HW9.6. OS: True or False

Q1.1: Which of the following statements are true about OS?

- [x] (a) The OS is often one of the first programs to run on bootup.
- [x] (b) The OS allows multiple programs to be run simultaneously.
- [x] (c) The system runs with at least two levels of permission; a "User" level which most programs use (and which is limited in how it can affect the system), and a "Supervisor" level, which has more permissions.
- [ ] (d) A majority of the OS is run in "Supervisor" mode.
- [ ] (e) User processes generally have full control of the Virtual Memory system.
- [x] (f) Users can access "Supervisor"-only operations through system calls; the OS then picks up those system call requests and runs them, generally after validation.
- [x] (g) The OS can interrupt running processes, saving its state, in order to run another process. This is known as a "context switch".
- [ ] (h) Due to the heavy overhead of a context switch, the OS generally does not force a context switch; most processes run in their entirety without any context switch.

Select all possible options that apply.

✓ 100%

Try a new variant

Correct answer

Q1.1: Which of the following statements are true about OS?
(a) The OS is often one of the first programs to run on bootup.
(b) The OS allows multiple programs to be run simultaneously.
(c) The system runs with at least two levels of permission; a "User" level which most programs use (and which is limited in how it can affect the system), and a "Supervisor" level, which has more permissions.
(f) Users can access "Supervisor"-only operations through system calls; the OS then picks up those system call requests and runs them, generally after validation.
(g) The OS can interrupt running processes, saving its state, in order to run another process. This is known as a "context switch".

a: This is generally true, though things like BIOS could be run before the OS.

b: This is generally accomplished through the VM and scheduling aspects of the OS's job.

c: This is a good part of security; it keeps user programs from accidentally bricking your entire system.

d: Surprisingly, this isn't true! An easy reasoning why is that supervisor mode is much riskier to use, in a sense that if a supervisor makes a mistake, critical systems could get affected. From a security standpoint, it is better to limit the amount of code with supervisor permissions as much as possible, both to prevent bugs from bricking your system, and to reduce the attack surface that malicious code can access.

e: VM tends to be facilitated by the OS; this allows the OS to restrict memory use to programs and prevent malicious or buggy code from using up all memory.

f: This validation process is also how the OS polices malicious code, and prevents it from modifying memory of other programs.

g: Switching between running processes is how the OS can run hundreds of programs off just 8 cores.

Homework 9

Assessment overview

Total points: 85/100

Score: 85%

Question

Value: 5

History: 5

Awarded points: 5/5

Report an error in this question

Previous question

Next question

Attached files

No attached files

Attach a file

Attach text

h: It is true that context switches have a high overhead, but this is often worth it. Memory operations tend to take hundreds of cycles, so it tends to be a good idea to run something else while waiting for a memory operation to finish. IO devices like keypresses can take even longer (on the order of 10^8 of clock cycles), so if a program is waiting on user input, it's generally a waste of processing power to just be waiting for user input. Further, oftentimes, the OS simply *has* to context switch to allow all running processes some runtime. A modern computer has about 8 cores at most, with 16 virtual cores, so it can run up to 16 processes at any given time. The OS alone tends to run hundreds of processes, and individual programs can run several dozen processes individually.

Submitted answer 3 **correct: 100%**
Submitted at 2022-11-20 04:55:56 (PST)

Submitted answer 2 **incorrect: 0%**
Submitted at 2022-11-20 04:55:47 (PST)

Submitted answer 1 **incorrect: 0%**
Submitted at 2022-11-20 04:55:40 (PST)