# Operating System

## Programming Assignment - 6

### Algorithm Used

First In First Out, Least Recently Used and Optimal Policy

### Programing Language Used

Python

### Operating System

Mac OS

### First In First Out:

Code output-

Page Request:

**[10, 8, 10, 2, 15, 14, 6, 13, 11, 13, 10, 12, 8, 13, 2, 8]**

```
Performing FIFO
Page request  10  =>  [10]
Page request  08  =>  [10, 8]
Page request  10  =>  [10, 8]
Page request  02  =>  [10, 8, 2]
Page request  15  =>  [10, 8, 2, 15]
Page request  14  =>  [10, 8, 2, 15, 14]
Page request  06  =>  [8, 2, 15, 14, 6]    ---->PageFault
Page request  13  =>  [2, 15, 14, 6, 13]    ---->PageFault
Page request  11  =>  [15, 14, 6, 13, 11]    ---->PageFault
Page request  13  =>  [15, 14, 6, 13, 11]
Page request  10  =>  [14, 6, 13, 11, 10]    ---->PageFault
Page request  12  =>  [6, 13, 11, 10, 12]    ---->PageFault
Page request  08  =>  [13, 11, 10, 12, 8]    ---->PageFault
Page request  13  =>  [13, 11, 10, 12, 8]
Page request  02  =>  [11, 10, 12, 8, 2]    ---->PageFault
Page request  08  =>  [11, 10, 12, 8, 2]
```

### Total number of page faults in FIFO = 7

## Least Recently Used:

Code output-

Page Request:

### [10, 8, 10, 2, 15, 14, 6, 13, 11, 13, 10, 12, 8, 13, 2, 8]

```
Performing LRU
Page request  10  =>  [10]
Page request  08  =>  [10, 8]
Page request  10  =>  [10, 8]
Page request  02  =>  [10, 8, 2]
Page request  15  =>  [10, 8, 2, 15]
Page request  14  =>  [10, 8, 2, 15, 14]
Page request  06  =>  [10, 2, 15, 14, 6]    ---->PageFault
Page request  13  =>  [10, 15, 14, 6, 13]    ---->PageFault
Page request  11  =>  [10, 14, 6, 13, 11]    ---->PageFault
Page request  13  =>  [10, 14, 6, 13, 11]
Page request  10  =>  [10, 14, 6, 13, 11]
Page request  12  =>  [10, 6, 13, 11, 12]    ---->PageFault
Page request  08  =>  [10, 13, 11, 12, 8]    ---->PageFault
Page request  13  =>  [10, 13, 11, 12, 8]
Page request  02  =>  [10, 13, 12, 8, 2]    ---->PageFault
Page request  08  =>  [10, 13, 12, 8, 2]
```

### Total number of page faults in LRU = 6

## Optimal Policy:

Code output-

Page Request:

### [10, 8, 10, 2, 15, 14, 6, 13, 11, 13, 10, 12, 8, 13, 2, 8]

```
Performing Optimal Policy
Page request  10  =>  [10]
Page request  08  =>  [10, 8]
Page request  10  =>  [10, 8]
Page request  02  =>  [10, 8, 2]
Page request  15  =>  [10, 8, 2, 15]
Page request  14  =>  [10, 8, 2, 15, 14]
Page request  06  =>  [10, 8, 2, 15, 6]    ---->PageFault
Page request  13  =>  [10, 8, 2, 15, 13]    ---->PageFault
Page request  11  =>  [10, 8, 2, 13, 11]    ---->PageFault
Page request  13  =>  [10, 8, 2, 13, 11]
Page request  10  =>  [10, 8, 2, 13, 11]
Page request  12  =>  [10, 8, 2, 13, 12]    ---->PageFault
Page request  08  =>  [10, 8, 2, 13, 12]
Page request  13  =>  [10, 8, 2, 13, 12]
Page request  02  =>  [10, 8, 2, 13, 12]
Page request  08  =>  [10, 8, 2, 13, 12]
```

## Total number of page faults in OPT = 4

Running for 10 cases:

| PageRequest | FIFO PageFaults# | LRU PageFaults# | Optimal Policy PageFaults# |
|---|---|---|---|
| [13, 15, 12, 8, 13, 2, 2, 2, 2, 13, 7, 11, 15, 8, 1, 1] | 4 | 5 | 3 |
| [8, 7, 13, 10, 15, 2, 1, 2, 6, 12, 3, 4, 2, 12, 10, 6] | 9 | 8 | 6 |
| [15, 2, 15, 6, 13, 7, 15, 3, 13, 5, 15, 3, 11, 6, 9, 9] | 6 | 5 | 4 |
| [8, 15, 9, 6, 10, 11, 6, 1, 2, 9, 8, 9, 3, 7, 7, 15] | 8 | 8 | 5 |
| [15, 5, 3, 5, 8, 14, 10, 9, 8, 4, 5, 10, 12, 5, 2, 15] | 7 | 6 | 5 |
| [3, 3, 10, 11, 6, 1, 10, 9, 14, 5, 10, 3, 13, 5, 15, 4] | 8 | 6 | 6 |
| [4, 6, 3, 6, 7, 7, 2, 4, 10, 6, 8, 14, 4, 2, 6, 5] | 6 | 5 | 4 |
| [10, 7, 10, 5, 4, 4, 9, 13, 9, 8, 11, 12, 11, 6, 2, 13] | 7 | 7 | 6 |
| [15, 4, 10, 1, 11, 9, 15, 8, 15, 10, 14, 3, 10, 1, 9, 4] | 9 | 9 | 5 |
| [13, 9, 10, 3, 8, 3, 14, 11, 5, 14, 12, 6, 10, 8, 14, 13] | 9 | 8 | 5 |
| Average Page Faults | 7.3 | 6.7 | 4.9 |

## Conclusion:

As per above results, It can be concluded that:

Optimal policy is better than LRU and FIFO.

LRU is better than FIFO.