Course Name : Embedded System EC5464

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EMBEDDED SYSTEMS EC5464

CO6 :Interpret the features of REAL TIME OPERATING SYSTEM

Topic 6.1 : Operating System: General and Real time operating system.

Topic 6.2: Characteristics of Real Time Operating System: Consistency, Reliability, scalability, Performance, Predictability

Topic 6.3 Functions of RTOS: Task management, Scheduling, Resource allocation and interrupt handling .

Topic 6.4 Task synchronization and Mutual Exclusion, Multitasking

Topic 6.5 : Features of RTOS: Watchdog timer, Semaphore, Deadlock. Starvation Deadlock , Multiple process

Scheduling : Preemptive and non preemptive

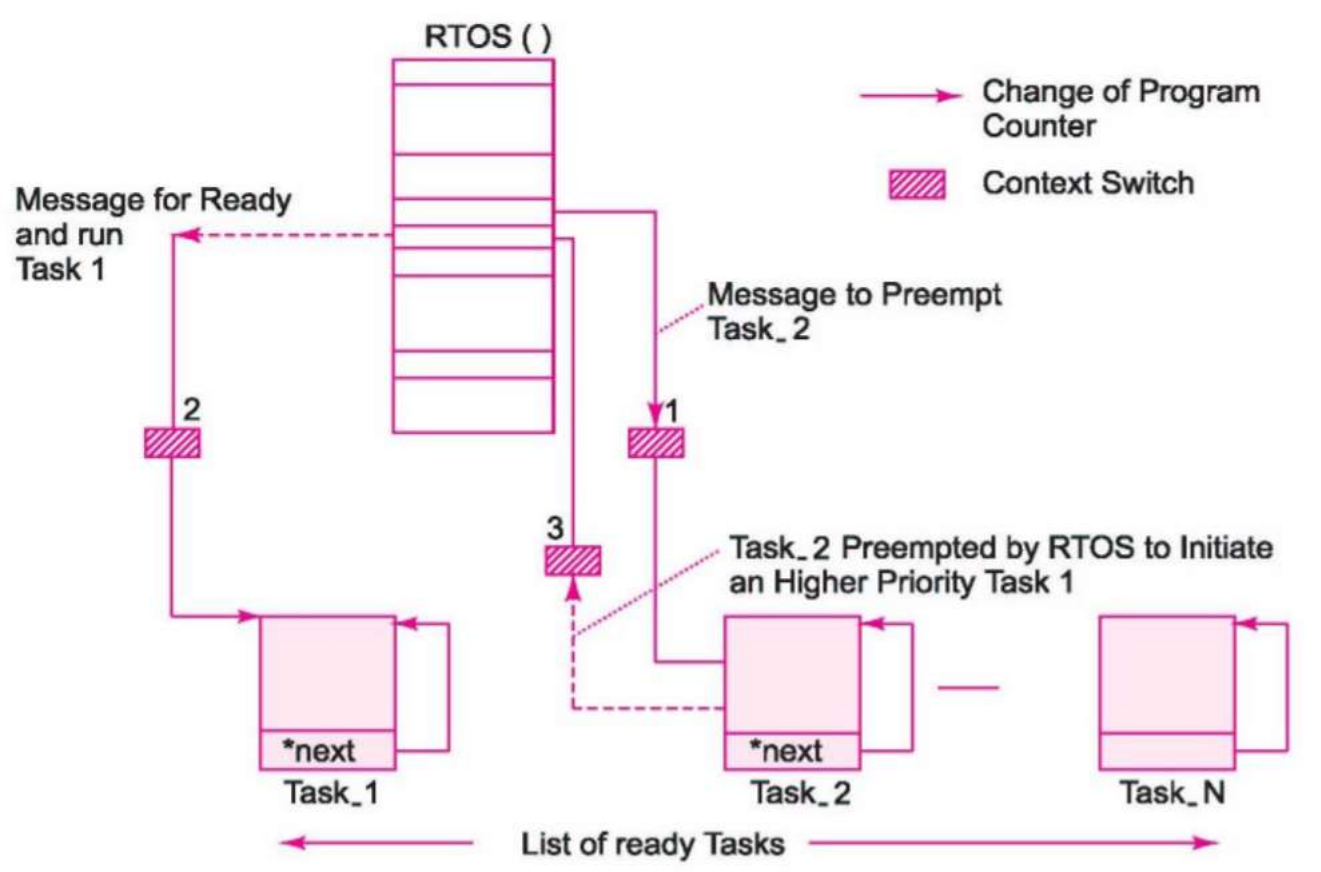
Preemptive Scheduling

- ❖Cyclic Scheduling of periodic tasks and Round Robin Time Slicing Scheduling of equal priority tasks
- ❖Cooperative Scheduling of ready tasks in a circular queue. It closely relates to function queue scheduling.
- ❖ Cooperative Scheduling with Precedence Constraints
- ❖Scheduling using 'Earliest Deadline First' (EDF) precedence

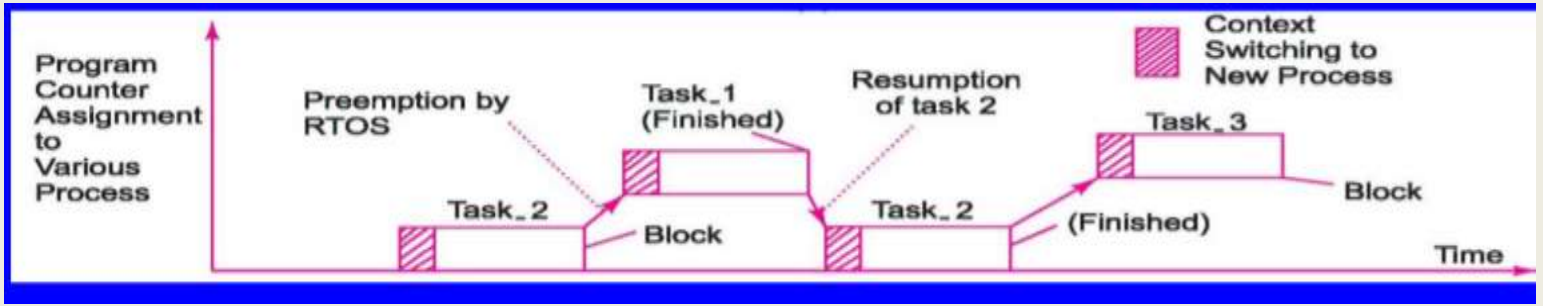
Preemptive Scheduling of tasks

OS schedules such that higher priority task, when ready (on receiving the IPC for which waiting or signal for start), preempts a lower priority by blocking running task

Preemptive scheduling



Preemptive scheduling



Worst-case latency

- **Not Same for every task**
- **Highest priority task latency smallest**
- **Lowest priority task latency highest**

1.Preemptive Scheduling:

Preemptive scheduling is used when a process switches from running state to ready state or from waiting state to ready state. The resources (mainly CPU cycles) are allocated to the process for the limited amount of time and then is taken away, and the process is again placed back in the ready queue if that process still has CPU burst time remaining. That process stays in ready queue till it gets next chance to execute.

2. Non-Preemptive Scheduling:

Non-preemptive Scheduling is used when a process terminates, or a process switches from running to waiting state. In this scheduling, once the resources (CPU cycles) is allocated to a process, the process holds the CPU till it gets terminated or it reaches a waiting state. In case of non-preemptive scheduling does not interrupt a process running CPU in middle of the execution. Instead, it waits till the process complete its CPU burst time and then it can allocate the CPU to another process.

Comparison Chart: pre empt and non preempt scheduling

PARAMENTER	PREEMPTIVE SCHEDULING	NON-PREEMPTIVE SCHEDULING
Basic	In this resources (CPU Cycle) are allocated to a process for a limited time.	Once resources(CPU Cycle) are allocated to a process, the process holds it till it completes its burst time or switches to waiting state.
Interrupt	Process can be interrupted in between.	Process can not be interrupted until it terminates itself or its time is up.
Starvation	If a process having high priority frequently arrives in the ready queue, low priority process may starve.	If a process with long burst time is running CPU, then later coming process with less CPU burst time may starve.
Overhead	It has overheads of scheduling the processes.	It does not have overheads.
Flexibility	flexible	rigid
CPU Utilization	In preemptive scheduling, CPU utilization is high.	It is low in non preemptive scheduling.
Examples	Examples of preemptive scheduling are Round Robin and Shortest Remaining Time	Examples of non-preemptive scheduling are First Come First Serve and Shortest Job First.

Thank You