SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ITT204 - MICROCONTROLLER AND EMBEDDED SYSTEMS

II YEAR/ IV SEMESTER

UNIT IV PROCESSES AND OPERATING SYSTEMS

TOPIC – Task Scheduling

Scheduling

Definition:

- It is the method by which threads, processes or data flows are given access to system resources (e.g. processor time, communications bandwidth).

- By use of Proper algorithm of scheduling, we can perform multiple task in a given time.

The scheduler is concerned mainly with:

- **Throughput** - The total number of processes that complete their execution per time unit.
- **Response time** - amount of time it takes from when a request was submitted until the first response is produced.
- **Waiting Time** - Equal CPU time to each process (or more generally appropriate times according to each process' priority). It is the time for which the process remains in the ready queue.

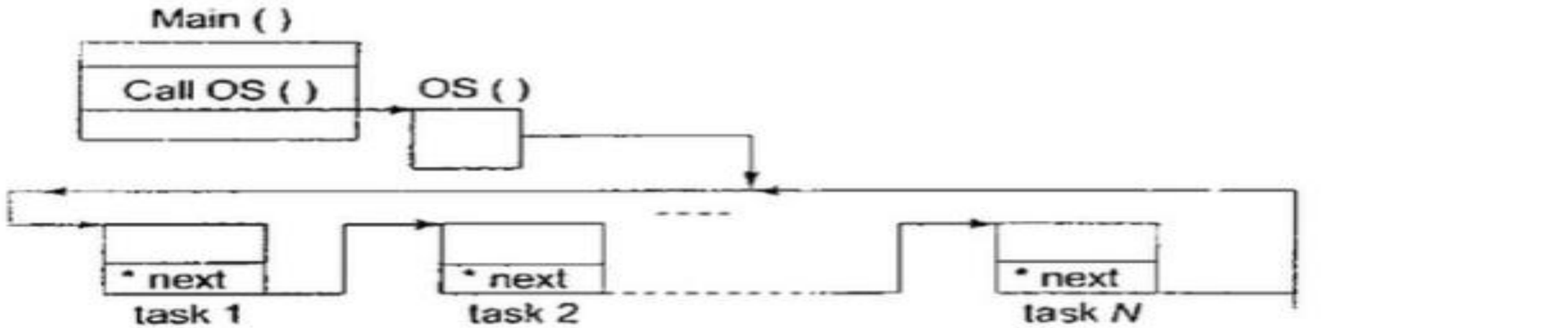
Preemptive vs. Non-Preemptive

- **A scheduling algorithm is:**
  - **Preemptive:** if the active process or task or thread can be temporarily suspended to execute a more important process or task or thread .
  - **Non-Preemptive:** if the active process or task or thread cannot be suspended, i.e., always runs to completion.

RTOS task scheduling models

1. Cooperative Scheduling of ready tasks in a queue.
2. Cyclic and round robin (time slicing) Scheduling.
3. Preemptive Scheduling.
4. Rate-Monotonic Scheduling (RMS).
5. Scheduling using “Earliest deadline first” (EDF).

1. **Cooperative Scheduling of ready tasks in a queue.**



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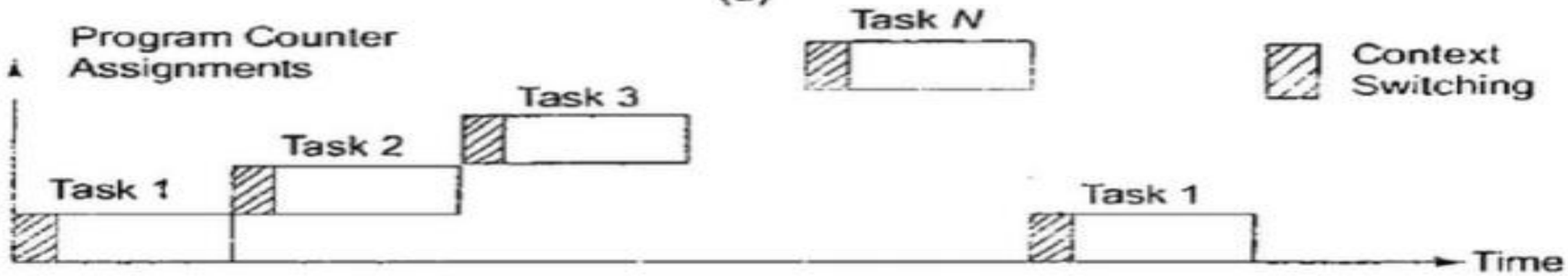


Dis-advantages:

Longer execution time of a low priority task makes a higher priority task wait until it finishes.

Round Robin (time slicing) Scheduling

- Round robin means that **each ready task runs turn by turn only in a cyclic queue for a limited time slice**

$$T_{slice} = \frac{T_{cycle}}{N}$$

Where
$T_{slice} = Limited\ time\ slice$
$T_{cycle} = Time\ cycle$
$N = Number\ of\ tasks$

- Round robin **is a hybrid model of clock-driven model** (for example cyclic model) **as well as event driven (for example, pre-emptive)**

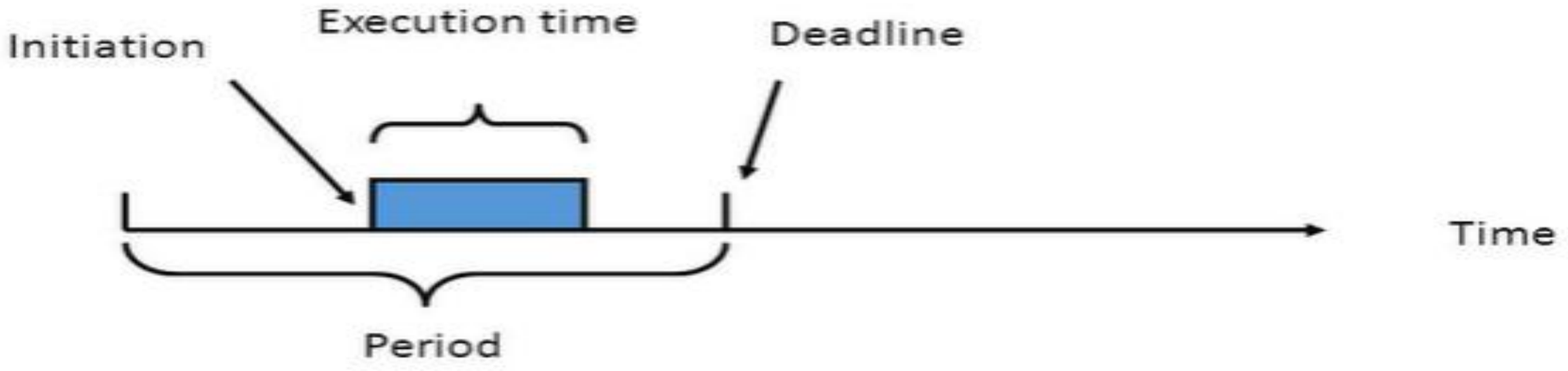
- A real time system responds to the event within a bound time limit and within an explicit time.

Priority-based Scheduling

- Typical RTOS based on fixed-priority preemptive scheduler
- Assign each process a priority
- At any time, scheduler runs highest priority process ready to run
- Process runs to completion unless preempted

Typical RTOS Task Model

- Each task a triplet: (execution time, period, deadline)
- Usually, deadline = period
- Can be initiated any time during the period



THANK YOU