Os4

1) SECOND CHANCE
CODE :

```c
#include<stdio.h>

int main(){
    int pages, frames, pfault = 0,ind = 0;

    printf("Enter the number of pages : \n");
    scanf("%d",&pages);

    int refString[pages];
    printf("Enter the Reference String : \n");
    for (int i = 0; i < pages; ++i)
        scanf("%d",&refString[i]);

    // int refString[] = {7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1};
    // pages = 20;
    // int refString[] = {2,5,10,1,2,2,6,9,1,2,10,2,6,1,2,1,6,9,5,1};
    // int refString[] = {9,14,10,11,15,9,11,9,15,10,9,15,10,12,15};

    printf("Enter the number of frames : \n");
    scanf("%d",&frames);

    int frarr[frames];
    int refbit[frames];
    for (int i = 0; i < frames; ++i) {
        frarr[i] = -9; //any neg number works
        refbit[i] = 0;
    }


    printf("Pages\t");
```

```c
for (int i = 0; i < frames; ++i)
    printf("\tFrame%d\t",i);

//SECOND CHANCE
for (int i = 0; i < pages; ++i)
{
    int fl = 0; //flag
    for (int j = 0; j < frames; ++j)
        if(refString[i] == frarr[j]){
            fl = 1;
            refbit[j] = 1;
            break;
        }

    if (!fl){
        pfault++;
        while(refbit[ind] == 1){
            refbit[ind] = 0; ind = (ind + 1) % frames;
        }
        // printf("page : %d, ind : %d\n",refString[i],ind);
        frarr[ind] = refString[i];
        ind = (ind + 1) % frames;
    }

    printf("\n%d\t",refString[i]);
    for (int j = 0; j < frames; ++j)
    {
        if(frarr[j]==-9) printf("\t--\t");
        else printf("\t%d(%d)\t",frarr[j],refbit[j]);
    }
    if(!fl) printf("\tPage Fault");

}

printf("\n\nThe total number of page faults : %d.\n",pfault);
```

```
    return 0;
  }
```

```
/*
OUTPUT :
------

Enter the number of frames :
3
Pages          Frame0          Frame1          Frame2
7              7(0)            --              --              Page Fault
0              7(0)            0(0)            --              Page Fault
1              7(0)            0(0)            1(0)            Page Fault
2              2(0)            0(0)            1(0)            Page Fault
0              2(0)            0(1)            1(0)
3              2(0)            0(0)            3(0)            Page Fault
0              2(0)            0(1)            3(0)
4              4(0)            0(1)            3(0)            Page Fault
2              4(0)            0(0)            2(0)            Page Fault
3              3(0)            0(0)            2(0)            Page Fault
0              3(0)            0(1)            2(0)
3              3(1)            0(1)            2(0)
2              3(1)            0(1)            2(1)
1              3(0)            1(0)            2(0)            Page Fault
2              3(0)            1(0)            2(1)
0              0(0)            1(0)            2(0)            Page Fault
1              0(0)            1(1)            2(0)
7              0(0)            1(0)            7(0)            Page Fault
0              0(1)            1(0)            7(0)
1              0(1)            1(1)            7(0)

The total number of page faults : 11. */
```

2) LFU
CODE :

```c
#include<stdio.h>

int minimum(int cnt[], int frames){
    int min = 9999; //large value
    for(int k = 0; k < frames; k++)
        if(cnt[k] < min) min = cnt[k];
    return min;
}


int main(){
    int pages, frames, pfault = 0,ind = 0,min;

    printf("Enter the number of pages : \n");
    scanf("%d",&pages);

    int refString[pages];
    printf("Enter the Reference String : \n");
    for (int i = 0; i < pages; ++i)
        scanf("%d",&refString[i]);

    // int refString[] = {7,3,5,8,5,8,3,6,7,3,6,7,8,5,3};
    // pages = 15;


    printf("Enter the number of frames : \n");
    scanf("%d",&frames);

    int cnt[frames];
    int frarr[frames];
    for (int i = 0; i < frames; ++i) {
        frarr[i] = -9; //any neg number works
        cnt[i] = 0;
    }
```

```c
printf("Pages\t");
for (int i = 0; i < frames; ++i)
    printf("Frame%d\t",i);

//LFU
for(int i = 0; i < pages; i++){
    int fl = 0;

    for(int j = 0; j < frames; j++){
        if(refString[i] == frarr[j]){
            fl = 1;
            cnt[j]++;
            break;
        }
    }

    if(!fl){
        pfault++;
        ind = ind % frames;
        min = minimum(cnt, frames);
        while(cnt[ind] != min)
            ind = (ind + 1) % frames;
        cnt[ind] = 1;
        frarr[ind] = refString[i] ;
        ind = (ind + 1) % frames;
    }

    printf("\n%d\t",refString[i]);
    for (int j = 0; j < frames; ++j)
    {
        if(frarr[j]==-9) printf(" -- \t");
        else printf("  %d \t",frarr[j]);
    }
    if(!fl) printf("\tPage Fault");
```

```
    }

    printf("\n\nThe total number of page faults : %d.\n",pfault);
    return 0;
}
```

```
/*
OUTPUT :
------

Enter the number of frames :
3
```

Pages	Frame0	Frame1	Frame2	
7	7	--	--	Page Fault
3	7	3	--	Page Fault
5	7	3	5	Page Fault
8	8	3	5	Page Fault
5	8	3	5	
8	8	3	5	
3	8	3	5	
6	8	6	5	Page Fault
7	8	7	5	Page Fault
3	8	3	5	Page Fault
6	8	6	5	Page Fault
7	8	7	5	Page Fault
8	8	7	5	
5	8	7	5	
3	8	3	5	Page Fault

The total number of page faults : 10.

```
*/
```

3) MFU
CODE :

```c
#include<stdio.h>

int maximum(int cnt[], int frames){
    int max = -1;
    for(int k = 0; k < frames; k++)
        if(cnt[k] > max) max = cnt[k];
    return max;
}


int main(){
    int pages, frames, pfault = 0,ind = 0;

    printf("Enter the number of pages : \n");
    scanf("%d",&pages);

    int refString[pages];
    printf("Enter the Reference String : \n");
    for (int i = 0; i < pages; ++i)
        scanf("%d",&refString[i]);


    // int refString[] = {7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1};
    // pages = 20;

    printf("Enter the number of frames : \n");
    scanf("%d",&frames);

    int cnt[frames];
    int frarr[frames];
    for (int i = 0; i < frames; ++i) {
        frarr[i] = -9; //any neg number works
        cnt[i] = 0;
    }
```

```c
    printf("Pages\t");
    for (int i = 0; i < frames; ++i)
        printf("Frame%d\t",i);

    //MFU
    for(int i = 0; i < pages; i++){
        int fl = 0;

        for(int j = 0; j < frames; j++){
            if(refString[i] == frarr[j]){
                fl = 1;
                cnt[j]++;
                break;
            }
        }

        if(!fl){
            pfault++;
            if(pfault <= frames)
                ind = pfault-1;
            else{
                int max = maximum(cnt,frames);
                // printf("page : %d, ind : %d, cnt[ind] : %d ,
max : %d\n",refString[i],ind,cnt[ind],max);
                while(cnt[ind] != max) ind = (ind + 1) % frames;
            }
            cnt[ind] = 1;
            frarr[ind] = refString[i] ;
            ind = (ind + 1) % frames;
        }

        printf("\n%d\t",refString[i]);
        for (int j = 0; j < frames; ++j)
        {
```

```
        if(frarr[j]==-9) printf(" -- \t");
        else printf("  %d \t",frarr[j]);
    }
    if(!fl) printf("\tPage Fault");
}

printf("\n\nThe total number of page faults : %d.\n",pfault);
return 0;
}

/*
OUTPUT :
------

Enter the number of frames :
3
```

Pages	Frame0	Frame1	Frame2	
7	7	--	--	Page Fault
0	7	0	--	Page Fault
1	7	0	1	Page Fault
2	2	0	1	Page Fault
0	2	0	1	
3	2	3	1	Page Fault
0	2	3	0	Page Fault
4	4	3	0	Page Fault
2	4	2	0	Page Fault
3	4	2	3	Page Fault
0	0	2	3	Page Fault
3	0	2	3	
2	0	2	3	
1	0	1	3	Page Fault
2	0	1	2	Page Fault
0	0	1	2	
1	0	1	2	
7	7	1	2	Page Fault

0   7   0   2   Page Fault
1   7   0   1   Page Fault

The total number of page faults : 15.

*/