1. A virtual memory system has 32-bit addresses. Given that 19 of these 32 bits are used by the page number, (a) How many bits of the address are used by the byte offset? (b) What is the page size of the system? (c) How many pages are there in a process address space?

a. (bit address) - (page number) = (byte offset)

b. page size = 2^(byte offset)

c. pages = 2^(page number)

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2. Consider a UNIX file called project.txt 1784 -rw-r----- 1 bob ssrg 1820900 May 4 09:15 report.txt and assume that the group ssrg contains the users alice, bob and carol.

rwx---- owner can read and write, no one else can read or write

rw-r--r-- owner can read and write, everyone else can only read

rw-rw-- owner and everyone can read and write

(a) Which access rights are granted to user bob? Read and write

(b) Which access rights are granted to user alice? Write only

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3. A 32-bit Berkeley UNIX file system has a block size of 4 kilobytes. How many blocks—not bytes—of a given file can be accessed:

(a) Using the block addresses stored in the i-node? 12 blocks.

If bytes, 12 \* 4KB = 48 KB

(b) With one level of indirection? b/4 -> 4KB / 4B = 1024 blocks

(c) With two levels of indirection? (4KB/4B)^2 - 1024 blocks (one level indirection) - 12 blocks (i-node)

Explain in one line or less your answer to point (c) above.

A 32-bit file cannot have more than 1 million 4KB blocks.

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4. How can you prevent deadlocks by denying the circular wait condition?

We will force all processes to acquire all resources in the same linear order.

Why does the Windows page replacement policy handle real-time processes better than other policies?

Because it assigns a minimum partition size to each process and can make this size large enough to accommodate the whole address space of a virtual process.

Where do UNIX file systems store their access control lists?

In the file i-node

What is the purpose of the dirty bit in a virtual memory system?

To tell whether the page has been modified since the last time it was brought into main memory. OR To tell whether the page must be saved in the swap area when it is expelled from main memory.

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