SOFTENG 370
Operating Systems

Assignment 2 - User space file system

Worth 10% - 30 marks

due date 9:30pm Friday 4th of October, 2019

See the submission information at the end of this document. You may submit answers to the questions even if you have not submitted the source code for a running file system. You can still answer all questions but you will have to answer as if you did have a running file system, e.g. when answering Q6.

Marks for the running file system 16 marks in total.

Questions

The questions are worth 14 marks in total.

Carry out the following tasks and answer the questions:

Q1

In a standard Linux file system (i.e. **not** your file system) perform the following tasks and show their output. [1 mark]

Create a new directory called "`a2tasks`".

```
ls -al a2tasks

echo "something" > a2tasks/some.txt
ls -al a2tasks

mkdir a2tasks/d1
ls -al a2tasks

mkdir a2tasks/d2
ls -al a2tasks
```

What do the results above tell you about the number of hard links to a directory? [1 mark]

Q2

In class you were told that you could not make hard links to a Unix file system directory. Given your answer above explain why you can and why this does not cause a problem with cycles in the file system graph? [2 marks]

Q3

Either using your user space file system or just thinking through what should happen, what system calls should be made when the user changes directories? Explain why you think these calls are or should be made by the `cd` command. [2 marks]

Q4

The markers won't run multiple processes accessing your file system at the same time. In the real world your file system would have to work correctly with multiple simultaneous accesses. Describe what information in your file system needs to be locked so that only one thread/process can access it at a time. Explain what could go wrong if concurrent access was allowed. [3 marks]

Q5

Because your file system is only in memory you can maintain it a little easier than if it was on a device. Describe one way in which it is easier. You should mention what you would have to do if you were using a block based device to hold your files instead. [2 marks]

Q6

Can you make "illegal" file names with your file system? An illegal filename would include "/" in its name, or be longer than 255 characters. Don't just answer "yes" or "no", explain why. [2 marks]

Q7

Give a brief explanation of what happens in the logger when you tab complete a file name within your file system. [1 mark]

Submission

The assignment is to be submitted through the assignment drop box system - adb.auckland.ac.nz.

Submit your MemoryFS.java files (and any other java files you have created or modified which are needed to run your program). These files will be put through a code comparison system to make sure that everyone's submissions are substantially different. Code too similar to that submitted by another student will receive 0 marks.

Also submit the answers to these questions in a PDF file called A2answers.pdf.

Make sure that your name and login (UPI) is in every file that you submit.

N.B. All submitted work must be your work alone. You may discuss assignments with others but by submitting any work you are claiming you did that work without the contributions of others (except for work you clearly identify as being from another source).