Ex. No.: 11c **Optimal Page Replacement Algorithm**

Date: ***15.04.2025***

Aim:

To write a C program to implement Optimal page replacement algorithm.

Algorithm:

1. Start the process
2. Declare the number of page frames
3. Get the number of pages and the reference string
4. For each page reference:
    - If the page is in memory, do nothing
    - Else if there is space in a frame, insert the page
    - Else find the page not used for the longest future duration, and replace it
5. Count and display page faults
6. Display frame contents after each operation
7. Stop the process

C Program:

```
#include <stdio.h>
int search(int key, int frame[], int n) {
   for(int i = 0; i < n; i++) {
      if(frame[i] == key)
         return 1;
   }
   return 0;
}
int predict(int pages[], int frame[], int n, int index, int f) {
   int res = -1, farthest = index;
   for(int i = 0; i < f; i++) {
```

```
        int j;
        for(j = index; j < n; j++) {
            if(frame[i] == pages[j]) {
                if(j > farthest) {
                    farthest = j;
                    res = i;
                }
                break;
            }
        }
        if(j == n)
            return i;
    }
    return (res == -1) ? 0 : res;
}
int main() {
    int n, f, pages[50], frame[10];
    int i, j, pageFaults = 0;
    printf("Enter number of frames: ");
    scanf("%d", &f);
    printf("Enter number of pages: ");
    scanf("%d", &n);
    printf("Enter reference string: ");
    for(i = 0; i < n; i++)
        scanf("%d", &pages[i]);
    for(i = 0; i < f; i++)
        frame[i] = -1;
    for(i = 0; i < n; i++) {
        if(search(pages[i], frame, f) == 0) {
```

```
            if(j < f)
                frame[j++] = pages[i];
            else {
                int pos = predict(pages, frame, n, i + 1, f);
                frame[pos] = pages[i];
            }
            pageFaults++;
        }
        for(int k = 0; k < f; k++) {
            if(frame[k] != -1)
                printf("%d ", frame[k]);
            else
                printf("- ");
        }
        printf("\n");
    }
    printf("\nTotal Page Faults = %d\n", pageFaults);
    return 0;
}
```

Sample Output:

Enter number of frames: 3

Enter number of pages: 6

Enter reference string: 5 7 5 6 7 3

5 - -

5 7 -

5 7 -

5 7 6

5 7 6

3 7 6

Total Page Faults = 4

Result:

Thus, the C program to implement the Optimal page replacement algorithm was successfully written and executed. The number of page faults was calculated and verified.