

Performance Evaluation of Computer Networks

Project#3

A database server has one processor and two disks, disk1 and disk2. The database server processes three types of workloads: query transactions, update transactions, and interactive users. Table (1) gives the input parameters for these classes.

Class	D_{CPU} (sec)	D_{disk1} (sec)	D_{disk2} (sec)	λ_T (tps)	M_r	Z_r (sec)
Query	0.050	0.025	0.06	3	-	-
Update	0.08	0.03	0.07	1.5	-	-
Interactive	0.09	0.06	0.0	-	30	15

Table (1)

- a) Use JMT and find the following performance metrics:
 - System throughput for each workload class
 - System throughput
 - Utilization of each resource for each workload class
 - Utilization of each resource
 - Residence time of each workload class at each resource
 - System response time for each workload class
 - System response time
 - Number of each workload class transactions at each resource
 - Number of transactions at each resource
 - Number of each workload class transactions at the system
 - Number of transactions at the system
- b) Use the results from previous part and obtain the followings:
 - Number of each workload class transactions is being served in CPU and disks
 - Number of each workload class transactions is being served in the system
 - Number of transactions is being served in the system
 - Queue length of each resource
 - Waiting time of each workload class transactions at each resource
 - Waiting time of each workload class transactions at system
- c) Consider the following scenarios and answer the questions associated with each scenario.

Scenario1: Increasing the arrival rate of query transactions by 70%

Assume that the arrival rate of query transactions is increased by 70%. Obtain the percentage change of system response time for each workload class compared to the base scenario.

Scenario2: Using a Faster Resource

Consider that the bottleneck resource is replaced by one that is two times faster. Obtain the followings:

- Service demand of each workload class transactions at the new resource

- Percentage change of system response time for each workload class compared to the base