**Introduction to Systems Programming (System I)**

**Lab #8**

Max Points: 40

**Due: Wednesday, October 21, 2020 before 11:59 PM**

**Email-based help Cutoff: 5:00 PM on Wednesday, October 21, 2020**

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| **You should save/rename this document using the naming convention MUid.docx (example: vendomcg.docx).**  **Objective**: The objective of this exercise is to gain experience with programming a database application using C++ and number representations including:   1. Binary 2. Octal 3. Hexadecimal   Fill in answers to all of the questions. You may discuss the questions with your neighbor or instructor. **Yes, you may verify your solution with reference solution available on Canvas.** |

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| **Name:** |  |

# Note: It is possible to get extra-credit. There are 45 possible points on this lab.

# Part #1: Binary number representation

**[15 points]**

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| The first exercise is completed for you to provide an example (you can copy-paste for other problems in this exercise) |

1. Convert 5410 to binary. **[2 points intermediate steps, 1 point final answer]**

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Operation | Result | Remainder |
| 1 | 54/2 | 27 | 0 |
| 2 | 27/2 | 13 | 1 |
| 3 | 13/2 | 6 | 1 |
| 4 | 6/2 | 3 | 0 |
| 5 | 3/2 | 1 | 1 |
| 6 | 1/2 | 0 | 1 |

Successively dividing by 2 until quotient is less than 2 and writing remainders in reverse order, 5410 = 1101102

1. Convert 11910 to 8-bit binary. **[2 points intermediate steps, 1 point final answer]**

1. Convert 12810 to binary. **[2 points intermediate steps, 1 point final answer]**
2. Convert 101002 to decimal. **[2 points intermediate steps, 1 point final answer]**

1. Convert 000011012 to decimal. **[2 points intermediate steps, 1 point final answer]**

# Part #2: Octal number representation

**[6 points]**

1. Convert 3610 to octal **[2 points intermediate steps, 1 point final answer]**
2. Convert 1108 to decimal. **[2 points intermediate steps, 1 point final answer]**

# Part #3: Hexadecimal number representation

**[12 points]**

1. Convert 10F16 to decimal. **[2 points intermediate steps, 1 point final answer]**
2. Convert ABC16 to binary **[2 points intermediate steps, 1 point final answer]**
3. Convert 01101001010100112 to Hex. **[2 points intermediate steps, 1 point final answer]**
4. Convert 100111112 to Hex **[2 points intermediate steps, 1 point final answer]**

# Part #4: Programming in C++ with SQL

**[12 points]**

**Background:** As we discussed in class, we can create a program just like the mysql command-line program that we used in the previous lab. In this lab, we will be making a light-weight interactive program to interface with a MySQL RDMS.

The program will need to do the following:

1. Take an argument from the command-line to specify interactive mode (-I) or to load (-L) a file into the database. **[1 point]**
   1. Interactive mode will operate like the mysql program where it reads from standard input to get queries from a user.
   2. Loading a file takes an additional argument of the file (so it will be: -L filename) to parse and load into the database.
2. The program will need to use the argument to determine its execution path. **[1 point]**
3. The program will need to connect to the database **(INFO BELOW)**. **[1 point]**
4. Interactive mode (-I): **[5 points]**
   1. Continue to run unless the user enters “quit” or reaches logical end-of-file
   2. Take a user input and make it a query
   3. Execute the query
   4. Access and format the results
   5. Display the results to the user **(EXAMPLE ON NEXT PAGE)**
5. Load a file (-L): **[4 points]**
   1. Parse the supplied file.
      1. Note: it can be safely assumed any file give will be structured the same, but values can be different (first column is table then columns formatted as attribute:value for some arbitrary number of columns).
   2. Generate a query to insert the file’s contents into the database
   3. Execute the query **(EXAMPLE ON NEXT PAGE)**

**NOTE: Assuming the prior sections are completed correctly, full credit for the lab will only require *one* of the two options to be correctly implemented. However, they will both be required for Homework 4.**

# Database Information (same as Lab 7):

Server: localhost

User: cse278

Password: S3rul3z

Database Name: cse278

# Example Query Result:

Example File Load Result:

# 

# Submit to Canvas (and *NOT* CODE)

Once you successfully completed the aforementioned exercises upload the following files to Canvas.

* 1. This MS-Word document (duly filled-in) saved as a PDF document.
  2. The C++ source file of the program developed as part of this lab.

Ensure you actually **submit** the files after uploading them to Canvas and the files are **NOT** empty/template files.