Applied Databases
Relational Database Tables

HIGHER DIPLOMA IN DATA ANALYTICS

SQL

- Structured Query Language S.Q.L. "See-Quell"
- Standard Relational Database Language
- SQL is an ANSI/ISO standard, but different databases e.g. MySQL, SQL Server, Oracle may use their own proprietary extensions on top of the standard SQL.

What can SQL do?

- Create a new database
- Create tables in a database
- Insert data into a database
- Read data from a database
- Update data in a database
- Delete data from a database
- Manage transactions
- Manage concurrency
- Backup and recovery
- Manage users

CRUD

SQL vs MySQL

- SQL is a language.
- MySQL is a database management system.

Creating a database

- CREATE DATABASE <*database*>;

```
mysql> create database myFirstDatabase;
Query OK, 1 row affected (0.03 sec)
```

```
mysql> CREATE dataBASE MYFirstDATABASE;
Query OK, 1 row affected (0.00 sec)
```

```
mysql> create
    ->
    -> database
    ->
    -> myFirstDatabase
    ->
    ->
    -> ;
Query OK, 1 row affected (0.01 sec)
```

Using a database

- SHOW DATABASES;

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| myfirstdatabase    |
| mysql              |
| performance_schema |
| sakila             |
| sys                |
| world              |
+--------------------+
7 rows in set (0.01 sec)
```

- USE <*database*>;

```
mysql> use myfirstdatabase;
Database changed
```

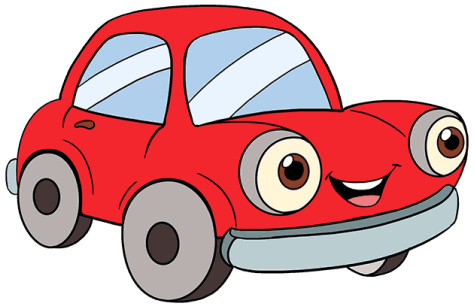
Creating Tables

- MySQL Data Types:

  https://dev.mysql.com/doc/refman/8.0/en/data-types.html

  Car Attributes

• Make	• `varchar(20)`
• Model	• `varchar(20)`
• Registration	• `varchar(15)`
• Colour	• `varchar(10)`
• Mileage	• `integer`
• Engine Size	• `float(2,1)`
• Cylinders	
• Crankshaft	



Creating Tables

- https://dev.mysql.com/doc/refman/8.0/en/creating-tables.html

- CREATE table *<table>* (
  <column1> <datatype>,
  <column2> <datatype>,
  <column3> <datatype>
  );

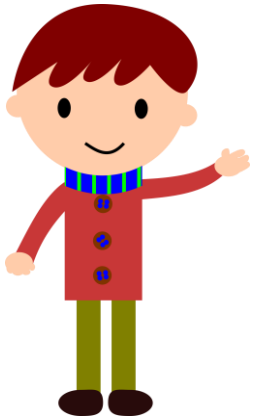
```
mysql> CREATE TABLE car (
    ->   make VARCHAR(20),
    ->   model VARCHAR(20),
    ->   registration VARCHAR(15),
    ->   colour VARCHAR(10),
    ->   milage INTEGER,
    ->   engineSize FLOAT(2,1));
Query OK, 0 rows affected (0.15 sec)
```

Describing Tables

- DESCRIBE <*table*>;

```
mysql> DESCRIBE car;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| make        | varchar(20) | YES  |     | NULL    |       |
| model       | varchar(20) | YES  |     | NULL    |       |
| registration | varchar(15) | YES  |     | NULL    |       |
| colour      | varchar(10) | YES  |     | NULL    |       |
| milage      | int(11)     | YES  |     | NULL    |       |
| engineSize  | float(2,1)  | YES  |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
6 rows in set (0.01 sec)
```

Creating Tables



Person Attributes

- Name • `varchar(20) NOT NULL`
- Age • `integer`
- Sex • `enum('M','F') default 'M'`
- dob • `date`
- isStudent • `tinyint(1)`

```
mysql> CREATE TABLE person (
    ->   name VARCHAR(20) NOT NULL,
    ->   age INTEGER,
    ->   sex ENUM('M','F') DEFAULT 'M',
    ->   dob DATE,
    ->   isStudent TINYINT(1));
Query OK, 0 rows affected (0.11 sec)
```

Describing Tables

```
mysql> DESCRIBE person;
+-----------+---------------+------+-----+---------+-------+
| Field     | Type          | Null | Key | Default | Extra |
+-----------+---------------+------+-----+---------+-------+
| name      | varchar(20)   | NO   |     | NULL    |       |
| age       | int(11)       | YES  |     | NULL    |       |
| sex       | enum('M','F') | YES  |     | M       |       |
| dob       | date          | YES  |     | NULL    |       |
| isStudent | tinyint(1)    | YES  |     | NULL    |       |
+-----------+---------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

Uniquely Identifying Rows

name	age	sex	dob	isStudent
John	23	M	2000-01-01	1
Tom	64	M	1958-03-11	0
Mary	12	F	2005-04-11	1
Alan	12	M	2005-11-21	1
Pat	29	M	1993-03-17	0
Shane	40	M	1988-07-21	0
Shane	14	M	2003-06-01	1
Alice	24	F	1999-03-01	1
Pat	37	F	1988-04-15	0

Uniquely Identifying Rows

```
mysql> DESCRIBE person;
+-----------+---------------+------+-----+---------+-------+
| Field     | Type          | Null | Key | Default | Extra |
+-----------+---------------+------+-----+---------+-------+
| name      | varchar(20)   | NO   |     | NULL    |       |
| age       | int(11)       | YES  |     | NULL    |       |
| sex       | enum('M','F') | YES  |     | M       |       |
| dob       | date          | YES  |     | NULL    |       |
| isStudent | tinyint(1)    | YES  |     | NULL    |       |
+-----------+---------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

- Primary Key
  - The PRIMARY KEY constraint uniquely identifies each record in a table.
  - Primary keys must contain UNIQUE values, and cannot contain NULL values.
  - A table can have only one primary key, which may consist of single or multiple fields.

Primary Key

Person Attributes

- PersonID
- Name
- Age
- Sex
- dob
- isStudent

- `integer auto_increment`
- `varchar(20) NOT NULL`
- `integer`
- `enum('M','F') default 'M'`
- `date`
- `tinyint(1)`

Primary Key

```
mysql> CREATE TABLE person (
    ->   personID INTEGER AUTO_INCREMENT,
    ->   name VARCHAR(20) NOT NULL,
    ->   age INTEGER,
    ->   sex ENUM('M','F') DEFAULT 'M',
    ->   dob DATE,
    ->   isStudent TINYINT(1),
    ->   PRIMARY KEY(personID));
Query OK, 0 rows affected (0.17 sec)
```

Primary Key

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)

Uniquely identifying rows

- DESCRIBE <*table*>;

```
mysql> DESCRIBE car;
+--------------+-------------+------+-----+---------+-------+
| Field        | Type        | Null | Key | Default | Extra |
+--------------+-------------+------+-----+---------+-------+
| make         | varchar(20) | YES  |     | NULL    |       |
| model        | varchar(20) | YES  |     | NULL    |       |
| registration | varchar(15) | YES  |     | NULL    |       |
| colour       | varchar(10) | YES  |     | NULL    |       |
| milage       | int(11)     | YES  |     | NULL    |       |
| engineSize   | float(2,1)  | YES  |     | NULL    |       |
+--------------+-------------+------+-----+---------+-------+
6 rows in set (0.01 sec)
```

191-G-201

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Primary Key

```
mysql> CREATE TABLE car (
    ->   registration VARCHAR(15),
    ->   make VARCHAR(20),
    ->   model VARCHAR(20),
    ->   colour VARCHAR(10),
    ->   milage INTEGER,
    ->   engineSize FLOAT(2,1),
    ->   PRIMARY KEY(registration));
Query OK, 0 rows affected (0.14 sec)
```

Getting information from a table

- SELECT https://dev.mysql.com/doc/refman/8.0/en/select.html

```
SELECT <columns>
FROM <table>;
```

SELECT

```
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> SELECT name
    -> FROM person;
+-------+
| name  |
+-------+
| John  |
| Tom   |
| Mary  |
| Alan  |
| Pat   |
| Shane |
| Shane |
| Alice |
| Pat   |
+-------+
9 rows in set (0.00 sec)
```

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

WHERE

```
+----------+-------+-----+-----+------------+----------+
| 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> SELECT name
    -> FROM person
    -> WHERE NOT isStudent;
+-------+
| name  |
+-------+
| Tom   |
| Pat   |
| Shane |
| Pat   |
+-------+
4 rows in set (0.01 sec)
```

```
mysql> SELECT name
    -> FROM person
    -> WHERE isStudent
    -> AND sex = "M";
+-------+
| name  |
+-------+
| John  |
| Alan  |
| Shane |
+-------+
3 rows in set (0.00 sec)
```

WHERE Operators

=	Equal To
<>	Not Equal To
!=	Not Equal To
>	Greater Than
<	Less Than
>=	Greater Than or Equal To
<=	Less Than or Equal To
BETWEEN	Between an inclusive range
LIKE	Search for a pattern
IN	Result is one of multiple specified values

WHERE >=, <=, BETWEEN

```
+----------+-------+-----+-----+------------+-----------+
| 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> select personID, name, age
    -> FROM person
    -> WHERE age >= 20
    -> AND age <= 39;
+----------+-------+-----+
| personID | name  | age |
+----------+-------+-----+
|        1 | John  |  23 |
|        5 | Pat   |  29 |
|        8 | Alice |  24 |
|        9 | Pat   |  37 |
+----------+-------+-----+
4 rows in set (0.00 sec)
```

```
mysql> select personID, name, age
    -> FROM person
    -> WHERE age BETWEEN 20 and 39;
+----------+-------+-----+
| personID | name  | age |
+----------+-------+-----+
|        1 | John  |  23 |
|        5 | Pat   |  29 |
|        8 | Alice |  24 |
|        9 | Pat   |  37 |
+----------+-------+-----+
4 rows in set (0.00 sec)
```

LIKE

- Used in a WHERE clause to search for a specified pattern in a column.
- % represents 0 or more characters

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT name, age
    -> FROM person
    -> WHERE name LIKE "%a%";
+-------+-----+
| name  | age |
+-------+-----+
| Mary  |  12 |
| Alan  |  12 |
| Pat   |  29 |
| Shane |  40 |
| Shane |  14 |
| Alice |  24 |
| Pat   |  37 |
+-------+-----+
7 rows in set (0.01 sec)
```

LIKE

- _ represents a single character

```
+----------+------+-----+-----+------------+----------+
| 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> SELECT name, age
    -> FROM person
    -> WHERE name LIKE "_a%";
+------+------+
| name | age  |
+------+------+
| Mary |   12 |
| Pat  |   29 |
| Pat  |   37 |
+------+------+
3 rows in set (0.00 sec)
```

IN

- The IN operator allows you to determine if a specified value matches any value in a set of values, or returned by a subquery.

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT personID, name
    -> FROM person
    -> WHERE age = 12
    -> OR age = 13
    -> OR age = 14
    -> OR age = 15;
+----------+-------+
| personID | name  |
+----------+-------+
|        3 | Mary  |
|        4 | Alan  |
|        7 | Shane |
+----------+-------+
3 rows in set (0.00 sec)
```

```
mysql> SELECT personID, name
    -> FROM person
    -> WHERE age IN
    -> (12, 13, 14, 15);
+----------+-------+
| personID | name  |
+----------+-------+
|        3 | Mary  |
|        4 | Alan  |
|        7 | Shane |
+----------+-------+
3 rows in set (0.00 sec)
```

Combining AND, OR operators

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT name, age
    -> FROM person
    -> WHERE sex="M"
    -> AND name LIKE "S%"
    -> OR name LIKE "A%";
+-------+------+
| name  | age  |
+-------+------+
| Alan  |   12 |
| Shane |   40 |
| Shane |   14 |
| Alice |   24 |
+-------+------+
4 rows in set (0.00 sec)
```

```
mysql> SELECT name, age
    -> FROM person
    -> WHERE sex="M"
    -> AND (name LIKE "S%" OR name LIKE "A%");
+-------+------+
| name  | age  |
+-------+------+
| Alan  |   12 |
| Shane |   40 |
| Shane |   14 |
+-------+------+
3 rows in set (0.00 sec)
```

1 + 2 * 4 = 9

(1 + 2) * 4 = 12

https://dev.mysql.com/doc/refman/8.0/en/operator-precedence.html

LIMIT

- The LIMIT clause can be used to constrain the number of rows returned by the SELECT statement

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT name, age
    -> FROM person
    -> WHERE sex = "F"
    -> AND age > 20;
+-------+------+
| name  | age  |
+-------+------+
| Alice |   24 |
| Pat   |   37 |
+-------+------+
2 rows in set (0.00 sec)
```

```
mysql> SELECT name, age
    -> FROM person
    -> WHERE sex = "F"
    -> AND age > 20
    -> LIMIT 1;
+-------+------+
| name  | age  |
+-------+------+
| Alice |   24 |
+-------+------+
1 row in set (0.00 sec)
```

LIMIT

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT name, age
    -> FROM person
    -> LIMIT 0,3;
+------+------+
| name | age  |
+------+------+
| John |   23 |
| Tom  |   64 |
| Mary |   12 |
+------+------+
3 rows in set (0.00 sec)
```

```
mysql> SELECT name, age
    -> FROM person
    -> LIMIT 3,3;
+-------+------+
| name  | age  |
+-------+------+
| Alan  |   12 |
| Pat   |   29 |
| Shane |   40 |
+-------+------+
3 rows in set (0.00 sec)
```

DISTINCT

- The SELECT DISTINCT statement is used to return only distinct (different) values.

https://dev.mysql.com/doc/refman/8.0/en/distinct-optimization.html

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT DISTINCT(name)
    -> FROM person;
+-------+
| name  |
+-------+
| John  |
| Tom   |
| Mary  |
| Alan  |
| Pat   |
| Shane |
| Alice |
+-------+
7 rows in set (0.00 sec)
```

ORDER BY

- https://dev.mysql.com/doc/refman/8.0/en/order-by-optimization.html

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

ORDER BY

ASC - Ascending

DESC - Descending

YEAR() – Get Year from date

DAY() – Get Year from date

MONTH() – Get Month from date

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

https://dev.mysql.com/doc/refman/8.0/en/date-and-time-functions.html

Putting it all together

Name, age and Birth Month's name

Name does not start with "A"

Born between 1st & 11th

Show in reverse name order

```
+----------+-------+-----+-----+------------+-----------+
| 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> SELECT name, age, MONTHNAME(dob)
    -> FROM person
    -> WHERE DAY(dob) BETWEEN 1 and 11
    -> AND name NOT LIKE "A%"
    -> ORDER BY name DESC;
```

```
+-------+------+----------------+
| name  | age  | MONTHNAME(dob) |
+-------+------+----------------+
| Tom   |   64 | March          |
| Shane |   14 | June           |
| Mary  |   12 | April          |
| John  |   23 | January        |
+-------+------+----------------+
4 rows in set (0.00 sec)
```