Quiz Questions on Crash Recovery (CS111 - Lecture 5)

Multiple Choice Questions (MCQs)

What is a major drawback of using a linked list to manage free space in a filesystem?

a) It is difficult to traverse.

b) Over time, the list becomes scrambled, reducing contiguous allocation.

c) It requires additional disk space for metadata.

d) It prevents fragmentation.

Why do spinning disks only support reading/writing in sectors?

a) To improve I/O efficiency

b) Due to built-in error-correction mechanisms

c) To reduce fragmentation

d) Because sectors are the smallest unit of disk storage

What is the main purpose of the block cache in a filesystem?

a) To store deleted files

b) To provide a backup in case of system failure

c) To retain frequently accessed disk blocks in memory for faster access

d) To prevent security breaches

Which of the following is NOT a challenge in crash recovery?

a) Data loss due to unwritten changes

b) File fragmentation

c) Filesystem inconsistency

d) Delayed writes

What is the purpose of the fsck utility?

a) To create new files in the filesystem

b) To perform a consistency check and repair filesystem issues after a crash

c) To optimize disk space by defragmenting files

d) To increase I/O performance

Which of the following is a drawback of using fsck?

a) It can take a long time to complete, especially for large disks

b) It causes fragmentation in filesystems

c) It permanently deletes all inconsistent files

d) It cannot handle inode inconsistencies

In ordered writes, which operation should be performed first to prevent corruption?

a) Writing the inode before updating the free list

b) Updating the free list before writing the inode

c) Writing data first, then updating the inode

d) Any order is fine, as the system can recover automatically

Short Answer Questions

Explain why delayed writes improve performance but can lead to data loss in case of a crash.

Describe a situation where an inconsistent filesystem state might occur due to a crash. How can fsck help resolve this issue?

What is the tradeoff between synchronous writes and delayed writes in terms of crash recovery and performance?

Conceptual Questions

What is the primary goal of crash recovery in filesystems? Discuss how different techniques (fsck, ordered writes) address this goal.

If a filesystem crashes before an update to a file’s inode is completed, what are the possible risks? Suggest a way to mitigate such risks.

Rubric:

Multiple Choice Accuracy

Full Score (10 points): All answers are correct.

Partial Score (7 points): One incorrect answer.

Lower Score (4 points): Two incorrect answers.

Minimal Score (0-2 points): Three or more incorrect answers.

Short Answer Clarity

Full Score (10 points): Answer is clear, well-explained, and uses correct terminology.

Partial Score (7 points): Mostly correct but missing details or has minor errors.

Lower Score (4 points): Explanation is unclear or contains multiple inaccuracies.

Minimal Score (0-2 points): Answer is incorrect or missing.

Conceptual Depth

Full Score (10 points): Demonstrates a strong understanding of filesystem crash recovery and tradeoffs.

Partial Score (7 points): Shows good understanding but lacks depth in some explanations.

Lower Score (4 points): Limited understanding, with errors in key concepts.

Minimal Score (0-2 points): Little to no understanding of the topic.

Use of Examples

Full Score (10 points): Provides relevant and well-explained examples.

Partial Score (7 points): Uses examples but lacks detail or clarity.

Lower Score (4 points): Minimal examples provided.

Minimal Score (0-2 points): No examples given.

Overall Effort and Completeness

Full Score (10 points): All questions are answered thoroughly.

Partial Score (7 points): Mostly complete but missing minor details.

Lower Score (4 points): Several incomplete responses.

Minimal Score (0-2 points): Many responses missing or lacking effort.