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Eighth Semester B.E. Degree Examination, December 2011
Advanced Computer Architecture

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

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

PART – A

1 a. Define the computer architecture. Explain the response time, throughput, elapsed time and processor clock. 　　　　　　　　　　　　　　　　　　　　　　**(06 Marks)**
   b. Briefly explain the Amdahl's law. 　　　　　　　　　　　　　　　　　　　　**(07 Marks)**
   c. Two code sequences for a particular machine are considered by a compiler designer.

Instruction class	CPI for this instruction class
A	1
B	2
C	3

The compiler designer considers 2 code sequences that require the following instruction counts for a particular high – level language statement.

Code sequence	Instruction counts for instruction class		
	A	B	C
1	20	10	20
2	40	10	10

   i)   Which code sequence executes most of the instructions?
   ii) What is the CPI for each sequence?
   iii) Which will be faster? 　　　　　　　　　　　　　　　　　　　　　　　**(07 Marks)**

2 a. What are the major hurdles of pipelining? Illustrate the data hazard, briefly. 　**(10 Marks)**
   b. With a neat block diagram, explain how an instruction can be executed in 4 or 5 clock cycles in MIPS data path, without the pipeline register. 　　　　　　　　　　　　**(10 Marks)**

3 a. List the steps to unroll the code and schedule. 　　　　　　　　　　　　　**(05 Marks)**
   b. Explain how Tomasulo's algorithm can be extended to support speculation. 　**(10 Marks)**
   c. Explain the dynamic branch prediction state diagram. 　　　　　　　　　　**(05 Marks)**

4 a. Explain the basic VLIW approach. List its drawbacks. 　　　　　　　　　　**(08 Marks)**
   b. With a neat diagram, explain the steps involved in handling an instruction, with a branch target buffer. Also evaluate how well it works. 　　　　　　　　　　　　　**(12 Marks)**

PART – B

   a. Explain the different taxonomy of parallel architecture. 　　　　　　　　　**(08 Marks)**
   b. With a neat diagram, explain the basic structure of a centralized shared – memory and distributed – memory multiprocessor. 　　　　　　　　　　　　　　　　**(06 Marks)**
   c. Explain the snooping, with a respect to cache – coherence protocols. 　　　　**(06 Marks)**

1 of 2

6 a. Explain the six basic optimizations. (12 Marks)
    b. With a neat diagram, explain the hypothetical memory hierarchy. (08 Marks)

7 a. Explain the DRAM technology. How do you improve memory performance inside a DRAM chip? (10 Marks)
    b. Explain the compiler optimizations to reduce miss rate. (10 Marks)

8 a. Find all the true dependences, output dependences and antidependences and eliminate the output and antidependences by renaming, in the code given below:

```
for (i = 1;   i <= 100;   i = i + 1) {
        y[i] = x[i] /c ;       /* s1 */
        x[i] = x[i]+c ;        /* s2 */
        z[i] = y[i]+c ;        /* s3 */
        y[i] = c – y[i] ;      /* s4 */
        }
```
(10 Marks)

    b. Write short notes on:
      i) The Itanium 2 processor
      ii) IA – 64 register model. (10 Marks)

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Eighth Semester B.E. Degree Examination, December 2011

System Modeling and Simulation

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting at least TWO questions from each part.*
2. *Statistical tables A.6 and A.8 from the text book can be provided.*

PART – A

1 a. List any five circumstances, when the simulation is the appropriate tool and when it is not.
                                                                                            (10 Marks)
   b. Explain the steps in a simulation study, with the flow chart.   **(10 Marks)**

2 a. One company uses 6 trucks to haul manganese ore from Kolar to its industry. There are two loaders, to load each truck. After loading, a truck moves to the weighing scale to be weighed. The queue discipline is FIFO. When it is weighed, a truck travels to the industry and returns to the loader queue. The distribution of loading time, weighing time and travel time are as follows :

Loading time : 10   5   5   10   15   10   10
Weigh time :   12   12   12   16   12   16
Travel time :   60 100   40   40   80

Calculate the total busy time of both the loaders, the scale average loader and scale utilization. Assume 5 trucks are at the loaders and one is at the scale, at time "0". Stopping time $T_E = 64$ min.   **(10 Marks)**
   b. Explain simulation in GPSS, with a block diagram, for the single server queue simulation.
                                                                                            (06 Marks)
   c. Explain the following :
       i) System   ii) Event list   iii) Entity   iv) Event.   **(04 Marks)**

3 a. Explain discrete random variables and continuous random variables, with examples.
                                                                                            (10 Marks)
   b. Explain any two discrete distributions.   **(05 Marks)**
   c. Explain the following continuous distribution :
       i)   Uniform distribution
       ii) Exponential distribution.   **(05 Marks)**

4 a. Explain the characteristics of a queuing system. List different queuing notations.   **(10 Marks)**
   b. Explain any two long-run measures of performance of queuing systems.   **(10 Marks)**

PART – B

5 a. Explain the two different techniques used for generating random numbers, with examples.
                                                                                            (10 Marks)
   b. The sequence of numbers 0.44, 0.81, 0.14, 0.05, 0.93 has been generated. Use the Kolmogonov-Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval [0, 1] can be rejected. Compare $F(X)$ and $S_N(X)$ on a graph.
                                                                                            (10 Marks)

6   a.   Explain inverse-transform technique of producing random variates for exponential distribution.   **(05 Marks)**

      b.   Generate three Poison variates with mean $\alpha = 0.2$.   **(05 Marks)**

      c.   Explain the types of simulation with respect to output analysis. Give at least two examples.   **(10 Marks)**

7   a.   Explain Chi-square goodness of fit test. Apply it to Poisson assumption with $\alpha = 3.64$. Data size = 100 and observed frequency $O_i = 12, 10, 19, 17, 10, 8, 7, 5, 5, 3, 3, 1$.   **(10 Marks)**

      b.   List the steps involved in the development of a useful model of input data.   **(05 Marks)**

      c.   Explain Chi-square goodness-of-fit test for exponential distribution, with an example.   **(05 Marks)**

8   a.   Explain, with a neat diagram, model building, verification and validation.   **(10 Marks)**

      b.   Explain any two output analysis for steady-state simulations.   **(10 Marks)**

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Eighth Semester B.E. Degree Examination, December 2011

Information and Network Security

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Define the terms : policy, standards and practices in the context of information security.
      Draw a schematic diagram depicting the inter-relationship between the above.   **(06 Marks)**
   b. What are the policies that must be defined by the managements (of organizations) as per
      NIST SP 800 – 14? Describe briefly the specific areas covered by any two of these policies.
                                                                                      (07 Marks)
   c. What are the components of contingency planning? Describe briefly the important steps
      involved in the recovery process after the extent of damage caused by an incident has been
      assessed.   **(07 Marks)**

2 a. What is a firewall? List the type of firewalls categorized by processing mode. Draw a
      schematic diagram of a packet-filtering router used as a firewall and explain its function
      using a sample firewall rule.   **(10 Marks)**
   b. Describe the steps involved in Kerberos login and Kerberos request for services, with
   suitable illustrations.   **(10 Marks)**

3 a. Define the following terms related to IDS :
      i)   Alert
      ii)   False attack stimulus
      iii) False negative
      iv)   False positive
      v)   True attack stimulus.   **(05 Marks)**
   b. Discuss the reasons for acquisition and use of IDSs by organizations.   **(06 Marks)**
   c. Discuss the differences between host IDS and network IDS, with the help of a schematic
      diagram.   **(06 Marks)**
   d. Define the terms : honey pots, honey net and padded cells.   **(03 Marks)**

4 a. Define the following terms related to cryptography :
      i)   Algorithm
      ii)   Cipher
      iii) Key
      iv)   Link encryption
      v)   Work factor.   **(05 Marks)**
   b. Distinguish between symmetric encryption and asymmetric encryption, with suitable
      examples.   **(06 Marks)**
   c. Describe the terms : authentication, integrity, privacy, authorization and non-repudiation.
                                                                                      (05 Marks)
   d. Discuss the "man-in-the-middle" attack.   **(04 Marks)**

PART – B

5 a. Describe briefly the various security attacks and specific security mechanisms covered by X.800. (14 Marks)
   b. Describe briefly the authentication procedures covered by X.809. (06 Marks)

6 a. Describe the steps involved in providing authentication and confidentiality by PGP, with suitable illustrations. (10 Marks)
   b. Discuss the limitations of SMTP/RFC 822 and how MIME overcomes these limitations. (10 Marks)

7 a. Describe the benefits of IPSec. (05 Marks)
   b. What is security association? Discuss briefly the parameters that are used to define a security association. (05 Marks)
   c. Describe the transport and tunnel modes used for IPSec AH authentication bringing out their scope relevant to IPV4. (10 Marks)

8 a. Discuss the SSL protocol stack. (04 Marks)
   b. What are the services provided by SSL record protocol? Describe the operation of this protocol, with suitable illustration. (08 Marks)
   c. What is SET? Discuss its specifications. (08 Marks)

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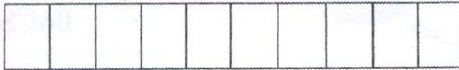
Eighth Semester B.E. Degree Examination, December 2011
Programming Languages

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

a. Describe any five tools that commonly support the work of a compiler within a larger programming environment. **(10 Marks)**
b. List different times – binding times, at which, decisions may be bound. **(05 Marks)**
c. Andy and Bob are shopping for groceries. Andy knows how to program prolog and Bob agrees to Andy's suggestion to use the following program to purchase the items :

likes (andy, twinkies)
likes (andy, cake)
likes (andy, pie)
likes (andy, juice)
likes (bob, pie)
likes (bob, apples)
likes (bob, twinkies)
price (twinkies, 1)
price (cake, 5)
price (pie, 7)
price (juice, 2)
buy (x) : likes (andy, x), /+
          likes (bob, x),
          price (x, p), p < 3

For query ? – buy (x), which items x are found on backtracking. **(05 Marks)**

a. Explain with examples, the eight major categories of control – flow mechanisms. **(10 Marks)**
b. Define deep binding and shallow binding. Describe the difference between them, with examples. **(10 Marks)**

a. What is short–circuit Boolean evaluation? Explain its importance, with examples. **(08 Marks)**
b. How are tail – recursive functions faster than naïve implementation of recursion? **(04 Marks)**
c. Write a recursive function in C and in scheme to implement

$$fib(n) = \begin{cases} 1 & \text{if } n = 0 \text{ or } n = 1 \\ fib(n-2) + fib(n-1) & \text{otherwise.} \end{cases}$$

(08 Marks)

a. Define :
   i) Strongly types language
   ii) Statically typed language
   iii) Denotational view of type
   iv) Constructive view of type. **(08 Marks)**
b. With neat diagrams, explain the difference between row – major and column – major layouts for contiguously allocated arrays. **(06 Marks)**
c. What is row – pointer layout? Mention its advantages. **(06 Marks)**

PART – B

5 a. Define list. Discuss the fundamental operations on lists in Lisp and ML.   (10 Marks)
   b. Write short notes on :
       i)   Deep and shallow equality and assignment
       ii) Pointers and arrays in C.   (10 Marks)

6 a. What are
       i)   Subroutine calling sequence
       ii) Prologue
       iii) Epilogue
       iv) Stack pointer.   (08 Marks)
   b. With a neat stack frame diagram, explain a typical calling sequence.   (12 Marks)

7 a. Define abstraction. Explain the three important benefits of abstraction.   (08 Marks)
   b. With respect to object oriented programming, explain
       i)   Abstract class
       ii) Virtual methods
       iii) Vtables.   (12 Marks)

8 a. List the common characteristics of scripting languages.   (06 Marks)
   b. Define the term, functional programming. List the features of functional languages.   (06 Marks)

   c. Given the following code :
       (define switch (lambda (X a b c)
           (cond ((< X O) a)
               ((= X O) b)
               ((> X O) c)))).
       Evaluate the expression :
       (switch – 1(+ 1 2)(+ 2 3)(+ 3 4) in applicative order, in normal order evaluation.   (08 Marks)

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