DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF CAPE TOWN.

Operating Systems: Assignment 1 (24.02.2014)

Anne Kayem

February 26, 2014

1 OVERVIEW

A system call is used by application (user) programs to request services from the operating system. These services provide access to the hardware of the system. System calls ensure that user programs never access a system's hardware directly. A key advantage of system calls is that they allow the kernel (of the operating system) keep the system safe and secure from malicious user programs.
When application (user) programs require some information from the hardware, since it is not possible for the user program to get the information directly, the user programs request the operating system to supply the information. These request are made by using an appropriate system call.
A system call executes in the kernel mode. Every system call has a number associated with it. This number is passed to the kernel and that's how the kernel knows which system call was made. When a user program issues a system call, what actually happens is that a library routine of the operating system is called. This library routine issues an interrupt to the operating system by executing an assembly instruction and passes the system call number to the kernel using a register. The arguments of the system call are also passed to the kernel using other registers. The kernel then executes the system call and returns the result to the user program using a register. If the system call needs to supply the user program with large amounts of data, it will use other mechanisms (e.g., "copy_to_user call" in Unix).

2 ASSIGNMENT OBJECTIVES

In this assignment, you will be implementing system calls that should eventually be combinable into a system program. You will be using the Java programming language and since sys-

tem calls are operating system platform dependent - for marking/grading simplicity please use either Windows or Ubuntu.

3 QUESTION 1

1. Using any approach of your choosing, create a text file and save it under the name "Testing.txt".
2. Insert the following text *"When the rain falls it is planting season."* into the file
3. Close and save the file in a safe location.

4 QUESTION 2

Write a program in Java to copy the contents of "Testing.txt" into a new file "Testing1.txt". In Linux/Ubuntu use **strace java "your_program_name"** to write down 5 of the systems calls that your program makes.

5 QUESTION 3

Write system call methods in Java to do the following:

1. Open the file "Testing.txt" that you just created and output the data into a different file say, "Testing2.txt".
2. Read and output the data in the "Testing.txt" file to the screen
3. Hide one copy of the "Testing.txt" files you created in Question 2. (Note: Your "Hide" function needs to protect the file against all delete operations!)
4. Delete all copies of "Testing.txt" on the system

6 QUESTION 4 - BONUS

Write a system program to search for the hidden copy of "Testing.txt", and modify the text it contains to read " When the rain falls it is the dry season!".