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Operating System Revision: Part 6

Special class

Vishvadeep Gothi • June 13, 2023

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Operating System: Memory Management

By: Vishvadeep Gothi

▲ 1 • Asked by Shreyas

Let a file system be of Linked Allocation type, Each directory having list of nodes containing file name and metadata,let a directory be of foo name, Which will take full scan ?

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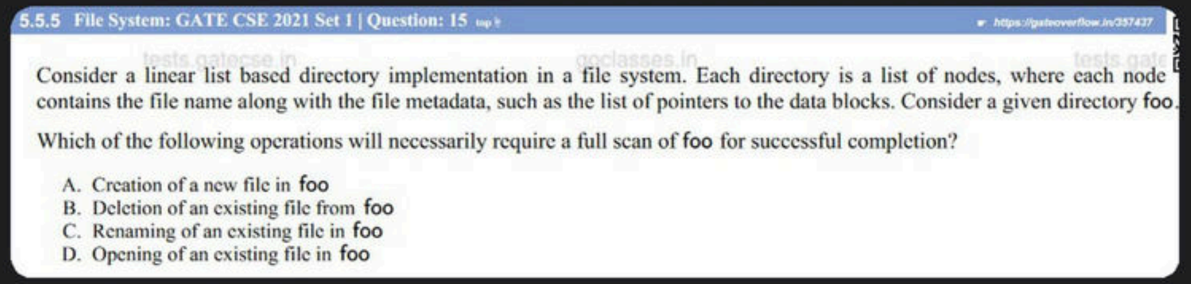
▲ 1 • Asked by Vaishnavij...

this question



5.5.5 File System: GATE CSE 2021 Set 1 | Question: 15 https://gateoverflow.in/357437

Consider a linear list based directory implementation in a file system. Each directory is a list of nodes, where each node contains the file name along with the file metadata, such as the list of pointers to the data blocks. Consider a given directory foo.

Which of the following operations will necessarily require a full scan of foo for successful completion?

A. Creation of a new file in foo
B. Deletion of an existing file from foo
C. Renaming of an existing file in foo
D. Opening of an existing file in foo

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▲ 1 • Asked by Shreyas

Please help me with this doubt

requests
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of movement

20 : 2 Marks]

d tory

5.36 Consider two files systems A and B, that use contiguous allocation and linked allocation, respectively. A file of size 100 blocks is already stored in A and also in B. Now, consider inserting a new block in the middle of the file (between 50^{th} and 51^{st} block), whose data is already available in the memory. Assume that there are enough free blocks at the end of the file and that the file control blocks are already in memory. Let the number of disk accesses required to insert a block in the middle of the file in A and B are n_A and n_B, respectively, then the value of $n_A + n_B$ is 153.

[2022 : 2 Marks]

Functions of Memory Management

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Goals of Memory Management

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Memory Management Techniques

Contiguous Memory Management Techniques

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Fixed Partition MMT

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Variable Partition MMT

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Non-contiguous MMT

Process is scattered in memory, not allocated at one area.

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Non-contiguous MMT

Process is scattered in memory, not allocated at one area.

Two techniques:

1. **Paging:** Scattered in same size of memory areas
2. **Segmentation:** Scattered in variable size of memory areas.

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Paging

Process is divided in equal size of pages

Physical memory is divided in same equal size of frames

Processor will have a view of process and its pages

Pages are scattered in frames

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Paging

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Paging

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Paging

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Paging

Process is divided in equal size of pages

Physical memory is divided in same equal size of frames

Processor will have a view of process and its pages

Pages are scattered in frames

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Question

A system has 64-bit virtual addresses and 43-bit physical addresses. If the pages are 8 kB in size, the number of bits required for VPN and PPN will be?

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Question

Consider a logical-address space of 8 pages, with page size 1024 bytes. The physical memory contains 32 frames.

1. Bits in LA
2. Bits in PA
3. Page table size

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Question

A system supports 4k pages of size 256 bytes each in a demand paging system. Main memory contain 1k frames. Number of bits required for logical address and physical address are?

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Question

A computer system implements 8 kilobyte pages and a 32−bit physical address space. Each page table entry contains a valid bit, a dirty bit, three permission bits, and the translation. If the maximum size of the page table of a process is 24 megabytes, the length of the virtual address supported by the system is _____ bits.

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Performance of Paging

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TLB

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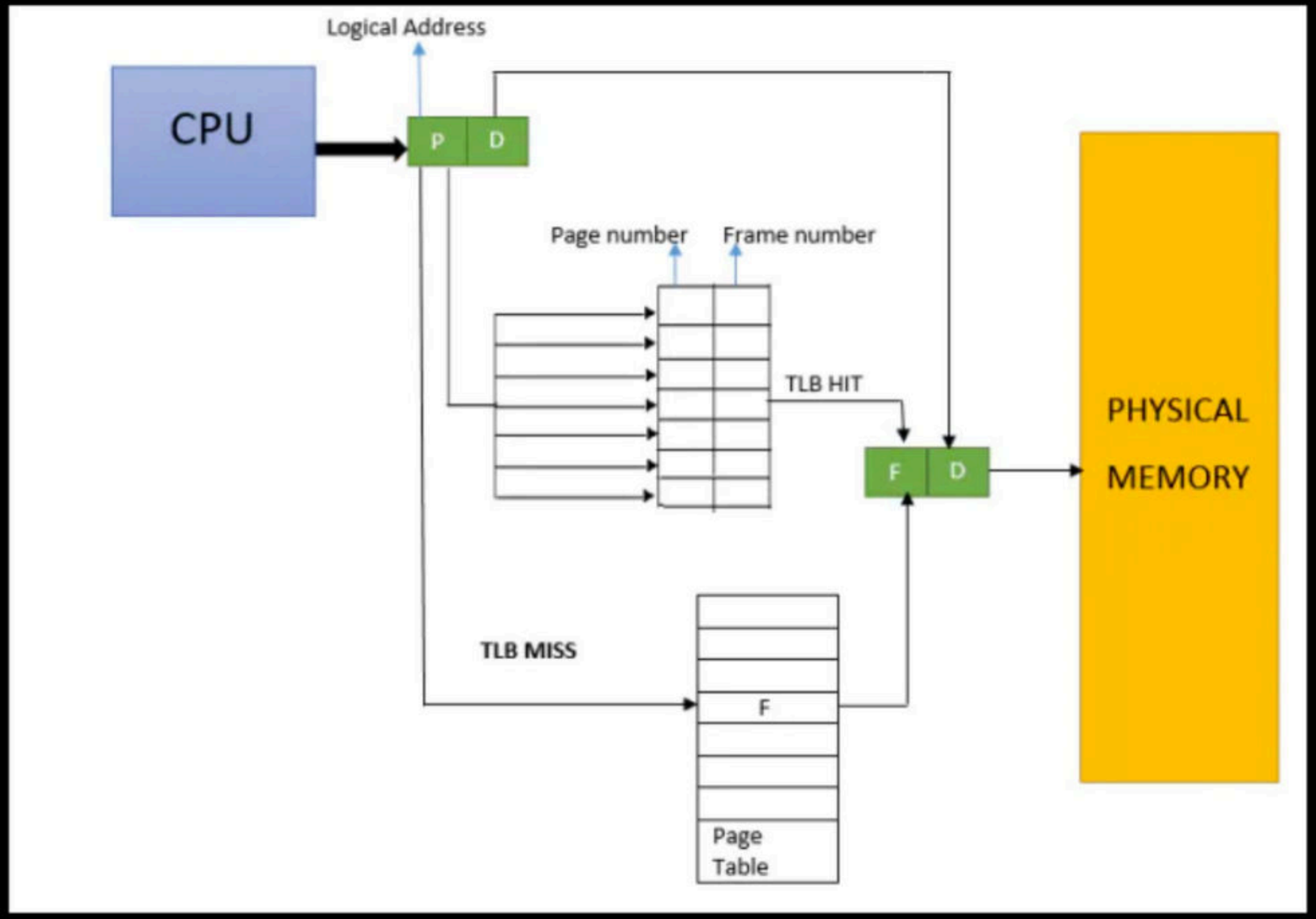
TLB



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TLB Mappings

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Question

A Computer system implements a 36-bit virtual address, page size of 16 KBytes and a 256 - entry translation look-aside buffer (TLB) organized into 64 sets each having four ways. Assume that the TLB tag does not store any process id. The minimum length of the TLB tag in bits is _____.

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Question GATE-2015

A computer system implements a 40 bit virtual address, page size of 8 kilobytes, and a 128-entry translation look-aside buffer (TLB) organized into 32 sets each having four ways. Assume that the TLB tag does not store any process id. The minimum length of the TLB tag in bits is _____?

(A) 20
(B) 10
(C) 11
(D) 22

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Question GATE-2015

A computer system implements a 40 bit virtual address, page size of 8 kilobytes, and a 128-entry translation look-aside buffer (TLB) organized into 32 sets each having four ways. Assume that the TLB tag does not store any process id. The minimum length of the TLB tag in bits is _____?

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Please help me with this doubt

Consider the following snapshot of a system running n concurrent processes. Process i is holding X_i instances of a resource $R, 1 \leq i \leq n$. Assume that all instances of R are currently in use. Further, for all i, process i can place a request for at most Y_i additional instances of R while holding the X_i instances it already has. Of the n processes, there are exactly two processes p and q such that $Y_p = Y_q = 0$. Which one of the following conditions guarantees that no other process apart from p and q can complete execution?

A. $X_p + X_q < \text{Min}\{Y_k \mid 1 \leq k \leq n, k \neq p, k \neq q\}$
B. $X_p + X_q < \text{Max}\{Y_k \mid 1 \leq k \leq n, k \neq p, k \neq q\}$
C. $\text{Min}(X_p, X_q) \geq \text{Min}\{Y_k \mid 1 \leq k \leq n, k \neq p, k \neq q\}$
D. $\text{Min}(X_p, X_q) \leq \text{Max}\{Y_k \mid 1 \leq k \leq n, k \neq p, k \neq q\}$

gatecse-2019 operating-system process-synchronization 2-marks

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▲ 1 • Asked by Shreyas

Please help me with this doubt

A system has n resources $R_0, \ldots, R_{n-1}$, and k processes $P_0, \ldots, P_{k-1}$. The implementation of the resource request logic of each process P_i is as follows:

```
if(i%2 == 0){
   if(i < n) request R_i;
   if(i + 2 < n) request R_{i+2};}
else{
   if(i < n) request R_{n-i};
   if(i + 2 < n) request R_{n-i-2};}
```

In which of the following situations is a deadlock possible?

A. $n = 40,\ k = 26$
B. $n = 21,\ k = 12$
C. $n = 20,\ k = 10$
D. $n = 41,\ k = 19$

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Happy Learning.!

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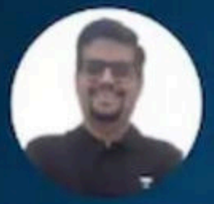
Amit Khurana

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