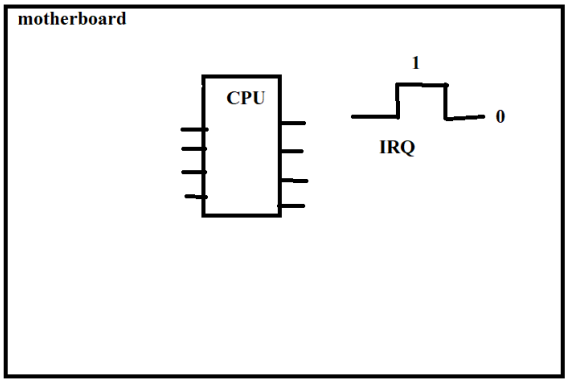
Tuesday, October 19, 2021 11:15 AM

Interrupts ------



CPU gets interrupts

CPU pins get interrupts requests IRQ

What is the meaning of Interrupt ATA HAI ? We get a signal on the respective pins of the CPU !

What is an **interrupt** ? It is a **signal** !!

Source----------Signal(**IRQ**)---------->Destination (CPU)
IO device
H/W
Clocks
Timers
Other programs

Operating System = **Kernel**

When an interrupt occurs SOMETHING must be done!!!

In the RAM ---- **main memory** section
functions for handling the interrupts-- code that tells what should be done when the interrupt occurs
Interrupt Handlers (IH)

Kernel will *map* the different interrupts to the IH
Simple mapping we saw since childhood

Roll num	Name
1	Rahul
2	Ameya
3	Gaurav
4	Lokesh

We want to **map** Interrupt Request with Interrupt Handler
Interrupt Table (Interrupt Vector Table - IVT)

IRQ	Function pointer to IH
1	(void *)H1
2	(void *) H2

Kernel will find the IRQ that got the signal
Kernel will find the Handler for that IRQ in the IVT and then execute the Handler Code !!!

Types of Interrupts----------

1	Hardware Interrupts	Interrupt comes from Keyboard, mouse,

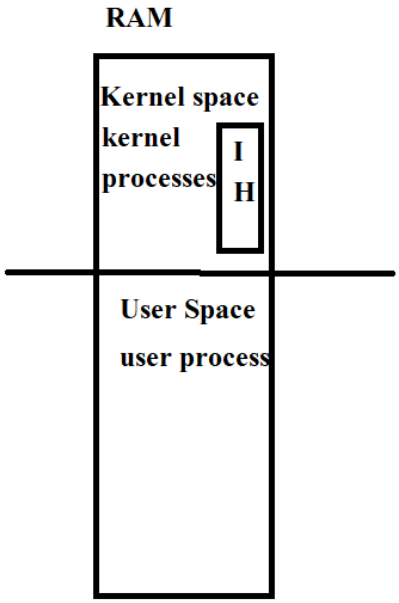
2	Software interrupts	Interrupt comes from one program

1	Maskable Interrupts	We can have setting to IGNORE the interrupt
2	Non Maskable Interrupts	We can never IGNORE these interrupts

HW ------
2 examples of each type of interrupts

IO interrupts - they are a way to communicate between h/w and the kernel !!!

Kernel Space
User Space



CPU can run in

a. Kernel Mode ---- the Kernel space instructions can be accessed
   Privileged instructions are executed by the CPU

b. User Mode ---- The PC can access only the user space instructions
   Non Privileged instructions are executed in user mode

Process Management ---------- very important job of the Kernel !!!!

Process = Process is a program in execution!!!

Program = set of instructions that are present on the HDD storage
Process = Active, Live Running programs that are present in the RAM

Process = non tangible , logical entity

Ctrl alt delete -------task manager

How many notepad.exe programs are on HDD ? 1
How many processes of notepad.exe are we starting ? 2 and more

Program is resting in the HDD - no life cycle !!!
Every Process Goes through a Life Cycle !!!!

Phase 1 , State1	Created State / Born	process gets a unique PID All attributes of the process are stored in a PCB PCB = Process Control Block Attributes of process in PCB = process metadata Current state, location, pid , priority, context info, user, statistical info	TRANSITION to READY STATE

		Process is loaded in the RAM (code, data stack , heap) = address space/process space Every process gets a UNIQUE address space	
Phase2 , State2	Ready	Number of CPUs is much less than number of processes Processes = 230 , CPU =4 At a time only 4 processes can occupy the CPUs Other (226)processes are waiting for the CPU in READY QUEUE - Kernel space	TRANSITION to RUNNING state
Phase3 , State3	Running/Executing	The process that gets the CPU --- starts loading one instruction at a time in the registers ALU executes the instructions	If last instruction is done - transition to TERMINATE If IO instruction is the next one - transition to WAIT STATE If interrupt occurs - transition to READY STATE
Phase4 , State4	Wait / IO Wait /Suspend	If process gets the next instruction as IO instruction then process leaves CPU, wait for DMA to complete the IO	After the IO is completed -transition to READY
Phase 5,State 5	Terminated	When the process finishes the last instruction of main then , process terminates Free the resources allocated to the process -- Release the RAM space and release the PID , PCB	

Life Cycle Diagram

STATE in rectangle

State transition straight line with the reason on it!!!!
