Tutorial

Chapter 2

Operating System Structures

Describe three general methods for passing parameters to the operating system.

a. Pass parameters in registers

b. Registers pass starting addresses of blocks of parameters

c. Parameters can be placed, or pushed, onto the stack by the program, and popped off the stack by the operating system

What are the five major activities of an operating system in regard to file management?

- The creation and deletion of files
- The creation and deletion of directories
- The support of primitives for manipulating files and directories
- The mapping of files onto secondary storage
- The backup of files on stable (nonvolatile) storage media

What are the two models of interprocess communication? What are the strengths and weaknesses of the two approaches?

The two models of interprocess communication are message-passing model and the shared-memory model. Message passing is useful for exchanging smaller amounts of data, because no conflicts need be avoided. It is also easier to implement than is shared memory for inter-computer communication. Shared memory allows maximum speed and convenience of communication, since it can be done at memory transfer speeds when it takes place within a computer. However, this method compromises on protection and synchronization between the processes sharing memory.

Why is the separation of mechanism and policy desirable?

Mechanism and policy must be separate to ensure that systems are easy to modify. No two system installations are the same, so each installation may want to tune the operating system to suit its needs.

With mechanism and policy separate, the policy may be changed at will while the mechanism stays unchanged. This arrangement provides a more flexible system.

What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel architecture? What are the disadvantages of using the microkernel approach?

Benefits typically include the following:

(a) adding a new service does not requiremodifying the kernel,

(b) it is more secure as more operations are done in user mode than in kernel mode,

(c) a simpler kernel design and functionality typically results in a more reliable operating system.

User programs and system services interact in a microkernel architecture by using interprocess communication mechanisms such as messaging. These messages are conveyed by OS.

The primary disadvantages of the microkernel architecture are the overheads associated with interprocess communication and the frequent use of OS messaging functions in order to enable the user process and the system service to interact with each other.

What are the advantages of using loadable kernel modules?

It is difficult to predict what features an operating system will need when it is being designed. The advantage of using loadable kernel modules is that functionality can be added to and removed from the kernel while it is running. There is no need to either recompile or reboot the kernel.

How are iOS and Android similar? How are they different?
Answer:
Similarities

- Both are based on existing kernels (Linux and Mac OS X).

- Both have architecture that uses software stacks.

- Both provide frameworks for developers.

Differences

- iOS is closed-source, and Android is open-source.

- iOS applications are developed in Objective-C, Android in Java.

- Android uses a virtual machine, and iOS executes code natively.