

Solutions for Mid Semester Exam M2024.CS3401

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1 Section A

4

NFS protocol is **stateless**.

The consequences of this are:

1. Updates must be flushed from the client to the server on close (modified blocks must be sent to the server).
2. Weak consistency – system can be inconsistent for a few seconds and eventually reach consistency.
3. Periodic checks of consistency must happen.
4. Idempotent operations.
5. Locking is not possible via NFS

Effects on system operations include:

1. Requires establishing exact state.
2. No guarantees on multiple writes.

Examples of effects on system operations include:

1. Caches are not updated immediately – different states of file may be noted by a writer and a reader.
2. Two readers may see different content in the same file as the caches are not updated immediately.
3. Reading from a file takes both file id and location within the file.

Note: Talking about read and delete examples also suffice as examples. Just one example is enough, along with proper reasoning.

There are 4 parts in this question - each is 0.5 marks.

2 Section B

2

The GFS master stores

1. File (hierarchical and on disk) and chunk namespaces (flat and in RAM) (0.5 + 0.5)
2. File to chunk mappings (0.5)
3. Locations of a chunks replicas (0.5)

Based on assumptions chosen, the number of files a master can keep track of can vary.

Note: This is the marking which will not change, given how few people got even part of the assumptions plausible.

Advantages of storing metadata in RAM are:

1. Fast access times
2. Simple to implement
3. Scales with large volumes of data
4. Limited by RAM availability
5. Fault tolerance - logs must be written to disk

Disadvantages of storing metadata in disk are that restarting the server takes a long time.

1. Master server must restart and recover chunks from chunkservers at startup
2. Cost

Note: Each point in this + its contrast is 1 point.