Operating Systems
Jacobs University Bremen
Brian Sherif Hanna Nasralla

Course: CO20-320202
December 5th, 2018

Homework 6

Problem 6.1

Solution:

(a) There is a directory 'lost+found' that is automatically created in the filesystem. This directory holds files that have been unlinked while they are open in other programs. The directory also holds files that have been affected by filesystem corruption. This allows the system to recover when the filesystem has been corrupted.

(b) The free blocks are the total blocks that are unoccupied, while the available blocks are the number of free blocks minus the blocks that are reserved for the root user. The root user by default on ext3 has reserved data blocks.

(c) The file system is unaffected. So long as it remains mounted the user can still interact with the file system even if 'vhd.ext3'.

(d) The number of free inodes has decreased by one because one new file was added and the files metadata needs to be stored in an inode. However, the number of free blocks stays the same. This is because the size of the file has been allocated but since it is empty has not filled any data blocks yet. Only when the file contains content will the data blocks be occupied and flagged as not free.

(e) The file can not be deleted because it was made immutable. Making a file immutable means that it cannot be deleted, renamed and links cannot be created to it.

(f) When we run the chroot command we change the root directory to mnt in a new root enviroment and run busybox from the link /bin/sh. It is important that busybox is statically linked because it is self contained. If it was dynamically linked then it may have dependencies that point outside our new rot directory 'mnt'.

(g) To run commnds like vi, we need to prefix the command with the command 'busybox'. To run commands like 'top' and 'ps', which rely on the '/proc' directory, we can mount the '/proc' directory into the new filesystem.

(h) The number of free inodes increases by one because there is one less file whose metadata the system needs to store, and the number of available blocks has increased because the filesystem was unmounted and the blocks which it was occupying are now marked to be free.