RTOS

* Real-Time operating System (Expand)
* Multitasking operating system
* Module called scheduler :-

⇒ Schedules different task and determines which task to process will executed on the processor.

⇒ Multitasking is achieved in this way.

⇒ Scheduling is provides a predicate execution pattern.

⇒ In embedded system event must be carried across strictly define time

⇒ The behavior of scheduler must be predictable.

* This type of OS which have scheduler with predictable execution pattern is called RTOS *

Features of RTOS :-

1) Context switching latency should be short
2) Interrupt latency should be short
3) Interrupt dispath latency should be short
4) Reliable and time bound inter process mechanism
5) Support kernel pre-emption

RTOS Responsibility :-

Main Responsibility :-

* Task management and Scheduling
* Interrupt servicing
* Inter-process communication and synchronization
* Memory Management

RTOS Types :-

* Hard real time
* Soft real time
* Real Real time
* Firm Real time

Hard Real time :-

* System where it is absolutely imperative that responses occur within the required deadline.

* Eg :- Flight control system.

Soft Real time :-

* System where deadline is important but which still functions correctly if deadlines are occasionally missed.

* Eg : Data acquisition System.

Real-Real time :-

* system which are hard real time and response time are very short

* Eg :- Missile guidance system

Firm Real time :-

* system which are soft real time but in which there is no benefit from late delivery of service

* A single system can have all hard, soft and real-real time system.

Automativ OS

* AUTOSAR - Automotive open system ARchitecture

* development patership of automotive interested parties found in 2003.

* The objective to create and establish an open and standardized softwar architecture for (ECU) Automotive electronic control unit.

OS objectives:

* Task
* Events
* counter
* scheduler
* Resource
* Alarm
* Hock function.

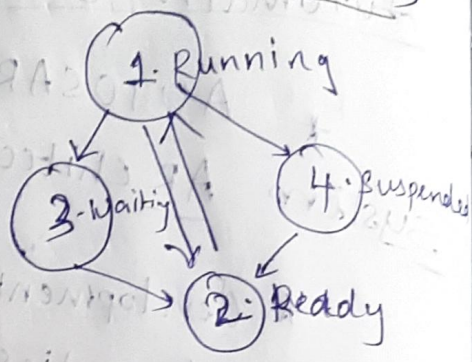
Task: (Executing the function)

Two types:-

* Extended task
* Basic task

Extended task (There are 4 task states)

* Running (1)
* Ready (2)
* waiting (3)
* suspended (4)

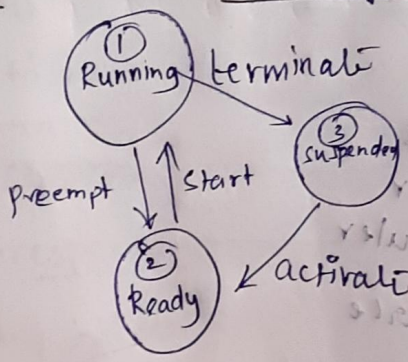


Basic task :-

There are 3 task states :-

1) Running
2) Redy
3) suspended.

* do not have a waiting state



Events :-

* Assigned to Extended task.

Eg :- * Signalling of an expiring time
* The availibility of Resources
* The reception of a message

Counter :- (Belong to OS App)

* Represent count value
* Use to drive scheduler and alarm if they are same (are

Scheduler :- (Main compound of RTOS)

4 types of scheduling :-

* Pre-emptive
* Non-Pre-emptive
* Group of task
* Mixed pre-emptive

* RTOS uses Pre-emptive scheduling
* The higher priority task can interrupt a running process and interrupted process will be resumed later

Alarm :-

* Use to activate task
* Set event, increment counter and call-back alarm

Hook function :-

* It's used only in debugging
* Not used in final product

OS - Applications :-

* OS must be capable of supporting all the components

* Different software components :-
  * Trusted
  * Non-Trusted

Trusted :-

* Allowed to run with monitoring or protection feature disabled to runtime.
* Allowed direct access to the hardware.

Non-Trusted :-

* NOT Allowed to run with monitoring or protection feature disabled to runtime.

Application :-

* spin lock
* IOC (Inter OS communication)
* Microkernel RTOS
* ~~Microkernel OS Architecture~~