Operating Systems
CSCI 5806

Term Project – Filesystem Integrity Checker

Goal

Develop a program that checks the integrity of an ext2 filesystem, reporting any errors found and possibly correcting the errors.

Details

Your program should scan an ext2 filesystem whose name is given as a command-line parameter. It should display the following general statistics about the filesystem:

- Total filesystem size in bytes
- Size available for files (used and unused)
- Amount of space currently used
- Number of possible files and directories (number of inodes)
- Number of existing files
- Number of existing directories
- Number of block groups, with the information for each block group
- Block size in bytes
- State of the filesystem

Your program should also check the following items:

- The superblock must have the appropriate magic number
- All copies of the superblock must be consistent
- All copies of the block group table must be consistent
- Every inode marked as used must be reachable from the root directory
- No unused inode may be reachable from the root directory
- Every directory entry must reference an in-use inode
- Every used data block must be referenced by exactly one inode, either as data or as an indirect block
- No unused data block may be referenced by any inode
- The number of existing files reported by the superblock must be correct
- The number of existing directories reported by the superblock must be correct

Extra Credit Options

For extra credit, you may do almost any combination of the following:

- (+3%) Correct copies of the superblock and block group descriptor table to match the master copy in block group 0
- (+3%, cannot be used with the next two options) Mark all unreachable inodes and data blocks as unused. Make sure that counts are correct.
- (+5%) For any unreachable inode marked in-use, see if its data blocks are orphans (also unreachable but marked in use)
    - If they are, create an entry in the lost+found directory using the unreachable inode
    - Otherwise, mark the inode as unused
    - Recheck after doing this
- (+10%) For any other orphaned data blocks, create an entry in lost+found using a new inode and place the orphaned data blocks under that inode. Allocate indirect blocks if necessary. Make sure that counts are correct and recheck afterward.

What to Turn In

Turn in your source code and instructions on how to run your program.