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-From the Graduate/Undergraduate Bulletin

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Name: ____________________________

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Date: ______________________________

Final Examination

COEN241 Cloud Computing
Department of Computer Engineering
Santa Clara University

Dr. Ming-Hwa Wang
Phone: (408) 805-4175
Email address: m1wang@scu.edu
Course website: http://www.cse.scu.edu/~mwang2/cloud/
Office Hours: Wednesday & Friday 9:00-9:30am

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1. [20 points] Please give the whole names for the following acronyms: SAGA, OGF, ABI, BPEL, OGSI, WSDL, RIAA, WORM, WSN, AMI.

2. [40 points] True or false (yes or no, 1 or 0) problems with wrong-answer penalties:
   a) ___ A cluster without shared-disk/memory can do rollback recovery, failover or failback.
   b) ___ Shared-nothing architecture for large-scale clusters and shared-disk and shared-memory for small-scale clusters.
   c) ___ A cluster has \( n \) nodes, the best maximum number of nodes can be assigned to a parallel job (with other sequential jobs) is \( n/2 \).
   d) ___ For grid load prediction algorithms, both point-value prediction and adaptive auto-regression use only historical load.
   e) ___ Parallel data transfer is an \( M \)-to-\( N \) communication problem.
   f) ___ A container not only can run an application efficiently, but also can keep the running environment such that it will be very easy to migrate to another container on another machine with the same OS.
   g) ___ Host VMs run on privilege mode and native VMs run on user mode.
   h) ___ SOA normally use HTTP (or REST) communication protocol.

3. [20 points] Simple questions:
   a) If you have a critical task that must be done correctly (give correct answers by all means), you can relate your algorithm as an instruction sequences, and view your input as data, which of the follow is the safest approach? a) SISD, b) SIMD, c) MISD, d) MIMD, e) SPMD, f) MPMD.
   b) A \( d \)-dimensional CAN system has equal sized zone on its \( d \)-torus at a particular time \( t \), and each zone with size \( 1/d^2 \) on every...
dimension. What is the routing complexity in term of big O notation?

4. [20 points] Name one of the most useful techniques or solutions to solve each of the following problems: a) selfish grids, b) grid security demand fulfillment, c) single sign-on, d) grid load prediction.

5. [20 points] For a Chord algorithm with nodes from node 0 to node 31, where nodes 1, 4, 9, 11, 14, 18, 20, 21, and 28 are active. Please build the finger tables for those nodes and show how an item is searched if the request goes to node 1 with hashed key 26?

6. [20 points] Gnutella version 0.4 uses pure P2P and has 5 descriptors. To discover other peers, a Ping descriptor is used. A servant that receives a Ping sends back one or more Pong descriptors along with the path of Ping in reverse direction. To search files, the Query descriptor is used and a QueryHit descriptor is responded to a Query. The Push descriptor enables firewalled servants to share files with others. Which descriptors are sent in a flooding fashion. Assume each peer has $d$ neighbors in average, and there are $n$ nodes in the system, then how many messages flooded in the system in average? And how many of those messages are duplicated/wasted in worst case?

7. [20 points] To make IoT possible, we moved from 32-bit IPv4 address direct to 128-bit IPv6 (instead of 64-bit IPv5). The Earth diameter is 12,742 km, then how many IPv6 addresses can be allocated per square meter on Earth surface?

8. [20 points] Which of the following are computation/data grids, information/knowledge grids, business grids, or P2P/parasitic grids: a) Berkeley BOINC, b) IBM WebSphere, c) EU DataGrid, d) semantic grids, e) SETI@Home, f) Microsoft .NET, g) NSF TeraGrid.

9. [20 points] Multiple choice questions with multiple answers for the questions: which of the following have single-points-of-failure problem: a) the gateway to a symmetric cluster, b) the gateway to a asymmetric cluster, c) the communication channel or bus in a von Neumann machine, d) the function unit in a von Neumann machine, e) a function unit in a single-CPU superscalar computer, f) the memory for UMA SMP