Performance Analysis Q/A

Dr. J. Burns

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The following laws are needed to solve this assignment:

1. Utilization Law: $U_i = S_i \times X_i$
2. Forced Flow: $X_i = V_i \times X_0$
3. Service Demand: $D_i = V_i \times S_i = \frac{U_i}{X_0}$
4. Little's Law: $N = XR$
5. Interactive Response Time Law: $R = \frac{M}{X_0} - Z$

Q1

A computer system is measured for 30 minutes. During this time, 5,400 transactions are completed and 18,900 I/O operations are executed on a certain disk that is 40% utilized. What is the average number of I/O operations per transaction on this disk? What is the average service time per transaction on this disk?

Q2

A transaction processing system is monitored for one hour. During this period, 5,400 transactions are processed. What is the utilization of a disk if its average service time is equal to 30 msec per visit and the disk is visited three times on average by every transaction?

Q3

A file server is monitored for 60 minutes, during which time 7,200 requests are completed. The disk utilization is measured to be 30%. The average service time at this disk is 30 msec per file operation request. What is the average number of accesses to this disk per file request?

Q4

A computer system has one CPU and two disks: disk 1 and disk 2. The system is monitored for one hour and the utilization of the CPU and of disk 1 are measured to be 32% and 60%, respectively. Each transaction makes 5 I/O requests to disk 1 and 8 to disk 2. The average service time at disk 1 is 30 msec and at disk 2 is 25 msec. Find:

1. Find the system throughput, X_0.
2. Find the utilization of disk 2.
3. Find the average service demands at the CPU, disk 1, and disk 2.

Q5

The average delay experienced by a packet when traversing a computer network is 100 msec. The average number of packets that cross the network per second is 128 packets/sec. What is the average number of concurrent packets in transit in the network at any time?

Q6

An interactive system has 50 terminals and the user's think time is equal to 5 seconds. The utilization of one of the system's disk was measured to be 60%. The average service time at the disk is equal to 30 msec. Each user interaction requires, on average, 4 I/Os on this disk. What is the average response time of the interactive system?