Assignment 2: SQL SELECT Queries

Before you start this assignment, you need to install the MySQL database server. If you use Microsoft Windows or MacOS, you are suggested to install a Linux virtual machine - e.g., Ubuntu Linux on VMware Workstation Player (for Windows) or VMWare Fusion (for MacOS) - and use MySQL in Linux for all your assignments. The following gives you instructions on how to install the default MySQL package (MySQL 8.0) on 64-bit Ubuntu 20.04 LTS.

On Ubuntu, open a terminal window and issue the following commands one-by-one:

```
sudo apt update
sudo apt install mysql-server
sudo mysql_secure_installation
  /* You will be asked to give a root password. Press Enter to keep other default settings*/
sudo mysql
mysql> CREATE USER 'cs4430' IDENTIFIED BY 'cs4430';
mysql> GRANT ALL PRIVILEGES ON *.* TO cs4430 WITH GRANT OPTION;
mysql> exit
```

Now you have installed MySQL server and created a user account 'cs4430' with password 'cs4430'. This will be the account that you'll use for homework assignments.

Put the following lines in the file ~/.my.cnf so that you do not need to enter user/password each time.

```
[client]
user=cs4430
password=cs4430
```

Optionally, append the following two lines at the end of the file /etc/mysql/mysql.cnf for better ANSI SQL compliance. After that, issue "service mysql restart" to restart the MySQL server.

```
[mysqld]
sql-mode="ANSI"
```

Now you have installed the MySQL 8.0 database server. Try commands like:

```
mysql
mysql> SHOW DATABASES;
mysql> HELP
```

For a quick grip of most-commonly-used MySQL commands, google "MySQL cheat sheet" or similar keywords. For official documentation, visit https://dev.mysql.com/doc/refman/8.0/en/.

Assignment Instructions:

Download the data script, alldata.sql, for this assignment, which contains all data you'd need. Run "mysql < alldata.sql" to create databases and load all data into database tables.

In this assignment, you are asked to write SQL SELECT queries to answer questions listed under the following databases. Test your SQL statement in MySQL to verify its correctness.

To keep query results short, use "SELECT DISTINCT" in the outmost query block when necessary to eliminate duplicates.

To submit your homework, put your answers in a **single plain text file (.txt)** and submit to e-learning. For each question, you should include in your submission:

1. the question number and the question itself in full text;
2. your SQL statement;
3. query result from MySQL.

For example, your answer to the first question should look like this:

```
1. Find the model number, speed, and hard-disk size for all PC's whose
price is under $1000.

SELECT model, speed, hdisk
FROM pc
WHERE price < 1000;

+-------+-------+-------+
| model | speed | hdisk |
+-------+-------+-------+
| 1002  |  2.10 |   250 |
| 1003  |  1.42 |    80 |
| 1004  |  2.80 |   250 |
| 1005  |  3.20 |   250 |
| 1007  |  2.20 |   200 |
| 1008  |  2.20 |   250 |
| 1009  |  2.00 |   250 |
| 1010  |  2.80 |   300 |
| 1011  |  1.86 |   160 |
| 1012  |  2.80 |   160 |
| 1013  |  3.06 |    80 |
+-------+-------+-------+
11 rows in set (0.00 sec)
```

Database 1: computer

A computer database consists of four relations, whose schemas are:

```
Product (maker, model, type)
PC (model, speed, ram, hdisk, price)
Laptop (model, speed, ram, hdisk, screen, price)
Printer (model, color, type, price)
```

1. Find the model number, speed, and hard-disk size for all PC ’s whose price is under $1000.
2. List the manufacturers of all printers.
3. Find the model number, memory size, and screen size for laptops costing more than $1500.
4. List all color printers.
5. Find the model number and hard-disk size for those PC ’s that have a speed of 3.2 and a price less than $2000.
6. Give the manufacturer and speed of laptops with a hard disk of at least 30.
7. Find the model number and price of all products (of any type) made by manufacturer B.
8. Find those manufacturers that sell Laptops, but not PC ’s.
9. Find those hard-disk sizes that occur in two or more PC ’s.
10. Find those pairs of PC models that have both the same speed and RAM. A pair should be listed only once; e.g., list (i , j) but not (j,i).
11. Find those manufacturers of at least two different computers (PC’s or laptops) with speeds of at least 3.0.
12. Find the makers of PC ’s with a speed of at least 3.0.
13. Find the printers with the highest price.
14. Find the laptops whose speed is slower than that of any PC.
15. Find the model number of the item (PC, laptop, or printer) with the highest price.
16. Find the maker of the least expensive color printer.
17. Find the maker(s) of the PC(s) with the fastest processor among all those PC’s that have the smallest amount of RAM.
18. Find the average speed of PC ’s.
19. Find the average speed of laptops costing over $1000.
20. Find the average price of PC’s made by manufacturer “A.”
21. Find the average price of PC’s and laptops made by manufacturer “D.”
22. Find, for each different speed, the average price of a PC.
23. Find for each manufacturer, the average screen size of its laptops.
24. Find the manufacturers that make at least three different models of PC.
25. Find for each manufacturer who sells PC’s the maximum price of a PC.
26. Find, for each speed of PC above 2.0, the average price.
27. For each manufacture that makes printers, find the average hard disk size of PCs it makes.

Database 2: battleship

A database concerning World War II warships. It involves the following relations:

```
Classes (class, type, country, guns, bore, displacement)
Ships (name, class, launched)
Battles (name, bdate)
```

Outcomes (ship, battle, result)

28. Find the class name and country for all classes with at least 10 guns.
29. Find the names of all ships launched prior to 1918, but call the resulting column shipName.
30. Find the names of ships sunk in battle and the name of the battle in which they were sunk.
31. Find all ships that have the same name as their class.
32. Find the names of all ships that begin with the letter "R."
33. Find the names of all ships from the Outcomes table whose name consists of three or more words (e.g., King George V).
34. Find the ships heavier than 35,000 tons.
35. List the name, displacement, and number of guns of the ships engaged in the battle of Guadalcanal.
36. Find those countries that have both battleships and battlecruisers.
37. Find those ships that were damaged in one battle, but later fought in.
38. Find those battles with at least three ships of the same country.
39. Find the countries whose ships had the largest number of guns.
40. Find the classes of ships, at least one of which was sunk in a battle.
41. Find the names of the ships with a 16-inch bore.
42. Find the battles in which ships of the Kongo class participated.
43. Find the names of the ships whose number of guns was the largest for those ships of the same bore.
44. Find the number of battleship (type='bb') classes.
45. Find the average number of guns of battleship (type='bb') classes.
46. Find the average number of guns of battleships (type='bb'). Note the difference to the previous question. In this question, you need to weight a class by the number of ships of that class.
47. Find for each class the year in which the first ship of that class was launched.
48. Find for each class the number of ships of that class sunk in battle.
49. Find for each class with at least three ships the number of ships of that class sunk in battle.
50. The weight (in pounds) of the shell fired from a naval gun is approximately one half the cube of the bore (in inches). Find the average weight of the shell for each country's ships.

Again, to make grading easier, put your answers in a **single plain text file (.txt)** and submit to e-learning. For each question, include in your submission:

1. the question number and the question itself;
2. your SQL statement;
3. query result from MySQL.