

Operating Systems Lab

Lab-8 Report

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1 Description

1.a FIFO (First in first out) Policy

- FIFO means the page which is accessed first should be evicted when the time of page fault occurs.
- To implement FIFO, I have maintained queue data structure in c++, when new page is accessed it is enqueued into queue.
- When page fault occurs the page which is in front of the queue is dequeued and new page is enqueued to queue.

1.b LRU (Least recently used) Policy

- LRU means the page which is least recently used should be evicted when the time of page fault occurs.
- To implement LRU, I have maintained vector data structure in c++, when new page or the page within the main memory is accessed it is pushed back to vector.
- When page fault occurs the page which is in front of the vector is removed and new page is pushed back to vector.

1.c Random policy

- Random policy means when page fault occurs, random page is evicted.
- To implement Random policy, I have maintained vector data structure in c++, when new page is accessed it is pushed back to vector.
- When page fault occurs random page from vector is removed and new page is pushed back to vector.

For all of the above policies unordered set data structure is maintained to store memory pages and for direct access for page in memory.

2 Running FIFO, LRU and Random policies

- To compile LRU.cpp, FIFO.cpp and Random.cpp we have run **make compile** command in terminal.
- To run testcase:
./FIFO < no.ofpages >< no.of frames >< no.of blocks >< testcasefilename >

2.a FIFO

```
pavan@pavan-OMEN-Laptop-15-ek0xxx:~/Documents/OS Lab/os-lab/lab8$ ./FIFO 60
20 60 testcases/req1.dat
Page Faults: 44
Page Hits: 12
Page Fault Rate: 0.785714
Page Hit Rate: 0.214286
```

Figure 1: FIFO on req1.dat testcase

2.b LRU

```
pavan@pavan-OMEN-Laptop-15-ek0xxx:~/Documents/OS Lab/os-lab/lab8$ ./LRU 60
20 60 testcases/req1.dat
Page Faults: 44
Page Hits: 12
Page Fault Rate: 0.785714
Page Hit Rate: 0.214286
```

Figure 2: LRU on req1.dat testcase

2.c Random

```
pavan@pavan-OMEN-Laptop-15-ek0xxx:~/Documents/OS Lab/os-lab/lab8$ ./Random
60 20 60 testcases/req1.dat
Page Faults: 47
Page Hits: 9
Page Fault Rate: 0.839286
Page Hit Rate: 0.160714
```

Figure 3: Random on req1.dat testcase

3 Graph

- First run **make compile** command in terminal.
- To plot graph:
`python3 ./Graph_PLOT/graph_plot.py < no.ofpages > < testcasefilename >`
- Graph is plotted by changing no. of frames from 1 to no. of pages. X-axis is number of frames. Y-axis is number of page faults.
- Green is Random policy. Orange is LRU policy. Blue is FIFO policy.

3.a Testcase: req1.dat

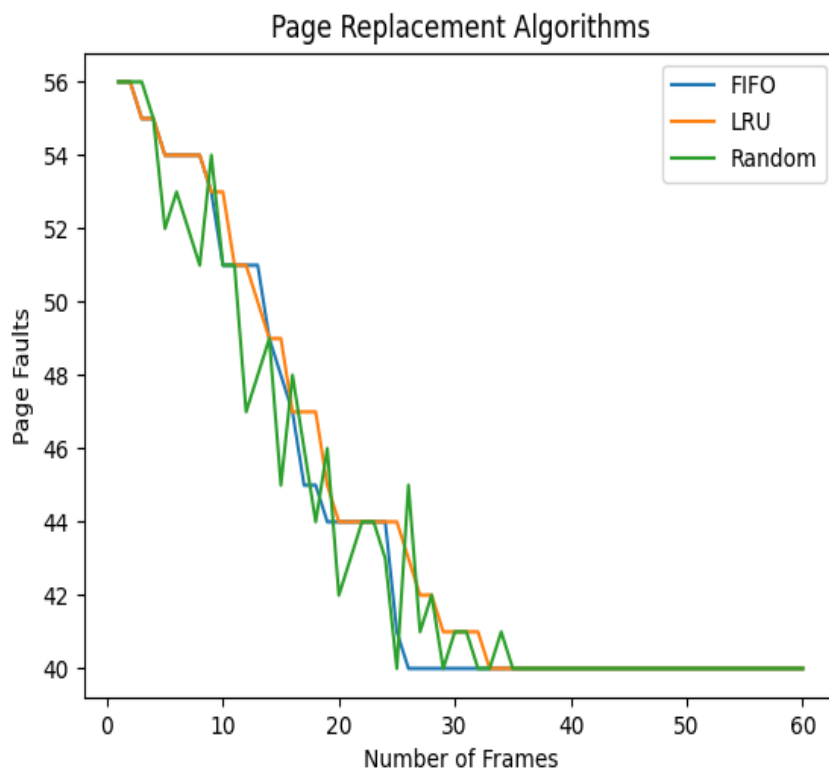


Figure 4: Testcase: req1.dat

- From the above graph we can infer that till 25 frames FIFO and LRU has approximately same page faults.
- From 25 frames to 32 frames FIFO performs better than LRU.

3.b Testcase: LRU_testcase.txt

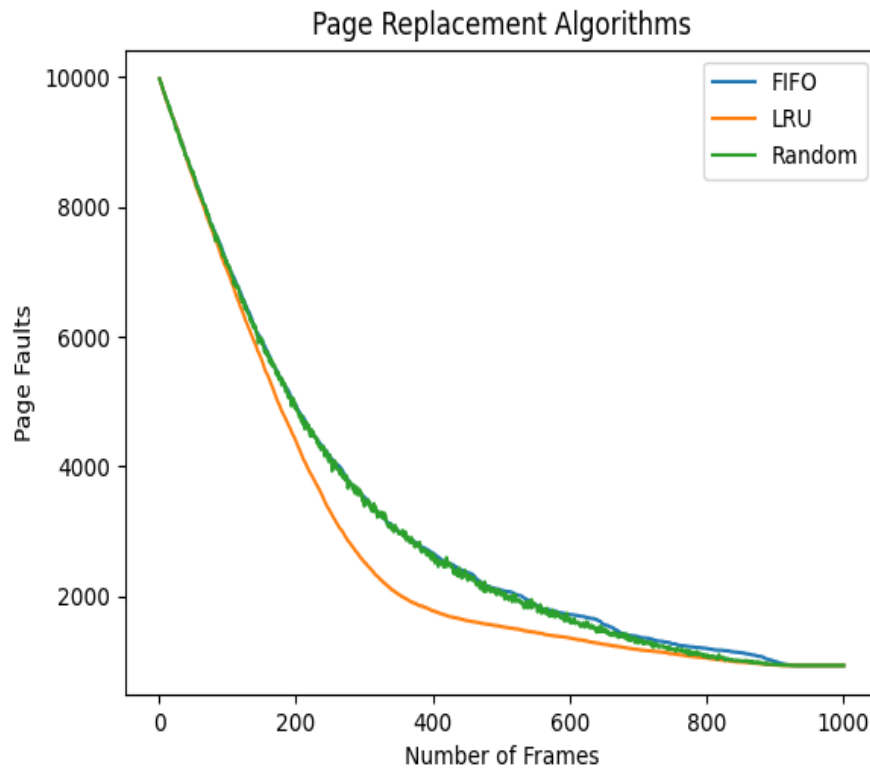


Figure 5: Testcase: LRU_testcase.txt

- Testcase is generated such that from 80% of accesses are from 1 to 200 and 20% accesses are from 201 to 1000. And virtual pages are 1000.
- From the above graph we can infer that LRU performs better than Random and FIFO policies.

3.c Testcase: FIFO_testcase.txt

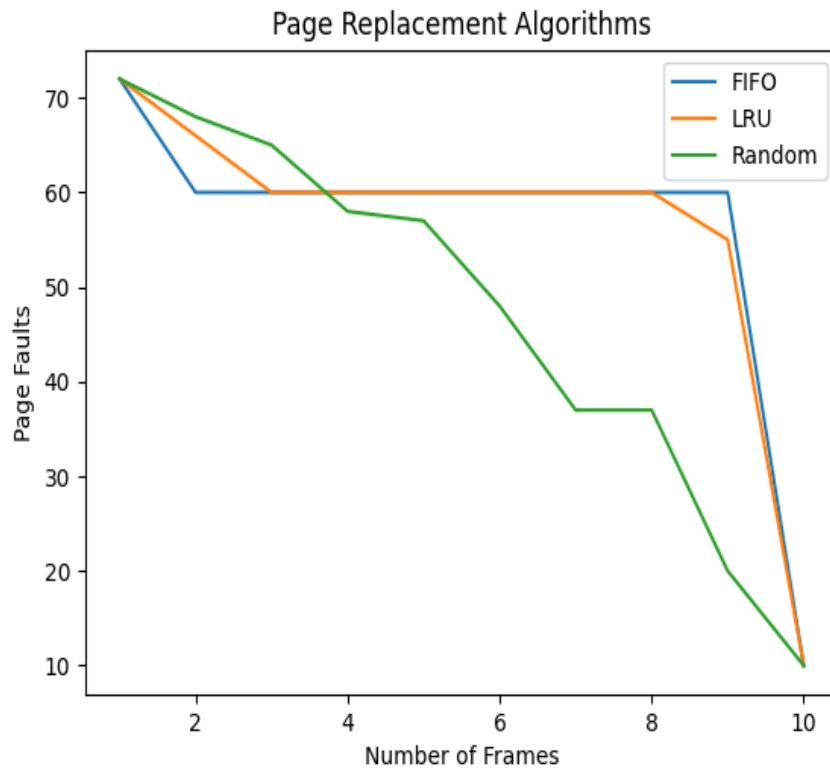


Figure 6: Testcase: FIFO_testcase.txt

- Testcase is generated such that when number of frames is less, the FIFO performs better than LRU. Virtual pages are 10.
- From the above graph we can infer that FIFO performs better than Random and LRU policies for frame size 2.

3.d Testcase: random_testcase.txt

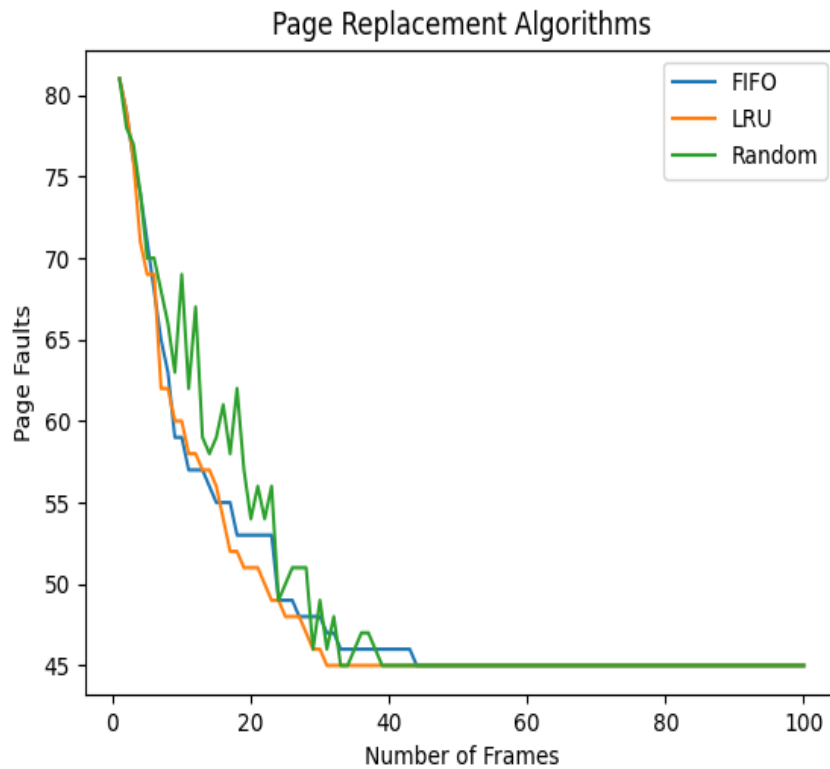


Figure 7: Testcase: random_testcase.txt

- Testcase is generated such that accesses are made randomly. Virtual pages are 100.
- From the above graph we can infer that LRU performs better than Random and FIFO policies for frame size 20 to 40.

3.e Testcase: testcase_linear.txt

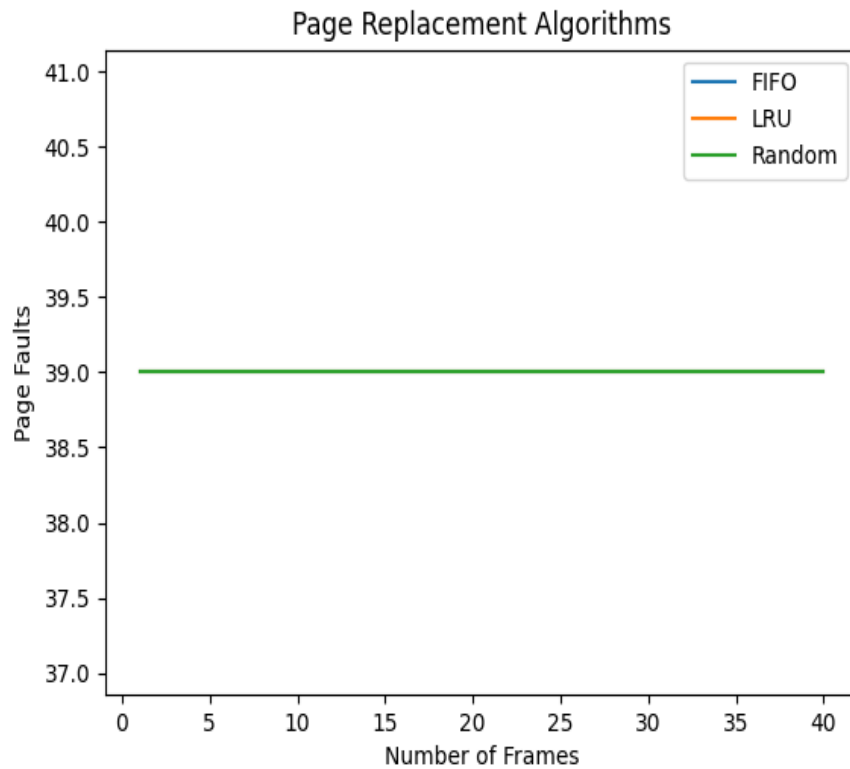


Figure 8: Testcase: testcase_linear.txt

- Testcase is generated such that pages are accessed sequentially. Virtual pages are 40.
- From the above graph we can infer that when pages are accessed sequentially number of page faults are same for all frame size.