LAB & TUT 7 – Heap

PART 1 – LAB

1. **Complete the flowing functions: InsertHeap, DeleteHeap, BuildHeap**

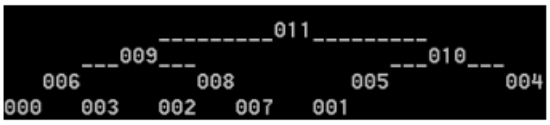
2. **Heap property checking:** write a function to check if an array is a max heap:
   ```
   bool IsMaxHeap(int *arr, int size)
   ```

3. **Delete an arbitrary node:** The provided **deleteHeap** function is only able to delete the root of a heap. Write another function that allows you to delete any node in a heap:
   ```
   bool DeleteHeapNode(int *&maxHeap, int delPosition,
                                    int &size, int & dataOut)
   ```

4. **Printing a heap as a normal tree:** Write a program that prints a heap as a normal tree. For example, with the heap:
   ```
   int size = 31;
   int *maxHeap = new int[size];
   for (int i = 0; i < size; i++) { maxHeap[i] = i; }
   buildHeap(maxHeap, size);
   ```

   Your program should print the following output:

   Here is another example



Note: for printing purpose, we assume that our heap only consists of integers ranged from 0 to 999 or else there will be displacement problem. If a node is less than 100, you will have to pad zeros in front of it so that it has exactly tree characters

PART 2 – TUT

1. **Building a heap:**
   Given the following arrays:
   ```
   int maxHeap1[8] = {56, 45, 4, 77, 60, 34, 35, 22};
   int maxHeap2[9] = { 1, 3, 5, 7, 9, 2, 4, 6, 8};
   ```
   Build a max heap for each of them. Draw the final result.

2. **Delete heap:**

   After finishing building the two heaps above, apply the **DeleteHeap** operation on each of them **twice**. Draw the result.