EECE.4810/EECE.5730: Operating Systems

Spring 2017

Homework 4

Due **2:30 PM**, **Wednesday, 5/17**

Notes:

- **This assignment is strictly for extra credit.**
- Typed, electronically submitted solutions are strongly preferred for this assignment.
- Any electronic submission must be in a single file. Archive files will not be accepted.
  - As noted in the syllabus, you will lose 10 points if you fail to follow this rule.
- Electronic submissions should be e-mailed to Dr. Geiger at Michael_Geiger@uml.edu. Please include your name as part of your filename (for example, mgeiger_hw4.pdf).
- All nine problems, which are worth a total of 75 points, are for students in both EECE.4810 and EECE.5730.

1. (8 points) Describe one benefit of shortest seek time first (SSTF) disk scheduling over the SCAN/C-SCAN algorithms, and one benefit of SCAN/C-SCAN over SSTF.

2. (8 points) Say a Linux user executes the following command: `chmod 634 file1`. What operations will the owner, group, and public be able to perform on the file `file1`?

3. (8 points) Describe one benefit of each of the major file allocation schemes we discussed: contiguous allocation, linked allocation, and indexed allocation.

4. (9 points) Say you have a 2 TB disk on which each disk block is 8 KB. To save space for your free-space management scheme, the blocks are clustered into groups of 4 blocks apiece. If you manage the free space with a bitmap, how many bytes (not bits) will be required for the free-space bitmap?

5. (8 points) In a file system using shadowing for transaction atomicity, if you want to rename a directory containing 10 files, what needs to be copied to execute the shadowing operation?

6. (8 points) In a distributed system, a process running on one node sends a byte stream to another node; the byte stream is split into several messages. How will the node running the receiving process recognize and handle (a) duplicate messages and (b) corrupted messages?

7. (9 points) Say a client process uses a linked list to store a collection of strings, one string per node. The starting address of that linked list is passed to a remote procedure call to be executed in a server process. Describe how the client can marshal the contents of the linked list into a single message to send to the server so it can execute the remote procedure.

8. (8 points) Explain what copy, owner, and control rights are in an access matrix.

9. (9 points) Explain how a stack overflow attack allows an attacker to execute a malicious piece of code on an infected machine.