FIRST IN FIRST OUT (FIFO)

Program:

```c
#include <stdio.h>

void prfr(int frames[], int frame) {
    int i;
    printf("\tCurrent status of Frames: ");
    for (i = 0; i < frame; i++) {
        printf("%d ", frames[i]);
    }
    printf("\n");
}

void fifo(int frame, int page[], int n) {
    int i, j;
    int count=0;
    int frames[frame];
    for (i = 0; i < frame; i++) {
        frames[i] = -1;
    }

    float pagefaults = 0, hits = 0;
    int found;

    for (i = 0; i < n; i++) {
        found = 0;
        for (j = 0; j < frame; j++) {
            if (page[i] == frames[j]) {
                found = 1;
                hits++;
                printf("Page %d is already in the frames: ", page[i]);
                prfr(frames, frame);
                break;
            }
        }

        if (!found) {
            pagefaults++;
            frames[(count++) % frame] = page[i];
            printf("Page %d loaded into frames:\t ", page[i]);
            prfr(frames, frame);
        }
    }
```

```c
        printf("Total Page Faults: %.0f\n", pagefaults);
        printf("Total Hits: %.0f\n", hits);
        printf("Miss Ratio: %.2f\n", pagefaults / n);
        printf("Hit Ratio: %.2f\n", hits / n);
}

int main() {
        int i, n, frame, page[100];
        printf("Enter the Number of Frames: ");
        scanf("%d", &frame);

        printf("Enter the length of reference string: ");
        scanf("%d", &n);

        printf("Enter the reference string (space-separated): ");
        for (i = 0; i < n; i++) {
                scanf("%d", &page[i]);
        }

        fifo(frame, page, n);
        return 0;
}
```

Output:

```
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ open fifo.c

gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ gcc fifo.c
-o fifo.out

gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ ./fifo.out


Enter the Number of Frames: 3
Enter the length of reference string: 10
Enter the reference string (space-separated): 1 2 3 3 2 1 4 7 8 1
Page 1 loaded into frames:              Current status of Frames: 1 -1 -1
Page 2 loaded into frames:              Current status of Frames: 1 2 -1
Page 3 loaded into frames:              Current status of Frames: 1 2 3
Page 3 is already in the frames:        Current status of Frames: 1 2 3
Page 2 is already in the frames:        Current status of Frames: 1 2 3
Page 1 is already in the frames:        Current status of Frames: 1 2 3
Page 4 loaded into frames:              Current status of Frames: 4 2 3
Page 7 loaded into frames:              Current status of Frames: 4 7 3
Page 8 loaded into frames:              Current status of Frames: 4 7 8
Page 1 loaded into frames:              Current status of Frames: 1 7 8
Total Page Faults: 7
Total Hits: 3
Miss Ratio: 0.70
Hit Ratio: 0.30
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$
```

Least Recently Used (LRU)

program

```c
#include<stdio.h>

typedef struct{
        int word;
        int freq;
}frame;

void print(frame f[10],int n){
        int i;
        printf("\tCurrent status of frame [");
        for(i=0;i<n;i++){
                printf(" %d ",f[i].word);
        }
        printf("]\n");
}
```

```c
void hit(frame f[10],int n,int i,int word){
        printf("HIT: The page %d is in the frame",word);
        //print(f,n);
        f[i].freq=n;
        for(i=0;i<n;i++){
                f[i].freq--;
        }
        print(f,n);
}

void miss(frame f[10],int n,int i,int word){
        int lowfreq=11,ind;
        printf("MISS: The page %d is not in the frame",word);
        for(i=0;i<n;i++){
                if(f[i].freq<lowfreq){
                        ind=i;
                        lowfreq=f[i].freq;
                }
        }
        f[ind].word=word;
        f[ind].freq=n;
        for(i=0;i<n;i++){
                f[i].freq--;
        }
        print(f,n);
}

void main(){
        int n,page,i,j;
        int pages[100];
        frame f[10];
        for(i=0;i<10;i++){
                f[i].word=-1;
                f[i].freq=i-10;
        }
        int flag;
        int hi=0,mi=0;
        printf("Enter the number of Frames in the system: ");
        scanf("%d",&n);
        printf("Enter the length of the referance string: ");
        scanf("%d", &page);
        printf("Enter the referance string (Space seperated): ");
        for(i=0;i<page;i++){
                scanf("%d",&pages[i]);
        }
        for(i=0;i<page;i++){
```

```c
            flag=0;
            for(j=0;j<n;j++){
                    if(f[j].word==pages[i]){
                            hit(f,n,j,f[j].word);
                            flag=1;
                            hi++;
                    }
            }
            if(flag==0){
                    miss(f,n,i,pages[i]);
                    mi++;
            }
    }
    printf("Number of Pagefaults: %d\n",mi);
    printf("Number of Hits: %d\n",hi);

    printf("Miss ratio: %d\n", (mi/page));
    printf("Hit ratio: %d\n", (hi/page));
    printf("Execution completed \n");
}
```

Output:

```
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ open lru.c
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ gcc lru.c -
o lru.out
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ ./lru.out
Enter the number of Frames in the system: 3
Enter the length of the referance string: 10
Enter the referance string (Space seperated): 1 2 3 3 2 1 4 7 8 1
MISS: The page 1 is not in the frame      Current status of frame [ 1  -1  -1 ]
MISS: The page 2 is not in the frame      Current status of frame [ 1   2  -1 ]
MISS: The page 3 is not in the frame      Current status of frame [ 1   2   3 ]
HIT: The page 3 is in the frame           Current status of frame [ 1   2   3 ]
HIT: The page 2 is in the frame           Current status of frame [ 1   2   3 ]
HIT: The page 1 is in the frame           Current status of frame [ 1   2   3 ]
MISS: The page 4 is not in the frame      Current status of frame [ 1   2   4 ]
MISS: The page 7 is not in the frame      Current status of frame [ 1   7   4 ]
MISS: The page 8 is not in the frame      Current status of frame [ 8   7   4 ]
MISS: The page 1 is not in the frame      Current status of frame [ 8   7   1 ]
Number of Pagefaults: 7
Number of Hits: 3
Miss ratio: 0
Hit ratio: 0
Execution completed
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$
```

Least Frequently Used (LFU)

program

```c
#include<stdio.h>

typedef struct {
    int word;
    int freq;
} frame;

void print(frame f[10], int n) {
    int i;
    printf("\t Current status of frame [");
    for (i = 0; i < n; i++) {
        printf(" %d ", f[i].word);
    }
    printf("]\n");
}

void hit(frame f[10], int n, int i, int word) {
    printf("HIT: The page %d is in the frame ", word);
    f[i].freq++;
    print(f, n);
}

void miss(frame f[10], int n, int i, int word) {
    int lowfreq = 11, ind;
    printf("MISS: The page %d is not in the frame ", word);
    for (i = 0; i < n; i++) {
        if (f[i].freq < lowfreq) {
            ind = i;
            lowfreq = f[i].freq;
        }
    }
    f[ind].word = word;
    f[ind].freq = 1;
    print(f, n);
}
```

```c
void main() {
    int n, page, i, j;
    int pages[100];
    frame f[10];
    for (i = 0; i < 10; i++) {
        f[i].word = -1;
        f[i].freq = 0;
    }
    int flag;
    int hi = 0, mi = 0;
    printf("Enter the number of Frames in the system: ");
    scanf("%d", &n);
    printf("Enter the length of the reference string: ");
    scanf("%d", &page);
    printf("Enter the reference string (Space separated): ");
    for (i = 0; i < page; i++) {
        scanf("%d", &pages[i]);
    }
    for (i = 0; i < page; i++) {
        flag = 0;
        for (j = 0; j < n; j++) {
            if (f[j].word == pages[i]) {
                hit(f, n, j, f[j].word);
                flag = 1;
                hi++;
            }
        }
        if (flag == 0) {
            miss(f, n, i, pages[i]);
            mi++;
        }
    }
    printf("Number of Pagefaults: %d\n", mi);
    printf("Number of Hits: %d\n", hi);

    printf("Miss ratio: %.2f\n", (float)(mi) / page);
    printf("Hit ratio: %.2f\n", (float)(hi) / page);
    printf("Execution completed \n");
}
```

Output:

```
gokulp@gokulp-B365M-GAMING-HD: ~/ASIET-main/S4/OS/LabCycle/EXP11_Pagerepla...

gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ touch lfu.c
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ open lfu.c
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ gcc lfu.c -
o lfu.out
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$ ./lfu.out
Enter the number of Frames in the system: 3
Enter the length of the reference string: 10
Enter the reference string (Space separated):  1 2 3 3 2 1 4 7 8 1
MISS: The page 1 is not in the frame     Current status of frame [ 1  -1  -1 ]
MISS: The page 2 is not in the frame     Current status of frame [ 1  2  -1 ]
MISS: The page 3 is not in the frame     Current status of frame [ 1  2   3 ]
HIT: The page 3 is in the frame          Current status of frame [ 1  2   3 ]
HIT: The page 2 is in the frame          Current status of frame [ 1  2   3 ]
HIT: The page 1 is in the frame          Current status of frame [ 1  2   3 ]
MISS: The page 4 is not in the frame     Current status of frame [ 4  2   3 ]
MISS: The page 7 is not in the frame     Current status of frame [ 7  2   3 ]
MISS: The page 8 is not in the frame     Current status of frame [ 8  2   3 ]
MISS: The page 1 is not in the frame     Current status of frame [ 1  2   3 ]
Number of Pagefaults: 7
Number of Hits: 3
Miss ratio: 0.70
Hit ratio: 0.30
Execution completed
gokulp@gokulp-B365M-GAMING-HD:~/ASIET-main/S4/OS/LabCycle/EXP11_Pagereplacemnt$
```