

# Homework 5

## CS550 (V01)

Amit Nikam (A20470263)

anikam@hawk.iit.edu

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- 1 What is view synchronous? What is atomic message?

**Ans:** View synchronous is when an entire group's members are either committed or none are. A atomic message is one that either is delivered to all the group nodes or none at all.

- 2 What is coordinated checkpointing?

**Ans:** Coordinated checkpointing is when all processes collectively synchronize to write their state to local storage. The saved state is automatically globally consistent.

- 3 What is a Byzantine failure? How many replicas are needed to survive a  $k$  component fail in Byzantine failure? Why?

**Ans:** When a node or component fails arbitrarily i.e. it might perform incorrect computations, give conflicting information to different parts of system and might collude with other failed nodes. A total  $2k+1$  replicas are needed to survive the failure as  $k+1$  replicas are more than  $k$  replicas which can give majority to the correct nodes.

- 4 Consider a Web browser that returns an outdated cached page instead of more recent one that had been updated at the server. Is this a failure, and if so, what kind of failure?

**Ans:** Yes, this is a type of response failure which occurs when simply returning a page from the cache without checking its consistency.

- 5 We have stated that totally ordered multicasting using Lamport's logical clocks does not scale. Explain why.

**Ans:** The totally ordered multicasting using Lamport's logical clocks requires that all servers are active. Performance is affected if one of the servers is weak or crashed, and that would have to be detected by all other servers. As the number of servers grow, this problem becomes extreme.

- 6 In reliable multicasting, is it always necessary that the communication layer keeps a copy of a message for retransmission purposes?

**Ans:** No it is not always necessary for the communication layer to keep a copy of a message for re-transmission, data availability at application is enough.

- 7 In the two-phase commit protocol, why can blocking never be eliminated, even when the participants elect a new coordinator?

**Ans:** The new coordinator may crash even after the election. So in such case, the remaining participants can also not reach final decision as this requires the vote from the newly elected coordinator.