DEPARTMENT OF COMPUTER SCIENCE

DCS UBIT

UNIVERSITY OF KARACHI

Project Title:

"Simulation of randomly generated arrival and service time with (M/M/1)"

Course name: Simulation and Modelling

Submitted by:

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Project Documentation

Introduction:

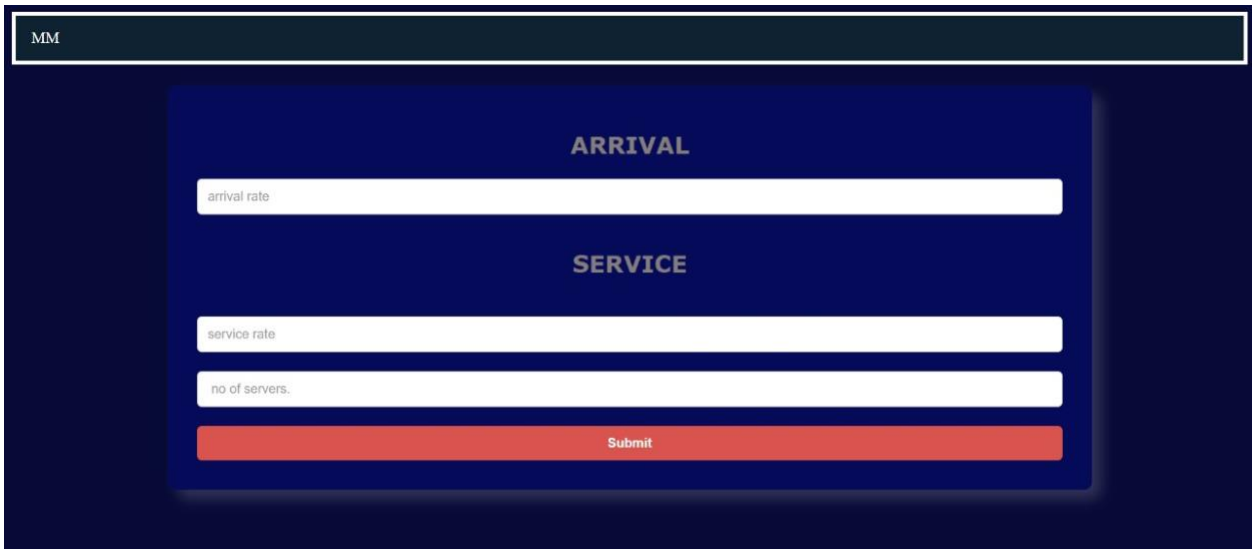
Our simulator comprises three distinct modules tailored for comprehensive analysis and simulation of queuing systems. These modules include

1) Deterministic Analysis
2) Stochastic Simulation
3) M/M/1 Priority Queue Simulation (recent addition)

Each component is meticulously crafted to address various aspects of queuing theory, enabling insightful exploration and evaluation of system performance.

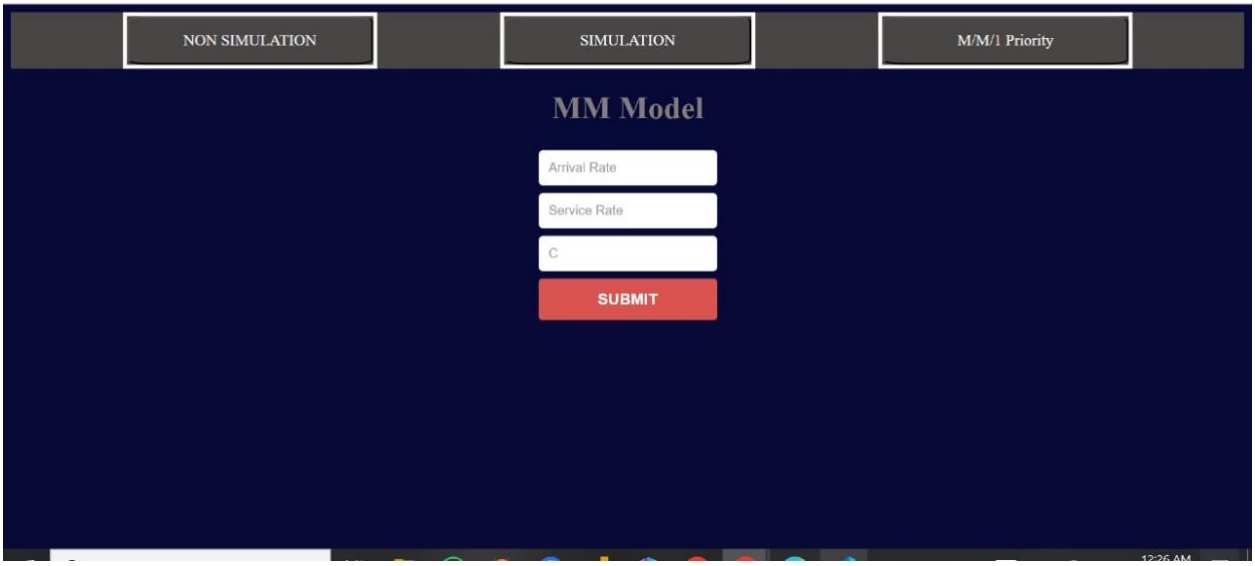
1. Deterministic Analysis:

In this segment, our focus lies on precisely computing essential queuing metrics such as the average number of customers in the system (Ls), the average number of customers in the queue (Lq), the average time a customer spends in the system (Ws), and the average time a customer spends waiting in the queue (Wq). We achieve this by leveraging established formulas tailored for M/M/n, M/G/n, and G/G/n queuing systems, given specific mean arrival and service times.



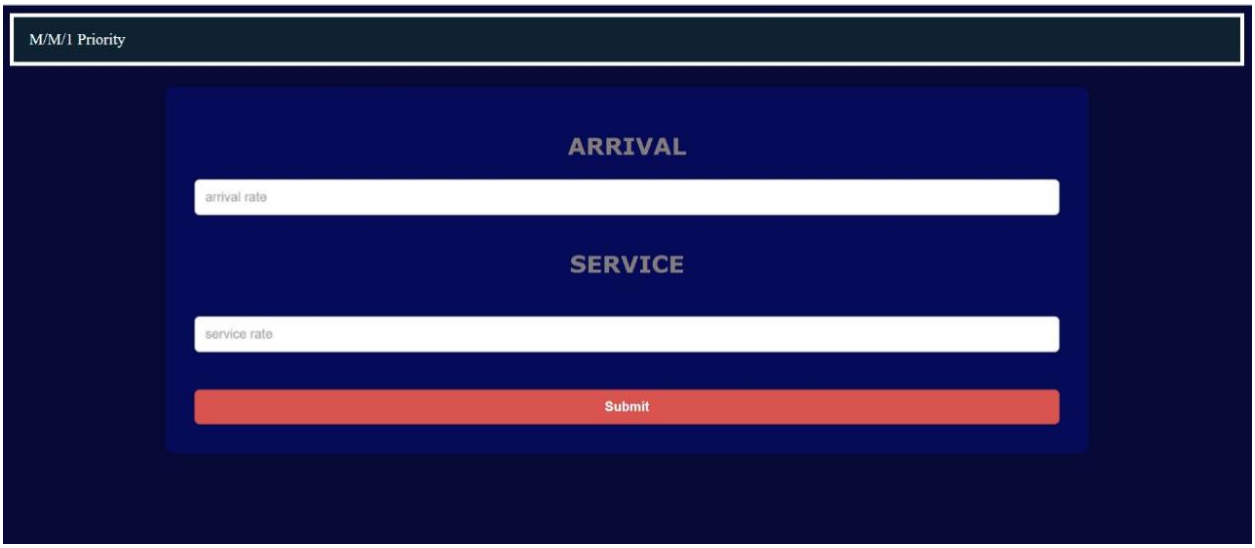
2. Stochastic Simulation:

The Stochastic Simulation module offers a dynamic approach to queuing analysis by employing random arrivals and service times. Through this simulation, we effectively emulate real-world scenarios, facilitating a deeper understanding of system behavior under varying conditions. By generating random values, we derive insights into queuing performance for M/M/n, M/G/n, and G/G/n systems, considering mean arrival and service times as input parameters.



3. M/M/1 Queue Simulation:

The latest addition to our simulator repertoire, the M/M/1 Queue Simulation module, addresses the intricacies of priority-based queuing. By implementing the M/M/1 priority queue model, we introduce a nuanced dimension to queuing analysis. Leveraging a Linear Congruential Generator (LCG) for generating random values, this module enables the simulation of priority queues, offering insights into system dynamics and performance metrics tailored to priority-based scenarios.



Conclusion:

Collectively, our simulator empowers users to delve into the complexities of queuing theory through deterministic analysis, stochastic simulation, and now, the specialized domain of priority queuing. By providing a comprehensive toolkit for queuing analysis, our simulator serves as a valuable resource for academia, research, and practical applications, facilitating informed decision-making and system optimization in diverse queuing environments.

Note:

- We have used Django at the backend (framework of python) and (HTML,CSS,JS) at the frontend.
- M/M/1 priority queue model and stochastic simulation also generate the results and a graph for better understanding.
- GitHub Link: https://github.com/SMAhmer17/Priority-Simulation-Project