

Filesystems

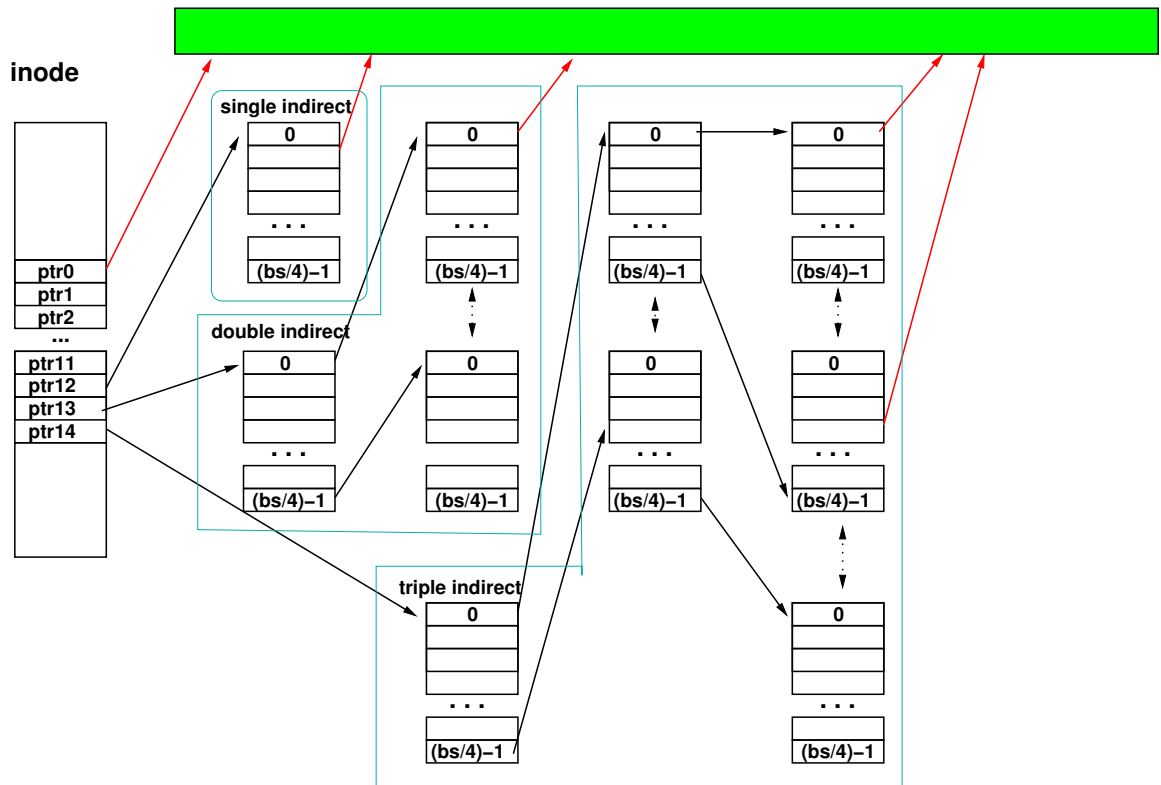
ECE598: Advanced Operating Systems – Homework 4

Spring 2015

Due: Wednesday, 25 March 2015, 5pm

Answer the following questions, putting the answer in some sort of document (.txt, .pdf, .doc).

1. What is the purpose of a filesystem?
2. On an ext2 filesystem, is the filename stored in the inode? Explain why this may be.
3. The ext2 filesystem inode contains 15 block pointers. The first 12 (0-11) point directly to disk blocks. Entry 12 points to an indirect block which contains $\text{BLOCKSIZE}/4$ (divided by 4 because the pointer size is 32-bits) block pointers. Entry 13 points to a double indirect block where each pointer points to an indirect block. And finally, entry 14 points to a triple indirect block. (See the diagram below which may or may not help).
 - (a) Assuming a blocksize of 1kB, what is the maximum file size supported without using indirect blocks?
 - (b) What is the maximum file size if additionally all the blocks from the first indirect block are used?
 - (c) What is the maximum file size if additionally the second indirect blocks are used?
 - (d) What is the maximum size of a file if all possible blocks are used (including the triple indirect)?
 - (e) For the previous answer involving the maximum size, what is the overhead involved (i.e. how much space is spent holding all of the indirect blocks)?



4. Pick a filesystem supported by Linux (that isn't ext2/3/4, btrfs, or fat) and do some brief research on it. Write a few sentences describing where the filesystem originated, its strengths and weaknesses, and why there's a Linux driver for it. You can find a list of Linux filesystems under the `fs` subdirectory of a Linux source tree, which you can find online here: <http://lxr.free-electrons.com/source/fs/>.
5. The ext2 and fat filesystems are very different.
 - (a) List one use case where an ext2 filesystem works better than fat.
 - (b) List one use case where a fat filesystem works better than ext2.

Submit your work

E-mail the file containing your answers to the questions to me by the homework deadline.