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Assignment
Operating System
IT-317

Q1) Explain Segmentation with Paging.

Ans) Paging and Segmentation are memory management schemes.

- The process of retrieving processes in the form of pages from the secondary storage into the main memory is known as paging. The basic purpose of paging is to separate each procedure into pages. It eliminates the need for contiguous allocation of physical memory. This scheme permits the physical address space of a process to be non-contiguous.

The logical address space is also splitted into fixed size blocks called pages.

- Segmentation gives the user's view of the process which paging do not give. A process is divided into segments. The chunks that a program is divided into which are not necessarily all of same sizes are called Segments.

There is no simple relation b/w logical addresses and physical addresses in Segmentation.

A Segment Table stores the information about all such segments. [Maps 2-D logical address into 1-D physical address].

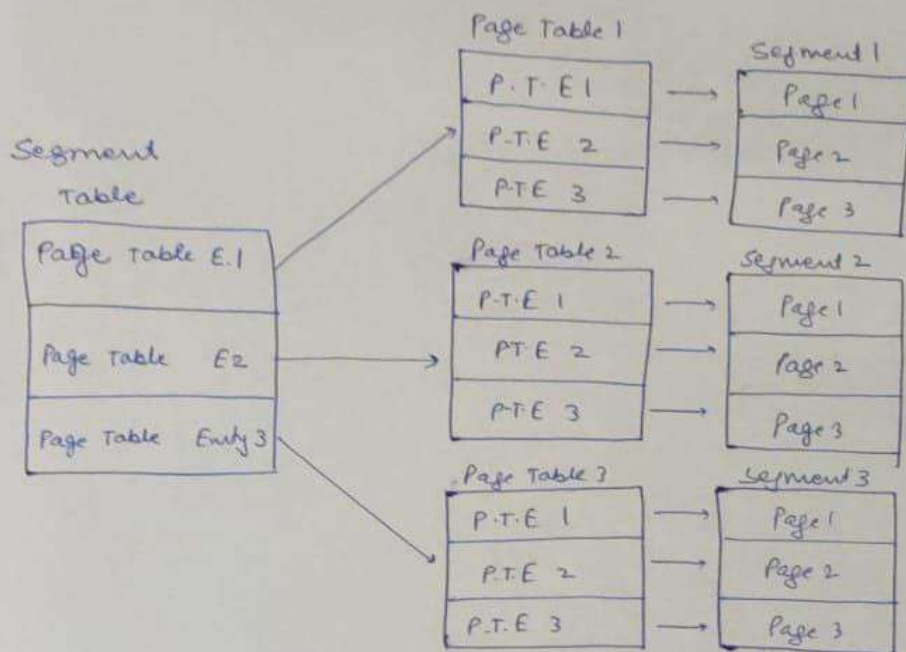
Segmentation with paging is a memory management technique used in operating systems to divide the physical memory of a computer into smaller chunks called pages and to allow multiple process to run concurrently by sharing the same physical memory. This approach combines the benefit of both segmentation and paging.

For a large logical address spaced process, a lot of its page table entries are invalid as a lot of logical address space goes unused.

A solution to the problem is to use segmentation along with paging to reduce size of page table.

In this technique, this segment is assigned a unique identifier and is used to store a specific type of data or code. This allows OS to allocate memory more efficiently and to protect critical data from being accessed by unauthorized processes. while still being able to use virtual memory to extend the available physical memory.

In the following diagram, when a process needs to access a specific piece of data, The request is sent to OS which uses segment identifier and page no. to relocate memory and if it is not found, then OS retrieves it using virtual memory from the disk space and brings it into physical memory.



Main memory

Segment 1
Segment 2
Segment 3

Segment Base	Page Number	Page offset
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Logical Address

Segmented Paging

Segmentation
technique
memory of

Q 2) What is Thread and Thread Structure?

Ans) A Thread is a single sequential flow of execution of tasks of a process so it is also known as thread of execution or thread of control.

- There can be more than one thread inside a process.
- In traditional operating systems, each process has an address space and a single thread of execution.
- In a process threads allow multiple execution of streams.

Why do we need threads?

- It takes far less time to create a new thread in an existing process than to create a new process.
- Context switching is faster when working with threads.
- It takes less time to terminate a thread less than a process.
- Resources can be shared b/w all threads within a process such as code, data, files.
- Effective utilization of multiprocessor system.
- Multiple threads ^{are} ~~are~~ treated as jobs done in unit time.
So, throughput of system also increases.

Components of a Thread -

- Program Counter
- Register Set
- Stack space

Structure of a Thread is as follows -

- Process is used to group resources together and Threads are entities scheduled for execution on CPU.
- The Thread has a program counter that keeps track of which instruction to execute next.
- It has registers which holds its current working variables.
- It has a stack which has execution history, with one frame for each next procedure called but not yet returned from.
- Having multiple ~~the~~ threads running in parallel in one process is similar to having multiple processes running in parallel in one computer.