

Assignment - 1

1 a) Categorize between internal and external fragmentation.

Sol: Internal fragmentation

1. In internal fragmentation fixed-sized memory blocks square measure appointed to process.
2. Internal fragmentation happens when the method or process is larger than the memory.
3. The solution of internal fragmentation is the best-fit block.
4. Internal fragmentation occurs when memory is divided into fixed-sized partitions.
5. The diff b/w memory allocated and required space of memory is called internal fragmentation.

External fragmentation

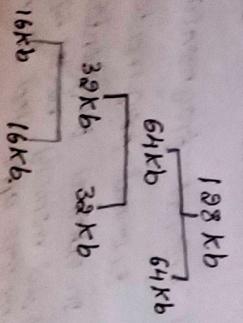
- In external fragmentation, variable sized memory blocks square measure appointed to method.
- External fragmentation happens when the method or process is removed.
- The solution to external fragmentation is compacting & paging.
- External fragmentation occurs when memory is divided into variable size partitions based on the size of processes.
- The unused spaces formed b/w non-contiguous memory fragments are so small to serve a new process, which is called external fragmentation.

b) Describe the Buddy system used for managing free memory assigned to kernel process.

Sol: Buddy allocation system is an algorithm in which a larger memory block is divided into small parts to satisfy the request. This algorithm is used to give best fit. The same manner one of the two buddies will further divide into smaller parts until the request is fulfilled. Benefit of this technique is that the two buddies can combine to form the block of larger size according to the memory request.

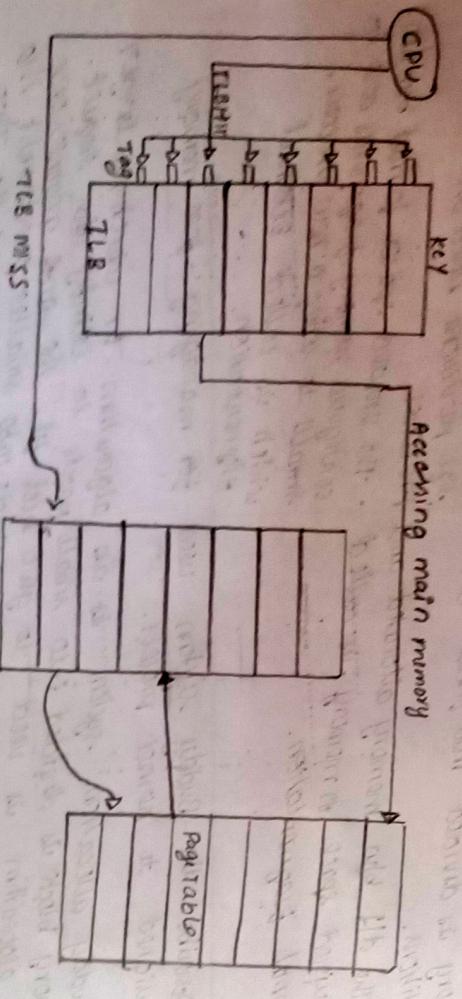
If the partition size & process size are different then poor match occurs & may use space inefficiently.

Example: If the request of 25kb is made then block of size 32kb is allocated.



- Q) a) Illustrate TLR [translation look aside buffers] in detail with a simple paging system with neat diagram.

A Translation look aside buffer can be defined as a memory cache which can be used to reduce the time taken to access the page table again & again.



In translation look aside buffers, there are tags and keys with the help of which the mapping is done. TLR hit is a condition where the desired entry is found in translation look aside buffer. If not happens then we can simply access the actual location in main memory.

b) what is locality of reference? Distinguish b/w paging and segmentation.

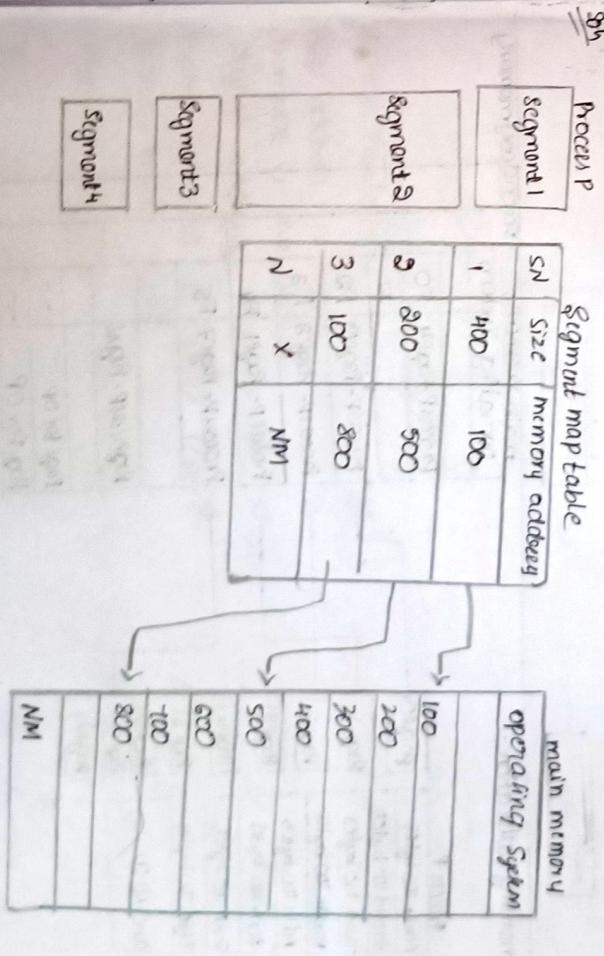
Paging

Segmentation

- In Paging, program is divided into . In segmentation, program is divided into variable size sections.
- For paging operating system is accountable.
- Page size is determined by hardware.
- It is faster in the compilation of code given by them.

- Segmentation could result in fragmentation.
- Paging could result in fragmentation.
- External fragmentation
- Internal fragmentation
- Segmentation is slow.

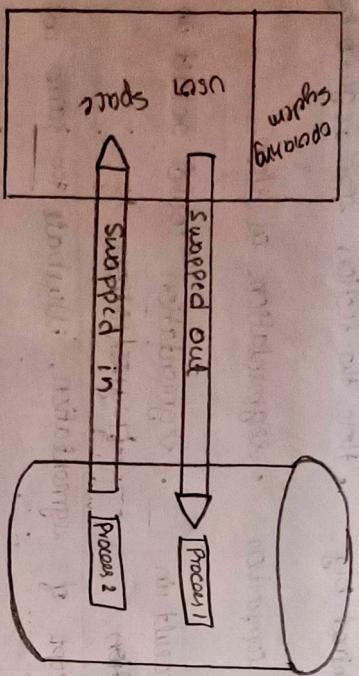
- Q) a) Explain the concept of segmentation. illustrate the same with an example.



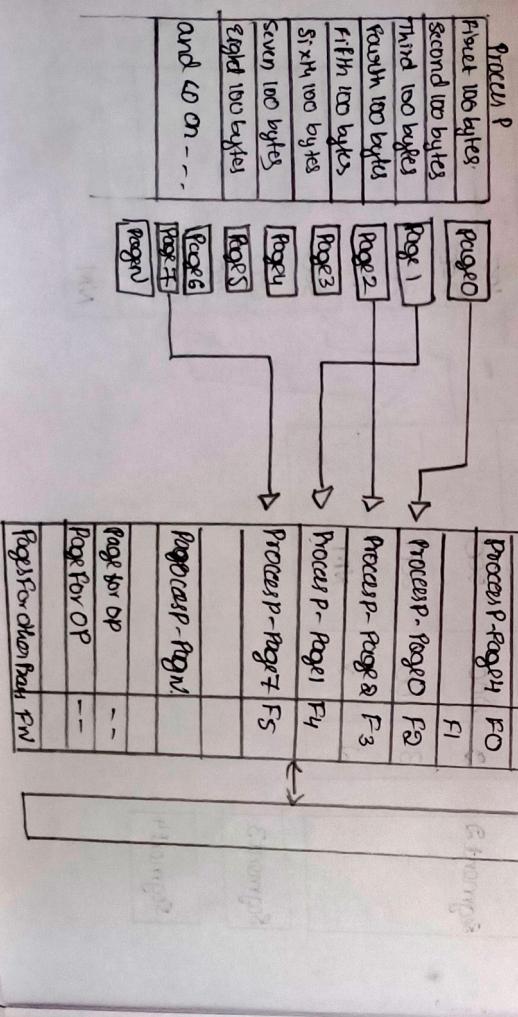
Summarize briefly if memory allocation in swapping

"il Swapping

Swapping is a mechanism in which a process can be swapped temporarily out of main memory (or move) to secondary storage (disk) and make that memory available to other process. Swapping is also known as a technique for memory conservation.



in memory allocation.



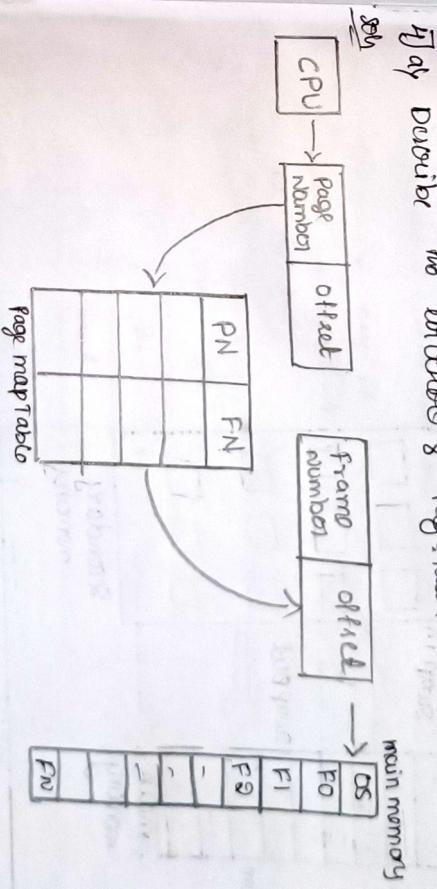
Address Translation

Page address is called logical address & generated by Page number & the offset.

Logical address = Page number + Page offset

Frame address is called physical address & generated by frame number & the offset.

Physical address = Frame number + Page offset.



* **Fixed-position allocation** : In this type of allocation relocation - negligible scheme is used to protect many processes from each other.

Multiplication Abstraction: In my type of abstraction many memory areas are divided into a number of macro word partitions where each partition would contain only one process.

to Great Britain; in the first available free no
movement of the process occurring

~~next fit~~ next fit as a modified street fit algorithm.

Ex. Illustrate demand paging with an example.

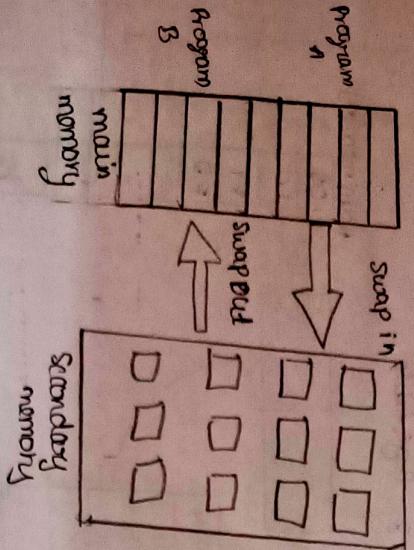
Demand Paging: system is just similar to apaged system with swapping where process needs an memory memory & pages are loaded only on demand.

Advantages:

- + large virtual memory
- + more efficient swap memory
- + there is no limit on degree of multiprogramming

Disadvantages:

- number of table & the amount of process overhead
- for handling page intermixes are greater than in the case of the simple paged management



Assignment - 2

① summarize the evolution of access rights.

② summarize the evolution of access rights associated with each domain.

③ Requisition: periodically, applications ask for a capability, it may bind that a process wants to use a capability, it may bind that

if a process wants to use a capability has been deleted

* Back-pointers: A list of pointers is maintained with each other object pointing to all capabilities associated with that object

* Requisition: periodically we can follow these pointers when reconnection is required we can follow these pointers directly to the objects.

* Evolution: The capabilities point directly to the objects.

* Each capability points to a unique entry in a global

table, which in turn points to the object

* Key: A key is a unique bit pattern that can be associated with a capability of that may be defined when the capability is created.

④ Define the access matrix model used for protection in a computer system

	F1	F2	F3	Printer
D1	read		read	
D2				print
D3		read	execute	
D4	read write		read write	

- * Matrix representation of protection state in computer system
- * Access matrix is a security model of protection state in computer system. It is represented as a matrix system. It is represented as a matrix system.
- * Access matrix is used to define the rights of each process operating in the domain with respect to each object.
- * The rows of matrix represent domain and column represent objects. Each cell of matrix represents set of access rights which are given to the processes of domain.
- * According to the above matrix there are four domains and four objects three files (F1, F2, F3) and one printer.

Q. 3) What are the goals of protection and principles of protection?

→ Goals of protection:

- * We need to provide protection for general reasons.
- * The most obvious is the need to prevent the malicious intention of an access restriction by user.
- * An unprotected resource cannot defend against use (or misuse) by an unauthorized or incompetent user.
- * Provide mechanism for the enforcement of the policies governing resource use.
- * A protection system must have the flexibility to enforce a variety of policies.

Principles of protection:

- * The time-stated guiding principle for protection is the principle of least privilege.
- * The principle of least privilege can help produce a more secure computing environment.

Q. 4) Describe the different forms of security verification in security problem.

→ Breach of confidentiality!

This type of violation involves unauthorized reading of data (or theft of information). Typically, a breach of confidentiality is the goal of an intruder.

* Breach of integrity! - This violation involves unauthorized modification of data. Such attacks can, for example, result in publication of data to an innocent party, or modification.

* Breach of availability! - This violation involves unauthorized destruction of data. Some crackers would rather break law and gain status or bragging rights than gain financially.

→ Shift of source: that violation involves unauthorized use of "normally" an example, an intruder may install a daemon on a system that acts as a file server.

5) Illustrate revocation of access rights. Discuss computer security classification at highest level. Use formal design specifications and validation techniques. Grants or high degree of assurance of proper security

→ Type B:

- * B1 - maintains the security label of each object in the system.
- * B2 - extends the sensitivity labels to each system resource such as storage objects. supports covert channels and auditing of events.
- * B3 - Allows creating lists of user groups for access control to grant access or revoke access to given named object

Type D:

lowest level. minimum protection in DOS, Windows 3.1 fall in this category.

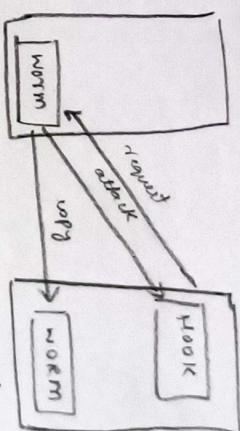
6) Explain how firewalls is done to protect systems and network.

→ A firewall is a computer, appliance, or router that sits between the trusted and the untrusted. A network firewall limits network access between the two security domains. The modern Internet worm used the finger protocol to break into computers, so being un-trusted may not be allowed to pass, for example.

In fact, a network firewall can separate a network into multiple domains. A common implemention has the internet as the untrusted domain; a semi-trusted and semi-trust zone in network called the demilitarized zone.

- * as another domain and from the internet to the their domain. Connections are allowed from the company computers to the DMZ computers and from the company computers to the Internet.
- * optionally controlled communications may be allowed between the DMZ may need to query a database stored on the corporate network.

1) Worm



- * an infection program which spreads through networks. Unlike a virus, they target mainly LAN's. A computer affected by a worm attacks the target system and writes a small program.

2) port Scanning!

- * it is a means by which the attacker identifies the vulnerable holes of the system to attack.
- * it is an automated process which involves creating a TCP/IP connection to a specific port

3) Denial of Service:

- * such attacks aren't aimed for the purpose of collecting information or destroying system files.
- * rather they are used for disrupting the legitimate use of a system or facility.
- * the second category involves disrupting the network of the facility. These attacks are a result of the abuse of some fundamental TCP/IP principle.

8) Discuss system and network threats in detail!

Types of System Threats!

- * aside from the program threats, various system threats are also endangering the security of our system.