Virtual Memory: Conversion from a Virtual to Physical Address

The program makes a memory access using a virtual address

Given a virtual address, compute the virtual page number

Look to the entry in the page table; is the valid bit set?

Is the memory access we’re handling a write to memory?

Yes

Set the dirty bit for this page to 1.

Set recently used to true. The data we want is in main memory. The entry in the page table will have the "frame number" we want.

Using the frame number and the page offset, compute the physical address!

Using "not recently referenced," we step through the frames starting with that pointed to by LRP. We stop when we encounter a frame that is either empty, or not recently referenced. When we "pass over" a frame because it has been recently referenced, we set its "recently referenced" bit to 0. At the close of our iteration, we have a frame that is either empty or has not been used. LRP now points to the frame we’re to replace, logically.

We must load the page into main memory so it may be accessed; to do this, we must first find a frame to load the page’s data into.

Is another page already in this frame?

No

Is the dirty bit for this frame set?

Yes

Copy the old data in the frame back to the page from which it came so as not to lose changes, and clear the dirty bit.

No

Copy the data from the page on the disk to the frame in main memory.

In the entry for the page table for the page just copied, set the valid bit in the page table to true. Set “frame number” to the frame number to which we have just copied this page so we know where to find the data.

Set "frame number" to the frame number to which we have just copied this page so we know where to find the data.

Clear the valid bit for the entry in the page table for the old data to reflect that it will no longer be in memory.

Yes

Is the dirty bit for this frame set?

Set recently used to true. The data we want is in main memory. The entry in the page table will have the “frame number” we want.

Using the frame number and the page offset, compute the physical address!

DONE!