

c) Optimal

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#include <stdio.h>

int findOptimal(int pages[], int frames[], int n, int f, int current) {
    int farthest = current;
    int pos = -1;
    for(int i = 0; i < f; i++) {
        int found = 0;
        for(int j = current + 1; j < n; j++) {
            if(frames[i] == pages[j]) {
                found = 1;
                if(j > farthest) {
                    farthest = j;
                    pos = i;
                }
            }
            break;
        }
        if(found == 0)
            return i;
    }
    if(pos == -1) {
        for(int i = 0; i < f; i++) {
            if(frames[i] == -1)
                return i;
        }
    }
    return pos;
}

int main() {
    int pages[100], frames[10], n, f, i, j, faults = 0;

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

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

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

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

    printf("\nPage\tFrames\t\tPage Fault\n");
```

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for(i = 0; i < n; i++) {
    int flag = 0;
    for(j = 0; j < f; j++) {
        if(frames[j] == pages[i]) {
            flag = 1;
            break;
        }
    }

    if(flag == 0) {
        int pos = findOptimal(pages, frames, n, f, i);
        frames[pos] = pages[i];
        faults++;

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

printf("\nTotal Page Faults = %d\n", faults);
return 0;
}

```

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Output
Enter number of pages: 2
Enter the page reference string:
3
6
Enter number of frames: 6

Page      Frames      Page Fault
3   3 - - - - -   Yes
6   6 - - - - -   Yes

Total Page Faults = 2

=== Code Execution Successful ===

```