CS323 – Exercises
Week 1
22 Feb 2019

Some exercises in this class will require coding. Students are advised that completing the exercises does not require running the programs. However, should you wish to test your programs, you may compile and run them on a standard Linux box as you were taught in the 2nd year class "Programmation orientée système". You may also choose to compile and run the code online (e.g., through https://www.tutorialspoint.com/compile_c_online.php) or using a virtual machine (sample instructions for doing so: https://www.cs.unm.edu/~bradykey/ubuntuVMInstallGuide.html).

Exercise 1:

From the list below, say which items are part of the OS and which are not. For those that are, explain how each creates convenience for users and which hardware resources they are managing. Would it be possible for user-level programs to provide these services?

a) Scheduler
b) Video player
c) VPN client
d) Device drivers
e) File management
f) Command interpreter
g) Text editor

Exercise 2:

What is the purpose of system calls? How do language libraries (such as libc), the kernel API, and system calls interact? In the list below, which of the C Library functions make use of system calls and which don't? Why?

a) `malloc()`
b) `printf()`
c) `sqrt()`
d) `strcmp()`
e) *`strcat()`*
f) `getchar()`
g) `isdigit()`
h) `time()`
i) `difftime()`
j) `fseek()`

Exercise 3:

What is the purpose of interrupts? How does an interrupt differ from a trap? Can traps be generated intentionally by a user program? If so, for what purpose? (*Exercise 1.19 from Operating System Concepts*)

Further Reading

For those who are interested in broadening the knowledge in the kernel design topic, or more precisely about monolithic kernels and microkernels, we suggest an interesting read about the *famous* ***Tanenbaum–Torvalds debate***.

The Tanenbaum–Torvalds debate was a debate between Andrew Tanenbaum (Prof. of Computer Science) and Linus Torvalds (Software engineer, creator of the Linux kernel), regarding the Linux kernel and kernel architecture in general. Tanenbaum began the debate in 1992 on the Usenet discussion group comp.os.minix, arguing that microkernels are superior to monolithic kernels and therefore Linux was, even in 1992, obsolete.

Part 1: http://www.oreilly.com/openbook/opensources/book/appa.html
Part 2: http://www.cs.vu.nl/~ast/reliable-os/