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Semster: 6th

Subject: operating system.

(Q) In deadlock prevention strategy do you think it is necessary to check that either safe state exists or not? Given reason to support your answer?

Ans: "Deadlock Prevention"

We can design a system to deadlock by making any of the 4 condition impossible.

Breaking mutual exclusion.

In some cases, deadlock can be mitigated by making resource more shareable. For example, using a reader/writer lock instead of a mutex. Can make deadlock less likely (since many readers can share the read lock) using a lock-free data structure is another way to allow multiple threads to access a data structure simultaneously (without blocking)

However, many resources are inherently non-shareable (e.g printer: can't print two documents simultaneously) mutual exclusion is a good condition to break if you but often you can't.

(3) ~~Breaks~~ "Breaks no-preemption"

In some situations we can make resources preemptable. If a process tries to acquire a resource that is held by another process, we can make it possible for the new process to steal the resource.

In order to do this, we need some mechanism for rollback. We need to be able to restore whatever program invariants that the resources was held in order to satisfy.
For example: if the resource is a lock protecting a shared variable we called roll back the thread that holds the lock by restoring the state of the shared variable to the state it held before the lock was acquired, and restarting the processes that was performing the update.
Once we allow computions to be rolled back, we introduce the possibility that two threads can continue to preempt each other forever. Although the system is not deadlocked (both threads seem to be making forward progress) the system may never actually finish its tasks is called livelock. When competing threads are continously being rolled back before they can finish.
It is not possible to make all resource preemptible. It is a well-known impediment to rollback. once some output has been performed it may be impossible to make all

all resource preemptible I/O is shown impediment to roll backs once some output has been performed. It may be impossible to return to a consist state. once you tell the user you've started processing their order you can't take it backs.

() Breaks hold-and-wait.

can breaks hold-and-wait by having threads release all locked and re-acquire them all one at once.

Releasing locks may require rollbacks which leads to the same issue described above.

Monitors partially use this strategy to avoid-and-wait calling wait & condition variable automatically. release the locks, so that acquiring the monitors locks cannot cause deed locks. However, it is still possible to create a form of deadlocks with a monitor, where one thread needs for some before updating state is a way satisfied another predicate while a second thread waits for the second predicate before making the first predicate true.

Q2 Differentiate between Dynamic Loading and dynamic linking with the help of examples?

Ans Dynamic Loading :

Means loading the library (or any other binary for that matter) into the memory during load or run-time. 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 load library call in C or C++).

Example : Dynamic loading has found its main use as a basis for plugin systems for applications like notepad++ for examples, which loads plugins from dll files in a certain directory in its folder structure.

Dynamic linking :

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

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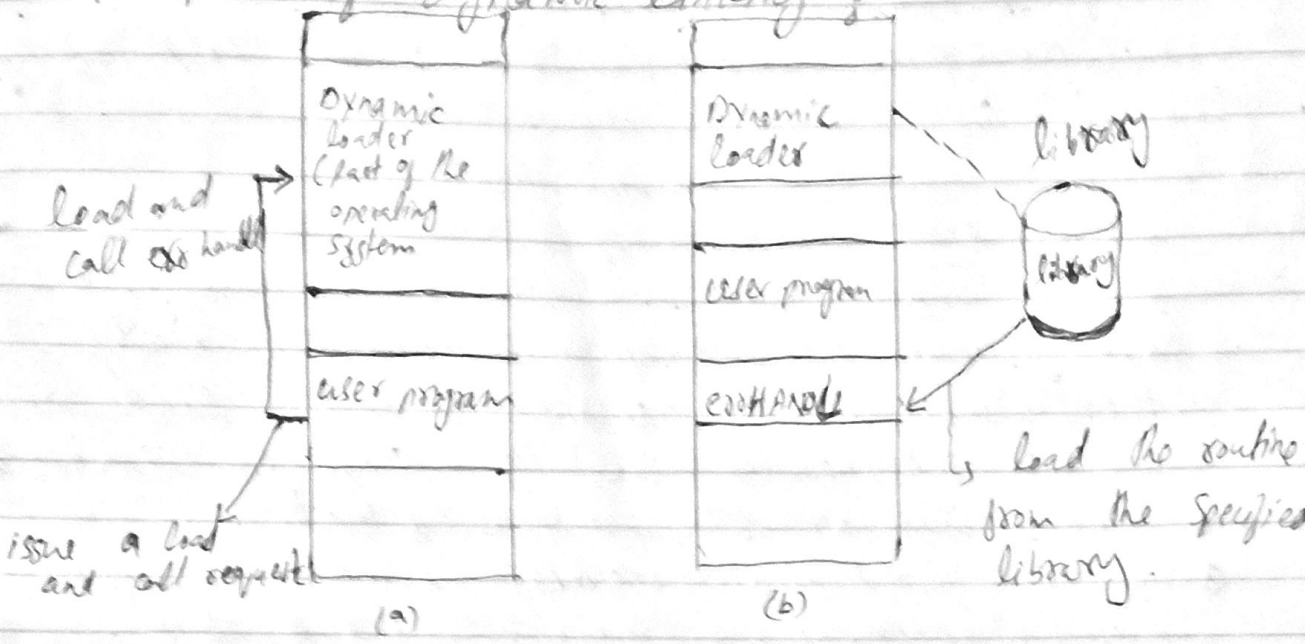
Examples of dynamic linking :



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 The kernel is a computer program at the core of a computer operating system with complete control over everything in the system. It is an integral part of any operating system. It is the portion of the operating system code that is always resident in memory.

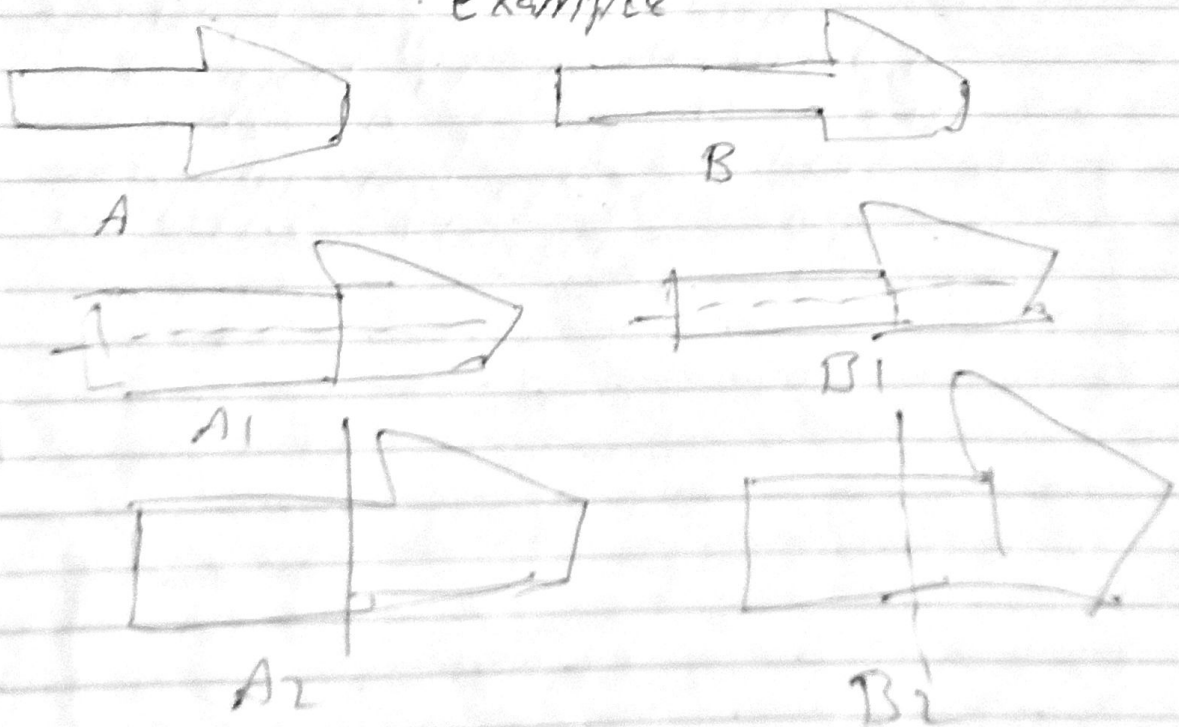
When the OS allows you to perform more than one task at a time. It is multitasking programs called device drivers facilitate communication between devices attached to the computer and the O.S

Q4 Differentiate between symmetric and A- symmetric encryption with the help of example?

Ans, "Symmetric"

Encryption is a process to change the form of any message In order to protect it from reading by anyone. In symmetric-key encryption the message is encrypted by using a key and the same encryption the message is encrypted by using a key and the same key is used to decrypt the message which makes it easy to use but less secure. It also requires a safe methods to transfer the key from one party to another.

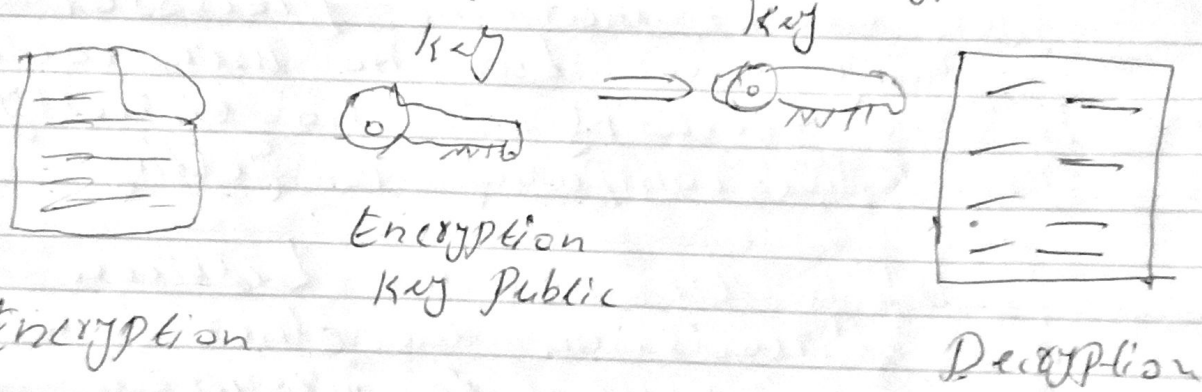
"Example"



Asymmetric key Encryption.

Asymmetric key encryption is based on public and private key encryption technique. It uses two different key to encrypt and decrypt the message. It is more secure than symmetric key encryption technique but is much slower.

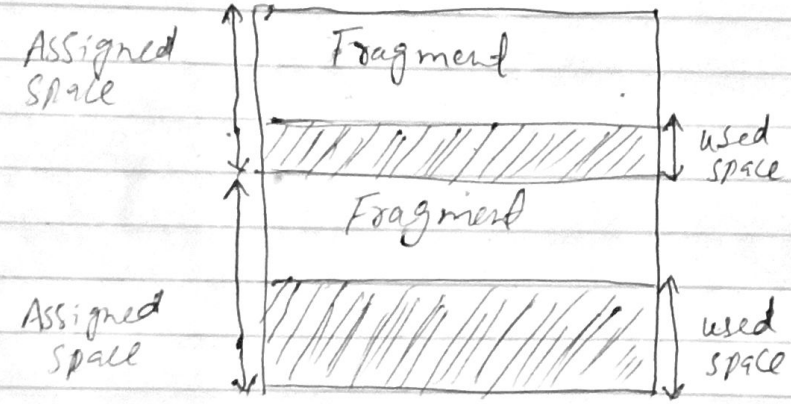
Example of Asymmetric Encryption:



Q5 Describe the differentiate between external and internal fragmentation. why should they be avoid.

Ans Internal Fragmentation :

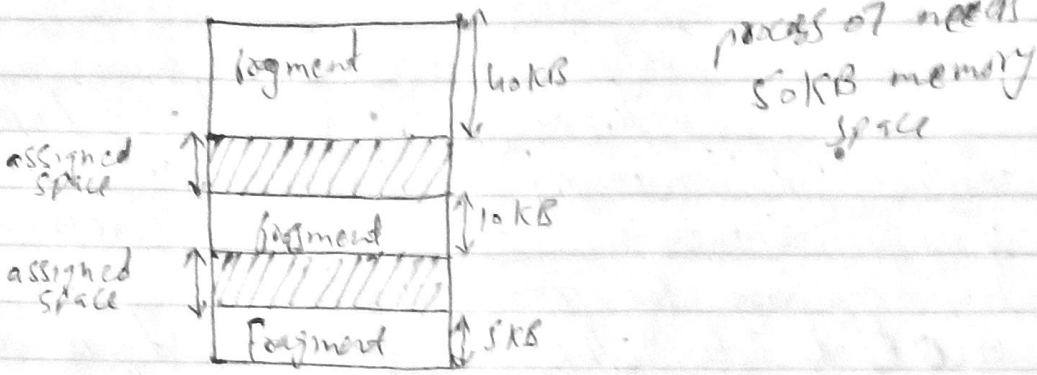
Internal fragmentation happens when the memory is split into mounted sized blocks. whenever a method request for the memory, the mounted sized block is allotted to the method. Just in case the memory ~~allo~~ allotted to the method. Just in case the memory allotted to the method is somewhat larger than the memory requested, then the distinction between allotted and requested memory is that the internal fragmentation.



External fragmentation :

External fragmentation happens when there's a sufficient quantity of area within the memory of satisfy the memory request of a method. however the process's memory request cannot be fulfilled because the memory offered is during non-contiguous manner. either you apply first-fit or best-fit memory

allocation strategy it'll cause external fragmentation.



However, both the phenomena can be avoided, Internal fragmentation can be reduced by allocating memory to process dynamically. whereas external fragmentation can be best avoid be compaction, paging and segmentation.

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

Ans 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 entery that will fit its data. Its aim 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 ~~beggining~~ beggining 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 space as possible to leave usable fragments left over. Needs to search the complete list and such is a poor performer.

Best-fit Carefully secours the memory for spaces that perfectly fit the RAM we need. However, the search is likely to take a very long time.

we must commonly use first-fit and next-fit in practice.

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

Ans7 Context-switch time is pure overhead because the system does no useful works while switching --- context switching is overhead because it is cycle (time) that the processor is being used but no user code is is executing, so no directly productive computing is getting done.

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 most of switching between threads is much smaller than the cost of switching between processes.