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 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 8