The University of Chicago
Department of Computer Science

CMSC 15200 – Introduction to Computer Science 2
Summer Quarter 2007
Lab #5 (08/22/2007)

Name:

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Do not write in this area

1	2	3	4	5	6	**TOTAL**

Maximum possible points: 30

SQLite and PySQLite

First of all, verify that you can use SQLite and PySQLite correctly on the Maclab machines. Download the **scientists.db** file which we will use in the lab, and run the following:

```
sqlite3 scientists.db
```

This should start the SQLite interactive interpreter:

```
SQLite version 3.3.8
Enter ".help" for instructions
sqlite>
```

To make sure that the SQLite interpreter shows data in a somewhat readable format, we suggest you run the following two commands from the sqlite prompt:

```
.headers on
.mode columns
```

Now, try to run some simple SQL queries:

```
sqlite> SELECT UNI_ID, UNI_Name FROM TB_UNIVERSITY;
UNI_ID      UNI_Name
----------  ------------------------
1           University of Metroville
2           Gotham State University
3           Metropolis University
4           Smallburg College

sqlite> SELECT PROJ_ID, PROJ_Name FROM TB_PROJECT;
PROJ_ID     PROJ_Name
----------  ---------------------
1           Applied Robopsychology
2           Space Elevator
3           Investigation on the F
4           Use of Dilithium Cryst
5           Cold Fusion
6           Theoretical Foundation
```

Next, verify that you can correctly use the PySQLite library. As in lab #4, you will need to use Python 2.5, which is available in the following location on the CS machines:

```
/opt/python/python-2.5/bin/python2.5
```

Remember that, to avoid having to write the entire path, you can modify the **PATH** environment variable, to make sure your UNIX shell always looks for executables in the above directory.

```
export PATH=/opt/python/python-2.5/bin:$PATH
```

Now, write the following program and save it as **test.py**:

```
from pysqlite2 import dbapi2 as sqlite
import sys

con = sqlite.connect(sys.argv[1])
con.row_factory = sqlite.Row
cur = con.cursor()
cur.execute("SELECT UNI_Name, UNI_Public FROM TB_UNIVERSITY")

for row in cur:
        print "Name:", row["UNI_Name"], "    Public:", row["UNI_Public"]
```

Run it:

```
python2.5 test.py scientists.db
```

You should see the following output:

```
Name: University of Metroville     Public: 0
Name: Gotham State University     Public: 1
Name: Metropolis University     Public: 0
Name: Smallburg College     Public: 1
```

Now, you need to test a module that you will use for this lab. Download the **printdb.pyc** file and place it in an empty directory. This module will allow you to easily print the results of an SQL query. Write the following program and save it as **test2.py**:

```
from pysqlite2 import dbapi2 as sqlite
import sys, printdb

con = sqlite.connect(sys.argv[1])
con.row_factory = sqlite.Row
cur = con.cursor()
cur.execute("SELECT UNI_Name, UNI_Public FROM TB_UNIVERSITY")
printdb.printQuery(cur)
```

Run it:

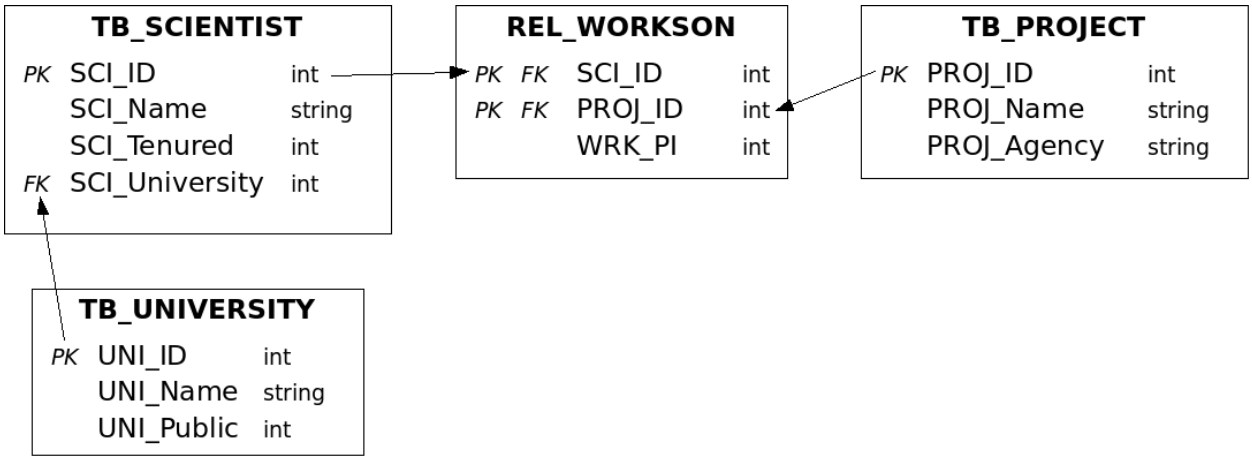
```
python2.5 test2.py scientists.db
```

You should see the following:

```
UNI_Name                  UNI_Public
-------------------------------------------------------------------------------
University of Metroville  0
Gotham State University   1
Metropolis University     0
Smallburg College         1
```

The Scientists Database

You are provided with the following database:



The meaning of each fields is the following:

- TB_SCIENTIST
  - SCI_ID: Unique number identifying each scientist.
  - SCI_Name: Name of scientist.
  - SCI_Tenured: 1 if scientist has tenure, 0 otherwise.
  - SCI_University: Foreign key indicating what university the scientist works for.
- TB_UNIVERSITY
  - UNI_ID: Unique number identifying each university.
  - UNI_Name: Name of the university.
  - UNI_Public: 1 if the university is public, 0 otherwise.
- TB_PROJECT
  - PROJ_ID: Unique number identifying each project.
  - PROJ_Name: Name of the project.
  - PROJ_Agency: Funding agency of the project.
- REL_WORKSON
  - SCI_ID and PROJ_ID: Foreign keys for TB_SCIENTIST AND TB_PROJECT
  - WRK_PI: 1 if the scientist is a PI (Principal Investigator) on the project, and 0 otherwise.

Exercise 1 <<5 points>>

Write a program, called **ex1.py**, that prints out the name of all the projects and their funding agencies. *Do **not** use the printdb module in this exercise*. The output of your program could look like this:

```
Project: Applied Robopsychology
Agency: DOD

Project: Space Elevator
Agency: NASA

Project: Investigation on the Feasability of Death Rays
Agency: DOD

Project: Use of Dilithium Crystals to Regulate Matter/Antimatter reactions
Agency: DOE

Project: Cold Fusion
Agency: DOE

Project: Theoretical Foundations of Warp Drives
Agency: NASA
```

Use the printdb module for exercises 2 through 6

Exercise 2 <<5 points>>

Write a program, called **ex2.py**, that prints out the name of all the tenured scientists, ordered by name. The correct output is:

```
SCI_Name
------------------------------
Charles Francis Xavier
Cuthbert Calculus
Egon Spengler
Eleanor Arroway
Emmett Brown
Hari Seldon
Henry Jones Jr.
Henry McCoy
Reed Richards
Susan Calvin
Zefram Cochrane
```

Exercise 3 <<5 points>>

Write a program, called **ex3.py**, that prints out the name of all the scientists that work in public universities. The correct output is:

```
SCI_Name
--------------------------------
Mohinder Suresh
Charles Francis Xavier
Henry McCoy
Eleanor Arroway
Emmett Brown
Ian Malcolm
Miles Bennett Dyson
Egon Spengler
Peter Venkman
```

Exercise 4 <<5 points>>

Write a program, called **ex4.py**, that prints out the name of all the scientists along with the name of the university they work in. The correct output is:

```
SCI_Name                 UNI_Name
------------------------------------------------------------
Mohinder Suresh          Gotham State University
Charles Francis Xavier   Gotham State University
Bruce Banner             Metropolis University
Henry McCoy              Smallburg College
Susan Calvin             University of Metroville
Eleanor Arroway          Gotham State University
Sam Beckett              Metropolis University
Cuthbert Calculus        University of Metroville
Emmett Brown             Smallburg College
Reed Richards            University of Metroville
Zefram Cochrane          Metropolis University
Hari Seldon              University of Metroville
Henry Jones Jr.          Metropolis University
Ian Malcolm              Smallburg College
Miles Bennett Dyson      Gotham State University
Egon Spengler            Smallburg College
Peter Venkman            Gotham State University
Raymond Stantz           University of Metroville
```

Exercise 5 <<5 points>>

Write a program, called **ex5.py**, that asks the user for a university ID, and prints out the name of all the scientists that work for that university. For example:

```
Type a university ID: 3
 SCI_Name
----------------------
Bruce Banner
Sam Beckett
Zefram Cochrane
Henry Jones Jr.
```

Exercise 6 <<5 points>>

Write a program, called **ex6.py**, that prints the name of all the tenured scientist that work as a PI on DOD projects. The correct output is:

```
SCI_Name
----------------------
Susan Calvin
Reed Richards
```