Due before:	11:59 PM (before Midnight) on Tue June 25, 2019

CSE278: Introduction to Systems Programming (Systems I)

Homework #5

Due: Tuesday June 25 2019 before 11:59 PM

Email-based help Cutoff: 5:00 PM on Mon, June 24, 2019

Maximum Points: 50

Submission Instructions

This part of the homework assignment must be turned-in electronically via Canvas. Ensure you name this document *HW5_MUID.docx*, where *MUid* is your Miami University unique ID. (Example: HW5_ahmede.docx)

Copy pasting from online resources is **Plagiarism**. Instead you should read, understand, and use your own words to respond to questions.

Submission Instructions:
Once you have completed answering the questions save this document as a PDF file (**don't just rename the document; that is not the correct way to save as PDF**) and upload it to Canvas.

General Note: Upload each file associated with homework (or lab exercises) individually to Canvas. Do not upload archive file formats such as zip/tar/gz/7zip/rar etc.

Objective

The objective of this homework is to review basic concepts of:

- RDBMS and MySQL from lecture slides
- Relational databases
- SQL queries
- Basics of computer architecture and organization

Required reading

Prior to answering the questions in this homework briefly review the following chapters from the E-book titled "MySQL, Fifth Edition". Link available on Canvas→Syllabus page.

- Chapter 1: Getting started
- Chapter 2.1 to 2.7: Using SQL to manage data
- Lecture Slides SQL-Part1
- Lecture Slides SQL-Part2
- Lab#3 (Solution)
- Lecture Slides ComputerArchitecture

1. What is a relational database (2-3 sentences)? [2 points]

   A relational database is a set of formally described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

2. What is a DBMS and its expansion? What is the difference between a database and a DBMS? [3 points]

   A DBMS is a software used to store and manage data. It is system software for creating and managing databases. The DBMS provides users and programmers with a systematic way to create, retrieve, update and manage data. A database is a collection of organized data and the system that manages a collection of databases is called a Database Management System.
   DBMS is one of software that manages databases and lets you create, edit and delete databases, their tables and their data.

3. What is schema of a database? [1 points]

   schema of a database system is kind of structure which can be described in a formal language using the DBMS. The term "schema" is called by organization of data how the database can be constructed.

4. What must be true in order for an attribute to be a key? How do you denote a key in a schema? [2 points]

   then the primary key of the details table is a foreign key as well.
   he primary key of one entity type comes the foreign key in the other

5. What is the difference between CHAR(n) and VARCHAR(n) data types? [2 points]

   CHAR is used to store strings of fixed length, an VARCHAR, as the name says is used to store variable length strings.

6. What property ensures consistency of a database? [2 points]

only valid data will be written to the database will ensure that.

7. Illustrate the 2 SQL CREATE statements to create the following 2 related tables (based on column `ssn`). You may assume suitable data types for the different columns: [4 points]
   - `Person(ssn, name, age, email)`
   - `Relationship(ssn1, ssn2, info)`

```
Create Table Person(
ssn VARCHAR(32) NOT NULL;
name VARCHAR(32) NOT NULL;

age INT NOT NULL;

email VARCHAR(32) NOT NULL;
)
Create Table Relationship(
Ssn1 VARCHAR(32) NOT NULL;
Ssn2 VARCHAR(32) NOT NULL;

info VARCHAR(32) NOT NULL;
)
```

8. Illustrate the SQL commands to insert 3 people (you can make up the data/information) into the following table: `Person(ssn, name, age, email)` [3 points]

```
        INSERT INTO Person
VALUES (1, brown, 21,breon@mm.com),
        INSERT INTO Person
VALUES (2, krown, 21,rreon@mm.com),
        INSERT INTO Person
VALUES (3, broen, 21,breen@mm.com)
,
```

9. Illustrate SQL command to delete all persons who are older than 125 years, from the following table: `Person(ssn, name, age, email)` [2 points]

```
Select *
From Person,
Where age >125;
```

10. What is projection? Illustrate with an example SQL statement. [2 points]

a SQL statement that demonstrates projection is

```
SELECT column_name
FROM table_name;
```

Which is only one column.

11. Briefly (max 3 sentences each) describe the functionality of following key components of the Central Processing Unit (CPU) [**2 points**]

- ALU: ALU stands for Arithmetic logic unit & it's a digital circuit.
  It is used to perform arithmetic and logical operations.
  ALU is divided into Arithmetic unit(AU) and the logic unit(LU).

- Registers: Register is a set of data which holds places that are places of computer. It is used to sore address,instructions or data.

- Caches: It is faster memory but it is smaller memory.
  It is used to access data from the main memory.
  Three types of cache :
  1) Instruction cache
  2) Data cache

3) Translation lookside buffer

12. What is the "Von Neumann" or "Stored Program" architecture? [**1 point**]

Von Neumann architecture is based on the stored-program computer concept, and the data is store in the same memor.

13. What is a memory address? [**1 points**]

memory address is a reference to a specific memory location which is used at different levels by different software and hardware

14. What is assembly language? State 1 advantage and 1 disadvantage of assembly language: [**2 points**]

Assembly language is a tool to solve problems like all the other languages are. It can explain what the machine are doing.
An advantage of assembly language is that it is very fast as it is directly converted into machine language.

A disadvantage assembly language is that hard to code and read , and the high level language is very easy to learn and understand.

15. Given the schema below (assume suitable data types), complete the following C++ program to print all the attributes for a given product name (`pname`) specified as the only command-line argument to the program [**2 points**]

```
Product(pname, price, category, manufacturer)
```

```
// Assume all necessary headers have been included

int main (int argc, char *argv[]) {
  // Connect to database with: database, server, userID, password
  mysqlpp::Connection myDB("prodDB", "ec2.aws.com", "amazon",
      "password");
  // Create a query
  mysqlpp::Query query = myDB.query();

query << "SELECT pname, price, category, manufacturer FROM Product "
          <<"WHERE price<=%0;";

    query.parse();  // check to ensure query is correct
```

```
 std::string price;
  getline(std::cin,price);
std::cout<<"Content-Type: text/html\r\n\r\n";
           std::string b= price.substr(6);
           int ex = std::stoi(b);

    // Run the query and get stored results
    mysqlpp::StoreQueryResult result = query.store(ex);

    // Results is a 2D vector of mysqlpp::String objects.


// Print the results.
std::cout<<"<table border=1>\n";
    for (const auto& row : result) {
std::cout<<"<tr>";
        for (const auto& col : row) {
               std::cout<<"<td>"<<col<<"</td>";


            std::cout << col << "\t";
        }
std::cout<<"</tr>\n";
}

    std::cout<<"/table>\n";
    // All done
    return 0;
}
```

Submission

- No late assignments will be accepted!
- This work is to be done individually
- The submission file will be saved with the name ***HW5_yourMUID.pdf***
- Assignment is due before Midnight Tue June 25, 2019.
- On or before the due time, drop the *electronic copy* of your work in the *canvas*
- Don't forget to Turn in the file! HW5_yourMUID.pdf