OPERATING SYSTEM – LABORATORY 4: MEMORY MANAGEMENT

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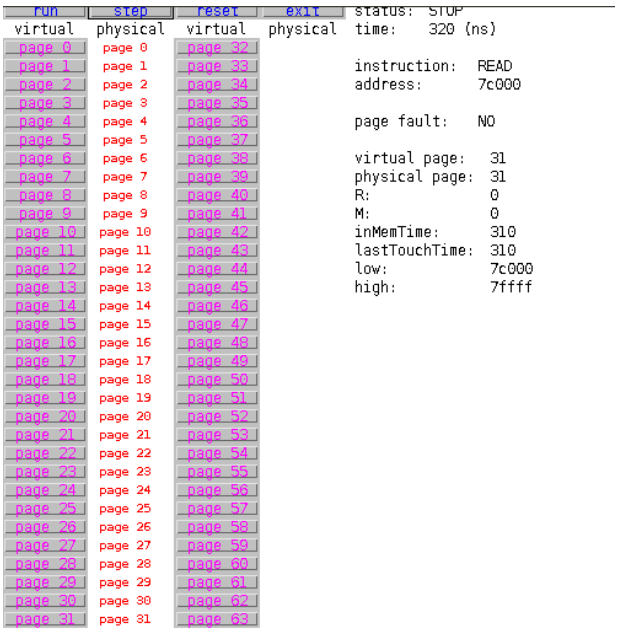
In the file named ***memory.conf***, I map the first 8 pages physical memory to the first 8 pages virtual memory, and the rest of physical memory page (24 pages) will be mapped by default.

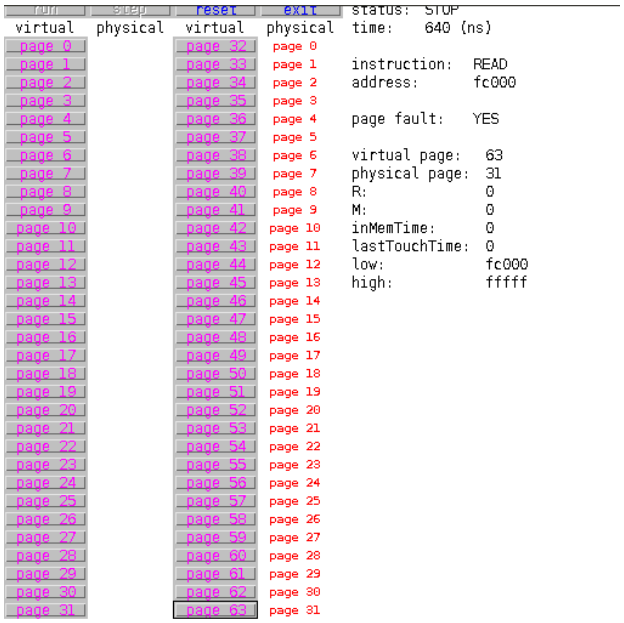
In the file named ***command***, I read from one virtual memory address on each of the 64 virtual memory pages. Because the size of a page is 16384 (2^{14}) bytes, the first virtual page will cover all address from 0 to 16383, the second virtual page will cover all address from 16383 to 32767, and so on, the final virtual page – the 64th page will cover all address from 1032192 to 1048575. The ***memory.conf*** and the ***command*** file should be like this:

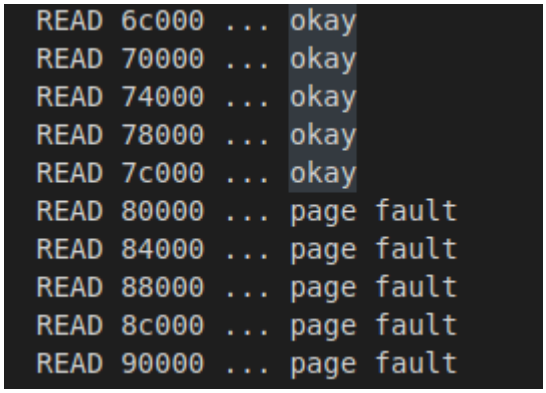
```
memset 0 0 0 0 0 0      READ 0
memset 1 1 0 0 0 0      READ 16384
memset 2 2 0 0 0 0      READ 32768
memset 3 3 0 0 0 0      READ 49152
memset 4 4 0 0 0 0      READ 65536
memset 5 5 0 0 0 0      READ 81920
memset 6 6 0 0 0 0      READ 98304
memset 7 7 0 0 0 0      READ 114688
```

Because there are in total 32 pages of physical memory and 64 pages of virtual memory, so all 32 pages of physical memory are mapped to the first 32 pages of virtual memory. When simulator tries to read from one specified virtual memory address from the 1st page to the 32nd page, there is no "page fault", because all of these virtual pages are mapped to physical pages.



But when the simulator tries to access the 33rd virtual page and further, it will be a “page fault” because these virtual pages are not mapped to any physical pages. And then, a page replacement algorithm will be called to replace this current physical page. In the simulator GUI, the physical pages are replaced in the same order from the oldest to the newest (page 0, page 1, …, page 31). Thus, the page replacement algorithm follows “First in, First out” strategy.





In this algorithm, the simulator (the operating system) keeps track of all pages in the memory in a queue, the oldest page is in the front of the queue. When a “page fault” occurs, the current page needs to be replaced, the front of the queue will be removed to place right this position.