

Reading Assignment - 3

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Reasons for

1 Project Creation

- **User request for process creation** - A process created based on a user's requested start of a software or service.
- **Initiation of a batch job** - The operating system is provided with a batch job control stream. When the operating system is prepared to take a new work, it will read the next sequence of job control commands.
- **Created by Operating System to provide a service** - Without the user having to wait, the operating system can create a process to perform a function on behalf of a user program.
- **Execution of a process creation syscall by a running process** - For purposes of modularity or to use parallelism, a user program can dictate the creation of a number of processes.

2 Project Termination

- **Normal Completion** - The process executes an OS service call to indicate that it has completed running.
- **Unavailability of the Required Memory** - A process is terminated when the system is unable to provide the memory required, as it is more than the memory that it is actually contained in the system.
- **Exceed in the Execution Time Limit** - Process termination also occurs when its execution time is very much longer than the specific time limit i.e., it takes longer time to execute.
- **Protection Error** - The process attempts to use a resource or a file that it is not allowed to use, such as writing to a read-only file.
- **Arithmetic Error** - Some arithmetic errors such as, division-by-zero or storing a number greater than the hardware capacity also leads to process termination.
- **I/O Failure** - An error occurs during input or output, like inability to find a file, failure to read or write after a specified maximum number of tries or invalid operation.
- **Data misuse** - A piece of data is of the wrong type or is not initialized.
- **Invalid Instruction Execution** - When a process is trying to execute an instruction that actually does not exist, the process gets terminated.
- **Using a Privileged Instruction** - The process attempts to use an instruction reserved for the operating system.
- **Parent Process Termination** - When a parent process terminates, it causes all its child processes to stop their execution.
- **Request from a Parent Process** - A parent process typically has the authority to terminate any of its offspring.

Commands

3 Linux - Creation

- `fork()` followed by `exec()`
- `clone()` followed by `exec()`
- `vfork()` followed by `exec()`

4 Linux - Termination

- `killall <process>`
- `pkill <options> <pattern>`
- `kill <processID>`
- `kill -9 <processID>`
- `xkill <resource>`
- We can also kill a process using `top` command and `exit()`

5 Windows - Creation

- `CreateProcess()`
- `CreateProcessAsUser()/CreateProcessWithLogonW()`

6 Windows - Termination

- `taskkill /F/PID pid number`
- `taskkill /IM "process name" /F`

References

- [1] GeeksForGeeks,
<https://www.geeksforgeeks.org/reasons-for-processes-termination/>
- [2] Phoenix Nap,
<https://phoenixnap.com/kb/how-to-kill-a-process-in-linux>
- [3] Microsoft Documents,
<https://docs.microsoft.com/en-us/windows/win32/api/processthreadsapi/>
- [4] Tutorialspoint,
<https://www.tutorialspoint.com/process-creation-vs-process-termination-in-operating-system>