White Quiz
First question

- Which UNIX shell construct lets users combine two or more UNIX utilities to perform a single task?
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Which UNIX shell construct lets users combine two or more UNIX utilities to perform a single task?

- Pipes (as in “ls –alg | more”).
Second question

- What is the purpose of Unix/Linux *symbolic links*?
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- To let a directory entry point to a file or a directory that is located in a different partition.
Third question

- Where do Unix/Linux file systems store *file names*?
Third question

- Where do Unix/Linux file systems store file names?
  - In the directory entry/entries pointing to the file.
Fourth question

- What does an FFS *cylinder group* contain

- How do these cylinder groups improve the performance of the file system?
Fourth question

- What does an FFS cylinder group contain
  - Both i-nodes and data blocks.

- How do these cylinder groups improve the performance of the file system?
  - They let the data blocks of a file reside on disk closer to its i-node thus eliminating long seeks.
Fifth question

- When we create a new file, in which order should we write to disk
  - (a) The i-node of the new file and
  - (b) The directory entry that points to it?
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- When we create a new file, in which order should we write to disk
  - (a) The i-node of the new file and
  - (b) The directory entry that points to it?

- We should write first the i-node of the new file then the directory entry pointing to it.
Sixth question

- When can we safely delete log entries in a *journaling file system*?
Sixth question

- When can we safely delete log entries in a journaling file system?

  - Once the metadata update has been written at its proper location in the file system.
Seventh question

The current FreeBSD scheduler divides its tasks between a short-term scheduler that is executed every time a core is released and a long-term scheduler that is executed once every second. What is the main advantage of this approach?
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- It keeps the short-term scheduler very simple.
Eighth question Part A

- How does the FreeBSD page replacement policy favor pages that have been frequently referenced?
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- FreeBSD uses a modified Clock policy that takes into account the *usage count* of a page when deciding whether to expel it.
Eighth question Part B

- Would this approach work on any hardware?
Eighth question Part B

Would this approach work on any hardware?

- No, it requires a processor having a page-referenced bit or access bit as the hand of the clock moves much faster than in the two-handed version of the BSD Clock policy.
Yellow quiz
First question

- What are Linux/UNIX special files?
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- Special files are hardware devices and other non-file entities that can be accessed through the standard file I/O interface.
Second question

- Why did FFS introduce *block fragments*?
Second question

- Why did FFS introduce block fragments?

  - FFS introduced block fragments to reduce internal fragmentation in the file system, especially when the file system contained many very small file.
Third question

- How do UNIX file systems implement access control lists?

- What is the main advantage of this approach?
Third question

- How do UNIX file systems implement access control lists?
  - Nine bits specify the read, write and execute permissions for the owner of the file, the file group, and all other users.

- What is the main advantage of this approach?
  - The access control list is small enough to fit in the file i-node.
Fourth question

- Why should we *replicate superblocks*?
Fourth question

- Why should we *replicate superblocks*?

  - Because losing the superblock of a disk partition would render the whole partition unreadable.
Fifth question

When we delete a file, in which order should we write to disk

☐ (a) The new value of the deleted file i-node and

☐ (b) The directory entry that pointed to it?

☐ We should overwrite first the directory entry that pointed to the file before reclaiming the file i-node.
Fifth question

- When we delete a file, in which order should we write to disk
  - (a) The new value of the deleted file i-node and
  - (b) The directory entry that pointed to it?
Sixth question

- What is the main advantage of *synchronous journaling file systems*?
Sixth question

- What is the main advantage of synchronous journaling file systems?
  - It guarantees the durability of metadata updates.
    - No updates will ever be lost after a crash.
Seventh question

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Eighth question Part A

- Why did the UNIX page replacement policy of the mid-eighties use two hands?
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That policy simulated by software a missing page-referenced bit, which caused two context switches each time a page with its simulated page-referenced bit equal to zero was accessed again, and had to minimize the linear speed of the clock hand.
Eighth question Part B

- Why did this second hand disappear in the current FreeBSD page replacement policy?
Eighth question Part B

- Why did this second hand disappear in the current FreeBSD page replacement policy?

  - Since FreeBSD runs on an architecture having a page-referenced bit, the linear speed of the clock hand is not anymore an issue.