CSE 2010, HW4

Due Mon Oct 23 at the start of your lab section; Submit Server: class = cse2010, assignment = hw4S*x*Individual
Due Mon Oct 23 at the end of your lab section; Submit Server: class = cse2010, assignment = hw4S*x*GroupHelp
x is 2, 3—your section number.

Recent disasters (e.g., hurricanes, earthquakes) and attacks (e.g., shooting) can suddenly increase the number of patients seeking help at emergency rooms. Emergency rooms have plans to prepare for the influx. How would you design a system that can handle the influx efficiently?

The goal of HW4 is to design and implement a system that can efficiently handle the influx of patients at an emergency room. One plan is to triage patients, where patients are prioritized by their level of severity. Some patients might need to be treated immediately, while some others can be delayed. Also, over time, conditions of a patient can deteriorate or improve.

Consider Emergency Severity Index (ESI) that ranges from 1 (resusitation) to 5 (nonurgent). For simplicity, the number of minutes needed for a doctor to treat a patient is $2^{(6-esi)}$. Initially, the emergency room has two available doctors (Alice and Bob), more doctors may arrive and become available. Furthermore, assume the patient departs after treatment (discharged or admitted to the hospital for further treatment). A patient might also depart after treatment from a nurse instead of a doctor. When two patients have the same ESI, the patient who arrives earlier will be treated first. Time stamps are unique.

To efficiently decide which patient each doctor is going to treat, you will use HeapAdaptablePriorityQueue (textbook). You may modify HeapAdaptablePriorityQueue and related classes to increase their general functionality. The program files are on the course website.

Input: The command-line argument for HW4.java is the name of the input file, which has one of the following possible events on each line:

- patientArrives *time patient esi*
- updatePatientESI *time patient newEsi*
- patientDepartsAfterNurseTreatment *time patient*
- doctorArrives *time doctor*

time is in HHMM format, where HH ranges from 00 to 23 and MM ranges from 00 to 59 (leading zeros are optional). Sample input is on the course website.

Output: Output goes to the standard output (screen):

- patientArrives *time patient esi*
- updatePatientESI *time patient newEsi*
- patientDepartsAfterNurseTreatment *time patient*
- doctorArrives *time doctor*
- doctorStartsTreatingPatient *time doctor patient*
- doctorFinishesTreatmentAndPatientDeparts *time doctor patient*

Sample output is on the course website.

Submission: Submit HW4.java that has the main method, (modified) HeapAdaptablePriorityQueue.java and related classes, and other program files. Submissions for Individual and GroupHelp have the same guidelines as HW1.

Note the late penalty on the syllabus if you submit after the due date and time as specified at the top of the assignment.