

CSCE 410/611 Homework #1
Due 2359 (11:59 pm) Thursday 27 Jan 2022

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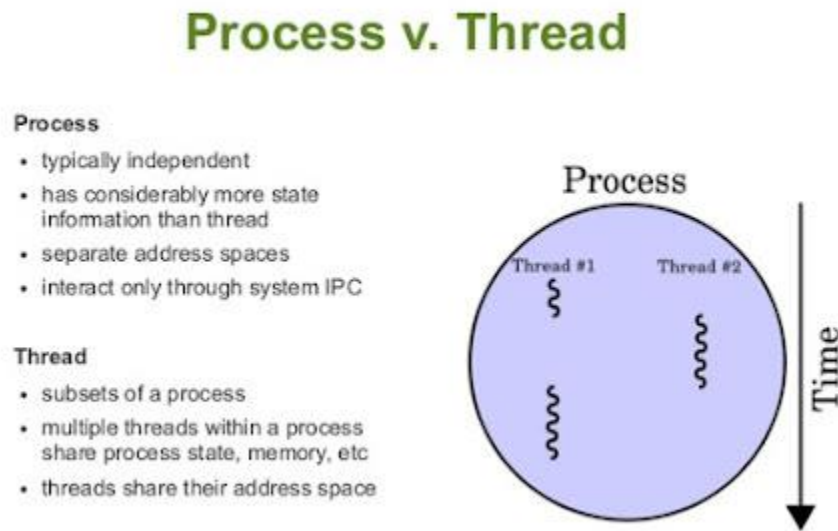
List of people you worked with on homework – None.

Question 1: What is the difference between processes and threads?

A process is an active program i.e. a program that is under execution. It is more than the program code as it includes the program counter, process stack, registers, program code etc. Compared to this, the program code is only the text section.

A thread is a lightweight process that can be managed independently by a scheduler. It improves the application performance using parallelism. A thread shares information like data segment, code segment, files etc. with its peer threads while it contains its own registers, stack, counter etc.

The diagram below illustrates these differences and makes understanding them much easier:



Question 2: What is spooling? Do you think that advanced personal computers will have spooling as a standard feature in the future?

Spooling is a process in which data is temporarily held to be used and executed by a device, program, or system. Data is sent to and stored in memory or other volatile storage until the program or computer requests it for execution.

I believe that the current issues that come with the process of spooling will be easily avoidable or even completely fixed in the future, especially given the quick progress that technology has been

making in the last decades. Most of the issues that arise with spooling are related to the current limitations in computer storage, but, as I just mentioned, technology has been progressing at reasonably high rates, and if we can find a way to fix storage issues, I think this could be a good technique to be included as a standard feature in personal computers. Most technology is usually developed for professional use before it gets to the public, and I think spooling may become one more example of this.

Question 3: What is priority inversion with respect to processes? Give an example.

Priority inversion is an operating system scenario in which a higher priority process is preempted by a lower priority process. This implies the inversion of the priorities of the two processes.

For example, the low priority task holds a mutex that the high priority task must wait for to continue executing.

Sources:

Question 1 (definitions & image):

Castro, K. (2018, October 10). *Difference between Process and Thread*. Difference between process and Thread. Retrieved January 26, 2022, from <https://www.tutorialspoint.com/difference-between-process-and-thread>

Difference between process and thread in Java - Example. Javarevisited. (2021, August 25). Retrieved January 26, 2022, from <https://javarevisited.blogspot.com/2015/12/difference-between-thread-and-process.html#axzz7J7PZ9De7>

Question 2:

Spooling in operating system - javatpoint. www.javatpoint.com. (n.d.). Retrieved January 27, 2022, from <https://www.javatpoint.com/spooling-in-operating-system>

Question 3 (definition & example):

Barnes, R. (2018, October 10). *Priority Inversion*. Priority inversion. Retrieved January 27, 2022, from <https://www.tutorialspoint.com/priority-inversion>

Introduction to RTOS - solution to part 11 (priority inversion). FreeRTOS Priority Inversion. (n.d.). Retrieved January 27, 2022, from <https://www.digikey.com/en/maker/projects/introduction-to-rtos-solution-to-part-11-priority-inversion/abf4b8f7cd4a4c70bece35678d178321>