Lab03

1. Lab Topics

This lab covers different types of variables, assignment, unsigned integers, input and output procedures, and basic mathematical operators, escape sequences and formatting input and output. Lectures to review include lecture 4, 5 and 6.

2. Time Calculator

Write a C++ program that simulates a simple clock with hours, minutes, and seconds. The program should take user input for the current time in 24-hour format (e.g., 14:30:45) and a positive integer N. Then, it should calculate and display the time after adding N seconds to the input time and display the time in a 12-hour format with AM or PM.

Consider the following guidelines:

1. Use unsigned integer variables for hours, minutes, and seconds to ensure non-negative values.
2. Handle the input in the HH:MM:SS format, where HH represents hours (00 to 23), MM represents minutes (00 to 59), and SS represents seconds (00 to 59).
3. Perform modular arithmetic to handle the rollover of seconds, minutes, and hours. For example, if adding N seconds results in 61 seconds, it should roll over to 01 minute.
4. Use integer division and the modulo operator (%) to convert the total seconds to hours, minutes, and seconds.
5. Implement pre and post-incremental and decremental operators to adjust the time values accordingly.
6. Display the time in the 12-hour format (e.g., 02:30:45 PM) and ensure proper handling of AM and PM.
7. Use escape sequences to format the output neatly.
8. Your program should ask the user to enter the current time and N (the number of seconds to add), perform the calculations, and then display the updated time.

Provide the C++ code that accomplishes this task and demonstrate it with sample input and output.

As you begin to step into the world of developing programs, there are things that you may not know or remember that you need to look up. Information like formulas, C++ in built functions, the particular values of known constants, behavior of certain functions, etc. are things you may need to look for.

In this lab you may use the internet to find this information. However, you are not permitted to use solutions and source codes created by others on the internet. If you are confused by something that

is soley related to how C++ operates, or you are not sure how to proceed with solving a prompt, please ask a lab helper or the lab instructor for guidance.
Looking up regular information like constant values or formulas or the use of an inbuilt function is OK.

Note:

1. You may want to learn how to use the “scanf” function. The expected format you may follow is **scanf("%02u:%02u:%02u", &hours, &minutes, &seconds);**
   Where hours, minutes and seconds are the unsigned integers.
2. You may also want to learn how to use **setw(2)** and **setfill('0')** to properly format the output to the desired outcome.
3. You can make use of if-else conditional statement to convert to “am/pm” time.

Example Output 1:

```
Enter current time in HH:MM:SS format: 12:54:47
Enter the number of seconds to add (N): 1245
Updated time: 01:15:32 PM
```

Example Output 2:

```
Enter current time in HH:MM:SS format: 00:45:90
Enter the number of seconds to add (N): 3546
Updated time: 01:45:36 AM
```

Example Output 3:

```
Enter current time in HH:MM:SS format: 10:45:19
Enter the number of seconds to add (N): 3254642
Updated time: 902:49:21 PM
```

3. How to get full marks

To get a 100% on this lab your code should:

1. Use good variable names such that one can easily understand a variable’s purpose just by looking at the name.
2. The program needs to be intuitive (e.g., display proper messages while you are taking user input or printing the result)
3. Follow all good coding conventions such as proper indentation.
4. Adhere to all coding standards outlined in lab2.
5. Follow the instructions of cloning, making dir, and submitting your code to git as previously discussed in lab01 and lab02
6. Comment you code properly (do not write comments for things that are obvious)

7. Push your most recent code in git and submit through canvas as well. The canvas submission should include following files:
    1. The cpp file downloaded from git
    2. **1 image file (Screenshot of the result)**