Discussion Session
Week 3

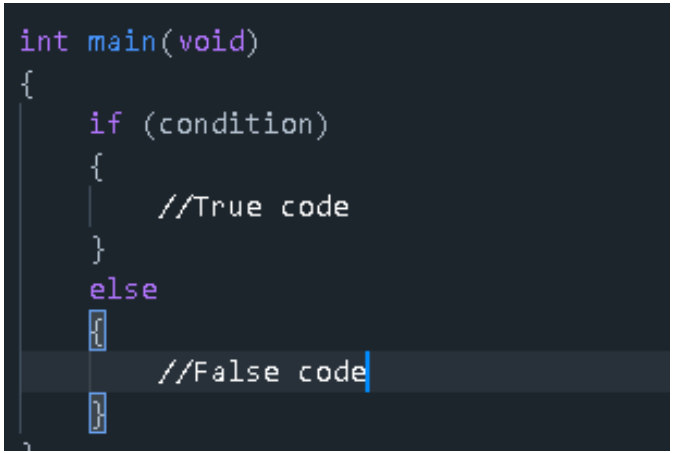
Conditionals, Loops, Tips and Tricks

Context

- Conditionals and loops are essentially all coding is
- Mastering these skills is essential for you to become successful as a programmer
- Assignments….it’s a lot

Right into conditionals

- You know the basics



Beyond the Basics

- Different Conditional Formatting (Ternary Ifs, one liners)

```
void main(void)
{
    int test = 123456
    std::string out = ((test % 10) == 6) ? "Last digit is 6" : "Last digit is not 6";
}
```

result = (condition) ? true_branch : false_branch

Congruent Statements

```cpp
int main(void)
{
    int test = 123456;
    std::string out;

    if (test % 10 == 6)
    {
        out = "Last digit is 6";
    }
    else
    {
        out = "Last digit is not 6";
    }

    return 0;
}
```

```cpp
void main(void)
{
    int test = 123456
    std::string out = ((test % 10) == 6) ? "Last digit is 6" : "Last digit is not 6";
}
```

Ranged Switch Statements

```
char GetLetterGrade(int numGrade)
{
    switch(numGrade)
    {
        case 90 ... 100 : return 'A';
        case 80 ... 89: return 'B';
        case 70 ... 79: return 'C';
        default: return 'U';
    }
}
```

How are conditionals (and loops too) executed?

No brackets? Assume the next line is iterated over/run on a condition, aka “One Liners”

```cpp
int main(void)
{
    int temp = 49;
    if(temp % 2 == 0) std::cout << "Even" << std::endl;
    else std::cout << "Odd" << std::endl;
```

```cpp
int main(void)
{
    for(int i = 0; i < 5) ++i) std::cout << "Hello World" << std::endl;

    return 0;
}
```

Exercise 1 (10 Min)

Write a program (named whatever you want) in c++ that does the following:

1) Takes in an integer and a string (Make sure the types are int and std::string from the string library)
2) Checks, using a ternary if statement, whether the string is a string representation of the int that was passed in
    a) If this condition is true, set a boolean flag to true, otherwise, set a boolean flag to false
    b) Hint: You will need to look up how to convert a string to an int for comparison
3) Checks, preferably using “one liner” if else statements, whether that boolean flag is true or false
    a) If true, then output “Good”, otherwise output “Bad”

Example input: 12 12

Output: Good

Useful Things to Remember

- In C/C++, **everything** can be evaluated to either true or false
- Examples:
- if(1)
- if(myCharStr)
- if (!varName)
- while(str[i])
- etc

Loops

Again, you've seen the basics

While, For

While loops

Standard syntax:

while(condition) { body }

Iterating through arrays

```c
int main(void)
{
    char array[] = "Hello";

    int i = 0;
    while(array[i])
    {
        //perform operation on character
        i++;
    }

    return 0;
}
```

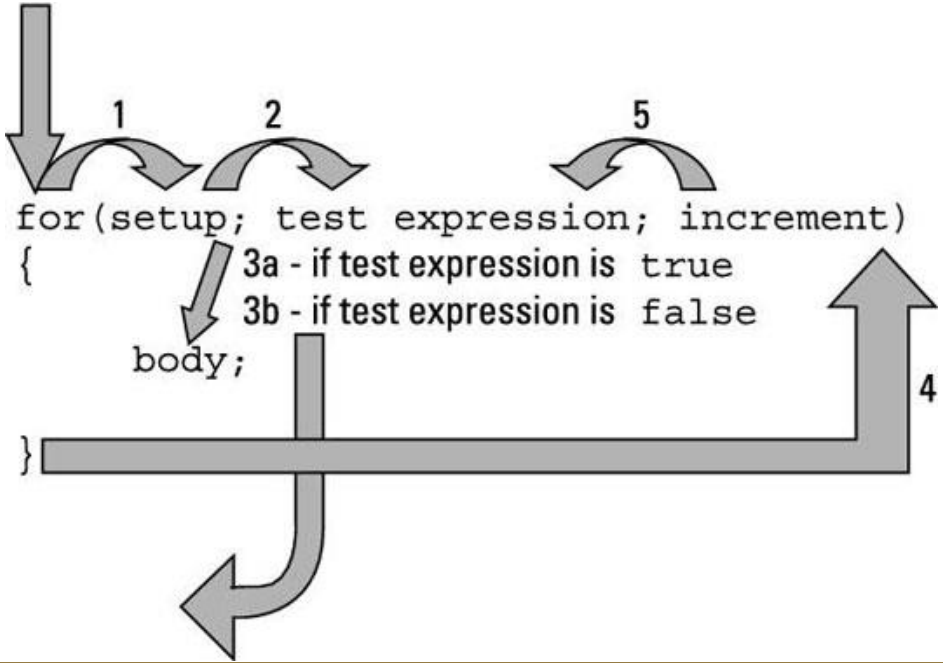
For Loops

- Range Based
- How to use them
- Increment

What’s the difference in output?

```cpp
int main(void)
{
    for(int i = 0; i < 10; i++)
    {
        std::cout << "Hello" << std::endl;
    }

    for(int i = 0; i < 10; ++i)
    {
        std::cout << "Hello" << std::endl;
    }

    return 0;
}
```

For Loop Execution Order



Range Based For Loops

Similar to iterating through an array using a while loop

```
4  int main(void)
5  {
6      char str[] = "Hello";
7
8      for(auto ele: str) std::cout << ele << std::endl;
9
10     return 0;
11 }
```

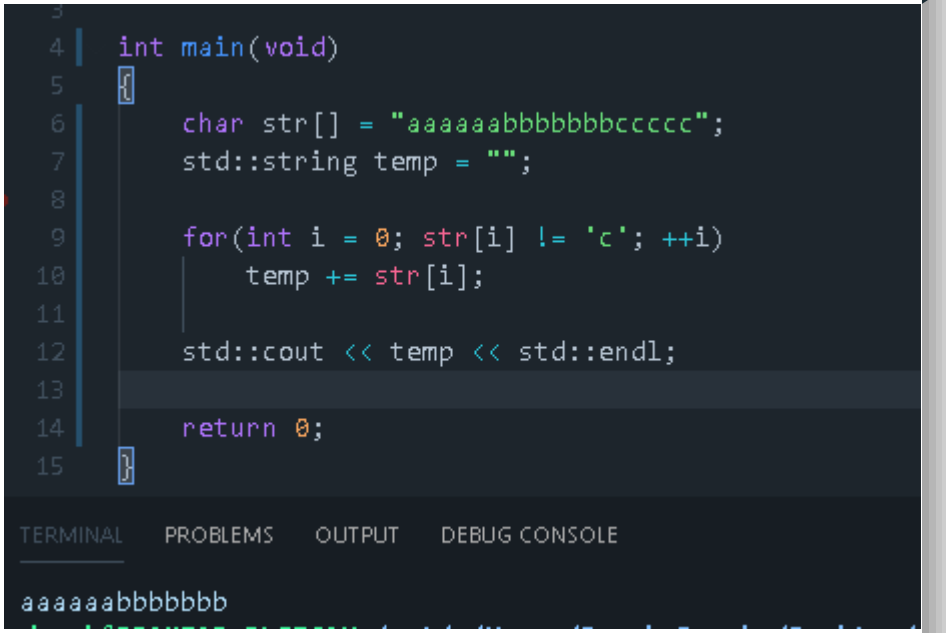
```
TERMINAL  PROBLEMS  OUTPUT  DEBUG CONSOLE

derek@DESKTOP-3L8T6AU:/mnt/c/Users/Derek Jacobs/Desktop/CSC/TA$ g++ temp.cpp && ./a.out
H
e
l
l
o

derek@DESKTOP-3L8T6AU:/mnt/c/Users/Derek Jacobs/Desktop/CSC/TA$
```

Basic Syntax of Range Based For Loop

```
for (type varName : object)
{
        Body
}
```

More on Using For Loops

- The 3 sections can be anything you want
- They are always executed in the same order
- ++i could be replaced with i+=2, or some other expression too



```cpp
int main(void)
{
    int i = 0;
    std::string str = "Hello World";

    for(i; ; )
    {
        std::cout << i << std::endl;
        if(str[i] == 'l') i += 2;
        if (str[i++] == 'W') break;
    }

    std::cout << str[--i] << std::endl;
    return 0;
}
```

Nested Loops

- You can write loops within loops
- The nested code will execute by a scale factor
- This pair of loops will print out “Hello” 10 times
  - And “Bye” a total of 50 times

```
#include <iostream>

int main(int argc, char* argv[])
{
    for(int i = 0; i < 10; ++i)
    {
        //Execute some code if you want
        std::cout << "Hello" << std::endl;
        for(int j = 0; j < 5; ++j)
        {
            std::cout << "Bye"
        }
        std::cout << "\n";
    }
    return 0;
}
```

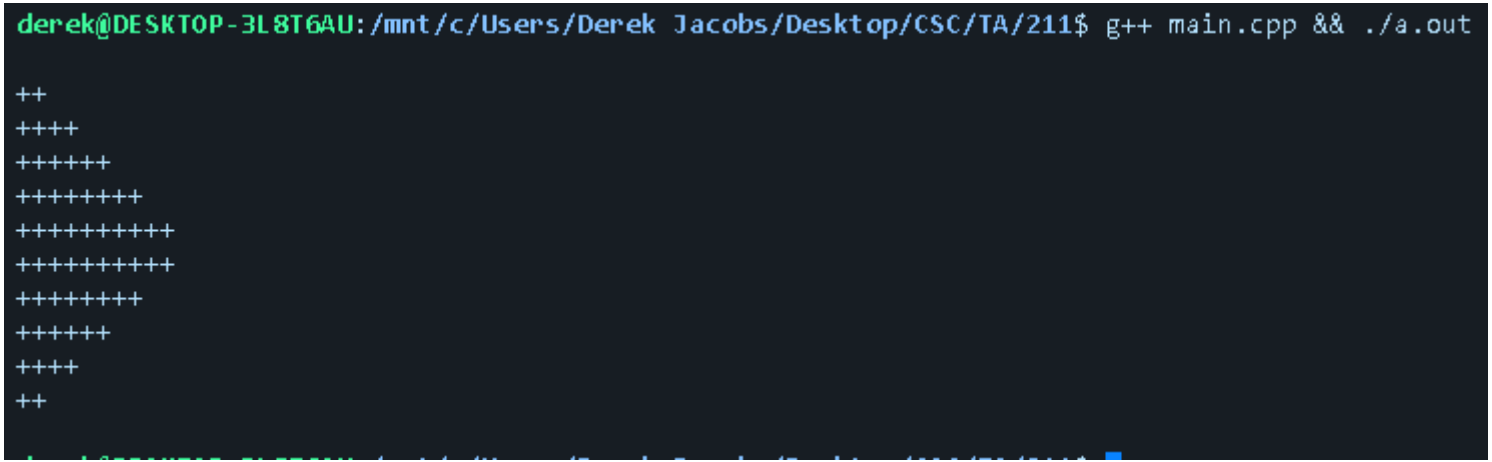
Exercise 2

- Using a pair of nested loops, do the following
  - Print out the following statement:
    - X + Y = Z
    - Where X are all even numbers up to and including 10, Y are powers of 3 starting at 1 and up to and including 81, and Z is the sum of X and Y

```cpp
#include "stdio.h"

int main(int argc, char* argv[])
{
    for(int i = 0; i <= 10; i+= 2)
    {
        for(int j = 1; j <= 81; j*=3)
        {
            printf("%d + %d = %d\n", i, j, i+j);
            //Also can be done using cout
            //std::cou << i << " + " << j << " = " << i+j << std::endl;
        }
    }
    return 0;
}
```

```
0 + 1 = 1
0 + 3 = 3
0 + 9 = 9
0 + 27 = 27
0 + 81 = 81
2 + 1 = 3
2 + 3 = 5
2 + 9 = 11
2 + 27 = 29
2 + 81 = 83
4 + 1 = 5
4 + 3 = 7
4 + 9 = 13
4 + 27 = 31
4 + 81 = 85
6 + 1 = 7
6 + 3 = 9
6 + 9 = 15
6 + 27 = 33
6 + 81 = 87
8 + 1 = 9
8 + 3 = 11
8 + 9 = 17
8 + 27 = 35
8 + 81 = 89
10 + 1 = 11
10 + 3 = 13
10 + 9 = 19
10 + 27 = 37
10 + 81 = 91
```

Art!


derek@DESKTOP-3L8T6AU:/mnt/c/Users/Derek Jacobs/Desktop/CSC/TA/211$ g++ main.cpp && ./a.out
++
++++
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++