

What are points to be consider in file system design? Explain linked list allocation in detail?

Points to be Considered in File System Design:

1. **File System Type:** The type of file system used can affect the performance and functionality of the system. For example, some file systems are optimized for specific types of data access, such as large files or many small files.
2. **File System Size:** The size of the file system determines the maximum amount of data that can be stored on the system. This should be determined based on the anticipated data storage requirements of the system.
3. **File System Security:** The file system should provide appropriate security measures to protect data from unauthorized access or modification.
4. **File System Performance:** The file system should be designed to optimize performance for common data access patterns, such as read-heavy or write-heavy workloads.
5. **File System Reliability:** The file system should provide mechanisms to ensure data integrity and recoverability in the event of hardware or software failures.

Linked List Allocation:

Linked list allocation is a method used in file system design to manage free space on a disk. In linked list allocation, the free blocks on the disk are stored in a linked list, where each block contains a pointer to the next free block. When a file is created, the file system allocates a number of contiguous free blocks from the linked list to the file. The first block is used to store the file's data, while the remaining blocks are used to store the file's metadata, such as its name, size, and location on the disk.

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When a file is deleted, the blocks allocated to the file are marked as free and added back to the linked list. This allows the blocks to be reused by other files in the future. However, if the file is larger than the available free blocks in the linked list, the file system may need to use other allocation methods, such as indexed allocation or multi-level indexed allocation.

Linked List Allocation advantages has several disadvantages, which includes:

1. Simple Implementation: Linked list allocation is a simple and straightforward method for managing free space on a disk. It does not require complex data structures or algorithms, which makes it easy to implement and maintain.
2. Efficient Use of Free Space: Linked list allocation allows for efficient use of free space on the disk, as blocks can be allocated and deallocated as needed. This helps to minimize wasted space on the disk.
3. No External Fragmentation: Linked list allocation does not suffer from external fragmentation, as blocks are allocated and deallocated in a non-contiguous manner. This means that small blocks of free space are not left scattered throughout the disk, making it easier to allocate contiguous blocks for larger files.
4. No Need for Defragmentation: Because linked list allocation does not suffer from external fragmentation, there is no need for periodic defragmentation of the disk. This helps to reduce disk maintenance overhead and improve performance.
5. Flexibility: Linked list allocation is a flexible method for managing free space on a disk, as it can be combined with other allocation methods, such as indexed allocation or multi-level indexed allocation, to handle larger files or more complex storage requirements.

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Linked list allocation has several disadvantages, which include:

1. **Internal Fragmentation:** Linked list allocation can suffer from internal fragmentation, where allocated blocks are larger than the requested size of a file. This can result in wasted space on the disk and reduce the overall storage capacity.
2. **Slow Allocation and Deallocation:** Traversing the linked list to find free blocks and allocate or deallocate them can be slow, especially for large disks with many free blocks. This can lead to reduced performance and longer wait times for users.
3. **Limited Scalability:** Linked list allocation can be limited in scalability, especially for large files. If a file is larger than the available contiguous free blocks in the linked list, other allocation methods, such as indexed allocation or multi-level indexed allocation, may need to be used.
4. **Risk of Corruption:** Linked list allocation can be more susceptible to disk corruption or data loss due to power failures or other system crashes. If the linked list becomes corrupted, it can be difficult to recover data or repair the file system.
5. **Difficulty in Disk Defragmentation:** Linked list allocation can make disk defragmentation difficult because the linked list can become fragmented over time, leading to slower disk access times.

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59. What do you mean by Virtual Memory? Write down its advantages?
60. Compare Paging and Segmentation?
61. What is Process Scheduling, CPU Scheduling, Disk Scheduling? Explain Short, Medium and Long term Scheduler?
62. Explain concept of a process with its components ?
63. Explain the following in brief Contiguous and Linked list allocation for implementing file system?
64. Explain various Disk scheduling algorithms with Illustrations ?
65. Define process and thread. What is PCB ? Explain its various entries with their usefulness ?
66. Discuss advantages and disadvantages of the Buffer cache ?
67. Explain different types of OS with examples of each ?
68. What is an Operating System? Write down its desirable characteristics ?
69. Define a deadlock ? Write down the conditions responsible for deadlock? How can we recover from deadlock ?
70. What are the various services provided by Operating system ?
71. What do you mean by PCB? Where is it used? What are its contents? Explain.
72. What is Binary and Counting semaphores ?
73. What is File? What are the different File attribute and operations?
74. What are System call? Explain briefly about various types of system call provided by an Operating System?
75. Describe necessary conditions for deadlocks situation to arise.
76. Write a Semaphore solution for dining Philosopher's problem?
77. Consider the following page reference string:1,2,3,4,5,3,4,1,2,7,8,7,8,9,7,8,9,5,4,5.
How many page faults would occur for the following replacement algorithm, assuming four frames:a) FIFO b) LRU
78. Explain CPU schedulers in operating system?

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- 79. Write the different state of a process with the help of Process state deagram?
- 80. What is Mutex in operating system?
- 81. Explain Network operating system?
- 82. What do you mean by paging in operating system ?