CSE 542/498J Home work assignment 1

Assigned: Thur, Nov 7

Due: Thu, Nov 21, 11:00AM

Late submissions will not be accepted
Individual effort

1. Sketch a solution to the priority inversion problem using lottery scheduling

```
@inproceedings{ waldspurger94lottery,
    author = "Carl A. Waldspurger and William E. Weihl",
    title = "Lottery Scheduling: Flexible Proportional-Share
Resource Management",
    booktitle = "Operating Systems Design and Implementation",
    pages = "1-11",
    year = "1994",
    url = "citeseer.nj.nec.com/waldspurger94lottery.html" }
```

2. Describe the salient advantages and disadvantages in choosing a SAN or a NAS server to support the following:
   a. a database server
   b. UNIX file server for CSE dept (academic access trace)
   c. CNN web server (supports millions of web clients)

3. Flash memory is frequently used as a persistent storage medium in mobile and embedded devices. Flash devices exhibit several unique characteristics:
   a. Flash memory is organized into blocks of memory (e.g. 128 KB). Writing or updating can only be performed at the block level. Each block has to be erased and written as a single whole block. It is not possible to write individual data bytes.
   b. The flash devices have restrictions on the number of times such write operations can be performed (e.g. 100000 for the entire life of the device).
   c. Erasing and writing new data are slower processes compared to reading data.
   d. Typical mobile devices can be powered off at any time without prior warning because of battery concerns

Describe the important modifications that you would make to a mobile file system (you can use your file system from home works 1-3 as a model) to operate effectively with flash storage. Justify (your solution should address all the concerns mentioned above)

4. (adopted from Wisconsin) AFS provides a well-defined cache consistency model. In this question, we explore AFS and discuss ramifications of its design and implementation.
   a. Central to AFS consistency is the notion of a callback. Describe what a callback is and why it's important to AFS, when one is established, and two circumstances when a client

callback might be "broken" (i.e., the client is notified by the server that the callback is no longer valid).

    b. The AFS consistency model is often described as "last writer wins." Describe what this term means, and why it is appropriate to use in describing AFS. In particular, give an example scenario where this issue arises.

5. (adopted from Duke) Could you simulate a multi-level directory structure with a single level directory structure in which arbitrary long names can be used? If your answer is yes, explain how and contrast these schemes. If not, explain why?

6. Exercise 16.5 (text book)

7. Exercise 17.2 (text book)

8. Exercise 17.4 (text book)

9. Exercise 17.7 (text book)

10. Exercise 19.1 (text book)