16/8/23 **OS LAB**

SHANA DIYA SUJIT

1BM21CS196

Write a C program to simulate disk scheduling algorithms

a) FCFS

b) SCAN

c) C-SCAN

<u>CODE:</u>

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

// Function to implement FCFS scheduling algorithm
void fcfs(int queue[], int n, int head) {
  int totalMovement = 0;

  printf("FCFS Scheduling\n");
  printf("Sequence of movement: %d ", head);

  for (int i = 0; i < n; i++) {
    totalMovement += abs(queue[i] - head);
    head = queue[i];
    printf("-> %d ", head);
  }

  printf("\nTotal head movement: %d\n\n", totalMovement);
}

// Function to implement SSTF scheduling algorithm
```

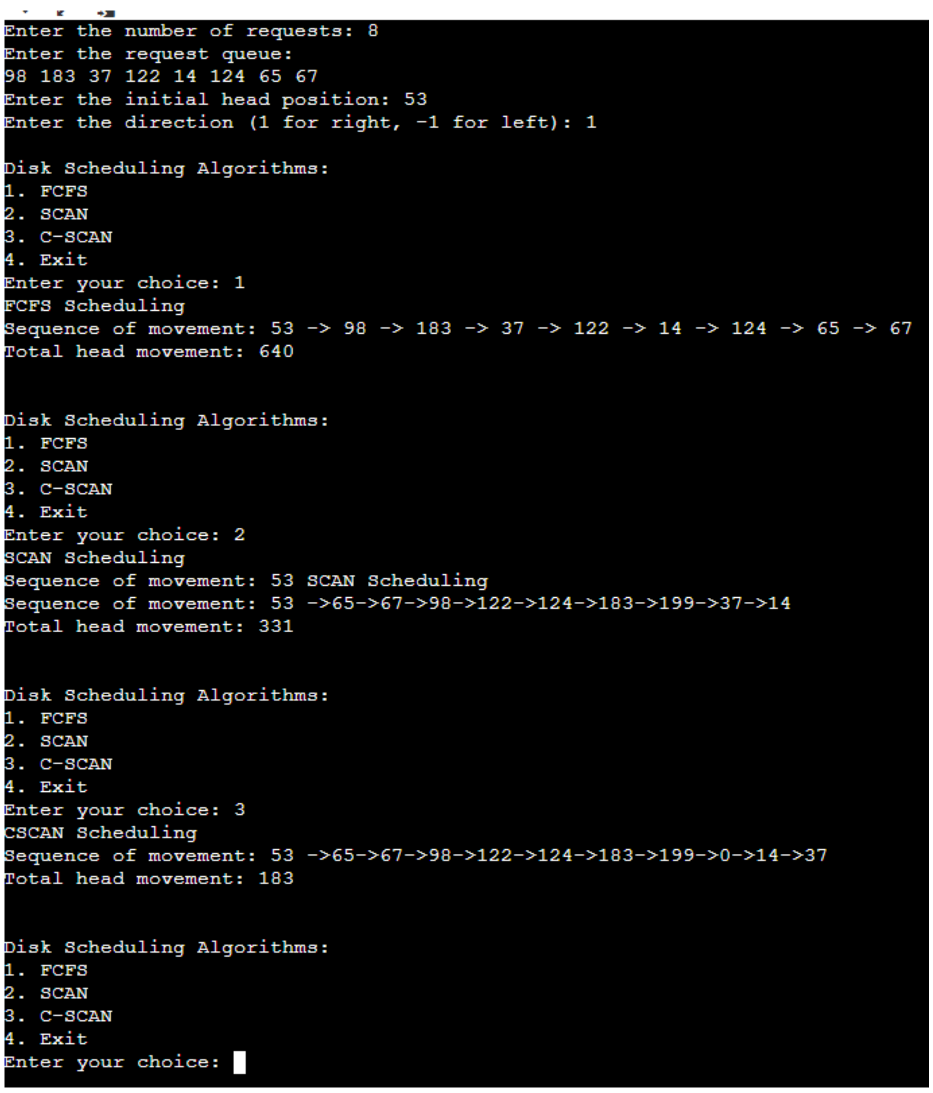
```
void sstf(int queue[], int n, int head) {
    int totalMovement = 0;
    int visited[n];

    for (int i = 0; i < n; i++) {
        visited[i] = 0;  //initialise entire visited array to 0(all unvisited initially)
    }

    printf("SSTF Scheduling\n");
    printf("Sequence of movement: %d ", head);

    for (int i = 0; i < n; i++) {
        int minDistance = 9999;
        int index = -1;

       //for loop to find min dist from each point
        for (int j = 0; j < n; j++) {
            if (visited[j]==0 && abs(queue[j] - head) < minDistance) {
                minDistance = abs(queue[j] - head);
                index = j;
            }
        }

        visited[index] = 1;
        totalMovement += minDistance;
        head = queue[index];
        printf("-> %d ", head);
    }

    printf("\nTotal head movement: %d\n\n", totalMovement);
}
```

```
// Function to implement SCAN scheduling algorithm
void scan(int queue[], int n, int head, int direction) {
    int totalMovement = 0;

    printf("SCAN Scheduling\n");
    printf("Sequence of movement: %d ", head);

   int t1,t2,t3,i;

    int pos=0,pos1,pos2=0;//pos of element left of head
for(i=0;i<n;i++)
{
    if(queue[i]>head)
    {
        pos=i-1; break;  //pos=1 here
    }
}
if(direction==1)
{   printf("SCAN Scheduling\n");
    printf("Sequence of movement: %d ", head);
    t1=199-head;
    pos2=pos;
    t3=199-queue[0];

    totalMovement=t1+t3;
    pos1=pos+1;
    while(pos1<=n-1)
    printf("->%d",queue[pos1++]);
    printf("->199");
    while(pos2>=0)
    printf("->%d",queue[pos2--]);
}
else
{
    t1=head;
    t2=199;
    totalMovement=t1+t2;
    pos1=pos; pos2=pos+1;
    printf("SCAN Scheduling\n");
    printf("Sequence of movement: %d ", head);
    while(pos1>=0)
    printf("->%d",queue[pos1--]);
    while(pos2<=n-1)
    printf("->%d",queue[pos2++]);
    printf("->199");
}


    printf("\nTotal head movement: %d\n\n", totalMovement);
}

// Function to implement C-SCAN scheduling algorithm
void cscan(int queue[], int n, int head, int direction) {
    int t1,t2,i;
    int totalMovement = 0; int pos=0,pos1,pos2=0;//pos of element left of head
for(i=0;i<n;i++)
{
    if(queue[i]>head)
    {
        pos=i-1; break;  //pos=1 here
    }
```

```
}
if(direction==1)
{   printf("CSCAN Scheduling\n");
    printf("Sequence of movement: %d ", head);
    t1=199-head;
    t2=queue[pos];
    totalMovement=t1+t2;
    pos1=pos+1;
    while(pos1<=n-1)
    printf("->%d",queue[pos1++]);
    printf("->199->0");
    while(pos2<=pos)
    printf("->%d",queue[pos2++]);
}
else
{
    t1=head;
    t2=199-queue[pos+1];
    totalMovement=t1+t2;
    pos1=pos; pos2=n-1;
    printf("CSCAN Scheduling\n");
    printf("Sequence of movement: %d ", head);
    while(pos1>=0)
    printf("->%d",queue[pos1--]);
    printf("->0->199");
    while(pos2>pos)
    printf("->%d",queue[pos2--]);
}



    printf("\nTotal head movement: %d\n\n", totalMovement);
```

```
}




int main() {
    int n, head, direction;


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


   int queue[n];


   int queue1[n];



   printf("Enter the request queue:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &queue[i]);
        queue1[i]=queue[i];
    }


    printf("Enter the initial head position: ");
    scanf("%d", &head);
    for(int u=0;u<n;u++)
    queue1[u]=queue[u];
    //sort
    for (int k=0;k<n-1;k++)
    {
      for(int y=0;y<n-k-1;y++)
      {
          if(queue[y]>queue[y+1])
          {
          int temp= queue[y];
          queue[y]=queue[y+1];
          queue[y+1]=temp;
          }
      }

    }//sorted



    printf("Enter the direction (1 for right, -1 for left): ");
    scanf("%d", &direction);



    while (1) {
        printf("\nDisk Scheduling Algorithms:\n");
        printf("1. FCFS\n");
        printf("2. SCAN\n");
        printf("3. C-SCAN\n");
        printf("4. Exit\n");
        printf("Enter your choice: ");

        int choice;
        scanf("%d", &choice);

        switch (choice) {
            case 1:
                fcfs(queue1, n, head);
                break;

            case 2:
                scan(queue, n, head, direction);
                break;
            case 3:
                cscan(queue, n, head, direction);
                break;

            case 4:
                exit(0);
            default:
                printf("Invalid choice! Please try again.\n");
        }
    }

    return 0;
}
```

<u>OUTPUT:</u>



```
Enter the number of requests: 8
Enter the request queue:
98 183 37 122 14 124 65 67
Enter the initial head position: 53
Enter the direction (1 for right, -1 for left): 1

Disk Scheduling Algorithms:
1. FCFS
2. SCAN
3. C-SCAN
4. Exit
Enter your choice: 1
FCFS Scheduling
Sequence of movement: 53 -> 98 -> 183 -> 37 -> 122 -> 14 -> 124 -> 65 -> 67
Total head movement: 640


Disk Scheduling Algorithms:
1. FCFS
2. SCAN
3. C-SCAN
4. Exit
Enter your choice: 2
SCAN Scheduling
Sequence of movement: 53 SCAN Scheduling
Sequence of movement: 53 ->65->67->98->122->124->183->199->37->14
Total head movement: 331


Disk Scheduling Algorithms:
1. FCFS
2. SCAN
3. C-SCAN
4. Exit
Enter your choice: 3
CSCAN Scheduling
Sequence of movement: 53 ->65->67->98->122->124->183->199->0->14->37
Total head movement: 183


Disk Scheduling Algorithms:
1. FCFS
2. SCAN
3. C-SCAN
4. Exit
Enter your choice:
```

Write a C program to simulate disk scheduling algorithms

a) SSTF

b) LOOK

c) c-LOOK

CODE:

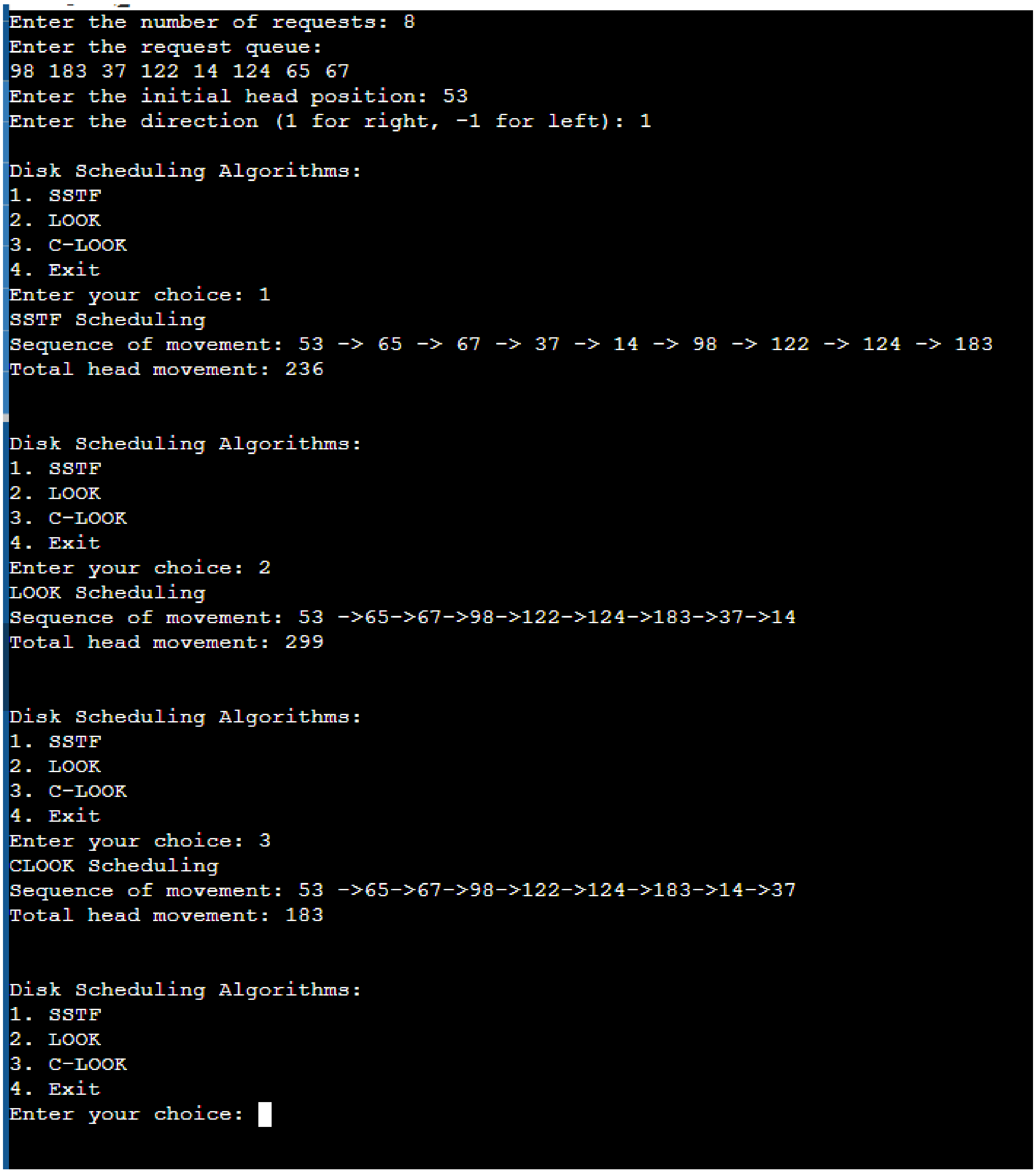
```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>


// Function to implement SSTF scheduling algorithm
void sstf(int queue[], int n, int head) {
   int totalMovement = 0;
   int visited[n];

   for (int i = 0; i < n; i++) {
      visited[i] = 0;  //initialise entire visited array to 0(all unvisited initially)
   }

   printf("SSTF Scheduling\n");
   printf("Sequence of movement: %d ", head);

   for (int i = 0; i < n; i++) {
      int minDistance = 9999;
      int index = -1;

     //for loop to find min dist from each point
      for (int j = 0; j < n; j++) {
         if (visited[j]==0 && abs(queue[j] - head) < minDistance) {
            minDistance = abs(queue[j] - head);
            index = j;
         }
      }

      visited[index] = 1;
      totalMovement += minDistance;
      head = queue[index];
      printf("-> %d ", head);
   }

   printf("\nTotal head movement: %d\n\n", totalMovement);
}


// Function to implement LOOK scheduling algorithm
void look(int queue[], int n, int head, int direction) {
   int totalMovement = 0; int t1=0,t2=0;
```

```
    int pos=0,pos1,pos2=0;//position of element left of head
for(int i=0;i<n;i++)
{
    if(queue[i]>head)
    {
        pos=i-1; break;  //pos=1 here
    }
}

    printf("LOOK Scheduling\n");
    printf("Sequence of movement: %d ", head);

    if (direction == 1) {
        t1=queue[n-1]-head;
        t2=queue[n-1]-queue[0];
        pos1=pos+1;
        while(pos1<=n-1)
        printf("->%d",queue[pos1++]);
        pos2=pos;
        while(pos2>=0)
        printf("->%d",queue[pos2--]);
        totalMovement=t1+t2;

    }
    else {
       t1=head-queue[0];
       t2=queue[n-1]-queue[0];
       totalMovement=t1+t2;
       pos1=pos;
       while(pos1>=0)
       printf("->%d",queue[pos1--]);
       pos2=pos+1;
       while(pos2<=n-1)
       printf("->%d",queue[pos2++]);

    }

    printf("\nTotal head movement: %d\n\n", totalMovement);
}

// Function to implement C-LOOK scheduling algorithm
void clook(int queue[], int n, int head, int direction) {
     int totalMovement = 0; int t1=0,t2=0,t3=0;
    int pos=0,pos1,pos2=0;//position of element left of head
for(int i=0;i<n;i++)
{
    if(queue[i]>head)
    {
        pos=i-1; break;  //pos=1 here
    }
```

```
}

    printf("CLOOK Scheduling\n");
    printf("Sequence of movement: %d ", head);

    if (direction == 1) {
        t1=queue[n-1]-head;
        pos1=pos;
        t2=queue[pos1]-queue[0];
        t3=(199-queue[n-1])+(queue[0]);
        pos1=pos+1;
        while(pos1<=n-1)
        printf("->%d",queue[pos1++]);
        pos2=0;
        while(pos2<=pos)
        printf("->%d",queue[pos2++]);
        totalMovement=t1+t2+t3;

    }
    else {
        pos1=pos+1;
       t1=head-queue[0];
       t2=queue[n-1]-queue[pos1];
       t3=queue[0]+199-queue[n-1];
       totalMovement=t1+t2+t3;
       pos1=pos;
       while(pos1>=0)
       printf("->%d",queue[pos1--]);
       pos1=pos+1;
       pos2=n-1;
       while(pos2>=pos1)
       printf("->%d",queue[pos2--]);

    }
    printf("\nTotal head movement: %d\n\n", totalMovement);
}

int main() {
    int n, head, direction;

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

   int queue[n];
   int queue1[n];

   printf("Enter the request queue:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &queue[i]);
        queue1[i]=queue[i];
```

```
}
//sort
for (int k=0;k<n-1;k++)
{
  for(int y=0;y<n-k-1;y++)
  {
      if(queue[y]>queue[y+1])
      {
      int temp= queue[y];
      queue[y]=queue[y+1];
      queue[y+1]=temp;
      }
  }

}//sorted

printf("Enter the initial head position: ");
scanf("%d", &head);

printf("Enter the direction (1 for right, -1 for left): ");
scanf("%d", &direction);

while (1) {
    printf("\nDisk Scheduling Algorithms:\n");

    printf("1. SSTF\n");

    printf("2. LOOK\n");
    printf("3. C-LOOK\n");
    printf("4. Exit\n");
    printf("Enter your choice: ");

    int choice;
    scanf("%d", &choice);

    switch (choice) {

        case 1:
            sstf(queue1, n, head);
            break;

        case 2:
            look(queue, n, head, direction);
            break;
        case 3:
            clook(queue, n, head, direction);
            break;
        case 4:
            exit(0);
        default:
            printf("Invalid choice! Please try again.\n");
        }
    }

    return 0;
}
```

OUTPUT:



```
Enter the number of requests: 8
Enter the request queue:
98 183 37 122 14 124 65 67
Enter the initial head position: 53
Enter the direction (1 for right, -1 for left): 1

Disk Scheduling Algorithms:
1. SSTF
2. LOOK
3. C-LOOK
4. Exit
Enter your choice: 1
SSTF Scheduling
Sequence of movement: 53 -> 65 -> 67 -> 37 -> 14 -> 98 -> 122 -> 124 -> 183
Total head movement: 236


Disk Scheduling Algorithms:
1. SSTF
2. LOOK
3. C-LOOK
4. Exit
Enter your choice: 2
LOOK Scheduling
Sequence of movement: 53 ->65->67->98->122->124->183->37->14
Total head movement: 299


Disk Scheduling Algorithms:
1. SSTF
2. LOOK
3. C-LOOK
4. Exit
Enter your choice: 3
CLOOK Scheduling
Sequence of movement: 53 ->65->67->98->122->124->183->14->37
Total head movement: 183


Disk Scheduling Algorithms:
1. SSTF
2. LOOK
3. C-LOOK
4. Exit
Enter your choice:
```

Write a C program to simulate page replacement algorithms

a) FIFO

b) LRU

c) Optimal

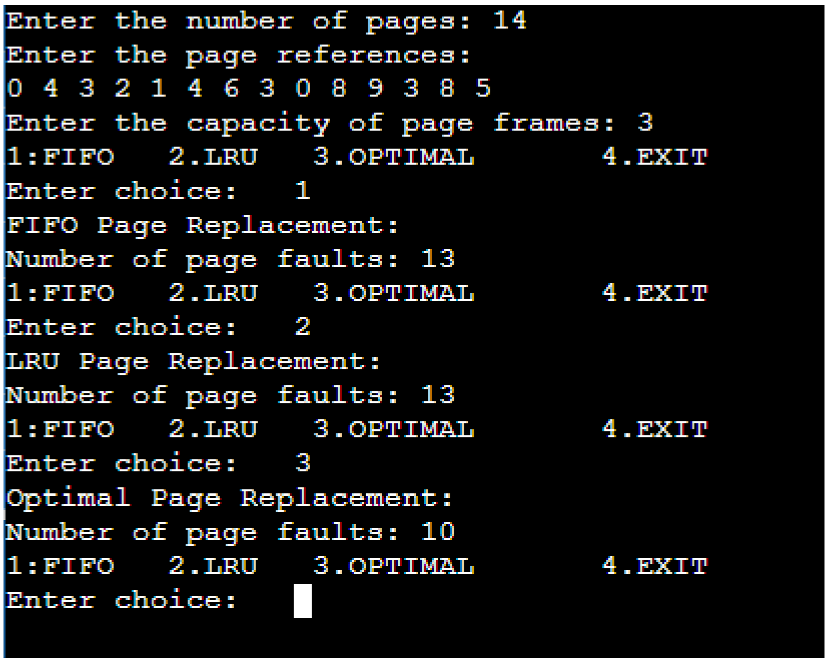
<u>CODE:</u>

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

// Function to simulate FIFO page replacement algorithm
void fifo(int pages[], int n, int capacity) {
   int pageFaults = 0;
   int frame[capacity];
   int front = 0, rear = 0,i;
     for ( i = 0; i < capacity; i++) {
       frame[i] = -1;

   }

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

       for (int j = 0; j < capacity; j++) {
           if (frame[j] == pages[i]) {
               found = 1;
               break;
           }
       }

       if (!found) {
           pageFaults++;
           if ((rear + 1) % capacity == front) {
            front = (front + 1) % capacity;

          }

          frame[rear] = pages[i];
          rear = (rear + 1) % capacity;

        }
    }

    printf("FIFO Page Replacement:\n");
    printf("Number of page faults: %d\n", pageFaults);
}

// Function to simulate LRU page replacement algorithm
void lru(int pages[], int n, int capacity) {
    int pageFaults = 0;
    int frame[capacity];
    int counter[capacity];

    for (int i = 0; i < capacity; i++) {
        frame[i] = -1;
        counter[i] = 0;
    }

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

        for (int j = 0; j < capacity; j++) {
            if (frame[j] == pages[i]) {
                found = 1;
                counter[j] = i;
                break;
            }
        }

        if (!found) {
            leastUsed = 0;
            for (int j = 1; j < capacity; j++) {
                if (counter[j] < counter[leastUsed]) {
                    leastUsed = j;
                }
            }

            frame[leastUsed] = pages[i];
            counter[leastUsed] = i;
            pageFaults++;
        }
    }

    printf("LRU Page Replacement:\n");
    printf("Number of page faults: %d\n", pageFaults);
}

// Function to simulate Optimal page replacement algorithm
void optimal(int pages[], int n, int capacity) {
    int pageFaults = 0;
    int frame[capacity];
    int nextUse[capacity];

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

```
    frame[i] = -1;
    nextUse[i] = n;
}

for (int i = 0; i < n; i++) {
    int found = 0;
    int replaceIndex = -1;

    for (int j = 0; j < capacity; j++) {
        if (frame[j] == pages[i]) {
            found = 1;
            break;
        }

        if (frame[j] == -1) {
            replaceIndex = j;
            break;
        }

        if (nextUse[j] > nextUse[replaceIndex]) {
            replaceIndex = j;
        }
    }

    if (!found) {
        frame[replaceIndex] = pages[i];
        nextUse[replaceIndex] = i;
        pageFaults++;
    }
}
```

```
    printf("Optimal Page Replacement:\n");
    printf("Number of page faults: %d\n", pageFaults);
}

int main() {
    int n, capacity,choice;

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

    int pages[n];

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

    printf("Enter the capacity of page frames: ");
    scanf("%d", &capacity);
while(1)
{ printf("1:FIFO \t 2.LRU \t 3.OPTIMAL\t 4.EXIT\n");
printf("Enter choice:\t");
scanf("%d",&choice);
switch(choice)
{
    case 1:fifo(pages, n, capacity);break;
    case 2:lru(pages, n, capacity);break;
    case 3:optimal(pages, n, capacity);break;
    case 4:exit(0);break;
    default:printf("Invalid input");
}//switch
}//while

    return 0;
}
```

OUTPUT:



```
Enter the number of pages: 14
Enter the page references:
0 4 3 2 1 4 6 3 0 8 9 3 8 5
Enter the capacity of page frames: 3
1:FIFO    2.LRU    3.OPTIMAL       4.EXIT
Enter choice:    1
FIFO Page Replacement:
Number of page faults: 13
1:FIFO    2.LRU    3.OPTIMAL       4.EXIT
Enter choice:    2
LRU Page Replacement:
Number of page faults: 13
1:FIFO    2.LRU    3.OPTIMAL       4.EXIT
Enter choice:    3
Optimal Page Replacement:
Number of page faults: 10
1:FIFO    2.LRU    3.OPTIMAL       4.EXIT
Enter choice:
```