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CS273 Data Structures

Final Project: Hospital Simulator

Project Specifications

Requirement Specifications:

Use Cases:

UML Diagram:

Pseudo-code:

\* You need to simulate a hospital emergency room located in the town of 273ville, population 2000.

\* The names of all the residents of 273ville are stored in our class folder.

\* Every person in 273ville is equally healthy, but they do occasionally need to go to the emergency room.

o I.e. there is equal probability that anyone in town will be admitted into the emergency room as a patient.

\* Your emergency room is small, but it has a big heart. It tries to run its operation as efficiently as possible.

\* When a patient arrives at the emergency room, he/she is triaged – that is, the patient is assigned a priority number from 1 to 20, depending on the severity of the illness. Higher priority values indicate more serious illnesses and are always treated ahead of lower priority illnesses.

o Illnesses with priority 1 to 10 occur approximately 70% of the time with equal probability

o Illnesses with priority 11 to 15 occur approximately 20% of the time with equal probability.

o Illnesses with priority 16 to 20 occur approximately 10% of the time with equal probability.

\* The emergency room has 2 categories of caregivers: Doctors and Nurses.

o Nurses can treat patients with priority 1 to 10, and doctors can treat patients with priority 1 to 20. **PRIORITY QUEUES**

o Empirically, we also know that nurses take 1 to 10 minutes to treat a patient, and doctors take 1 to 20 minutes to treat a patient, on average.

\* The hospital keeps a record of all patients that were treated in the emergency room. Each record stores:

o the number of visits to the emergency room, and

o the severity of illness on each visit **VECTORS**

\* Your simulation needs to examine a week in the life of the emergency room on a minute-by-minute basis (i.e. it needs to simulate at least 7x24x60 minutes).

\* Allow the user to input the following data values:

o The average hourly patient arrival rate (patients/ hour) at the emergency room –assume that there will not be more than 60 patients per hour.

o The number of doctors working in the emergency room.

o The number of nurses working in the emergency room.

\* You simulation will need to calculate the average visit time (arrival to discharge time) for emergency room patients.

\* At the end of the simulation, you will need to display a menu with options to list the names of all residents that were treated, and retrieve the record of a resident by “name”.

\* For your final report and presentation:

o Compare and comment on the average patient visit time (for some fixed patient arrival rate) when the emergency room has

\* 1 doctor and 1 nurse

\* 1 doctor and 2 nurse

\* 2 doctors and 1 nurse

o Display a plot of the visit time for increasing patient arrival rates, for a combination of doctors and nurses of your choice