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Assignment 4 - Page Replacement Algorithms

Objectives:

1. Implementing several page replacement algorithms.

2. Evaluating several page replacement algorithms.

Problem Statement:

It is required to simulate some paging replacement algorithms. The required algorithms to be implemented are as follows:

- Optimal
- First In First Out (FIFO)
- Least Recently Used (LRU)
- Clock

Input/Output:

Your input will be from standard input. Your output will be to standard output. The input will contain the number of memory frames allocated to the process (assume they are all empty at the start of your program) , the simulated algorithm (OPTIMAL, FIFO, LRU, or CLOCK), and then a sequence of page references (page address stream) like below:

```
3
FIFO
5
12
5
2
4
2
5
......
-1
```

Note: The last line in the input is -1 (and is ignored)
For each run, you should print the following:

1. A trace recording page faults for each memory reference in the sequence.

2. Counter recording total page faults.

We will have the following results (*notice the two-digit page numbers*):

```
Replacement Policy = FIFO
-------------------------------------
Page     Content of Frames
--—      -----------------
05       05
12       05  12
05       05  12
02       05  12  02
04 F     04  12  02
02       04  12  02
05 F     04  05  02
-------------------------------------
Number of page faults = 2
```

Notes:

- You must write your solution in C/C++.
- Operating System: Linux
- Your input and output ***must*** follow the described format ***strictly***. Your program will be automatically graded.
- Complete source code commented thoroughly and clearly.
- You should work individually.
- Check the academic integrity policy of the course.

Deliverables:

- Complete source code in **ONE FILE**
    - Name your file as your ID (e.g., 5237.c, 5237.cpp, 5237.C, 5237.cc, ...)
- Your source program will be compiled, then will be tested by running the following command, which should produce nothing in case of a successful test:

```
gcc <ID>.c -o lab4
cat inputfile | ./lab4 | diff outputfile -
```