

CSCI-1380: Distributed Computer Systems

Homework #4

Assigned: 04/24/2018

Due: 05/03/2018

1 Practical Distributed File Systems

1. Your company is currently running NFS (with opportunistic locking) and your workloads are 95% reads. Over the weekend, you decide to turn off opportunistic locking, what is the anticipated impact of this design choice? Explain.

2. Cassandra and Dynamo share many features. One key difference is in the conflict resolution. First, explain why conflict resolution is required.

Second, If Dynamo always uses Cassandra-style resolution, what is the impact? (Hint: Think about the impact of Cassandra-style resolution on the shopping cart)

2 Consensus

3. You are designing a highly available system. You anticipate that hackers are able to hack at most four nodes and convert them into byzantine nodes. How many nodes will you need in your system to overcome byzantine faults?


4. We analyze consensus protocols in terms of Integrity, Agreement, and Termination. For Raft, what ensures that, in a non-byzantine scenario, a Raft cluster achieves Integrity, Agreement, Termination? Please explain.

Termination:

Agreement:

A large, empty rectangular box with a thin black border, intended for a user to write their agreement.

Integrity:

A large, empty rectangular box with a thin black border, intended for a user to write their integrity statement.

3 Handing In

Once finished, you should hand in a PDF with your answers on Gradescope. Gradescope will allow you to select which pages contain your answers for each part of each question.

Please do not put your name on any page of your handin! This will allow us to do fully anonymized grading through Gradescope.

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