Assignment 2

Aim: Install and configure client and server for MySQL and MongoDB (Show all commands and necessary steps for installation and configuration).

MYSQL:

MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company. MySQL is becoming so popular because of many good reasons −

- MySQL is released under an open-source license. So you have nothing to pay to useit.
- MySQL is a very powerful program in its own right. It handles a large subset of the functionality of the most expensive and powerful databasepackages.
- MySQL uses a standard form of the well-known SQL datalanguage.
- MySQL works on many operating systems and with many languages includingPHP, PERL, C, C++, JAVA,etc.
- MySQL works very quickly and works well even with large datasets.
- MySQL is very friendly to PHP, the most appreciated language for webdevelopment.
- MySQL supports large databases, up to 50 million rows or more in a table. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes(TB).
- MySQL is customizable. The open-source GPL license allows programmers to modify the MySQL software to fit their own specificenvironments.

MySQL Features

- **Relational Database Management System (RDBMS):** MySQL is a relational database managementsystem.
- **Easy to use:** MySQL is easy to use. You have to get only the basic knowledge ofSQL. You can build and interact with MySQL with only a few simple SQL statements.
- **It is secure:** MySQL consist of a solid data security layer that protects sensitivedata from intruders. Passwords are encrypted inMySQL.
- **Client/ServerArchitecture:**MySQLfollowsaclient/serverarchitecture.Thereisa database server (MySQL) and arbitrarily many clients (application programs), which communicate with the server; that is, they query data, save changes, etc.
- **Free to download:** MySQL is free to use and you can download it from MySQLofficial website.
- **It is scalable:** MySQL can handle almost any amount of data, up to as much as 50 million rows or more. The default file size limit is about 4 GB. However, you can increase this number to a theoretical limit of 8 TB ofdata.
- **Compatibale on many operating systems:** MySQL is compatible to run on many operating systems, like Novell NetWare, Windows* Linux*, many varieties of UNIX* (such as Sun* Solaris*, AIX, and DEC* UNIX), OS/2, FreeBSD*, and others.MySQL

also provides a facility that the clients can run on the same computer as the server or on another computer (communication via a local network or the Internet).

- **Allows roll-back:** MySQL allows transactions to be rolled back, commit andcrash recovery.
- **High Performance:** MySQL is faster, more reliable and cheaper because of itsunique storage engine architecture.
- **High Flexibility:** MySQL supports a large number of embedded applicationswhich makes MySQL veryflexible.
- **High Productivity:** MySQL uses Triggers, Stored procedures and views which allows the developer to give a higherproductivity.

Installation Step of MYSQL:

Following steps are to be followed while installing MYSQL on Ubuntu operating System.

1. Connect the system with theInternet.
2. Open the terminal and Execute the command
   sudo apt-getupdate
   sudo apt-get install mysql-server
3. Enter the password for root as**"root"**
4. After installation enter the below command to get the MYSQL Terminal.
   mysql –u root-p
5. Enter the earlier chosen password ie.**root**
6. Then enter the command "show database", by this all the databases in the systemwill display onscreen.
7. Createdatabase.
8. Use that givendatabase.

MongoDB

MongoDB is a cross-platform, document oriented database that provides, high performance, high availability, and easy scalability. MongoDB works on concept of collection and document.

Database

Database is a physical container for collections. Each database gets its own set of files on the file system. A single MongoDB server typically has multiple databases.

Collection

Collection is a group of MongoDB documents. It is the equivalent of an RDBMS table. A collection exists within a single database. Collections do not enforce a schema. Documents within a collection can have different fields. Typically, all documents in a collection are of similar or relatedpurpose.

Document

A document is a set of key-value pairs. Documents have dynamic schema. Dynamic schema means that documents in the same collection do not need to have the same set of fields or structure, and common fields in a collection's documents may hold different types of data. The following table shows the relationship of RDBMS terminology with MongoDB.

MongoDB Features

- **General purpose database**, almost as fast as the key:value NoSQLtype.
- Highavailability.
- **Scalability** (from a standalone server to distributed architectures of huge clusters). This allows us to shard our database transparently across all our shards. This increases the performance of our dataprocessing.
- **Aggregation**: batch data processing and aggregate calculations using nativeMongoDB operations.
- **Load Balancing**: automatic data movement across different shards for load balancing. The balancer decides when to migrate the data and the destination Shard, so they are evenly distributed among all servers in the cluster. Each shard stores the data for a selected range of our collection according to a partitionkey.
- **Native Replication**: syncing data across all the servers at the replicaset.
- **Security**: authentication, authorization,etc.
- Advanced usersmanagement.
- **Automatic failover**: automatic election of a new primary when it has gonedown.

Installation Steps for MongoDB

1. Connect the system with theInternet.
2. Open the terminal and Execute the command

   sudo apt-getupdate

   sudo apt-get install

   mongodbsudo service

   mongodb start
3. Type mongo to start the mongodbterminal.
4. Now write yourqueries.

Comparison between MYSQL and MongoDB

Date	MySQL	MongoDB
Written in	C++, C	C++, C and JavaScript
Type	RDBMS	Document-oriented
Main points	- Table - Row - Column	- Collection - Document - Field
License	GPL v2 / Commercial licenses available OD	GNU AGPL v3.0 / Commercial licenses available OD
Schemas	Strict	Dynamic
Scaling	Vertically	Horizontally
Key features	- Full-text searching and indexing - Integrated replication support - Triggers - SubSELECTs - Query caching - SSL support - Unicode support - Different storage engines with various performance characteristics	- Auto-sharding - Native replication - In-memory speed - Embedded data models support - Comprehensive secondary indexes - Rich query language support - Various storage engines support
Best used for	- Data structure fits for tables and rows - Strong dependence on multi-row transactions - Frequent updates and modifications of large volume of records - Relatively small datasets	- High write loads - Unstable schema - Your DB is set to grow big - Data is location based - HA (high availability) in unstable environment is required - No database administrators (DBAs)
Examples	NASA, US Navy, Bank of Finland, UCR, Walmart, Sony, S2 Security Corporation, Telenor, Italtel, iStock, Uber, Zappos, Booking.com, Twitter, Facebook, others.	Expedia, Bosch, Otto, eBay, Gap, Forbes, Foursquare, Adobe, Intuit, Metlife, BuzzFeed, Crittercism, CitiGroup, the City of Chicago, others.

Conclusion:-

We have studied the Installation and configuration of client and server for MySQL and MongoDB.

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Assignment 3

Aim: Study the SQLite database and its uses. Also elaborate on building and installing of SQLite.

What is SQLite?

SQLite is an in-process library that implements a self-contained, serverless, zero-configuration, transactional SQL database engine. It is a database, which is zero-configured, which means like other databases you do not need to configure it in your system.

SQLite engine is not a standalone process like other databases, you can link it statically or dynamically as per your requirement with your application. SQLite accesses its storage files directly.

Why SQLite?

- SQLite does not require a separate server process or system to operate(serverless).
- SQLite comes with zero-configuration, which means no setup or administrationneeded.
- A complete SQLite database is stored in a single cross-platform diskfile.
- SQLite is very small and light weight, less than 400KiB fully configured or lessthan 250KiB with optional featuresomitted.
- SQLite is self-contained, which means no externaldependencies.
- SQLite transactions are fully ACID-compliant, allowing safe access from multiple processes orthreads.
- SQLite supports most of the query language features found in SQL92 (SQL2)standard.
- SQLite is written in ANSI-C and provides simple and easy-to-useAPI.
- SQLite is available on UNIX (Linux, Mac OS-X, Android, iOS) and Windows (Win32, WinCE,WinRT).

SQLite A Brief History

- 2000 - D. Richard Hipp designed SQLite for the purpose of no administrationrequired for operating aprogram.
- 2000 - In August, SQLite 1.0 released with GNU DatabaseManager.
- 2011 - Hipp announced to add UNQl interface to SQLite DB and to developUNQLite (Document orienteddatabase).

SQLite Limitations

There are few unsupported features of SQL92 in SQLite which are listed in the following table.

Sr.No.	Feature & Description
1	**RIGHT OUTER JOIN**

	Only LEFT OUTER JOIN is implemented.
2	**FULL OUTER JOIN** Only LEFT OUTER JOIN is implemented.
3	**ALTER TABLE** The RENAME TABLE and ADD COLUMN variants of the ALTER TABLE command are supported. The DROP COLUMN, ALTER COLUMN, ADD CONSTRAINT are not supported.
4	**Trigger support** FOR EACH ROW triggers are supported but not FOR EACH STATEMENT triggers.
5	**VIEWs** VIEWs in SQLite are read-only. You may not execute a DELETE, INSERT, or UPDATE statement on a view.
6	**GRANT and REVOKE** The only access permissions that can be applied are the normal file access permissions of the underlying operating system.

SQLite Commands

The standard SQLite commands to interact with relational databases are similar to SQL. They are CREATE, SELECT, INSERT, UPDATE, DELETE and DROP. These commands can be classified into groups based on their operational nature−

DDL - Data Definition Language

Sr.No.	Command & Description
1	**CREATE** Creates a new table, a view of a table, or other object in database.
2	**ALTER** Modifies an existing database object, such as a table.
3	**DROP** Deletes an entire table, a view of a table or other object in the database.

DML - Data Manipulation Language

Command	Description
INSERT	Creates a record

UPDATE	Modifies records
DELETE	Deletes records

DQL - Data Query Language

Sr.No.	Command &Description
1	**SELECT** Retrieves certain records from one or more tables

SQLite - Installation

SQLite is famous for its great feature zero-configuration, which means no complex setup or administration is needed. This chapter will take you through the process of setting up SQLite on Windows, Linux and Mac OS X.

Install SQLite on Windows

- **Step 1** − Go to SQLite download page, and download precompiled binariesfrom Windowssection.
- **Step 2** − Download sqlite-shell-win32-*.zip and sqlite-dll-win32-*.zip zippedfiles.
- **Step 3** − Create a folder C:\>sqlite and unzip above two zipped files in this folder,which will give you sqlite3.def, sqlite3.dll and sqlite3.exefiles.
- **Step 4** − Add C:\>sqlite in your PATH environment variable and finally go to the command prompt and issue sqlite3 command, which should display the followingresult.

```
C:\>sqlite3
SQLite version 3.7.15.2 2013-01-09 11:53:05
Enter ".help" for instructions
Enter SQL statements terminated with a ";"
sqlite>
```

Install SQLite on Linux

Today, almost all the flavours of Linux OS are being shipped with SQLite. So you just issue the following command to check if you already have SQLite installed on your machine.

```
$sqlite3
SQLite version 3.7.15.2 2013-01-09 11:53:05
Enter ".help" for instructions
Enter SQL statements terminated with a ";"
sqlite>
```

If you do not see the above result, then it means you do not have SQLite installed on your Linux machine. Following are the following steps to install SQLite −

- **Step 1** − Go toSQLite download pageand download sqlite-autoconf-*.tar.gz from source codesection.
- **Step 2** − Run the following command−

```
$tar xvfz sqlite-autoconf-3071502.tar.gz
$cd sqlite-autoconf-3071502
$./configure --prefix = /usr/local
$make
$make install
```

The above command will end with SQLite installation on your Linux machine. Which you can verify as explained above.

Finally, you have SQLite command prompt where you can issue SQLite commands for your exercises.

Conclusion:-

We have studied the SQLite database and its uses.