

Advanced Database Management Systems

Lecture 9 – Sections 8.1, 8.2, 8.3, 8.6
SQL: Data Definition and Data Manipulation

Installing MySql with XAMPP

SQL Data Definition and Admin

- Administration:
 - **CREATE DATABASE**
 - CREATE SCHEMA
 - SET ROLE
 - GRANT PRIVILEGES
- Data Definition:
 - **CREATE TABLE**
 - **ALTER TABLE**
 - **DROP TABLE**
 - CREATE VIEW
- Data Modification:
 - INSERT
 - DELETE
 - UPDATE
- Queries:
 - SELECT

Create Database/Schema

- Specifies a new database schema by giving it a name
- MySQL uses CREATE DATABASE
- Some systems allow you to create multiple schema within a single database
- Often requires root access
 - then grant privileges on the new database/schema to individual users/developers

CREATE TABLE

- Specifies a new base relation by giving it a name, and specifying each of its attributes and their domain
 - INTEGER, FLOAT, DECIMAL(i,j), CHAR(n), VARCHAR(n))
- A constraint NOT NULL may be specified on an attribute

```
CREATE TABLE DEPARTMENT (  
    DNAME                VARCHAR(10)        NOT NULL,  
    DNUMBER               INTEGER            NOT NULL,  
    MGRSSN               CHAR(9) ,  
    MGRSTARTDATE         CHAR(9)    ) ;
```

CREATE TABLE

- Key attributes can be specified via the PRIMARY KEY and UNIQUE phrases
- Entity integrity constraints are specified in the FOREIGN KEY phrase.

```
CREATE TABLE DEPT (  
    DNAME          VARCHAR(10)          NOT NULL,  
    DNUMBER        INTEGER              NOT NULL,  
    MGRSSN         CHAR(9) ,  
    MGRSTARTDATE   CHAR(9) ,  
    PRIMARY KEY (DNUMBER) ,  
    UNIQUE (DNAME) ,  
    FOREIGN KEY (MGRSSN) REFERENCES EMP  ) ;
```

DROP TABLE

- Used to remove a relation and its definition (schema)
- The relation can no longer be used in queries, updates, or any other commands since its description no longer exists
- Example:

DROP TABLE DEPENDENT ;

ALTER TABLE

- Used to add an attribute or keys to existing relations
- Examples:

```
ALTER TABLE EMPLOYEE  
ADD JOB VARCHAR(12) ;
```

```
alter table StoreStock  
add (foreign key (store)  
      references Store(storeID)) ;
```

Foreign Keys

- We can specify RESTRICT, CASCADE, SET NULL or SET DEFAULT on referential integrity constraints (foreign keys)

```
CREATE TABLE DEPT (  
    DNAME                VARCHAR(10)          NOT NULL,  
    DNUMBER              INTEGER              NOT NULL,  
    MGRSSN               CHAR(9) ,  
    MGRSTARTDATE         CHAR(9) ,  
    PRIMARY KEY (DNUMBER) ,  
    UNIQUE (DNAME) ,  
    FOREIGN KEY (MGRSSN) REFERENCES EMP  
    ON DELETE SET DEFAULT ON UPDATE CASCADE) ;
```


Foreign Keys

```
CREATE TABLE EMP (  
    ENAME          VARCHAR(30)          NOT NULL,  
    ESSN           CHAR(9) ,  
    BDATE          DATE ,  
    DNO            INTEGER  DEFAULT 1 ,  
    SUPERSSN       CHAR(9) ,  
    PRIMARY KEY   (ESSN) ,  
    FOREIGN KEY   (DNO) REFERENCES DEPT  
        ON DELETE SET DEFAULT ON UPDATE CASCADE ,  
    FOREIGN KEY   (SUPERSSN) REFERENCES EMP  
        ON DELETE SET NULL ON UPDATE CASCADE) ;
```

Additional Data Types: SQL-99

- **DATE:**
 - Made up of year-month-day in the format yyyy-mm-dd
- **TIME:**
 - Made up of hour:minute:second in the format hh:mm:ss
- **TIME(i):**
 - Made up of hour:minute:second plus i additional digits specifying fractions of a second
 - format is hh:mm:ss:ii...i

Additional Data Types: SQL-99

- **TIMESTAMP:**

- Has both DATE and TIME components

- **INTERVAL:**

- Specifies a relative value rather than an absolute value
- Can be DAY/TIME intervals or YEAR/MONTH intervals
- Can be positive or negative when added to or subtracted from an absolute value, the result is an absolute value

Practical Schema Definition

- Develop your schema commands in a text file
 - most DMBSs provide some way to execute commands from a file
 - MySQL: use the SOURCE command
- For initial development,
simply wipe the tables and recreate them
 - include DROP TABLE commands
 - prevents need for extensive use of ALTER TABLE
- CREATE TABLE order is important
when there are foreign keys.
 - referenced table must be defined before referencing table
 - DROP order is reversed
 - Circular FKs are more easily handled with ALTER TABLE

SQL Data Modification

- Administration:

- CREATE DATABASE
- CREATE SCHEMA
- SET ROLE
- GRANT

- Data Definition:

- CREATE TABLE
- ALTER TABLE
- DROP TABLE
- CREATE VIEW

- Modifications:

- **INSERT**
- **DELETE**
- **UPDATE**

- Queries:

- **SELECT**

INSERT

- In its simplest form,
it is used to add one or more tuples to a relation
- Attribute values should be listed in the same order
that the attributes were specified
in the **CREATE TABLE** command

INSERT

**insert into <tablename> [(column {, column})]
values (expression {, expression})**

**insert into <tablename> [(column {, column})]
<select-statement>**

INSERT

```
insert into STOCK_ITEM  
values (1234, 'cat food', $3.49)
```

```
insert into STORE (ID, PHONE, ZIPCODE)  
values (95, '456-1221', '95209')
```


INSERT

- To reorder attributes or omit attributes, list attribute names explicitly

```
INSERT INTO EMPLOYEE (FNAME, LNAME, SSN)  
VALUES ('Richard', 'Marini', '653298653')
```

INSERT

```
create table cust95204 (  
    name varchar(50),  
    phone char(10),  
    constraint c_pk primary key (name, phone))
```

```
insert into cust95204  
    select name, phone  
    from customer  
    where zipcode = '95204'
```

inserts result
of a query
into a table

DELETE

**delete from <tablename>
[where <search_condition>]**

DELETE

```
delete from STOCK_ITEM  
where DESCRIPTION = 'Toothpaste'
```

```
delete from PURCHASE    (integrity constraint violation!)  
where DATE < '01/01/00'
```

```
delete from PURCHASE_ITEM    (deletes all tuples)
```

```
delete from Customer  
where card_no not in  
(select card_no from Purchase)
```

DELETE

- Removes tuples from a relation
 - Includes a WHERE-clause to select the tuples to be deleted
 - Referential integrity should be enforced
 - Tuples are deleted from only *one table* at a time (unless CASCADE is specified on a referential integrity constraint)
 - A missing WHERE-clause specifies that *all tuples* in the relation are to be deleted; the table then becomes an empty table
 - The number of tuples deleted depends on the number of tuples in the relation that satisfy the WHERE-clause

UPDATE

```
update <tablename>  
set <column = <expression>  
    { , <column = <expression> }  
[where <search_condition>]
```

UPDATE

```
update STOCK_ITEM  
set base_price = base_price*1.1
```

```
update STOCK_ITEM  
set base_price = '$3.99'  
where description = 'ice cream'
```

```
update STORE  
set MANAGER='Julliet', PHONE='7877-9870'  
where ID = 22
```

UPDATE

- Used to modify attribute values of one or more selected tuples
- A WHERE-clause selects the tuples to be modified
- An additional SET-clause specifies the attributes to be modified and their new values
- Each command modifies tuples *in the same relation*
- Referential integrity should be enforced

UPDATE

- Example: Change the location and controlling department number of project number 10 to 'Bellaire' and 5, respectively.

```
UPDATE PROJECT  
  SET      PLOCATION = 'Bellaire',  
          DNUM = 5  
 WHERE     PNUMBER=10
```

UPDATE

- Example: Give all employees in the 'Research' department a 10% raise in salary.

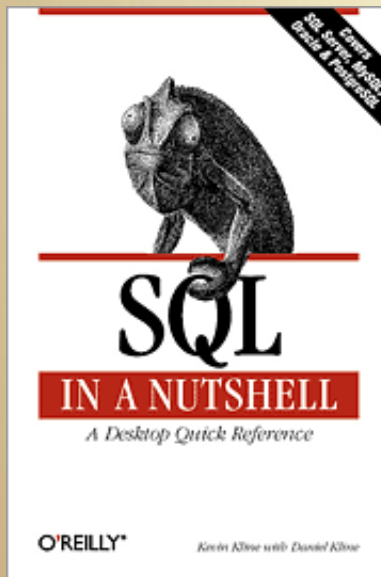
```
UPDATE      EMPLOYEE
  SET       SALARY = SALARY *1.1
  WHERE     DNO IN (SELECT DNUMBER
                    FROM DEPARTMENT
                    WHERE     DNAME='Research')
```

- In this request, the modified SALARY value depends on the original SALARY value in each tuple
 - The reference to the SALARY attribute on the right of = refers to the old SALARY value before modification
 - The reference to the SALARY attribute on the left of = refers to the new SALARY value after modification

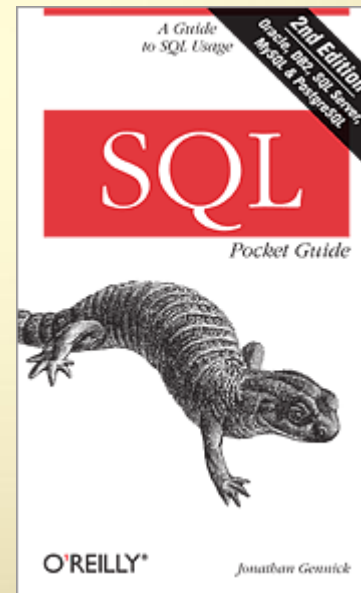
SQL: Suggested References

MySQL reference manual, section 12:

- <http://dev.mysql.com/doc/refman/5.0/en/sql-syntax.html>



“Nutshell” details syntax variations among Oracle, MS SQL Server and MySQL.

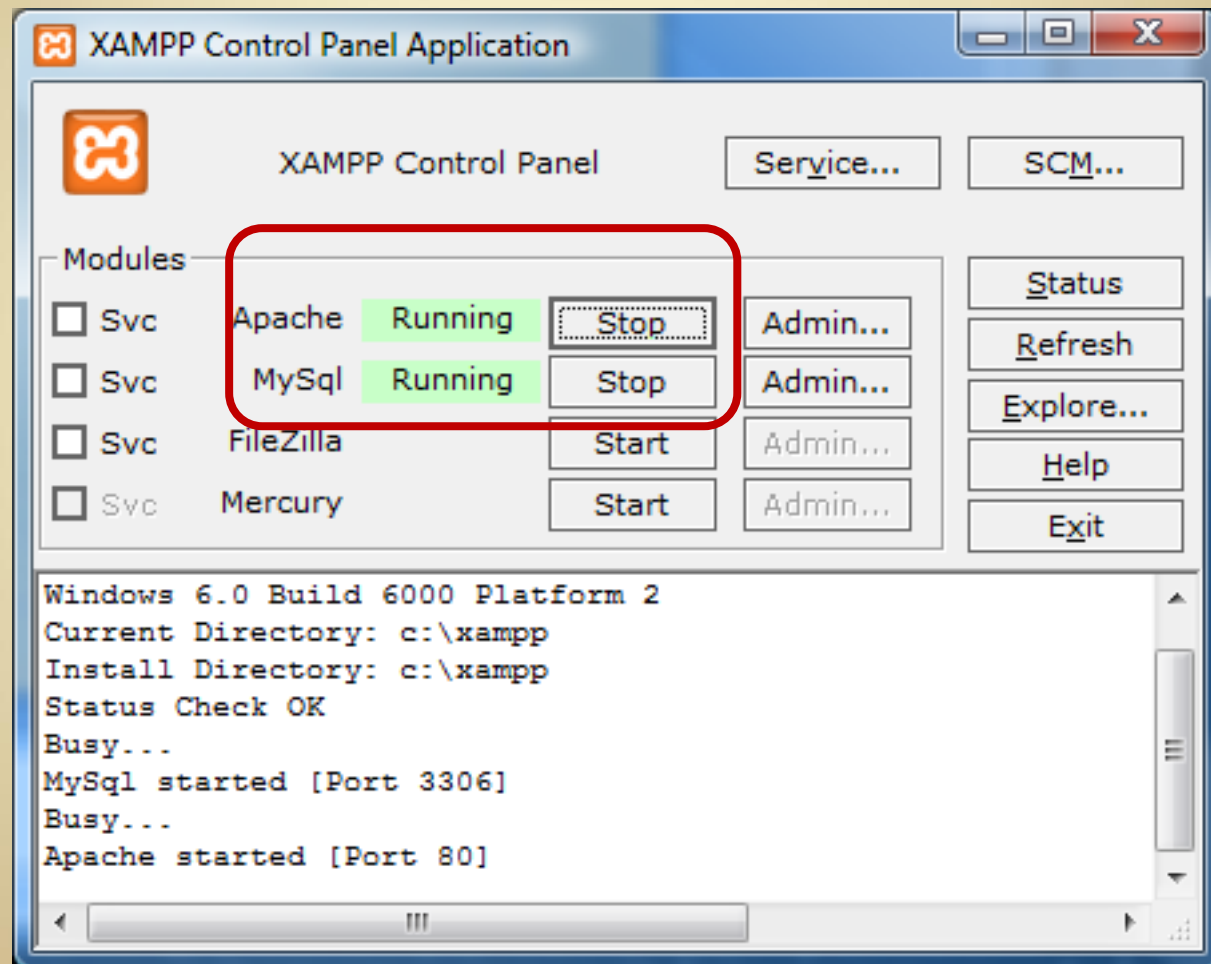


Good for quick syntax checks.

Installing XAMPP

- XAMPP is a free package that contains everything needed to create web based database applications:
 - MySQL
 - Apache web server
 - PHP
- Download from
 - <http://www.apachefriends.org/en/xampp.html>
- Run installer:
 - Suggestion: do not start Apache and MySQL as services. It's better to simply start them when you need them.

Turn on Apache and MySql



Initial Configuration

The first time you start up, go to the security page.

XAMPP will suggest setting a MySQL root password.



XAMPP Security Check

XAMPP SECURITY [Security Check 1.0]

This page gives you a quick overview about the security status of your XAMPP installation. (Please continue reading after the table.)

| Subject | Status |
|---|----------|
| These XAMPP pages are accessible by network for everyone Every XAMPP demo page you are right now looking at is accessible for everyone over network. Everyone who knows your IP address can see these pages. | UNSECURE |
| The MySQL admin user root has NO password Every local user on Windows box can access your MySQL database with administrator rights. You should set a password. | UNSECURE |
| PhpMyAdmin is free accessible by network PhpMyAdmin is accessible by network without password. The configuration 'httpd' or 'cookie' in the "config.inc.php" can help. | UNSECURE |
| A FTP server is not running or is blocked by a firewall! A FTP server is not running or is blocked by a firewall! | UNKNOWN |
| PHP is NOT running in "safe mode" If do you want to offer PHP executions for outside persons, please think about a "safe mode" configuration. But for standalone developer we recommend NOT the "safe mode" configuration because some important functions will not working then. More Info | UNSECURE |
| A POP3 server like Mercury Mail is not running or is blocked by a firewall! A POP3 server like Mercury Mail is not running or is blocked by a firewall! | UNKNOWN |

The green marked points are secure; the red marked points are definitively unsecure and the yellow marked points couldn't be checked (for example because the software to check isn't running).

To fix the problems for mysql, phpmyadmin and the xampp directory simply use

=> <http://localhost/security/xamppsecurity.php> <= [allowed only for localhost]

click here to setup security

Set Passwords

Security console MySQL & XAMPP directory protection

MYSQL SECTION: "ROOT" PASSWORD

MySQL SuperUser: **root**

New password:

Repeat the new password:

PhpMyAdmin authentication: *http* ☐ *cookie* ☒

---- Security risk! ----

Safe plain password in text file? ☐

(File: C:\xampp\security\security\mysqlrootpasswd.txt)

Password changing

XAMPP DIRECTORY PROTECTION (.htaccess)

User:

Password:

---- Security risk! ----

Safe plain password in text file? ☐

(File: C:\xampp\security\security\xamppdirpasswd.txt)

Make safe the XAMPP directory

Set a MySQL root password (and remember it). Stop and restart MySQL from XAMPP control panel after changing password.

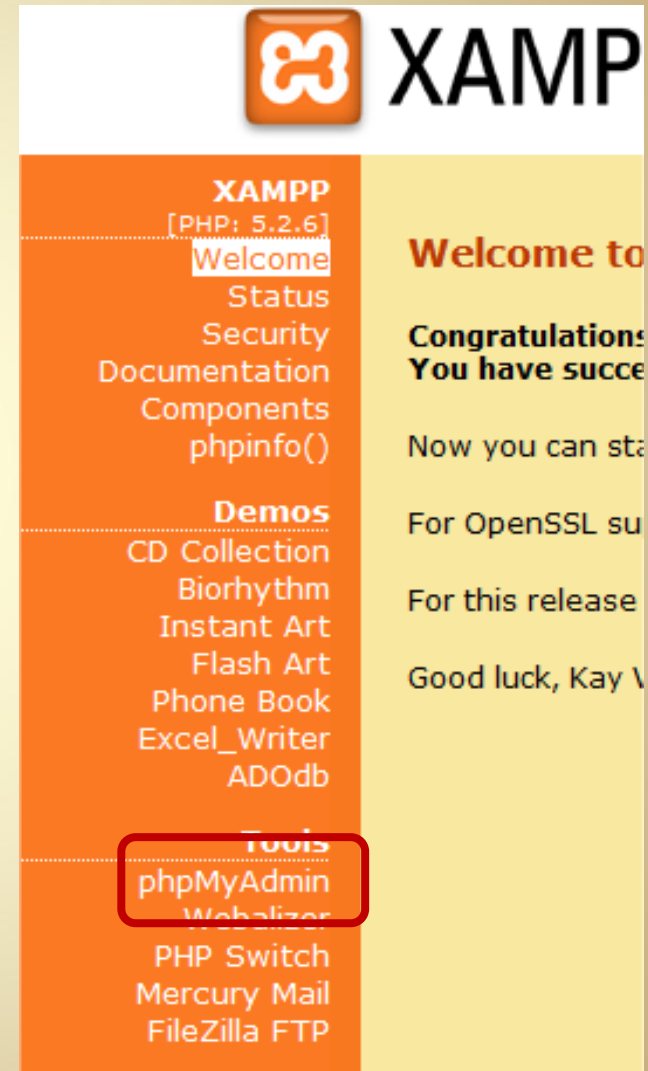
Click here to save the password to a text file. Only risk is that someone could get in and mess up you database.

This section sets a web server password. This password would be required to access your local XAMPP web pages. Not necessary ... but be aware of accessibility when you are on a network.

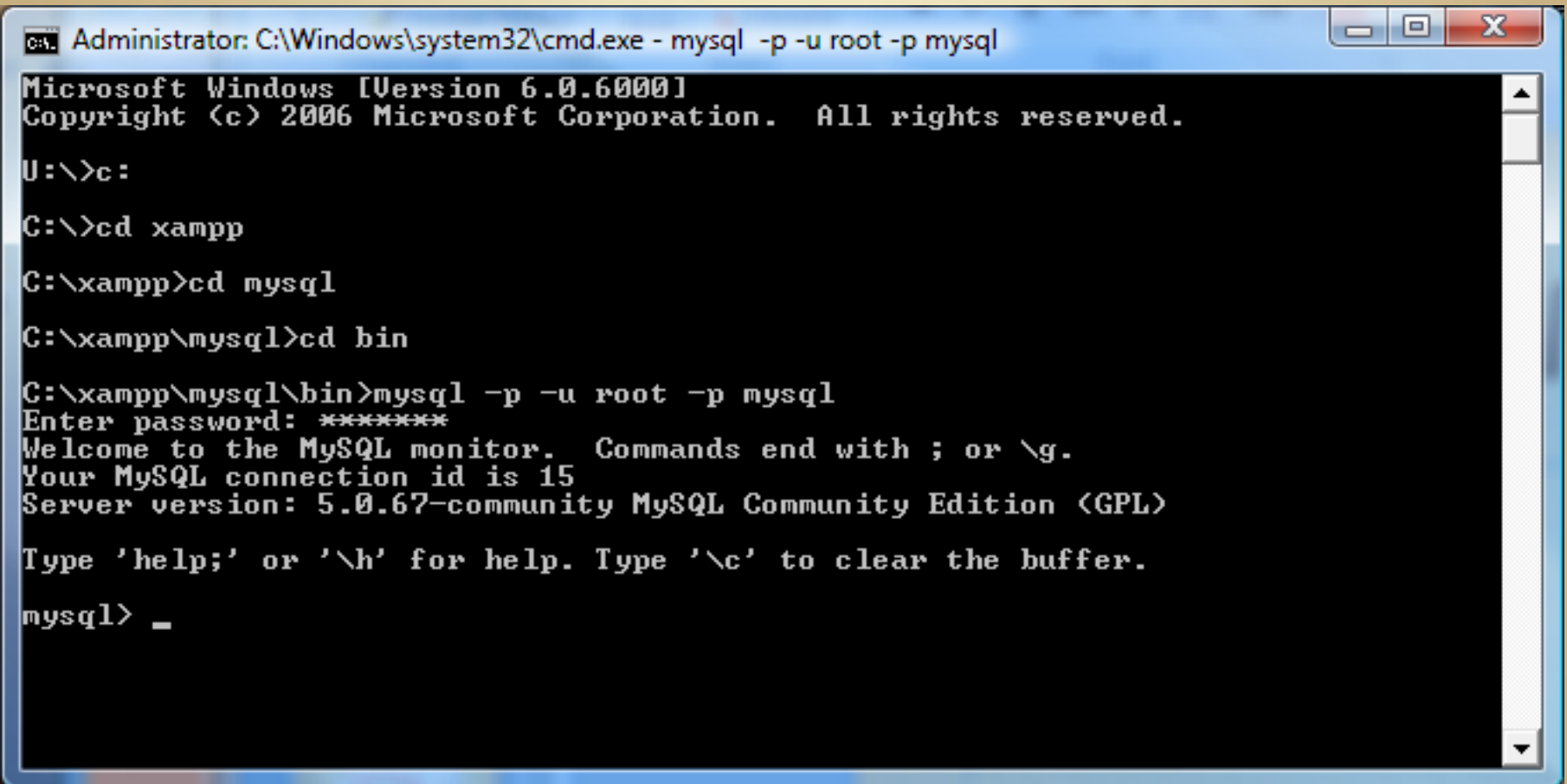
PHP MyAdmin

phpMyAdmin is a web based tool for accessing MySQL databases.

You can use it to perform everything you would normally do from the MySQL command line.



MySQL Client

A screenshot of a Windows command prompt window. The title bar reads "Administrator: C:\Windows\system32\cmd.exe - mysql -p -u root -p mysql". The window contains the following text:

```
Microsoft Windows [Version 6.0.6000]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.

U:\>c:

C:\>cd xampp

C:\xampp>cd mysql

C:\xampp\mysql>cd bin

C:\xampp\mysql\bin>mysql -p -u root -p mysql
Enter password: *****
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 15
Server version: 5.0.67-community MySQL Community Edition (GPL)

Type 'help;' or '\h' for help. Type '\c' to clear the buffer.

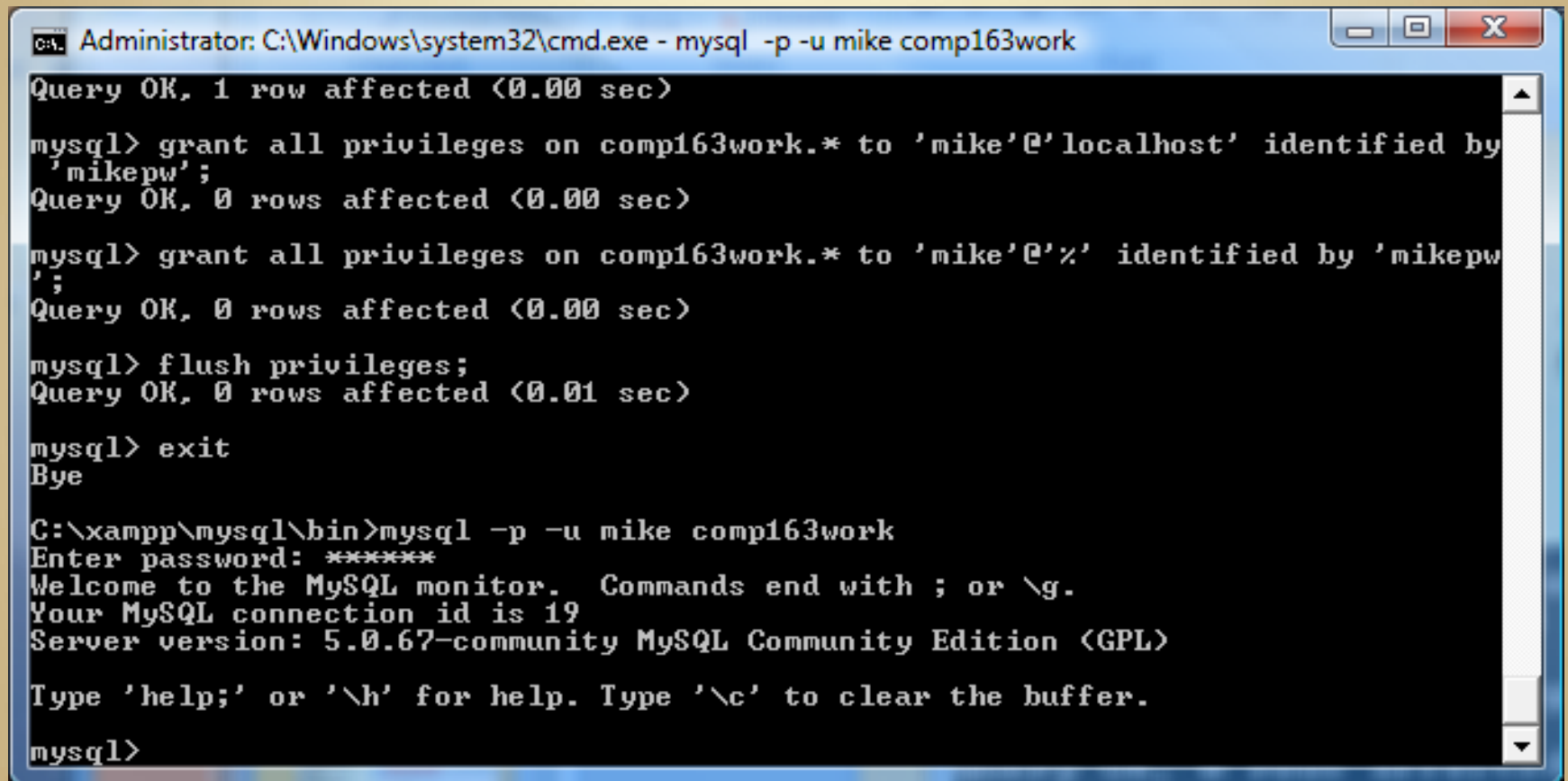
mysql> _
```

The MySql client is a text interface for entering SQL commands.
(The MySql server must be running.)

Create a database and user

```
mysql> create database comp163work;  
Query OK, 1 row affected (0.00 sec)  
  
mysql> grant all privileges on comp163work.* to 'mike'@'localhost' identified by  
'mikepw';  
Query OK, 0 rows affected (0.00 sec)  
  
mysql> grant all privileges on comp163work.* to 'mike'@'%' identified by 'mikepw  
';  
Query OK, 0 rows affected (0.00 sec)  
  
mysql> flush privileges;  
Query OK, 0 rows affected (0.01 sec)  
  
mysql> exit  
Bye  
  
C:\xampp\mysql\bin>
```

Log in as Regular User



```
Administrator: C:\Windows\system32\cmd.exe - mysql -p -u mike comp163work
Query OK, 1 row affected (0.00 sec)
mysql> grant all privileges on comp163work.* to 'mike'@'localhost' identified by
'mikepw';
Query OK, 0 rows affected (0.00 sec)
mysql> grant all privileges on comp163work.* to 'mike'@'%' identified by 'mikepw
';
Query OK, 0 rows affected (0.00 sec)
mysql> flush privileges;
Query OK, 0 rows affected (0.01 sec)
mysql> exit
Bye

C:\xampp\mysql\bin>mysql -p -u mike comp163work
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 5.0.67-community MySQL Community Edition (GPL)

Type 'help;' or '\h' for help. Type '\c' to clear the buffer.

mysql>
```