CS5343 Assignment 3

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Assignment 3 Description

Implement the heap sort. Given a random list of numbers in an array (index zero stores the number of nodes). Sort them in ascending order.
1. You must first make a heap an then sort it. Initialize an array of random numbers (at least 20).
Print the list. Make a heap. Print the list. Sort it, using heap sort. Print the list again.
Submit code
submit screen shot showing each printout.

Description of the program.

The program implements a heap using an array. The array is first initialized and filled with random numbers using the "fill_array". The array is displayed using the "print_array." The method "build_heap" is then ran to enforce the max heap constraints on the array. The array is then displayed using the "print_array" method. The heap is then placed in ascending order using the "heap_sort" method and the array is again displayed using the "print_array" method.

Methods implemented in the program:

- fill_array: stores the number of nodes for the heap in index 0. Randomly generates an integer using the rand() function from the "cstdlib" library and stores it in the array.
- print_array: accepts an array as the argument and displays the contents. Note, since the array stores the number of nodes in index 0, the contents of index 0 are not printed.
- max_heapify: accepts an integer array, an integer index, and an integer size as arguments, runs the max heapify algorithm from class on the array and index. Recursively calls itself to percolate to the bottom of the heap.
- build_heap: accepts an integer array as an argument and builds a heap in the array using the max_heapify method.
- heap_sort: accepts an integer array as an argument and sorts the array in ascending order using the max_heapify method.

Compiling instructions.

This program was created using Microsoft Visual Studio. To compile open Visual Studio and create a new empty C++ project. Right click the source files folder under the solution explore window and click Add then Existing item. Browse to the file Source.cpp and double click. Save the project, click build, then "Local Windows Debugger." The program should run.