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Computing Systems Fundamentals
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Programming Assignment #1

Description of Submitted Files and Programs:

Program1.py: This Python script simulates the workload for a system composed of 1000 processes. It generates a list of tuples containing process ID, arrival time, and requested service time. The arrival rate of processes follows a Poisson distribution, and the service time follows an exponential distribution.

Program2.py: This Python script models a computing system composed of two mirrored servers. It generates synthetic data showing the failure and restoration times for each server over 20 years. The failure times follow an exponential distribution with a mean time between failures (MTBF), and restoration time is fixed at 10 hours.

run.py: This Python script orchestrates the execution of both file1.py and file2.py simultaneously using the subprocess module.

2. Results:

Program1.py: Upon execution, Program1.py generates a workload comprising tuples representing process ID, arrival time, and requested service time. The actual average arrival rate and service time are calculated based on the generated workload.

Program2.py: After running Program2.py, the failure and restoration times for each server over 20 years are simulated. Additionally, the script calculates the average time until the entire computing system fails when both servers have restoration times overlapped.

3. Answers to Questions:

Program1.py: The actual average arrival rate and service time generated by Program1.py are computed based on the generated workload. These values provide insights into the system's performance and resource utilization.

Program2.py: The average time until the whole computing system fails, considering the overlapping restoration times of both servers, is determined through multiple simulations. By analyzing these results, we gain an understanding of the system's reliability and resilience to failures.