Homework1

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1.3

A real-time system has well-defined, fixed time constraints. The main difficulty is to get task done within the defined constraints. A programmer must guarantee the system returns the correct result within its time constraints.

1.5

Since the operating system and the users share the hardware and software resources of the computer system, one erroneous program might modify another program, the data of another program, or even the operating system itself.

The privileged instructions could only be executed in kernel mode. User mode has limited capability. User program should invoke system calls to switch to kernel mode, letting operating system complete related privileged instructions.

1.6

a. set value of time
c. clear memory
e. turn off interrupts
f. modify entries in device-status table
g. switch to kernel mode
h. access I/O device

should be privileged.

1.12

a.

1. To control the different accesses of different users to access files and how they access it (read, write, append).
2. The system must provide mechanisms for jobsynchronization and communication, and it may ensure that jobs do not get stuck in a deadlock, forever waiting for one another.

b.

Because we can't ensure operating system prevents any data sharing between users (such as modifying same data), neither can we ensure share the computer resources exactly fairly time. So we can't achieve the same degree of security as in a dedicated machine.

1.19

The purpose of interrupt: After a system is fully booted, it waits for some event to occur. The occurrence of an event is usually signaled by an interrupt generated by the hardware.

Difference between interrupt and trap: A trap is a software-generated interrupt cause by user process, either an error or a specific request form a user program.

Traps can be generated intentionally by a user program, for example, to invoke a system call.

1.21

It is possible:

That kind of system should be operated in monitor mode all the time (for example, Interpreter would be provided to all user programs).

Not possible:

Lack of it can cause serious shortcomings in an operating system: A user program running awry can wipe out the OS by writing over it with data; multiple programs are able to write to a device at the same time.

1.25

OS keeps track of memory space allocated to each program, preventing access to memory space out of assigned range for a program.

2.1

System calls allow user application request services from the operating system.

2.8

The main advantage of the layered approach is simplicity of construction and debugging. Each layer uses functions and services of only lower-level layers.

The problems include:

1. It requires appropriately defining the various layer, which in some cases are not

easy. For example, the layer definition between CPU scheduler and backing-store driver.

2. It tends to be less efficient than other types. Each layer adds overhead to the system call. The net result is a system call that takes longer than does on on a nonlayered system.

Virtual machine screenshot