

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:1 Does pre-paging help to control the trashing ?justify with solid reason.

An obvious property of a pure demand paging system is the large number of page faults that occur when a process is started. This situation is the result of trying to get the initial locality into memory. Pre-paging is an attempt to prevent this high level of initial paging. The strategy is to bring into memory at one time all the pages that will be needed.

Q:2 List down two major benefits of Virtual Memory.

- Virtual Memory is the separation of user logical memory from physical memory. This separation allows an extremely large virtual memory to be provided for programmers when only a smaller physical memory is available.
- Virtual memory makes the task of programming easier because the programmer need not worry about the amount of physical memory

Q:3 Write down the use of mounting and mount point in file system.

Mounting makes file systems, files, directories, devices, and special files available for use at a particular location. Mount point is the actual location from which the file system is mounted and accessed. There are types of mounts: Remote mount Local mount

Q:4 In valid operating system name the system call that can be used to request memory map an opened file.

In a UNIX system, mmap() system call can be used to request the operating system to memory map an opened file.

Q:5 what are possible ways to recover a system from deadlock.

Recovery from Deadlock

When a deadlock detection algorithm determines that a deadlock exists, several alternatives exist. One possibility is to inform the operator that a deadlock has occurred, and to let the operator deal with the deadlock manually. The other possibility is to let the system recover from the deadlock automatically. There are two options for breaking a deadlock. One solution is simply to abort one or more processes to break the circular wait. The second option is to preempt some resources from one or more of the deadlocked processes.

<https://www.facebook.com/groups/mcsvu2013/>

<https://www.facebook.com/AjnabiseRasty>

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:6 what are the problems that can occur while trying to violate the condition of hold and wait for deadlock .

To ensure that the hold and wait condition does not occur in a system, we must guarantee that whenever a process requests a resource, it does not hold any other resources. One protocol that can be used requires each process to request and be allocated all its resources before it begins execution

Q:7 Difference between MVT and MFT?

Multiprogramming with Variable Tasks (MVT)

This is the generalization of the fixed partition scheme. It is used primarily in a batch environment. This scheme of memory management was first introduced in IBM OS/MVT (multiprogramming with a varying number of tasks). Here are the main characteristics of MVT.

- Both the number and size of the partitions change with time.
- Job still has only one segment (as with MFT) but now can be of any size up to the size of the machine and can change with time.
- A single ready list.
- Job can move (might be swapped back in a different place).
- This is dynamic address translation (during run time).
- Must perform an addition on every memory reference (i.e. on every address translation) to add the start address of the partition.

Q8 Multiprogramming with Fixed Tasks (MFT)

In this technique, memory is divided into several fixed-size partitions. Each partition may contain exactly one process. Thus the degree of multiprogramming is bound by the number of partitions. In this multiple partition method, when a partition is free, a process is selected from the input queue and is loaded in the free partition. When the process terminates, the partition becomes available for another process

- This was used by IBM for system 360 OS/MFT (multiprogramming with a fixed number of tasks).

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

- Can have a single input queue instead of one for each partition.
- So that if there are no big jobs can use big partition for little jobs.
- Can think of the input queue(s) as the ready list(s) with a scheduling policy of FCFS in each partition.
- The partition boundaries are not movable and are set at boot time (must reboot to move a job).
- MFT can have large internal fragmentation, i.e., wasted space inside a region
- Each process has a single ``segment" (we will discuss segments later)
- No sharing between processes.
- No dynamic address translation.
- At load time must ``establish addressability".
- Must set a base register to the location at which the process was loaded (the bottom of the partition).
- The base register is part of the programmer visible register set.
- This is an example of address translation during load time.
- Also called relocation.
- Storage keys are adequate for protection (IBM method).
- Alternative protection method is base/limit registers.
- An advantage of base/limit is that it is easier to move a job.
- But MFT didn't move jobs so this disadvantage of storage keys is moot.

Q:9 How many step involved in file management system when we copy data on floppy disk through dos.

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:10 Write two name of efficient implement of page table

- Hierarchical / Multilevel Paging
- Hashed Page Table
- Inverted Page Table

Q:11 Overlays and virtual memory

Virtual Memory is the separation of user logical memory from physical memory. This separation allows an extremely large virtual memory to be provided for programmers when only a smaller physical memory is available. Virtual memory makes the task of programming easier because the programmer need not worry about the amount of physical memory, or about what code can be placed in overlays; she can concentrate instead on the problem to be programmed.

Overlays

To enable a process to be larger than the amount of memory allocated to it, we can use **overlays**. The idea of overlays is to keep in memory only those instructions and data that are needed at any given time. When other instructions are needed, they are loaded into space occupied previously by instructions that are no longer needed.

Q:12 How system keeps tacking of system free disk space.

To keep track of free disk space, the system maintains a **free-space list**. The free space list records all *free* disk blocks-those not allocated to some file or directory. To create a file we search the free-space list for the required amount of space and allocate the space to the new file. This space is then removed from the free-space list. When a file is deleted, its disk space is added to the free space list

Q:13 Semaphores types

There are two kinds of semaphores:

- Counting semaphore** whose integer value can range over an unrestricted integer domain.
- Binary semaphore** whose integer value cannot be > 1 ; can be simpler to implement.

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:14 In memory management, how a page fault occurs and who is responsible to handle page fault if it occurs? 2Marks

When the process tries to access locations that are not in memory, the hardware traps the operating system (page fault). Operating system is responsible to handle the page fault.

Q:15 How can you achieve memory protection in paging? 2Marks

Memory protection in paging is achieved by associating protection bits with each page. These bits are associated with each page table entry and specify protection on the corresponding page. The primary protection scheme guards against a process trying to access a page that does not belong to its address space. This is achieved by using a valid/invalid (v) bit. This bit indicates whether the page is in the process address space or not. If the bit is set to invalid, it indicates that the page is not in the process's logical address space. Illegal addresses are trapped by using the valid-invalid bit and control is passed to the operating system for appropriate action.

Q:16 Write the name of two commonly used methods for file space allocation. 2Marks

- Contiguous allocation
- Linked allocation
- Indexed allocation

Q:17 How can you define compile time? 2Marks

if you know at compile where the process will reside in memory, the **absolute addresses** can be assigned to instructions and data by the compiler

Q:18 How operating system attacks the "hold and wait" condition necessary for deadlock in order to solve the problem of deadlock? 3Marks

To ensure that the hold and wait condition does not occur in a system, we must guarantee that whenever a process requests a resource, it does not hold any other resources. One protocol that can be used requires each process to request and be allocated all its resources before it begins execution. We can implement this provision by requiring that system calls requesting resources for a process precede all other system calls.

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:19 "if a process is starved then it means that the system is in deadlock" is it true or not? Give the answer.

3Marks

Yes we can assume it as dead lock. A set of processes are said to be in a deadlock state if every process is waiting for an event that can be caused only by another process in the set and Starvation is infinite blocking caused due to unavailability of resources.

<https://www.facebook.com/groups/mcsvu2013/>

<https://www.facebook.com/AjnabiseRasty>

Q:20 There exists many ways to break a deadlock. One of them is "preempt a resource" to break cycle of dead lock resources. Which issue will be addressed by this strategy? 3Marks

Resource Preemption

To eliminate deadlocks using resource preemption, we successively preempt some resources from processes and give these to other processes until the deadlock cycle is broken. If preemption is required to deal with deadlocks, then three issues need to be addressed:

1. Selecting a victim: 2. Rollback: 3. Starvation:

Q:21 In large address space (above 32 bits) each page table may consist millions of entries. How the mapping of logical address spaces of process onto the physical memory is possible? Name the solution with brief. 3 Marks

For large address spaces (32-bit and above), each page table may consist of millions of entries. These tables may consume large amounts of physical memory, which is required just to keep track of how the mapping of logical address spaces of processes onto the physical memory.

A solution is to use an inverted page table. An **inverted page table** has one entry for each real page (frame) of memory. Each entry consists of the virtual address of the page stored in the in that real memory location, with information about the process that own the page.

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:22 Let us consider page of size 16 bytes and process address space 32 pages and physical address

space of 64 frames.

Calculate following.

A.) size of logical address i.e number of bits needed to uniquely identify a page in this address

Space of 16 pages.

B) logical addressing bits for (18,10) where p and d are 18 and 10 respectively. 5Marks

No. of bits needed for **p** = ceiling $[\log_2 16]$ bits = 4 bits

No. of bits needed for **f** = ceiling $[\log_2 64]$ bits = 6 bits

No. of bits needed for **d** = ceiling $[\log_2 32]$ bits = 5 bits

Logical address size = $|p| + |d| = 4+9$ bits = 13 bits

Physical address size = $|f| + |d| = 10+5$ bits = 15 bits

B) logical addressin bits for (18,10) where p and d are 18 and 10 respectively

Logical address size = $|p| + |d| = 18+10$ bits = 28 bits

Q:23 Several file space allocation methods can be implemented in one Operating system. How space

allocation methods can be implemented in linex/unix operating system? 5Marks

UNIX Space Allocation

The UNIX file manager uses a combination of indexed allocation and linked lists for the index table. It maintains 10-15 direct pointers to file blocks, and three indirect pointers (one-level indirect, two-level indirect, and three-level indirect), all maintained in file's inode,

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

Q:24 Aborting a process way not be so easy. If a proces was in the midst of updating a file, terminating it will leave the system in a inconsistant state. If the partial termination method is used , this gives a set of deadlock process.the process of this determination is a policy decision similar to cpu scheduling problems so economic decision is needed. You are required to determine the criteria that make it possible for system to select which proces should be terminated. 5Marks

When a deadlock detection algorithm determines that a deadlock exists, several alternatives exist. One possibility is to inform the operator that a deadlock has occurred, and to let the operator deal with the deadlock manually. The other possibility is to let the system recover from the deadlock automatically. There are two options for breaking a deadlock. One solution is simply to abort one or more processes to break the circular wait. The second option is to preempt some resources from one or more of the deadlocked processes

<https://www.facebook.com/groups/mcsvu2013/>

<https://www.facebook.com/AjnabiseRasty>

Q:25 Considered the scenario of demand paging system 5Marks

A. Cpu=10%

B. Paging disk=95%

C. Other i / o devices= 3%

you are required to identify the situation of system by consider the above parameter and which of

the of following parameter improve the cpu utilization. Justify them

1. Install a faster cpu

2. Introduce page replacememt algorithm

3.increase degree of multiprogramming

CS604-Operating System Subjective Fall in 2015 , Solved By Aabi Ali



MC120203474@vu.edu.pk

4. Increase hard disk storage

5. decrease the degree of multiprogramming

6. Instal more main memory

Ans:

If a process does not have enough frames, it will quickly page fault. At this point, if a free frame is not available, one of its pages must be replaced so that the desired page can be loaded into the newly vacated frame. However since all its pages are in active use, the replaced page will be needed right away. Consequently it quickly faults again and again. The process continues to fault, replacing pages for which it then faults and brings back in right away. This high paging activity is called **thrashing**. In this case, *only one process is thrashing*. A process is thrashing if it is spending more time paging than executing. Thrashing results on severe performance problems. The operating system monitors CPU utilization and, if CPU utilization is too low, the operating system increases the degree of multiprogramming by introducing one or more new processes to the system. This decreases the number of frames allocated to each process currently in the system, causing more page faults and further decreasing the CPU utilization. This causes the operating system to introduce more processes into the system. As a result CPU utilization drops even further and the CPU scheduler tries to increase the degree of Multiprogramming even more. Thrashing has occurred and system throughput plunges.

The page fault rate increases tremendously. As a result the effective memory access time

increases. Along with low CPU utilization, there is high disk utilization. There is low utilization of other I/O devices. No work is getting done, because the processes are spending all their time paging and the system spend most of its time servicing page fault.

Now *the whole system is thrashing*—the CPU utilization plunges to almost zero, the paging disk utilization becomes very high, and utilization of other I/O devices becomes very low.