**Rudyjay Keopuhiwa**

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**CS273**

**Pete Tucker**

**Final Project Summary Report:**

* **Description**
  + The project that is presented is an emergency room simulator. This emergency room simulator is built on user inputs. The user will input information like, number of nurses and doctors, average patient arrival rate and length of simulation. After user inputs that the simulation is run, and a menu pops up prompting the user to select a choice. One choice that the user can choose is listing all patients and the user is able to choose a patient and it will pop up information on that specific patient. Lastly if the user enters a negative number then the program will exit.
* **Comparison of average patient treat time**
  + 1 Doctor and 1 Nurse
    - 3 Minutes for the run of 5 patients/hour for a week length (168 hours)
    - 4 Minutes for the run of 15 patients/hour
    - 11 Minutes for the run of 30 patients/hour
    - 17 Minutes for the run of 59 patients/hour
  + 1 Doctor and 2 Nurses
    - 3 Minutes for the run of 5 patients/hour
    - 3 Minutes for the run of 15 patients/hour
    - 4 Minutes for the run of 30 patients/hour
    - 14 minutes for the run of 59 patients/hour
  + 2 Doctors and 1 Nurse
    - 3 Minutes for the run of 5 patients/hour
    - 3 Minutes for the run of 15 patients/hour
    - 4 Minutes for the run of 30 patients/hour
    - 11 Minutes for the run of 59 patients/hour
* **Plot and graphs**

|  |  |  |  |
| --- | --- | --- | --- |
| Average arrival rate(patients/hour) | 1 Doctor/ 1 Nurses | 2 Doctor/ 1 Nurse | 1 Doctor/ 2 Nurses |
| 5 | 3 | 3 | 3 |
| 15 | 3 | 3 | 3 |
| 30 | 11 | 4 | 4 |
| 59 | 17 | 11 | 14 |

* **Conclusions**
  + The data taken above was used with the emergency room simulation. The simulation finds the average treat time within the entirety of the emergency room. You the user has the flexibility of setting up this simulation by following the program and entering your choices. As you can see in the data above as you run the simulation the more doctors and nurses that are working the lower the average treat time. You can also see that doctors are better to have working because they can treat anyone in this simulation. So, we can conclude that the simulation is running correctly and that the more people working means the faster the time being treated for patients.
* **Changes / Challenges / Lessons Learned**
  + Adding a name element into Patient
    - I first wanted to create a simulation without the name element to make sure that it would run correctly. Once I was confident that the simulation was running correctly, I decided to add a name element to the patient class and implement a record system so I can access each patient information via the name.
  + Changing from a priority queue to a multiset for the service part
    - Before it was a multiset it was a priority queue however I found that it was hard to access more than 1 element because it was a queue. Also, I needed to access more than 1 element within that part of the data because there are more than 1 caregiver sometimes.
  + Fixing exceptions and using debugging
    - A big challenge was using the debugging method to find where exceptions were being thrown from. It took me a while to get used to it but I found where and why the exceptions were happening and fixed them immediately
  + Using iterators to access elements in a multiset
    - Something about the multiset is in order to access elements you will have to use the iterator of the element. So learning how to use iterators was a challenge but I re-watched multiple class sessions and searched up online on how to do them and ended up making it work.