Shayan
DT-22037

OS LAB 12

Question 1: Implement the above code and paste the screen shot of the output.

Solution:

a. FIFO:

```
#include <stdio.h>
#include <conio.h>

int main()
{
    int i, j, k, f, pf = 0, count = 0, rs[25], m[10], n;

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

    printf("Enter the reference string:\n");
    for (i = 0; i < n; i++)
        scanf("%d", &rs[i]);

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

    for (i = 0; i < f; i++)
        m[i] = -1;

    printf("\nThe Page Replacement Process is:\n");
    for (i = 0; i < n; i++)
    {
        for (k = 0; k < f; k++)
        {
            if (m[k] == rs[i])
                break;
        }

        if (k == f)
        {
            m[count++] = rs[i];
            pf++;
        }

        for (j = 0; j < f; j++)
```

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```
        {
            if (m[j] != -1)
                printf("\t%d", m[j]);
            else
                printf("\t-");
        }

        if (k == f)
            printf("\tPage Fault No. %d", pf);

        printf("\n");

        if (count == f)
            count = 0;
    }

    printf("\nTotal number of Page Faults using FIFO: %d\n", pf);
    return 0;
}
```

```
Enter the length of reference string: 12
Enter the reference string:
1 2 3 4 1 2 5 1 2 3 4 5
Enter the number of frames: 3

The Page Replacement Process is:
        1       -       -       Page Fault No. 1
        1       2       -       Page Fault No. 2
        1       2       3       Page Fault No. 3
        4       2       3       Page Fault No. 4
        4       1       3       Page Fault No. 5
        4       1       2       Page Fault No. 6
        5       1       2       Page Fault No. 7
        5       1       2
        5       1       2
        5       3       2       Page Fault No. 8
        5       3       4       Page Fault No. 9
        5       3       4

Total number of Page Faults using FIFO: 9
```

b. **LRU:**

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```
#include <stdio.h>
#include <conio.h>

int main()
{
    int i, j, k, min, rs[25], m[10], count[10], flag[25];
    int n, f, pf = 0, next = 1;

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

    printf("Enter the reference string:\n");
    for (i = 0; i < n; i++) {
        scanf("%d", &rs[i]);
        flag[i] = 0;
    }

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

    for (i = 0; i < f; i++) {
        count[i] = 0;
        m[i] = -1;
    }

    printf("\nThe Page Replacement process is:\n");
    for (i = 0; i < n; i++) {
        for (j = 0; j < f; j++) {
            if (m[j] == rs[i]) {
                flag[i] = 1;
                count[j] = next++;
                break;
            }
        }

        if (flag[i] == 0) {
            if (i < f) {
                m[i] = rs[i];
                count[i] = next++;
            } else {
                min = 0;
                for (j = 1; j < f; j++) {
                    if (count[j] < count[min])
                        min = j;
                }
                m[min] = rs[i];
                count[min] = next++;
```

```
            }
            pf++;
        }

        for (j = 0; j < f; j++) {
            if (m[j] != -1)
                printf("%d\t", m[j]);
            else
                printf("-\t");
        }

        if (flag[i] == 0)
            printf("PF No. -- %d", pf);

        printf("\n");
    }

    printf("\nThe number of page faults using LRU are: %d\n", pf);
    return 0;
}
```

```
Enter the length of reference string: 12
Enter the reference string:
1 2 3 4 1 2 5 1 2 3 4 5
Enter the number of frames: 3

The Page Replacement process is:
1       -       -       PF No. -- 1
1       2       -       PF No. -- 2
1       2       3       PF No. -- 3
4       2       3       PF No. -- 4
4       1       3       PF No. -- 5
4       1       2       PF No. -- 6
5       1       2       PF No. -- 7
5       1       2
5       1       2
3       1       2       PF No. -- 8
3       4       2       PF No. -- 9
3       4       5       PF No. -- 10

The number of page faults using LRU are: 10
```

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c. **Optimal:**

```
#include <stdio.h>

int main()
{
    int no_of_frames, no_of_pages, frames[10], pages[30], temp[10];
    int flag1, flag2, flag3, i, j, k, pos, max, faults = 0;

    printf("Enter number of frames: ");
    scanf("%d", &no_of_frames);

    printf("Enter number of pages: ");
    scanf("%d", &no_of_pages);

    printf("Enter page reference string:\n");
    for (i = 0; i < no_of_pages; ++i)
    {
        scanf("%d", &pages[i]);
    }

    for (i = 0; i < no_of_frames; ++i)
    {
        frames[i] = -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])
            {
                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)
        {
            if (frames[j] != -1)
                printf("%d\t", frames[j]);
            else
                printf("-\t");
        }
    }

    printf("\n\nTotal Page Faults = %d\n", faults);

    return 0;
}
```

```
Enter number of frames: 3
Enter number of pages: 12
Enter page reference string:
7 0 1 2 0 3 0 4 2 3 0 3

7       -       -
7       0       -
7       0       1
2       0       1
2       0       1
2       0       3
2       0       3
2       4       3
2       4       3
2       4       3
0       4       3
0       4       3

Total Page Faults = 7
```

d. **MRU:**

```
#include <stdio.h>

int main()
{
    int no_of_frames, no_of_pages, frames[10], pages[30], temp[10];
    int flag1, flag2, flag3;
    int i, j, k, pos, max, faults = 0;
```

```
    printf("Enter number of frames: ");
    scanf("%d", &no_of_frames);

    printf("Enter number of pages: ");
    scanf("%d", &no_of_pages);

    printf("Enter page reference string:\n");
    for (i = 0; i < no_of_pages; ++i)
    {
        scanf("%d", &pages[i]);
    }

    for (i = 0; i < no_of_frames; ++i)
    {
        frames[i] = -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])
            {
                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)
        {
            if (frames[j] != -1)
```

```
                printf("%d\t", frames[j]);
            else
                printf("-\t");
        }
    }

    printf("\n\nTotal Page Faults = %d\n", faults);

    return 0;
}
```

```
Enter number of frames: 3
Enter number of pages: 12
Enter page reference string:
7 0 1 2 0 3 0 4 2 3 0 3

7       -       -
7       0       -
7       0       1
2       0       1
2       0       1
2       0       3
2       0       3
2       4       3
2       4       3
2       4       3
0       4       3
0       4       3

Total Page Faults = 7
```