Assessed Exercise 3

Deadline: 13 December, 24.00h

The time between keystrokes is sometimes used as a biometric authentication measure. In this exercise we develop a simple way of gathering the required data.

You should develop a program which orders the time between characters typed during the run of the program and outputs the maximal time between keystrokes which passed between 10%, 20% etc. of keystrokes. You should discard times between keystrokes which are bigger than 1s, because they arise when users stop typing and start thinking. The output should look like

10%	0.08s
20%	0.12s
30%	0.25s
40%	0.3s
50%	0.33s
60%	0.41s
70%	0.5s
80%	0.63s
90%	0.8s
100%	0.99s

This program requires both a kernel module and a user program. The kernel module needs to handle the interrupts generated by the keyboard driver. This interrupt is normally inacessible to kernel modules, Hence I provided a modification of the kernel (kernel 2.6.28-prep on the virtual machine accessible from the module webpage) which causes a function `i8042_interrupt_handler` to be called whenever a keyboard interrupt is generated. For each keystroke two interrupts are generated, one when the key is pressed and one when the key is released.

By default this function is a no-op, but it is possible for a kernel module to reassign this function to any function the kernel module defines. Please note that this function is called in an interrupt context and hence must not sleep. An example usage of this function is available from the module webpage.

The kernel measures time in so-called `jiffies`, which are related to system clock ticks. There is a global kernel variable `jiffies`, which contains a representation of the current time in clock ticks. There are kernel functions `jiffies_to_usecs` and `jiffies_to_msecs` which convert jiffies to microseconds and milliseconds respectively.

The data transfer between the kernel and the user program should be done via a suitable file in the `/proc`-directory.

Good handling of concurrency is crucial for this exercise, as the keyboard interrupt may be called at any time.