

Performance Evaluation of Computer Networks

Quiz #3

1. The workload of a database server is characterized by three types of transactions: Trivial, Medium, and Complex. The database server which consists of one CPU and one disk. This server is monitored for one hour and the utilization of CPU and disk are measured to be 45% and 70%. Additional metrics obtained during the observation period are shown in Table 1.

	Trivial	Medium	Complex
Number of Physical I/Os	10	20	40
Total CPU Seconds	700	450	200
Number of Transactions Completed	9500	6500	1800

Table 1. Data for exercise 1

For each workload class, find the following:

- a. Service demands at CPU and Disk.
 - b. System throughput
 - c. System response time
2. Consider a VMM (Virtual Machine Monitor) that runs three virtual machines concurrently. The VMM runs on top of a mainframe which consists of a single CPU. VM₁ runs a guest operating system that processes three workload classes: Batch (B), Interactive (I), and Transactions (TP). The TP monitor supports the execution of two classes of transactions: Query (Q) and Update (U).

Using data collected by monitors at different layers of the system, the analyst obtains the following measurements:

$$U_{\text{CPU,Total}} = 95\%, U_{\text{CPU,VM1}} = 60\%, U_{\text{CPU,VM2}} = 12\%, U_{\text{CPU,VM3}} = 13\%,$$

$$T_B = 15 \text{ seconds}, T_I = 15 \text{ seconds}, T_{\text{TP}} = 80 \text{ seconds},$$

$$T_Q = 30 \text{ seconds}, T_U = 40 \text{ seconds}, \lambda_Q = 10 \text{ tps}, \lambda_U = 4 \text{ tps}$$

Find the service demands of Query and Update workload classes at CPU.

