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Assignment 7

Implement Page Replacement Policies using FIFO, LRU and Optimal.

Code:

```
#include<iostream>

using namespace std;


class pagereplacement

{

 int frame[50], frame1[50][2], pn[50], n, cnt, p, fs;

public:

 void init()

{

 int i;

 for (i = 0; i < fs; i++)

 {

  frame[i] = -1;

 }

 for (i = 0; i < fs; i++)
 {
  frame1[i][0] = -1;
  frame1[i][1] = 0;
 }
 p = 0;
 cnt = 0;
}
 void getdata()
{
 cout << "\nEnter frame size : ";
 cin >> fs;
 cout << "\nEnter the number of pages : ";
 cin >> n;
 cout << "\nEnter the page numbers : ";
 for (int i = 0; i < n; i++)
 {
  cin >> pn[i];
 }
}

 void fifo()
{
```

```
init();
int pi = 0, ind = 0, fault = 0, i, j, k, fn;
p = 0;
cnt = 0;
for (i = 0; i < n; i++)
{
 j = 0;
 if (ind > fs - 1)
  ind = 0;
 fault = 1;
 while (j < fs)
 {
  if (frame[j] == pn[pi])
  {
   fault = 0;
   goto l1;
  }
  fn = ind;
  j++;
 }
 j = 0;
 while (j < fs)
```

```
  {
   if (frame[j] == -1)
   {
    fault = 1;
    fn = j;
    goto l1;
   }
   j++;
  }
  ind++;

l1:
  if (fault == 1)
  {
   frame[fn] = pn[pi];
   cnt++;
  }
  cout << "\nElement is : " << pn[pi] << "-->";
  pi++;
  for (k = 0; k < fs; k++)
  {
   cout << "\t" << frame[k];
  }
  if (fault == 1)
   cout << "\t*****Page Fault******";
  else
   cout << "\t-----No Page Fault-----";
 }
 cout << "\nTotal number of page fault : " << cnt;
}

 void lru()
 {
 init();
 int ind = 0, fault = 0, pi = 0, i, j, fn, k;
 p = 0;
 cnt = 0;
 int min;
 for (i = 0; i < fs; i++)
 {
  frame1[i][0] = -1;
  frame1[i][1] = 0;
 }
 pi = 0;
```

```
for (i = 0; i < n; i++)
{
 j = 0;
 if (ind > fs - 1)
  ind = 0;
 fault = 1;
 min = 999;
 while (j < fs)
 {
  if (frame1[j][0] == pn[pi])
  {
   fault = 0;
   p++;
   frame1[j][1] = p;
   goto l2;
  }
  if (frame1[j][1] < min)
  {
   min = frame1[j][1];
   fn = j;
  }
  j++;
  }

  j = 0;

  while (j < fs)

  {

   if (frame1[j][0] == -1)

   {

    fault = 1;

    fn = j;

    goto l2;

   }

   j++;

  }

  ind++;

l2:

  if (fault == 1)

  {

   p++;

   frame1[fn][0] = pn[pi];

   frame1[fn][1] = p;

   cnt++;

  }

  cout << "\nElement is : " << pn[pi] << "-->";
  pi++;
  for (k = 0; k < fs; k++)
  {
   cout << "\t" << frame1[k][0];
  }
  if (fault == 1)
   cout << "\t*****Page Fault******";
  else
   cout << "\t-----No Page Fault-----";
 }
 cout << "\nTotal number of page fault : " << cnt;
}
 void optimal()
 {
 init();
 int pi1 = 0, pi = 0, fault = 0, flag = 0, flag1 = 0, i, j, k, fn, max = 0, ind = 0;
 cnt = 0, p = 0;
 for (i = 0; i < n; i++)
 {
  j = 0;
  if (ind > fs - 1)
   ind = 0;
```

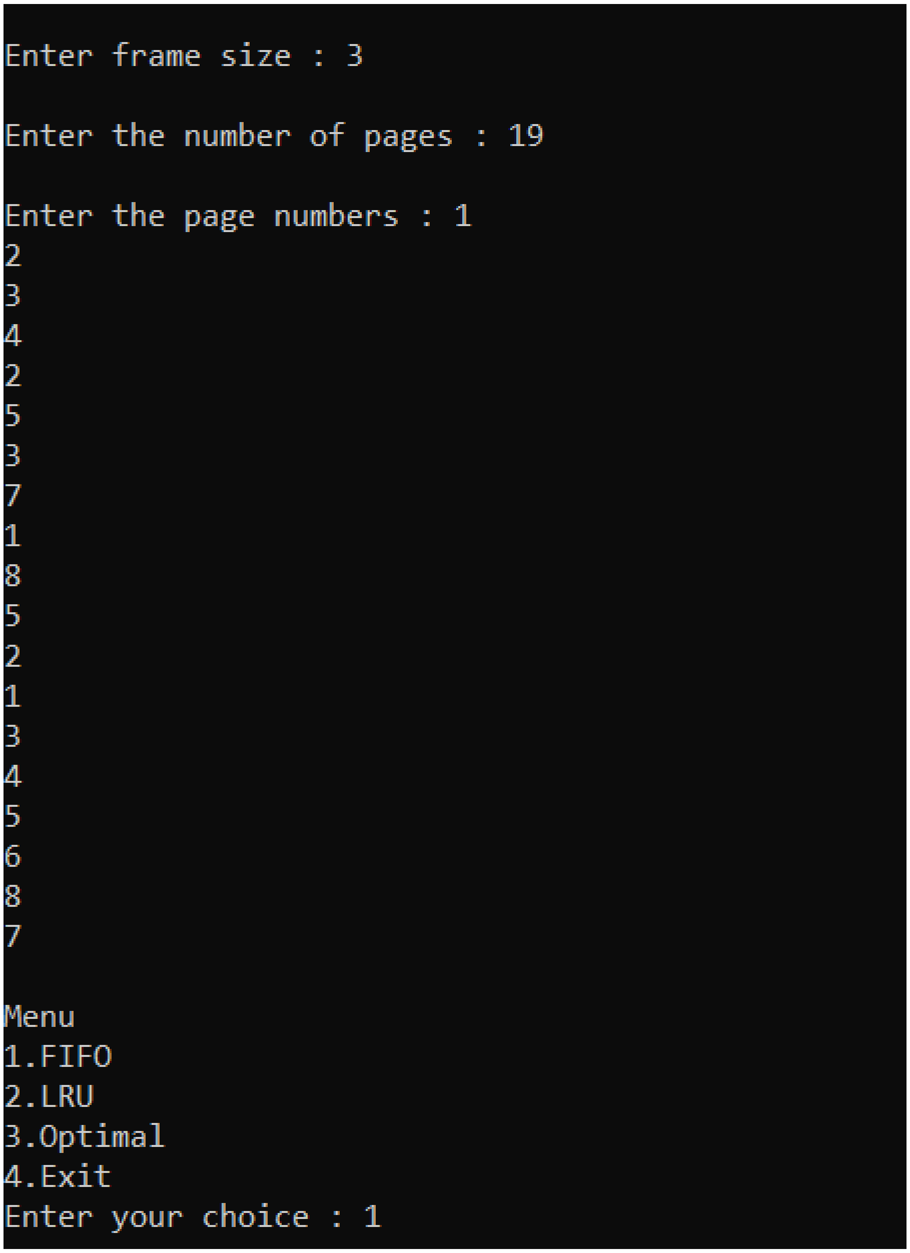
```
fault = 1;
max = 0;
while (j < fs)
{
 if (frame[j] == -1)
 {
  fault = 1;
  fn = j;
  goto l1;
 }
 j++;
}
j = 0;
while (j < fs)
{
 k = 0;
 while (k < fs)
 {
  if (frame[k] == pn[pi])
  {
   fault = 0;
   goto l1;
 }

 k++;

}

flag = 0;

flag1 = 0;

pi1 = pi;

while (pi1 < n)

{

 if (frame[j] == pn[pi1+1] && pi1 + 1 < max)

 {

  break;

 }

 if (frame[j] == pn[pi1+1] && pi1 + 1 > max)

 {

  max = pi1 + 1;

  fn = j;

  flag1 = 1;

  break;

 }

 pi1++;

}

pi1 = pi;
```

```
   if (flag1 == 0)
   {
    pi1 = pi;
    while (pi1 < n)
    {
     if (frame[j] == pn[pi1+1])
     {
      flag = 1;
      break;
     }
     pi1++;
    }
    if (flag == 0)
    {
     fn = j;
     goto l1;
    }
   }
   j++;
  }
l1:
  if (fault == 1)
  {
   frame[fn] = pn[pi];
   cnt++;
  }
  cout << "\nElement is : " << pn[pi] << "-->";
  pi++;
  for (k = 0; k < fs; k++)
  {
   cout << "\t" << frame[k];
  }
  if (fault == 1)
   cout << "\t*****Page Fault******";
  else
   cout << "\t-----No Page Fault-----";
 }
 cout << "\nTotal number of page fault : " << cnt;
}
};

int main()
{
 pagereplacement p;
```

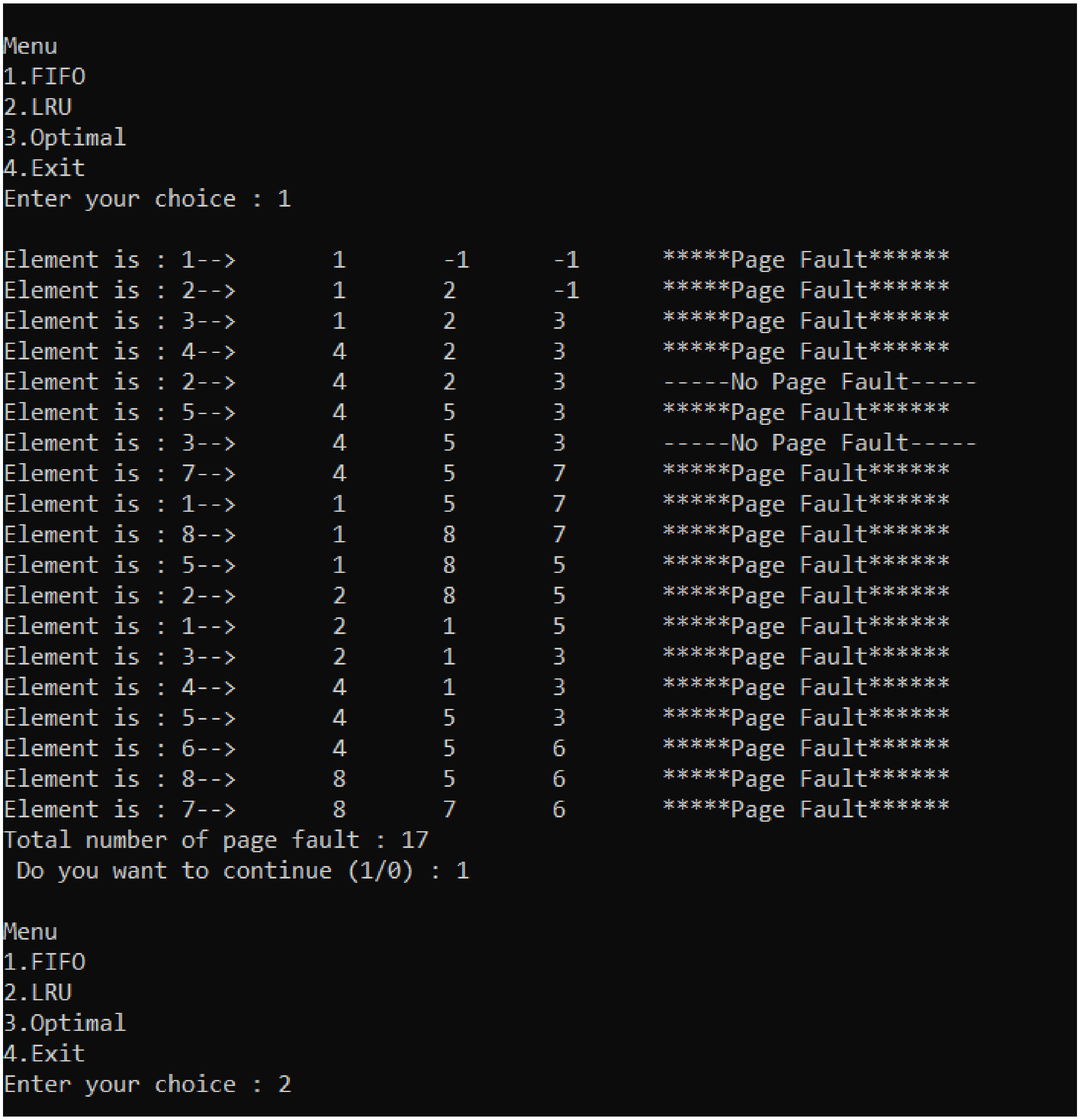
```
int ans, ch;
p.getdata();
do
{
 cout << "\nMenu\n1.FIFO \n2.LRU \n3.Optimal \n4.Exit \nEnter your choice : ";
 cin >> ch;

 switch (ch)
 {
 case 1:p.fifo();
        break;
 case 2:p.lru();
        break;
 case 3:p.optimal();
        break;
 case 4:return 0;

 default:cout << "\nInvalid choice!!!";
 }
 cout << "\n Do you want to continue (1/0) : ";
 cin >> ans;
}
```

```
 while (ans == 1);

 return 1;

}
```

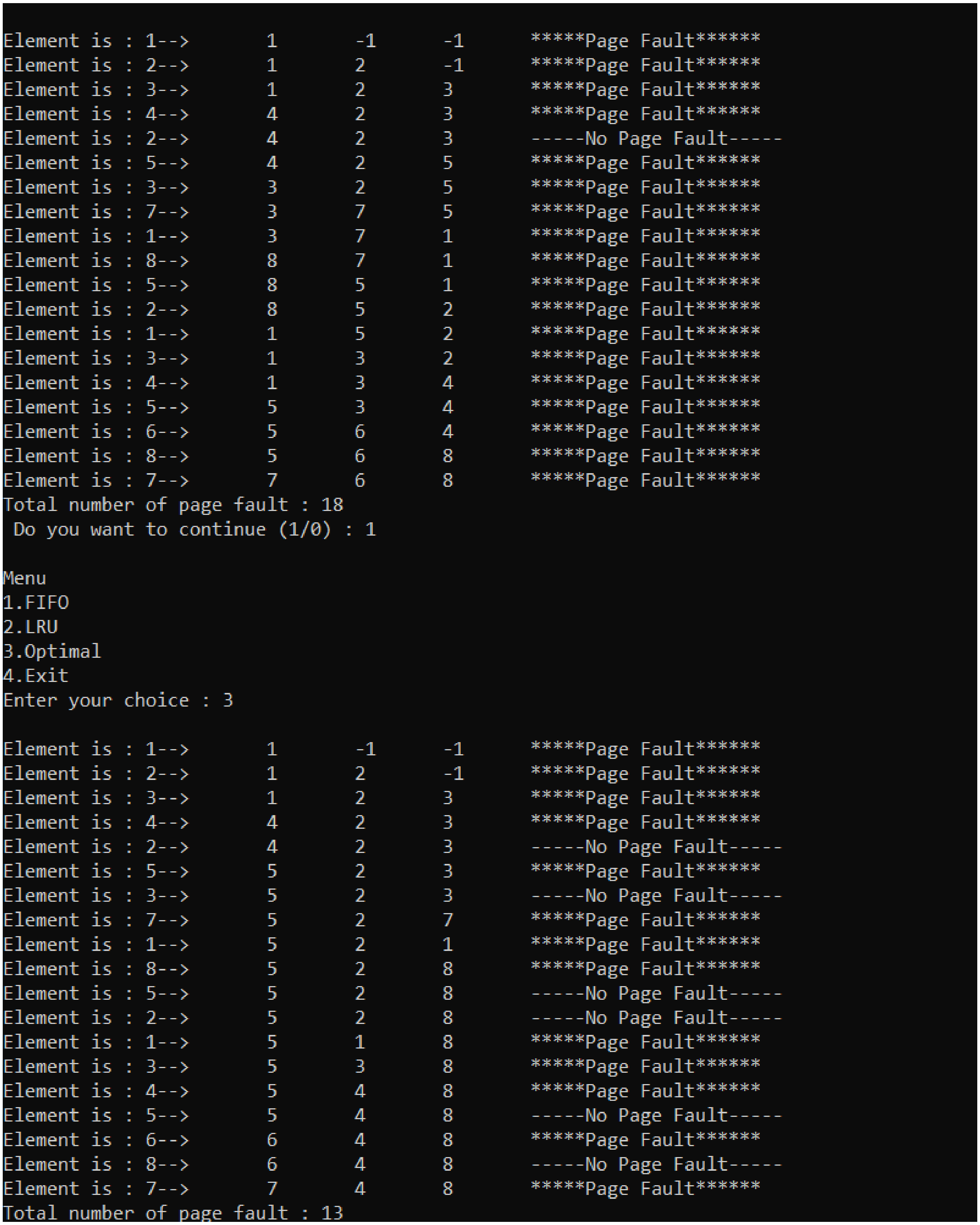
Output:



```
Enter frame size : 3

Enter the number of pages : 19

Enter the page numbers : 1
2
3
4
2
5
3
7
1
8
5
2
1
3
4
5
6
8
7

Menu
1.FIFO
2.LRU
3.Optimal
4.Exit
Enter your choice : 1
```



```
Menu
1.FIFO
2.LRU
3.Optimal
4.Exit
Enter your choice : 1

Element is : 1-->       1       -1      -1      *****Page Fault******
Element is : 2-->       1       2       -1      *****Page Fault******
Element is : 3-->       1       2       3       *****Page Fault******
Element is : 4-->       4       2       3       *****Page Fault******
Element is : 2-->       4       2       3       -----No Page Fault-----
Element is : 5-->       4       5       3       *****Page Fault******
Element is : 3-->       4       5       3       -----No Page Fault-----
Element is : 7-->       4       5       7       *****Page Fault******
Element is : 1-->       1       5       7       *****Page Fault******
Element is : 8-->       1       8       7       *****Page Fault******
Element is : 5-->       1       8       5       *****Page Fault******
Element is : 2-->       2       8       5       *****Page Fault******
Element is : 1-->       2       1       5       *****Page Fault******
Element is : 3-->       2       1       3       *****Page Fault******
Element is : 4-->       4       1       3       *****Page Fault******
Element is : 5-->       4       5       3       *****Page Fault******
Element is : 6-->       4       5       6       *****Page Fault******
Element is : 8-->       8       5       6       *****Page Fault******
Element is : 7-->       8       7       6       *****Page Fault******
Total number of page fault : 17
 Do you want to continue (1/0) : 1

Menu
1.FIFO
2.LRU
3.Optimal
4.Exit
Enter your choice : 2
```



```
Element is : 1-->       1       -1      -1      *****Page Fault******
Element is : 2-->       1       2       -1      *****Page Fault******
Element is : 3-->       1       2       3       *****Page Fault******
Element is : 4-->       4       2       3       *****Page Fault******
Element is : 2-->       4       2       3       -----No Page Fault-----
Element is : 5-->       4       2       5       *****Page Fault******
Element is : 3-->       3       2       5       *****Page Fault******
Element is : 7-->       3       7       5       *****Page Fault******
Element is : 1-->       3       7       1       *****Page Fault******
Element is : 8-->       8       7       1       *****Page Fault******
Element is : 5-->       8       5       1       *****Page Fault******
Element is : 2-->       8       5       2       *****Page Fault******
Element is : 1-->       1       5       2       *****Page Fault******
Element is : 3-->       1       3       2       *****Page Fault******
Element is : 4-->       1       3       4       *****Page Fault******
Element is : 5-->       5       3       4       *****Page Fault******
Element is : 6-->       5       6       4       *****Page Fault******
Element is : 8-->       5       6       8       *****Page Fault******
Element is : 7-->       7       6       8       *****Page Fault******
Total number of page fault : 18
 Do you want to continue (1/0) : 1

Menu
1.FIFO
2.LRU
3.Optimal
4.Exit
Enter your choice : 3

Element is : 1-->       1       -1      -1      *****Page Fault******
Element is : 2-->       1       2       -1      *****Page Fault******
Element is : 3-->       1       2       3       *****Page Fault******
Element is : 4-->       4       2       3       *****Page Fault******
Element is : 2-->       4       2       3       -----No Page Fault-----
Element is : 5-->       5       2       3       *****Page Fault******
Element is : 3-->       5       2       3       -----No Page Fault-----
Element is : 7-->       5       2       7       *****Page Fault******
Element is : 1-->       5       2       1       *****Page Fault******
Element is : 8-->       5       2       8       *****Page Fault******
Element is : 5-->       5       2       8       -----No Page Fault-----
Element is : 2-->       5       2       8       -----No Page Fault-----
Element is : 1-->       5       1       8       *****Page Fault******
Element is : 3-->       5       3       8       *****Page Fault******
Element is : 4-->       5       4       8       *****Page Fault******
Element is : 5-->       5       4       8       -----No Page Fault-----
Element is : 6-->       6       4       8       *****Page Fault******
Element is : 8-->       6       4       8       -----No Page Fault-----
Element is : 7-->       7       4       8       *****Page Fault******
Total number of page fault : 13
```