

HOMEWORK 4

CSE 120 OPERATING SYSTEMS FALL 2006

DUE ON 11/28/2006 (TUESDAY) AT THE BEGINNING OF CLASS

- 1) Explain briefly how NFS attempts to keep the server 'stateless.' List 2 disadvantages of using such a design.**
- 2) [Silberschatz Galvin Gagne – 7th Edition – Chapter 10 – Problem 10.1] Consider a file system where a file can be deleted and its disk space reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided?**
- 3) Why might a file system that uses linked allocation perform poorly for applications that require direct access?**
- 4) Consider a UNIX-style i-node with 10 direct pointers, one single-indirect pointer, and one double-indirect pointer only. Assume that the block size is 8 Kbytes, and that the size of a pointer is 4 bytes. How large a file can be indexed using such an i-node?**
- 5) Give a scenario where choosing a large file system block size might be a benefit; and give an example where it might be a hindrance. What are the tradeoffs associated in choosing large or small block sizes?**
- 6) Why might file systems managing external storage devices do write-through caching (avoid buffering writes) even though there is a detrimental affect on performance?**
- 7) Log-structured file systems have a data structure called an 'i-node map' – which is used to determine the location of each i-node on the disk. Regular (non-log-structured) UNIX file systems do not. What is the reason for this distinction?**

8) The kernel typically maintains a 'file-open count' along with other pieces of data associated with an open file. The 'file-open count' is simply a counter indicating the number of times a particular file is open. Why do we need to store this information?

9) Consider a disk with a sector size of 512 bytes, 100 sectors per track. Given a rotational speed of 7200 revolutions per second, what is the maximum rotational delay to the start of a sector? Assuming that one track of data can be transferred per revolution, what is the transfer rate?

10) Assuming a normal UNIX i-node file system, what are the fewest number of disk blocks that must be read from disk to access the 1048th byte of the file /foo/bar/baz? Assume that the i-node for the root file system is already cached, but the disk buffer cache is otherwise empty. Consider a UNIX-style i-node with 12 direct pointers, one single-indirect pointer, and one double-indirect pointer. Assume that the block size is 2 Kbytes, and that the size of a pointer is 4 bytes.