Linux Network Administration

MySQL
COMP1071 Summer 2020

Databases

- Database is a term used to describe a collection of structured data

- A database software package contains the tools used to store, access, and protect a database of a specific format or structure

- There are many different software toolsets or packages that provide database functionality

- There are many free database packages for Linux as well as non-free packages

Terminology

- The data structure definition of a database is part of the database schema
- The schema of a database defines tables which contain records called rows
- Each record contains attributes, or elements, called fields or columns
- The list of columns is defined by the table, so every row in a table has the same columns defined, although the data in the column can be different from one row to another
- A database server can hold multiple databases, referred to by their database names which are unique within that server
- Users interact with applications which can use one or more databases stored on one or more servers to store their data

MySQL

- Created by Monty Widenius as a free open source alternative to existing database software available at the time
- The original versions were quite simple, fast, and relatively reliable
- As it grew in popularity, features were added and performance improved
- It demonstrated viability for production work and attracted a sizable developer community
- Oracle bought the rights to MySQL and extended it, creating a community FOSS version separate from an extended and supported commercial enterprise version
- Monty then founded Monty Program AB which created MariaDB, a FOSS drop-in replacement for MySQL

Installation

- There are two main packages to consider installing for MySQL

- mysql-client has the command line tools and libraries necessary to use existing MySQL servers

- mysql-server provides the data storage, access, and protection components necessary to run a MySQL server

- mysql-server includes mysql-client

- Installing these will actually install mysql-server-N.N or mysql-client-N.N where N.N is the current version number

Default Configuration

- The default MySQL server install listens for connections only from localhost, on tcp port 3306

- The MySQL access control is done by the MySQL software and does not require MySQL users to have UNIX/Linux user accounts

- The default install creates some databases on the server, for server management and for permissions and configuration

- The permissions and configuration database is important and is named mysql

Configuration Changes

- The MySQL daemon and command line tools use /etc/mysql/my.cnf and ~/.my.cnf for configuration options (there are many)
- Things you might change could include bind-address to allow non-local access, port number, or datastore directory (/var/lib/mysql)
- Any configuration file changes that modify the service daemon process(es) require a reload of the mysql service to take effect

MySQL Users

- MySQL users and their permissions are created in tables in the database named mysql, not as Linux accounts, usually by an application you install to manage your MySQL service such as phpMyAdmin
- You don't need a Linux account to connect as a MySQL user, and you don't need MySQL user permissions to login to Linux - you don't need to log in to the Linux system at all to use an existing MySQL service unless the server does not allow remote access
- The package installation creates the MySQL superuser named root in the permissions database named mysql
- The password for the MySQL root user is unrelated to the Linux root password

mysql

- The mysql command is used to send SQL commands to a MySQL server, either interactively or from a file containing SQL commands

```
bash$ mysql -u root -p
Password:
mysql> show databases;
mysql> show tables in dbname;
mysql> show columns in dbname.tablename;
mysql> use dbname;
mysql> select * from tablename;
mysql> quit
bash$
```

mysqldump

- mysqldump is a simple tool used to create a text file containing all the SQL commands necessary to recreate a database from scratch

- It is used as a basic backup tool or to seed (sometimes called populate) a database with known starting schema and data

- Restoring a mysqldump backup is done by giving the file as input to the mysql command

```
bash$ mysqldump -u root -p dbname > dbbackup.sql

bash$ mysql -u root -p newdbname <dbbackup.sql
```

mysqladmin

- mysqladmin is a tool used to perform administrative tasks on a MySQL server
- It takes a subcommand to specify a task to perform on the server
- mysqladmin status will show a brief status message
- mysqladmin extended-status will show a large pile of status information
- mysqladmin processlist will show who is doing what in the mysql server at the time, similar to the ps command for Linux
- mysqladmin create *dbname* will create a new empty database named *dbname*
- mysqladmin drop *dbname* will delete the database named *dbname* and everything it contains
- mysqladmin reload will reread the configuration files for mysql
- mysqladmin flush-privileges will reread the user permissions tables
- mysqladmin shutdown will close off connections and shutdown the mysql server processes cleanly

phpMyAdmin

- Managing the schema and data of a database or the user permissions of a production database server is much more involved than this course covers

- To make it easier to manage a database there are quite a few tools that give graphical views of what is on your MySQL server

- A very commonly installed application for MySQL server management is called phpMyAdmin

- It is a free open source web application designed to run on top of a web server such as Apache

- It can be installed using apt with the package name phpmyadmin

Logfiles

- The MySQL server keeps log files in /var/log/mysql
- The log we are most interested in is error.log which will show messages about problems the server software encounters
- Because a database is a service, not an application, you need to look in the logs for useful information when there is a problem
- Applications seldom show the end user details of database errors in any error message because end users are typically application users, not database admins