CS4306 Algorithm Analysis

Kennesaw State University
Department of Computer Science
Fall 2021

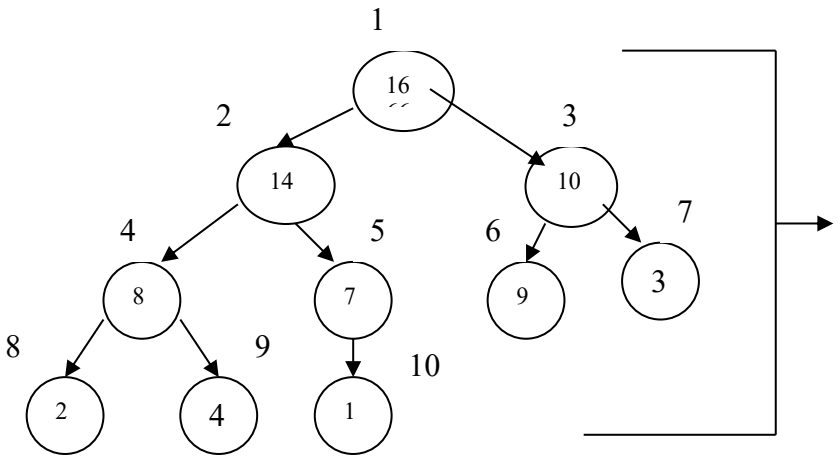
Programing Assignment # 03

Due: Thursday, September 30, 2021 by 11:59pm Midnight

- Maintain a Priority Queue Using Heap Data Structure (*Consider the Descending Order Of Elements*)

Hints: To maintain a Priority Queue using Heap Data Structure you need to know what is Heap and what is priority queue.

Heap: Heap is an array object that can be viewed as a complete binary tree. Look at the following figure:



This is a binary tree where the data is stored following the data structure of a heap. If you see this as a array it will be

1	2	3	4	5	6	7	8	9	10
16	14	10	8	7	9	3	2	4	1

In heap, each parent node store the higher value than its child node. So you need to take input in an array , where following the index of the array you need to build a heap using a method **Build Heap (A)**, in which you need to use a recursive function **Heapify (A, i)**.

Refer to the procedures described in your book in Chapter 6 of CLRS Algorithm Text book.

Priority Queue: A priority queue is a data structure for maintaining a set of elements where each of them is associated with an input value "**Key"**. So, when you implement a priority a queue you will define the "**Key".** Here you will use the heap structure to build a queue and then you have to Extract the element with the max value (if you consider the ascending order of elements). Then you have to sort the array with next priority key using Heapify(A,i) recursively. Use all the procedures given in your book.. But as you are said that you have to consider the descending order of elements you need to reverse the linear order of priority queue. Specially take care of the functions Heap-Extract-Min(A) and Heapsort(A).