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CST 370, Spring 2017
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Design/Analysis
of Algorithms

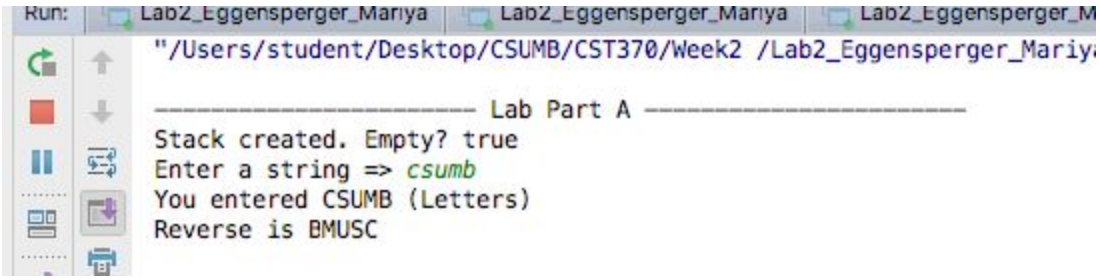
Lab 2 Submission : Stacks

(a) Download Stack.h, Stack.cpp, and Sample_Stack_tester.cpp from iLearn

Make a project with the three files. Then, modify the programs so that the program can read a sequence of characters and reverse it using the stack. The output of your program should look as follows:

Enter a string => CSUMB
You entered CSUMB
Reverse is BMUSC

Figure 1 This is the first run for the character input program. The program first checks whether a new stack was created and that the new stack is empty for input. The program then prompts the user to enter a sequence of characters. If the user inputs lowercase letters, the program transforms the letters toupper (uppercase) and then reverses the input as seen in these console output(s).



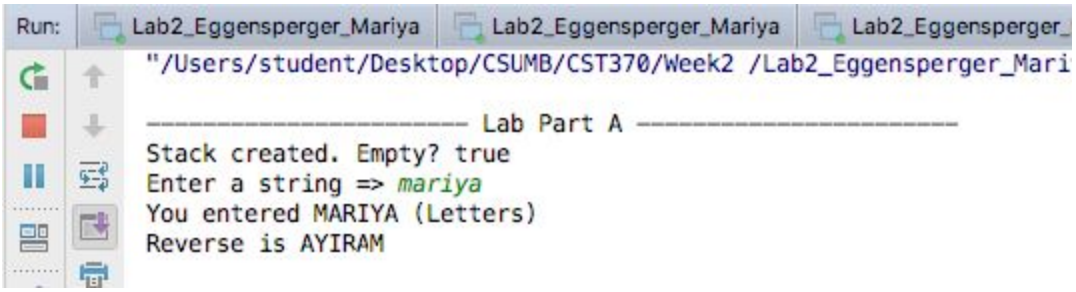
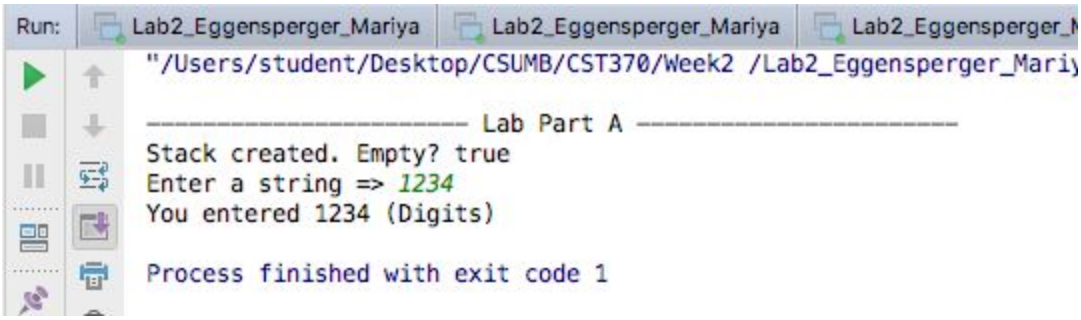
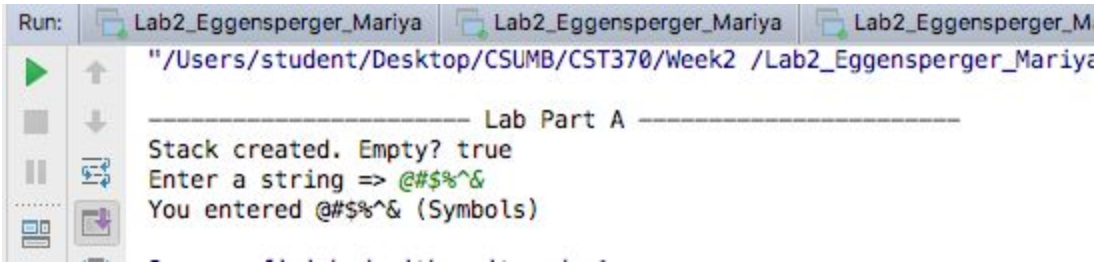


Figure 2 This is the second run for the character input program. The program first checks whether a new stack was created and that it is empty for input. However, if the user inputs digits or symbols, the program is terminated with a code exit(1), since these are not valid character inputs.





(b) Download Stack.h, Stack.cpp, and Sample_Stack_tester.cpp from iLearn.

Make a project with the three files. Then, modify the programs so that the program can convert a positive integer to a binary representation. The output of your program should look as follows:

Enter a number: 5
Decimal: 5
Binary: 101

This is another sample execution:

Enter a number: 26
Decimal: 26
Binary: 11010

Figure 3 As per lab instructions, the program requests that that user input a set of **positive** integers. If the user inputs a set of negative integers, letters or symbols, an error message is displayed and the program terminates with exit(1).

Figure 4 Only after a valid input is made with positive integers, the program runs an algorithm to convert the integer to a binary representation. The algorithm is such that, while *number* is not equal to zero, calculate the *remainder* that results when the *number* is divided by 2. Place the *remainder* on the top of the *stack_of_remainders* and replace the *number* by the integer quotient of *number/2.* End while. Then, while the stack of remainders is not empty, retrieve and remove the *remainder* from the top of the stack of remainders and append the *remainder to the output* produced. End while. Below are two runs as instructed in the lab.

```
------------------------ Lab Part B ------------------------
Enter a number: 5
Decimal: 5
Binary: 101
```

```
------------------------ Lab Part B ------------------------
Enter a number: 26
Decimal: 26
Binary: 11010
```