EOPSY Lab #4

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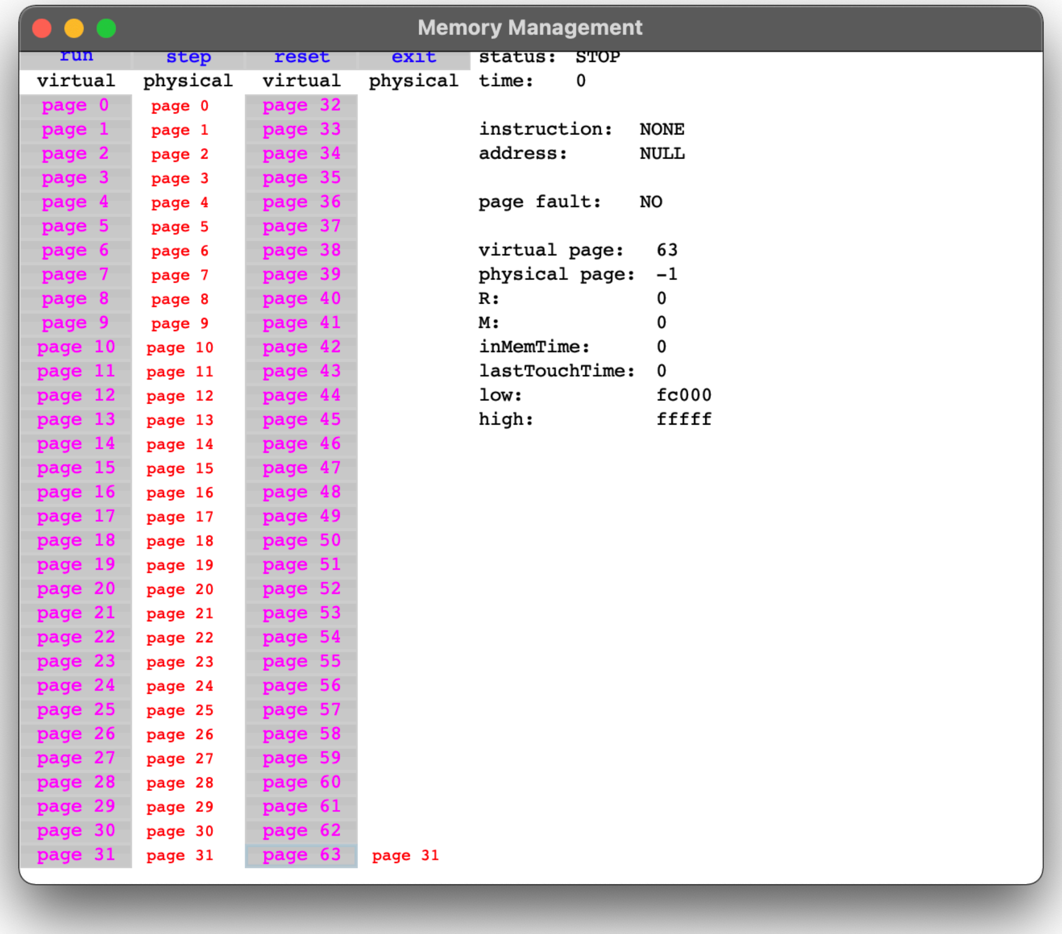
The task of this laboratory consisted of mapping any 8 pages of physical memory to the first 8 pages of virtual memory, reading from one virtual memory address on each of the 64 virtual pages.

With the simulator provided, it happens to be impossible to map only 8 pages and read from 64. The number of pages mapped (numpages in memory.conf) is the sum of number of virtual and physical pages mapped, e.g. numpages 64 maps 32 physical to 32 virtual pages.

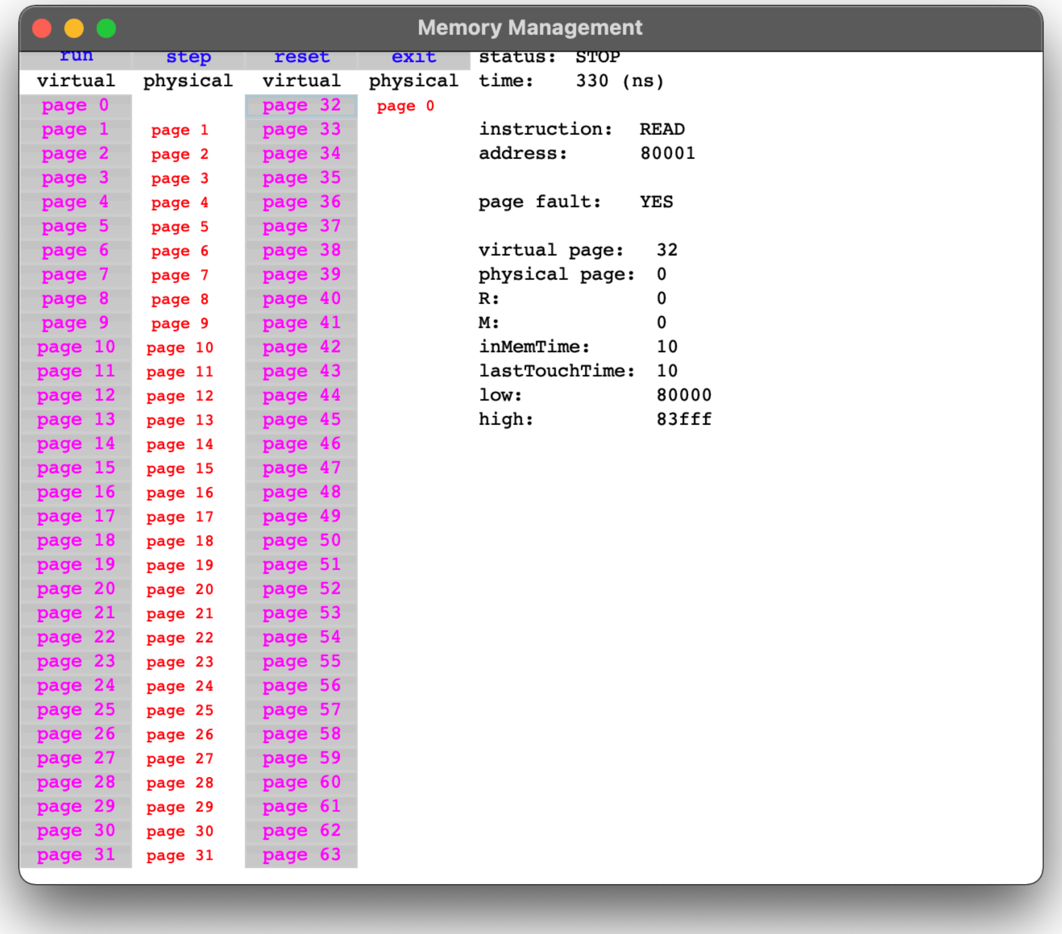


```
status:  STOP
time:    0

instruction:   NONE
address:       NULL

page fault:    NO

virtual page:    63
physical page:   -1
R:               0
M:               0
inMemTime:       0
lastTouchTime:   0
low:             fc000
high:            fffff
```

```
virtual   physical  virtual   physical
page 0    page 0    page 32
page 1    page 1    page 33
page 2    page 2    page 34
page 3    page 3    page 35
page 4    page 4    page 36
page 5    page 5    page 37
page 6    page 6    page 38
page 7    page 7    page 39
page 8    page 8    page 40
page 9    page 9    page 41
page 10   page 10   page 42
page 11   page 11   page 43
page 12   page 12   page 44
page 13   page 13   page 45
page 14   page 14   page 46
page 15   page 15   page 47
page 16   page 16   page 48
page 17   page 17   page 49
page 18   page 18   page 50
page 19   page 19   page 51
page 20   page 20   page 52
page 21   page 21   page 53
page 22   page 22   page 54
page 23   page 23   page 55
page 24   page 24   page 56
page 25   page 25   page 57
page 26   page 26   page 58
page 27   page 27   page 59
page 28   page 28   page 60
page 29   page 29   page 61
page 30   page 30   page 62
page 31   page 31   page 63      page 31
```

Initial setup

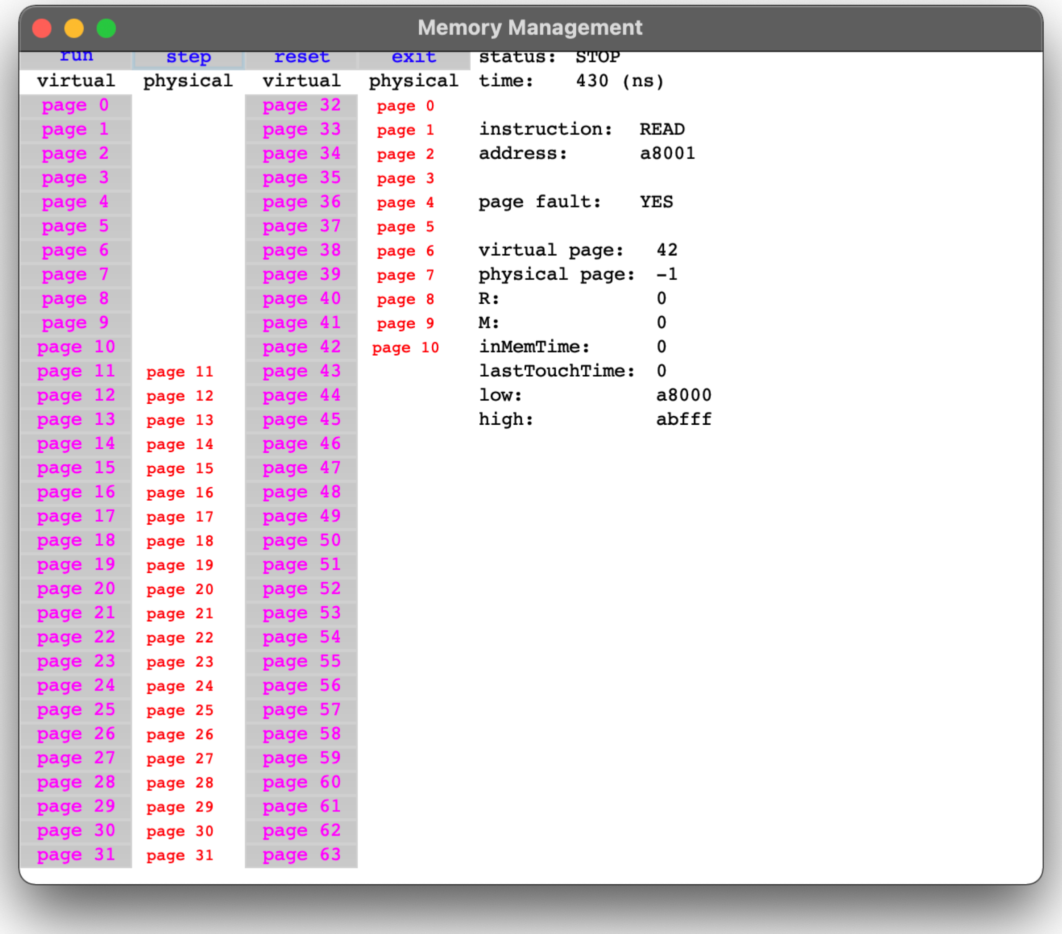
In the commands file, I READ the pagesize (16384) 64 times in order to cause a page fault to observe the page replacement algorithm. After it read through the 32 pages, it started replacing them one by one in order of FIFO.



```
virtual   physical  virtual   physical
page 0              page 32   page 0
page 1    page 1    page 33
page 2    page 2    page 34
page 3    page 3    page 35
page 4    page 4    page 36
page 5    page 5    page 37
page 6    page 6    page 38
page 7    page 7    page 39
page 8    page 8    page 40
page 9    page 9    page 41
page 10   page 10   page 42
page 11   page 11   page 43
page 12   page 12   page 44
page 13   page 13   page 45
page 14   page 14   page 46
page 15   page 15   page 47
page 16   page 16   page 48
page 17   page 17   page 49
page 18   page 18   page 50
page 19   page 19   page 51
page 20   page 20   page 52
page 21   page 21   page 53
page 22   page 22   page 54
page 23   page 23   page 55
page 24   page 24   page 56
page 25   page 25   page 57
page 26   page 26   page 58
page 27   page 27   page 59
page 28   page 28   page 60
page 29   page 29   page 61
page 30   page 30   page 62
page 31   page 31   page 63
```

```
status:  STOP
time:    330 (ns)

instruction:   READ
address:       80001

page fault:    YES

virtual page:   32
physical page:  0
R:              0
M:              0
inMemTime:      10
lastTouchTime:  10
low:            80000
high:           83fff
```

Step 33



```
                                               status:  STOP
virtual   physical   virtual   physical        time:    430 (ns)
page 0               page 32   page 0
page 1               page 33   page 1          instruction:   READ
page 2               page 34   page 2          address:       a8001
page 3               page 35   page 3
page 4               page 36   page 4          page fault:    YES
page 5               page 37   page 5
page 6               page 38   page 6          virtual page:   42
page 7               page 39   page 7          physical page:  -1
page 8               page 40   page 8          R:              0
page 9               page 41   page 9          M:              0
page 10              page 42   page 10         inMemTime:      0
page 11   page 11    page 43                   lastTouchTime:  0
page 12   page 12    page 44                   low:            a8000
page 13   page 13    page 45                   high:           abfff
page 14   page 14    page 46
page 15   page 15    page 47
page 16   page 16    page 48
page 17   page 17    page 49
page 18   page 18    page 50
page 19   page 19    page 51
page 20   page 20    page 52
page 21   page 21    page 53
page 22   page 22    page 54
page 23   page 23    page 55
page 24   page 24    page 56
page 25   page 25    page 57
page 26   page 26    page 58
page 27   page 27    page 59
page 28   page 28    page 60
page 29   page 29    page 61
page 30   page 30    page 62
page 31   page 31    page 63
```

Step 43

FIFO ("First-In First-Out") is a page replacement algorithm that uses the frame whose page has been in memory the longest. The page frames are kept in a queue and the frame that was used last is moved to the tail and in the next replacement the next page from the queue is used.

This is by no means an effective algorithm due to its inability to distinguish which pages are used frequently, and which are not used at all. A better algorithm for page replacement would be a Least Frequently Used (LFU).