Name:	Sujal Sandeep Dingankar
UID:	2024301005
Experiment No.	9

AIM:	To Study Page Replacement Algorithms.
Program 1	
PROBLEM STATEMENT:	To perform First In First Out (FIFO) Page Replacement Algorithm.
PROGRAM:	

```
#include <stdio.h>
int main() {
    int frames, pages, pageFaults = 0,
    pageHits = 0;
    int frameIndex = 0;

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

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

    int pageSequence[pages], frame[frames];

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

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

    for (int i = 0; i < pages; i++) {
        int page = pageSequence[i];
        int found = 0;
   for (int j = 0; j < frames; j++) {
```

```
            if (frame[j] == page) {
                found = 1;
                pageHits++;
                break;
            }
        }
  printf("Frame status after page %d: ",
page);

        if (!found) {
            frame[frameIndex] = page;
   frameIndex = (frameIndex + 1) % frames;
            pageFaults++;

         for (int k = 0; k < frames;k++) {
            if (frame[k] != -1)
                printf("%d ", frame[k]);
                else
                    printf("- ");
            }
            printf("Fault\n");
        } else {
         for (int k = 0; k < frames; k++) {
                if(frame[k]!=-1)
               printf("%d ", frame[k]);
                else
                    printf("- ");
            }
            printf("Hit\n");
        }
    }
      printf("\nTotal Page Faults: %d\n",
   pageFaults);
    printf("Total Hits: %d\n", pageHits);
    return 0;
}
```

RESULT:

```
/tmp/VRShAXJ30r.o
Enter the number of frames: 3
Enter the number of pages: 20
Enter the page sequence : 1 2 3 2 4 5 6 4 7 7 3 4 6 6 4 5 6 8 2 3
Frame status after page 1: 1 - - Fault
Frame status after page 2: 1 2 - Fault
Frame status after page 3: 1 2 3 Fault
Frame status after page 2: 1 2 3 Hit
Frame status after page 4: 4 2 3 Fault
Frame status after page 5: 4 5 3 Fault
Frame status after page 6: 4 5 6 Fault
Frame status after page 4: 4 5 6 Hit
Frame status after page 7: 7 5 6 Fault
Frame status after page 7: 7 5 6 Hit
Frame status after page 3: 7 3 6 Fault
Frame status after page 4: 7 3 4 Fault
Frame status after page 6: 6 3 4 Fault
Frame status after page 6: 6 3 4 Hit
Frame status after page 4: 6 3 4 Hit
Frame status after page 5: 6 5 4 Fault
Frame status after page 6: 6 5 4 Hit
Frame status after page 8: 6 5 8 Fault
Frame status after page 2: 2 5 8 Fault
Frame status after page 3: 2 3 8 Fault

Total Page Faults: 14
Total Hits: 6


=== Code Execution Successful ===
```

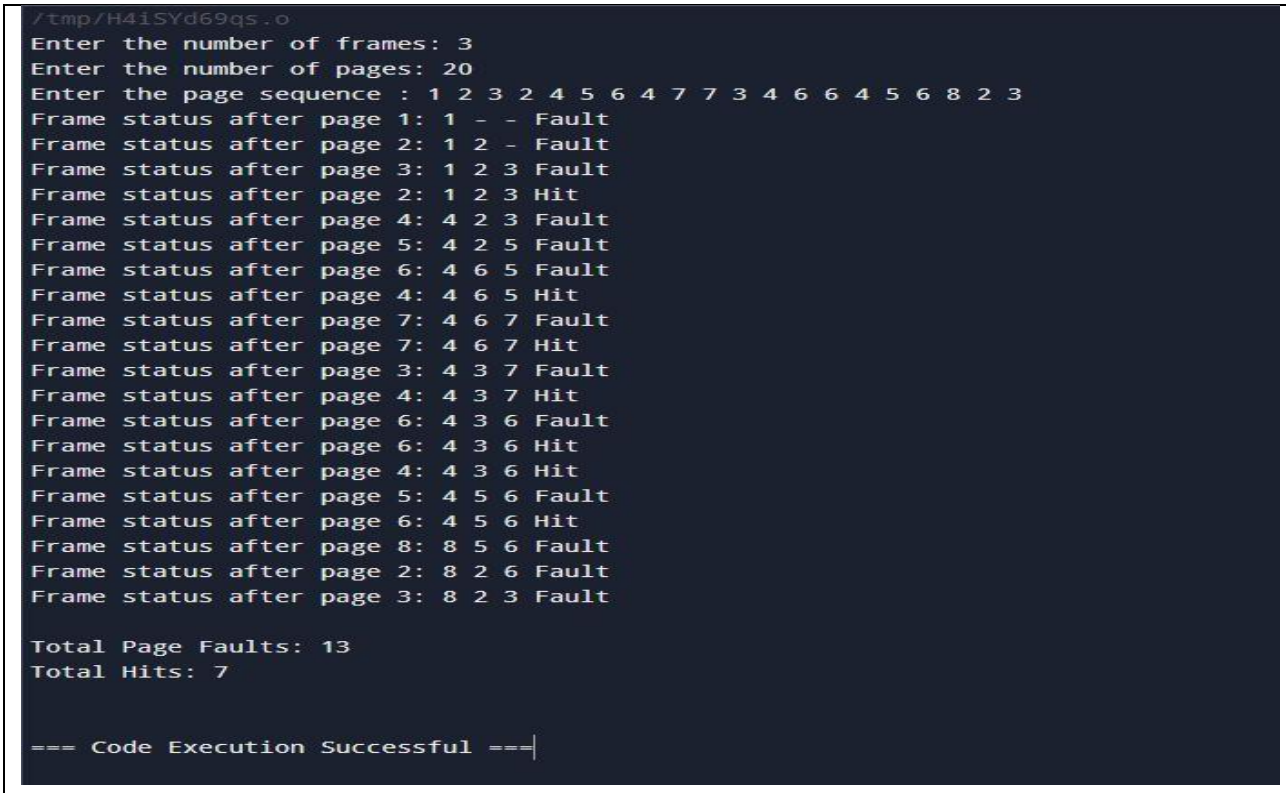
Program 2	
PROBLEM STATEMENT:	To perform Least Recently Used (LRU) Page Replacement Algorithm.

PROGRAM:	`#include <stdio.h>`
	`int findLRU(int time[], int frames) {`
	`  int min = time[0], pos = 0;`
	`  for (int i = 1; i < frames; i++) {`
	`  if (time[i] < min) {`
	`  min = time[i];`
	`  pos = i;`
	`  }`
	`  }`
	`  return pos;`
	`}`

```
  int main() {
   int frames, pages, pageFaults = 0, pageHits = 0;
   int counter = 0;

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

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

    int pageSequence[pages], frame[frames],
time[frames];

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

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

    for (int i = 0; i < pages; i++) {
        int page = pageSequence[i];
        int found = 0;

        for (int j = 0; j < frames; j++) {
            if (frame[j] == page) {
                found = 1;
                pageHits++;
                counter++;
                time[j] = counter;
                break;
            }
        }
     printf("Frame status after page %d: ", page);

        if (!found) {
            int pos;
           if (frame[0] == -1){
                 pos = i % frames;
```

```
            } else {
                pos = findLRU(time, frames);
            }
            frame[pos] = page;
            counter++;
            time[pos] = counter;
            pageFaults++;

            for (int k = 0; k < frames; k++) {
                if (frame[k] != -1)
                    printf("%d ", frame[k]);
                else
                    printf("- ");
            }
            printf("Fault\n");
        } else {
            for (int k = 0; k < frames; k++) {
                if (frame[k] != -1)
                    printf("%d ", frame[k]);
                else
                    printf("- ");
            }
            printf("Hit\n");
        }
    }

    printf("\nTotal Page Faults: %d\n",
pageFaults);
    printf("Total Hits: %d\n", pageHits);
    return 0;
}
```

RESULT:



CONCLUSION:	In this experiment, I implemented the FIFO, LRU, and Optimal page replacement algorithms to manage memory page requests. The FIFO algorithm replaces the oldest page, making it simple but prone to high page faults. The LRU algorithm reduces page faults by replacing the least recently used page, adapting better to usage patterns. The Optimal algorithm achieves the lowest page faults by replacing the page that will not be used for the longest period, though it requires future knowledge.