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Q1).

A state is safe if the system can allocate all resources requested by all process up to their stated maximums without entering a deadlock state. If a safe sequence does not exist then the system is in an unsafe state which may lead to deadlock All safe states are deadlock free but not all unsafe states lead to deadlocks.

Q2 Differentiate b/w Dynamic loading and dynamic linking with the help of example.

The memory management of operating system is to increase the degree of multiprogramming is based on the following concepts in which two are explained.

① Dynamic Loading.

Is used to increase the degree of multiprogramming In dynamic loading we just load the main part of the process to the main memory and then the other parts would be loaded only if it is called or executed. That is why for each process we will be require only less memory space within the main memory. Hence we will be able to load more numbers of processes to the main memory thereby we can increase the degree of multiprogramming Hence the CPU utilization will also be increased.

② example.

When we write a program in C language and we all

going to execute the same program so here how the dynamic loading works.

```
main()
    if (    )
        move()
    Else
        run().
```

First the loader will only load the main function to the main memory. Later on if the if statement is true it will call the move() function or when the if statement is false it will call the run() function.

As we noticed that using dynamic loading we save the space in the main memory instead of loading the whole program to the main memory. Hence the dynamic loading increase the degree of multiprogramming

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Dynamic Linking.

Every dynamically linked program contains a small statically linked function that is called when the program starts. This static function only maps the link library into memory and runs the code that the function contains. The link library determines what are all the dynamic libraries which the program requires along with the names of the variables and functions needed from those libaries by reading the information contained in sections of the library.

After which it maps the libraries into the middle of virtual memory and resolves the references to the symbols contained in those libraries. We don't know where in the memory these shared libraries are actually mapped. They are compiled into position independent code (PIC), that can run at ~~any address~~ address in memory.

Which component of an operating system is best suited to ensure fair, secure orderly, and efficient use of memory? Also identify some more tasks managed by that component.

Memory management is the best component of an operating system to ensure, fair, secure orderly and use of a memory. Memory management includes keeping tracks of used and free memory space as well as when and how much memory to allocate and deallocate it. Also responsible for swapping processes in and out of main memory.

Some other tasks carried by

Q4 Symmetric and Asymmetric Encryption differences and examples.

Symmetric Encryption is a type of encryption in which we shared the information with the same key. It means we use the same key to encrypt the information as well as to decrypt the information. It was the first method for using the Encryption the data but it is still widely used but there is a problems using symmetric encryption while sharing the same key by encrypting and decrypting because this key might be stolen and hacked during sharing through network. To avoid such problems we use another type of encryption that is called Asymmetric encryption. Symmetric encryption is also called Convential encryption and Secret Key Encryption.

Examples.

Practical example is sending verification to the mobile to access the account.

Others examples are

① AES (Rijndael) ② Two fish ③ Serpent ④ DES

Asymmetric Encryption is an encryption in which we use two different keys the public key to encrypt the information and the private key to decrypt the information.
If the public key is visible to the other people still people can not decrypt the information
It is more safe encryption method as compared to symmetric encryption.
Examples
Here are the algorithms
① RSA ② Diffie-Hellmen ③ ElGamal

Differences B/w Symmetric & Assymmetric encryption

Symmetric	Assymmetric
① It is fast way of encryption	① Public key can be shared.
② Efficient for large data	② Designed for small data.
③ Hard to transport shared key.	③ It is slow way of encryption.
	④ Inefficient for large data

Q5. Difference b/w internal & external fragmentation.

Internal fragmentation	External fragmentation
① In internal fragmentation fixed-sized memory blocks square measures appointed to process	① In external fragmentation variables-sized memory blocks square measure appointed to method.
② It happens when the method or process is larger than the memory.	② It happens when method or process is removed.
③ The difference B/w memory allocated and requisite space on memory is called internal fragmentation.	③ The unused spaces formed b/w contiguous memory fragments are too small to serve a new process is known as external fragmentation
④ This solution is best fit block	④ This solution is compaction, paging & segmentation
⑤ It occurs when memory is divided in to fixed sized partitions.	⑤ It occurs when memory is divided into variable size partition based on the size of process

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06.

Ans The four memory allocation algorithms that are covered are given.

(1) First fit:- First fit allocates into the first available gap found of adequate size, starting from the begining of memory.

Scan memory region list from start for first fit must always skip over potentially many regions at the start of list.

Next fit It allocates into the first available gap from resuming the search from the last allocation. Scan memory region list from point of last allocation to next fit breaker up large block at the end of memory

Best fit pick up the closest free region in the entire list leaves small unusable regions and slower due to searching of entire list.

(4) Worst fit :- It finds the worst fit in the entire list slower as it searches entire list. Fragmentation is still an issue.

=> Both fit and Next fit are most commonly used in practice.

07)

Ans Uses level threads implement in uses level libraries, rather than via system calls, so thread switching does not need to call the operating system and to cause interruption to the kernel. In fact, the kernel knows nothing about user-level threads and manages them as if they were single-threaded processes. Threads are very inexpensive to create and destroy and they are inexpensive to represent. For example they require space to store the PC, the SP and general purpose registers, but they do not require space to share memory information. Information about open files of input output devices in use. With so little content it is much faster to switch between threads in the other words it is relatively easier for a context switch using threads. The most obvious advantage of this techniques is that a user level threads package can be implemented on an operating system that does not support thread

7→ (1) User level threads do not require modification to operating system.

(2) Simple Representation :- Each thread is represented simply by a PC, registers, stack and a small control block all stored in the users process address space.

(3) Simple management :- The simple means that creating a thread switching between threads and synchronization between threads can all be done without intervention of the Kernel.

(4) Fast and Efficient :- Thread switch is not much more expensive than a procedure call.