Performance Evaluation of Computer Networks

Assignment #5

1. Consider a computer system with one CPU and two disks used to support a database server. To guarantee acceptable QoS levels, at most three users are allowed to be logged onto the database system at any time. A typical transaction requires a total of 5 sec of CPU time, 7.5 sec of disk1 time and 10 sec of disk2 time. Use MVA and find the following:
    - **a.** Utilization of resources
    - **b.** System throughput
    - **c.** Number of transactions at each resource
    - **d.** Residence time of transactions at each resource
    - **e.** System response time
2. Consider a database server which consists of one CPU and two disks. The workload of the database server is characterized by two types of transactions: Query and Update. To guarantee acceptable QoS levels, at most two query and one update transactions are allowed to be processed by the database system at any time. The service demands of each type of transaction at each resource are given at Table 1. Use MVA and find the system throughput and system response time for query and update transactions.

Workload	Service Demands (sec)		
	CPU	Disk1	Disk2
Query	0.15	0.18	0.12
Update	0.35	0.45	0.25

Table1. Data for exercise 2

3. Reconsider the system described in problem(2). Suppose now that we characterize the query workload of the database server as an open class, with arrival rate equal to 4 tps and the update workload as a closed class, with N equal to 2. Use MVA and find the system throughput and system response time for query and update transactions.