Analysis Of Algorithms I

Homework 2

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1- Intro

This is an individual assignment report includes heap sort algorithm. In this assignment first a file is read which keeps a list of events with the following format:

EVENT-NAME START-TIME END-TIME

Where EVENT-NAME is the name of the event, START-TIME is the scheduling time of the event and END-TIME is the finishing time of the event. At the reading time a min-heap is created by the program. Then a virtual clock (actually a for loop) is starting the ticks. In every clock tick the event which is scheduled at that time is printed out by program in that format: TIME T: EVENT-NAME STARTED. If there is no event it prints out TIME T: NO EVENT. At the end of the program it prints out: TIME T: NO MORE EVENTS, SCHEDULER EXITS.

2- Development and Operating Environments

The project was developed in a Visual Studio 2019 environment with C++ language. The program tested in ITU servers using SSH and it can be run using g++ compiler. The program must take the name of the file that contains events from the command line. Event format is given in Intro part. The program is a single file: 150160726.cpp

3- Data Structures and Variables

In this program a node structure is used as a struct. It has value, name and state variables, value stores time of event, name stores name of event and state stores start or end state of event. The node struct is used in minHeap class in a vector. In minHeap class count variables is used for store number of elements in the heap. In main function str and name variables are used as string; start, end, max variables used as integer. Also heap variable used as object and n variable is used as node pointer.

4- Program Flow

The program is starts in main function. Then input reading process (line by line) is done in a loop. At the same time events with their times and their states are inserted in heap variable. A min-heap is created in that process. After reading, events are printed out in a for loop according to time. When an event is prints out, the node of the event is taken from the heap using *extractMin* function. If there is no event in a time no events prints out. If there are multiple events in a time, time variable is decreased for prints out the next event. At the end it stated that there is no more event and program is finished.

5- Conclusion

In this assignment it’s hard for me to understand heapify function due to recursion method. Every recursion is complicated for me. Detailed explanation of the c++ code is written as comment on cpp file.

As a result the heap sort process and it’s usage in a program was learned. Run time of heap sort is *nlogn* and it is an in-place sort algorithm. So it is useful fort his assignment.