Tecnológico de Costa Rica

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Escuela de Ingeniería en Computación
Principios de Sistemas Operativos

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Operating System Concepts

Chapter 2 - Practice Exercises

2.1 What is the purpose of system calls?

Provide an interface to the services made available by an operating system. In an interactive system, this approach will require a sequence of system calls, first to write a prompting message on the screen and then to read from the keyboard the characters that define the two files.

2.2 What are the five major activities of an operating system with regard to process management?

1. Create and delete user and system processes
2. Suspension and resumption of processes
3. Provision of mechanisms for synchronization
4. Provision of mechanisms for communication
5. Provision of mechanisms for deadlock handling

2.3 What are the three major activities of an operating system with regard to memory management?

1. Keep track of which parts of memory are currently being used and by whom.
2. Decide which processes are loaded into memory when memory space becomes available
3. Allocate and deallocate memory space as needed

2.4 What are the three major activities of an operating system with regard to secondary-storage management?

1. Free space management
2. Storage allocation
3. Disk scheduling

2.5 What is the purpose of the command interpreter? Why is it usually separate from the kernel?

It reads commands from the user or file of commands and executes them turning into one or more system calls. It is not part of the kernel since the command interpreter is subject to changes

2.6 What system calls have to be executed by a command interpreter or shell in order to start a new process?
A fork(for clone executing process) system call followed by exec(overlays a new process) system call for start a process

2.7 What is the purpose of system programs?
They provide basic functionality to users so that users do not need to write their own programs to solve common problems

2.8 What is the main advantage of the layered approach to system design? What are the disadvantages of the layered approach?

Advantages: The system is easier to debug and modify because changes affect only limited sections of the system rather than touching all sections of the operating system.

Disadvantages: Information is kept only where it is needed and is accessible only within a defined and restricted area, so any bugs affecting that data must be limited to a specific module or layer

2.9 List five services provided by an operating system, and explain how each creates convenience for users. In which cases would it be impossible for user-level programs to provide these services? Explain your answer.

1. **Program Execution:**OS loads contents of a file in memory and begins execution
2. **I/O operations:** The user need only specify the device and the operation to perform on it, while the system converts that request into device- or controller-specific commands
3. **File-system manipulation:** There are many details in file creation, deletion, allocation, and naming that users should not have to perform. User programs could neither ensure adherence to protection methods nor be trusted to allocate only free blocks and deallocate blocks on file deletion
4. **Communications:** systems requires messages to be turned into packets of information, sent to the network controller, transmitted across a communications medium, and reassembled by the destination system.
5. **Error detection:** ensure that data have not been corrupted in transit. Media must be checked for data consistency; for instance, whether the number of allocated and unallocated blocks of storage match the total number on the device. Processes need not contain code to catch and correct all the errors possible on a system

2.10 Why do some systems store the operating system in firmware, while others store it on disk?
A disk with a file system may be not be available for mobile device. The operating system must be stored in firmware, from this point of view.

2.11 How could a system be designed to allow a choice of operating systems from which to boot? What would the bootstrap program need to do?

Special program will determine which operating system to boot into locations of the hard disk, was be recognized during system startup. Boot managers often provide the user with a selection of systems to boot into; boot managers are also typically designed to boot into a default operating system if no choice is selected by the user