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Homework01

CSCI 356

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1) The operating system is used to manage the computers hardware, application programs and provide a way for the user to interact with the computer system.

According to GCF Global, they claim that the operating system is what manages the memory and processes along with the software and hardware of the device while allowing a user to communicate with the device without knowing the device's languages.

https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/

2) Having the user and kernel modes acts as security by limiting the user to protect the system and other users from malicious, fraudulent, or errant users from harming the system or others.

User mode is a less privileged mode in which it must request to run a process and are not allowed direct access to the systems hardware and resources. Whereas kernel mode is where all operating system components are. It accesses hardware and schedules processes for the system and must be accessed by the user through system calls this prevents unwanted use and access to the systems hardware and software.

https://www.geeksforgeeks.org/difference-between-user-mode-and-kernel-mode/

3) Of the listed instructions,modifying entries in device-status table, turning off interrupts, switching to kernel mode, accessing and I/O device would be considered privileged instructions as they are managed by the OS or require direct access to hardware.

4) The five major activities for process management are to create or terminate processes, to load and execute processes, get and set attributes of the processes, wait or signal events, and to allocate memory for the processes.

5) The three major activities in regards to memory management in regards to the Operating System are knowing who and where memory is being accessed, which processes should be put into memory when the space is available, and to allocate and de-allocate memory as needed by the system and it's processes.

6) The two categories of an operating system services are the services for the user, and the services of the system. These differ because the user services are focused on allowing the user to interact with the system, it provides a user interface, program execution, and I/O operations, file system manipulation, communication, as well as error detection. The system services primarily focus on the allocation of resources, accounting of resources, and protection and security that allow the system to work properly and efficiently.

7) The main advantage of the layered design system is that it allows easy debugging as you can start at the lowest layer then work up until the bug occurs so it will be on that layer. The downside to it is that it causes a lot of overhead and can be hard to implement for an OS as it can be hard to define each layer in terms of function and processes. This means OSes with a layered approach often have poor performance.

Advantages to using a layered OS System is that it allows easy debugging, Modularity, easy updates, no direct hardware access, and abstraction. However the cons of such a system are that it is complex and is a slower system as the processes must pass a message between layers to start other processes, and this creates overhead and a longer response time for the OS.

https://www.geeksforgeeks.org/layered-operating-system/

8) In order to do a context switch the computer must do a save state in which it takes all of the information, and the state of the process and it stores it in the PCB so that it can return to the process later. It then takes the new process or previously saved process and stores all the information into the registers and then begins the new process.

9) The parent process would create 6 processes, the parent and then 5 more children processesas it iterates through the loop. On top of that each child would then create 5 more iterations of the loop creating more 5 children processes. So the number of children processes would continue forever as each child creates and runs 5 more processes.

10) In Unix/ Linux, the Init process can take over as the parent of an orphan process, this occurs when a parent process terminates before the process of the child has completed. Init is the main process of the system and therefore is the fallback in that situation to terminate the processes so that the memory and resources can be reallocated. In Linux Init is known as Systemd, however works in the same way.

Init also known as the mother of all processes will take and collect all of the orphan processes and will perform a wait system call so that the orphan processes can exit, in the case of a zombie process the Init will eventually perform a wait() call and free up the resources if the parent process never calls for the wait.

https://linuxjourney.com/lesson/process-termination