



REAL TIME OPERATING SYSTEM (RTOS)

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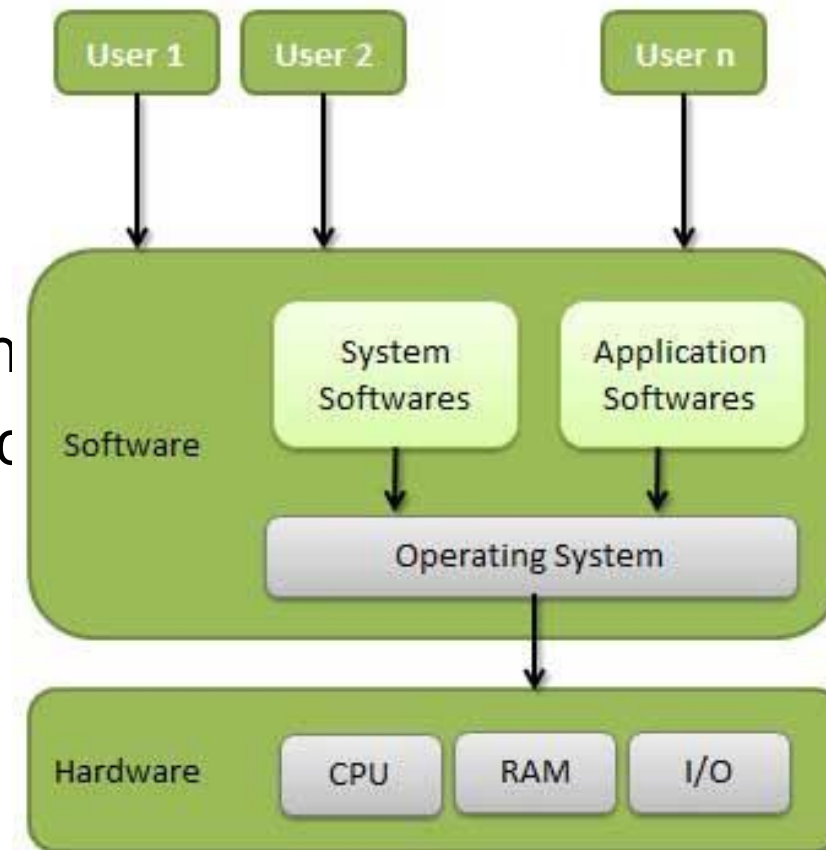
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OPERATING SYSTEM

- In technical terms, It is a software which manages hardware.
- An operating System (OS) is an intermediary between users and computer hardware. It provides users an environment in which a user can execute programs conveniently and efficiently.



IMPORTANT FUNCTIONS OF OPERATING SYSTEM

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control over system performance
- Job accounting
- Error detecting aids
- Coordination between other software and users

TYPE OF OPERATING SYSTEM

- Single-user operating system
 - MS-DOS, WindowsXp, etc
- Multi-user operating system
 - UNIX, Linux, etc
- Network operating System
 - Microsoft Windows Server 2003, Microsoft Windows Server 2008, etc
- Real Time Operating System
 - For example : Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, and home-appliance controllers, Air traffic control system etc.

REAL-TIME OPERATING SYSTEM (RTOS)

- RTOS is an operating system (OS) intended to serve real-time applications which process data as it comes in, typically without buffering delays.

Processing time requirements (including any OS delay) are measured in tenths of seconds or shorter increments of time.

They either are **event driven** or **time sharing**. Event driven system switches between task based on their priorities while time sharing switch the task based on clock interrupts.

www.wikipedia.org

- Real-time OS (RTOS) is an intermediate layer between hardware devices and software programming
- “Real-time” means keeping deadlines, not speed
- Advantages of RTOS in SoC design
 - Shorter development time
 - Less porting efforts
 - Better reusability
- Disadvantages
 - More system resources needed
 - Future development confined to the chosen RTOS

■ Soft real-time

- Tasks are performed by the system as fast as possible, but tasks don't have to finish by specific times
- Priority scheduling
- Multimedia streaming

■ Hard real-time

- Tasks have to be performed correctly and on time
- Deadline scheduling
- Aircraft controller, Nuclear reactor controller

REAL TIME OPERATING SYSTEM

- Real time system is defines as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment.
- **Real time** processing is always **on line** whereas **on line** system need not be **real time**.

EXAMPLE OF RTOS

- Keil RTX Real-Time Kernel
 - <http://www.keil.com/arm/rl-arm/kernel.asp>
- Micrium μ C/OS-II
 - <http://www.micrium.com/products/rtos/kernel/rtos.html>
- CMX-RTX
 - <http://www.cmx.com/rtx.htm>
- Express Logic ThreadX
 - <http://www.rtos.com/>
- Segger ebmOS
 - http://www.segger.com/embos_general.html
- uClinux
 - As distributed with the EA LPC2468 board
- FreeRTOS.org
 - <http://www.freertos.org/>



THE MC/OS-II RTOS

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MC/OS-II

- Real-time kernel
 - Portable, scalable, preemptive RTOS
 - Ported to over 90 processors
- Pronounced “microC OS two”
- Written by Jean J. Labrosse of Micrium,
<http://ucos-ii.com>
- Extensive information in **MicroC/OS-II: The Real-Time Kernel (A complete portable, ROMable scalable preemptive RTOS)**, Jean J. LaBrosse, CMP Books

TASK STATES

- Five possible states for a task to be in
 - Dormant – not yet visible to OS (use OSTaskCreate(), etc.)
 - Ready
 - Running
 - Waiting
 - ISR – preempted by an ISR
- See manual for details

