Operating Systems - Lab Assignment 4 (part 2)

Task: Create file1.txt and put some random text in it. Create a hard link between file1.txt and file2.txt:
ls -li file1.txt
790553 -rw-rw-r-- 1 dawood dawood 65 dec 4 12:08 file1.txt

ln file1.txt file2.txt
ls -li file2.txt
790553 -rw-rw-r-- 2 dawood dawood 65 dec 4 12:08 file2.txt

Question: What are the inode values of file1.txt and file2.txt?
The inode value for file1.txt is 790553.
The inode value for file2.txt is 790553.

Question: Are they the same or different?
Both files have the same inode values since we created a hard link between them. The inode value for both files is 790553.

Question: Do the two files have the same - or different - contents?
Both files have the same content.

Task: Next, edit file2.txt and change its contents. After you have done so, examine the contents of file1.txt.

Question: Are the contents of file1.txt and file2.txt the same or different?
The contents of both files are the same. Changing the content of file2.txt automatically changed the content of file1.txt.

Task: Remove file1.txt.
rm file1.txt

Question: Does file2.txt still exist as well (after removing file1.txt)?
Yes, file2.txt still exists. Removing file1.txt did not remove file2.txt

Task: Remove file2.txt with strace.
strace rm file2.txt

Question: What system call is used for removing file2.txt?
unlinkat()
(The system call “unlink()” can also be used, but when I used the command “rm”, my Ubuntu version called “unlinkat()”. I am only writing this here in case you were looking for the answer “unlink()”.)

Task: Create a soft link to file3.txt
ln -s file3.txt file4.txt

Task: Obtain the inode numbers of file3.txt and file4.txt
ls -li file*.txt
791153 -rw-rw-r-- 1 dawood dawood 65 dec 4 13:45 file3.txt
790553 lrwxrwxrwx 1 dawood dawood 9 dec 4 13:52 file4.txt -> file3.txt

Question: Are the inodes the same, or is each unique?
The inode value for file3.txt is 791153.
The inode value for file4.txt is 790553.
So the inode values are unique.

Task: Next, edit the contents of file4.txt.

Question: Have the contents of file3.txt been altered as well?
Yes, the contents of file3.txt has been altered as well. Changing the content of file4.txt automatically changed the content of file3.txt.

Task: Delete file3.txt.

Question: Explain what happens when you attempt to edit file4.txt (after deleting file3.txt).
The content of file4.txt is empty. And we cannot write anything to the file. This is the case because file4.txt was a soft-link which simply pointed to file3.txt. When we deleted file3.txt all of its content was deleted and file4.txt is now pointing to a file which no longer exists. We can therefore not even write anything to file4.txt.