

CS 537: Intro to Operating Systems (Summer 2017)

Worksheet 15 - File System Implementation

DUE: Aug 8th 2017 (Tuesday)

The very simple file system (VSFS) uses basic data structures such as a super block, bitmaps, inodes, and data blocks to store all relevant file system information. Assume further a multi-level index within each inode, with 12 direct pointers, one indirect pointer, and one double-indirect pointer.

- a. You need to read a 4KB (one block) file, given its inode number. Assume no relevant structures are in memory in the file cache. How many disk accesses will the read take? (describe)

- b. If this same file is read frequently, how many disk accesses will typically occur? (with caching)

- c. Assume you need to **append** a block of size 4KB to a (small) file that already exists. Assume no relevant structures are in the file cache. How many disk accesses will the append take? (describe)

- d. If this small file is **appended** to frequently, how many disk accesses will typically occur? (with caching)

- e. Assume you need to **append** a block of size 4KB to a (large) file that already exists. Assume no relevant structures are in the file cache. How many disk accesses will the append take? (describe)

- f. Assume you **create** a file in the root directory (e.g., /foo.txt). How many disk writes will take place (in the worst case)?

- g. Assume you **delete** a file in the root directory (e.g., /foo.txt). How many disk writes will take place (in the worst case)?