IIIT Hyderabad

Monsoon 2024

Distributed Systems

Quiz 1   October 17, 2024.

Instructions:

- The quiz is for 45 minutes.
- Answer all the questions. The quiz is for 25 points.
- No clarifications shall be provided during the quiz.

Question 1. Describe the limitations of one-phase commit protocols in a distributed database system. Explain briefly which of the above limitations the 2-phase commit protocol addresses. Mention also some issues that the 2-phase commit protocol fails to address.

(Points: 2+3+2=8)   **(CO-3)**

Question 2. Define what is meant by a ranged hash family. What is meant by monotonicity and spread properties of consistent hashing. Explain how consistent hashing can be used to achieve these two properties.

(Points: 2+1+1+2+2=8)   **(CO-3)**

Question 3. Show how one can reach agreement in the case of Byzantine failures in a network of 7 nodes with up to 2 of them being faulty. How does the solution change if the initiator is faulty?

(Points: 4)   **(CO-4)**

Question 4. Explain the terms ACID and BASE in the context of transaction processing. Mention reasons why relational databases and non-relational databases tend to choose the ACID and BASE semantics, respectively.

(Points: 1+1+3=5)   **(CO-3)**