Computer Science Principles

Class 5

Today's Agenda

- Review Homework,
- Review Loops
- Introduce Arrays
- Pair Program Assignment
- Practice what we know

Homework Review, While Loop

- While (while_count < NUM_LOOPS)
- For (x= 0; x<NUM_LOOPS; x+=1)
- For(y=0;y<NUM_LOOPS; y+=1)
- print x, y
- end   #end of y for loop
- end   #end of x for loop
- while_count += 1
- End   #end of while loop

Output

- 0,0
- 0,1
- 1,0
- 1,1
- 0,0
- 0,1
- 1,0
- 1,1

Homework, Data Types

- Go over sheet, review answers

Homework, Operators

- Any questions?
- The division operator "/" does integer division. This means it returns the whole number only, not the fractional part – if dividing integers.
- So 4/2 = 2   5/2 = 2   2/3 = 0
- The modulo aka mod "%" operator returns the fractional part of a division, which is actually the "remainder" part in reality, as a number.
- 4%2 = 0   5%2 = 1   2%3 = 2

Loop Review

- Two main kinds of loops, what are they?

Loop Review

- Two main kinds of loops, what are they?
- While() and For()
- What is the loop mechanism for a While loop?
- How is a For loop different?

New Topic: Arrays

- Arrays are simply a collection of similar data.
- Think of a train. A train is a long connected series of train cars, right?
- Arrays are variables that are linked/connected together in memory.

Advantage of Arrays

- Accessing array elements is by an "index". This is just a number of which item in the array list.

- Counting starts at 0, not 1. This is a little confusing. This means that the first element in the array is 0.

- You can use a variable to index the array, which makes them very useful in loops, for example.

Array Example

- Integer classAge[5]
- classAge[0] = 15   #Kevin
- classAge[1] = 15   #Emily
- . . .
- classAge[4] = 15   #James?
- classAge[5] =? VERY BAD, NOT IN ARRAY!

Array size

- You can specify the size when creating the array.
- You can pre-fill the array with data, and it will automatically take the size from the data.
- Integer array[5] #size 5 elements, no init
- Integer array[] = (0,1,2,3,4) #size 5 elements, initialized

Array Examples

- Boolean Kevin[] = (true, false)   #size = 2
- Kevin[1] == false
- Kevin[2] == not in array
- Kevin[0] == true

- Integer index = 1
- Kevin[index] = false
- Index -= 1
- Kevin[index] = true   #index = 0

Array Example

- Constant NUM_STRINGS = 3
- String Ethan[NUM_STRINGS]
- Size = 3
- Values = ? We don't know yet, hopefully "0"
- Integer i
- For(i=0, i<NUM_STRINGS, i+= 1)
-   Ethan[i] = "for loop value i"
- End
- Ethan[0] = ? "for loop value 0"
- Ethan[1] = ? "for loop value 1"
- Ethan[2] = ? "for loop value 2"

Pair Programming

- One method to accomplish things faster in programming is called "pair programming"
- This is where, you guessed it, you are paired with a person to code something.
- Advantages are that your partner can often think of different things that you may miss, and can make the coding better.
- Another advantage is that you are accountable to another person, so you are inclined to work harder on the task, which causes it to get done sooner.

Pair Programming Project

- Number 2 out of 3 projects in this class
- Due in 1 month, on March 3.
- Its actually a fairly simple project, you have the knowledge you need to complete it today (at least you've been taught it, you may not realize it)

Here it is!

- Graham and James
- Kevin and Emily
- Ethan and ……..

Here it is!

- Graham and James
- Kevin and Emily
- Ethan and Brad! (Ha! Poor Ethan!)
- Call, email, USE SLACK!!!! To communicate with each other.

Review Time

- Anybody have any clue what the two main goals of this class are?

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- #1 goal is to learn to program basic code building blocks.

- I feel we need to push ourselves more in that area.

- You now have 99% of the basic knowledge you need to complete most any programming project.

Review Time

- What was number two goal?

Review Time

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- #2 is to learn how Computer Science works in the real world, and use tools the pros use, organize as a team, manage projects like a team using project management philosophies.

- I think we've done a great job of this, at the expense of the programming part.

Keep the Main Thing, the Main Thing

- You CANNOT learn to program on Thursday nights before class.
- You must do/try something every day to learn it. Because …..
- You have to train your mind to think like a machine, using cold, hard, logic.
- You have to practice, and understand the basic building blocks of code, so you can apply them.

Why? Why? Why?

- Because I want EVERY. SINGLE. ONE. Of you to take the next step with me, which is taking the follow up course, where we apply everything learned here, into actual programming language.

- If you can know and somewhat understand the concepts in this class, then learning a computer language is an exercise in learning "syntax"

So Let's go …. How do we create a new program/function?

- Copy/paste Header stuff from another program into a new file.

- Do a little design work first, what are you doing, and why? What are inputs needed, what is this function going to accomplish?

- Write Function declaration. This means the start of the function:

- OutputType FunctionName(inputs)

- End #add the end line

Now we have a function "shell"

- Other people now have knowledge of what you are going to do, and can start to expect to use that code.

- Now you can fill in the rest of the function, and make it do what it is supposed to do.