Politecnico di Milano

090950 – Distributed Systems

Prof. G. Cugola – June 20th, 2019

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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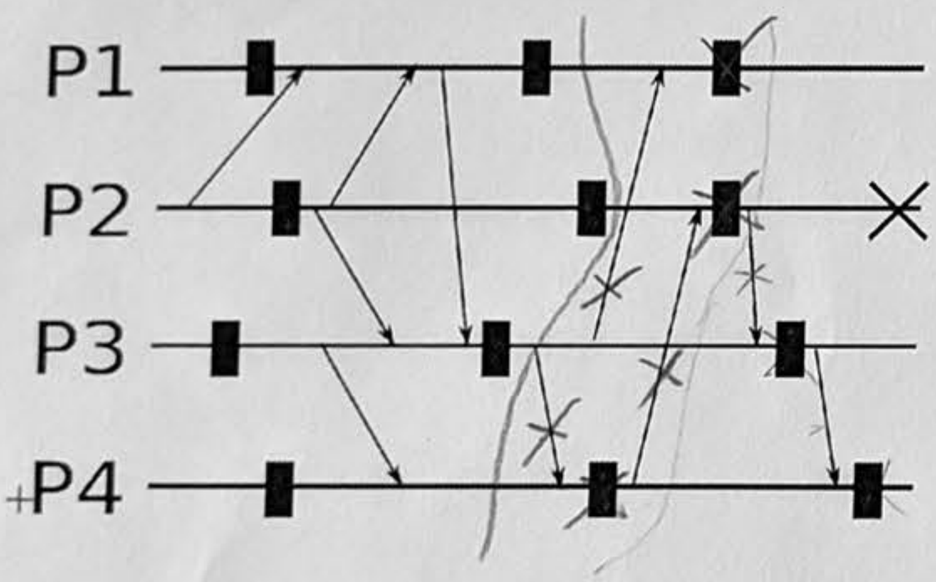
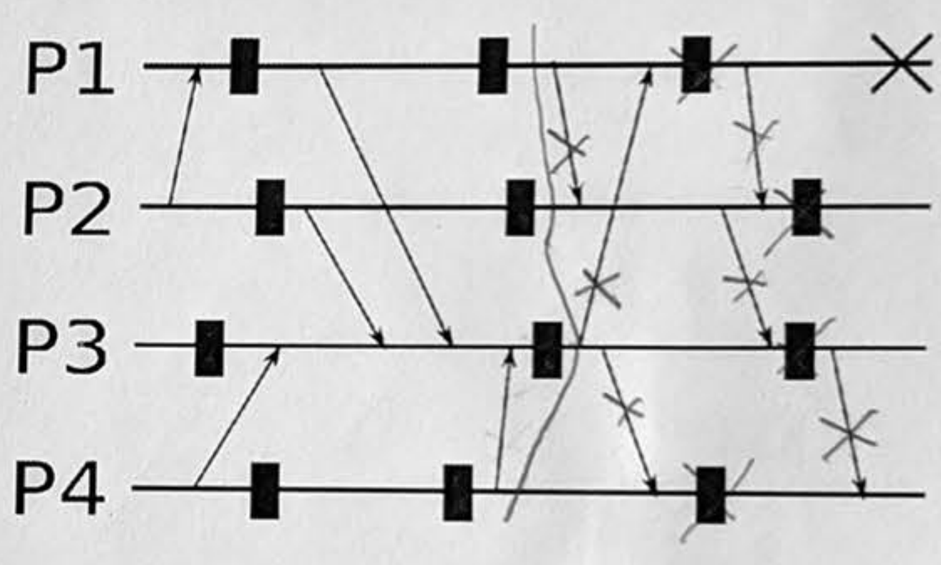
1. Describe the various mobile code paradigms and the type of technologies that support them. Which paradigm is the most complex to implement? Why? #2

2. Describe the differences between a flat naming system implemented using a hierarchy of servers and a structured naming system implemented using a similar hierarchy of servers. Compare the two solutions explaining why the latter is more efficient than the former. #4

3. Calculate the recovery line for the two diagrams below using the rollback-dependency graph for the first one, the checkpoint dependency graph for the second one.





4. Describe how scalar clocks can be used to guarantee mutual exclusion in accessing a shared resource. #6

5. Consider client-centric consistency models. In which situations are they relevant? Define the 4 models presented in class and discuss how they can be implemented. #5

6. With reference to Big Data processing platforms. #3
   a. Explain the difference between pipelined and scheduled execution.
   b. Discuss how the two execution models influence task parallelism, load balancing, and elasticity.

7. Three peers (IDs = 1, 2, 5) participate in a circular DHT with finger table using the CHORD protocol. Assume that the DHT uses 3-bits to represent the node IDs and the Keys.
   a. Show the routing tables of the three peers.
   b. Peer 5 wants to retrieve the value of an object having key 2. Show the exchange of messages required to search the desired value.