

Name and master program: .....

## Operating Systems (practical)

January 27th, 2012

Exam duration: 60 minutes

**Observation:** Justify all answers.


1. How is the keyboard interrupt treated in a PC architecture?

- (a) synchronous by the kernel and the applications
- (b) synchronous by the kernel, async by the applications
- (c) asynchronous

Explain your choice.

2. How is the implementation of Fast Userspace Mutex using the mechanisms provided by the virtual memory system?

3. What kind of problems does Read-Copy-Update solve and how?

4. Describe a method to prevent deadlocking.

5. Given a System Call Wrapper security mechanism, is it easier to exploit it on a single processor machine or on a dual processor one? Why and how can the exploit be written?

6. Explain what happens when executing the following C code in a process inside a User-mode Linux virtual machine:

```
...
fprintf(out_file, "Operating Systems Practical");
...
```

7. What Xen module can be used to prevent attempts to connect to a Xen virtual machine on a specific port?

8. For a hypervisor in an energy-managed system, identify one of its features that is relevant for designing a host-level energy manager. Describe how the host-level energy manger can benefit from this feature.

9. Describe a scenario in which an end-host software error in the TCP segment would be generated.

10. Which tainting mechanism(s) should be used for tracking down the effects of a malicious change of variable 'p' in the following code:

```
int locations[10];
int get_destination(int *p) {
    int index = *p;
    int x = locations[index];
    return x;
}
```

11. For a system with mobile devices accessing the same file-system simultaneously, which file-system consistency model is best and why?

According with the ethical guide of the Computer Science Department, I declare that I have not cheated nor I shall cheat in this exam. Also, I did not help nor I will help anyone cheat in this exam.

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**Signature:**.....