Final - essay online

Started: Apr 29 at 3:42pm

Quiz Instructions

You will have 90 minutes to answer any two (2) of the questions.

Question 1

15 pts

- Processes

1. (4) What must Unix/Minix do in order to fork() a new process? Include all allocations, initializations, and meta-information that must be stored correctly.
2. (3) How a process know whether it is the parent or the child after performing a fork()? Be specific, and explain why the difference is the way it is.
3. (4) What must Unix/Minix do in order to clean up when a process is terminated? Include changes to meta-information that may cause other actions to occur.
4. (4) What are zombies, how do they arise, why are they bad, and how does Minix3 avoid creation of zombies?

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Question 2

15 pts

- Device Drivers

1. (3) How are devices treated as files in Unix? Give an example of each type.
2. (4) What do major and minor device numbers signify in Unix? How is each used?
3. (3) Give an example of a device dependent software function. Explain why it is device dependent.
4. (3) Give an example of a device independent software function. Explain why it is device independent.

5. (2) How is a device dependence - device independence split evident in the Minix 3.2.1 file system?

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Question 3

15 pts

- File Systems

1. (5) Explain how the Minix 3 file system knows that a directory in a path is not an ordinary directory but is a mount point. How does Minix 3 find the file system that is mounted on that node? Include all relevant structures and how they are used.

2. (4) What is the worst case overhead (in percent) for index structures (not including i-node) for a Unix-style file system with 7 direct pointers in the i-node? Assume 8KB blocks and 32-bit block pointers.

3. (3) Suppose you have a disk that holds 128 GB of data, and you want to be able to use (almost) all of it for one big file. If 32-bit physical block pointers are used, how big do you have to make the block size in order to do this with any file system? How big do you have to make the blocks to do this with double indirect indexed storage? Show your work.

4. (3) Suppose you have a disk that holds 1 TB of data, and you want to be able to use (almost) all of it for one big file. If 32-bit physical block pointers are used, how big do you have to make the block size in order to do this with any file system? How big will the FAT be if a FAT approach to file system allocation is used? Show your work

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Question 4

15 pts

- Security

1. (5) What is a digital signature and how does it work? How are digital signature operations optimized so that lengthy computations are only done on a small amount of data, yet a possibly very large message/file can be signed? Explain.
2. (5) What is a setuid program, how does the OS know that a program is setuid, and why is this option provided in Unix? Given an example of a setuid program that is commonly used. How do they increase vulnerability in a system? Explain.
3. (5) How do Unix-style systems protect user passwords from possible disclosure? What is a salt, how is it used, and why is it used? Explain.

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