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Programming Languages

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Term Project: Sorting Algorithms

**Summary:**

For my term project I decided to learn the language swift. Swift is a language developed by Apple for macOS, iOS, watchOS, and tvOS. It is built with the open source LLVM compiler framework and has been included in Xcode since version 6. On platforms other than Linux, it uses the Objective-C runtime library which allows C, Objective-C, C++ and Swift code to run within one program. I was tasked to create sorting algorithms in the Swift language. For my project, I created two sorting algorithms. Both of these algorithms sort a specific array that I initialized in the code. They sort the array in ascending and descending order respectively.

**Compiler and IDE:**

Swift was developed for linux machines. Since I am using a windows machine, I had to go out and find a compiler and IDE that work with swift. I found a compiler called Swift for Windows online and I have been using that to compile and run my program. For my IDE, I decided to use Visual Studio Code as there are plenty of Swift frameworks and extensions I can download to assist me in my coding. I have also been using Visual Studio Code since I began coding so it made the whole process much easier.

**Algorithm Overview:**

The algorithms are similar in design. I will include snippets of import code from the Swift file I am submitting with the project and explain them.

*The first import part of the code is:*

extension Array where Element: Comparable {

I was able to find an Array extension online which made it easier to pass in the array value, I used this and used the comparable protocol to be able to use relational operators.

*The next important section is the first function:*

func descendingSort(by descendingOrder: ((Element, Element) -> Bool) = (>)) -> [Element] {

var data = self

//iterates through the array until the second to last element

for i in 0..<(data.count-1) {

//iterates again from the current element i, comparing the two elements and swaping them, greater number first.

for j in 0..<(data.count-i-1) where descendingOrder(data[j+1], data[j]) {

data.swapAt(j, j + 1)

}

}

return data

}

This creates the function of descendingSort. It compares two elements, if the first element is less than the first element then it swaps the two elements. There are two for loops nested inside of this function.

They work as follows:

1. The first for loop is going to iterate through the array until the last element in the array. For each element, the second for loop will start. Once the second for loop completes, the first for loop will move onto the next element.
2. The second for loop loops through the array starting at element i from the first for loop. It then compares the elements and swaps them according to the function. This goes through the whole array until the last element and then jumps back up to the first for loop.

*The second function is almost identical to the first, however it is sorts in ascending order:*

func ascendingSort(by increasingOrder: ((Element, Element) -> Bool) = (<)) -> [Element] {

var data = self

//iterates through the array

for i in 0..<(data.count-1) {

//iterates again from the current element i, comparing the two elements and swaping them, lesser number first.

for j in 0..<(data.count-i-1) where increasingOrder(data[j+1], data[j]) {

data.swapAt(j, j + 1)

}

}

return data

}

}

The same rules apply to this function as the previous function, however it is sorting in increasing order rather than decreasing order. Not much to explain about this part.

*The last part of the program is as follows:*

//creates the array to be sorted

let theArray = [9, 3, 2, 5, 1, 7, 6, 4, 11, 20, 14, 42, 13, 26, 62, 23, 52, 76, 21, 15]

//creates the sorted arrays

let ascendedSort = theArray.ascendingSort()

let descendedSort = theArray.descendingSort()

//prints the sorted arrays

print(ascendedSort)

print(descendedSort)

This is simply initializing the array that is being pasted into said functions. The array is created, then the function is applied to the array, then the return data is printed to the screen.

**Resources**

https://developer.apple.com/documentation/swift

<https://swift.org/documentation/>

<https://www.airpair.com/swift/learning-swift-tutorial>

<https://www.raywenderlich.com/73967/swift-cheat-sheet-and-quick-reference>

<http://jamesonquave.com/blog/swift-3-tutorial-fundamentals/>

https://stackoverflow.com/