SPOT EXERCISE

LAB 13

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1.FIFO

```
[s2019103562@centos8-linux Mon May 03 11:04 AM lab13]$ gcc spot1.c -o spot1
[s2019103562@centos8-linux Mon May 03 11:04 AM lab13]$ ./spot1
Enter the number of frames:     3
Enter the number of pages:      20
Enter the pages
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2
Ref string               Page frames
1               1       -1      -1
2               1       2       -1
4               1       2       4
5               5       2       4
3               5       3       4
4
1               5       3       1
3
6               6       3       1
7               6       7       1
8               6       7       8
7
8
8
9               9       7       8
5               9       5       8
4               9       5       4
5
4
2               2       5       4
Total number of page faults:13
```

```
[s2019103562@centos8-linux Mon May 03 11:05 AM lab13]$ ./spot1
Enter the number of frames:     4
Enter the number of pages:      20
Enter the pages
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2
Ref string               Page frames
1               1       -1      -1      -1
2               1       2       -1      -1
4               1       2       4       -1
5               1       2       4       5
3               3       2       4       5
4
1               3       1       4       5
3
6               3       1       6       5
7               3       1       6       7
8               8       1       6       7
7
8
8
9               8       9       6       7
5               8       9       5       7
4               8       9       5       4
5
4
2               2       9       5       4
Total number of page faults:13
```

```
[s2019103562@centos8-linux Mon May 03 11:06 AM lab13]$ ./spot1
Enter the number of frames:     5
Enter the number of pages:      20
Enter the pages
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2
Ref string               Page frames
1               1       -1      -1      -1      -1
2               1       2       -1      -1      -1
4               1       2       4       -1      -1
5               1       2       4       5       -1
3               1       2       4       5       3
4
1
3
6               6       2       4       5       3
7               6       7       4       5       3
8               6       7       8       5       3
7
8
8
9               6       7       8       9       3
5               6       7       8       9       5
4               4       7       8       9       5
5
4
2               4       2       8       9       5
Total number of page faults:12
[s2019103562@centos8-linux Mon May 03 11:07 AM lab13]$
```

```
[s2019103562@centos8-linux Mon May 03 11:07 AM lab13]$ cat spot1.c
#include<stdio.h>
int main(){
        int i,j,n,pages[50],frame[10],n1,k,avail,count=0;
        printf("Enter the number of frames:\t");
        scanf("%d",&n1);
        printf("Enter the number of pages:\t");
        scanf("%d",&n);
        printf("Enter the pages\n");
        for(i=1;i<=n;i++)
                scanf("%d",&pages[i]);
        for(i=0;i<n1;i++)
                frame[i]=-1;
        j=0;
        printf("Ref string\t\t Page frames\n");
        for(i=1;i<=n;i++){
                printf("%d\t\t",pages[i]);
                avail=0;
                for(k=0;k<n1;k++)
                        if(frame[k]==pages[i])
                                avail=1;
                if(avail==0){
                        frame[j]=pages[i];
                        j=(j+1)%n1;
                        count++;
                        for(k=0;k<n1;k++)
                                printf("%d\t",frame[k]);
                }
                printf("\n");
        }
        printf("Total number of page faults:%d\n",count);
        return 0;
}
[s2019103562@centos8-linux Mon May 03 11:09 AM lab13]$
```

BELADY'S ANAMOLY:

Belady anamoly is nothing but the increase in number of page faults with respect to increase in number of frames.

Here, when number of frames is 3, page faults occurred is 13, when number of frames is 4, page faults occurred is 13 and when number of frames is 5, page faults occurred is 12. So there doesn't seems to be a rise in number of page faults when number of frames increase.

Hence the program does'nt encounter belady's anamoly for these test cases.

2.LRU

```
[s2019103562@centos8-linux Mon May 03 11:16 AM lab13]$ gcc spot3.c -o spot3
[s2019103562@centos8-linux Mon May 03 11:16 AM lab13]$ ./spot3
Enter the number of frames:     3
Enter the number of pages:      20
Enter the pages:
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2

1       -1      -1
1       2       -1
1       2       4
5       2       4
5       3       4
5       3       4
1       3       4
1       3       4
1       3       6
7       3       6
7       8       6
7       8       6
7       8       6
7       8       6
7       8       9
5       8       9
5       4       9
5       4       9
5       4       9
5       4       2
Total number of Page Faults:13
[s2019103562@centos8-linux Mon May 03 11:16 AM lab13]$ ./spot3
```

```
[s2019103562@centos8-linux Mon May 03 11:16 AM lab13]$ ./spot3
Enter the number of frames:     4
Enter the number of pages:      20
Enter the pages:
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2

1       -1      -1      -1
1       2       -1      -1
1       2       4       -1
1       2       4       5
3       2       4       5
3       2       4       5
3       1       4       5
3       1       4       5
3       1       4       6
3       1       7       6
3       8       7       6
3       8       7       6
3       8       7       6
3       8       7       6
9       8       7       6
9       8       7       5
9       8       4       5
9       8       4       5
9       8       4       5
9       2       4       5
Total number of Page Faults:13
[s2019103562@centos8-linux Mon May 03 11:17 AM lab13]$ ./spot3
```

```
[s2019103562@centos8-linux Mon May 03 11:17 AM lab13]$ ./spot3
Enter the number of frames:     5
Enter the number of pages:      20
Enter the pages:
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2

1       -1      -1      -1      -1
1       2       -1      -1      -1
1       2       4       -1      -1
1       2       4       5       -1
1       2       4       5       3
1       2       4       5       3
1       2       4       5       3
1       2       4       5       3
1       6       4       5       3
1       6       4       7       3
1       6       8       7       3
1       6       8       7       3
1       6       8       7       3
1       6       8       7       3
9       6       8       7       3
9       6       8       7       5
9       4       8       7       5
9       4       8       7       5
9       4       8       7       5
9       4       8       2       5
Total number of Page Faults:12
[s2019103562@centos8-linux Mon May 03 11:18 AM lab13]$
```

BELADY ANAMOLY:

Here, when number of frames is 3, page faults occurred is 13, when number of frames is 4, page faults occurred is 13 and when number of frames is 5, page faults occurred is 12. So there doesn't seems to be a rise in number of page faults when number of frames increase.

Hence the program does'nt encounter belady's anamoly for these test cases.

```
[s2019103562@centos8-linux Mon May 03 11:18 AM lab13]$ cat spot3.c
#include<stdio.h>
int findmin(int time[],int n){
        int i,minimum=time[0],pos=0;
        for(i=1;i<n;i++){
                if(time[i]<minimum){
                        minimum=time[i];
                        pos=i;
                }
        }
        return pos;
}
int main(){
        int i,j,k,flag1,flag2,faults=0,counter=0,time[10],pages[50],frames[10],no_of_frames,no_of_pages,pos;
        printf("Enter the number of frames:\t");
        scanf("%d",&no_of_frames);
        printf("Enter the number of pages:\t");
        scanf("%d",&no_of_pages);
        printf("Enter the pages:\n");
        for(i=0;i<no_of_pages;i++)
                scanf("%d",&pages[i]);
        for(j=0;j<no_of_frames;j++)
                frames[j]=-1;
        for(i=0;i<no_of_pages;i++){
                flag1=flag2=0;
                for(j=0;j<no_of_frames;j++){
                        if(frames[j]==pages[i]){
                                counter++;
                                time[j]=counter;
                                flag1=flag2=1;
                                break;
                        }
                }
```

```
                if(flag1==0){
                        for(j=0;j<no_of_frames;j++){
                                if(frames[j]==-1){
                                        counter++;
                                        faults++;
                                        frames[j]=pages[i];
                                        time[j]=counter;
                                        flag2=1;
                                        break;
                                }
                        }
                }
                if(flag2==0){
                        pos=findmin(time,no_of_frames);
                        counter++;
                        faults++;
                        frames[pos]=pages[i];
                        time[pos]=counter;
                }
                printf("\n");
                for(j=0;j<no_of_frames;j++)
                        printf("%d\t",frames[j]);
        }
        printf("\nTotal number of Page Faults:%d\n",faults);
        return 0;
}


[s2019103562@centos8-linux Mon May 03 11:22 AM lab13]$
```

3. OPR:

```
[s2019103562@centos8-linux Mon May 03 11:10 AM lab13]$ gcc spot2.c -o spot2
[s2019103562@centos8-linux Mon May 03 11:11 AM lab13]$ ./spot2
Enter the number of frames:     3
Enter the number of pages:      20
Enter the pages
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2

1       -1      -1
1       2       -1
1       2       4
1       5       4
1       3       4
1       3       4
1       3       4
1       3       4
6       3       4
7       3       4
7       8       4
7       8       4
7       8       4
7       8       4
9       8       4
5       8       4
5       8       4
5       8       4
5       8       4
2       8       4
Total number of page faults:11
[s2019103562@centos8-linux Mon May 03 11:11 AM lab13]$ ./spot2
```

```
[s2019103562@centos8-linux Mon May 03 11:11 AM lab13]$ ./spot2
Enter the number of frames:     4
Enter the number of pages:      20
Enter the pages
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2

1       -1      -1      -1
1       2       -1      -1
1       2       4       -1
1       2       4       5
1       3       4       5
1       3       4       5
1       3       4       5
1       3       4       5
6       3       4       5
7       3       4       5
7       8       4       5
7       8       4       5
7       8       4       5
7       8       4       5
9       8       4       5
9       8       4       5
9       8       4       5
9       8       4       5
9       8       4       5
2       8       4       5
Total number of page faults:10
[s2019103562@centos8-linux Mon May 03 11:12 AM lab13]$ ./spot2
```

```
[s2019103562@centos8-linux Mon May 03 11:12 AM lab13]$ ./spot2
Enter the number of frames:     5
Enter the number of pages:      20
Enter the pages
1 2 4 5 3 4 1 3 6 7 8 7 8 8 9 5 4 5 4 2

1       -1      -1      -1      -1
1       2       -1      -1      -1
1       2       4       -1      -1
1       2       4       5       -1
1       2       4       5       3
1       2       4       5       3
1       2       4       5       3
1       2       4       5       3
6       2       4       5       3
7       2       4       5       3
7       2       4       5       8
7       2       4       5       8
7       2       4       5       8
7       2       4       5       8
9       2       4       5       8
9       2       4       5       8
9       2       4       5       8
9       2       4       5       8
9       2       4       5       8
9       2       4       5       8
Total number of page faults:9
[s2019103562@centos8-linux Mon May 03 11:13 AM lab13]$
```

BELADY ANAMOLY:

Here, when the number of frames is 3, the number of page faults occurred is 11, when the number of frames is 4, the number of page faults occurred is 10 and when the number of frames is 5, the number of page faults occurred is 9. Hence the program does'nt encounter Belady's anamoly for these test cases.

```
[s2019103562@centos8-linux Mon May 03 11:13 AM lab13]$ cat spot2.c
#include<stdio.h>
int main(){
        int no_of_frames,no_of_pages,frames[10],pages[50],temp[10],flag1,flag2,flag3,i,j,k,pos,max,faults=0;
        printf("Enter the number of frames:\t");
        scanf("%d",&no_of_frames);
        printf("Enter the number of pages:\t");
        scanf("%d",&no_of_pages);
        printf("Enter the pages\n");
        for(i=0;i<no_of_pages;i++)
                scanf("%d",&pages[i]);
        for(i=0;i<no_of_frames;i++)
                frames[i]=-1;
        //printf("Ref string\t Page frames\n");
        for(i=0;i<no_of_pages;i++){
                //printf("%d\t",pages[i]);
                flag1=flag2=0;
                for(j=0;j<no_of_frames;j++){
                        if(frames[j]==pages[i]){
                                flag1=flag2=1;
                                break;
                        }
                }
                if(flag1==0){
                        for(j=0;j<no_of_frames;j++){
                                if(frames[j]==-1){
                                        faults++;
                                        frames[j]=pages[i];
                                        flag2=1;
                                        break;
                                }
                        }
                }
                if(flag2==0){
                        flag3=0;
                        for(j=0;j<no_of_frames;j++){
                                temp[j]=-1;
                                for(k=i+1;k<no_of_pages;k++){
                                        if(frames[j]==pages[k]){
                                                temp[j]=k;
                                                break;
                                        }
                                }
                        }
                for(j=0;j<no_of_frames;j++){
                        if(temp[j]==-1){
                                pos=j;
                                flag3=1;
                                break;
                        }
                }
                if(flag3==0){
                        max=temp[0];
                        pos=0;
                        for(j=1;j<no_of_frames;j++){
                                if(temp[j]>max){
                                        max=temp[j];
                                        pos=j;
                                }
                        }
                }
                frames[pos]=pages[i];
                faults++;
                }
                printf("\n");
                for(j=0;j<no_of_frames;j++)
                        printf("%d\t",frames[j]);
        }
        printf("\nTotal number of page faults:%d\n",faults);
        return 0;
}
[s2019103562@centos8-linux Mon May 03 11:14 AM lab13]$
```