CSE 311
Lab1-Part 2 - SQL

Setup Mysql account:
Go to http://cse.unl.edu/check and enter your login information.
Navigate to account settings, and check to make sure that you have a mysql account enabled. Enable it and check your email for login information.
To check that it is enabled, log into the cse server and type
mysql -u [cse login] -p
and then enter your password. (see additional information about what you can check at the last section of this document)

Basic SQL commands.
There are four basic commands when utilizing SQL: create, read, update, and delete, also known as CRUD operations. Each command must be ended with a semicolon ';'.

First, we need to create a table to work with. Even though they share the same name, the create in CRUD refers to inserting elements into a table and not creating the table itself.

Syntax for creating a table:

```
CREATE TABLE [table name]
(
[field name] [type] [constraint],
[field name] [type],
[field name] [type]
);
```

```
CREATE TABLE protein
(
id INT(10) PRIMARY KEY AUTO_INCREMENT,
accessID VARCHAR(6) UNIQUE,
description VARCHAR(255),
sequence VARCHAR(2000)
);
```

The [table name] is the name you want to give your table.
The [field name] is the name you want to give to a column in your table.
The [type] is the type of data structure, such as CHARACTER, BOOLEAN, INTEGER, or FLOAT. To store a string in the table, you must use VARCHAR. You must specify a maximum length for integers, floats, and varchars, by appending (n) to the type.
The [constraint] is optional, and the common ones are these: NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY. Each table should have at least one primary key.

CREATE
Syntax for inserting elements into a table:

INSERT INTO [table name] ([column 1],[column 2],[column 3]) VALUES ([value 1],[value 2],[value 3]);

Using our created table, we would create an entry using the following command:

INSERT INTO protein (accessID, description, sequence) VALUES ('O12345', 'Sample Description', 'ATCG');

Activity:
Add to your python program you wrote last week that inserts all the entries from uniprot_sprot.fasta into your mysql database.

Example of interacting with a MySQL database in python:

```
01 import MySQLdb
02 HOST = 'cse.unl.edu'
03 USER = '[CSE Login]'
04 PASSWD = '[mysql password]'
05 DB = '[CSE Login]'
06
07 db = MySQLdb.connect(host=HOST,user=USER,passwd=PASSWD,db=DB)
08 cur = db.cursor()
09 cur.execute('[PLACE SQL STATEMENT HERE]',([var1, var2, var3]))
10 #  You may place '%s' in the SQL statement, and you can specify them by
11 #  var1, var2, var3.  For instance:
12 #  cur.execute('INSERT INTO [table name] ([column]) VALUES (%s)',(var1))
13 db.commit()
14 cur.close()
```

READ
Read refers to selecting elements from a table. The syntax is as follows:

SELECT [column1, column2, ...] FROM [table name] [clause1, clause2]

Columns are the columns that you want to return with your statement. A '*' means that you want to return all columns. In production environments, it is not recommended to use '*', but it is ok for debugging. The table name is the table that you're working with. Clauses are extra statements that can be added onto an SQL statement that may trigger a more specific response. The most common one is WHERE, for example:

SELECT accessID, description, sequence FROM protein WHERE accessID='O12345'

UPDATE
Updating changes entries currently in the database to a have a new value. The syntax is as follows:

UPDATE [table name] SET [column1]=[value1], [column2]=[value2], … [clauses]

For example, if we discovered we had an error in the sequence for the entry with access ID of O12345, we would update the entry with the following command:

UPDATE protein SET sequence='CATTGA' WHERE accessID='O12345'

*****If you do not provide a clause, then all records from the table will be updated!! To prevent this, always use a WHERE clause to specify which entry to update******

DELETE
Deleting removes a row from the table. The syntax is as follows:

DELETE FROM [table name] [clause]

*****If you do not provide a clause, then all records from the table will be deleted!! To prevent this, always use a WHERE clause to specify which entry to delete******

To remove the entry O12345 from the table, we would use the following command: DELETE

FROM protein WHERE accessID='O12345'

Additional information about connecting to the sever.

connect to cse server cse.unl.edu and enter in the command line:

mysql -u <user_name> - p #substitute your MySQL username

prompt will ask for your password, enter it (you will not see any characters, but your

password is captured.)

MariaDB [(none)]>

SHOW DATABASES;

SELECT database(); # The result is null , meaning a database is not currently selected.