

# MySQL

Relational Database Management System (RDBMS)

# Overview

- What is RDBMS?
- MySQL installation process and data types
- Create Database
- Create tables
- Insert data in tables
- Update data in tables
- Delete data from row of database table
- Add (Alter command) new column in a table
- Delete (Alter command to Drop) column from table
- Delete Database

# Data and Database

- Data – stored facts (e.g. google stores or has reference to zetta words of data – stored in form of text, speech, videos, images and other formats)
- Information – extract meaningful contents from data based on certain criteria (google – search from data based on criteria)
- Database – stores collection of related data in specific format
- Roles of administrators – Database administrators – create and fine tune database, design and create databases

# Files vs Databases

- Files store data but application user needs to write queries to search information
- Files may not independently be used concurrently
- Needs to run through various software tools for versioning
- Files needs specific path
- Storage in files require redundancy and storing data in multiple files may create inconsistency
- Databases on the other hand hides data behind Database Management System (DBMS)
- DBMS optimizes storage and retrieval of large amounts of data
- Relational DBMS – Data is stored in the form of tables and all or most tables have relations ‘joining’ (connecting) various tables together

# Data types in MySQL (Numeric Type – INTEGER)

Table 11.1 Required Storage and Range for Integer Types Supported by MySQL

Type	Storage (Bytes)	Minimum Value Signed	Minimum Value Unsigned	Maximum Value Signed	Maximum Value Unsigned
TINYINT	1	-128	0	127	255
SMALLINT	2	-32768	0	32767	65535
MEDIUMINT	3	-8388608	0	8388607	16777215
INT	4	-2147483648	0	2147483647	4294967295
BIGINT	8	$-2^{63}$	0	$2^{63}-1$	$2^{64}-1$

<https://dev.mysql.com/doc/refman/8.0/en/integer-types.html>

FLOAT (M, D) and DECIMAL (M, D) are real number types

# Data types in MySQL – DATE and TIME

Data Type	"Zero" Value
<u>DATE</u>	'0000-00-00'
<u>TIME</u>	'00:00:00'
<u>DATETIME</u>	'0000-00-00 00:00:00'
<u>TIMESTAMP</u>	'0000-00-00 00:00:00'
<u>YEAR</u>	0000

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

# Data types in MySQL – Characters and Strings

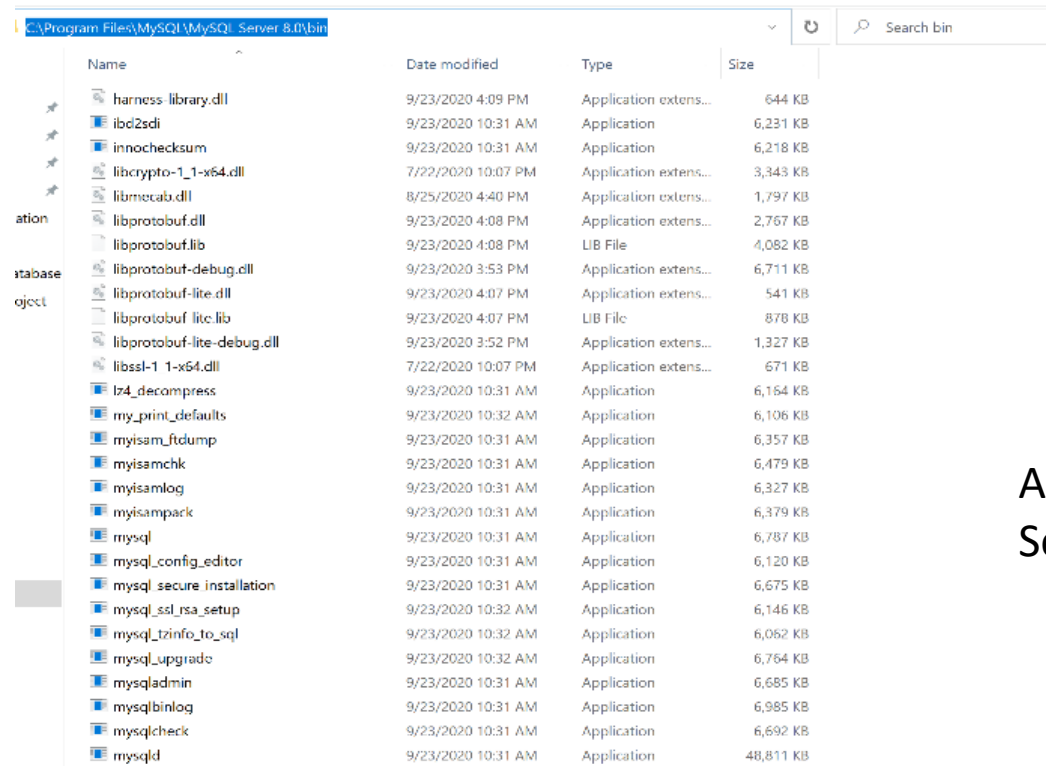
Value	CHAR (4)	Storage Required	VARCHAR (4)	Storage Required
' '	' '	4 bytes	' '	1 byte
'ab'	'ab '	4 bytes	'ab'	3 bytes
'abcd'	'abcd'	4 bytes	'abcd'	5 bytes
'abcdefgh'	'abcd'	4 bytes	'abcd'	5 bytes

<https://dev.mysql.com/doc/refman/8.0/en/char.html>

CHAR – maximum characters (uses space-padding to right of last character): 255

VARCHAR – maximum characters 65535  
(dynamic data storage size)

# Set up Environment Variables



Name	Date modified	Type	Size
harness_library.dll	9/23/2020 4:09 PM	Application extens...	644 KB
ibd2sdi	9/23/2020 10:31 AM	Application	6,231 KB
innochecksum	9/23/2020 10:31 AM	Application	6,218 KB
libcrypto-1_1-x64.dll	7/22/2020 10:07 PM	Application extens...	3,343 KB
libmscab.dll	8/25/2020 4:40 PM	Application extens...	1,797 KB
libprotobuf.dll	9/23/2020 4:08 PM	Application extens...	2,767 KB
libprotobuf.lib	9/23/2020 4:08 PM	LIB File	4,082 KB
libprotobuf-debug.dll	9/23/2020 3:53 PM	Application extens...	6,711 KB
libprotobuf-lite.dll	9/23/2020 4:07 PM	Application extens...	541 KB
libprotobuf-lite.lib	9/23/2020 4:07 PM	LIB File	878 KB
libprotobuf-lite-debug.dll	9/23/2020 3:52 PM	Application extens...	1,327 KB
libssl-1_1-x64.dll	7/22/2020 10:07 PM	Application extens...	671 KB
lz4_decompress	9/23/2020 10:31 AM	Application	6,164 KB
my_print_defaults	9/23/2020 10:32 AM	Application	6,106 KB
myisam_ftdump	9/23/2020 10:31 AM	Application	6,357 KB
myisamchk	9/23/2020 10:31 AM	Application	6,479 KB
myisamlog	9/23/2020 10:31 AM	Application	6,327 KB
myisampack	9/23/2020 10:31 AM	Application	6,379 KB
mysql	9/23/2020 10:31 AM	Application	6,787 KB
mysql_config_editor	9/23/2020 10:31 AM	Application	6,120 KB
mysql_secure_installation	9/23/2020 10:31 AM	Application	6,675 KB
mysql_ssl_rsa_setup	9/23/2020 10:32 AM	Application	6,146 KB
mysql_tzinfo_to_sql	9/23/2020 10:32 AM	Application	6,062 KB
mysql_upgrade	9/23/2020 10:32 AM	Application	6,764 KB
mysqldadmin	9/23/2020 10:31 AM	Application	6,685 KB
mysqlbinlog	9/23/2020 10:31 AM	Application	6,985 KB
mysqlcheck	9/23/2020 10:31 AM	Application	6,692 KB
mysqld	9/23/2020 10:31 AM	Application	48,811 KB

Absolute Path to MySQL  
Server 8.0\bin



# Access mysql using cmd terminal

```
Administrator: Command Prompt - mysql -u root -p -h 127.0.0.1
Microsoft Windows [Version 10.0.18363.1198]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>mysql -u root -p -h 127.0.0.1
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 27
Server version: 8.0.22 MySQL Community Server - GPL

Copyright (c) 2000, 2020, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> ■
```

mysql -u root -p

Password required

# Display existing databases (show databases;)

```
Administrator: Command Prompt - mysql -u root -p -h 127.0.0.1
(c) 2019 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>mysql -u root -p -h 127.0.0.1
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 27
Server version: 8.0.22 MySQL Community Server - GPL

Copyright (c) 2000, 2020, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql       |
| performance_schema |
| sakila      |
| sys         |
| world       |
+-----+
6 rows in set (0.00 sec)

mysql>
```

# Select a specific database (use name of database;)

```
Administrator: Command Prompt - mysql -u root -p -h 127.0.0.1
C:\WINDOWS\system32>mysql -u root -p -h 127.0.0.1
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 27
Server version: 8.0.22 MySQL Community Server - GPL

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Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sakila |
| sys |
| world |
+-----+
6 rows in set (0.00 sec)

mysql> use world;
Database changed
mysql>
```

In this example:

use world;

# Once Database selected, **show tables;**

```
Administrator: Command Prompt - mysql -u root -p -h 127.0.0.1
owners.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sakila |
| sys |
| world |
+-----+
6 rows in set (0.00 sec)

mysql> use world;
Database changed
mysql> SHOW TABLES;
+-----+
| Tables_in_world |
+-----+
| city |
| country |
| countrylanguage |
+-----+
3 rows in set (0.00 sec)

mysql>
```

SHOW TABLES;

# DESCRIBE 'TABLE NAME';

```
Administrator: Command Prompt - mysql -u root -p -h 127.0.0.1
6 rows in set (0.00 sec)

mysql> use world;
Database changed
mysql> SHOW TABLES;
+-----+
| Tables_in_world |
+-----+
| city             |
| country          |
| countrylanguage  |
+-----+
3 rows in set (0.00 sec)

mysql> describe world.tables;
ERROR 1146 (42S02): Table 'world.tables' doesn't exist
mysql> describe world.city
-> ;
```

Field	Type	Null	Key	Default	Extra
ID	int	NO	PRI	NULL	auto_increment
Name	char(35)	NO			
CountryCode	char(3)	NO	MUL		
District	char(20)	NO			
Population	int	NO		0	

```
5 rows in set (0.00 sec)

mysql>
```

Here **DESCRIBE world.city**

It gives details about the fields of the table

# Create a new database

```
Administrator: Command Prompt - mysql -u root -p

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql          |
| performance_schema |
| sakila         |
| sys           |
| world         |
+-----+
6 rows in set (0.00 sec)

mysql> CREATE DATABASE courses;
Query OK, 1 row affected (0.01 sec)

mysql> █
```

CREATE DATABASE courses;

# New database is created – SHOW DATABASES;

```
Administrator: Command Prompt - mysql -u root -p
+-----+
| sys   |
| world |
+-----+
6 rows in set (0.00 sec)

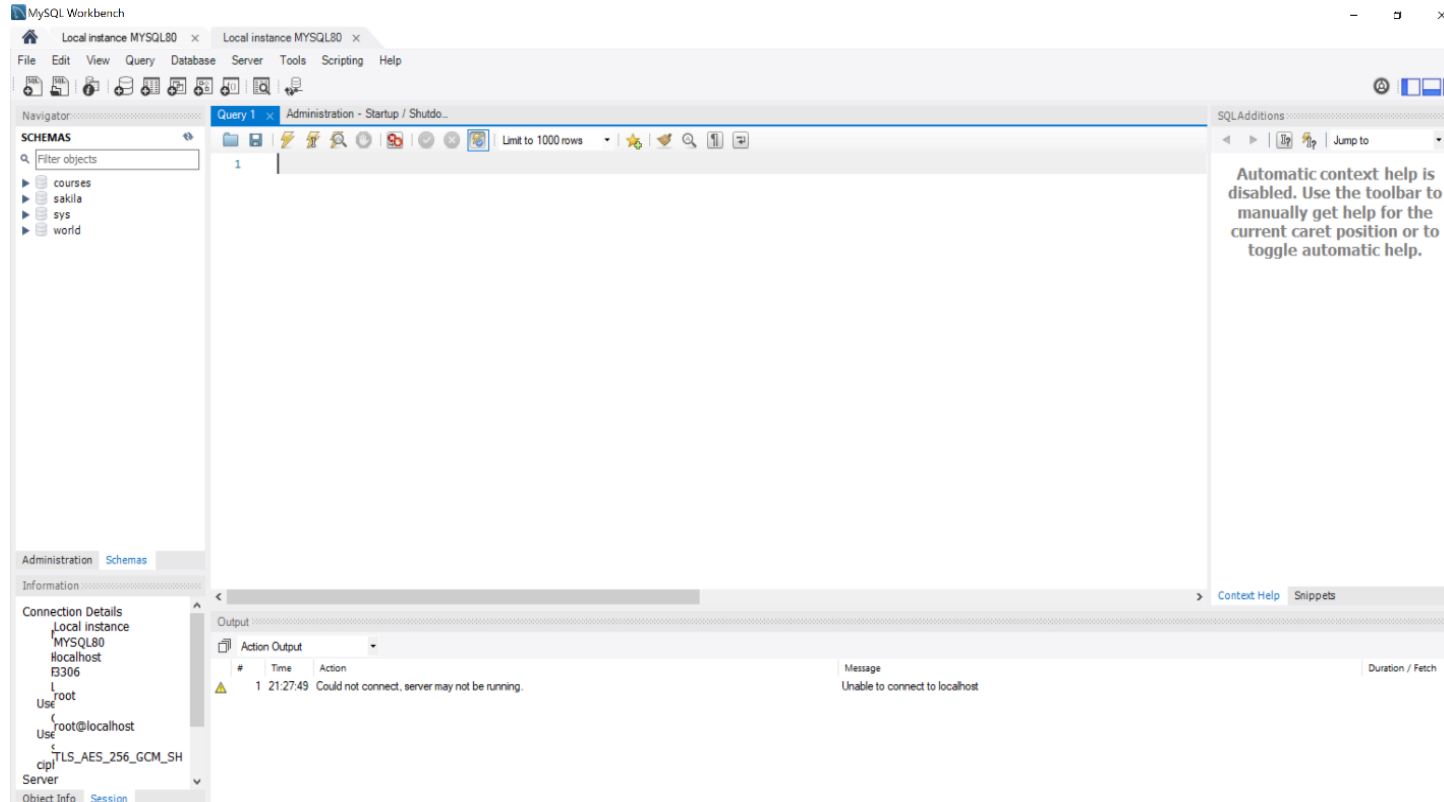
mysql> CREATE DATABASE courses;
Query OK, 1 row affected (0.01 sec)

mysql> SHOW DATABASES;
+-----+
| Database |
+-----+
| courses  |
| information_schema |
| mysql    |
| performance_schema |
| sakila   |
| sys      |
| world    |
+-----+
7 rows in set (0.00 sec)

mysql>
```

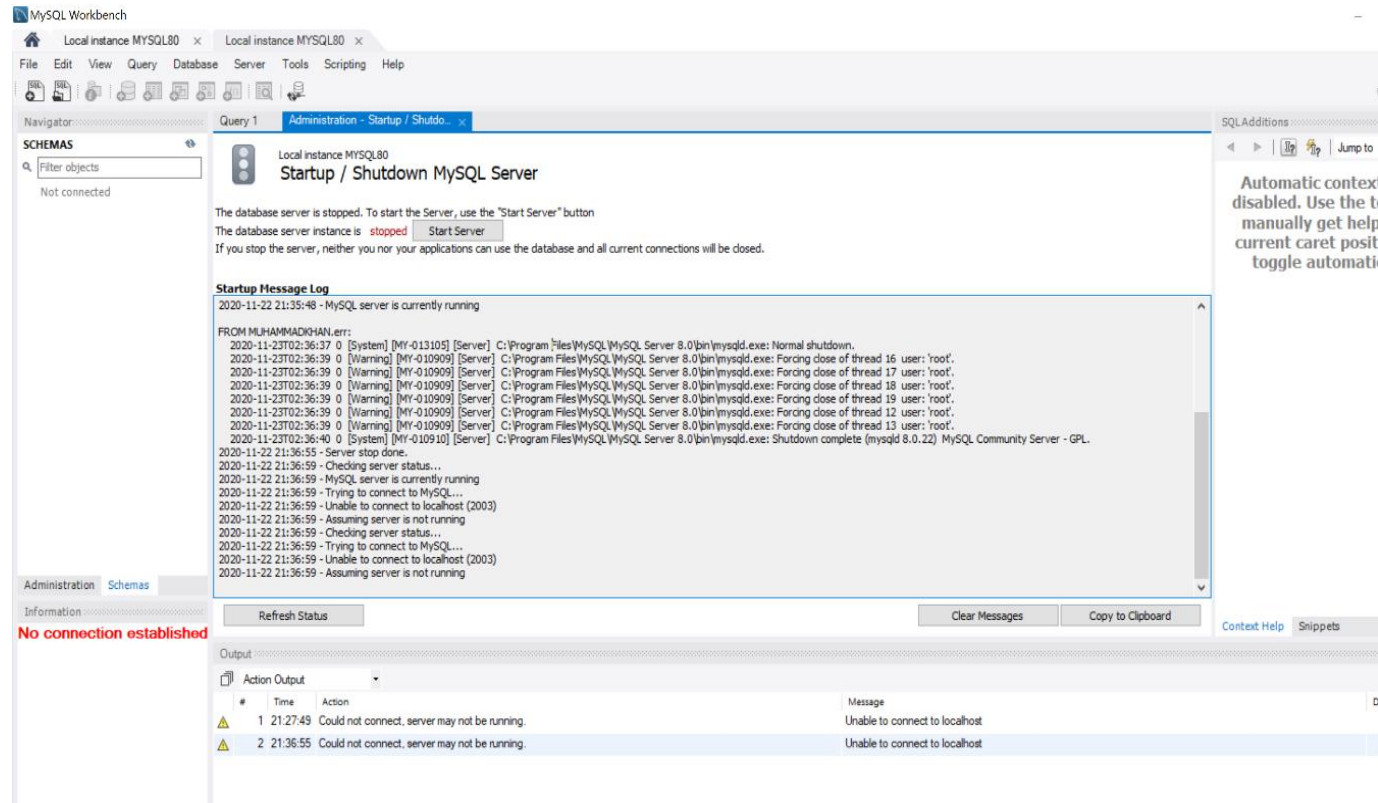
Courses is new database that is created

# MySQL Workbench





# Start Server/Shutdown Server



# Start Server/Shut down Server

The screenshot shows the MySQL Workbench interface with the 'Administration - Startup / Shutdown MySQL Server' window open. The window displays the status of the local instance MySQL80 as 'running'. It includes a 'Startup Message Log' with detailed system messages and a 'Connection Details' sidebar on the left. The 'Output' pane at the bottom shows two failed connection attempts.

**Administration - Startup / Shutdown MySQL Server**

The database server is started and ready for client connections. To shut the server down, use the "Stop Server" button. The database server instance is **running**. **Stop Server** **Bring Offline**

If you stop the server, neither you nor your applications can use the database and all current connections will be closed.

**Startup Message Log**

```
FROM MUHAMMADKHAN.err:
2020-11-23T02:38:46 0 [Warning] [MY-010915] [Server] 'NO_ZERO_DATE', 'NO_ZERO_IN_DATE' and 'ERROR_FOR_DIVISION_BY_ZERO' sql modes should be used with strict mode. They will be merged with strict mode in a future release.
2020-11-23T02:38:46 0 [System] [MY-010116] [Server] C:\Program Files\MySQL\MySQL Server 8.0\bin\mysqld.exe (mysqld 8.0.22) starting as process 8448
2020-11-23T02:38:46 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2020-11-23T02:38:46 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2020-11-23T02:38:47 0 [System] [MY-011323] [Server] X Plugin ready for connections. Bind-address: '::' port: 33060
2020-11-23T02:38:47 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2020-11-23T02:38:47 0 [System] [MY-013602] [Server] Channel mysql_main configured to support TLS. Encrypted connections are now supported for this channel.
2020-11-23T02:38:47 0 [System] [MY-010931] [Server] C:\Program Files\MySQL\MySQL Server 8.0\bin\mysqld.exe: ready for connections. Version: '8.0.22' socket: '*' port: 3306 MySQL Community Server - GPL.
2020-11-22 21:38:48 - Server start done.
2020-11-22 21:38:48 - Checking server status...
2020-11-22 21:38:48 - Trying to connect to MySQL...
2020-11-22 21:38:48 - Connection succeeded
2020-11-22 21:38:48 - Assuming server is running
2020-11-22 21:38:48 - Checking server status...
2020-11-22 21:38:48 - Trying to connect to MySQL...
2020-11-22 21:38:48 - Connection succeeded
2020-11-22 21:38:48 - Assuming server is running]
```

**Connection Details**

- Local instance
- MySQL80
- localhost
- 3306
- root
- Use root@localhost
- Use TLS\_AES\_256\_GCM\_SHA384
- Server

**Output**

#	Time	Action	Message	Duration / Fetch
1	21:27:49	Could not connect, server may not be running.	Unable to connect to localhost	
2	21:36:55	Could not connect, server may not be running.	Unable to connect to localhost	

# Create a new database and Create Table in the database

```
mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sakila |
| sys |
| world |
+-----+
6 rows in set (0.00 sec)

mysql> CREATE DATABASE students;
Query OK, 1 row affected (0.01 sec)

mysql> use students;
Database changed

mysql> CREATE TABLE student(id varchar(9) primary key not null, first_name varchar (25) not null, last_name varchar(25) not null, email
varchar(25) not null);
Query OK, 0 rows affected (0.08 sec)
```

CREATE DATABASE students

# Create Table in Database

```
mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sakila |
| sys |
| world |
+-----+
6 rows in set (0.00 sec)
```

```
mysql> CREATE DATABASE students;
Query OK, 1 row affected (0.01 sec)
```

```
mysql> use students;
Database changed
```

```
mysql> CREATE TABLE student(id varchar(9) primary key not null, first_name varchar (25) not null, last_name varchar(25) not null, email
varchar(25) not null);
Query OK, 0 rows affected (0.08 sec)
```

# Insert Data in Database Table 'student'

```
mysql> SELECT * FROM student;
```

id	first_name	last_name	email
N01234567	Muhammad	Khan	abc@mnop.com

1 row in set (0.00 sec)

```
mysql> insert into student(id, first_name, last_name, email) values ('N0000001', 'Murray', 'Smith', 'MSmith@gmail.com');  
Query OK, 1 row affected (0.00 sec)
```

# Insert Data into table and Display data from table

```
mysql> insert into student(id, first_name, last_name, email) values('N01234567','Muhammad', 'Khan', 'abc@mnop.com');  
Query OK, 1 row affected (0.01 sec)
```

```
mysql> SELECT * FROM student;
```

id	first_name	last_name	email
N01234567	Muhammad	Khan	abc@mnop.com

1 row in set (0.00 sec)

```
mysql> insert into student(id, first_name, last_name, email) values ('N0000001','Murray', 'Smith', 'MSmith@gmail.com');  
Query OK, 1 row affected (0.00 sec)
```

```
mysql> select * from student;
```

id	first_name	last_name	email
N0000001	Murray	Smith	MSmith@gmail.com
N01234567	Muhammad	Khan	abc@mnop.com

2 rows in set (0.00 sec)

```
mysql> ■
```

# Create a new table and Insert data in table 'course'

```
mysql> create table course(id varchar(8) primary key not null, title varchar(25) not null, description varchar(255) not null );  
Query OK, 0 rows affected (0.08 sec)
```

```
mysql> insert into course(id, title, description) values ('TECH 101', 'Electrical Circuits' , 'This course covers foundations of DC circuits and introductory AC circuits');  
Query OK, 1 row affected (0.01 sec)
```

```
mysql> insert into course(id, title, description) values('TECH104', 'Programming Fundamentals', 'This course is an introductory course in Programming. Language of choice is C-programming');  
Query OK, 1 row affected (0.00 sec)
```

# SELECT \* FROM course;

```
mysql> insert into course(id, title, description) values('TECH104', 'Programming Fundamentals', 'This course is an introductory course in Programming. Language of choice is C-programming');  
Query OK, 1 row affected (0.00 sec)
```

```
mysql> SELECT * FROM course;
```

id	title	description
TECH 101	Electrical Circuits	This course covers foundations of DC circuits and introductory AC circuits
TECH104	Programming Fundamentals	This course is an introductory course in Programming. Language of choice is C-programming

```
2 rows in set (0.00 sec)
```



# UPDATE course SET id = 'TECH 104' WHERE title = 'Programming Fundamentals' ;

```
mysql> SELECT * FROM course;
```

id	title	description
TECH 101	Electrical Circuits	This course covers foundations of DC circuits and introductory AC circuits
TECH104	Programming Fundamentals	This course is an introductory course in Programming. Language of choice is C-programming

2 rows in set (0.00 sec)

```
mysql> UPDATE course SET id='TECH 104' WHERE title = 'Programming Fundamentals';
```

```
mysql> UPDATE course SET id='TECH 104' WHERE title = 'Programming Fundamentals';  
Query OK, 1 row affected (0.01 sec)  
Rows matched: 1  Changed: 1  Warnings: 0
```

```
mysql> SELECT * FROM course;
```

id	title	description
TECH 101	Electrical Circuits	This course covers foundations of DC circuits and introductory AC circuits
TECH 104	Programming Fundamentals	This course is an introductory course in Programming. Language of choice is C-programming

2 rows in set (0.00 sec)

# Alter Table Column – add a column 'phone' in the table 'student'

```
mysql> ALTER TABLE student ADD phone VARCHAR(14) NOT NULL AFTER email;
```

```
Query OK, 0 rows affected (0.07 sec)
```

```
Records: 0 Duplicates: 0 Warnings: 0
```

```
mysql> DESCRIBE student;
```

Field	Type	Null	Key	Default	Extra
id	varchar(9)	NO	PRI	NULL	
first_name	varchar(25)	NO		NULL	
last_name	varchar(25)	NO		NULL	
email	varchar(25)	NO		NULL	
phone	varchar(14)	NO		NULL	

```
5 rows in set (0.02 sec)
```

# DESCRIBE student (see all the data types of fields)

```
mysql> ALTER TABLE student ADD phone VARCHAR(14) NOT NULL AFTER email;
```

```
Query OK, 0 rows affected (0.07 sec)
```

```
Records: 0 Duplicates: 0 Warnings: 0
```

```
mysql> DESCRIBE student;
```

Field	Type	Null	Key	Default	Extra
id	varchar(9)	NO	PRI	NULL	
first_name	varchar(25)	NO		NULL	
last_name	varchar(25)	NO		NULL	
email	varchar(25)	NO		NULL	
phone	varchar(14)	NO		NULL	

```
5 rows in set (0.02 sec)
```

DESCRIBE student

# Update field in student (table)

```
mysql> Update student  
-> SET phone = '111-222-3333'  
-> WHERE id='N0000001';
```

Query OK, 1 row affected (0.01 sec)  
Rows matched: 1 Changed: 1 Warnings: 0

```
mysql> SELECT * FROM student;
```

id	first_name	last_name	email	phone
N0000001	Murray	Smith	MSmith@gmail.com	111-222-3333
N01234567	Muhammad	Khan	abc@mnop.com	

2 rows in set (0.00 sec)

```
mysql> UPDATE student  
-> SET phone='555-666-7777'  
-> WHERE id='N01234567';
```

Query OK, 1 row affected (0.01 sec)  
Rows matched: 1 Changed: 1 Warnings: 0

```
mysql> SELECT * FROM student;
```

id	first_name	last_name	email	phone
N0000001	Murray	Smith	MSmith@gmail.com	111-222-3333
N01234567	Muhammad	Khan	abc@mnop.com	555-666-7777

2 rows in set (0.00 sec)

# Add a new column

```
mysql> ALTER TABLE user ADD phone VARCHAR(15) NOT NULL AFTER name;
```

```
Query OK, 0 rows affected (0.14 sec)
```

```
Records: 0 Duplicates: 0 Warnings: 0
```

```
mysql> SELECT * FROM user;
```

id	name	phone	email
1	SAM		abc@h.com
2	TOM		mnop@a.ca
3	RICHARD		s@amb.org

```
3 rows in set (0.00 sec)
```

# Update contents in Table

```
mysql> SELECT * FROM user;
+----+-----+-----+-----+
| id | name  | phone | email  |
+----+-----+-----+-----+
| 1  | SAM   |       | abc@h.com |
| 2  | TOM   |       | mnop@a.ca |
| 3  | RICHARD |      | s@amb.org |
+----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> UPDATE user
-> SET phone = '111-222-333'
-> WHERE name='TOM';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

```
Administrator: Command Prompt - mysql -u root -p
mysql> SELECT * FROM user;
+----+-----+-----+-----+
| id | name  | phone      | email  |
+----+-----+-----+-----+
| 1  | SAM   |           | abc@h.com |
| 2  | TOM   | 111-222-333 | mnop@a.ca |
| 3  | RICHARD |          | s@amb.org |
+----+-----+-----+-----+
3 rows in set (0.00 sec)
```

# Update all records

```
mysql> UPDATE user SET phone = '222-333-4444';
```

```
Query OK, 3 rows affected (0.01 sec)
```

```
Rows matched: 3  Changed: 3  Warnings: 0
```

```
mysql> SELECT * FROM user;
```

id	name	phone	email
1	SAM	222-333-4444	abc@h.com
2	TOM	222-333-4444	mnop@a.ca
3	RICHARD	222-333-4444	s@amb.org

3 rows in set (0.00 sec)

# Delete column from a table

```
mysql> ALTER TABLE user DROP phone;  
Query OK, 0 rows affected (0.11 sec)  
Records: 0 Duplicates: 0 Warnings: 0  
  
mysql> SELECT * FROM user;  
+-----+-----+-----+  
| id | name   | email   |  
+-----+-----+-----+  
| 1  | SAM    | abc@h.com |  
| 2  | TOM    | mnop@a.ca |  
| 3  | RICHARD | s@amb.org |  
+-----+-----+-----+  
3 rows in set (0.00 sec)  
  
mysql> ■
```



# DROP DATABASE

```
Administrator: Command Prompt - mysql -u root -p
Records: 0  Duplicates: 0  Warnings: 0

mysql> SELECT * FROM user;
+----+-----+-----+
| id | name  | email |
+----+-----+-----+
| 1  | SAM   | abc@h.com |
| 2  | TOM   | mnop@a.ca |
| 3  | RICHARD | s@amb.org |
+----+-----+-----+
3 rows in set (0.00 sec)

mysql> DROP DATABASE test;
Query OK, 1 row affected (0.02 sec)

mysql> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| mysql          |
| performance_schema |
| sakila         |
| students       |
| sys            |
| world          |
+-----+
7 rows in set (0.00 sec)

mysql>
```

NOTE: TABLE can also be DROPPED  
as  
DROP TABLE user;

# CREATE TABLE registration

```
line 1
mysql> CREATE TABLE registration (registration_id INT (10) UNSIGNED AUTO_INCREMENT PRIMARY KEY NOT NULL, student_id VARCHAR(9) NOT NULL, course_id VARCHAR(8) NOT NULL, OFFERED_IN VARCHAR (25) NOT NULL, GRADE TINYINT(3) );
Query OK, 0 rows affected, 2 warnings (0.07 sec)

mysql> select
```

```
mysql> DESCRIBE registration;
```

Field	Type	Null	Key	Default	Extra
registration_id	int unsigned	NO	PRI	NULL	auto_increment
student_id	varchar(9)	NO		NULL	
course_id	varchar(8)	NO		NULL	
OFFERED_IN	varchar(25)	NO		NULL	
GRADE	tinyint	YES		NULL	

```
5 rows in set (0.00 sec)

mysql>
```

# Insert multiple rows of data in table

```
mysql> INSERT INTO registration (student_id, course_id, offered_in ) values ('N01234567', 'TECH 104', 'WINTER 2021'),('N01234567', 'TECH 172', 'WINTER 2021');
Query OK, 2 rows affected (0.01 sec)
Records: 2  Duplicates: 0  Warnings: 0

mysql> SELECT * FROM registration;
+-----+-----+-----+-----+-----+
| registration_id | student_id | course_id | OFFERED_IN | GRADE |
+-----+-----+-----+-----+-----+
| 1 | N01234567 | TECH 104 | WINTER 2021 | NULL |
| 2 | N01234567 | TECH 172 | WINTER 2021 | NULL |
+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)
```

Each Field (IF defined as NOT NULL) must be entered – see below

```
mysql> INSERT INTO registration (student_id, course_id ) VALUES ('N0000001', 'TECH 101');
ERROR 1364 (HY000): Field 'OFFERED_IN' doesn't have a default value
mysql> ■
```

# Add new row in registration table

```
mysql> INSERT INTO registration (student_id, course_id ) VALUES ('N0000001', 'TECH 101');  
ERROR 1364 (HY000): Field 'OFFERED_IN' doesn't have a default value  
mysql> INSERT INTO registration (student_id, course_id, offered_in, grade ) VALUES ('N0000001', 'TECH 101', 'FALL 2020',  
82);  
Query OK, 1 row affected (0.01 sec)  
  
mysql> SELECT * FROM registration;
```

registration_id	student_id	course_id	OFFERED_IN	GRADE
1	N01234567	TECH 104	WINTER 2021	NULL
2	N01234567	TECH 172	WINTER 2021	NULL
3	N0000001	TECH 101	FALL 2020	82

```
3 rows in set (0.00 sec)  
  
mysql>
```

# Display contents- combining multiple tables

```
mysql> use students;
Database changed
mysql> SELECT first_name, student.id, title, course.id, offered_in FROM student, course, registration WHERE student.id = registration.s
tudent_id AND course.id=registration.course_id;
```

first_name	id	title	id	offered_in
Murray	N0000001	Electrical Circuits	TECH 101	FALL 2020
Muhammad	N01234567	Programming Fundamentals	TECH 104	WINTER 2021
Muhammad	N01234567	Linux Administration 1	TECH 172	WINTER 2021

```
3 rows in set (0.01 sec)
```

# Display information about one person – combining information from multiple tables

```
mysql> SELECT first_name, student.id, title, course.id, offered_in FROM student, course, registration WHERE student.id = registration.student_id AND course.id=registration.course_id AND student.first_name='Muhammad';
```

first_name	id	title	id	offered_in
Muhammad	N01234567	Programming Fundamentals	TECH 104	WINTER 2021
Muhammad	N01234567	Linux Administration 1	TECH 172	WINTER 2021

```
2 rows in set (0.00 sec)
```

```
mysql> █
```

# Display contents from Table using 'LIKE' filter

```
mysql> SELECT * FROM student WHERE last_name LIKE '%r%';
```

id	first_name	last_name	email	phone
N024681	Nick	Anderson	nick@gmail.com	888-8888-9999
N034680	Richardson	Carl	carl.rick@gmail.com	676-8888-9999
N054681	Gary	Proctor	proctor@gmail.com	567-8888-9999
N0609121	Ian	McLaren	ian@gmail.com	891-234-1234

```
4 rows in set (0.00 sec)
```

```
mysql> █
```

Filter based on character  
'r' in last\_name

# Display using 'ORDER BY' (sort) based on a field (default is ASCENDING order)

```
mysql> SELECT last_name, first_name, id FROM student ORDER BY first_name;
```

last_name	first_name	id
Proctor	Gary	N054681
Smith	George	N024682
McLaren	Ian	N0609121
Khan	Muhammad	N01234567
Smith	Murray	N0000001
Anderson	Nick	N024681
Carl	Richardson	N034680
Smith	Rick	N024680
Manny	Samuel	N074682

```
9 rows in set (0.00 sec)
```

```
mysql>
```

ORDER BY first\_name



# Displaying using ORDER BY (sort) by DESCENDING order (DESC)

```
mysql> SELECT last_name, first_name, id FROM student ORDER BY first_name DESC;
```

last_name	first_name	id
Manny	Samuel	N074682
Smith	Rick	N024680
Carl	Richardson	N034680
Anderson	Nick	N024681
Smith	Murray	N0000001
Khan	Muhammad	N01234567
McLaren	Ian	N0609121
Smith	George	N024682
Proctor	Gary	N054681

```
9 rows in set (0.00 sec)
```

# Summary

- What is RDBMS?
- MySQL installation process and data types
- Create Database
- Create tables
- Insert data in tables
- Update data in tables
- Delete data from row of database table
- Add (Alter command) new column in a table
- Delete (Alter command to Drop) column from table
- Delete Database