Politecnico di Milano

090950 – Distributed Systems

Prof. G. Cugola – September 13, 2016

**Rules:**

- **You are not allowed to use books, notes, or other material.**
- **You can answer in Italian or English.**
- **Total time for the test: 2 hours.**

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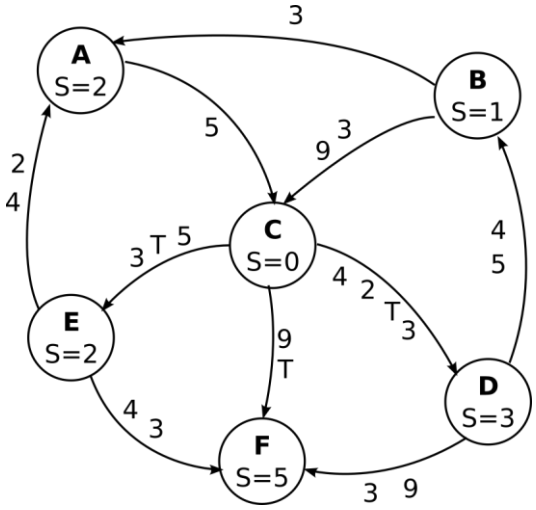
1. Describe the mobile code architectural style.

2. Describe the various techniques to remove unreferenced entities in a distributed system.

3. Consider the system in figure, which is running a distributed snapshot. Suppose that every process works by adding the value held by the received messages to its internal state S. Process A started the snapshot, recording state 2 and sending a token to processes C, which already processed it and sent out its own tokens. Assuming that channels exiting from C are much faster than others, and that no other operations occur apart those required to end the snapshot, show the state captured by every node at the end of the snapshot (local state and messages recorded for each link).




4. Describe and discuss the protocols you know to get reliable group communication in case of reliable nodes and unreliable links.

5. Given the following schedule over 2 variables (both initialized with zero):

   P0 R(x)0 W(y)1 R(x)2 W(y)2
   P1 R(y)1 R(y)2 R(x)2 R(x)3
   P2 W(x)1 R(y)2 W(x)2 R(y)3
   P3 R(y)0 W(x)3 R(x)3 W(y)3

   Is it FIFO/causal/sequential consistent?

6. Suppose to have a Chord DHT system with finger table, which can support up to 8 hosts. Four hosts are currently connected: 1, 3, 5, 6. Describe the content of the routing table of each of the four nodes. If node 1 receives a query for item 7, located in node 6, what is the path of the query along the ring?

7. Describe all the types of synchronization variables belonging to the different consistency models, with pros and cons for each type.