NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES
ISLAMABAD CAMPUS
CS-118 Programming Fundamentals - FALL 2020
ASSIGNMENT- 2

Due Date: 6 November, 2020 at 11:59 pm on Google Classroom

Instructions:

1. Assignments are to be done **individually**. You must complete this assignment by yourself. You cannot work with anyone else in the class or with someone outside of the class. The code your write must be your own and you must have an understanding of each part you code. You are encouraged to get help from the instructional staff through email, on google classroom or individually visiting their respective offices.
2. The **AIM** of this assignment is to give you practice with conditional statements in c++ (chapters 4 of textbook).
3. Use appropriate data types, operations, and conditional structures for each problem. You cannot use advance constructs like loops/arrays for this assignment.
4. **No late** assignments will be accepted.
5. Displayed output should be **well mannered** and **well presented**. Use appropriate **comments** and **indentation** in your source code.
6. **Plagiarism:**

   Plagiarism of any kind (copying from others, copying from internet etc) is not allowed. If found plagiarized, you will be awarded zero marks in the assignment. Repeating such an act can lead to strict disciplinary actions and failure in course.

Submission Guidelines:

1) Dear students we will be using auto-grading tools, so failure to submit according to the below format would result in zero marks in the relevant evaluation instrument.
2) For each question in your assignment, make a separate cpp file e.g. for question 1, make q1.cpp and so on. Each file that you submit must contain your name, student-id, and assignment on top of the file in the comments.
3) Combine all your work in one folder. The folder must contain only .cpp files (no binaries, no exe files etc.).
4) Run and test your program on a lab machine before submission.
5) Rename the folder as ROLL-NUM_SECTION (e.g. 20i-0001_A) and compress the folder as a zip file. (e.g. 20i-0001_A.zip).
6) Submit the .zip file on Google Classroom within the deadline.
7) Submission other than Google classroom (e.g. email etc.) will not be accepted.
8) The student is solely responsible to check the final zip files for issues like corrupt file, virus in the file, mistakenly exe sent. If we cannot download the file from Google classroom due to any reason it will lead to zero marks in the assignment.

Problem 1: [20 Marks]

Write a program that prints the Decimal Equivalent of a Binary Number. Input a 8 digit integer containing only 0s and 1s (i.e., a "binary" integer) and print its decimal equivalent.

[**Hint:** Use the remainder and division operators to pick off the "binary" number's digits one at a time from right to left. Just as in the decimal number system, in which the rightmost digit has a positional value of 1, and the next digit left has a positional value of 10, then 100, then 1000, and so on, in the

binary number system the rightmost digit has a positional value of 1, the next digit left has a positional value of 2, then 4, then 8, and so on. Thus the decimal number 234 can be interpreted as 4 * 1 + 3 * 10 + 2 * 100. The decimal equivalent of binary 1101 is 1 * 1 + 0 * 2 + 1 * 4 + 1 * 8 = 1 + 0 + 4 + 8 = 13.**]**

Problem 2: [10 Marks]

Foo Corporation needs a program to calculate how much to pay their hourly employees. The US Department of Labor requires that employees get paid time and a half for any hours over 40 that they work in a single week. For example, if an employee works 45 hours, they get 5 hours of overtime, at 1.5 times their base pay. The State of Massachusetts requires that hourly employees be paid at least $8.00 an hour. Foo Corp requires that an employee not work more than 60 hours in a week.

An employee gets paid (hours worked) × (base pay), for each hour up to 40 hours.
For every hour over 40, they get overtime = (base pay) × 1.5.
The base pay must not be less than the minimum wage ($8.00 an hour). If it is, print an error.
If the number of hours is greater than 60, print an error message.

Write a program that takes the base pay of the employee and hours worked as input (Check for invalid inputs). Calculate the total pay for employee and output the result in the following format:

Test Case 1

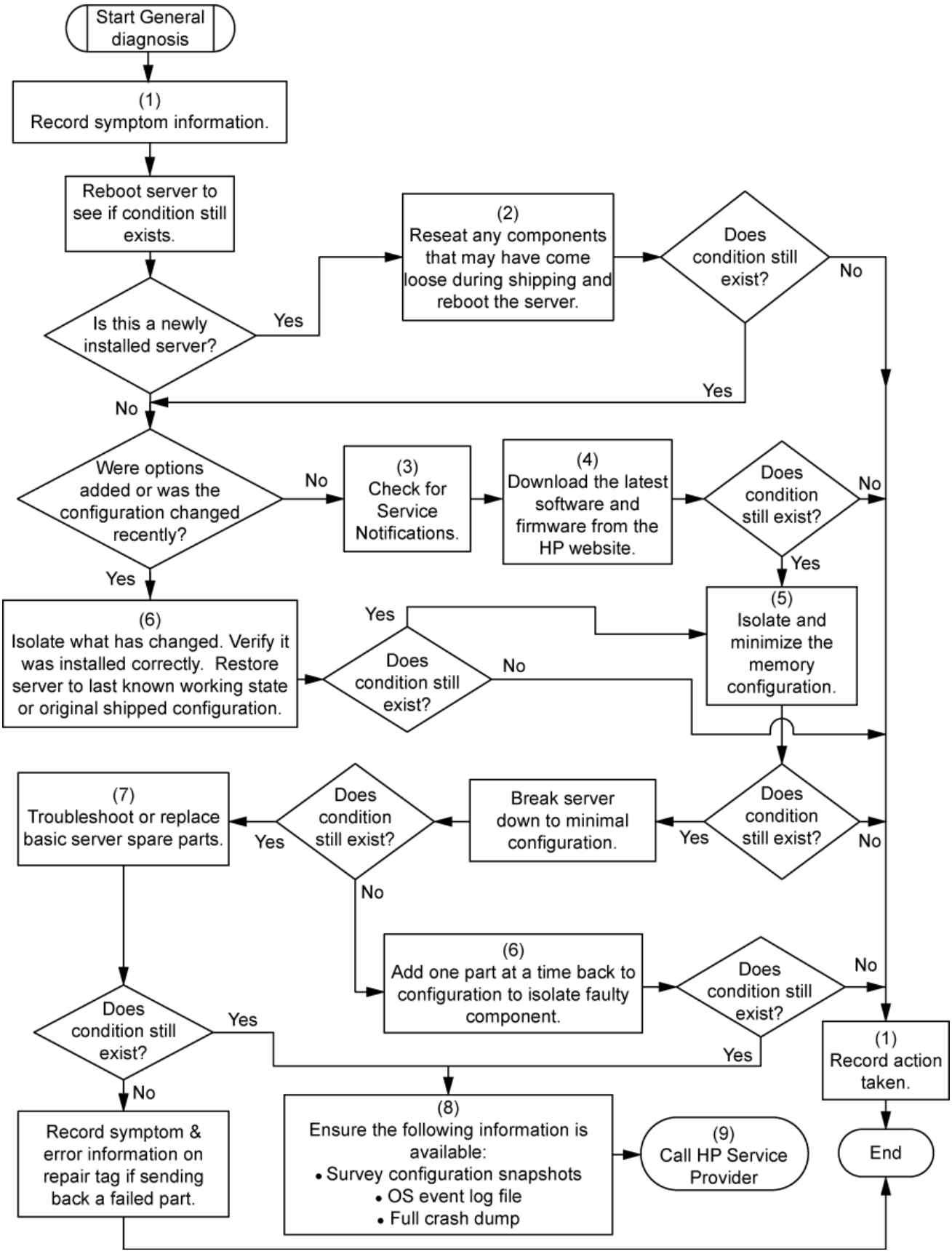
Enter your base pay per hour: 8.50
Enter the number of hours you worked: 45

Your total pay is: $403.75
You overtime is: 5 hrs

Problem 3: [20 Marks]

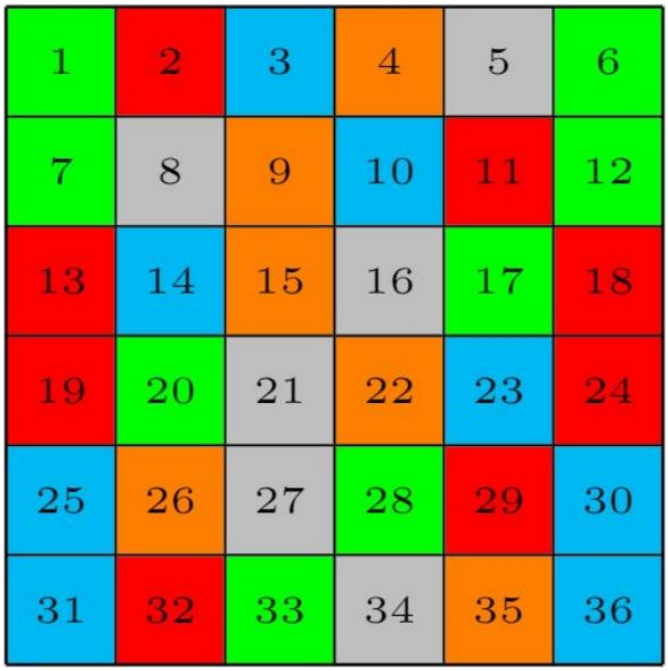
The below mentioned figure shows a General diagnosis flowchart for troubleshooting HP servers. Use the flowchart to create a C++ program that leads a person through the steps of fixing a bad HP server.

Here is an example of the program's output (following one of the flow):
Starting General Diagnosis Program.
Recoding symptoms information - **DONE.**
Rebooting server to see if condition still exists - **DONE.**
Is this a newly installed server? **yes [enter]**
Please reseat any components that may have come loose during shipping - **DONE.**
Rebooting the server - **DONE.**
Does the condition still exist? **no [enter]**
Recording all actions taken for future - **DONE.**
Congratulations, your server problems are solved.
Notice the program ends as soon as a solution is found to the problem.



HP Solutions – General Diagnostics Flowchart

Problem 4: [20 marks]
You are given a grid as shown in the figure below. You can determine the color and number of each square from the grid. Write a C++ program that inputs two numbers within the grid range. Your program will determine if the two squares entered have the same color or not in the grid. **Note: You cannot use arrays to store the matrix information.**



Problem 5: [20 Marks]
Write a program in C++ that will allow us to play the "LOTTO GAME". Generate six different numbers between 1 and 40 inclusive (Hint: use rand() or srand() function from <cstdlib>). Ask the user to enter six numbers between 1 and 40 inclusive. Make sure all six numbers generated and the numbers entered by the user are different. Compare both sets of numbers and count how many numbers matched (The order doesn't matter). Output should be as follows:

Test Case 1
Enter your lottery numbers: 3 10 18 23 37 41
The winning numbers randomly selected by the computer are: 3 12 18 27 37 49
You won 3 stars: 3 18 37

Test Case 2
Enter your lottery numbers: 5 7 18 23 32 44
The winning numbers randomly selected by the computer are: 6 12 17 29 38 47
Your lottery numbers don't match any number. Thanks for playing the lottery game

Test Case 3
Enter your lottery numbers: 5 7 18 23 32 44
The winning numbers randomly selected by the computer are: 23 18 7 5 44 32
Congratulations!!! You won the jackpot!

Problem 6: [10 Marks]

Combine the codes for all of the above problems in one menu driven program using switch statements. Ask the user to enter numbers from 0 to 5. For any number entered by user from 1-5, your program should run the code for corresponding problem in this assignment. For 0, your program should exit after displaying the message “You exited the program”. Your code should display an error message for invalid inputs (for any number other than 0-5).