CS342 – Operating Systems Lab

Lab 9

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Question 1: Write a C program to take the number of frames and page sequence as input and select the best page replacement algorithm among (FIFO, LRU, Optimal) based on the number of page faults occurred. For the selected page replacement algorithm, output the frame content at each time step t and also the number of page faults. First line of input is number of frames and second line the page sequence.

Answer:

Compilation:

g++ -o -P1_1 P1_1.cpp -> Fifo
g++ -o -P1_2 P1_2.cpp -> Lru
g++ -o -P1_2 P1_2.cpp -> Optimal

Syntax:

./P1
No of frames
Page Sequence
X -> (To stop taking input)

Sample Input and Output Fifo:

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ g++ -o P1_1 P1_1.cpp
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P1_1
3
4 7 6 1 7 6 1 2 7 2
X
FIFO:
4 7 6 1 7 6 1 2 7 2
Frame content at each time step t
F1      F2      F3
X       X       X       at t = 0
4       X       X       at t = 1
4       7       X       at t = 2
4       7       6       at t = 3
1       7       6       at t = 4
1       7       6       at t = 5
1       7       6       at t = 6
1       7       6       at t = 7
1       2       6       at t = 8
1       2       7       at t = 9
1       2       7       at t = 10

Number of page defaults: 6
```

Sample Input and Output Lru:

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ g++ -o P1_2 P1_2.cpp
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P1_2
3
4 7 6 1 7 6 1 2 7 2
X
LRU:
4 7 6 1 7 6 1 2 7 2
Frame content at each time step t
F1      F2      F3
X       X       X       at t = 0
4       X       X       at t = 1
4       7       X       at t = 2
4       7       6       at t = 3
1       7       6       at t = 4
1       7       6       at t = 5
1       7       6       at t = 6
1       7       6       at t = 7
1       2       6       at t = 8
1       2       7       at t = 9
1       2       7       at t = 10

Number of page defaults: 6
```

Sample Input and Output Optimal:

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ g++ -o P1_3 P1_3.cpp
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P1_3
3
4 7 6 1 7 6 1 2 7 2
X
OPTIMAL:
4 7 6 1 7 6 1 2 7 2
Frame content at each time step t
F1      F2      F3
X       X       X       at t = 0
4       X       X       at t = 1
4       7       X       at t = 2
4       7       6       at t = 3
1       7       6       at t = 4
1       7       6       at t = 5
1       7       6       at t = 6
1       7       6       at t = 7
2       7       6       at t = 8
2       7       6       at t = 9
2       7       6       at t = 10

#Page Faults: 5
```

Question 2: Either modify the existing page replacement algorithm (FIFO, LRU, Optimal) or design unique page replacement algorithm in such a way that modified technique has less page faults when compared with FIFO, LRU and Optimal. Write a C code for the modified page replacement algorithm.

Answer:
We will first see for our new algorithm and then we will compare it with lru fifo and our optimal from previous question:

Compilation:

g++ -o -P2 P2.cpp

Syntax:

./P2
No of frames
Page Sequence
X -> (To stop taking input)

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ g++ -o P2 P2.cpp
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P2
4
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
X
NFU:
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
Frame content at each time step t
F1      F2      F3      F4
1       E       E       E
1       2       E       E
1       2       3       E
1       2       3       4
1       2       3       4
7       2       3       4
7       2       5       4
7       2       5       1
7       2       5       1
6       2       5       1
6       2       4       1
6       2       4       7
6       2       4       7
1       2       4       7
1       2       4       7
1       2       5       7

Number of page defaults: 12
```

Now lets see for lru:

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P1_2
4
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
X
LRU:
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
Frame content at each time step t
F1      F2      F3      F4
X       X       X       X       at t = 0
1       X       X       X       at t = 1
1       2       X       X       at t = 2
1       2       3       X       at t = 3
1       2       3       4       at t = 4
1       2       3       4       at t = 5
7       2       3       4       at t = 6
7       2       5       4       at t = 7
7       2       5       1       at t = 8
7       2       5       1       at t = 9
7       6       5       1       at t = 10
4       6       5       1       at t = 11
4       6       7       1       at t = 12
4       6       7       2       at t = 13
4       1       7       2       at t = 14
4       1       7       2       at t = 15
5       1       7       2       at t = 16

Number of page defaults: 13
```

For fifo:

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P1_1
4
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
X
FIFO:
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
Frame content at each time step t
F1      F2      F3      F4
X       X       X       X       at t = 0
1       X       X       X       at t = 1
1       2       X       X       at t = 2
1       2       3       X       at t = 3
1       2       3       4       at t = 4
1       2       3       4       at t = 5
7       2       3       4       at t = 6
7       5       3       4       at t = 7
7       5       1       4       at t = 8
7       5       1       4       at t = 9
7       5       1       6       at t = 10
4       5       1       6       at t = 11
4       7       1       6       at t = 12
4       7       2       6       at t = 13
4       7       2       1       at t = 14
4       7       2       1       at t = 15
5       7       2       1       at t = 16

Number of page defaults: 13
```

Our optimal from previous:

```
tarusimittal@LAPTOP-6CRHF1GO:/mnt/c/Users/Tarusi Mittal/desktop/Assignment9$ ./P1_3
4
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
X
OPTIMAL:
1 2 3 4 2 7 5 1 1 6 4 7 2 1 2 5
Frame content at each time step t
F1      F2      F3      F4
X       X       X       X       at t = 0
1       X       X       X       at t = 1
1       2       X       X       at t = 2
1       2       3       X       at t = 3
1       2       3       4       at t = 4
1       2       3       4       at t = 5
1       2       7       4       at t = 6
1       5       7       4       at t = 7
1       5       7       4       at t = 8
1       5       7       4       at t = 9
1       6       7       4       at t = 10
1       6       7       4       at t = 11
1       6       7       4       at t = 12
1       2       7       4       at t = 13
1       2       7       4       at t = 14
1       2       7       4       at t = 15
5       2       7       4       at t = 16

#Page Faults: 9
```

END