Griffin's OH 2/19/22

COMSW 1004 Introduction to Programming and Computer Science in Java

Quick Announcements

1. Programming Project 2 is due on Monday so please begin working on it if you haven't already done so.

2. Quiz 2 is on Thursday 2/24/22

3. The Sunday Collaborative space is open in Math 207 from 1-5pm

Weekly Review Topics

1. Introduction to Binary Numbers
2. Two's Complement
3. Boolean Logic
4. Logic Gates
5. While Loops
6. For Loops
7. Break/Continue
8. Questions on PPSet 2

Introduction to Binary Numbers

The Binary System is a counting system which is based in Base 2, with the only two values being 0 and 1.

Here is an example of a Binary Number: 101101

To convert from binary to decimal starting from the right and adding the powers of 2 start from 2^0 whenever you see a 1 so in this case:

32+8+4+1 = 45 Dec

Two's Complement

In order to properly represent negative values in Binary without running into the issue of two zeroes we use a method called Two's Complement to store these values. Let's show the value of -7 in binary using Two's Complement:

Step 1.) Write out the value of +7 in binary: 00000111

Step 2.) Invert all the bit values: 11111000

Step 3.) Add 1 to that result: 11111001

The same methodology can be applied to go backwards too

Boolean Logic

Booleans are used to represent true or false values, that is a boolean can only ever be true or only ever be false.

You have seen booleans before, within the conditions of you while loops, for loops and the conditionals themselves

Much of the modern day architecture used to power your technological devices uses boolean logic to work.

Logic Gates

There are plenty of logic gates within the realms of Computer Science and Computer Engineering but here are the three most important ones to know:

a. And – represented by **&&** in Java
b. Or – represented by ‖ in Java
c. Not – represented by ! in Java

There are things called truth tables that allow us to run through the result of some of these booleans, let's try one now!

Truth Table Exercise

Let's start with the following expression: (x || z) **&&** (y || !z)

x	y	z	x || z	y || !z	(x || z) **&&** (y||!z)
0	0	1	1	0	0
0	1	0	0	1	0
1	0	0	1	1	1
0	1	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1
0	0	0	0	1	0

While Loops

While loops allow you to repeat a certain set of instructions until a condition is met. They are formatted as follows:

```
while(conditionToCheck){

    //code to run

}
```

While loops are most used for scanning files and performing actions until the user terminates

For Loops

For loops allow users to repeat actions a certain number of times before the loop concludes. The syntax is as follows:

```
for(int i = 0; i < someValue; i++){

    //some code to run

}
```

For loops are most commonly used for iterating through Strings, Arrays and ArrayLists

Break / Continue Keywords

The Break keyword is used in loops to 'break' out of the loop, the break keyword should only be used sparingly as it is often considered bad design (not always)

When you use the break keyword, no more iterations of the loop will be done and the program will move on to the next block of code.

The Continue keyword is used in loops to 'continue' to the next iteration of the loop, the current iteration is stopped and the loop moves on to the next iteration.

Link to Drive Videos

https://drive.google.com/drive/folders/11sUlYbFZQ7GezIBOI5fJ-2OSw3P_kSTD?usp=sharing