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First Semester M.Tech. Degree Examination, January 2011

Computer System Performance Analysis

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1
 - a. What are the different methods for performance evaluation? (04 Marks)
 - b. Indicate the seven criteria for selecting an evaluation technique. (08 Marks)
 - c. Define nominal capacity and usable capacity of a system. (04 Marks)
 - d. Based on utility classification, what are the different classes of performance matrices, with examples of each class? (04 Marks)
- 2
 - a. What are the five types of test workloads used to compare computer systems? (05 Marks)
 - b. Explain the synthetic program and debit credit benchmark. (06 Marks)
 - c. What are the components of SPEC 1.0? (05 Marks)
 - d. How do you calculate SPEC mark of a system? (04 Marks)
- 3
 - a. Based on implementation mechanism, what are the different methods for monitoring the performance of a computer system? (04 Marks)
 - b. Explain the terms event, overhead, trace and resolution in the context of monitoring. (04 Marks)
 - c. Which type of monitor has less overhead and higher resolution? (02 Marks)
 - d. Explain the architecture and functionality of a distributed system monitor. (10 Marks)
- 4
 - a. What are single parameter and multi parameter histograms? Explain. (08 Marks)
 - b. Consider a workload with five components and two parameters. The CPU time and number of disk I/Os were measured for five programs as shown below :

Program	A	B	C	D	E
CPU time	2	3	1	4	5
Disk I/O	4	5	6	3	2

Using a spanning tree algorithm for cluster analysis, prepare a dendrogram. (12 Marks)

- 5
 - a. Explain the terminologies in DOE : i) Response, ii) Factor, iii) Level, iv) Treatment, v) Replication and vi) Interaction. (06 Marks)
 - b. Explain the advantages and disadvantages of simple design, full factorial design and fractional factorial design in experimental design. (08 Marks)
 - c. For a 2^2 design, the variation can be divided into three parts : $SST = 2^2 q_A^2 + 2^2 q_B^2 + 2^2 q_{AB}^2$. Deduce this equation. (06 Marks)
- 6
 - a. What is Kendall notation in queuing systems? (03 Marks)
 - b. Prove Little's law. (05 Marks)
 - c. Explain the Markov process, birth and death process and Poisson process. (09 Marks)
 - d. What does M / M / 5 / 20 / 1500 / FCFS denote? (03 Marks)
- 7
 - a. Find the expression for steady state probability of being in state n for a birth and death process in terms of arrival rate, service rate and p_0 (probability being in the zero state). (10 Marks)
 - b. A storage system consists of three disk drives, sharing a common queue. The average time to service a I/O request is 50 milli secs. The I/O requests arrive in the storage system, at the rate of 30 requests per second. Using M / M / 3 queuing system, determine the average desk utilization and probability of the system being idle. (10 Marks)
- 8
 - a. Explain open, closed and mixed queuing networks, with examples, on the type of jobs they are used for. (06 Marks)
 - b. Explain the machine repairman model of a computer system. (06 Marks)
 - c. Explain the two operational laws : i) Utilization law ii) Forced flow law. (08 Marks)