Fundamentos de los Sistemas Operativos

Departamento de Informática de Sistemas y Computadoras (DISCA)
Universitat Politècnica de València

fSO

Part 1 Exercises
Introduction to Operating Systems
UT01 and UT02

Content

1. Reasoning questions

The following questions are intended to get a deeper understanding of the concepts covered in theory classes (Unit 1 and Unit 2), and they are a convenient way of test the level of concept acquisition. They allow training to use the associated technical vocabulary properly.
Try to give reasoning answers to the following questions:

1. What is an operating system?
2. In what moments during a user program execution interveans the OS?
3. Why has been required the evolution of the OS components?
4. Tell what computer knowledge would need a user of a computer without OS.
5. What are the features that differentiate the following kinds of systems:
   a) Batch systems
   b) Multimprogrammed batch systems
   c) Time sharing systems
6. What are the new functions that a bacth system OS has to implement to get converted into a batch multiprogrammed system?
7. Define a resident monitor in a batch system and describe the operations that it performs.
8. What is the main goal of multiprogramming?
9. Tell the two more relevant features that better define the following OS generations:
   a) Batch systems
   b) Time sharing systems
   c) Personal computers
10. What is a CPU burst?
11. What kind of CPU burst is more convenient in a time sharing system, short ones or long ones?
12. Why OS operation requires (at least) two CPU working modes? What kind of instructions can be executed in each mode?
13. Analyze the terms “device controller” and “device driver”, to do that indicate what kind of component is made each one (hardware or software) and their location in a computer system.
14. What is an interrupt?
15. What does the hardware in our basic computer system (slide 5 on UT02) when it detects that an interrupt has happen?
16. What kind of operations takes the most advantage of DMA?
17. Explain what are system calls used for and why they are convenient.
18. What is the purpose of system programs? Tell some examples.
19. What is a command interpreter? For what it is used to?
20. When talking about the OS it is very common to refer to it as the system “kernel”, but the real thing is that the “kernel” is a part of the OS. Try to define both terms.
21. A user program can completely avoid using system calls?
22. Tell the sequence of activities that happen in a computer system in order to respond to a system call and indicate which of them happen in kernel mode and which in user mode.
23. Describe the existing relation between the system call mechanism and the CPU operation modes (user and kernel).
24. Given the following command line in the UNIX Shell, executed on a working directory that contains file “list.txt” which content is a list of names:

```
$ cat list.txt | grep lopez | wc –l > n_lopez  2> error
```

   a) What will be its execution result?
   b) What is shown in the terminal after its execution?

2. Select the better answer

Next a set of question is proposed that will help to better understand particular aspect of the studied concepts. From the given enunciates the student has to choose the better or the true option(s).

1. In the following actions list, indicate for every action what code is dealing with it: OS code or the shell. Write a cross in the corresponding cell in the table:

OS	SHELL	Action
		Reading a command line and interpreting it
		Initializing a device controler
		Choosing a process to assign the CPU to it
		Providing a system calls inteface
		Performing a system call
		Providing a convenient user interface

2. Which of the following activities is required to be in kernel mode? Mark it with a cross.

KERNEL MODE	Activity
	Disabling interrupts
	Reading system time
	Updating system time
	Changing the memory map
	Programming a disk controller
	Changing the interupt vector

3. Which of the following functions are exclusive responsibility of the OS kernel, and which ones involve at least one user process? Mark them with a cross.

OS only	At least a user process	Function
		Replying commands in the command line
		Interrupt processing
		Delivering CPU time between several processes
		Detecting ilegal memory accesses
		Locating data in a file stored in a disk
		Performing a execution program trace for debugging

4. For every one of the OSs types that appear in the following table, mark with a cross the functions that the corresponding OS type has (or can) perform.

Function	Batch	Batch multiprogrammed	Time sharing
I/O device access			
Memory protection			
Job sequencing			
CPU scheduling			
File management			

5. Which of the following statements about UNIX are true(T) or false(F)?

T	F	Statements
		The UNIX shell has internal and external commands
		The UNIX shell doesn't make system calls to Access system resources because it is a part of the OS
		In order to guaranty information protection in UNIX, the only user that can change the permission bits of a file is the file's owner

6. In the following command line for the UNIX shell:

```
$ cat list | grep lopez | wc –l > n_lopez  2> error
```

For every one of its elements mark with a cross which ones correspond to a file, to a process or neither of them:

	cat	list	|	grep	lopez	|	wc	-l	>	n_lopez	2>	error
Proceso												
Fichero												
Otro												