**Components**

|  |  |
| --- | --- |
| System | Emergency Department |
| Entities | Patients |
| Resources | Nurses, Doctors, Beds |
| Attributes | Type of Patient, Type of Service, Service Time |
| Activities | Lab Test (by Nurse), Doctor Consult, Stay in Bed |
| Events | Arrival, Departure |
| State Variables | Queue length at each station, Number of staff busy at each station |

**Process Flow Chart**

A diagram of a flowchart

AI-generated content may be incorrect.

**Input Data**

Definitions:

* Station
  + Lab (Stations staffed by nurse)
    - Nurse allocated to each lab can only stay within that lab and not move to other labs if they’re free
    - Labs are done sequentially in ascending order
  + Doctor’s Room (Station where doctor’s consult is done)
  + Bed
    - Only for main track, if patient is diagnosed at doctor room to need a bed stay, the patient will proceed to this station

Inputs:

* Station
  + Number of staff/beds
  + Name
  + Treatment time distribution
  + Probability station is needed
    - First lab and doctor’s room are compulsory for all patients, probability specified for these stations will be overridden to 1
* Patient
  + Probability patient is of type fast track
  + Patient interarrival time distribution

**Output Collected**

* Average Queue Length at Each Station
* Average Number of Staff Busy at Each Station
* Average Patient Wait Times at Each Station (Not enough time to implement)

**Methodology**

1. Check for initialisation bias, and define period to discard as burn-in period
2. Repeat simulation n number of times to find average and confidence interval for each stat
   1. Batch size of each iteration is hard coded as burn-in period \* 4
   2. Check if values across simulations for each station fall within an absolute tolerance value with a confidence of 95%, tolerance is hard coded as 0.5

**Instructions for running code**

1. Download all required modules from requirements.txt
2. Launch interface by running “streamlit run app.py”
3. Modify simulation settings in settings page
4. Check for initialisation bias with “Check Initialisation Bias” button, graphically determine burn-in period value
5. Use burn-in period value for analysis, feed it into settings then press “Get Simulation Results” button