UNIT IV

RTOS BASED EMBEDDED SYSTEM DESIGN

4.5 Robin Time Slicing of tasks of equal priorities Common scheduling models

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

Common scheduling models

- RateMonotonicSchedulingusing_higherrateofeventsoccurrenceFirst'precedence
- Fixed Times Scheduling
- Scheduling of Periodic, sporadic and a periodic Tasks
- Advanced scheduling algorithms using the probabilistic Timed Petri nets (Stochastic)or Multi Thread Graph for the multi processors and complex distributed systems.

Round Robin Time Slice Scheduling of Equal Priority Tasks
Equal Priority Tasks

- Round robin means that each ready task runs turn by in turn only in a cyclic queue for a limited time slice.
- Widely used model in traditional OS.
- Round robin is a hybrid model of clock-driven
- model (for example cyclic model)as well as event driven (for example, preemptive)
- A real time system responds to the event with in a bound time limit and within an explicit time.

Tasks programs contexts at the five instances in the Time SchedulingSchedulerforC1toC5
Programming model for the Cooperative Time sliced scheduling of the tasks
Program counter assignments on the scheduler call to tasks at two consecutive time slices

.Each cycle takes time $= N \square$ t slice

Case: T cycle$=N \square$T slice

- Same for every task=T cycle
- T cycle$=\{$T slice$)\} \square N +$t ISR.
- T ISR is the sum of all execution times for the ISRs
- For an I - th task, switching time from one task to another be is st and task execution time be I set
- Number of tasks =N

Worst-case latency

- Same for every task in the ready list
- T worst= $\{N \square (T$ slice $)\}+$t ISR.
- T ISR is the sum of all execution times for the ISRs
- i = 1,2, …, N$\square$1 , N

VoIP Tasks Example

- Assume a VoIP [Voice Over IP.] router.

- It routes the packets to N destinations from N sources.
- It has N calls to route.
- Each of N tasks is allotted from a time slice and is cyclically executed for routing packet from a source to its destination

Round Robin

- Case1: Then each task is executed once and finishes in one cycle itself.
- When a task finishes the execution before the maximum time it can takes there is a waiting period in-between period between two cycles.
- The worst-case latency for any task is then $N_{t\,slice}$. A task may periodically need execution .A task the period for the its need of required repeat execution of a task is an integral multiple of t slice.

Case2: Alternative model strategy

- Case2:Certain tasks are executed more than once and do not finish in one cycle
- *Decomposition* of a task that takes the abnormally long time to be executed.
- The decomposition is *into two or four or more tasks*.
- Then one set off tasks (or the odd numbered tasks) can run in one time slice t 'slice and the another set of tasks (or the even numbered tasks) in another time slice, t' slice.

Decomposition of the long time taking task into a number of sequential states

- *Decomposition of the long time taking task* into a number of sequential states or a number of node-places and transitions as in finite state machine. (FSM).
- Then its one of its states or transitions runs in the first cycle the next state in the second cycle and so on.

This task then reduces the response times of the remaining tasks that are executed after a state change.