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PART - 1 : Theory

(20 points)

Question 1: (5 points) What are the important data items related to a process that are maintained by the kernel for process management?

Kernel maintains two data structures for each process.

- an entry (proc structure) in the process table
- user structure or (u-area)

The Kernel maintains a Process Control Block for each process, which contains:

- Process execution state
- Process control
- I/O status - open files and devices
- CPU scheduling information
- Memory management information
- Accounting information
- Pending signals
- Signals masked

The Kernel maintains a user structure for each process, which contains:

- process file-descriptor table
- Pointer points to process table
- Information of current directory
- Kernel stack for the process
- Machine registers - area to save machine registers on a trap on context switch
- Kernel stack for executing traps and interrupt service routines

Question 2: (5 points) For each of the following four cases, identify the conditions under which the scheduler will change the status of a process:

a. Running to Ready

The process gets interrupted

When the scheduler select another process to run, the current running process is moved from running to ready.

b. Swapped to Running

The execution continue with the newly arrived process

c. Running to Waiting (Blocked)

Process need to perform I/O operation or waiting for event.

d. Ready or Waiting to Swapped

The process gets moved to secondary memory and gets put in a queue of temporary suspended process

When there is no enough memory for in the main memory.

Question 3: (5 points) When a UNIX process executes fork(), does the child process inherit
a. any pending signals of the parent?
No
b. the signal handlers of the parent process?
Yes
c. the signal mask of the parent?
Yes

Question 4: (5 points) Why is a separate stack in the kernel memory space used for handling system call functions and interrupt handlers for a process, instead of using the process stack?
For safety reason, user cannot access data items for the process if it is in the kernel memory