

### Tutorial Sheet 3

**Question 1.** Are the following programs *batch* or *interactive*?

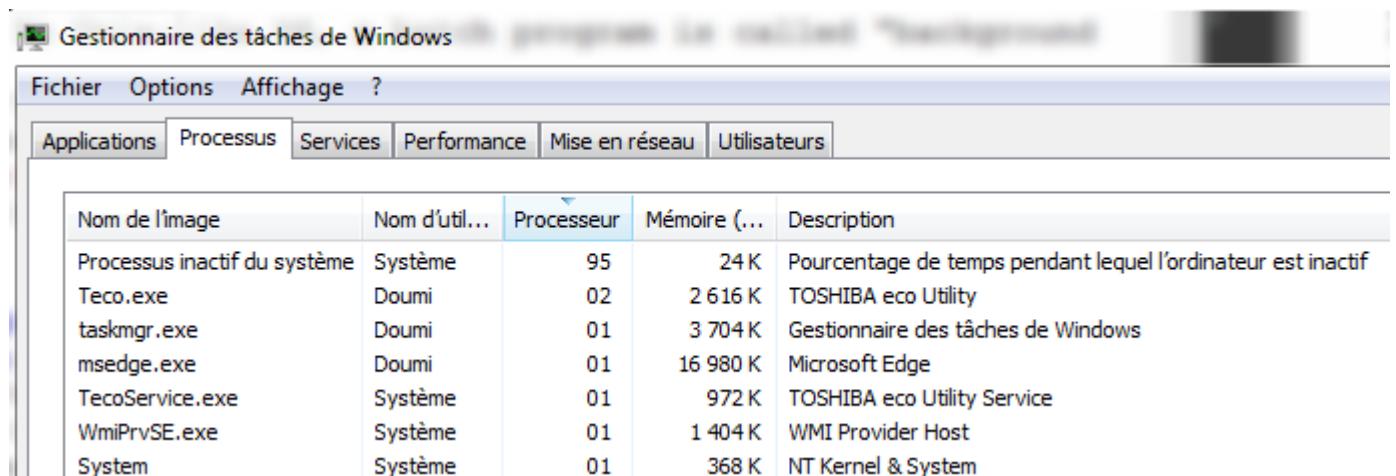
1. Word processing,
2. Production of monthly bank statements,
3. Calculation of the number  $\pi$  up to one million digits after the decimal point.

**NB.**

- In Unix-like OS, a batch program is called "background job"
- To manipulate foreground and background jobs in Linux, use the three commands: **jobs**, **bg** and **fg**.

**Question 2.**

- What does the CPU do when there are no programs to run?
- Comment the figure bellow. How you explain the high processor usage for the 1st item?



Nom de l'image	Nom d'util...	Processeur	Mémoire (...)	Description
Processus inactif du système	Système	95	24 K	Pourcentage de temps pendant lequel l'ordinateur est inactif
Teco.exe	Doumi	02	2 616 K	TOSHIBA eco Utility
taskmgr.exe	Doumi	01	3 704 K	Gestionnaire des tâches de Windows
msedge.exe	Doumi	01	16 980 K	Microsoft Edge
TecoService.exe	Système	01	972 K	TOSHIBA eco Utility Service
WmiPrvSE.exe	Système	01	1 404 K	WMI Provider Host
System	Système	01	368 K	NT Kernel & System

**NB.** In Unix-like OS, we talk about swaper/scheduler idle process.

**Question 3.** Do the following terms mean the same thing or they are different? And what are they used for?

• Interrupt handler	• Interrupt routine
• Programmable Interrupt Controller (PIC)	
• Interrupt controller	• Interrupt Service Routine (ISR)

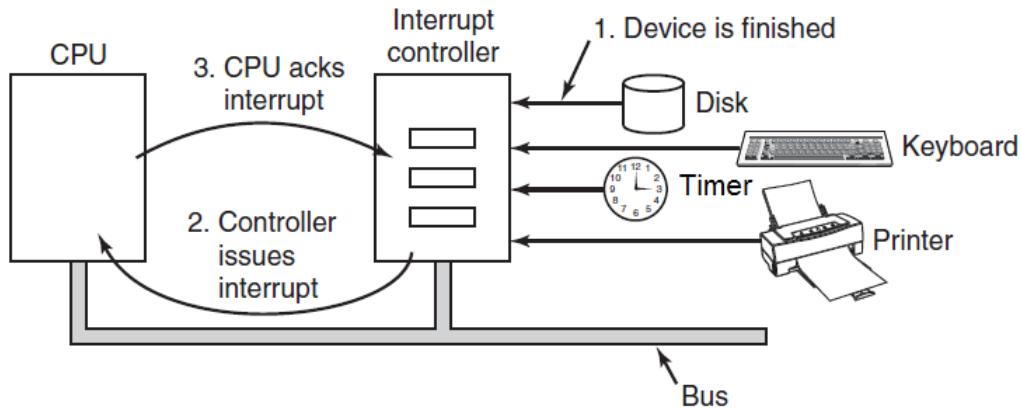
**Question 4.** What differentiates trap, system call and subroutine call on one hand to interrupt on other hand?

**Question 5.** In Linux kernel, what is an interrupt vector?

**Question 6.** What differentiates trap, interrupt and system call on one hand to subroutine call on other hand?

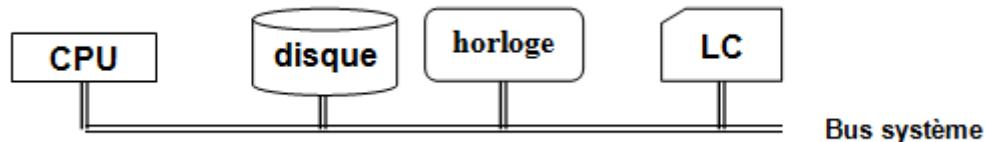
**Question 7.** In Linux kernel, what does the signal mean? And how is it sent?

**Exercise 1.** Consider the following hardware configuration



Explain operations 1, 2 and 3 in the diagram.

**Exercise 2.** Consider the following hardware configuration



1. What should be the priority for each of the components connected via system bus to CPU?

The clock (timer) sends interrupts at successive time intervals of  $20\mu s$ .

Let the sequence of events be as follows:

- at time 0, the user program begins
- at  $5\mu s$ , the card reader issues an interrupt which will be processed during  $100\mu s$ .
- at  $25\mu s$ , the disk sends an interrupt which will be processed during  $40\mu s$ .

2. Give a temporal chart of the executions of these events.

**NB.** Timer is an electronic component that measures time in a computer. In x86 microprocessors this is the Intel 8253/8254 circuit, it has IRq0 as an interrupt.

It is often confused with the processor clock which synchronizes the operation of all the circuits on the motherboard. The latter, in new PCs, its frequency is measured in GHz.