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06CS81

Eighth Semester B.E. Degree Examination, June 2012
Advanced Computer Architecture

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART - A

- 1 a. Define computer architecture. Illustrate the seven dimensions of an ISA. (08 Marks)
 b. Explain in brief measuring, reporting and summarizing performance of computer system. (08 Marks)
 c. Assume a disk subsystem with the following components and MTTF:
- 10 disks, each rated at 1000000 - hour MTTF.
 - 1 SCSI controller, 500,000 - hour MTTF.
 - 1 power supply, 200,000 - hour MTTF.
 - 1 fan, 200,000 - hour MTTF.
 - 1 SCSI cable, 1,000,000 - hour MTTF.

Using the simplifying assumptions that the lifetimes are exponentially distributed and that failures are independent, compute the MTTF of the system as a whole. (04 Marks)

- 2 a. Explain how pipeline is implemented in MIPS. (06 Marks)
 b. Explain different techniques in reducing pipeline branch penalties. (06 Marks)
 c. What are the major hurdles of pipelining? Explain briefly. (04 Marks)
 d. Consider the unpipelined processor in RISC. Assume that it has a 1 ns clock cycle and that it uses 4 cycles for ALU operations and branches and 5 cycles for memory operations. Assume that the relative frequencies of these operations are 40%, 20% and 40% respectively. Suppose that due to clock skew and setup, pipelining the processor adds 0.2 ns of overhead to the clock. Ignoring any latency impact, how much speedup in the instruction execution rate will we gain from a pipeline? (04 Marks)

- 3 a. What are the basic compiler techniques for exposing ILP? Explain briefly. (08 Marks)
 b. Explain Tomarulo's algorithm, sketching the basic structure of a MIPS floating point unit. (08 Marks)
 c. Explain true data dependence, name dependence and control dependence with an example code fragment. (04 Marks)

- 4 a. Explain exploiting ILP using dynamic scheduling, multiple issue and speculation. (08 Marks)
 b. Explain Pentium 4 pipeline supporting multiple issue with speculation. (08 Marks)
 c. Suppose we have a VLIW that could issue two memory references, two FP operations and one integer operation or branch in every clock cycle, show an unrolled version of the loop $x(i) = x(i) + s$, for such a processor. Unroll as many times as necessary to eliminate any stalls. Ignore delayed branches.

MIPS	Code
Loop: L. D	$F_0, O(R_1);$
ADD.D	$F_4, F_0, F_2;$
S.D	$F_4, O(R_1);$
DADDUI	$R_1, R_1, \#-8;$
BNE	R_1, R_2, Loop

(04 Marks)

PART – B

- 5 a. Explain basic schemes for enforcing coherence. (08 Marks)
 b. Explain performance of symmetric shared memory multiprocessors. (08 Marks)
 c. Suppose we have an application running on a 32-processor multiprocessor, which has a 200 ns time to handle reference to a remote memory. For this application, assuming that all the references except those involving communication hit in the local memory hierarchy, which is slightly optimistic. Processors are stalled on a remote request, and the processor clock rate is 2 GHz. If the base CPI (assuming that all references hit in the cache) is 0.5, how much faster is the multiprocessor if there is no communication versus if 0.2% of the instructions involve a remote communication reference? (04 Marks)
- 6 a. Explain the six basic cache optimization techniques. (10 Marks)
 b. Given the data below, what is the impact of second level cache associativity on its miss penalty?
 ❖ Hit time L_2 for direct mapped = 10 clock cycles
 ❖ Two way set associativity increases hit time by 0.1 clock cycles to 10.1 clock cycles.
 ❖ Local miss rate L_2 for direct mapped = 25%
 ❖ Local miss rate L_2 for two-way set associative = 20%
 ❖ Miss penalty L_2 = 200 clock cycles. (06 Marks)
 c. What are the techniques for fast address translation? Explain. (04 Marks)
- 7 a. Explain any 3 advanced cache optimization techniques. (08 Marks)
 b. Explain memory technology and optimizations. (06 Marks)
 c. Assume that the hit time of a two-way set associative first level data cache is 1.1 times faster than a four-way set associative cache of the same size. The miss falls from 0.049 to 0.044 for an 8 KB data cache. Assume a hit is 1 clock cycle and that the cache is the critical path for the clock. Assume that the miss penalty is 10 clock cycles to the L_2 cache for the two-way set associative cache, and that the L_2 cache does not miss. Which has the faster average memory access time? (06 Marks)
- 8 a. Explain detecting and enhancing loop level parallelism for VLIW. (06 Marks)
 b. Explain Intel-IA 64 architecture with a neat diagram. (06 Marks)
 c. Explain hardware support for exposing parallelism for VLIW and EPIC. (08 Marks)

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06CS82

Eighth Semester B.E. Degree Examination, June 2012

System Modelling and Simulation

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. List any three situations when simulation is the appropriate tool and not appropriate tool. (06 Marks)
- b. Define the following terms used in simulation: (06 Marks)
 - i) Discrete system
 - ii) Continuous system
 - iii) Stochastic system
 - iv) Deterministic system
 - v) Entity
 - vi) Attribute
- c. Draw the flowchart of steps involved in simulation study. (08 Marks)

- 2 a. Consider the grocery store with one checkout counter. Prepare the simulation table for eight customers and find out average waiting time of customer in queue, idle time of server, and average service time. The inter arrival time (IAT) and service time (ST) are given in minutes.

IAT : 3, 2, 6, 4, 4, 5, 8
 ST (min) : 3, 5, 5, 8, 4, 6, 2, 3

Assume first customer arrives at t = 0.

- b. Suppose the maximum inventory level M is 11 units and the review period N is 5 days, estimate by simulation, the average ending units in inventory and number of days when a shortage condition occurs. Initial simulation has started with inventory level of 3 units and an order of 8 units scheduled to arrive in two days time. Simulate for three cycles (15 days). The probability for daily demand and lead time is given in table.

Demand	0	1	2	3	4
P	0.1	0.25	0.35	0.2	0.1

Lead time	1	2	3
Probability	0.5	0.3	0.2

RD for demand: 24, 35, 65, 25, 8, 85, 77, 68, 28, 5, 92, 55, 49, 69, 70.
 RD for lead time: 5, 0, 3.

(10 Marks)

- 3 a. Define the term used in discrete event simulation: (06 Marks)
 - i) System state
 - ii) List
 - iii) Event
 - iv) FEL
 - v) Delay
 - vi) System.

- b. Six dump trucks are used to haul coal from the entrance of a small mine to railroad. Each truck is loaded by one of two loaders. After loading truck moves to scale, to be weighed. After weighing a truck begins a travel time and then returns to loader queue. It has been assumed that five of trucks are at loader and one at scale at time 0. By using event scheduling algorithm find out busy time of loader and scale and stopping time E is 64 minutes.

Loading time	10	5	5	10	15	10	10
Weighing time	12	12	12	16	12	16	-
Travel time	60	100	40	40	80	-	-

(14 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 4 a. The number of Hurricanes hitting the coast of India follows Poisson distribution with mean $\alpha = 0.8$ per year. Determine:
- The probability of more than two hurricanes in a year
 - The probability of only one hurricane in a year.
- b. Explain terms used in queuing notations of the form A/B/C/N/K. (06 Marks)
- c. List the steady state parameters of M/G/1. (08 Marks)

PART - B

- 5 a. Using multiplicative congruential method, generate random numbers to complete cycle. Explain maximum density and maximum period. $A = 11, m = 16, X_0 = 7$. (10 Marks)
- b. Using suitable frequency test find out whether the random numbers generated are uniformly distributed on the interval $[0, 1]$ can be rejected. Assume $\alpha = 0.05$ and $D_\alpha = 0.565$. The random numbers are 0.54, 0.73, 0.98, 0.11, 0.68. (10 Marks)
- 6 a. Develop a random variate generator for X with pdf given by
- $$f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2-x, & 1 < x \leq 2 \\ 0, & \text{otherwise} \end{cases}$$
- (06 Marks)
- b. Explain with an example, importance of data distribution using histogram. (06 Marks)
- c. The following is set of single digit numbers from a random number generator. Using appropriate test, check whether the numbers are uniformly distributed. $N = 50, \alpha = 0.05$ and $X_{0.05,9}^2 = 16.9$.
- 6, 7, 0, 6, 9, 9, 0, 6, 4, 6, 4, 0, 8, 2, 6, 6, 1, 2, 6, 8, 5, 6, 0, 4, 7
1, 3, 5, 0, 7, 1, 4, 9, 8, 6, 0, 9, 6, 6, 7, 1, 0, 4, 7, 9, 2, 0, 1, 4, 8 (08 Marks)
- 7 a. Records pertaining to the monthly number of job related injuries at an underground coalmine were being studied by federal agency. The values of past 100 months are as follows:
- | Injuries/month | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------------|----|----|----|---|---|---|---|
| Frequency of occurrence | 35 | 40 | 13 | 6 | 4 | 1 | 1 |
- Apply the chi-square test to these data to test the hypothesis that the distribution is Poisson with mean 1.0 and $\alpha = 0.05$ and $X_{0.05,3}^2 = 7.81$. (10 Marks)
- b. Differentiate between terminating and steady state simulation with respect to output analysis with an example. (10 Marks)
- 8 a. Explain with a neat diagram verification of simulation model. (10 Marks)
- b. Describe with a neat diagram iterative process of calibrating a model. Which are three steps that aid in the validation process? (10 Marks)

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06CS/IS835

Eighth Semester B.E. Degree Examination, June 2012
Information and Network Security

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Explain issue-specific security policy. (10 Marks)
b. Draw a schematic diagram showing the major steps in contingency planning. Explain in detail, business impact analysis. (10 Marks)
- 2 a. Explain the firewall rules. (10 Marks)
b. What is a VPN? Explain the different techniques to implement on VPN. (10 Marks)
- 3 a. Differentiate between network-based IDS and host-based IDS emphasizing on their advantages and disadvantages. (08 Marks)
b. With the help of a schematic diagram, explain the centralized control strategy implementation of IDS. (06 Marks)
c. Enumerate the advantages and disadvantages of using honey pots. (06 Marks)
- 4 a. What are the fundamental differences between symmetric and asymmetric encryption. (06 Marks)
b. Explain the different categories of attacks on the cryptosystem. (08 Marks)
c. Define the following terms with relation to cryptography.
i) Algorithm ii) Key iii) Plaintext
iv) Steganography v) Work factor vi) Key space. (06 Marks)

PART – B

- 5 a. Discuss active security attacks. (04 Marks)
b. With the help of a neat diagram, explain the general format of a X.509 public key certificate. (06 Marks)
c. Explain the Kerberos version 4 message exchanges. (10 Marks)
- 6 a. Explain the PGP message generation and reception processes. (10 Marks)
b. Explain the different MIME content types. (10 Marks)
- 7 a. Mention the applications of IPsec. (04 Marks)
b. Explain the security association selectors that determine an security policy database entry. (06 Marks)
c. Draw a neat diagram of IPsec ESP format and explain. (05 Marks)
d. Mention the important features of Oakley algorithm. (05 Marks)
- 8 a. Explain the parameters that define session state and connection state in SSL. (10 Marks)
b. Describe the SET participants. (05 Marks)
c. Explain the construction of dual signature in SET with a diagram. Also show its verification by the merchant and the bank. (05 Marks)

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06CS842

Eighth Semester B.E. Degree Examination, June 2012
Software Testing

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Explain with a supporting flow graph the concept of errors, faults and failures in the process of programming and testing. (10 Marks)
b. Explain the types of metrics used in software testing and their relationships. (10 Marks)
- 2 a. Explain the elements of static testing and distinguish between walkthroughs and inspections. (10 Marks)
b. Explain how saturation effect is observed during the testing of complex software systems with supporting figure. (10 Marks)
- 3 a. List the techniques for test selection from informal and rigorously specified requirements and with an example explain any one technique from this list. (10 Marks)
b. Explain the steps in the category-partition method. (10 Marks)
- 4 a. Explain the procedure for generating a decision table from a cause-effect graph. (10 Marks)
b. Explain fault propagation by giving example. (10 Marks)

PART – B

- 5 a. Explain different elements in control flow, discuss them with regard to testing, adequacy criterion and coverage. (15 Marks)
b. Write short notes on procedure call testing. (05 Marks)
- 6 a. Define the following by giving necessary examples: i) Use of a variable; ii) Definition of a variable; iii) Direct data dependency; iv) Definition of clear path. (08 Marks)
b. Define the various data flow testing criteria. (08 Marks)
c. Write a short note on data flow coverage with complex structures. (04 Marks)
- 7 a. Explain the following:
i) Test case
ii) Test case specification
iii) Test suite
iv) Adequacy criteria
v) Test obligation. (10 Marks)
b. With reference to test execution, explain the concept of scaffolding and test oracles. (10 Marks)
- 8 a. Explain integration testing strategies. (08 Marks)
b. Compare system, acceptance and regression testing. (08 Marks)
c. Write short notes on clean room process model. (04 Marks)

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06CS846

Eighth Semester B.E. Degree Examination, June 2012
Programming Languages

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1
 - a. What is the difference between machine language and assembly language? (06 Marks)
 - b. Explain the distinction between interpretation and compilation. What are the advantages and disadvantages of the two approaches? (08 Marks)
 - c. What is the advantage of binding things as early as possible? What is the advantage of delaying binding? (06 Marks)
- 2
 - a. Describe the difference between deep and shallow binding of referencing environments. (06 Marks)
 - b. What is subroutine closure? What is it used for? How is it implemented? (08 Marks)
 - c. What is short-circuit evaluation? Why is it useful? (06 Marks)
- 3
 - a. List the principal uses of goto, and the structured alternatives to each. (08 Marks)
 - b. Describe the “iteration count” loop implementation. What problem does it solve? (06 Marks)
 - c. What is lazy evaluation? Mention the reasons for its usage. (06 Marks)
- 4
 - a. Mention the languages that lack a Boolean type. What do they use instead? (06 Marks)
 - b. What does it mean for a set of language features to be orthogonal? (05 Marks)
 - c. Explain the difference among type conversion, type coercion and nonconverting type casts. (09 Marks)

PART – B

- 5
 - a. Name three languages that provide extensive support for character strings. (04 Marks)
 - b. What is the difference between a pointer and an address? Discuss the advantages and disadvantages of interoperability of pointers and arrays in C. (09 Marks)
 - c. What are dangling references? How are they created? (07 Marks)
- 6
 - a. How do calling sequences typically differ in CISC and RISC compilers? (06 Marks)
 - b. Describe how to maintain the static chain during a subroutine call. (08 Marks)
 - c. What is the difference between formal and actual parameters? Explain the rationale for READONLY parameters in modula-3. (06 Marks)
- 7
 - a. What is the difference between a coroutine and a thread? (06 Marks)
 - b. What are constructors and destructors? (06 Marks)
 - c. Explain the distinctions among private, protected and public class members in C++. (08 Marks)
- 8
 - a. Describe the three most important functions to manipulate lists. (09 Marks)
 - b. Explain how prolog differs from imperative languages in its handling of arithmetic. (06 Marks)
 - c. Briefly discuss any five common characteristics of scripting languages. (05 Marks)

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