

Task 14: Write a program to calculate the number of page faults for a reference string using LRU page replacement algorithm (input Takes by user).

Here's an example of the LRU page replacement algorithm in C:

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

```
#define SIZE 3 // Size of the page table
```

```
int isPageInMemory(int page, int pageTable[], int size) {  
    for (int i = 0; i < size; i++) {  
        if (pageTable[i] == page)  
            return 1;  
    }  
    return 0;  
}
```

```
void lruPageReplacement(int referenceString[], int n, int pageTable[], int size) {
```

```
    int pageFaults = 0;
```

```
    int counter = 0; // Counter to track the age of each page
```

```
    int ages[size]; // Age of each page in the page table
```

```
    for (int i = 0; i < size; i++)
```

```
        ages[i] = 0;
```

```
    for (int i = 0; i < n; i++) {
```

```
        if (!isPageInMemory(referenceString[i], pageTable, size)) {
```

```
            int index = 0;
```

```
            for (int j = 1; j < size; j++) {
```

```
                if (ages[j] < ages[index])
```

```

        index = j;
    }

    pageTable[index] = referenceString[i];
    ages[index] = counter++;
    pageFaults++;
} else {
    // If the page is already in memory, update its age
    for (int j = 0; j < size; j++) {
        if (pageTable[j] == referenceString[i])
            ages[j] = counter++;
    }
}

// Display page table and ages after each reference
printf("Page Table: ");
for (int j = 0; j < size; j++) {
    if (pageTable[j] == -1)
        printf("[ ] ");
    else
        printf("[%d] ", pageTable[j]);
}

printf("Ages: ");
for (int j = 0; j < size; j++) {
    printf("%d ", ages[j]);
}

printf("\n");
}

```

```

    printf("Total Page Faults: %d\n", pageFaults);
}

int main() {
    int n;

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

    int referenceString[n];
    printf("Enter the page reference string:\n");

    for (int i = 0; i < n; i++)
        scanf("%d", &referenceString[i]);

    int pageTable[SIZE];
    for (int i = 0; i < SIZE; i++)
        pageTable[i] = -1;

    lruPageReplacement(referenceString, n, pageTable, SIZE);

    return 0;
}

```

OutPut-

```

Enter the number of page references: 4
Enter the page reference string:
1 2 3 4
Page Table: [1] [ ] [ ] Ages: 0 0 0
Page Table: [2] [ ] [ ] Ages: 1 0 0
Page Table: [2] [3] [ ] Ages: 1 2 0
Page Table: [2] [3] [4] Ages: 1 2 3
Total Page Faults: 4

```