------+
| Birthday   |
+------------+
| 1949-11-01 |
+------------+
1 row in set (0.00 sec)
```



```
mysql> SELECT DATE_FORMAT(dob, "%m/%d/%y") as dob
    -> FROM teacher
    -> where tid=5;
+----------+
| dob      |
+----------+
| 11/01/49 |
+----------+
1 row in set (0.00 sec)
```

Aggregate Functions

Aggregate Functions

- An aggregate function performs a calculation on a set of values and returns a single value.

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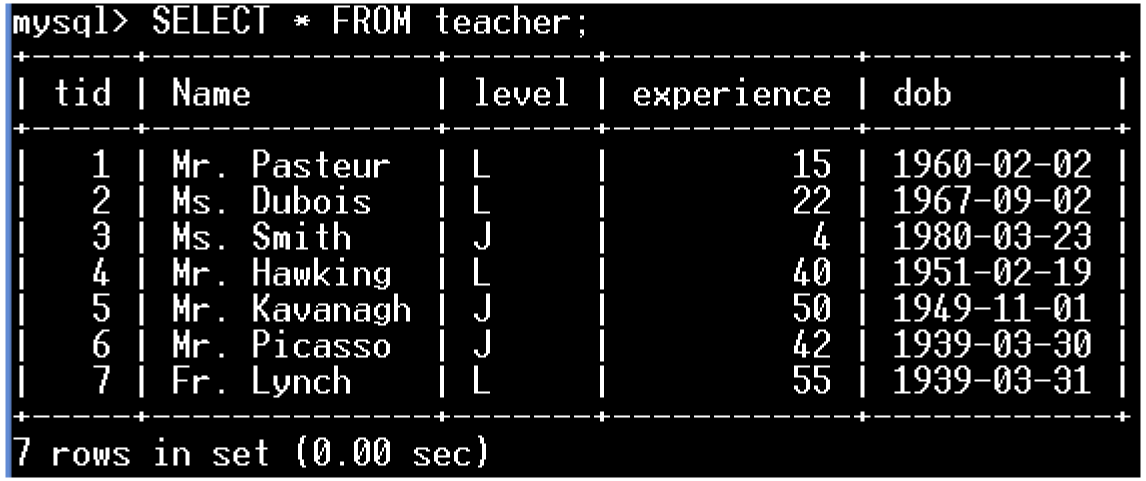
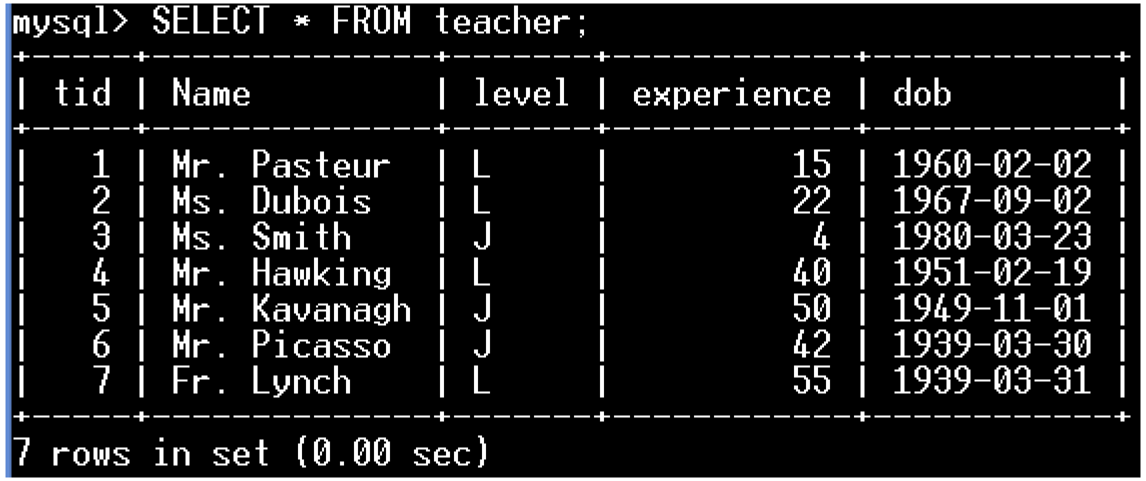


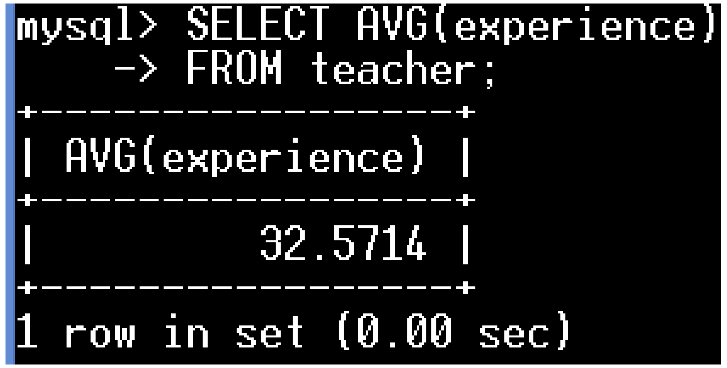
```
mysql> SELECT * FROM teacher;
+-----+---------------+-------+------------+------------+
| tid | Name          | level | experience | dob        |
+-----+---------------+-------+------------+------------+
|   1 | Mr. Pasteur   | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois    | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith     | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking   | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh  | J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso   | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch     | L     |         55 | 1939-03-31 |
+-----+---------------+-------+------------+------------+
7 rows in set (0.00 sec)
```

Aggregate Functions

- An aggregate function performs a calculation on a set of values and returns a single value.



```
mysql> SELECT * FROM teacher;
+-----+--------------+-------+------------+------------+
| tid | Name         | level | experience | dob        |
+-----+--------------+-------+------------+------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |
+-----+--------------+-------+------------+------------+
7 rows in set (0.00 sec)
```

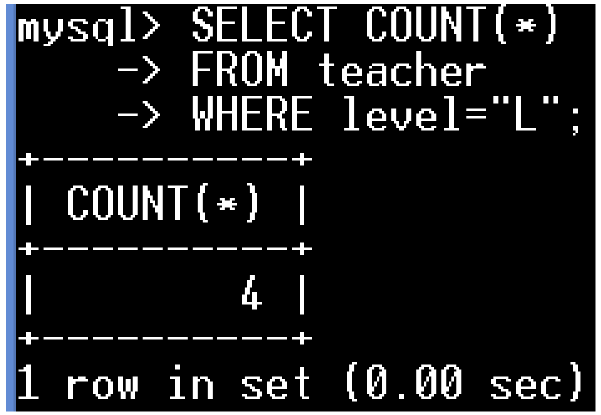


```
mysql> SELECT AVG(experience)
    -> FROM teacher;
+-----------------+
| AVG(experience) |
+-----------------+
|         32.5714 |
+-----------------+
1 row in set (0.00 sec)
```

- AVG()

Aggregate Functions

- MIN(), MAX(), SUM(), COUNT()



```
mysql> SELECT COUNT(*)
    -> FROM teacher
    -> WHERE level="L";
+----------+
| COUNT(*) |
+----------+
|        4 |
+----------+
1 row in set (0.00 sec)
```

Aggregate Functions – Group By

- The GROUP BY statement is often used with aggregate functions (COUNT, MAX, MIN, SUM, AVG) to group the result-set by one or more columns.

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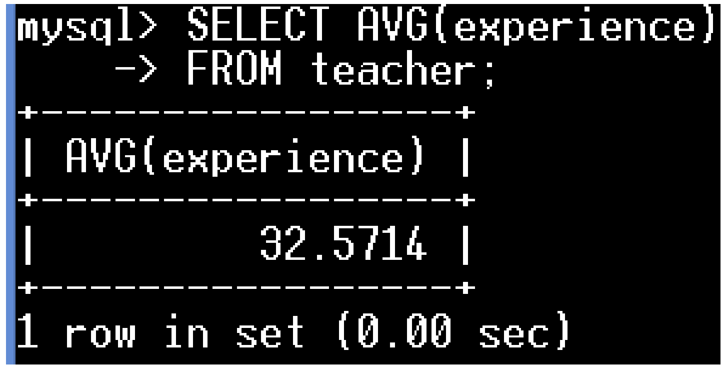

```
mysql> SELECT AVG(experience)
    -> FROM teacher;
+-----------------+
| AVG(experience) |
+-----------------+
|         32.5714 |
+-----------------+
1 row in set (0.00 sec)
```

Aggregate Functions – Group By

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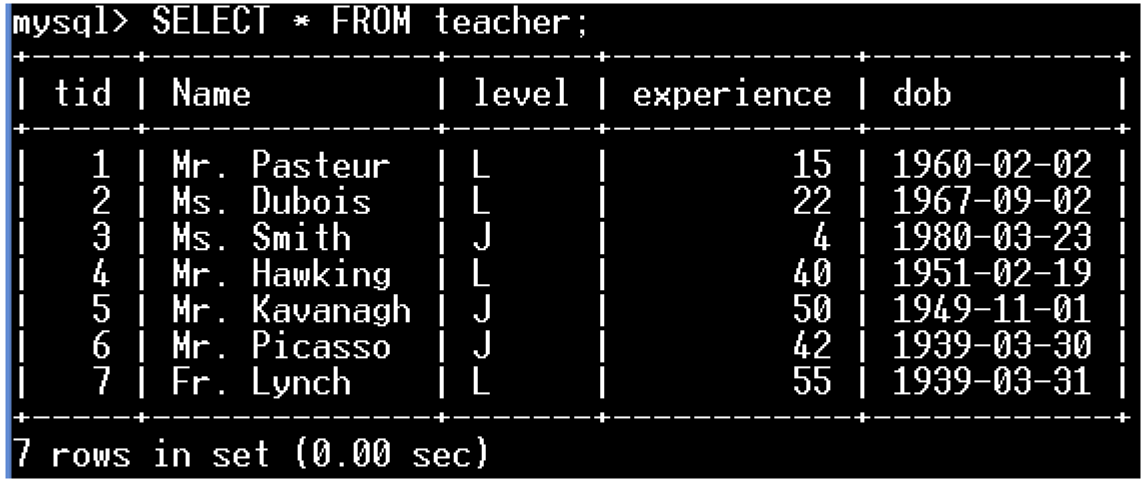
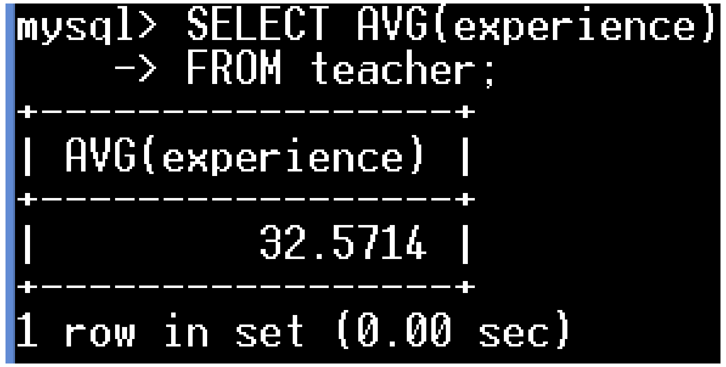


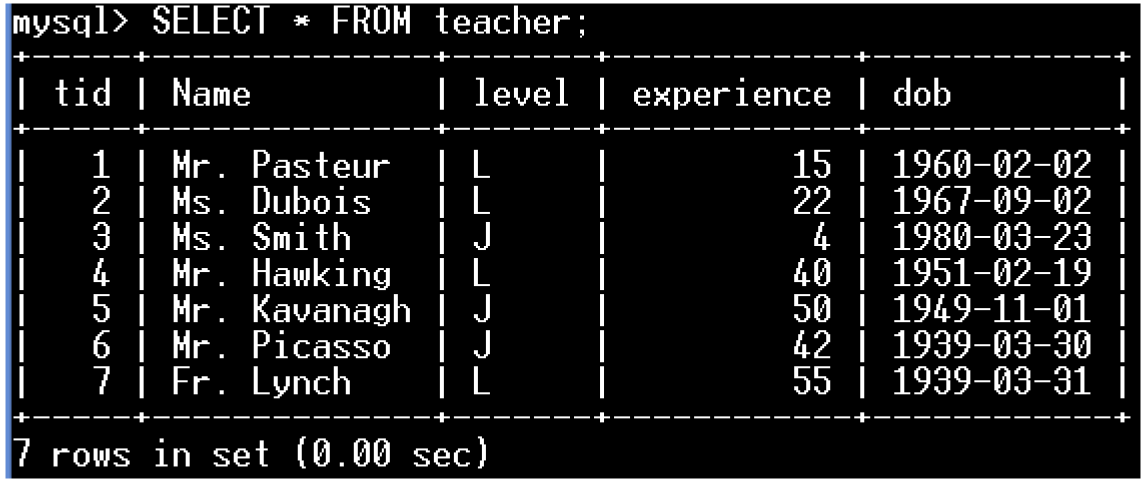
```
mysql> SELECT * FROM teacher;
+-----+--------------+-------+------------+------------+
| tid | Name         | level | experience | dob        |
+-----+--------------+-------+------------+------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |
+-----+--------------+-------+------------+------------+
7 rows in set (0.00 sec)
```



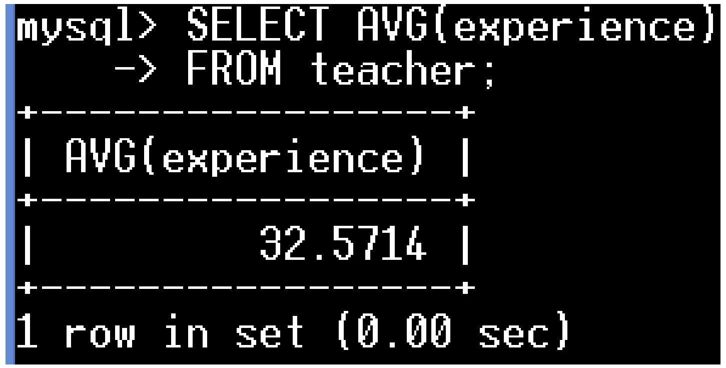
```
mysql> SELECT AVG(experience)
    -> FROM teacher;
+-----------------+
| AVG(experience) |
+-----------------+
|         32.5714 |
+-----------------+
1 row in set (0.00 sec)
```

Aggregate Functions – Group By

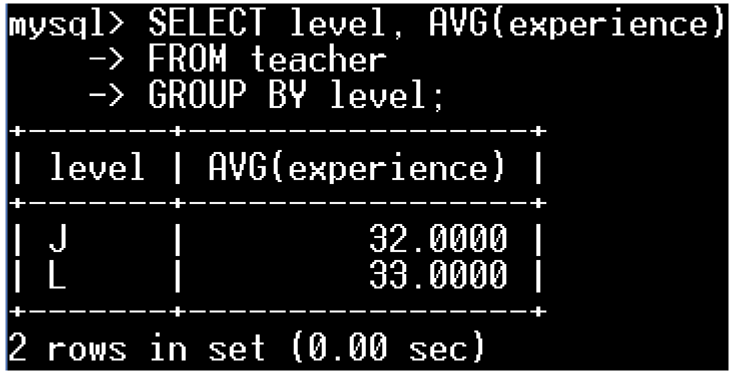
- The GROUP BY statement is often used with aggregate functions (COUNT, MAX, MIN, SUM, AVG) to group the result-set by one or more columns.



```
mysql> SELECT * FROM teacher;
+-----+-------------+-------+------------+------------+
| tid | Name        | level | experience | dob        |
+-----+-------------+-------+------------+------------+
|   1 | Mr. Pasteur | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois  | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith   | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh| J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch   | L     |         55 | 1939-03-31 |
+-----+-------------+-------+------------+------------+
7 rows in set (0.00 sec)
```

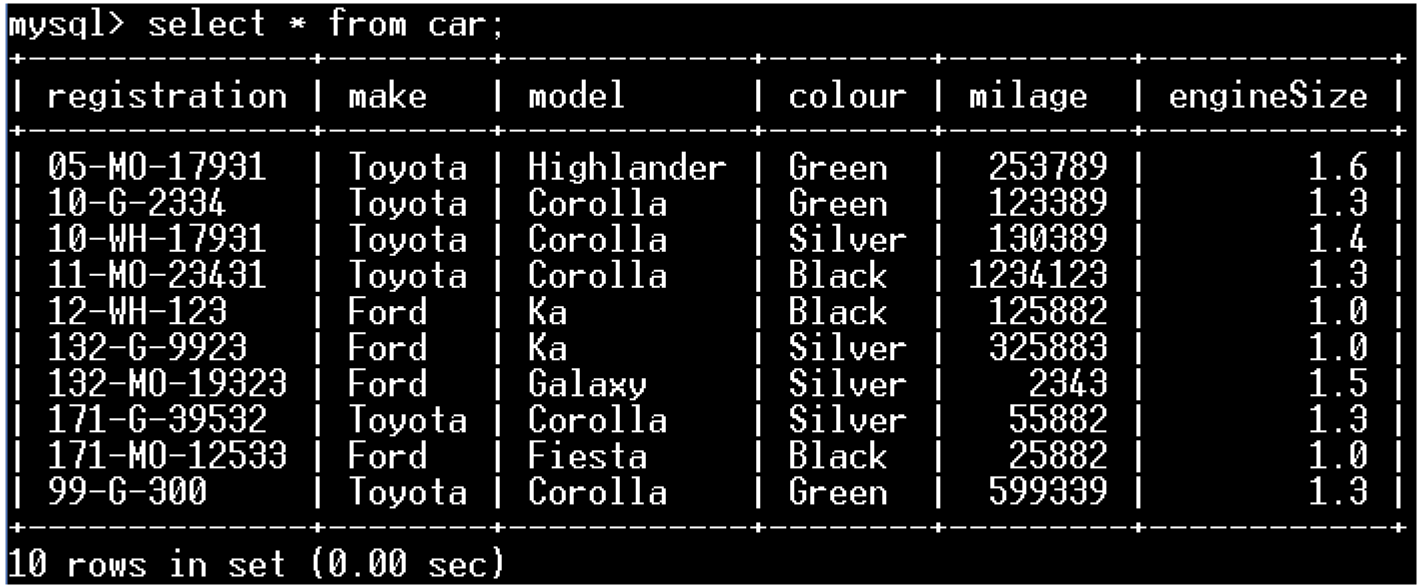


```
mysql> SELECT AVG(experience)
    -> FROM teacher;
+-----------------+
| AVG(experience) |
+-----------------+
|         32.5714 |
+-----------------+
1 row in set (0.00 sec)
```



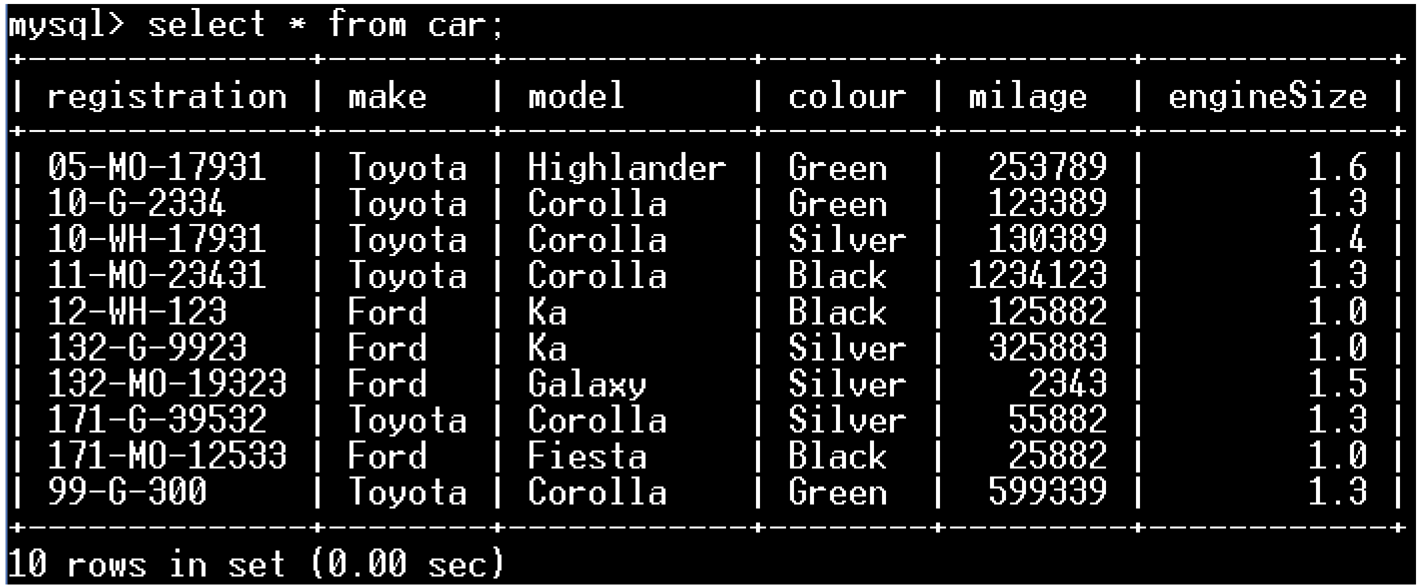
```
mysql> SELECT level, AVG(experience)
    -> FROM teacher
    -> GROUP BY level;
+-------+-----------------+
| level | AVG(experience) |
+-------+-----------------+
| J     |         32.0000 |
| L     |         33.0000 |
+-------+-----------------+
2 rows in set (0.00 sec)
```

Aggregate Functions – Group By



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```

Aggregate Functions – Group By



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
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+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```
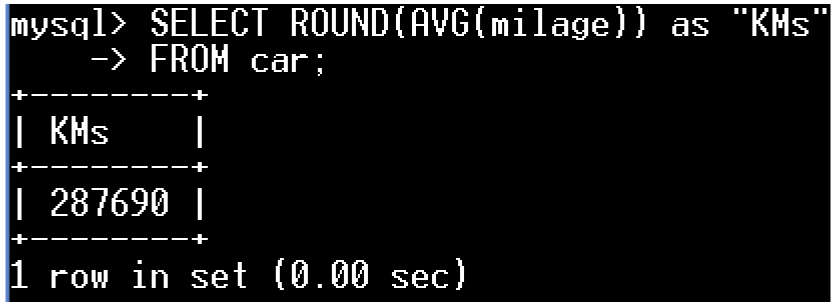
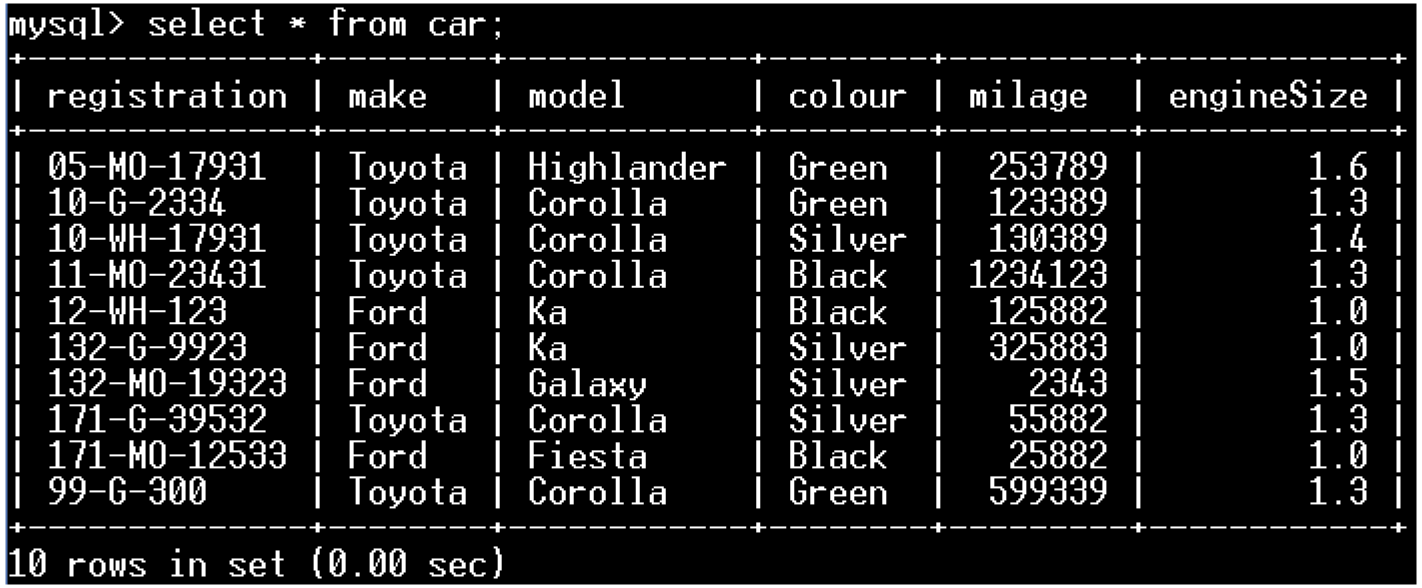



```
mysql> SELECT ROUND(AVG(milage)) as "KMs"
    -> FROM car;
+--------+
| KMs    |
+--------+
| 287690 |
+--------+
1 row in set (0.00 sec)
```

Aggregate Functions – Group By



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
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| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
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+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```
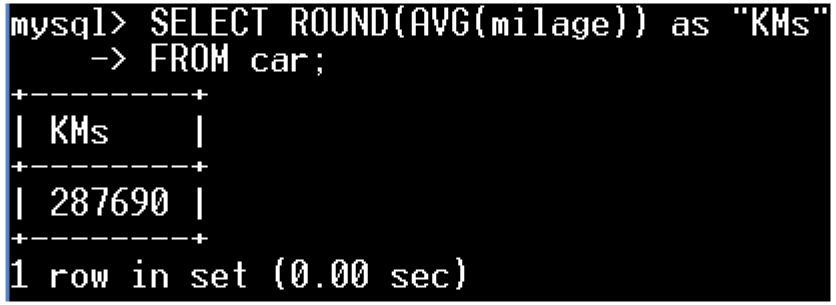
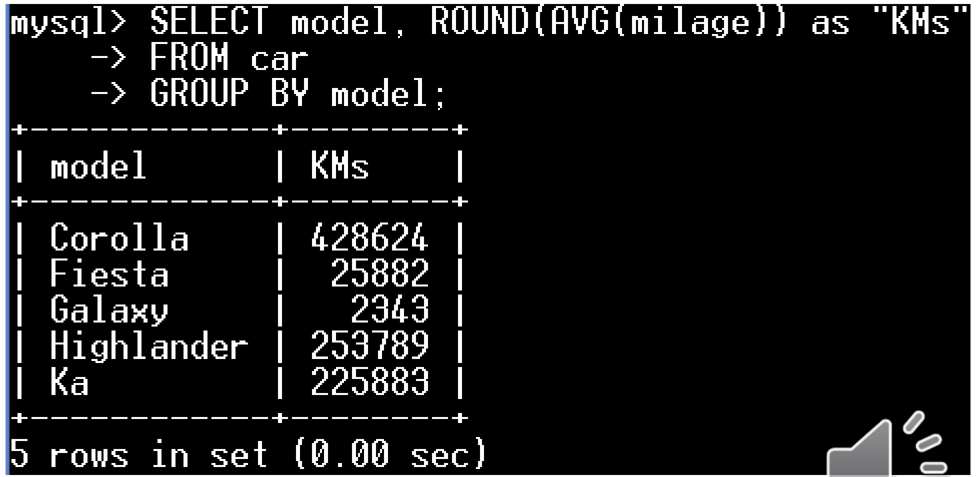
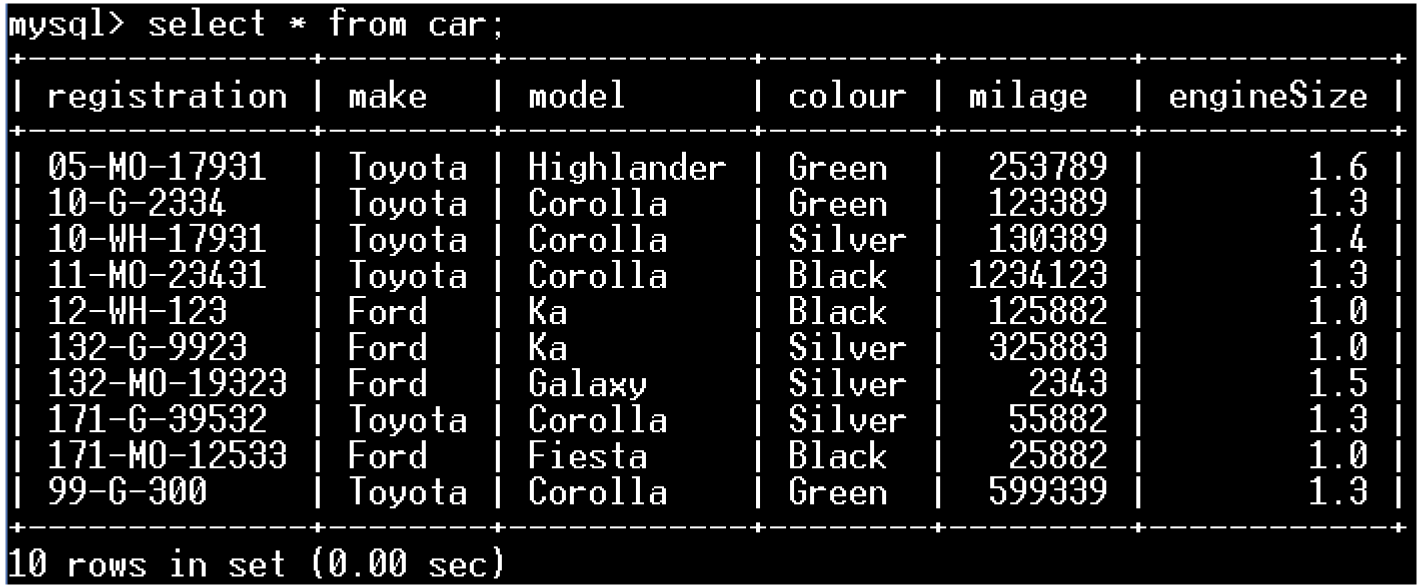



```
mysql> SELECT ROUND(AVG(milage)) as "KMs"
    -> FROM car;
+--------+
| KMs    |
+--------+
| 287690 |
+--------+
1 row in set (0.00 sec)
```



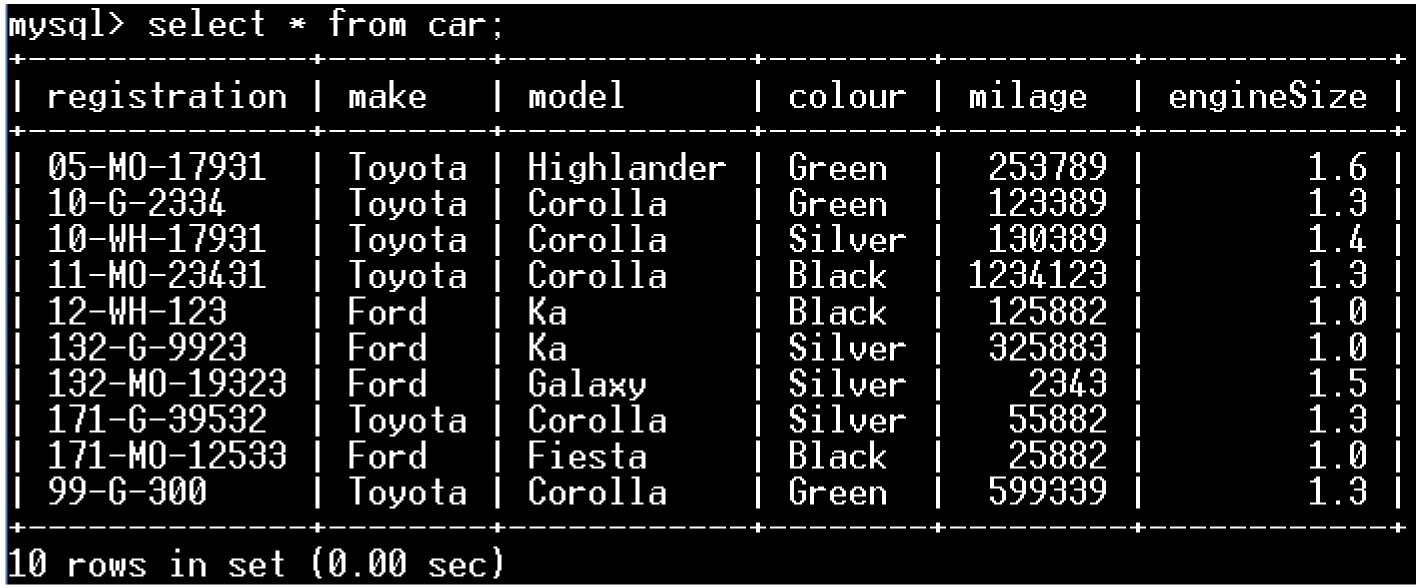
```
mysql> SELECT model, ROUND(AVG(milage)) as "KMs"
    -> FROM car
    -> GROUP BY model;
+------------+--------+
| model      | KMs    |
+------------+--------+
| Corolla    | 428624 |
| Fiesta     |  25882 |
| Galaxy     |   2343 |
| Highlander | 253789 |
| Ka         | 225883 |
+------------+--------+
5 rows in set (0.00 sec)
```

Aggregate Functions – Group By



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```

Aggregate Functions – Group By



```
mysql> select * from car;
+---------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+---------------+--------+------------+--------+---------+------------+
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| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
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| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+---------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```

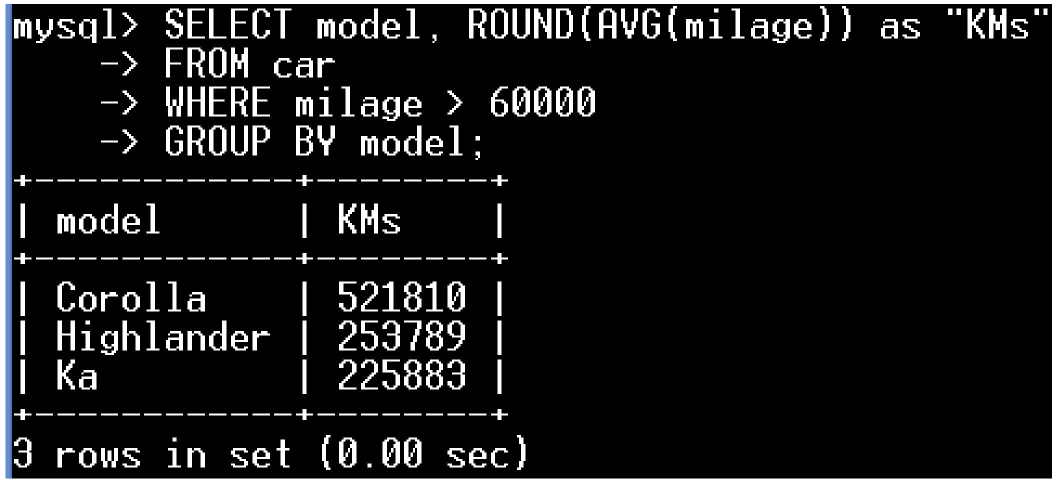

```
mysql> SELECT model, ROUND(AVG(milage)) as "KMs"
    -> FROM car
    -> WHERE milage > 60000
    -> GROUP BY model;
+------------+--------+
| model      | KMs    |
+------------+--------+
| Corolla    | 521810 |
| Highlander | 253789 |
| Ka         | 225883 |
+------------+--------+
3 rows in set (0.00 sec)
```

Aggregate Functions – Group By

- The HAVING clause is often used with the GROUP BY clause to filter groups based on a specified condition.
- If the GROUP BY clause is omitted, the HAVING clause behaves like the WHERE clause.
- The HAVING clause applies a filter condition to each group of rows.
- The WHERE clause applies the filter condition to each individual row.

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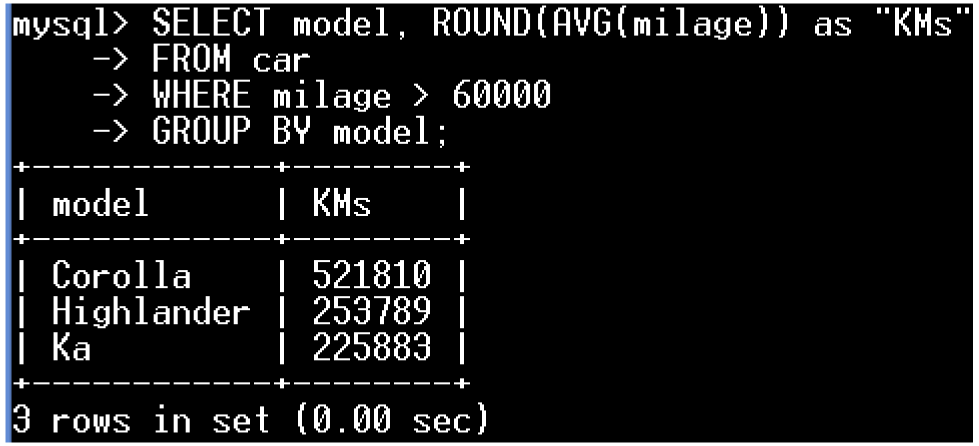

```
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    -> FROM car
    -> WHERE milage > 60000
    -> GROUP BY model;
+-------------+---------+
| model       | KMs     |
+-------------+---------+
| Corolla     | 521810 |
| Highlander  | 253789 |
| Ka          | 225883 |
+-------------+---------+
3 rows in set (0.00 sec)
```

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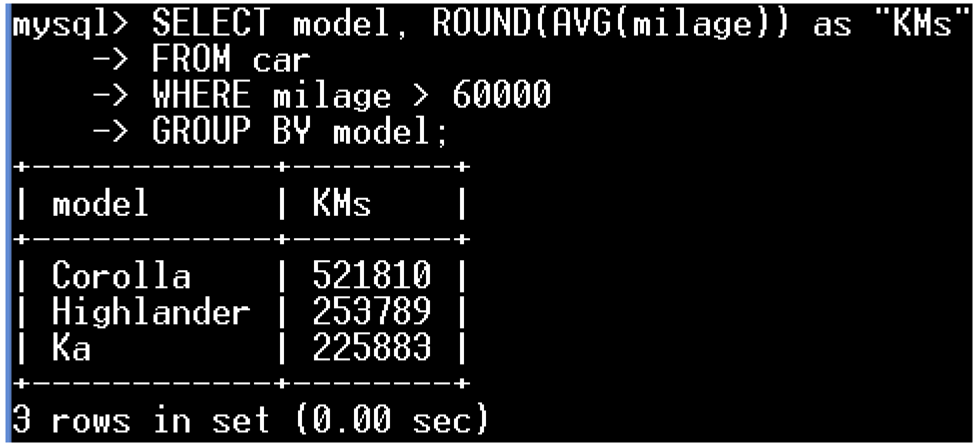

```
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    -> FROM car
    -> WHERE milage > 60000
    -> GROUP BY model;
+------------+--------+
| model      | KMs    |
+------------+--------+
| Corolla    | 521810 |
| Highlander | 253789 |
| Ka         | 225883 |
+------------+--------+
3 rows in set (0.00 sec)
```

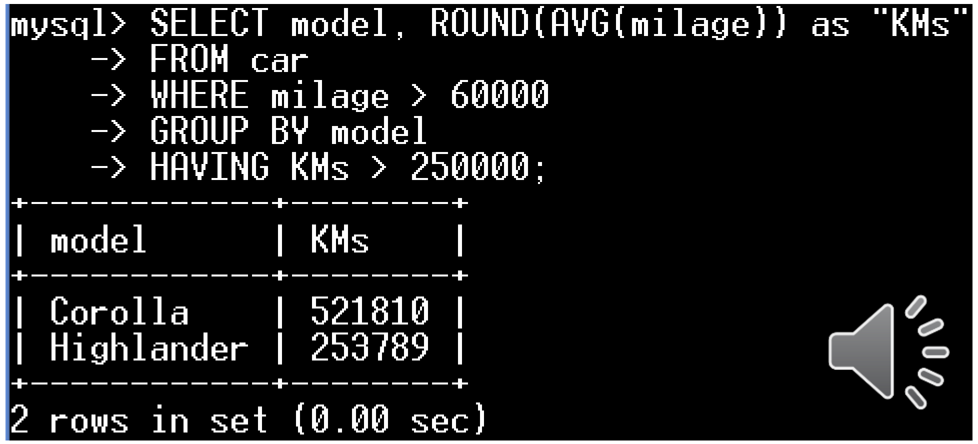

```
mysql> SELECT model, ROUND(AVG(milage)) as "KMs"
    -> FROM car
    -> WHERE milage > 60000
    -> GROUP BY model
    -> HAVING KMs > 250000;
+------------+--------+
| model      | KMs    |
+------------+--------+
| Corolla    | 521810 |
| Highlander | 253789 |
+------------+--------+
2 rows in set (0.00 sec)
```

MySQL Information Functions

- MySQL provides some information functions such as
  - DATABASE()

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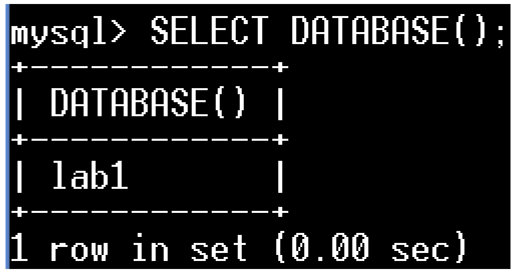
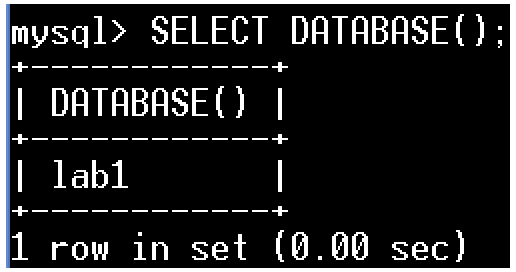
  - DATABASE()



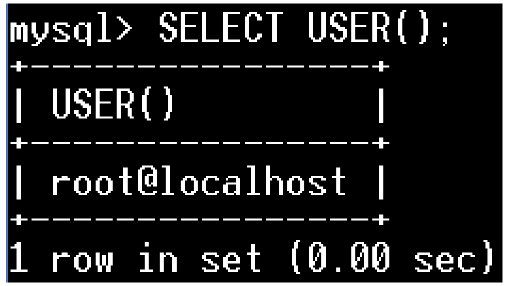
```
mysql> SELECT DATABASE();
+------------+
| DATABASE() |
+------------+
| lab1       |
+------------+
1 row in set (0.00 sec)
```

MySQL Information Functions

- MySQL provides some information functions such as
  - DATABASE()
  - USER()



```
mysql> SELECT DATABASE();
+------------+
| DATABASE() |
+------------+
| lab1       |
+------------+
1 row in set (0.00 sec)
```



```
mysql> SELECT USER();
+----------------+
| USER()         |
+----------------+
| root@localhost |
+----------------+
1 row in set (0.00 sec)
```

MySQL Control Flow Functions

MySQL Control Flow Functions

- IF(*condition, value_if_true, value_if_false*)
  - *condition* - Value to Test
  - *value_if_true* – Value to return if *condition* is True
  - *value_if_false* – Value to return if *condition* is False

MySQL Control Flow Functions

- IF(*condition, value_if_true, value_if_false*)
  - *condition* - Value to Test
  - *value_if_true* – Value to return if *condition* is True
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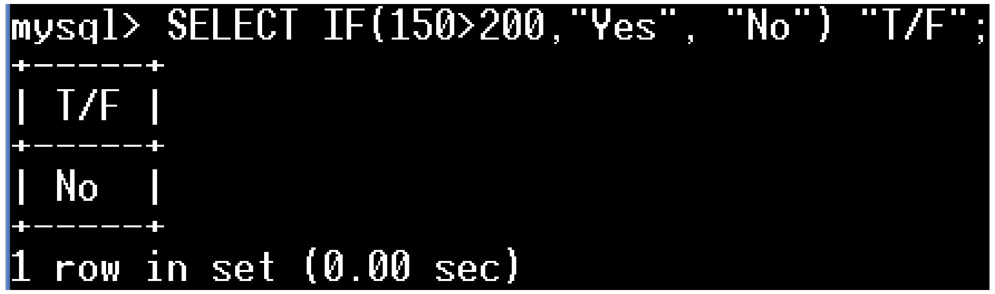
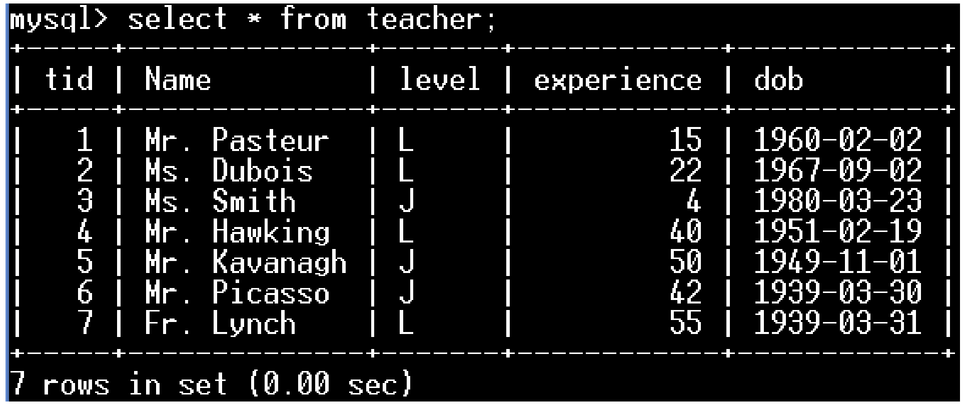


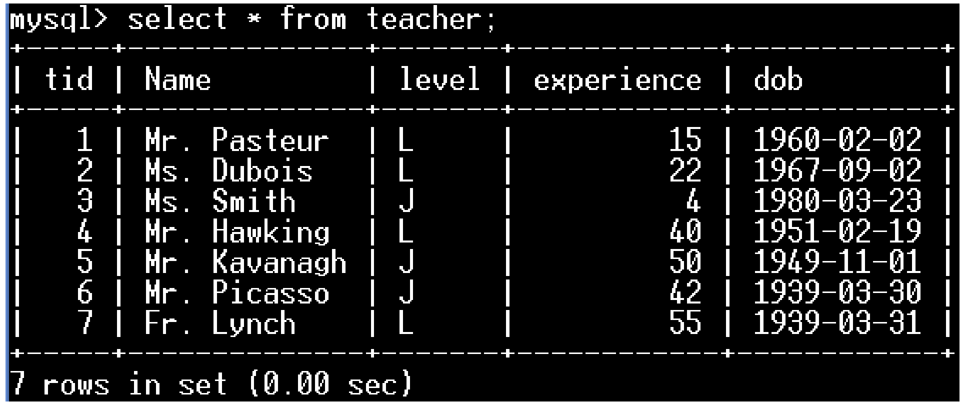
```
mysql> SELECT IF(150>200,"Yes", "No") "T/F";
+------+
| T/F |
+------+
| No   |
+------+
1 row in set (0.00 sec)
```

MySQL Control Flow Functions

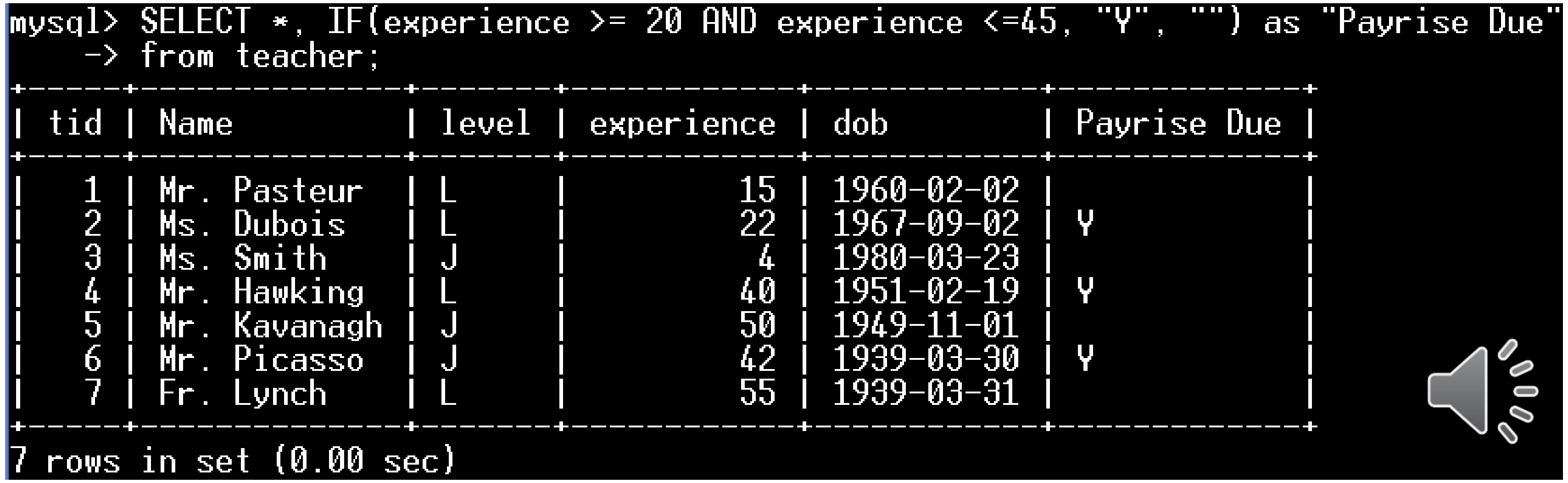


```
mysql> select * from teacher;
+-----+--------------+-------+------------+------------+
| tid | Name         | level | experience | dob        |
+-----+--------------+-------+------------+------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |
+-----+--------------+-------+------------+------------+
7 rows in set (0.00 sec)
```

MySQL Control Flow Functions

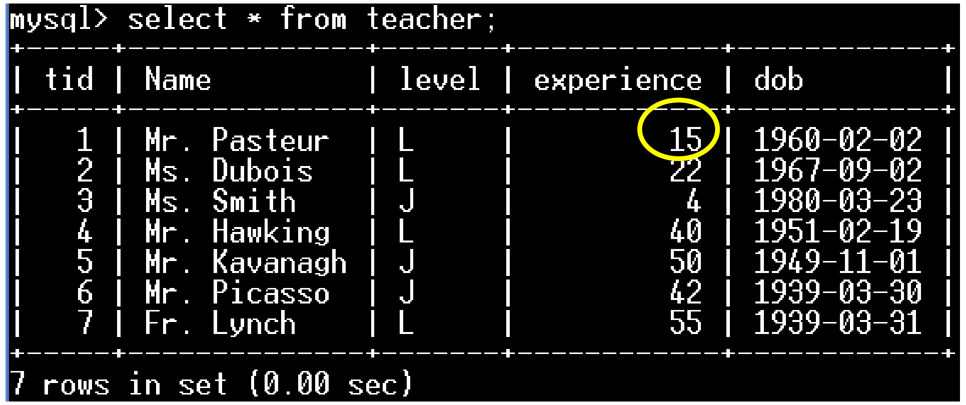


```
mysql> select * from teacher;
+-----+--------------+-------+------------+------------+
| tid | Name         | level | experience | dob        |
+-----+--------------+-------+------------+------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |
+-----+--------------+-------+------------+------------+
7 rows in set (0.00 sec)
```



```
mysql> SELECT *, IF(experience >= 20 AND experience <=45, "Y", "") as "Payrise Due"
    -> from teacher;
+-----+--------------+-------+------------+------------+-------------+
| tid | Name         | level | experience | dob        | Payrise Due |
+-----+--------------+-------+------------+------------+-------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |             |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 | Y           |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |             |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 | Y           |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |             |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |             |
+-----+--------------+-------+------------+------------+-------------+
7 rows in set (0.00 sec)
```

MySQL Control Flow Functions



```
mysql> select * from teacher;
+-----+-------------+-------+------------+------------+
| tid | Name        | level | experience | dob        |
+-----+-------------+-------+------------+------------+
|   1 | Mr. Pasteur | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois  | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith   | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J    |         50 | 1949-11-01 |
|   6 | Mr. Picasso | J     |         42 | 1939-03-30 |
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+-----+-------------+-------+------------+------------+
7 rows in set (0.00 sec)
```
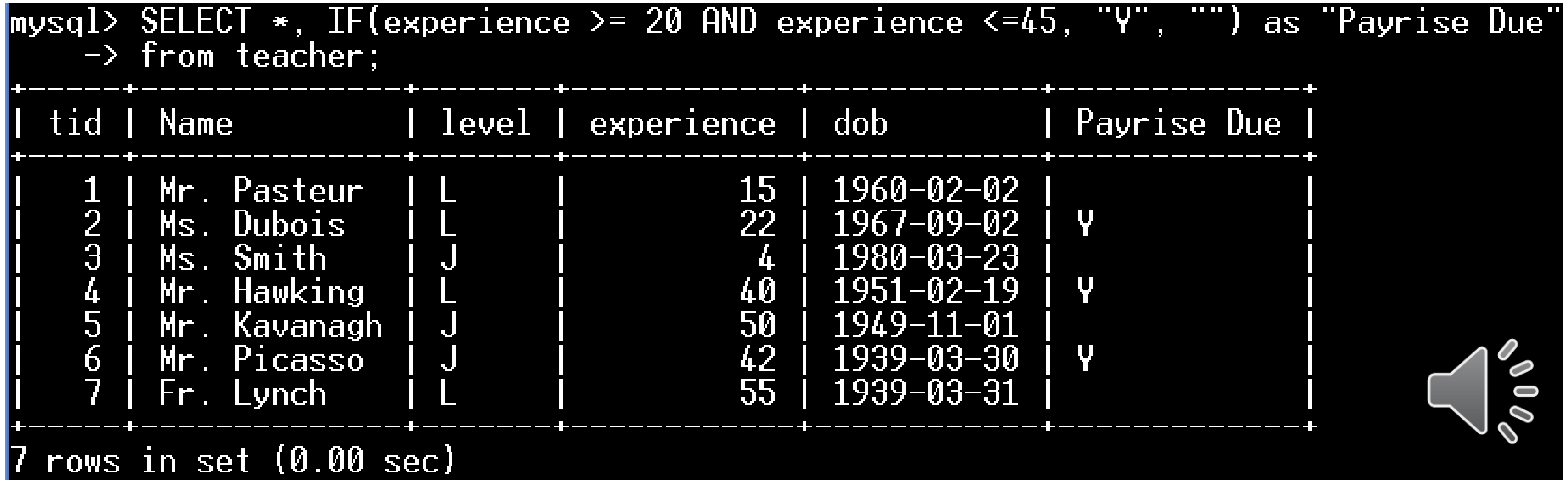
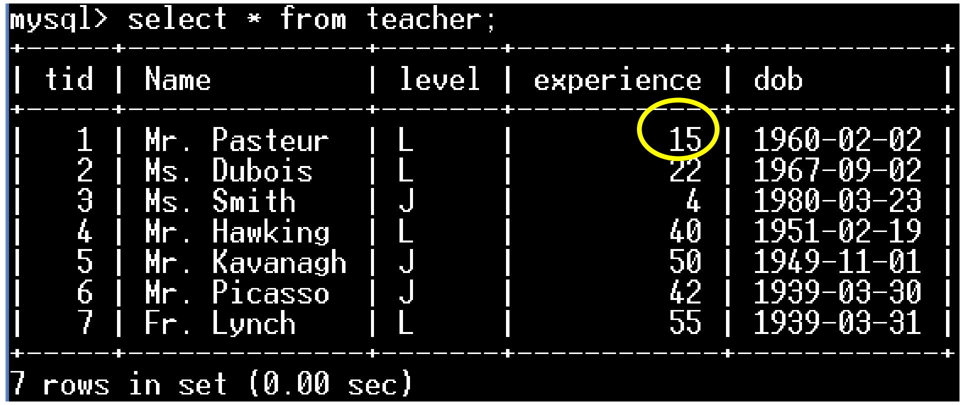
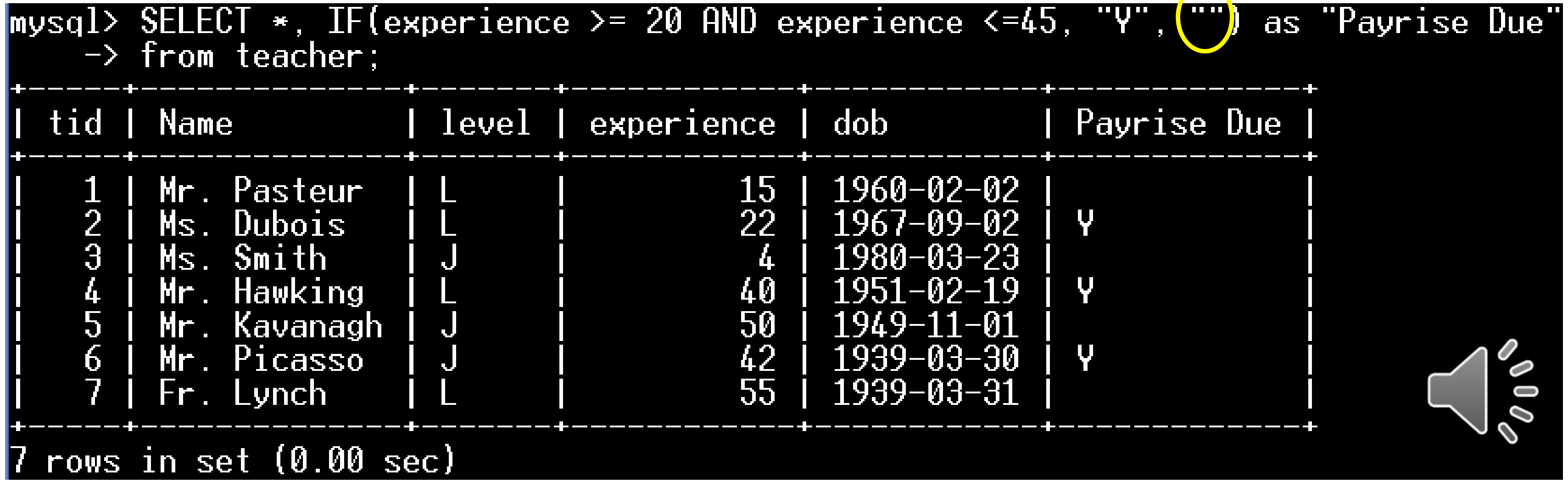



```
mysql> SELECT *, IF(experience >= 20 AND experience <=45, "Y", "") as "Payrise Due"
    -> from teacher;
+-----+--------------+-------+------------+------------+-------------+
| tid | Name         | level | experience | dob        | Payrise Due |
+-----+--------------+-------+------------+------------+-------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |             |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 | Y           |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |             |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 | Y           |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |             |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |             |
+-----+--------------+-------+------------+------------+-------------+
7 rows in set (0.00 sec)
```

MySQL Control Flow Functions

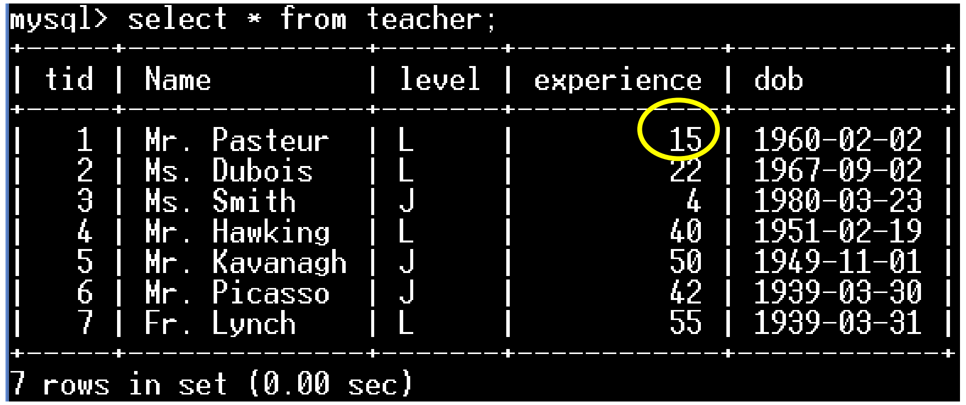


```
mysql> select * from teacher;
+-----+--------------+-------+------------+------------+
| tid | Name         | level | experience | dob        |
+-----+--------------+-------+------------+------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |
+-----+--------------+-------+------------+------------+
7 rows in set (0.00 sec)
```



```
mysql> SELECT *, IF(experience >= 20 AND experience <=45, "Y", "") as "Payrise Due"
    -> from teacher;
+-----+--------------+-------+------------+------------+-------------+
| tid | Name         | level | experience | dob        | Payrise Due |
+-----+--------------+-------+------------+------------+-------------+
|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |             |
|   2 | Ms. Dubois   | L     |         22 | 1967-09-02 | Y           |
|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |             |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 | Y           |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |             |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |             |
+-----+--------------+-------+------------+------------+-------------+
7 rows in set (0.00 sec)
```

MySQL Control Flow Functions



```
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| tid | Name        | level | experience | dob        |
+-----+-------------+-------+------------+------------+
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+-----+-------------+-------+------------+------------+
7 rows in set (0.00 sec)
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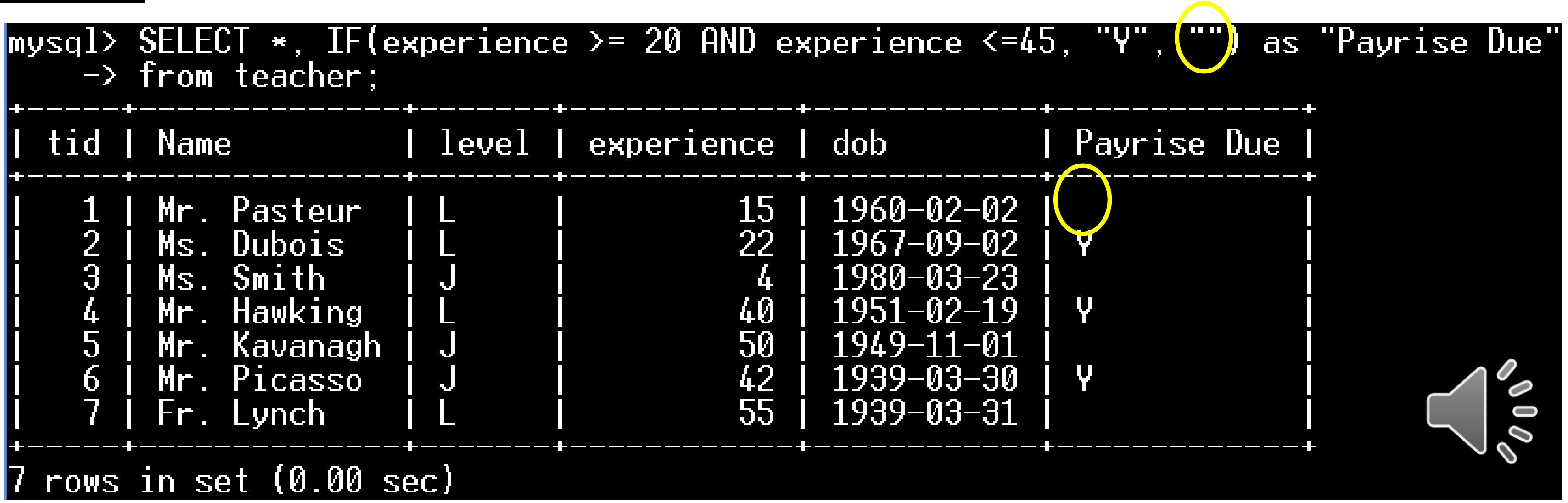

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+-----+--------------+-------+------------+------------+-------------+
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|   1 | Mr. Pasteur  | L     |         15 | 1960-02-02 |             |
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|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
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+-----+--------------+-------+------------+------------+-------------+
7 rows in set (0.00 sec)
```
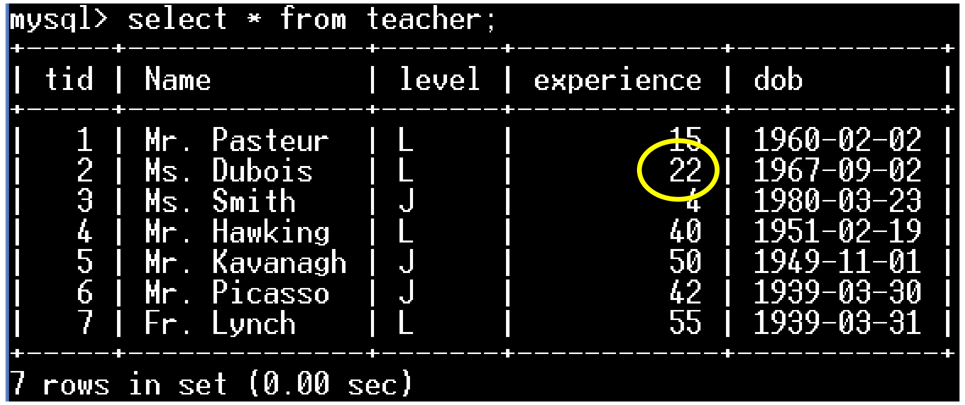

MySQL Control Flow Functions



```
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+-----+-------------+-------+------------+------------+
| tid | Name        | level | experience | dob        |
+-----+-------------+-------+------------+------------+
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+-----+-------------+-------+------------+------------+
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```

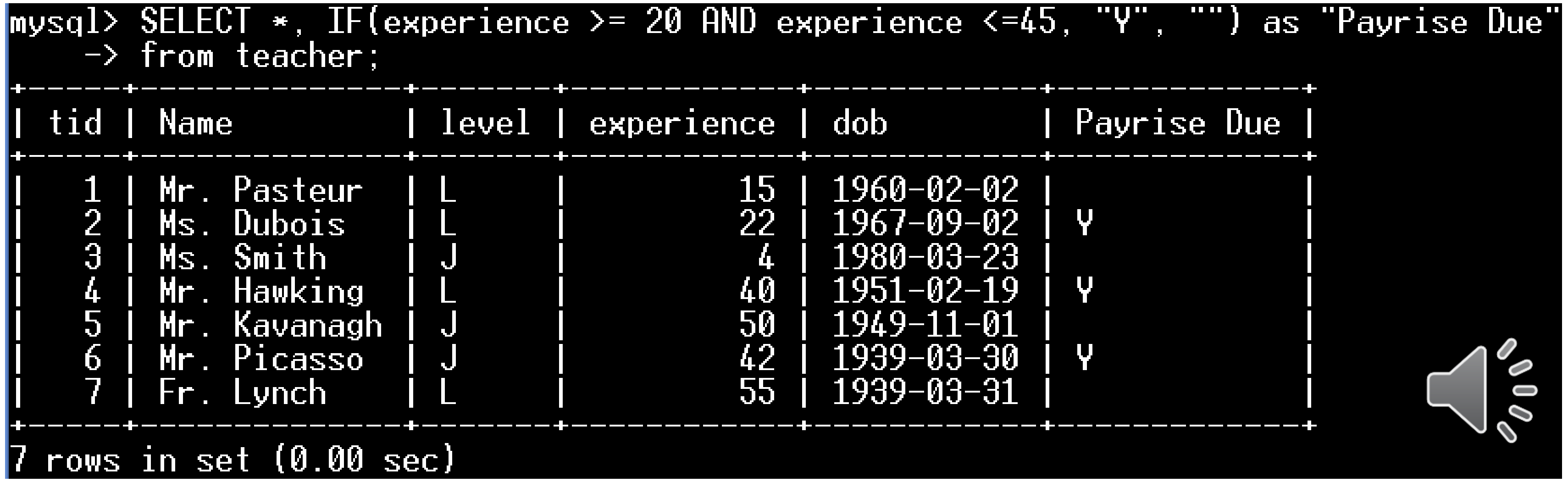

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+-----+--------------+-------+------------+------------+-------------+
| tid | Name         | level | experience | dob        | Payrise Due |
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|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |             |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 | Y           |
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|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
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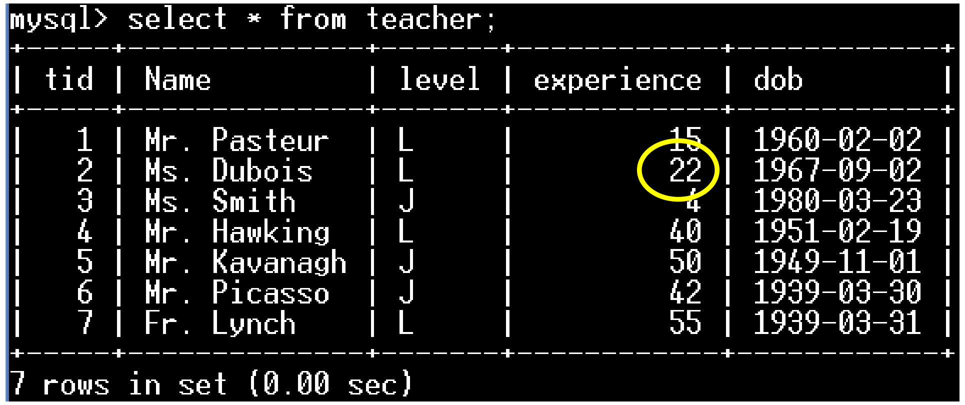
```

MySQL Control Flow Functions



```
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|   4 | Mr. Hawking | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh| J     |         50 | 1949-11-01 |
|   6 | Mr. Picasso | J     |         42 | 1939-03-30 |
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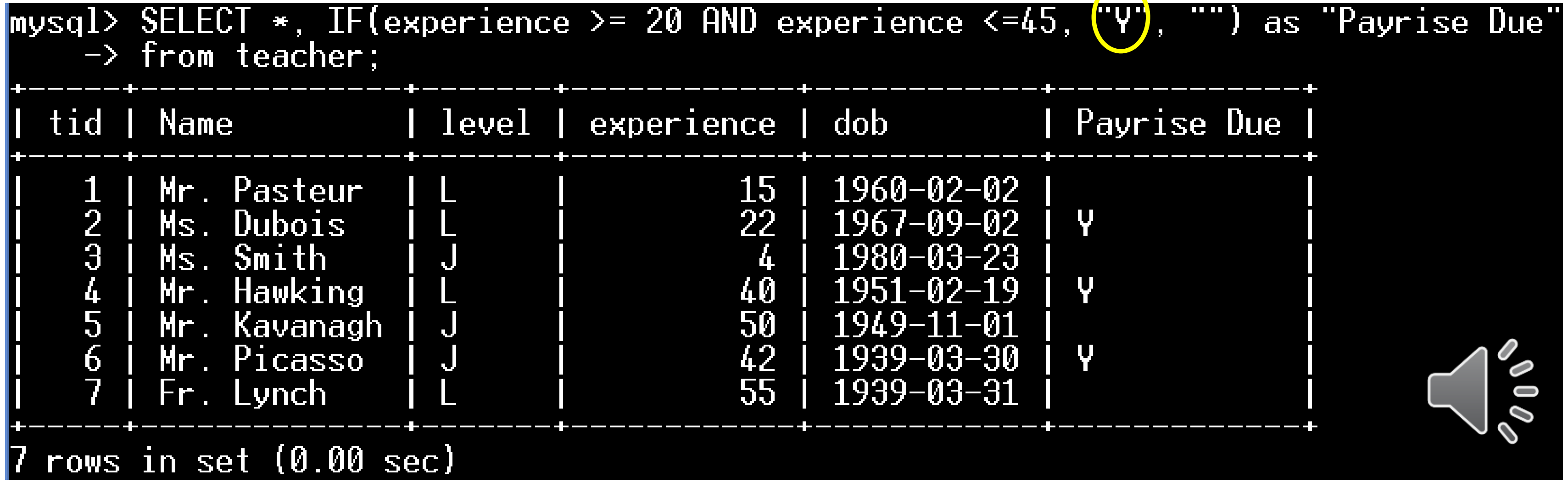

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|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |             |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 | Y           |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |             |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
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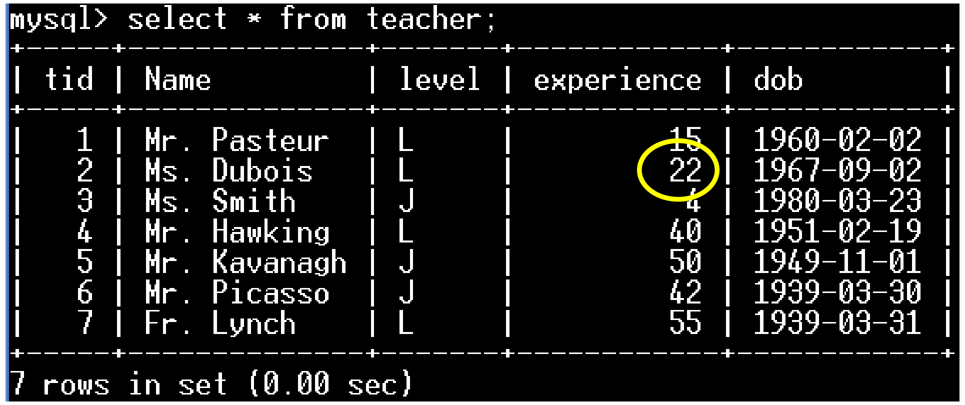
```

MySQL Control Flow Functions



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| tid | Name         | level | experience | dob        |
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|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |
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|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |
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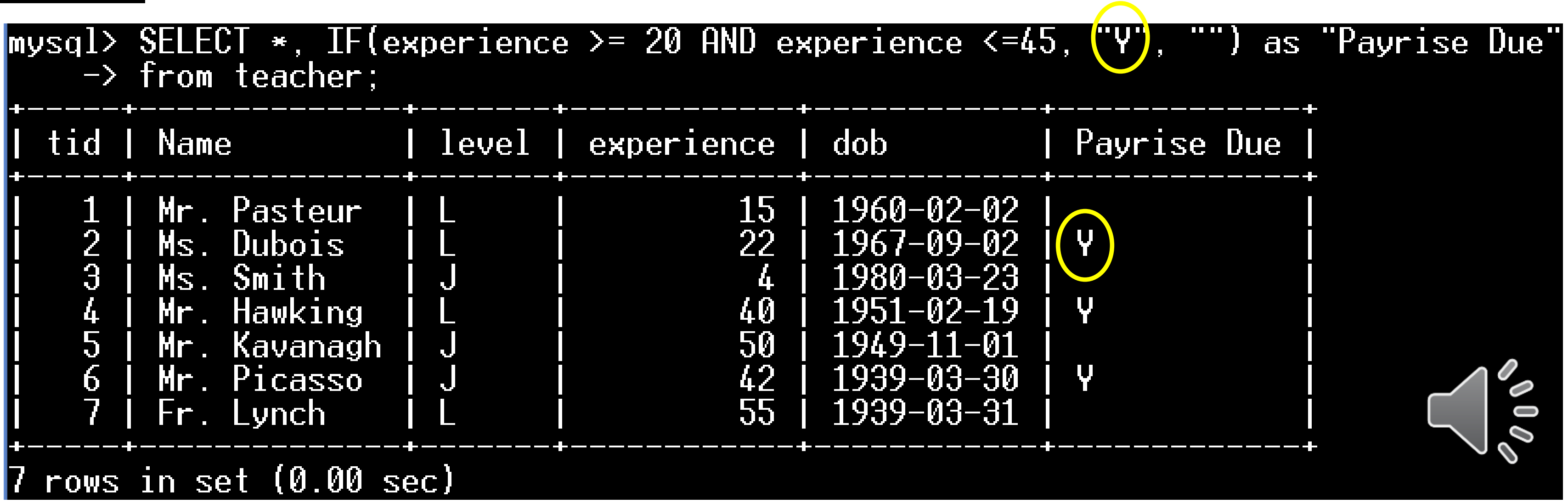

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|   3 | Ms. Smith    | J     |          4 | 1980-03-23 |             |
|   4 | Mr. Hawking  | L     |         40 | 1951-02-19 | Y           |
|   5 | Mr. Kavanagh | J     |         50 | 1949-11-01 |             |
|   6 | Mr. Picasso  | J     |         42 | 1939-03-30 | Y           |
|   7 | Fr. Lynch    | L     |         55 | 1939-03-31 |             |
+-----+--------------+-------+------------+------------+-------------+
7 rows in set (0.00 sec)
```

MySQL Control Flow Functions

MySQL Control Flow Functions

- CASE WHEN *condition 1* THEN *result 1*

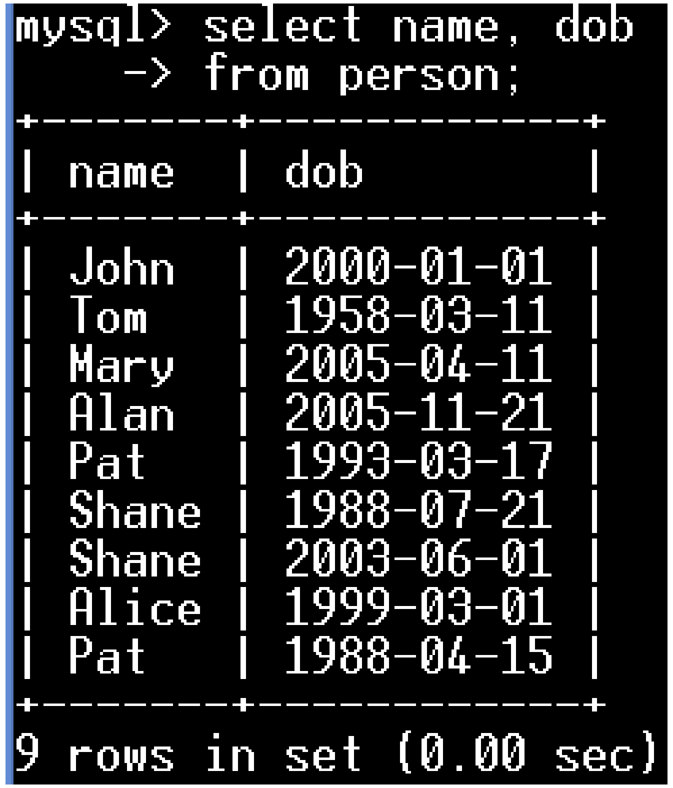
  WHEN *condition* 2 THEN *result 1*

  WHEN *condition n* THEN *result n*

  ELSE *result*

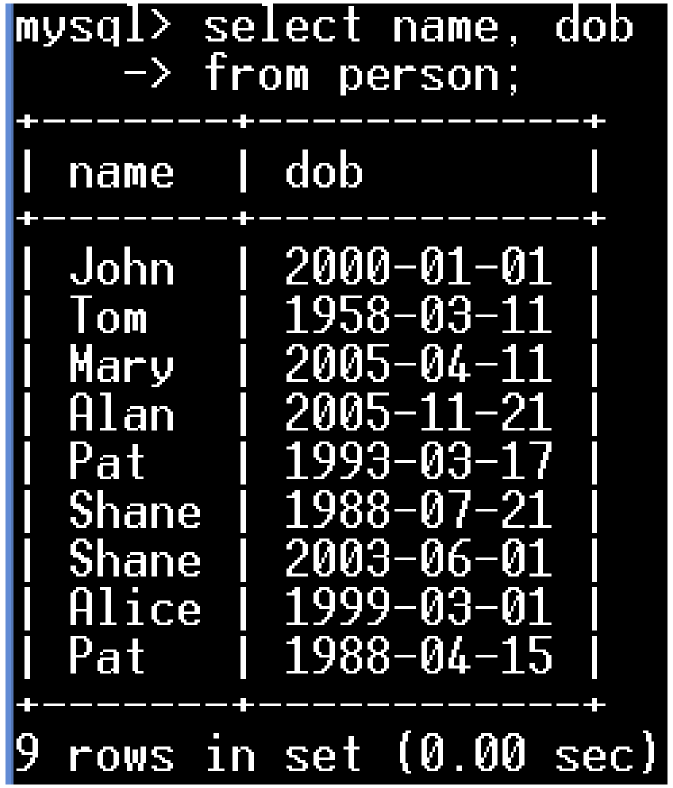
  END

MySQL Control Flow Functions

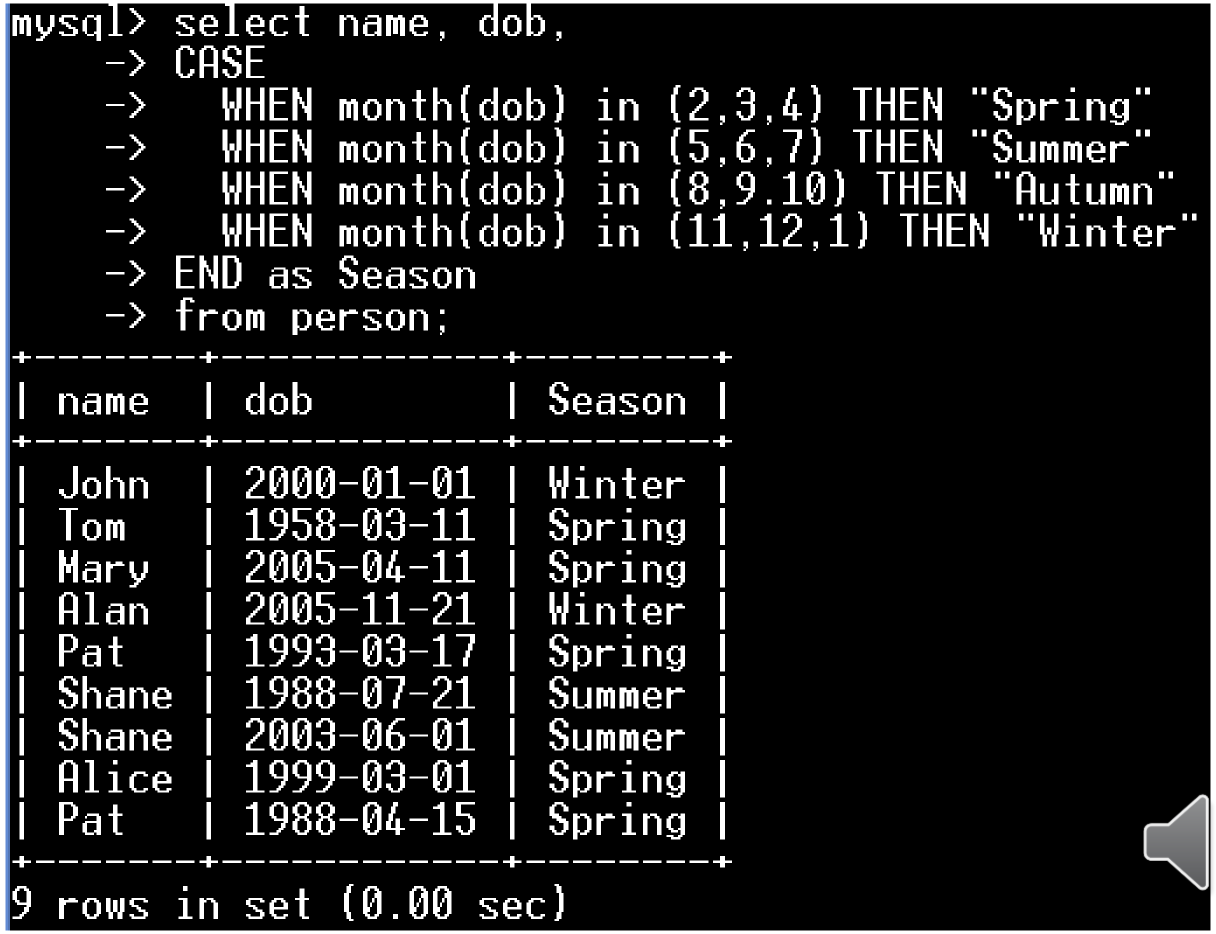


```
mysql> select name, dob
    -> from person;
+--------+------------+
| name   | dob        |
+--------+------------+
| John   | 2000-01-01 |
| Tom    | 1958-03-11 |
| Mary   | 2005-04-11 |
| Alan   | 2005-11-21 |
| Pat    | 1993-03-17 |
| Shane  | 1988-07-21 |
| Shane  | 2003-06-01 |
| Alice  | 1999-03-01 |
| Pat    | 1988-04-15 |
+--------+------------+
9 rows in set (0.00 sec)
```

MySQL Control Flow Functions

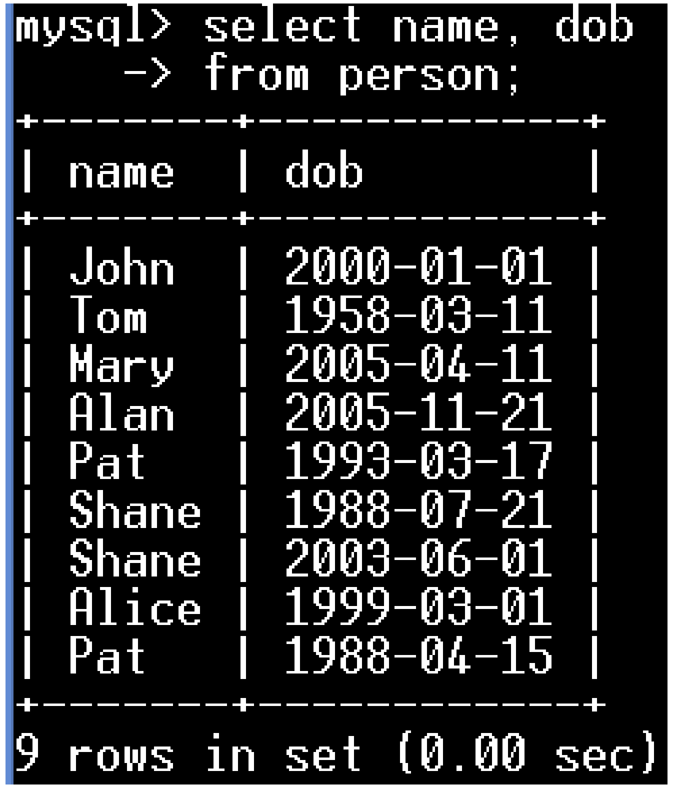


```
mysql> select name, dob
    -> from person;
+-------+------------+
| name  | dob        |
+-------+------------+
| John  | 2000-01-01 |
| Tom   | 1958-03-11 |
| Mary  | 2005-04-11 |
| Alan  | 2005-11-21 |
| Pat   | 1993-03-17 |
| Shane | 1988-07-21 |
| Shane | 2003-06-01 |
| Alice | 1999-03-01 |
| Pat   | 1988-04-15 |
+-------+------------+
9 rows in set (0.00 sec)
```

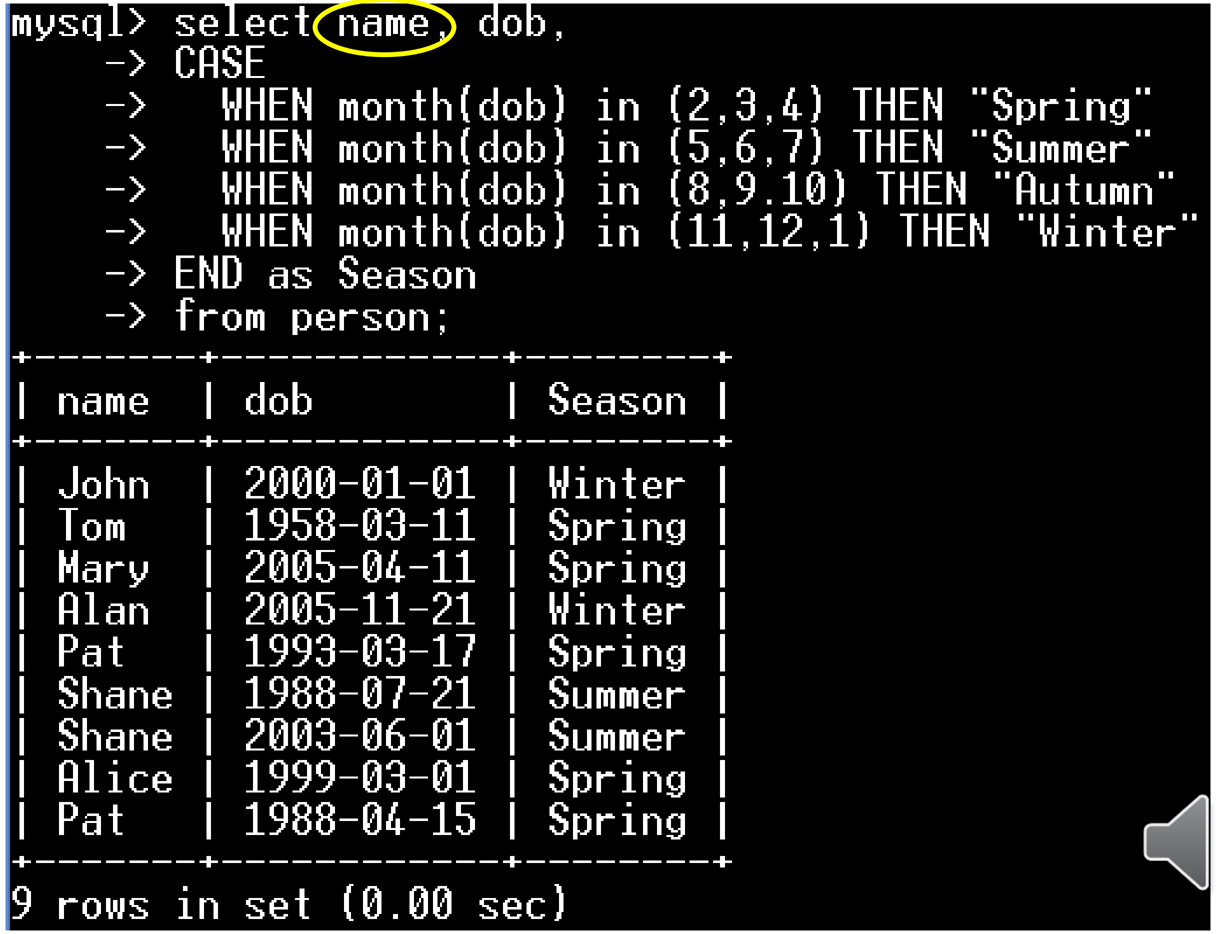


```
mysql> select name, dob,
    -> CASE
    ->   WHEN month(dob) in (2,3,4) THEN "Spring"
    ->   WHEN month(dob) in (5,6,7) THEN "Summer"
    ->   WHEN month(dob) in (8,9.10) THEN "Autumn"
    ->   WHEN month(dob) in (11,12,1) THEN "Winter"
    -> END as Season
    -> from person;
+-------+------------+--------+
| name  | dob        | Season |
+-------+------------+--------+
| John  | 2000-01-01 | Winter |
| Tom   | 1958-03-11 | Spring |
| Mary  | 2005-04-11 | Spring |
| Alan  | 2005-11-21 | Winter |
| Pat   | 1993-03-17 | Spring |
| Shane | 1988-07-21 | Summer |
| Shane | 2003-06-01 | Summer |
| Alice | 1999-03-01 | Spring |
| Pat   | 1988-04-15 | Spring |
+-------+------------+--------+
9 rows in set (0.00 sec)
```

MySQL Control Flow Functions

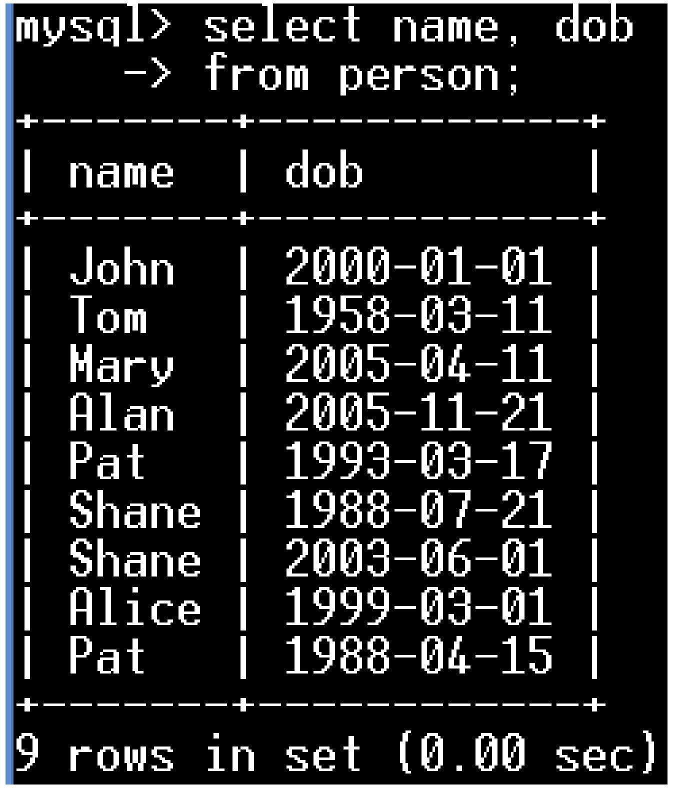


```
mysql> select name, dob
    -> from person;
+-------+------------+
| name  | dob        |
+-------+------------+
| John  | 2000-01-01 |
| Tom   | 1958-03-11 |
| Mary  | 2005-04-11 |
| Alan  | 2005-11-21 |
| Pat   | 1993-03-17 |
| Shane | 1988-07-21 |
| Shane | 2003-06-01 |
| Alice | 1999-03-01 |
| Pat   | 1988-04-15 |
+-------+------------+
9 rows in set (0.00 sec)
```

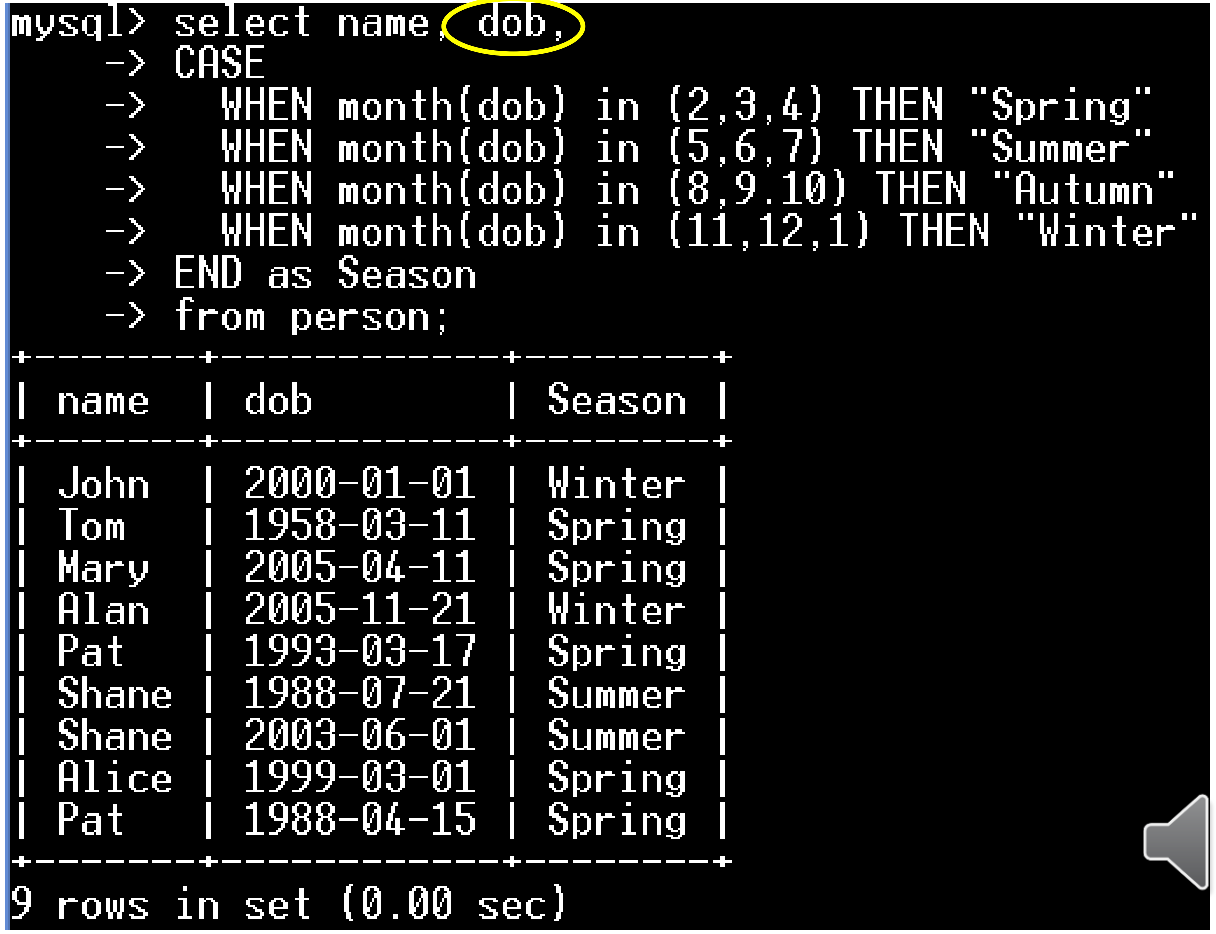


```
mysql> select name, dob,
    -> CASE
    ->   WHEN month(dob) in (2,3,4) THEN "Spring"
    ->   WHEN month(dob) in (5,6,7) THEN "Summer"
    ->   WHEN month(dob) in (8,9.10) THEN "Autumn"
    ->   WHEN month(dob) in (11,12,1) THEN "Winter"
    -> END as Season
    -> from person;
+-------+------------+--------+
| name  | dob        | Season |
+-------+------------+--------+
| John  | 2000-01-01 | Winter |
| Tom   | 1958-03-11 | Spring |
| Mary  | 2005-04-11 | Spring |
| Alan  | 2005-11-21 | Winter |
| Pat   | 1993-03-17 | Spring |
| Shane | 1988-07-21 | Summer |
| Shane | 2003-06-01 | Summer |
| Alice | 1999-03-01 | Spring |
| Pat   | 1988-04-15 | Spring |
+-------+------------+--------+
9 rows in set (0.00 sec)
```

MySQL Control Flow Functions

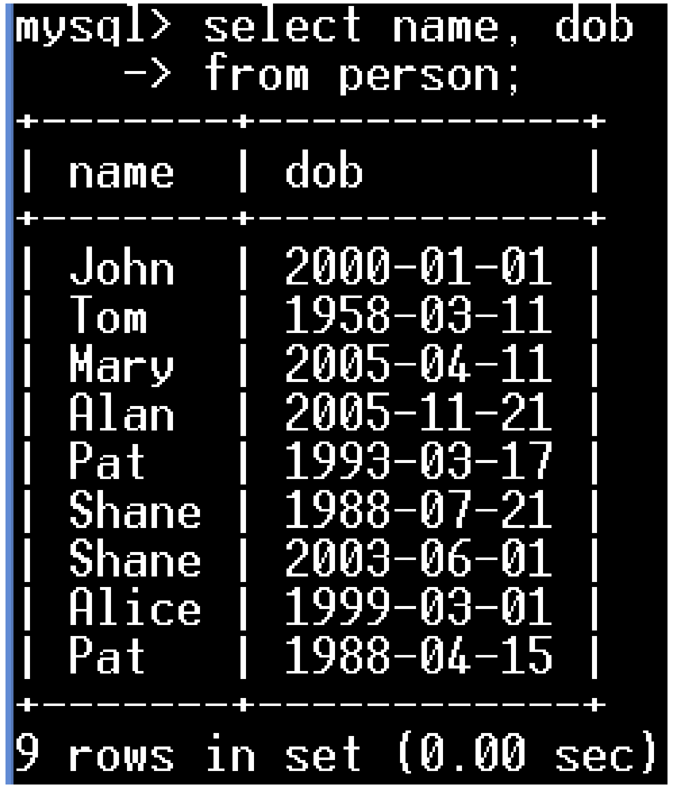


```
mysql> select name, dob
    -> from person;
+-------+------------+
| name  | dob        |
+-------+------------+
| John  | 2000-01-01 |
| Tom   | 1958-03-11 |
| Mary  | 2005-04-11 |
| Alan  | 2005-11-21 |
| Pat   | 1993-03-17 |
| Shane | 1988-07-21 |
| Shane | 2003-06-01 |
| Alice | 1999-03-01 |
| Pat   | 1988-04-15 |
+-------+------------+
9 rows in set (0.00 sec)
```

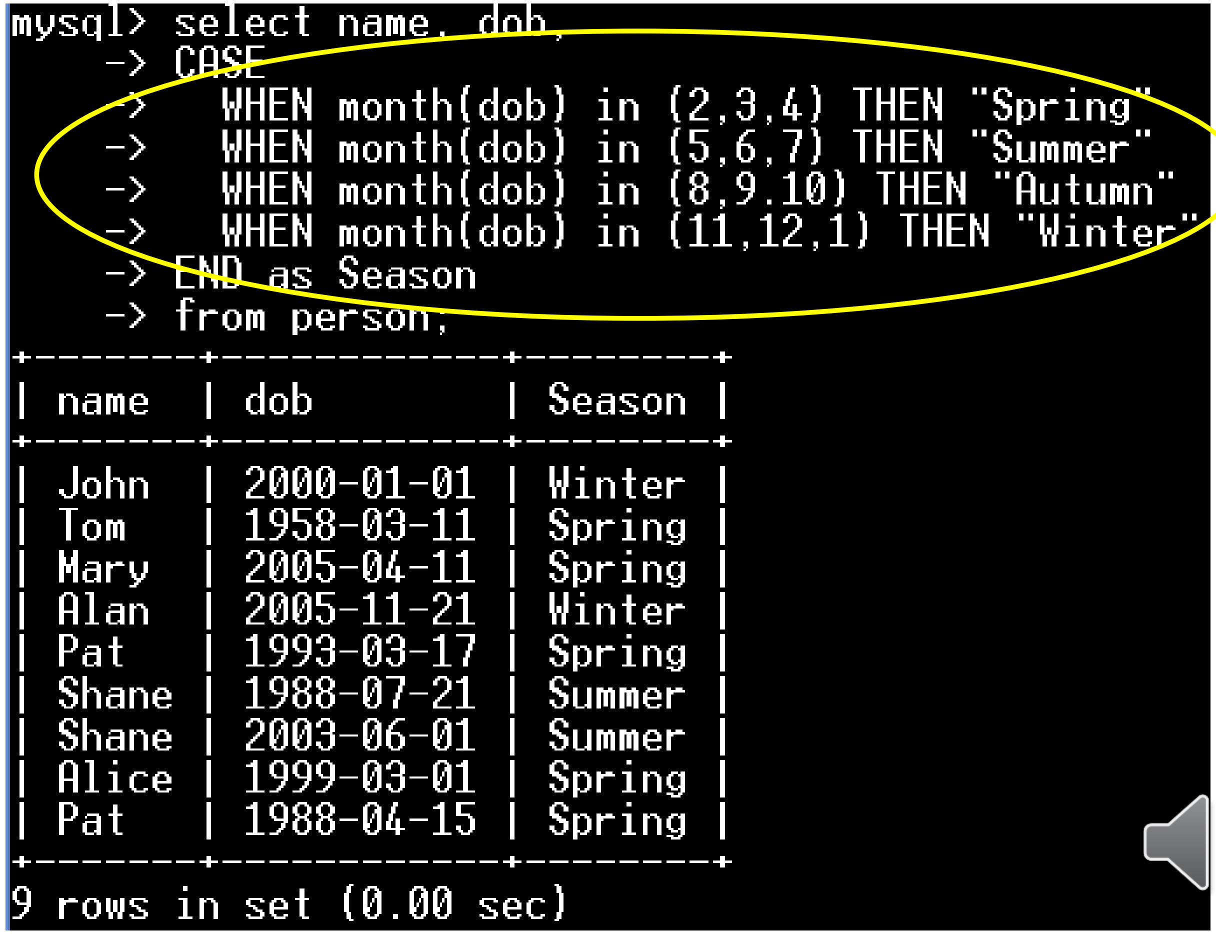


```
mysql> select name, dob,
    -> CASE
    ->   WHEN month(dob) in (2,3,4) THEN "Spring"
    ->   WHEN month(dob) in (5,6,7) THEN "Summer"
    ->   WHEN month(dob) in (8,9.10) THEN "Autumn"
    ->   WHEN month(dob) in (11,12,1) THEN "Winter"
    -> END as Season
    -> from person;
+-------+------------+--------+
| name  | dob        | Season |
+-------+------------+--------+
| John  | 2000-01-01 | Winter |
| Tom   | 1958-03-11 | Spring |
| Mary  | 2005-04-11 | Spring |
| Alan  | 2005-11-21 | Winter |
| Pat   | 1993-03-17 | Spring |
| Shane | 1988-07-21 | Summer |
| Shane | 2003-06-01 | Summer |
| Alice | 1999-03-01 | Spring |
| Pat   | 1988-04-15 | Spring |
+-------+------------+--------+
9 rows in set (0.00 sec)
```

MySQL Control Flow Functions



```
mysql> select name, dob
    -> from person;
+--------+------------+
| name   | dob        |
+--------+------------+
| John   | 2000-01-01 |
| Tom    | 1958-03-11 |
| Mary   | 2005-04-11 |
| Alan   | 2005-11-21 |
| Pat    | 1993-03-17 |
| Shane  | 1988-07-21 |
| Shane  | 2003-06-01 |
| Alice  | 1999-03-01 |
| Pat    | 1988-04-15 |
+--------+------------+
9 rows in set (0.00 sec)
```



```
mysql> select name, dob,
    -> CASE
    ->   WHEN month(dob) in (2,3,4) THEN "Spring"
    ->   WHEN month(dob) in (5,6,7) THEN "Summer"
    ->   WHEN month(dob) in (8,9.10) THEN "Autumn"
    ->   WHEN month(dob) in (11,12,1) THEN "Winter"
    -> END as Season
    -> from person;
+--------+------------+--------+
| name   | dob        | Season |
+--------+------------+--------+
| John   | 2000-01-01 | Winter |
| Tom    | 1958-03-11 | Spring |
| Mary   | 2005-04-11 | Spring |
| Alan   | 2005-11-21 | Winter |
| Pat    | 1993-03-17 | Spring |
| Shane  | 1988-07-21 | Summer |
| Shane  | 2003-06-01 | Summer |
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| Pat    | 1988-04-15 | Spring |
+--------+------------+--------+
9 rows in set (0.00 sec)
```
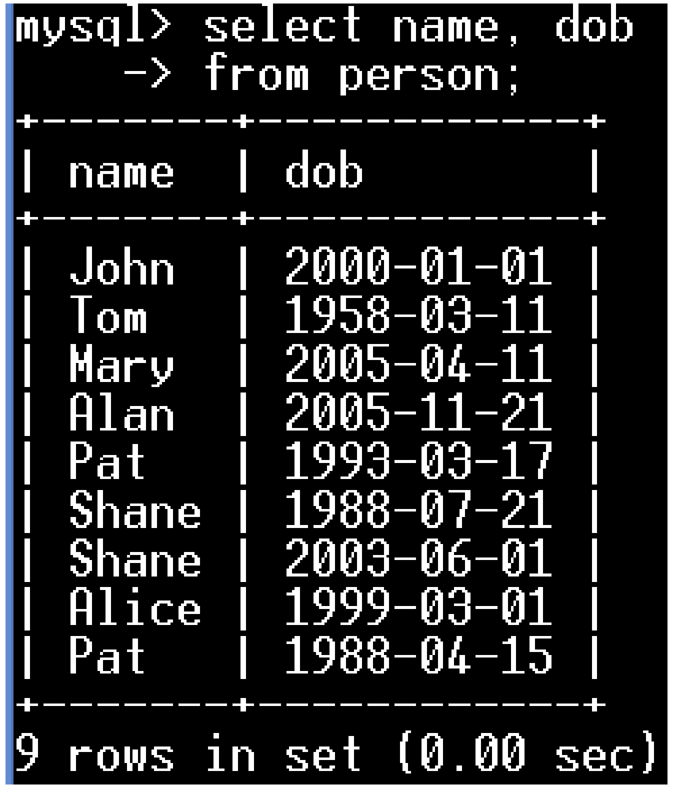

MySQL Control Flow Functions



```
mysql> select name, dob
    -> from person;
+-------+------------+
| name  | dob        |
+-------+------------+
| John  | 2000-01-01 |
| Tom   | 1958-03-11 |
| Mary  | 2005-04-11 |
| Alan  | 2005-11-21 |
| Pat   | 1993-03-17 |
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| Shane | 2003-06-01 |
| Alice | 1999-03-01 |
| Pat   | 1988-04-15 |
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9 rows in set (0.00 sec)
```

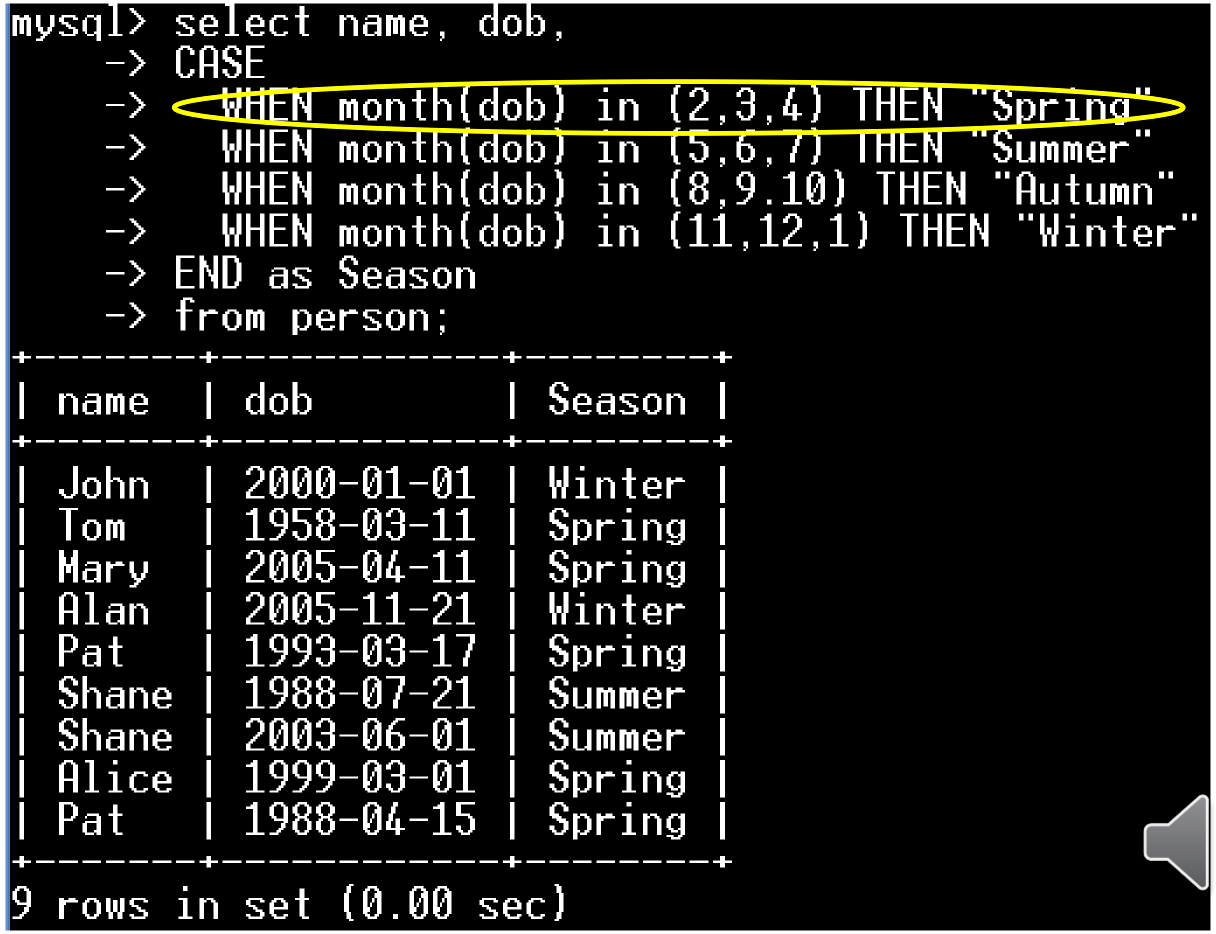

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    ->   WHEN month(dob) in (11,12,1) THEN "Winter"
    -> END as Season
    -> from person;
+-------+------------+--------+
| name  | dob        | Season |
+-------+------------+--------+
| John  | 2000-01-01 | Winter |
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| Mary  | 2005-04-11 | Spring |
| Alan  | 2005-11-21 | Winter |
| Pat   | 1993-03-17 | Spring |
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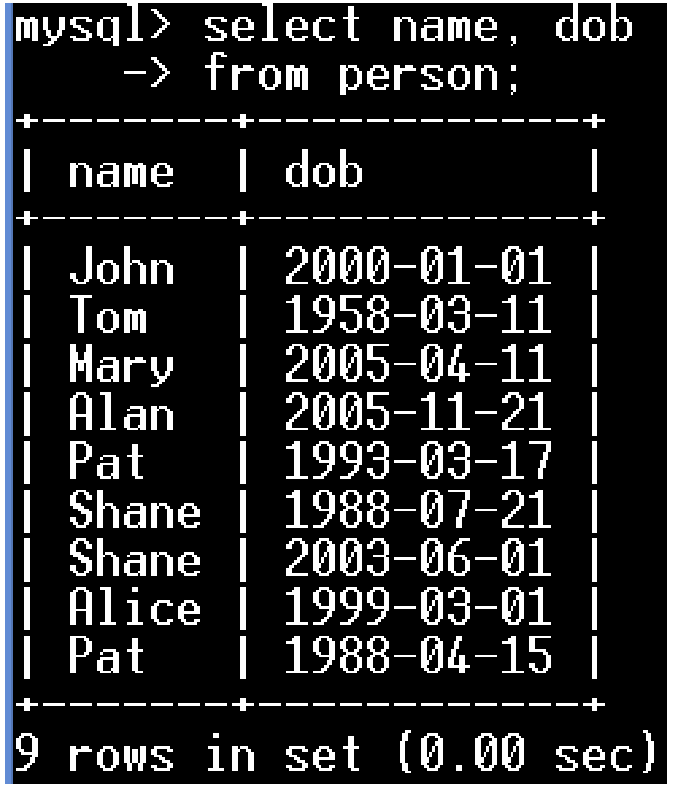
```

MySQL Control Flow Functions



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+--------+------------+
| name   | dob        |
+--------+------------+
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+--------+------------+
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```
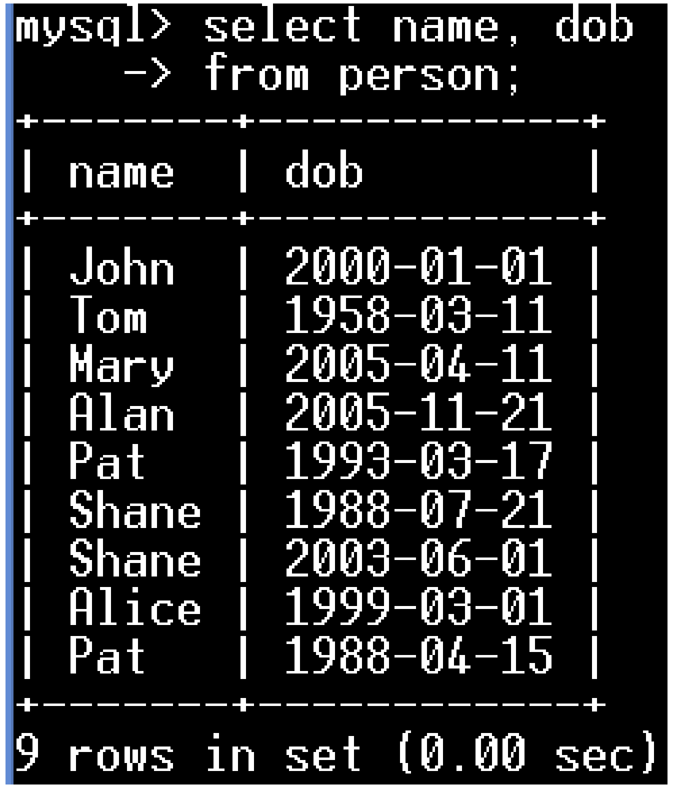

MySQL Control Flow Functions



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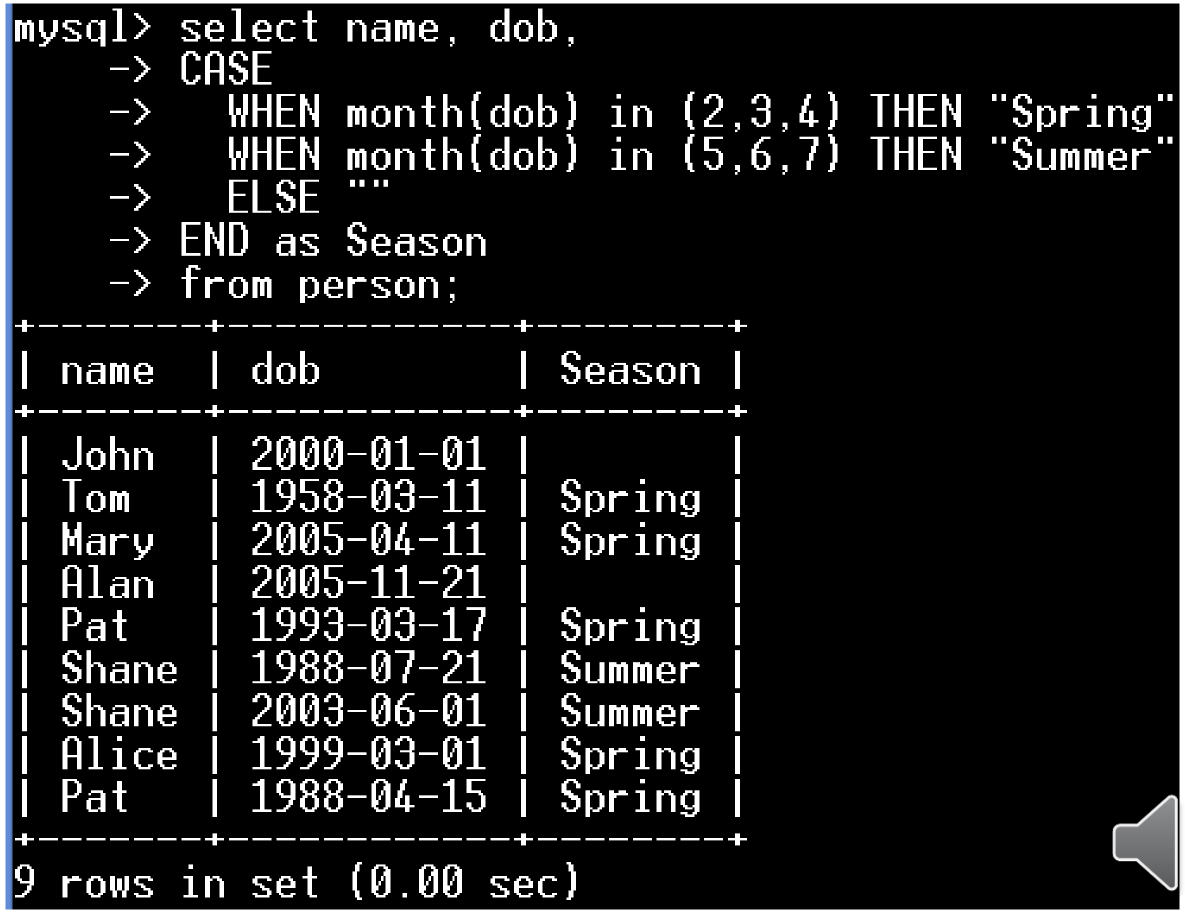

```
mysql> select name, dob,
    -> CASE
    ->   WHEN month(dob) in (2,3,4) THEN "Spring"
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    ->   ELSE ""
    -> END as Season
    -> from person;
+-------+------------+--------+
| name  | dob        | Season |
+-------+------------+--------+
| John  | 2000-01-01 |        |
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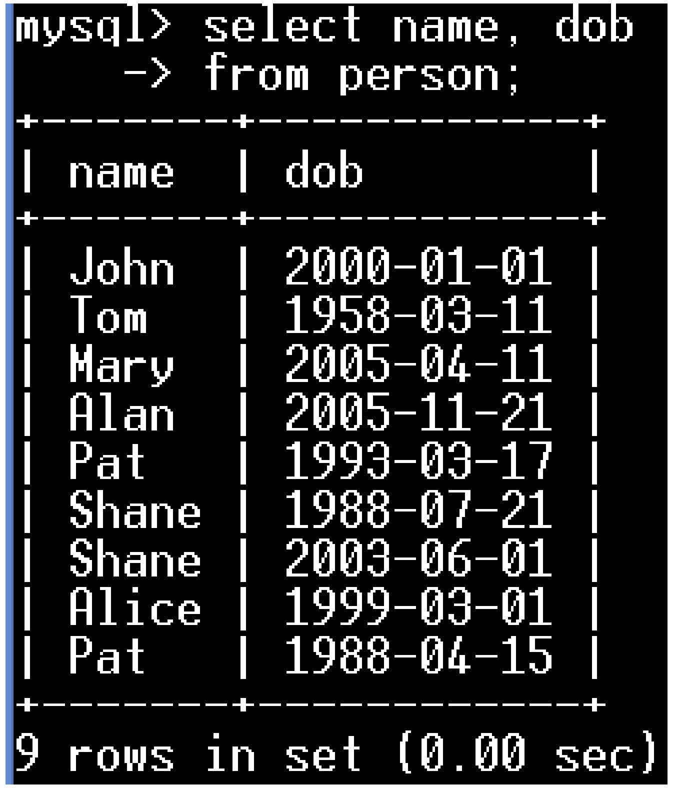
MySQL Control Flow Functions



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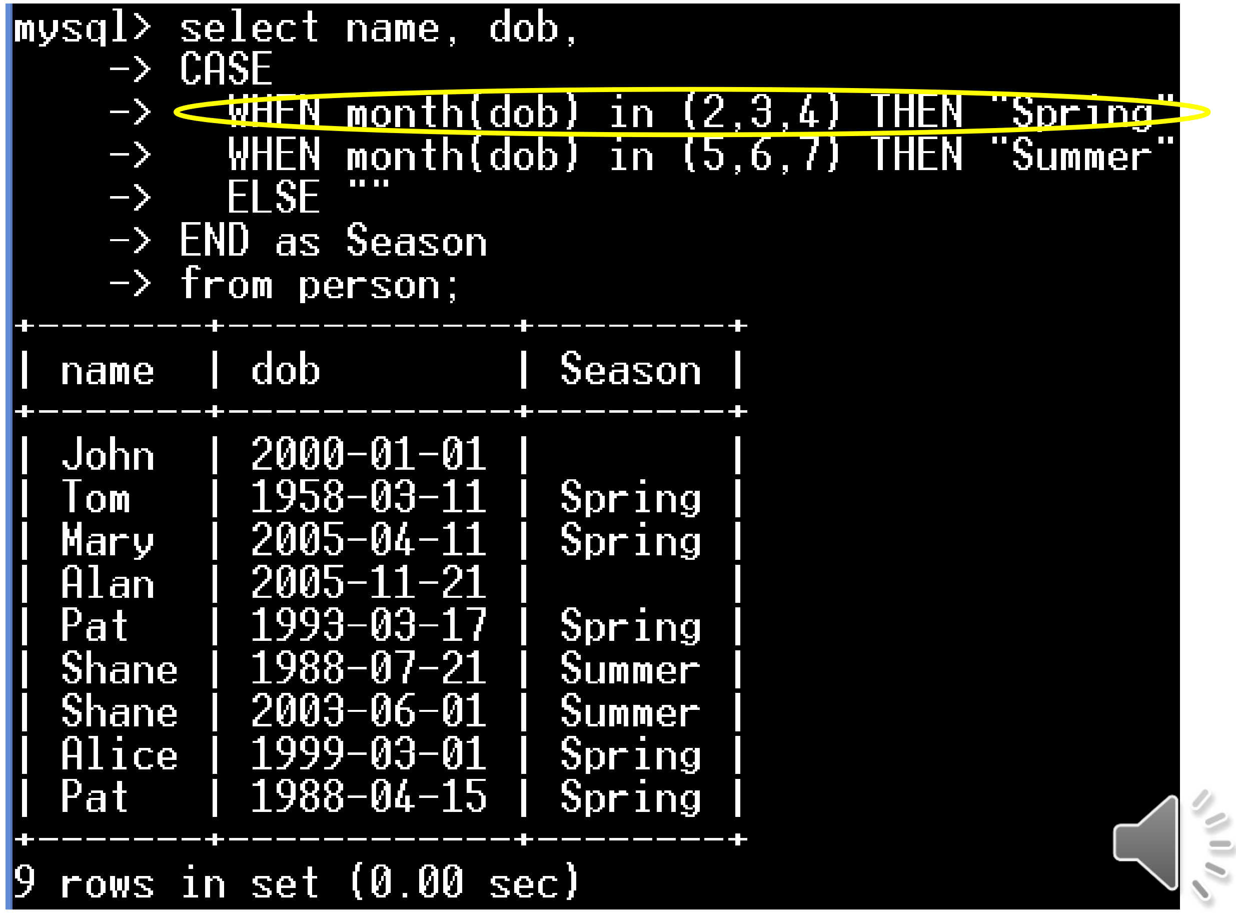

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+-------+------------+--------+
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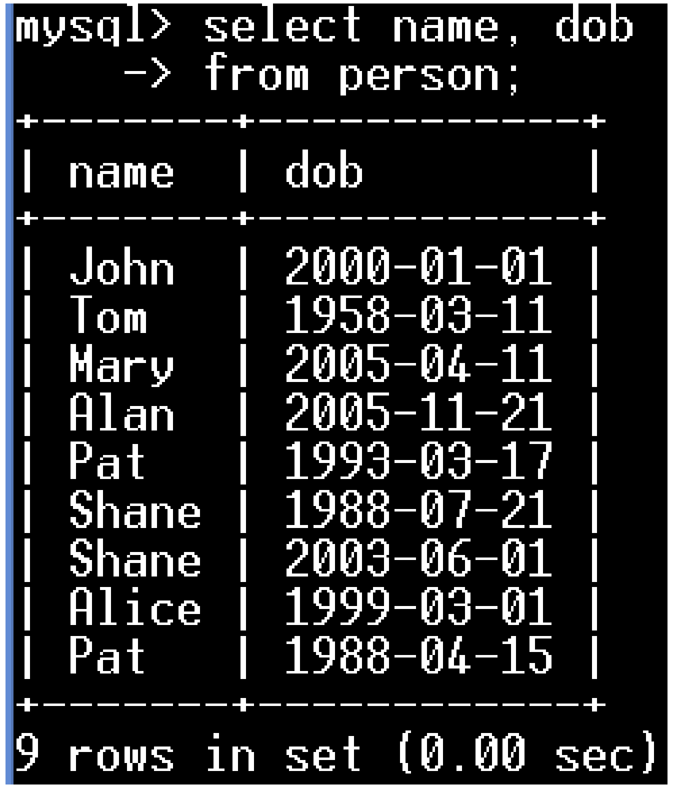
MySQL Control Flow Functions



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| name  | dob        |
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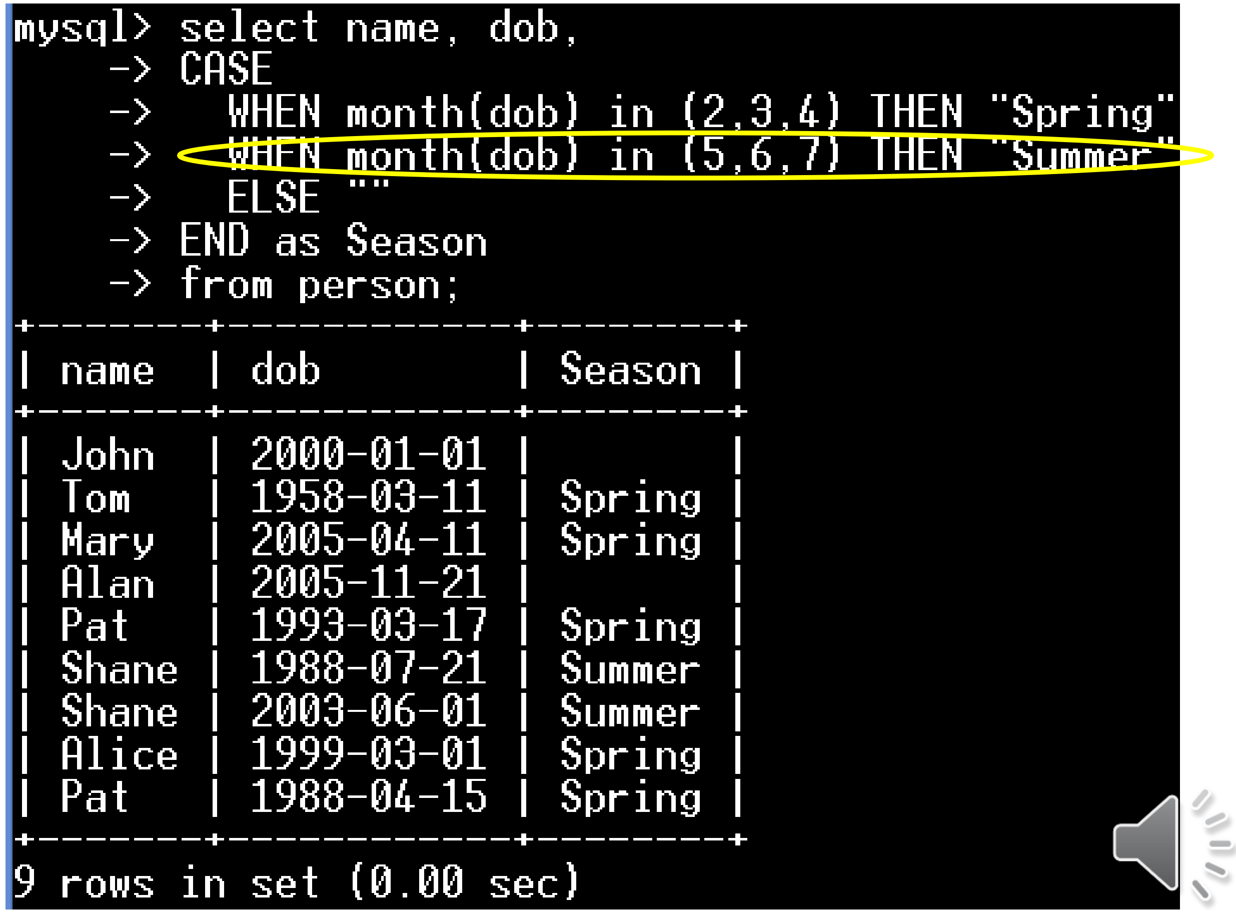

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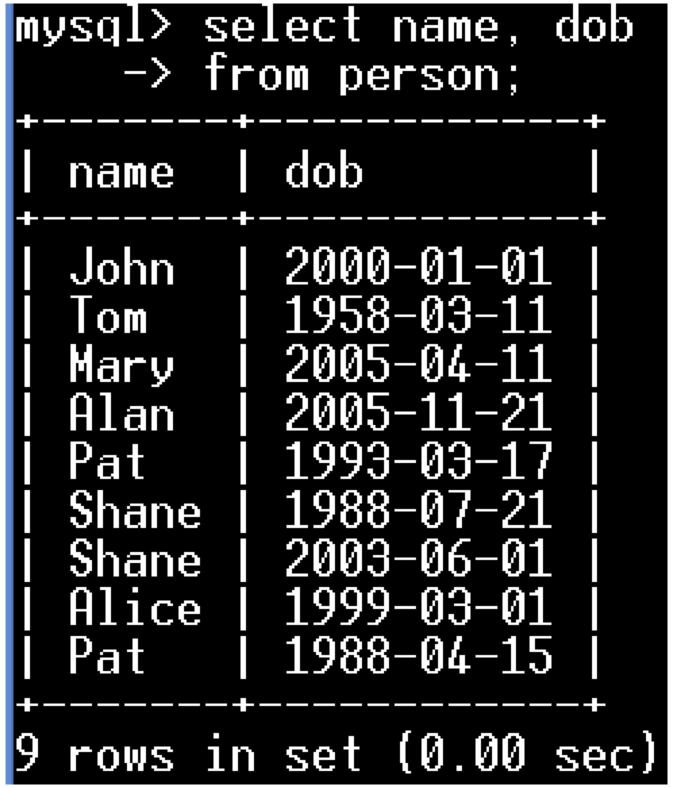
MySQL Control Flow Functions



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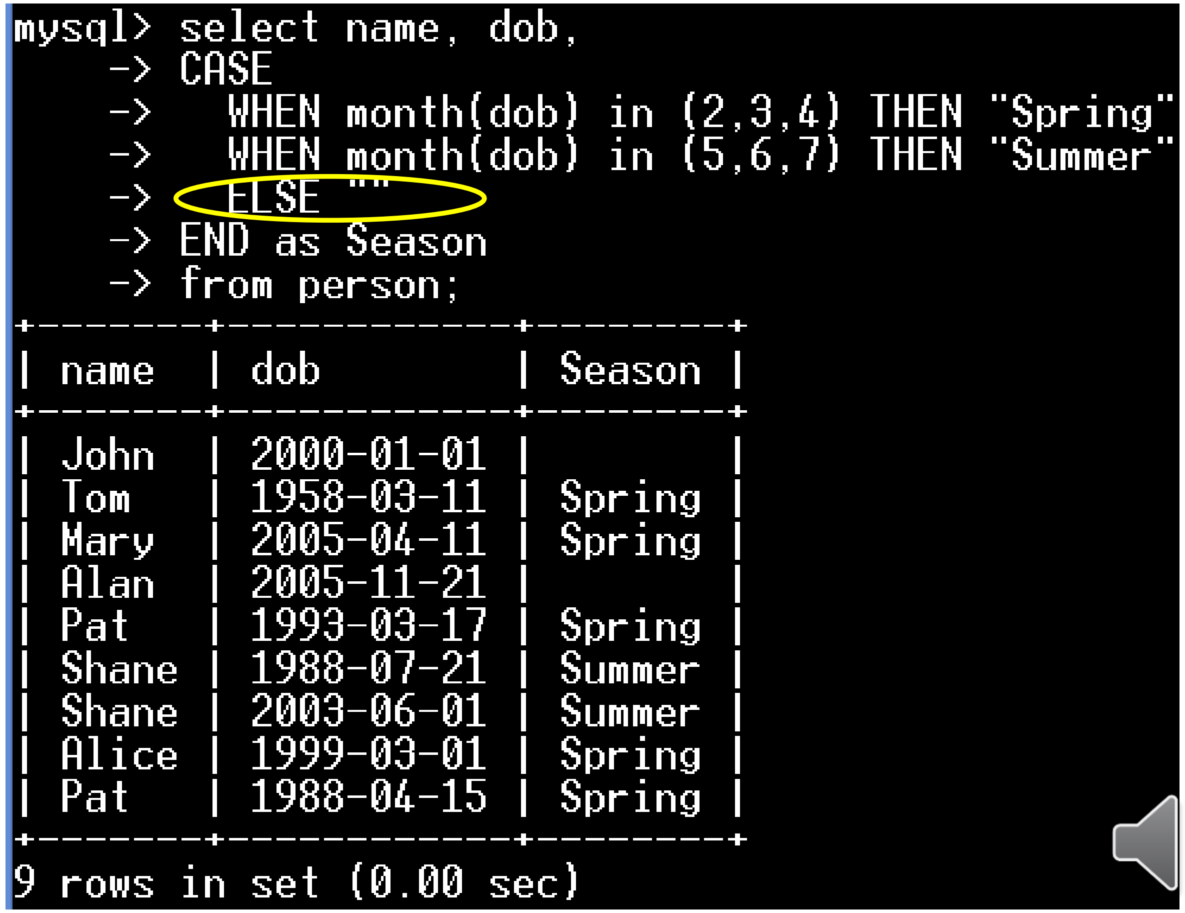

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```

MySQL Stored Routines

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<u>Uses</u>

- When multiple client applications are written in different languages or work on different platforms, but need to perform the same database operations.

- To ensure security. Applications cannot directly access tables only stored routines.

MySQL Stored Routines

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  - Speed

    Performance of applications accessing the database is increased.

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    Not designed for complex business logic.

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    Only a few database management systems allow you to debug stored procedures. MySQL is not one of them.

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  - Difficult to debug

    Only a few database management systems allow you to debug stored procedures. MySQL is not one of them.
  - Performance

    A DBMS is not well-designed for logical operations.

MySQL Stored Functions

- A stored function is a special kind stored routine that returns a single value.

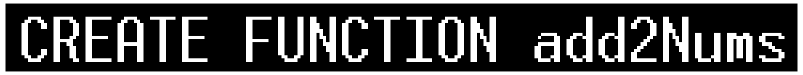
- Stored functions are used to encapsulate common formulas or business rules that are reusable among SQL statements or stored routines.

- Functions take 0 or more input parameters and return a single value.

https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html

MySQL Stored Functions

MySQL Stored Functions



```
CREATE FUNCTION add2Nums
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer
DETERMINISTIC
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer

DETERMINISTIC

BEGIN



END
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer
DETERMINISTIC
BEGIN
    RETURN
END
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer
DETERMINISTIC
BEGIN
    RETURN num1 + num2;
END
```

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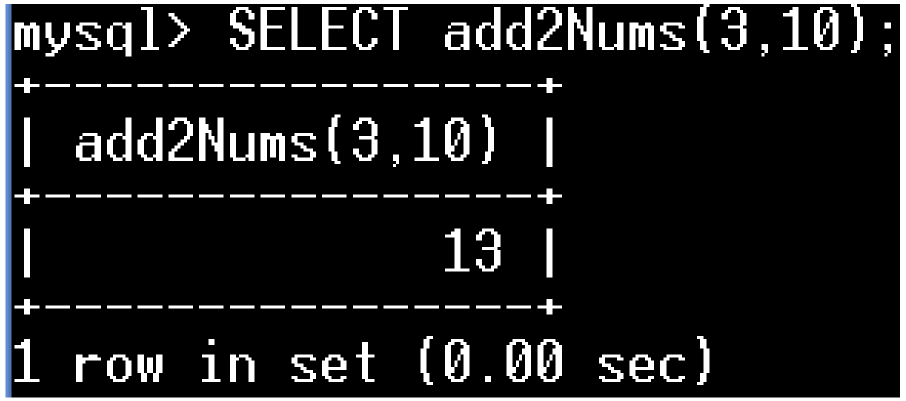
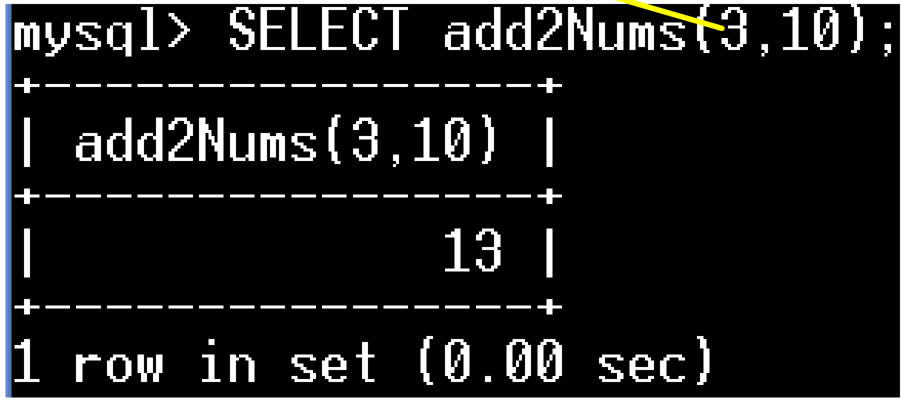
```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer
DETERMINISTIC
BEGIN
    RETURN num1 + num2;
END
```



```
mysql> SELECT add2Nums(3,10);
+----------------+
| add2Nums(3,10) |
+----------------+
|             13 |
+----------------+
1 row in set (0.00 sec)
```

MySQL Stored Functions

```
CREATE FUNCTION add2Nums (num1 integer, num2 integer)
RETURNS integer
DETERMINISTIC
BEGIN
    RETURN num1 + num2;
END
```



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+-----------------+
| add2Nums(3,10) |
+-----------------+
|              13 |
+-----------------+
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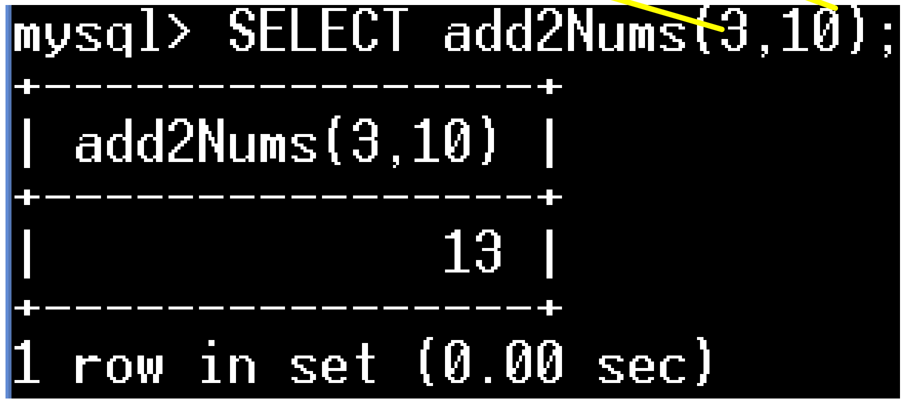

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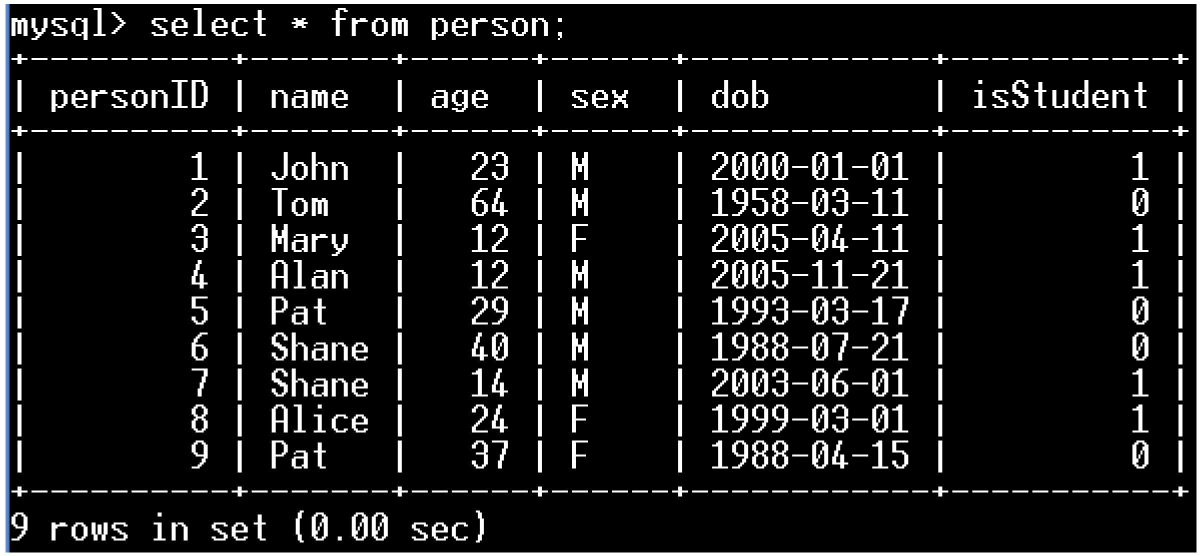
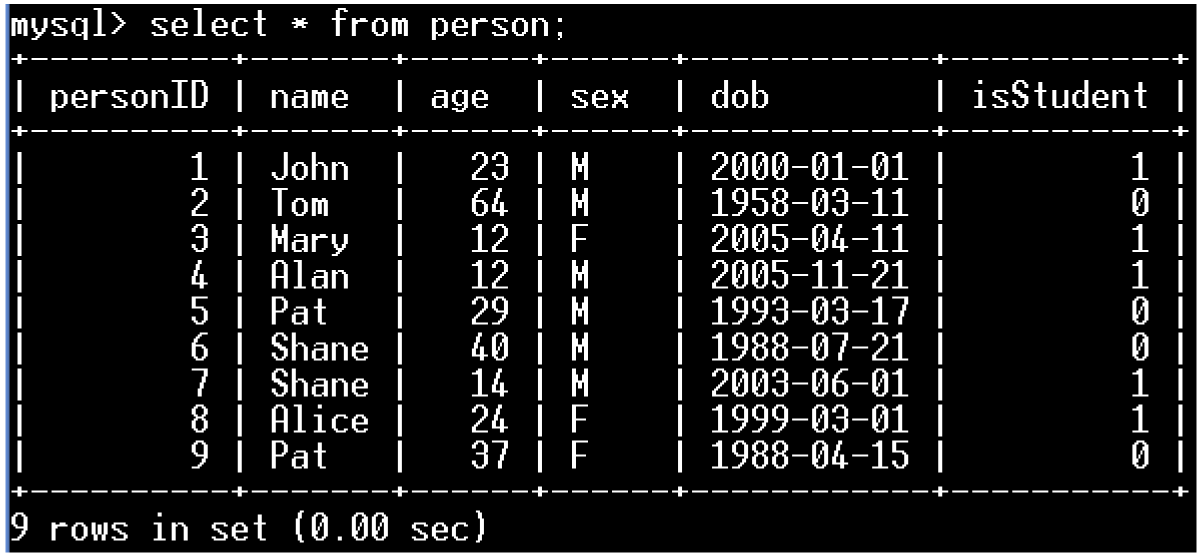
MySQL Stored Functions



```
mysql> select * from person;
+----------+-------+------+------+------------+-----------+
| personID | name  | age  | sex  | dob        | isStudent |
+----------+-------+------+------+------------+-----------+
|        1 | John  |   23 | M    | 2000-01-01 |         1 |
|        2 | Tom   |   64 | M    | 1958-03-11 |         0 |
|        3 | Mary  |   12 | F    | 2005-04-11 |         1 |
|        4 | Alan  |   12 | M    | 2005-11-21 |         1 |
|        5 | Pat   |   29 | M    | 1993-03-17 |         0 |
|        6 | Shane |   40 | M    | 1988-07-21 |         0 |
|        7 | Shane |   14 | M    | 2003-06-01 |         1 |
|        8 | Alice |   24 | F    | 1999-03-01 |         1 |
|        9 | Pat   |   37 | F    | 1988-04-15 |         0 |
+----------+-------+------+------+------------+-----------+
9 rows in set (0.00 sec)
```

MySQL Stored Functions



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|        3 | Mary  |   12 | F    | 2005-04-11 |         1 |
|        4 | Alan  |   12 | M    | 2005-11-21 |         1 |
|        5 | Pat   |   29 | M    | 1993-03-17 |         0 |
|        6 | Shane |   40 | M    | 1988-07-21 |         0 |
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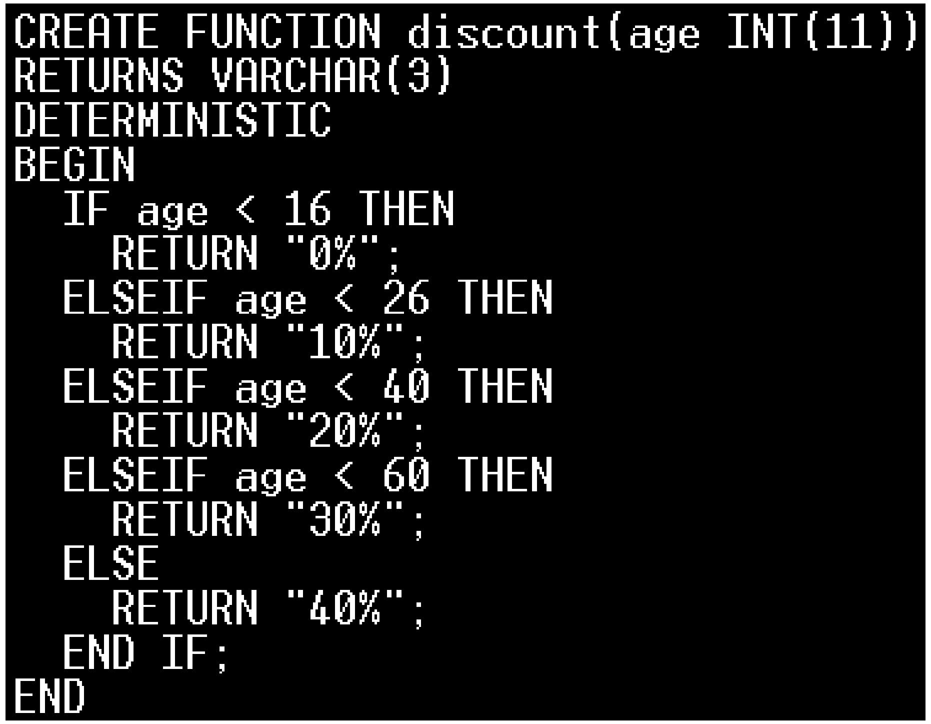
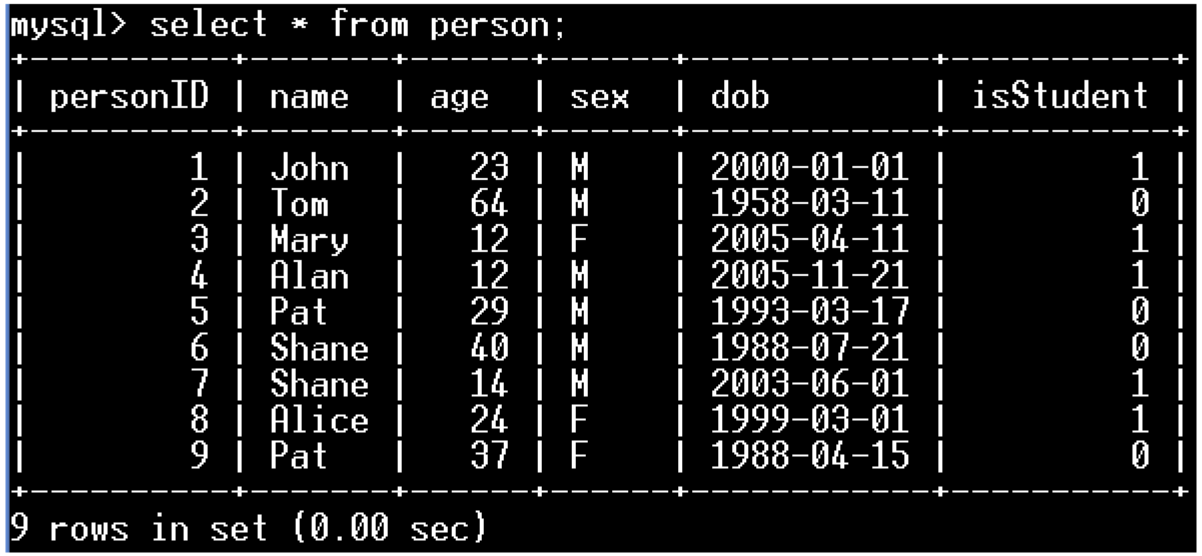


```
CREATE FUNCTION discount(age INT(11))
RETURNS VARCHAR(3)
DETERMINISTIC
BEGIN
  IF age < 16 THEN
    RETURN "0%";
  ELSEIF age < 26 THEN
    RETURN "10%";
  ELSEIF age < 40 THEN
    RETURN "20%";
  ELSEIF age < 60 THEN
    RETURN "30%";
  ELSE
    RETURN "40%";
  END IF;
END
```

MySQL Stored Functions



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+----------+-------+------+------+------------+-----------+
| personID | name  | age  | sex  | dob        | isStudent |
+----------+-------+------+------+------------+-----------+
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|        6 | Shane |   40 | M    | 1988-07-21 |         0 |
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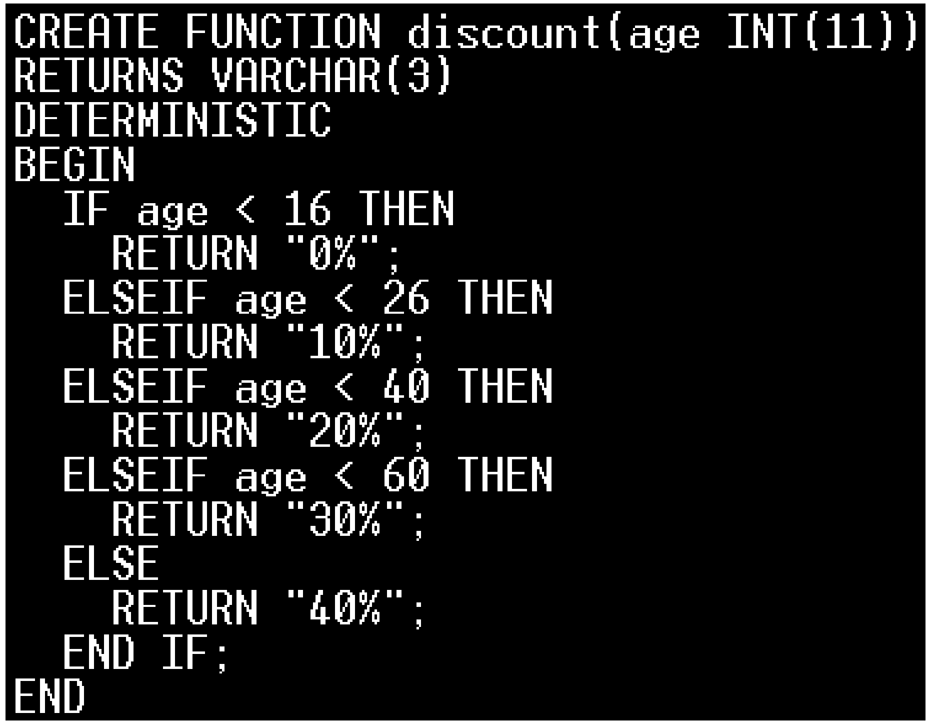

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  END IF;
END
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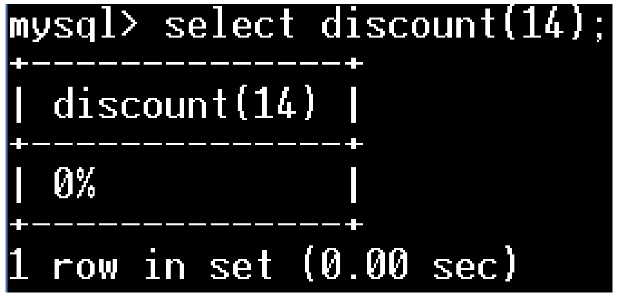
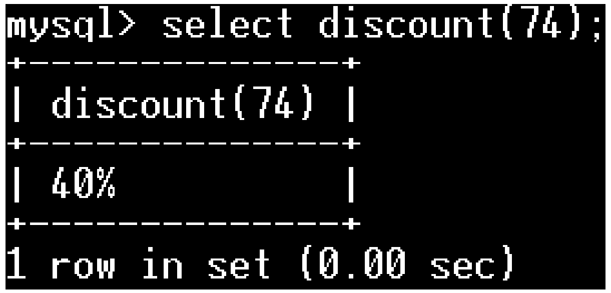
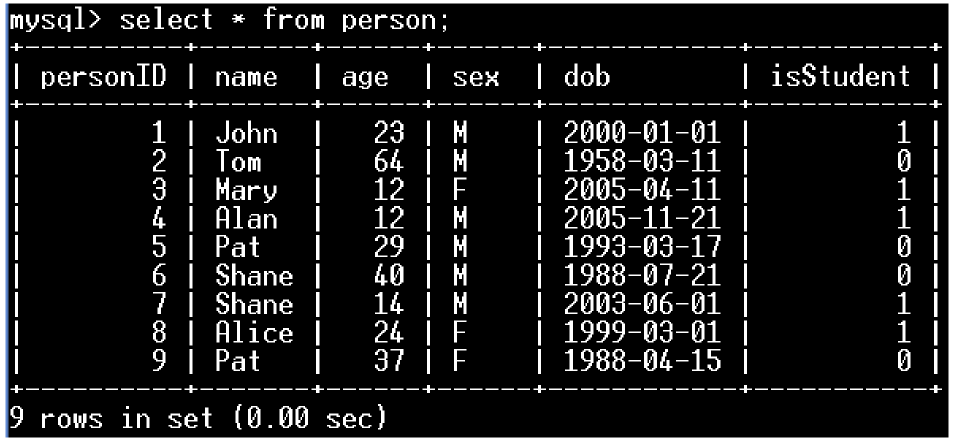


```
mysql> select discount(14);
+--------------+
| discount(14) |
+--------------+
| 0%           |
+--------------+
1 row in set (0.00 sec)
```

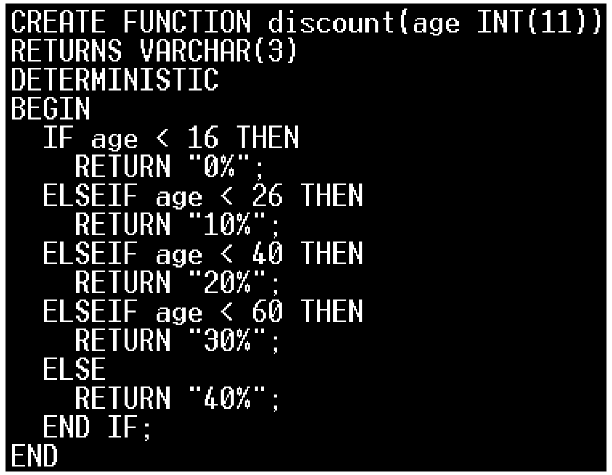


```
mysql> select discount(74);
+--------------+
| discount(74) |
+--------------+
| 40%          |
+--------------+
1 row in set (0.00 sec)
```

MySQL Stored Functions

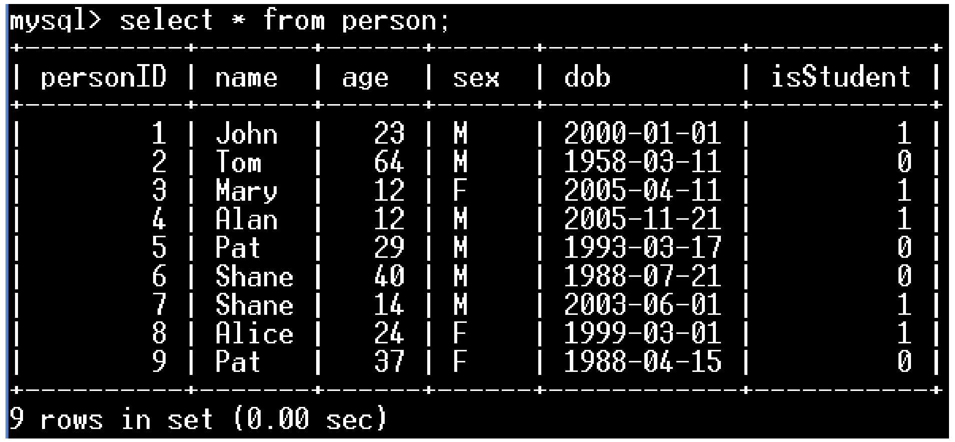


```
mysql> select * from person;
+----------+-------+------+------+------------+-----------+
| personID | name  | age  | sex  | dob        | isStudent |
+----------+-------+------+------+------------+-----------+
|        1 | John  |   23 | M    | 2000-01-01 |         1 |
|        2 | Tom   |   64 | M    | 1958-03-11 |         0 |
|        3 | Mary  |   12 | F    | 2005-04-11 |         1 |
|        4 | Alan  |   12 | M    | 2005-11-21 |         1 |
|        5 | Pat   |   29 | M    | 1993-03-17 |         0 |
|        6 | Shane |   40 | M    | 1988-07-21 |         0 |
|        7 | Shane |   14 | M    | 2003-06-01 |         1 |
|        8 | Alice |   24 | F    | 1999-03-01 |         1 |
|        9 | Pat   |   37 | F    | 1988-04-15 |         0 |
+----------+-------+------+------+------------+-----------+
9 rows in set (0.00 sec)
```

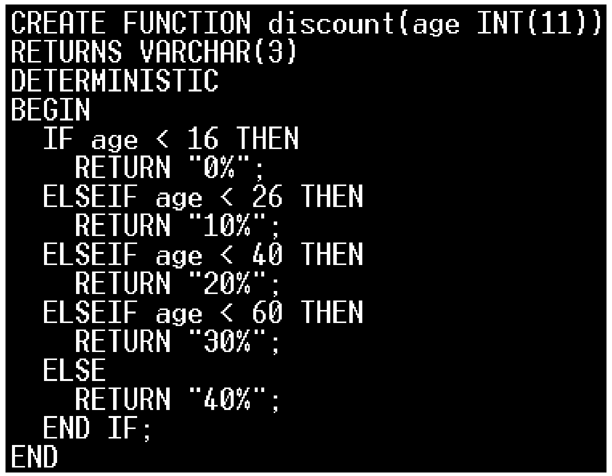


```
CREATE FUNCTION discount(age INT(11))
RETURNS VARCHAR(3)
DETERMINISTIC
BEGIN
  IF age < 16 THEN
    RETURN "0%";
  ELSEIF age < 26 THEN
    RETURN "10%";
  ELSEIF age < 40 THEN
    RETURN "20%";
  ELSEIF age < 60 THEN
    RETURN "30%";
  ELSE
    RETURN "40%";
  END IF;
END
```

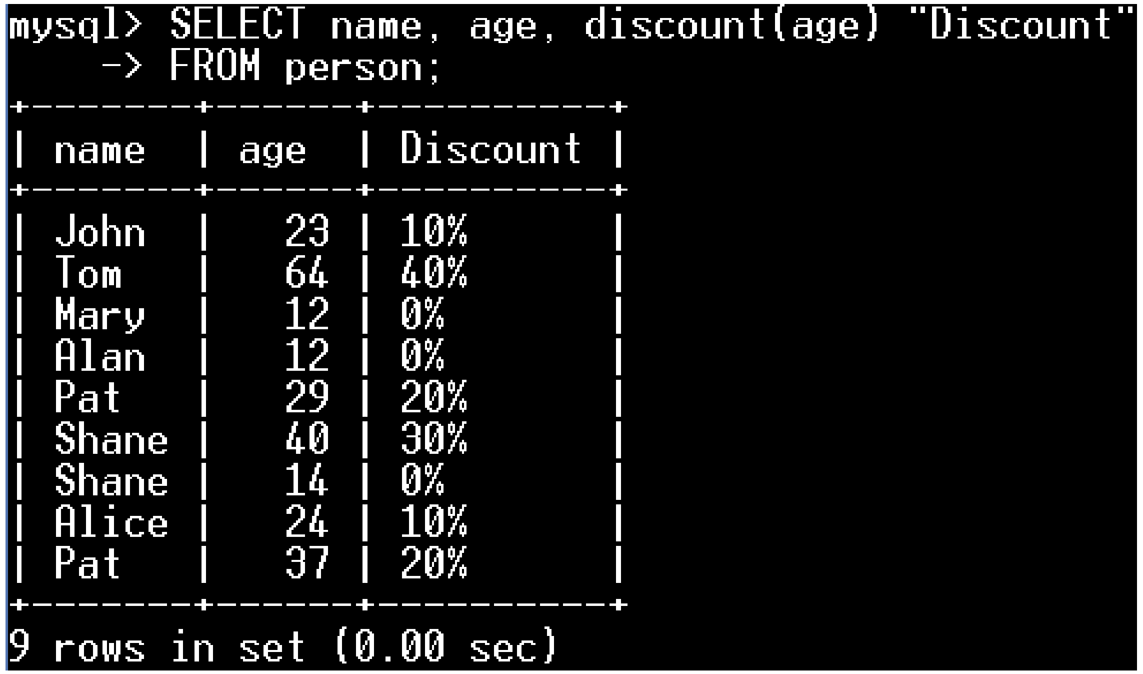
MySQL Stored Functions



```
mysql> select * from person;
+----------+-------+------+------+------------+-----------+
| personID | name  | age  | sex  | dob        | isStudent |
+----------+-------+------+------+------------+-----------+
|        1 | John  |   23 | M    | 2000-01-01 |         1 |
|        2 | Tom   |   64 | M    | 1958-03-11 |         0 |
|        3 | Mary  |   12 | F    | 2005-04-11 |         1 |
|        4 | Alan  |   12 | M    | 2005-11-21 |         1 |
|        5 | Pat   |   29 | M    | 1993-03-17 |         0 |
|        6 | Shane |   40 | M    | 1988-07-21 |         0 |
|        7 | Shane |   14 | M    | 2003-06-01 |         1 |
|        8 | Alice |   24 | F    | 1999-03-01 |         1 |
|        9 | Pat   |   37 | F    | 1988-04-15 |         0 |
+----------+-------+------+------+------------+-----------+
9 rows in set (0.00 sec)
```



```
CREATE FUNCTION discount(age INT(11))
RETURNS VARCHAR(3)
DETERMINISTIC
BEGIN
  IF age < 16 THEN
    RETURN "0%";
  ELSEIF age < 26 THEN
    RETURN "10%";
  ELSEIF age < 40 THEN
    RETURN "20%";
  ELSEIF age < 60 THEN
    RETURN "30%";
  ELSE
    RETURN "40%";
  END IF;
END
```



```
mysql> SELECT name, age, discount(age) "Discount"
    -> FROM person;
+-------+------+----------+
| name  | age  | Discount |
+-------+------+----------+
| John  |   23 | 10%      |
| Tom   |   64 | 40%      |
| Mary  |   12 | 0%       |
| Alan  |   12 | 0%       |
| Pat   |   29 | 20%      |
| Shane |   40 | 30%      |
| Shane |   14 | 0%       |
| Alice |   24 | 10%      |
| Pat   |   37 | 20%      |
+-------+------+----------+
9 rows in set (0.00 sec)
```

MySQL Stored Procedures

MySQL Stored Procedures

FUNCTIONS	PROCEDURES
Return a single value	Return 0 or more values

MySQL Stored Procedures

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Return a single value	Return 0 or more values
Only SELECT	SELECT, NSERT, UPDATE, DELETE

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Return a single value	Return 0 or more values
Only SELECT	SELECT, NSERT, UPDATE, DELETE
Can’t use Stored Procedures	Can use Stored Functions

MySQL Stored Procedures

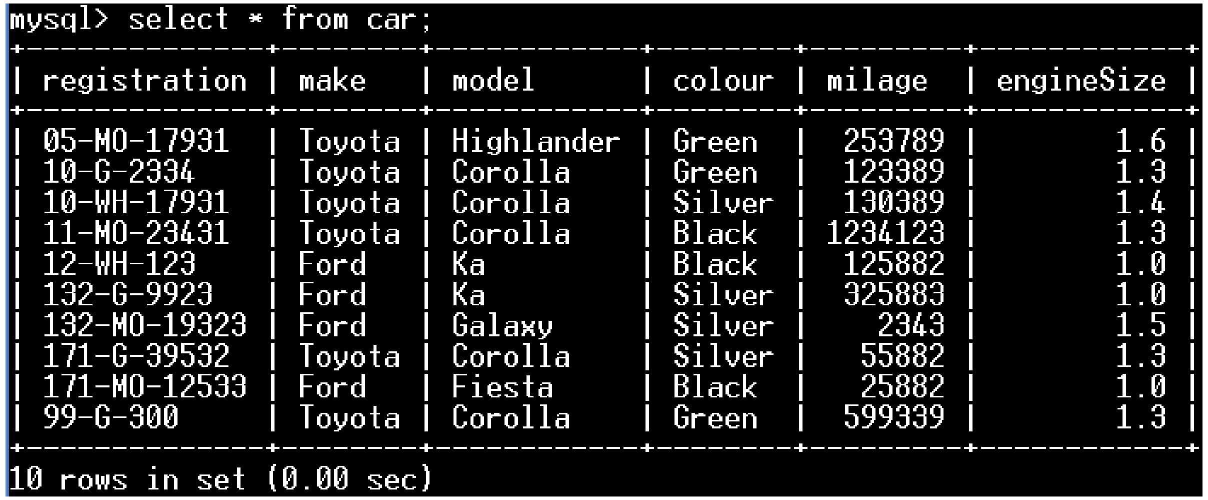
FUNCTIONS	PROCEDURES
Return a single value	Return 0 or more values
Only SELECT	SELECT, NSERT, UPDATE, DELETE
Can't use Stored Procedures	Can use Stored Functions
Does not support Transactions	Supports Transactions

MySQL Stored Procedures

FUNCTIONS	PROCEDURES
Return a single value	Return 0 or more values
Only SELECT	SELECT, NSERT, UPDATE, DELETE
Can’t use Stored Procedures	Can use Stored Functions
Does not support Transactions	Supports Transactions

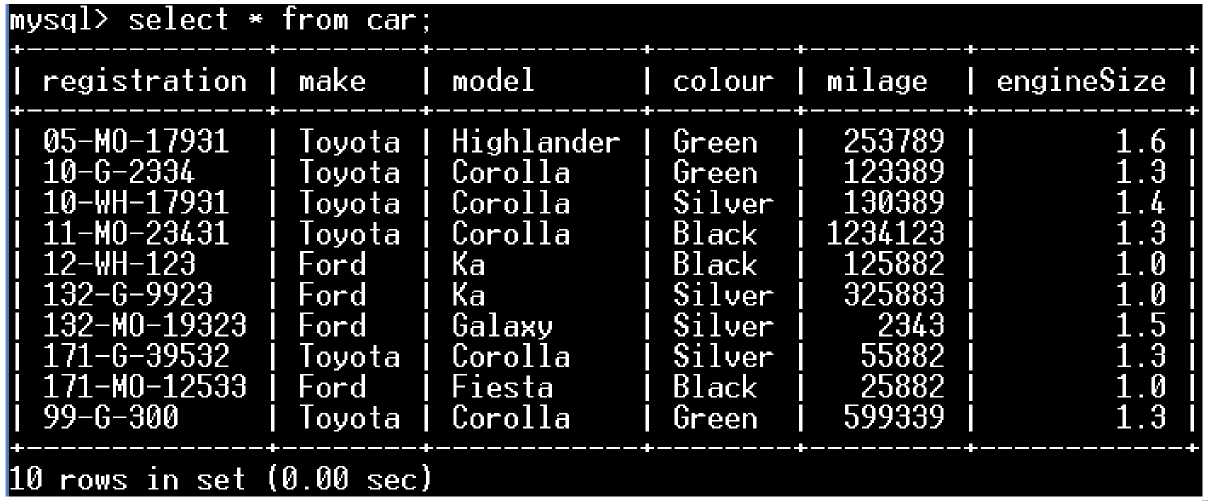
https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html

MySQL Stored Procedures



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```

MySQL Stored Procedures



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
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| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```
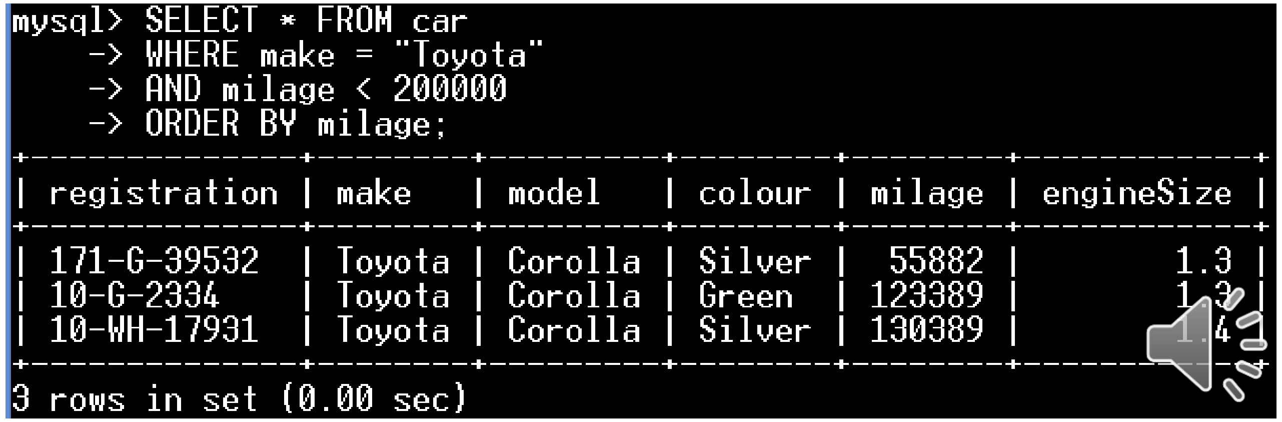
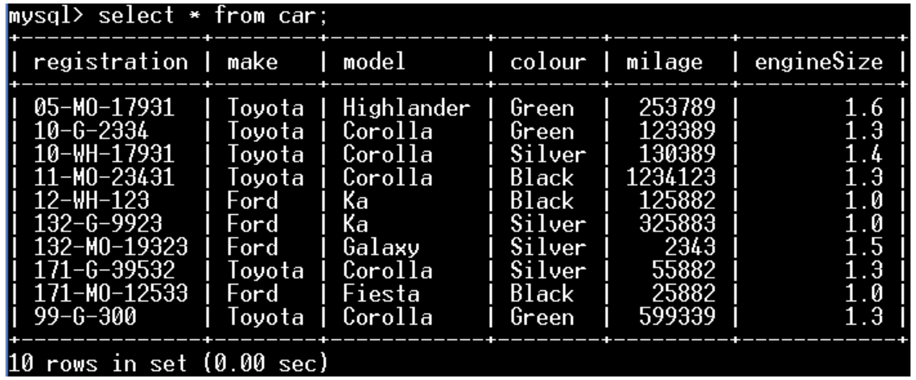
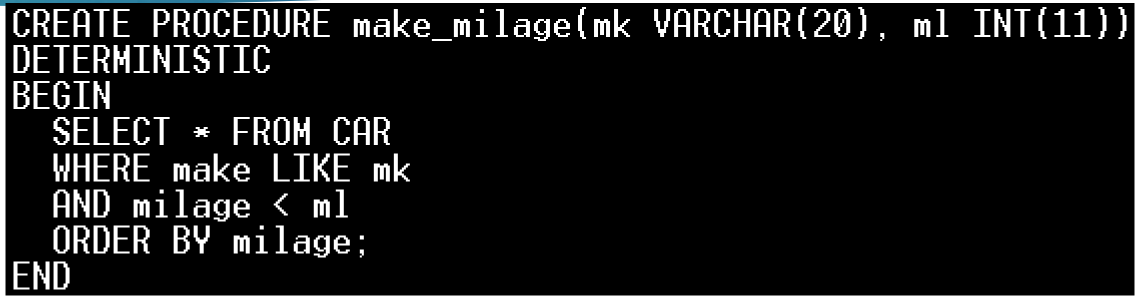



```
mysql> SELECT * FROM car
    -> WHERE make = "Toyota"
    -> AND milage < 200000
    -> ORDER BY milage;
+--------------+--------+---------+--------+--------+------------+
| registration | make   | model   | colour | milage | engineSize |
+--------------+--------+---------+--------+--------+------------+
| 171-G-39532  | Toyota | Corolla | Silver |  55882 |        1.3 |
| 10-G-2334    | Toyota | Corolla | Green  | 123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla | Silver | 130389 |        1.4 |
+--------------+--------+---------+--------+--------+------------+
3 rows in set (0.00 sec)
```

MySQL Stored Procedures

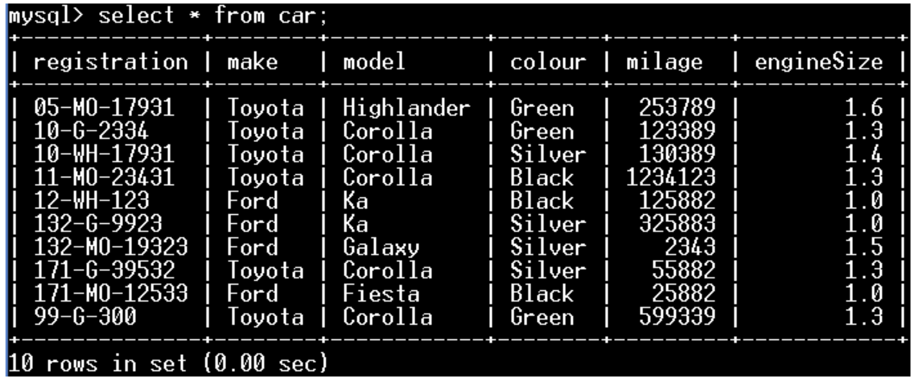


```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```

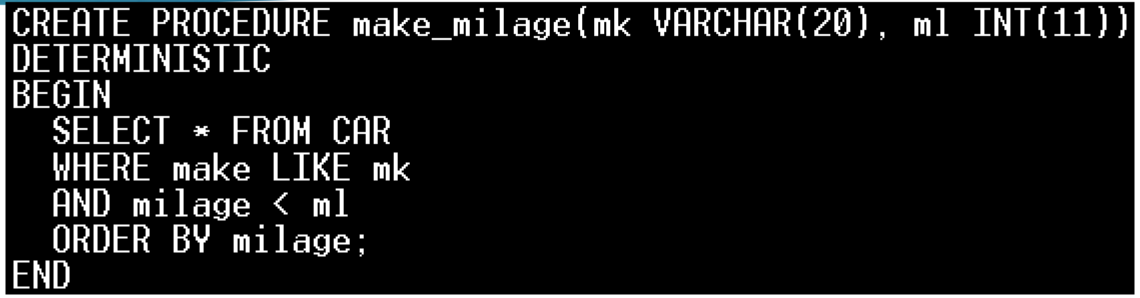


```
CREATE PROCEDURE make_milage(mk VARCHAR(20), ml INT(11))
DETERMINISTIC
BEGIN
  SELECT * FROM CAR
  WHERE make LIKE mk
  AND milage < ml
  ORDER BY milage;
END
```

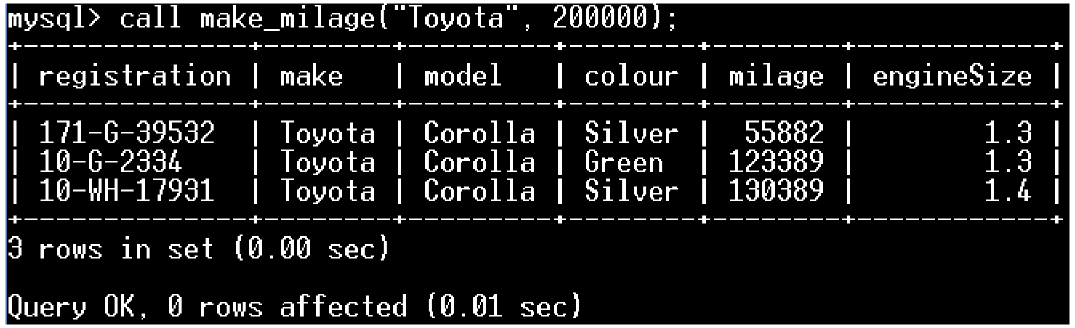
MySQL Stored Procedures



```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```

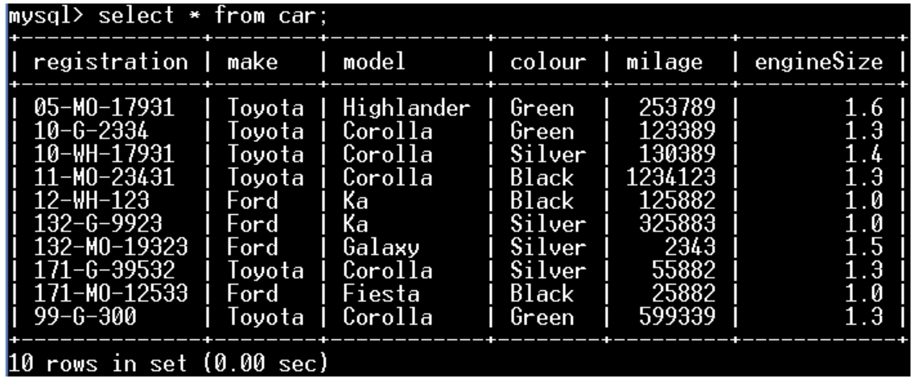


```
CREATE PROCEDURE make_milage(mk VARCHAR(20), ml INT(11))
DETERMINISTIC
BEGIN
  SELECT * FROM CAR
  WHERE make LIKE mk
  AND milage < ml
  ORDER BY milage;
END
```

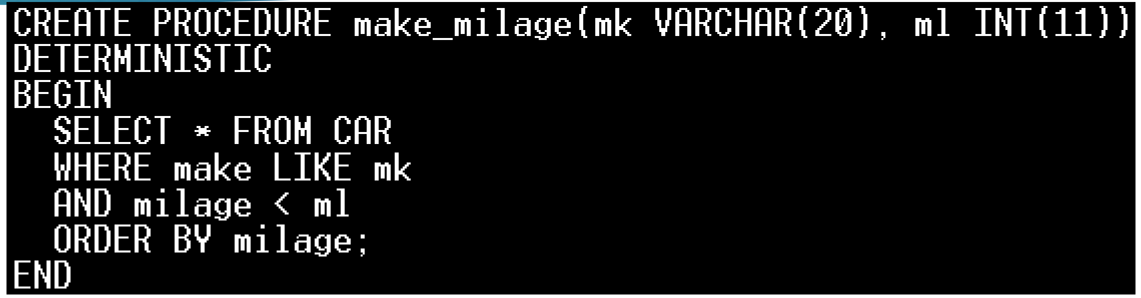


```
mysql> call make_milage("Toyota", 200000);
+--------------+--------+---------+--------+--------+------------+
| registration | make   | model   | colour | milage | engineSize |
+--------------+--------+---------+--------+--------+------------+
| 171-G-39532  | Toyota | Corolla | Silver |  55882 |        1.3 |
| 10-G-2334    | Toyota | Corolla | Green  | 123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla | Silver | 130389 |        1.4 |
+--------------+--------+---------+--------+--------+------------+
3 rows in set (0.00 sec)

Query OK, 0 rows affected (0.01 sec)
```

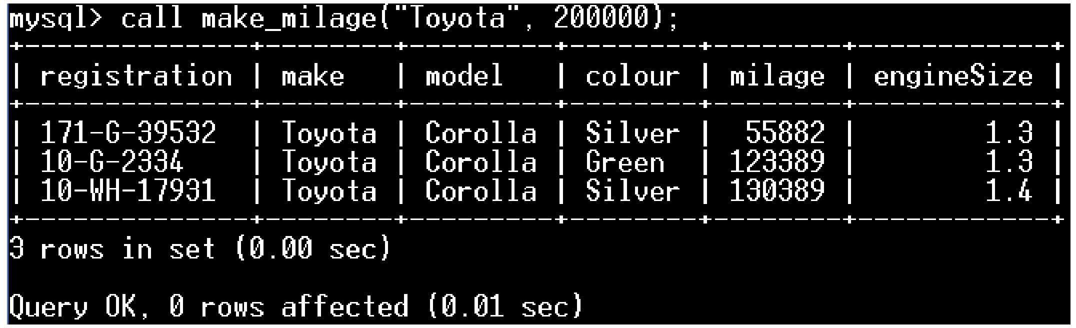
MySQL Stored Procedures



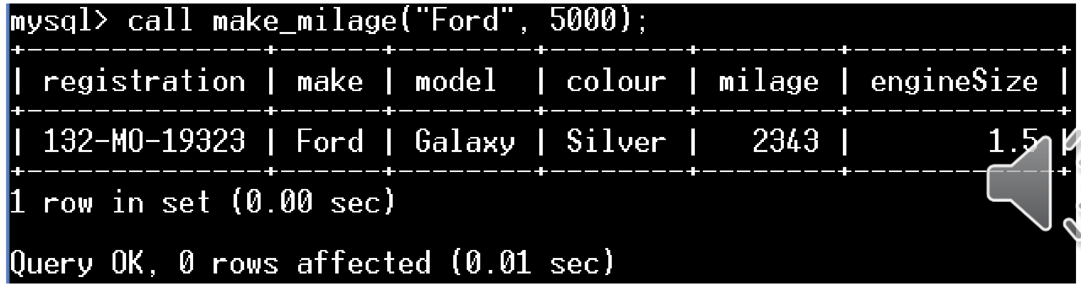
```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```



```
CREATE PROCEDURE make_milage(mk VARCHAR(20), ml INT(11))
DETERMINISTIC
BEGIN
  SELECT * FROM CAR
  WHERE make LIKE mk
  AND milage < ml
  ORDER BY milage;
END
```

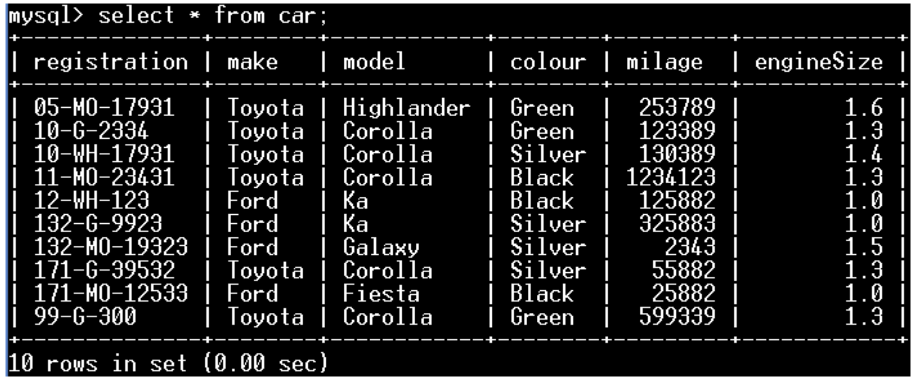


```
mysql> call make_milage("Toyota", 200000);
+--------------+--------+---------+--------+--------+------------+
| registration | make   | model   | colour | milage | engineSize |
+--------------+--------+---------+--------+--------+------------+
| 171-G-39532  | Toyota | Corolla | Silver |  55882 |        1.3 |
| 10-G-2334    | Toyota | Corolla | Green  | 123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla | Silver | 130389 |        1.4 |
+--------------+--------+---------+--------+--------+------------+
3 rows in set (0.00 sec)

Query OK, 0 rows affected (0.01 sec)
```

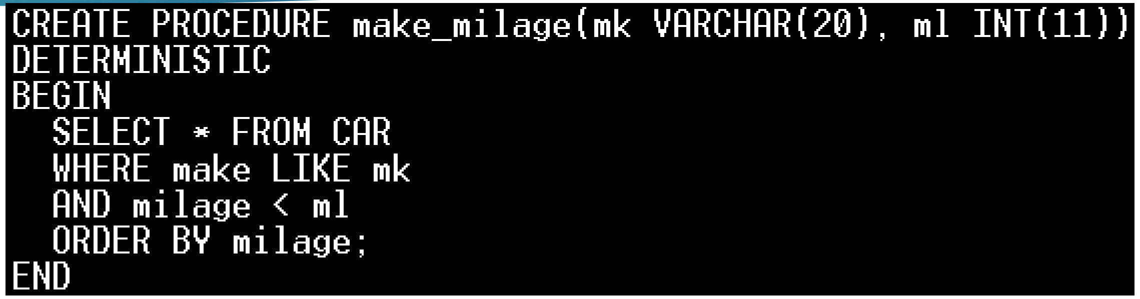


```
mysql> call make_milage("Ford", 5000);
+--------------+------+--------+--------+--------+------------+
| registration | make | model  | colour | milage | engineSize |
+--------------+------+--------+--------+--------+------------+
| 132-MO-19323 | Ford | Galaxy | Silver |   2343 |        1.5 |
+--------------+------+--------+--------+--------+------------+
1 row in set (0.00 sec)

Query OK, 0 rows affected (0.01 sec)
```

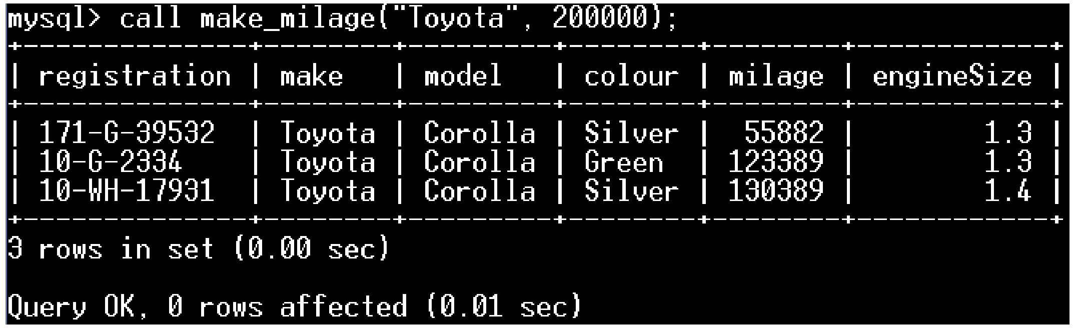
MySQL Stored Procedures



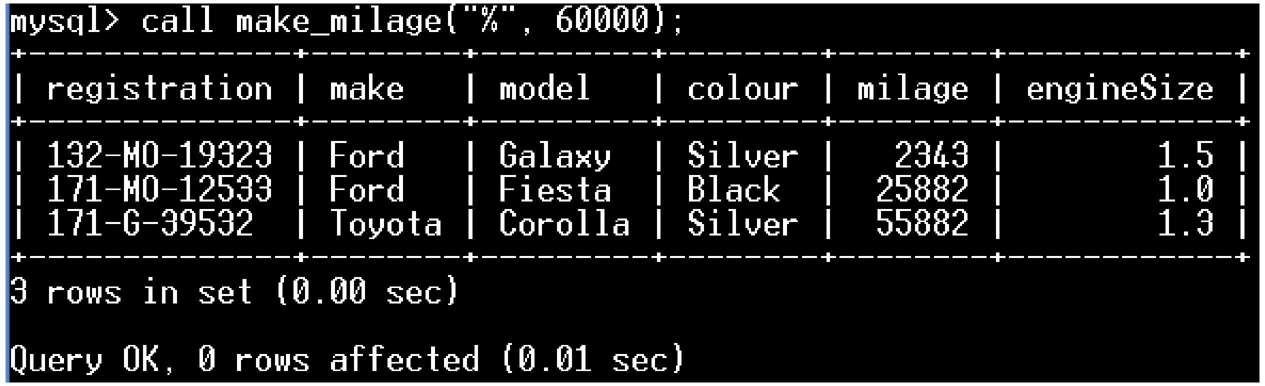
```
mysql> select * from car;
+--------------+--------+------------+--------+---------+------------+
| registration | make   | model      | colour | milage  | engineSize |
+--------------+--------+------------+--------+---------+------------+
| 05-MO-17931  | Toyota | Highlander | Green  |  253789 |        1.6 |
| 10-G-2334    | Toyota | Corolla    | Green  |  123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla    | Silver |  130389 |        1.4 |
| 11-MO-23431  | Toyota | Corolla    | Black  | 1234123 |        1.3 |
| 12-WH-123    | Ford   | Ka         | Black  |  125882 |        1.0 |
| 132-G-9923   | Ford   | Ka         | Silver |  325883 |        1.0 |
| 132-MO-19323 | Ford   | Galaxy     | Silver |    2343 |        1.5 |
| 171-G-39532  | Toyota | Corolla    | Silver |   55882 |        1.3 |
| 171-MO-12533 | Ford   | Fiesta     | Black  |   25882 |        1.0 |
| 99-G-300     | Toyota | Corolla    | Green  |  599339 |        1.3 |
+--------------+--------+------------+--------+---------+------------+
10 rows in set (0.00 sec)
```



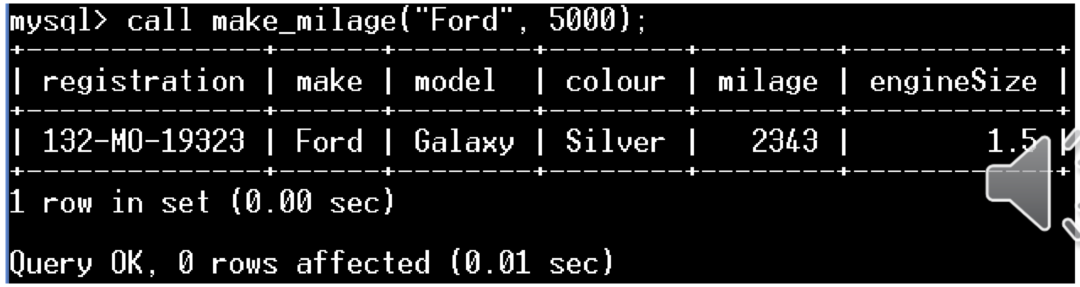
```
CREATE PROCEDURE make_milage(mk VARCHAR(20), ml INT(11))
DETERMINISTIC
BEGIN
  SELECT * FROM CAR
  WHERE make LIKE mk
  AND milage < ml
  ORDER BY milage;
END
```



```
mysql> call make_milage("Toyota", 200000);
+--------------+--------+---------+--------+--------+------------+
| registration | make   | model   | colour | milage | engineSize |
+--------------+--------+---------+--------+--------+------------+
| 171-G-39532  | Toyota | Corolla | Silver |  55882 |        1.3 |
| 10-G-2334    | Toyota | Corolla | Green  | 123389 |        1.3 |
| 10-WH-17931  | Toyota | Corolla | Silver | 130389 |        1.4 |
+--------------+--------+---------+--------+--------+------------+
3 rows in set (0.00 sec)

Query OK, 0 rows affected (0.01 sec)
```



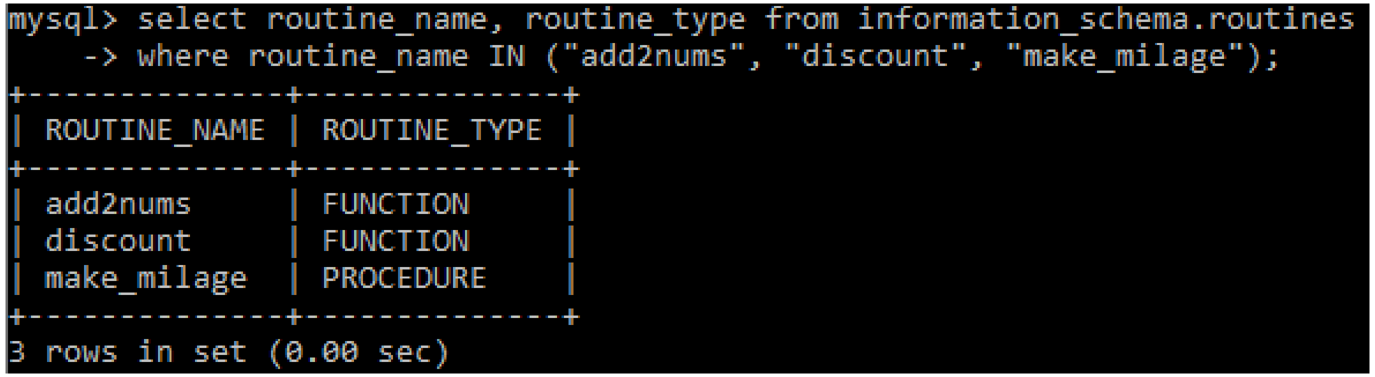
```
mysql> call make_milage("%", 60000);
+--------------+--------+---------+--------+--------+------------+
| registration | make   | model   | colour | milage | engineSize |
+--------------+--------+---------+--------+--------+------------+
| 132-MO-19323 | Ford   | Galaxy  | Silver |   2343 |        1.5 |
| 171-MO-12533 | Ford   | Fiesta  | Black  |  25882 |        1.0 |
| 171-G-39532  | Toyota | Corolla | Silver |  55882 |        1.3 |
+--------------+--------+---------+--------+--------+------------+
3 rows in set (0.00 sec)

Query OK, 0 rows affected (0.01 sec)
```



```
mysql> call make_milage("Ford", 5000);
+--------------+------+--------+--------+--------+------------+
| registration | make | model  | colour | milage | engineSize |
+--------------+------+--------+--------+--------+------------+
| 132-MO-19323 | Ford | Galaxy | Silver |   2343 |        1.5 |
+--------------+------+--------+--------+--------+------------+
1 row in set (0.00 sec)

Query OK, 0 rows affected (0.01 sec)
```

MySQL Stored Routine Management

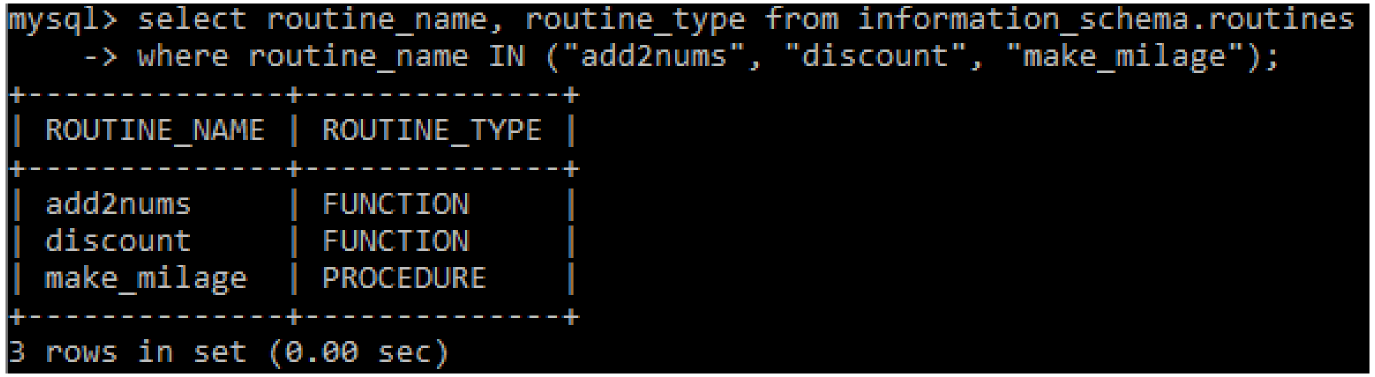
- Finding Functions and Procedures



```
mysql> select routine_name, routine_type from information_schema.routines
    -> where routine_name IN ("add2nums", "discount", "make_milage");
+--------------+--------------+
| ROUTINE_NAME | ROUTINE_TYPE |
+--------------+--------------+
| add2nums     | FUNCTION     |
| discount     | FUNCTION     |
| make_milage  | PROCEDURE    |
+--------------+--------------+
3 rows in set (0.00 sec)
```

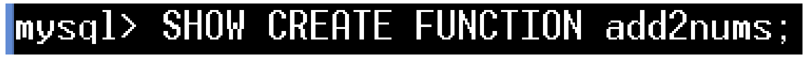
MySQL Stored Routine Management

- Finding Functions and Procedures



```
mysql> select routine_name, routine_type from information_schema.routines
    -> where routine_name IN ("add2nums", "discount", "make_milage");
+--------------+--------------+
| ROUTINE_NAME | ROUTINE_TYPE |
+--------------+--------------+
| add2nums     | FUNCTION     |
| discount     | FUNCTION     |
| make_milage  | PROCEDURE    |
+--------------+--------------+
3 rows in set (0.00 sec)
```

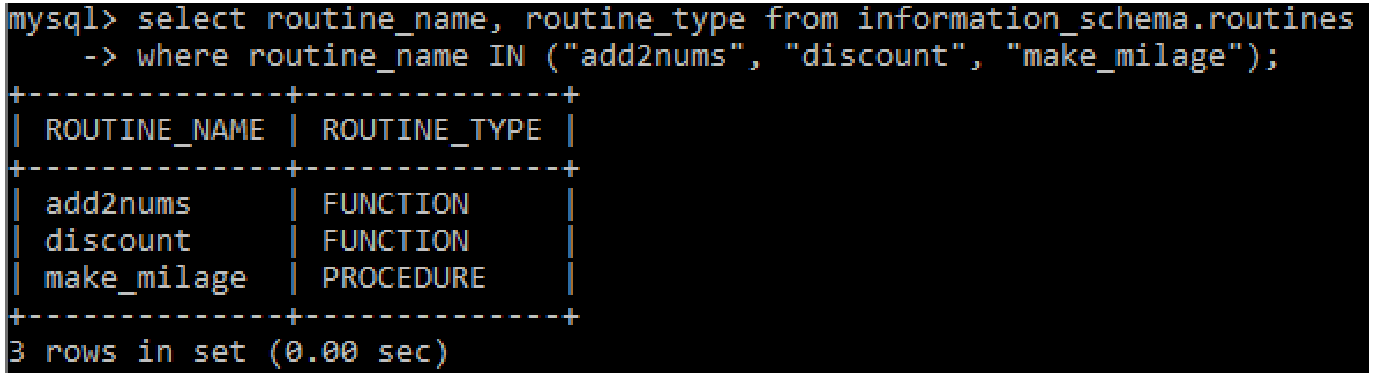
- What's in a Function or Procedure



```
mysql> SHOW CREATE FUNCTION add2nums;
```

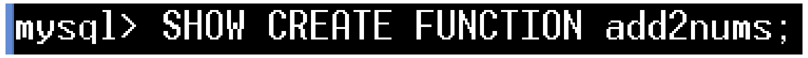
MySQL Stored Routine Management

- Finding Functions and Procedures



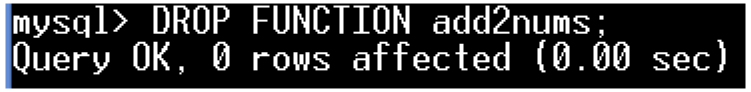
```
mysql> select routine_name, routine_type from information_schema.routines
    -> where routine_name IN ("add2nums", "discount", "make_milage");
+--------------+--------------+
| ROUTINE_NAME | ROUTINE_TYPE |
+--------------+--------------+
| add2nums     | FUNCTION     |
| discount     | FUNCTION     |
| make_milage  | PROCEDURE    |
+--------------+--------------+
3 rows in set (0.00 sec)
```

- What's in a Function or Procedure



```
mysql> SHOW CREATE FUNCTION add2nums;
```

- Delete a Function or Procedure



```
mysql> DROP FUNCTION add2nums;
Query OK, 0 rows affected (0.00 sec)
```