Lab 10

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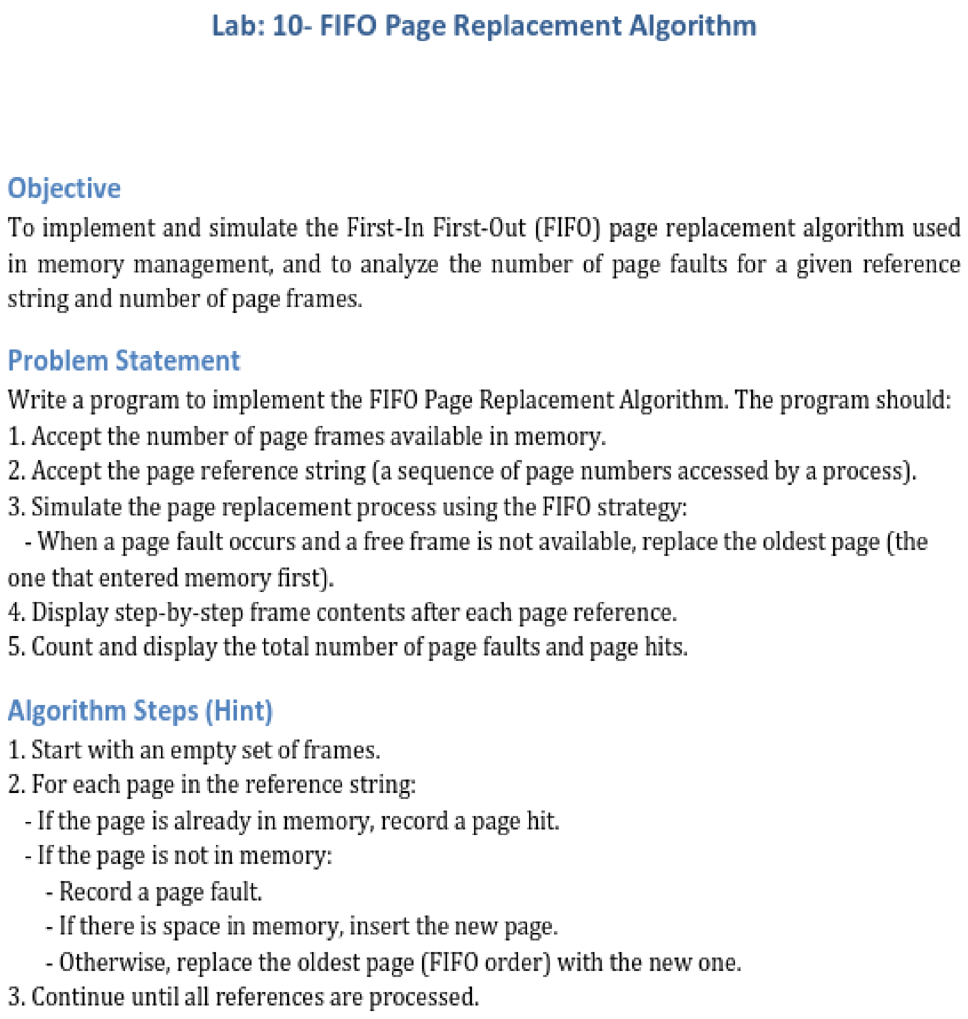
Q1:



Lab: 10- FIFO Page Replacement Algorithm

Objective

To implement and simulate the First-In First-Out (FIFO) page replacement algorithm used in memory management, and to analyze the number of page faults for a given reference string and number of page frames.

Problem Statement

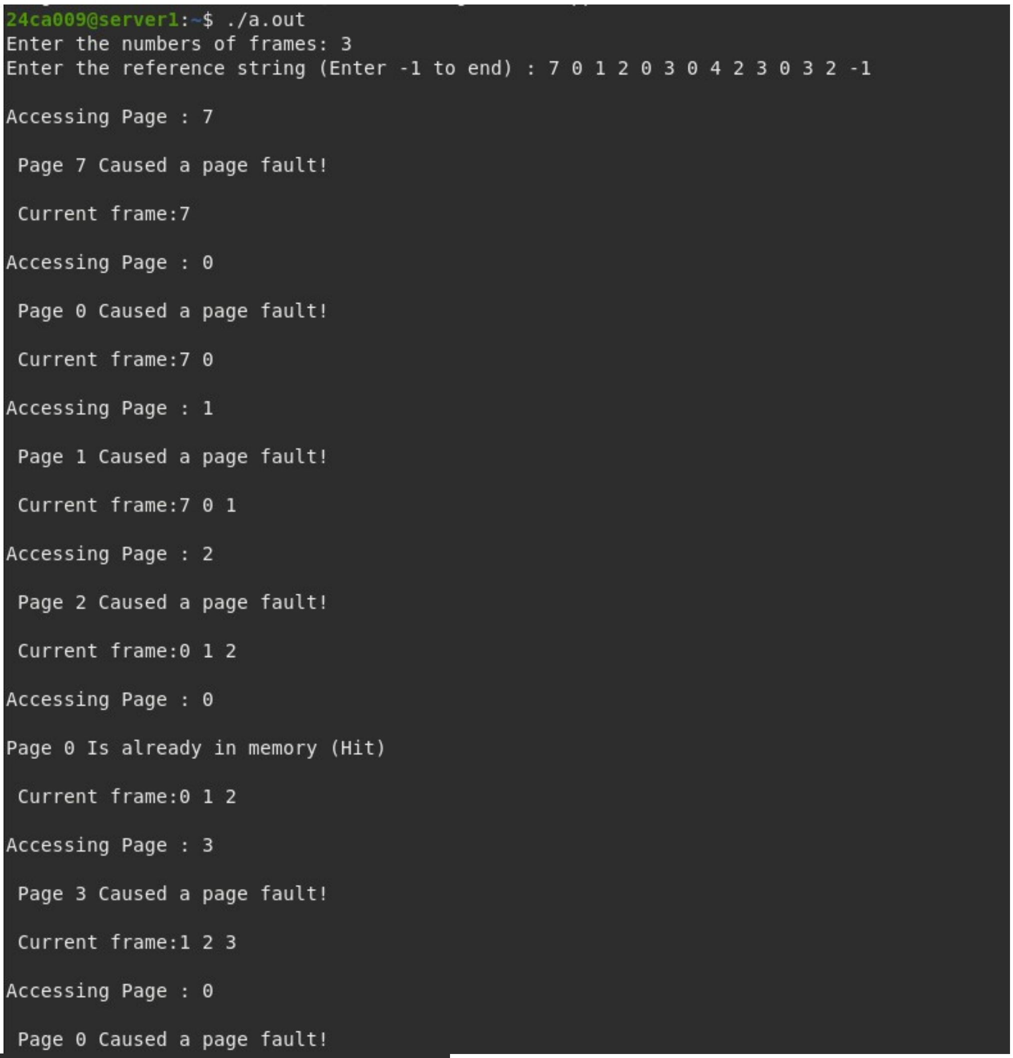
Write a program to implement the FIFO Page Replacement Algorithm. The program should:

1. Accept the number of page frames available in memory.
2. Accept the page reference string (a sequence of page numbers accessed by a process).
3. Simulate the page replacement process using the FIFO strategy:
   - When a page fault occurs and a free frame is not available, replace the oldest page (the one that entered memory first).
4. Display step-by-step frame contents after each page reference.
5. Count and display the total number of page faults and page hits.

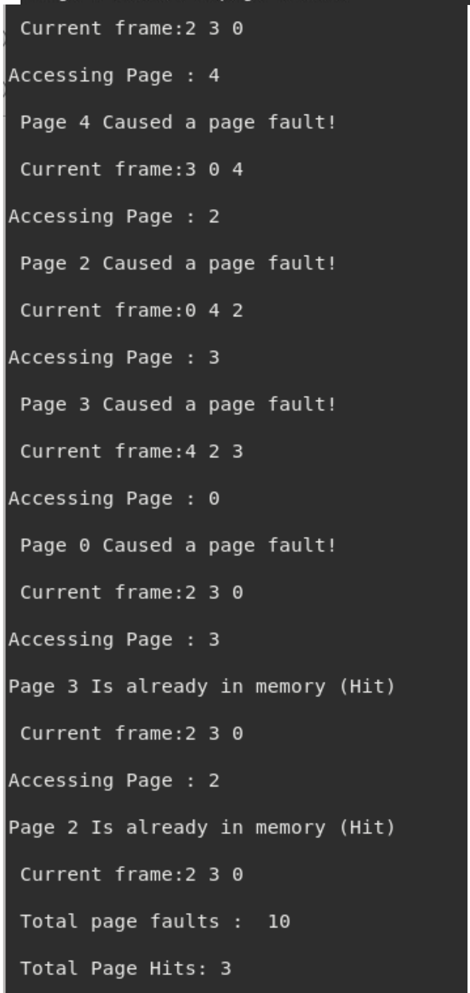
Algorithm Steps (Hint)

1. Start with an empty set of frames.
2. For each page in the reference string:
   - If the page is already in memory, record a page hit.
   - If the page is not in memory:
     - Record a page fault.
     - If there is space in memory, insert the new page.
     - Otherwise, replace the oldest page (FIFO order) with the new one.
3. Continue until all references are processed.

Output:



```
24ca009@server1:~$ ./a.out
Enter the numbers of frames: 3
Enter the reference string (Enter -1 to end) : 7 0 1 2 0 3 0 4 2 3 0 3 2 -1

Accessing Page : 7

 Page 7 Caused a page fault!

 Current frame:7

Accessing Page : 0

 Page 0 Caused a page fault!

 Current frame:7 0

Accessing Page : 1

 Page 1 Caused a page fault!

 Current frame:7 0 1

Accessing Page : 2

 Page 2 Caused a page fault!

 Current frame:0 1 2

Accessing Page : 0

Page 0 Is already in memory (Hit)

 Current frame:0 1 2

Accessing Page : 3

 Page 3 Caused a page fault!

 Current frame:1 2 3

Accessing Page : 0

 Page 0 Caused a page fault!
```



```
 Current frame:2 3 0

Accessing Page : 4

 Page 4 Caused a page fault!

 Current frame:3 0 4

Accessing Page : 2

 Page 2 Caused a page fault!

 Current frame:0 4 2

Accessing Page : 3

 Page 3 Caused a page fault!

 Current frame:4 2 3

Accessing Page : 0

 Page 0 Caused a page fault!

 Current frame:2 3 0

Accessing Page : 3

Page 3 Is already in memory (Hit)

 Current frame:2 3 0

Accessing Page : 2

Page 2 Is already in memory (Hit)

 Current frame:2 3 0

 Total page faults :  10

 Total Page Hits: 3
```

Code:

```
#include<iostream>

#include<vector>

#include<queue>

#include<unordered_set>

#include<iomanip>

using namespace std;

void fifopagereplacement(int numframes,const vector<int>&
referenceString){

     queue<int> frames;

     unordered_set<int> pagesinmemory;

     int pagefaults=0;

     int pagehits=0;

     for(int i =0;i<referenceString.size();i++){

          int currentpage=referenceString[i];

          cout<<"\nAccessing Page : "<<currentpage<<endl;

          if(pagesinmemory.find(currentpage) !=
pagesinmemory.end()){

               cout<<"\nPage "<<currentpage<<" Is already in memory
(Hit)"<<endl;

               pagehits++;



          }

          else{


               cout<<"\n Page "<<currentpage<<" Caused a page
fault!"<<endl;

               pagefaults++;


          if(frames.size()<numframes){


               frames.push(currentpage);

               pagesinmemory.insert(currentpage);

          }
          else{
               int oldestpage=frames.front();
               frames.pop();
               pagesinmemory.erase(oldestpage);
               frames.push(currentpage);
               pagesinmemory.insert(currentpage);
          }
     }
     cout<<"\n Current frame:" ;
     queue<int> tempframes=frames;
     while(!tempframes.empty()){
          cout<<tempframes.front()<<" ";
          tempframes.pop();
     }
     cout<<endl;



     }
     cout<<"\n Total page faults :  "<<pagefaults<<endl;
     cout<<"\n Total Page Hits: "<< pagehits<<endl;

}



int main(){

int numframes;
cout<<"Enter the numbers of frames: ";
cin>>numframes;
vector<int>referenceString;
int page;
cout<<"Enter the reference string (Enter -1 to end) : ";
while(cin>>page&& page!=-1){
     referenceString.push_back(page);
```

```
}
fifopagereplacement(numframes,referenceString);


return 0;
}
```