SOLUTIONS FOR THE THIRD 3360/6310 QUIZ

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First question

- What is the main advantage and the main disadvantage of ***access control lists*** over ***tickets***?
  - ***Main advantage of access control lists:***
  - ***Main disadvantage of access control lists:***

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  - ***Main advantage of access control lists:***
    - ***They are more flexible than tickets***
  - ***Main disadvantage of access control lists:***
    - ***They are much slower***

Second question

- What does an FFS ***cylinder group*** contain?

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

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  - ***They contain both i-node blocks and data blocks***
- How do these cylinder groups improve the performance of the file system?
  - ***They eliminate most long seeks by allocating to files data blocks in the same cylinder group as their i-nodes.***

Third question

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    - **2^{13} = 8,192 *bytes***

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    - **48 – 13 = 35 *bits***

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  - On average, how much memory is lost to internal fragmentation?
    - ***Half a page or* 4,096 *bytes***

Fourth question

- What is the main purpose of the UNIX **mount** primitive?

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  - ***To make the directory tree of a given disk partition appear as a subtree of the directory tree of another partition.***
  - ***To merge the directory trees of multiple disk partitions into a single tree.***

Fourth question

- What is the major disadvantage of using ***large block***s in a file system?

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  - ***They increase internal fragmentation.***

Fourth question

- What is the major disadvantage of letting the kernel handle ***TLB misses***?

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  - ***Each TLB miss will require two context switches.***

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- What is the main advantage of ***journaling file systems*** using ***asynchronous log writes***?

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  - ***They are much faster than journaling file systems using synchronous log writes.***

Fourth question

- Why did BSD FFS introduce ***block fragments***?

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- Why did BSD FFS introduce ***block fragments*****?**
  - ***To reduce internal fragmentation.***

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- When a user creates a ***new file***, what should be written to disk ***first*** (a) the ***directory block*** containing the new entry for the file ***or*** (b) the ***i-node block*** containing the new i-node?

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  - ***We should write first the i-node block containing the new i-node.***

Fifth question

- A virtual memory system uses **4KB** pages and ***inverted page tables***. Assuming that each page table entry occupies **24 *bytes*** what is the fraction of main memory occupied by page tables?

Why 24 bytes?
Assuming 64-bit addresses, we will have 8 bytes for the page number, 8 bytes for the page frame number and 8 bytes for the address of the the next PTE in the bucket.

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  - **24/4,096 = 3/512 = 0.586 *percent***

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  - What happens when the ***first hand*** of the clock reaches a ***valid page***?
    - ***It marks it invalid.***

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- Consider the ***two-handed BSD clock replacement policy***.
  - What happens when the ***second hand*** of the clock reaches a ***valid page***?

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- Consider the ***two-handed BSD clock replacement policy***.
  - What happens when the ***second hand*** of the clock reaches a ***valid page***?
    - ***Absolutely nothing.***

Sixth question

- Consider the ***two-handed BSD clock replacement policy***.
  - What happens when the ***second hand*** of the clock reaches a page that was ***marked invalid***?

Sixth question

- Consider the ***two-handed BSD clock replacement policy***.
  - What happens when the ***second hand*** of the clock reaches a page that was ***marked invalid***?
    - ***It expels it.***

Seventh question

- A **32-*bit*** Berkeley UNIX file system has a block size of ***eight*** kilobytes.
- How many indirect blocks will be accessed through one level of indirection:
  - For a **54-*kilobyte*** file?
  - For a ***two-megabyte*** file?

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    - ***(Can access 96 KB straight from i-node)***
  - For a ***two-megabyte*** file? ***244***
    - ***File has 256 data blocks***
    - ***The first 12 are accessed straight from the i-node***