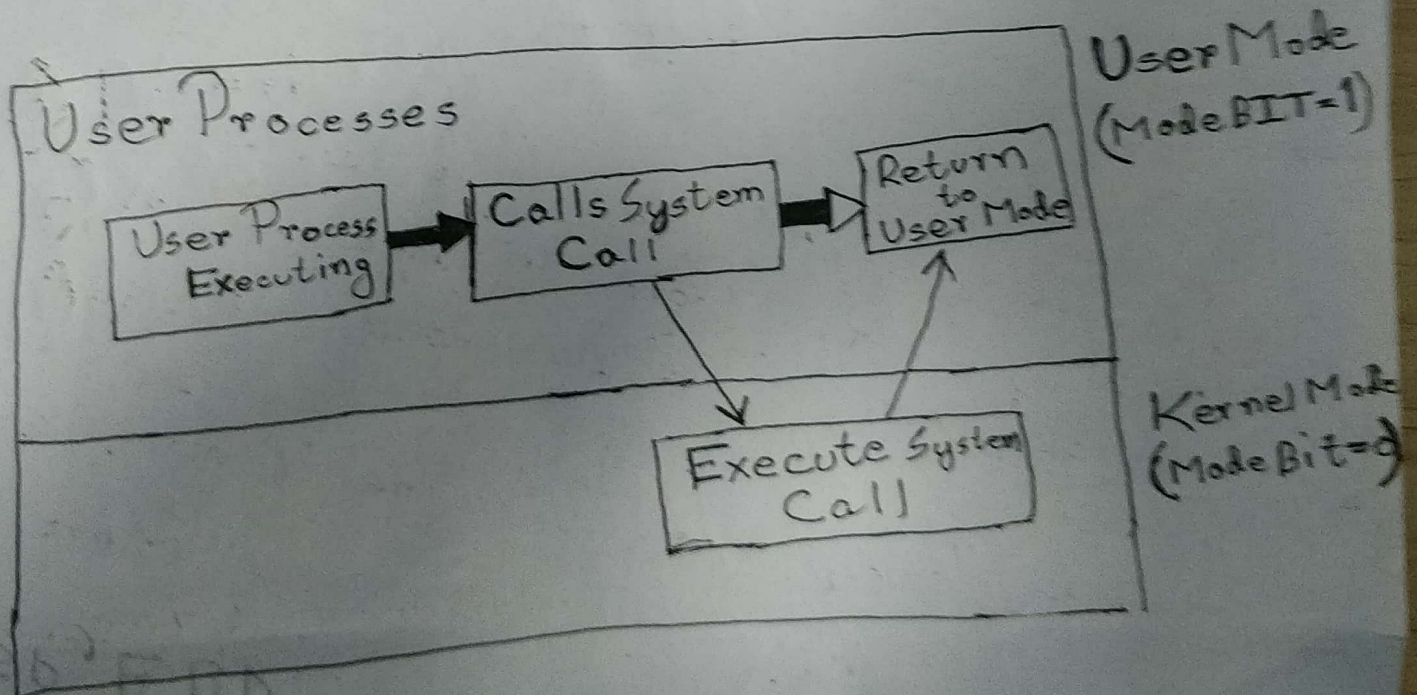
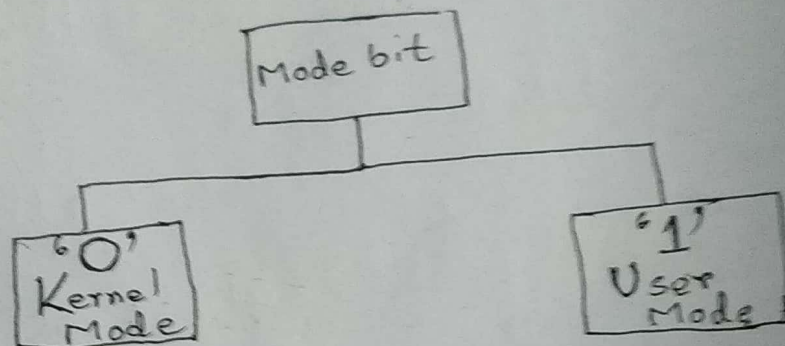


1) What is dual mode?

Ans: Two modes are provided by the hardware →
User & kernel mode / privileged Mode / System Mode
Non-privileged supervisory Mode

These two modes are called dual mode.

Mode bit is added to computer hardware to indicate the current mode



Note:
V.V.I

This two modes are the ~~CPU~~ CPU or processor mode.

Advantages:

- 1) Provide protection & security to user program
- 2) *Privileged mode occurs in kernel mode
- * Non- " " " " user "
- *** 3) OS system works in kernel mode (default)
- 4) During booting, it always starts with kernel mode
- 5) Mode switching takes less time compared to process " "

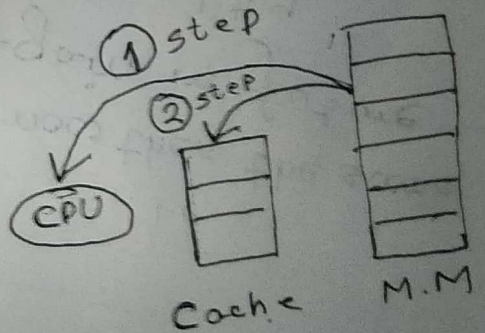
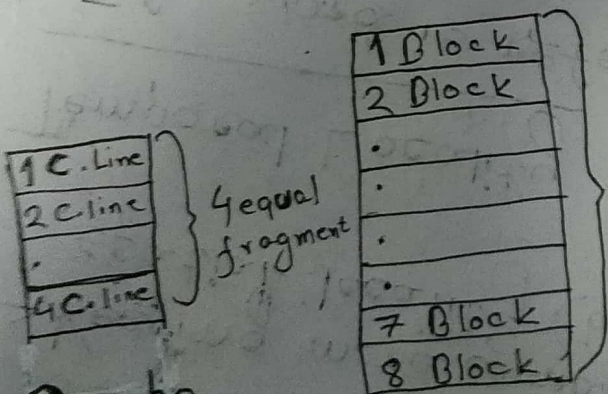
2) What are temporal locality & spatial locality?

Ans:

Locality of Reference

Spatial Locality
(Space Related)

Temporal Locality
(Time Related)



* Each fragment is called Line.

Main Memory

* Each fragment is called block

* There are 8 blocks

Note: Block size = Cache line

Spatial locality

- If a word is accessed now the word adjacent to it (close proximity) will be accessed next
- Keeping more words in a block affects spatial locality (block size)

Temporal Locality

- If a word is referenced now then the same word will be referenced again in future
- LRU is used in temporal locality
Least Recently Used
- LRU is replaced by New Block from Hard disk

3) Describe the bootstrap process of one typical X 86 machine.

Ans: The BIOS. When an X 86 computer is booted, the processor looks at the end of system memory for the Basic Input/Output System or BIOS program and runs it. The BIOS controls not only the first step of the boot process, but also provides the lowest level interface to peripheral devices.

4) List at least three different ways (or machine level instructions) that a user mode program uses to transfer control to the kernel.

Ans:

The few different ways (or machine level instruction) that a user mode program uses to transfer control to the kernel are given below:

- If we are dividing by zero
- Explicitly executing a hardware trap instruction.
- Executing an illegal instruction
- Executing a privileged instruction (such as a "change processor mode" instruction)
- Reading or writing an invalid or protected piece of memory (including device registers)

V.V.I
Q.12

5) What is the purpose of interrupts? How does an interrupt differ from a trap? Can traps be generated intentionally by a user program? If so, for what purpose?

Ans: An interrupt is a hardware-generated change-of-flag within the system. An interrupt handler is summoned to deal with the cause of the interrupt; control is then returned to the interrupted context & instruction. A trap is a software-generated interrupt. An interrupt can be used to signal the completion of an I/O to obviate the ~~can~~ need for device polling. A trap can be used to call operating system routines or to catch arithmetic errors.

6) Which of the following instructions should be privileged?

- Set value of timer
- Read the clock
- Clear memory
- Issue a trap instruction
- Turn off interrupts
- Switch from user to kernel mode
- Modify entries in device-status table

h. Access I/O device

Ans:

Privileged instructions: a, c, e, f, h

These are used in user mode.

Privileged instructions are those instructions that can be executed only when processor is in kernel mode. It includes operations such as interrupt calls and handling, access I/O devices, memory management, timer control & management, protected control registers, etc.)

Set the value of a timer - It requires the CPU to change the protected control of timer, which changes the values at system level. It can't be executed in the user mode. Therefore,

the option A is privileged instruction. Read the clock - Every process can access the time of the clock to read the time only. This can be executed in the user mode. Therefore, the ss.

option B is an unprivileged instruction.

Clear memory - This instruction can harm

the operating system & other applications by manipulating the values at system

level. It can't be executed in the user mode.
Therefore, option C is a privileged instruction.
Issue a trap instruction - It doesn't require any kernel to make system call because most of the user processes.

7) Describe the differences between symmetric & asymmetric multiprocessing. What are the advantages & disadvantages of multiprocessor systems?

Ans:

Asymmetric

In this system, each processor is assigned a different task. To better co-ordinate the work of all processors, one processor is designated as a boss processor & it gives tasks to other processors - worker processors.

Symmetric

In this system, all processors are peers, meaning that they can perform all tasks.

Advantages:

The three main advantages are:

- 1) Better speed — more processors generally mean that the work will be done more quickly.
- 2) Multiprocessor system can be cheaper than buying & maintaining equivalent multiple single processor systems.
- 3) If one processor fails, the system doesn't halt.

Disadvantages:

The main disadvantage is that multiprocessing can cause a performance penalty by changing the memory access model from uniform memory access to non-uniform memory access.