



Bansilal Ramnath Agarwal Charitable Trust's

# Vishwakarma Institute of Technology

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

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## **Operating System Lab**

### **Assignment No: 6**

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## 1. First in First Out (FIFO) Page Replacement Algorithm

Code:

```
1 #!/bin/env python3
2
3 def FIFO(input_ , pg_frame_count):
4
5     change = 0
6     hit, fault = 0, 0
7     frames = []
8     print('\nInput \t Frames')
9
10    for i in input_ :
11        if(len(frames) < pg_frame_count):
12            if i not in frames:
13                frames.append(i)
14                print(i, ' \t*', [j for j in frames])
15                fault += 1
16            else:
17                print(i, ' \t ', [j for j in frames])
18                hit += 1
19        else:
20            if i not in frames:
21                frames[change] = i
22                print(i, ' \t*', [j for j in frames])
23                change = (change +1) % pg_frame_count
24                fault += 1
25            else:
26                print(i, ' \t ', [j for j in frames])
27                hit += 1
28
29    return hit, fault
30
31 if __name__ == '__main__':
32     input_ = [7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 1, 2, 0]
33     pg_frame_count = int(input("Enter page frame count : "))
34     hit, fault = FIFO(input_ , pg_frame_count)
35     print(f'\nFor the given input: \n{input_}\n\nTotal hits = {hit}\nFault = {fault}')
36
```

## Output:

```
~/vit-comp/Module-4/Operating-System/Assignment-6 on main !1
> python3 FIFO.py
Enter page frame count : 3

Input    Frames
7         * [7]
0         * [7, 0]
1         * [7, 0, 1]
2         * [2, 0, 1]
0         [2, 0, 1]
3         * [2, 3, 1]
0         * [2, 3, 0]
4         * [4, 3, 0]
2         * [4, 2, 0]
3         * [4, 2, 3]
0         * [0, 2, 3]
3         [0, 2, 3]
1         * [0, 1, 3]
2         * [0, 1, 2]
0         [0, 1, 2]

For the given input:
[7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 1, 2, 0]

Total hits = 3
Fault = 12
```

## 2. Least Recently Used (LRU) Page Replacement Algorithm

Code:

```
1 #!/bin/env python3
2
3 def replace(inp, frames):
4
5     ff = []
6     for i in inp[::-1]:
7         if i not in ff and i in frames:
8             ff.append(i)
9         else:
10             pass
11     return ff[-1]
12
13 def LRU(inp , pg_frame_count):
14
15     change = 0
16     hit, fault = 0, 0
17     frames = []
18     print('\nInput \t Frames')
19     counter = 0
20     for i in inp:
21         counter += 1
22         new_inp = inp[:counter - 1]
23         if(len(frames) < pg_frame_count):
24             if i not in frames:
25                 frames.append(i)
26                 print(i, ' \t*', [j for j in frames])
27                 fault += 1
28             else:
29                 print(i, ' \t' , [j for j in frames])
30                 hit += 1
31         else:
32             if i in frames:
33                 print(i, ' \t ', [j for j in frames])
34                 hit += 1
35             else:
36                 change = replace(new_inp, frames)
37                 frames[frames.index(change)] = i
38                 print(i, ' \t*', [j for j in frames])
39                 fault += 1
40
41     return hit, fault
42
43 if __name__ == '__main__':
44
45     input_ = [7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1]
46     pg_frame_count = int(input("Enter page frame count : "))
47     hit, fault = LRU(input_, pg_frame_count)
48     print(f'\nFor the given input: \n{input_}\n\nTotal hits = {hit}\nFault = {fault}')
```

## Output:

```
> python3 LRU.py
Enter page frame count : 4

Input    Frames
7         * [7]
0         * [7, 0]
1         * [7, 0, 1]
2         * [7, 0, 1, 2]
0         [7, 0, 1, 2]
3         * [3, 0, 1, 2]
0         [3, 0, 1, 2]
4         * [3, 0, 4, 2]
2         [3, 0, 4, 2]
3         [3, 0, 4, 2]
0         [3, 0, 4, 2]
3         [3, 0, 4, 2]
2         [3, 0, 4, 2]
1         * [3, 0, 1, 2]
2         [3, 0, 1, 2]
0         [3, 0, 1, 2]
1         [3, 0, 1, 2]
7         * [7, 0, 1, 2]
0         [7, 0, 1, 2]
1         [7, 0, 1, 2]

For the given input:
[7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1]

Total hits = 12
Fault = 8
```

### 3. Optimal Page Replacement Algorithm

Code:

```
1 #!/bin/env python3
2
3 def replace(inp, frames):
4
5     ff = []
6     for i in frames:
7         if i not in inp:
8             return i
9
10    for i in inp:
11        if i not in ff and i in frames:
12            ff.append(i)
13        else:
14            pass
15    return ff[-1]
16
17 def Optimal(inp , pg_frame_count):
18
19     change = 0
20     hit, fault = 0, 0
21     frames = []
22     print('\nInput \t Frames')
23     counter = 0
24     for i in inp:
25         counter += 1
26         new_inp = inp[counter:]
27         if(len(frames) < pg_frame_count):
28             if i not in frames:
29                 frames.append(i)
30                 print(i, ' \t*', [j for j in frames])
31                 fault += 1
32             else:
33                 print(i, ' \t' , [j for j in frames])
34                 hit += 1
35         else:
36             if i in frames:
37                 print(i, ' \t ', [j for j in frames])
38                 hit += 1
39             else:
40                 change = replace(new_inp, frames)
41                 frames[frames.index(change)] = i
42                 print(i, ' \t*', [j for j in frames])
43                 fault += 1
44
45     return hit, fault
46
47 if __name__ == '__main__':
48
49     input_ = [7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1]
50     pg_frame_count = int(input("Enter page frame count : "))
51     hit, fault = Optimal(input_ , pg_frame_count)
52     print(f'\nFor the given input: \n{input_}\n\nTotal hits = {hit}\nFault = {fault}')
53
```

## Output:

```
~/vit-comp/Module-4/Operating-System/Assignment-6 on main
```

```
> python3 Optimal.py
```

```
Enter page frame count : 4
```

Input	Frames
7	* [7]
0	* [7, 0]
1	* [7, 0, 1]
2	* [7, 0, 1, 2]
0	[7, 0, 1, 2]
3	* [3, 0, 1, 2]
0	[3, 0, 1, 2]
4	* [3, 0, 4, 2]
2	[3, 0, 4, 2]
3	[3, 0, 4, 2]
0	[3, 0, 4, 2]
3	[3, 0, 4, 2]
2	[3, 0, 4, 2]
1	* [1, 0, 4, 2]
2	[1, 0, 4, 2]
0	[1, 0, 4, 2]
1	[1, 0, 4, 2]
7	* [1, 0, 7, 2]
0	[1, 0, 7, 2]
1	[1, 0, 7, 2]

For the given input:

```
[7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1]
```

Total hits = 12

Fault = 8