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Final Term Assignment

OPERATING SYSTEMS CONCEPTS

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BS (SE) Section B (8th semester)

Q1. In deadlock prevention strategy do you think it is necessary to check that either safe state exists or not? Give reason to support your answer

ANS 1: Its not necessary to check the safe state exist or not because in this method excessive time consumed in the request to be allocated memory. We can avoid deadlock by preventing any of these condition

1. Mutual Exclusion
2. Hold and Wait
3. No preemption
4. Circular wait

Q2. Differentiate between Dynamic loading and Dynamic Linking with the help of examples.

ANS 2: The difference between dynamic loading and linking is that:

Dynamic loading: means loading the library (or any other binary for that matter) into the memory during load or run-time.

Example: Dynamic loading can be imagined to be similar to plugins , that is an exe can actually execute before the dynamic loading happens(The dynamic loading for example can be created using LoadLibrary call in C or C++)

Dynamic linking : refers to the linking that is done during load or run-time and not when the exe is created.

Example: In case of dynamic linking the linker while creating the exe does minimal work.For the dynamic linker to work it actually has to load the libraries too.Hence it's also called linking loader.

Q3. 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.

ANS 1:

The most suitable component of an operating system that suited to ensure fair, secure, orderly and efficient use of memory is Memory Management System. The task of memory management includes keeping track of used and free memory space as well as when, where, and how much memory to allocate and deallocate. It is also responsible for swapping process in and out of main memory. The purpose of memory management is to ensure fair, secure, orderly and efficient use of memory.

Q4. Differentiate between Symmetric and A-Symmetric encryption with the help of example.

ANS 4: The main Difference Between Symmetric and Asymmetric Encryption:

Symmetric encryption: It uses a single key that needs to be shared among the people who need to receive the message

Example: Blowfish, AES, RC4, DES, RC5, and RC6 are examples of symmetric encryption

Asymmetrical encryption: It uses a pair of public key and a private key to encrypt and decrypt messages when communicating.

Example : An example of such a method is the RSA algorithm, which uses some lovely tricks of number theory and the fact that it's hard to factorize large composite numbers with few prime factors.

Q5. Describe the difference between external and internal fragmentation. Why should they be avoided?

ANS 1:

There are two types of fragmentation in OS which are given as: Internal fragmentation, and External fragmentation:

Internal Fragmentation:

It occurs when fixed sized memory blocks are allocated to the processes. It occurs When the memory assigned to the process is slightly larger than the memory requested by the process this creates free space in the allocated block causing internal fragmentation.
Internal fragmentation happens when the memory is split into mounted sized blocks. Whenever a method request for the memory, the mounted sized block is allotted to the method. just in case the memory allotted to the method is somewhat larger than the memory requested, then the distinction between allotted and requested memory is that the Internal fragmentation.

External Fragmentation:

It occurs when variable size memory space are allocated to the processes dynamically.When the process is removed from the memory, it creates the free space in the memory causing external fragmentation.
External fragmentation happens when there's a sufficient quantity of area within the memory to satisfy the memory request of a method. however the process's memory request cannot be fulfilled because the memory offered is during a non-contiguous manner. Either you apply first-fit or best-fit memory allocation strategy it'll cause external fragmentation.

The external and internal segmentation must be avoid because it slows down the system and damage the memory.

Q6. List and describe the four memory allocation algorithms covered in lectures. Which two of the four are more commonly used in practice?

ANS 1: The four memory allocation algorithms (in the scheme of dynamic partitioning placement) are:

First-Fit – in the linked list of available memory addresses, we place the data in the first entry that will fit its data. Its aim is to minimise the amount of searching, but leads to external fragmentation later on.

Next-Fit – similar to first fit, but instead of searching from the beginning each time, it searches from the last successful allocation. Greatly reduces the amount of searching but leaves external fragmentation at the beginning of memory.

Worst-Fit – traverses the memory and gives the partitions as large spaces as possible – to leave usable fragments left over. Needs to search the complete list and such is a poor performer.

Best-Fit – carefully scours the memory for spaces that perfectly fit the RAM we want. However, the search is likely to take a very long time.

We most commonly use first-fit and next-fit in practise. They're easier to implement and are faster to boot.

Q7. Why is the context switch overhead of a user-level threading as compared to the overhead for processes? Explain.

ANS 1: When comparing processes and threads, we can also analyze the context switch cost. Whenever it is needed to switch between two processes, we must invalidate the TLB cache which can be a slow operation. When we switch between two threads, on the other hand, it is not needed to invalidate the TLB because all threads share the same address space, and thus have the same contents in the cache. Thus the cost of switching between threads is much smaller than the cost of switching between processes.

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End of the Assignment