Jan Świerczyński

293660

EOPSY

Laboratory 4. – *Memory Management*

TASK:

Create a command file that maps any 8 pages of physical memory to the first 8 pages of virtual memory, and then reads from one virtual memory address on each of the 64 virtual pages. Step through the simulator one operation at a time and see if you can predict which virtual memory addresses cause page faults. What page replacement algorithm is being used?

Locate in the sources and describe to the instructor the page replacement algorithm.

Memory.conf file:

```
// memset  virt page #  physical page #  R (read from)  M (modified)
inMemTime (ns) lastTouchTime (ns)

memset 0 0 0 0 0 0

memset 1 1 0 0 0 0

memset 2 2 0 0 0 0

memset 3 3 0 0 0 0

memset 4 4 0 0 0 0

memset 5 5 0 0 0 0

memset 6 6 0 0 0 0

memset 7 7 0 0 0 0


// enable_logging 'true' or 'false'

// When true specify a log_file or leave blank for stdout

enable_logging true


// log_file <FILENAME>

// Where <FILENAME> is the name of the file you want output

// to be print to.

log_file tracefile


// page size, defaults to 2^14 and cannot be greater than 2^26

// pagesize <single page size (base 10)> or <'power' num (base 2)>

pagesize 16384 //Left as it was


// addressradix sets the radix in which numerical values are displayed

// 2 is the default value

// addressradix <radix>

addressradix 10 //Changed to decimal for better visualisation


// numpages sets the number of pages (physical and virtual)

// 64 is the default value

// numpages must be at least 2 and no more than 64

// numpages <num>

numpages 64
```

commands file:

```
// Enter READ/WRITE commands into this file

// READ <OPTIONAL number type: bin/hex/oct> <virtual memory address or
random>

// WRITE <OPTIONAL number type: bin/hex/oct> <virtual memory address or
random>

READ 0      //First index of first page -> next page at 16384

READ 16384

READ 32768

READ 49152

READ 65536

READ 81920

READ 98304

READ 114688

READ 131072

READ 147456

READ 163840

READ 180224

READ 196608

READ 212992

READ 229376

READ 245760

READ 262144

READ 278528

READ 294912

READ 311296

READ 327680

READ 344064

READ 360448

READ 376832

READ 393216

READ 409600

READ 425984

READ 442368

READ 458752
```

READ 475136

READ 491520

READ 507904

READ 524288

READ 540672

READ 557056

READ 573440

READ 589824

READ 606208

READ 622592

READ 638976

READ 655360

READ 671744

READ 688128

READ 704512

READ 720896

READ 737280

READ 753664

READ 770048

READ 786432

READ 802816

READ 819200

READ 835584

READ 851968

READ 868352

READ 884736

READ 901120

READ 917504

READ 933888

READ 950272

READ 966656

READ 983040

READ 999424

READ 1015808

READ 1032192

Tracefile file:

```
READ 0 ... okay
READ 16384 ... okay
READ 32768 ... okay
READ 49152 ... okay
READ 65536 ... okay
READ 81920 ... okay
READ 98304 ... okay
READ 114688 ... okay
READ 131072 ... okay
READ 147456 ... okay
READ 163840 ... okay
READ 180224 ... okay
READ 196608 ... okay
READ 212992 ... okay
READ 229376 ... okay
READ 245760 ... okay
READ 262144 ... okay
READ 278528 ... okay
READ 294912 ... okay
READ 311296 ... okay
READ 327680 ... okay
READ 344064 ... okay
READ 360448 ... okay
READ 376832 ... okay
READ 393216 ... okay
READ 409600 ... okay
READ 425984 ... okay
READ 442368 ... okay
READ 458752 ... okay
READ 475136 ... okay
READ 491520 ... okay
READ 507904 ... okay
READ 524288 ... page fault    // 32nd page
```

```
READ 540672 ... page fault
READ 557056 ... page fault
READ 573440 ... page fault
READ 589824 ... page fault
READ 606208 ... page fault
READ 622592 ... page fault
READ 638976 ... page fault
READ 655360 ... page fault
READ 671744 ... page fault
READ 688128 ... page fault
READ 704512 ... page fault
READ 720896 ... page fault
READ 737280 ... page fault
READ 753664 ... page fault
READ 770048 ... page fault
READ 786432 ... page fault
READ 802816 ... page fault
READ 819200 ... page fault
READ 835584 ... page fault
READ 851968 ... page fault
READ 868352 ... page fault
READ 884736 ... page fault
READ 901120 ... page fault
READ 917504 ... page fault
READ 933888 ... page fault
READ 950272 ... page fault
READ 966656 ... page fault
READ 983040 ... page fault
READ 999424 ... page fault
READ 1015808 ... page fault
READ 1032192 ... page fault
```

Conclusions:

Page replacement algorithm: FIFO (First-In-First-Out) – OS keeps track of all memory pages in a queue, the oldest page is at the front. When a page needs to be replaced, the first one (oldest one as well) is selected to removal.

Predictions:

My predictions where that the simulation would fail at the 32nd (31st by the index) page. Due to the fact that for virtual pages with numbers between 31 and 63, there are no physical pages. First 8 virtual ones were mapped to first 8 physical ones, rest, until 32nd page ,were assigned by default. Moreover we have the information in our config file that the maximum number of pages is 64, hence we have got only 32 physical pages and 32 virtual pages.