REAL TIME OPERATING SYSTEMS

Lesson-8:
I/O Subsystems

1. I/O Subsystem

I/O ports

- Subsystems of OS device management system─ UART access sub system and the parallel port access sub system
- They are used by drivers to communicate with the many devices that use them
- I/O instructions depend on the hardware platform
- I/O sub-systems differ in different OSes.

I/O Subsystem in a Typical I/O System at in an OS

- Application
- IO Basic functions
- IO device driver functions
- Device Hardware or Port or IO Interface card

2. I/O Operations

OSes differing IO operations

- Traditional OSes *Synchronous IO operations*— at a certain fixed data transfer rates.
- RTOSes *Asynchronous IO operations* — at the variable data transfer rates.

Synchronous IO operations

- Are at a certain fixed data transfer rates.
- Therefore, a task (process) blocks tills till completion of the IO.
- For example, a write function, write ( ) for 1 kB data transfer to a buffer.

Synchronous IO

- Synchronous IO operation means once synchronous IO initiates, the data transfer will block the task till 1 kB data gets transferred to the buffer.
- Similarly, read ( ) once initiated blocks the task till 1 kB is read

Asynchronous IO operations

- Variable data transfer rates
- Permits that a process of high priority to run and should not block during the IOs

2. POSIX asynchronous functions for IOs

POSIX asynchronous functions for IOs

- aio_read ( )
- aio_write ( )
- aio_list ( )
- aio_error ( )
- aio_cancel,
- aio_suspend ( )─ Suspension is till the next port-device interruption or till a timed out.
- aio_return ( ) returns the status of completed operations.

Summary

We learnt

- I/O subsystems are part of OS services.
- Examples are UART access and parallel port access.
- Synchronous and asynchronous IOs.
- A task gets blocked during the synchronous IOs, for example, fread ( ) or write ( ).
- RTOSes support asynchronous IOs, for example, *aio_read* ( ) and *aio_write* also in order to not to block a task during the IOs

End of Lesson 8 of Chapter 10

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I/O Subsystems