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Sub: Operating Systems Laboratory SAP ID: 60003220131

EXPERIMENT NO. 06

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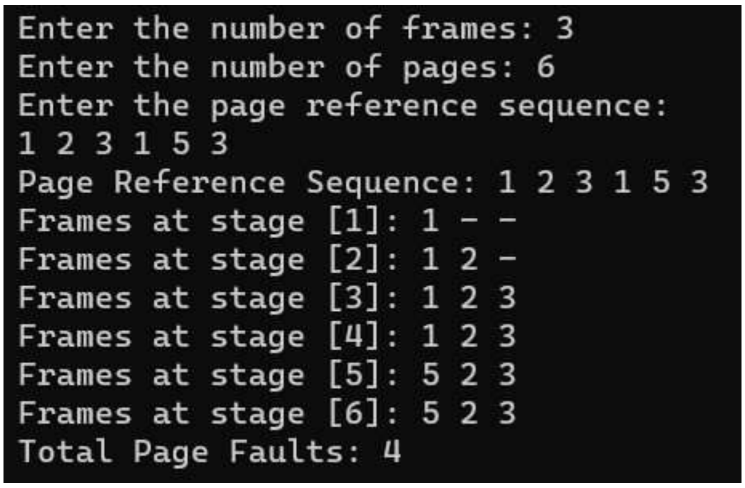
BATCH: 1

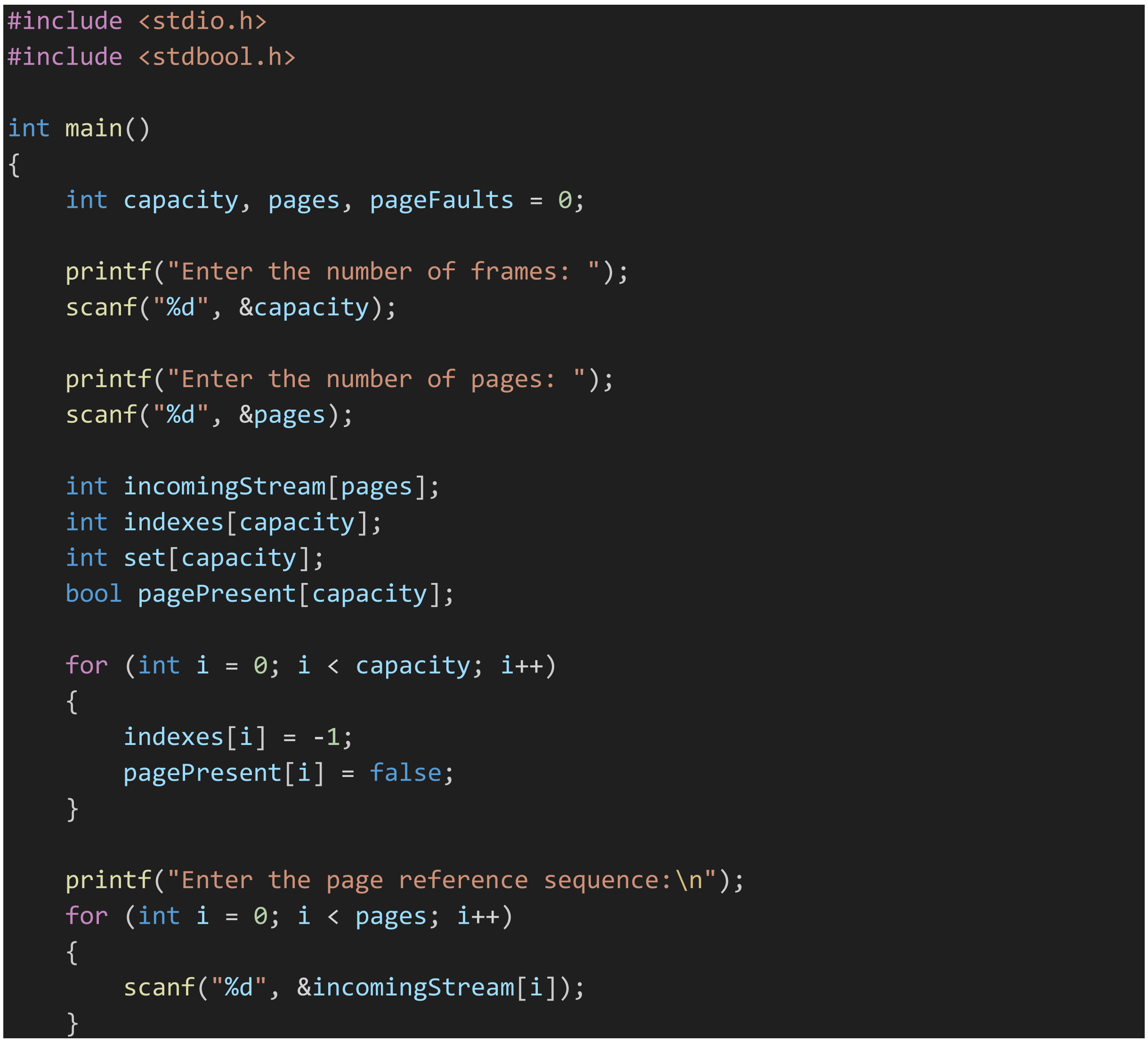
FIFO

```c
#include <stdio.h>

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

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

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

    int incomingStream[pages];

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

    int temp[frames];

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

    printf("Page Reference Sequence: ");
    for (int i = 0; i < pages; ++i)
    {
        printf("%d ", incomingStream[i]);
    }
    printf("\n");

    int m, n, s;
    for (m = 0; m < pages; m++)
    {
        s = 0;
        for (n = 0; n < frames; n++)
        {
            if (incomingStream[m] == temp[n])
            {
                s++;
                pageFaults--;
            }
        }
        pageFaults++;

        if ((pageFaults <= frames) && (s == 0))
        {
            temp[m] = incomingStream[m];
        }
        else if (s == 0)
        {
            temp[(pageFaults - 1) % frames] = incomingStream[m];
        }

        printf("Frames at stage [%d]: ", m + 1);
        for (int i = 0; i < frames; ++i)
        {
            if (temp[i] == -1)
            {
                printf("- ");
            }
            else
            {
                printf("%d ", temp[i]);
            }
        }
        printf("\n");
    }

    printf("Total Page Faults: %d\n", pageFaults);

    return 0;
}
```

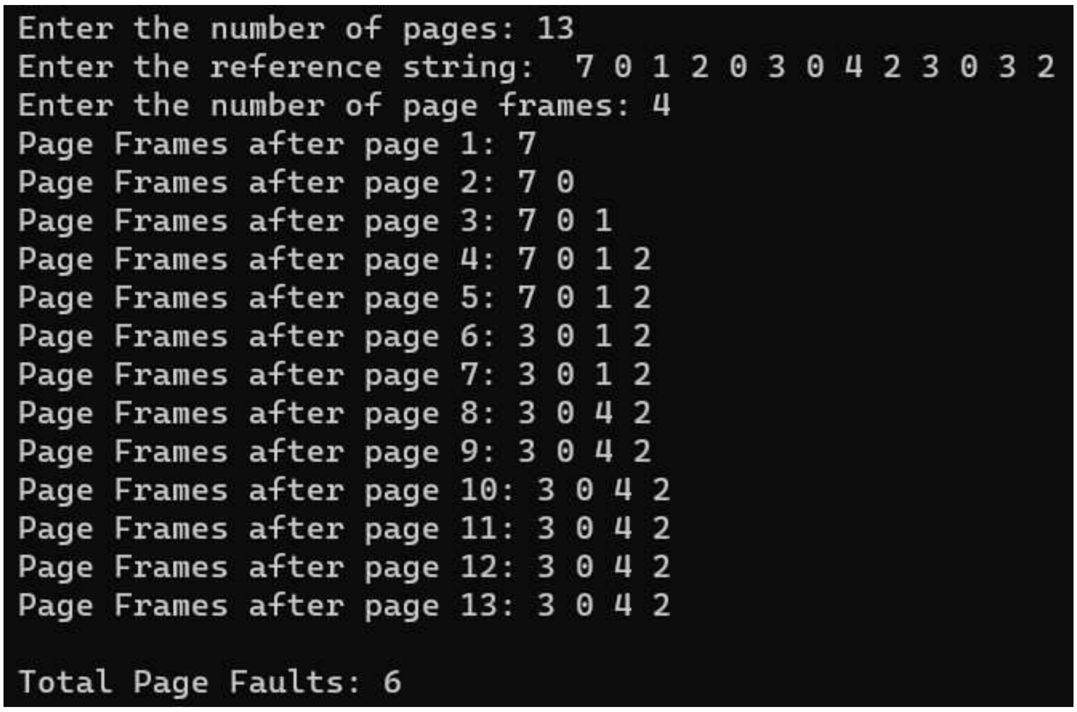


```
Enter the number of frames: 3
Enter the number of pages: 6
Enter the page reference sequence:
1 2 3 1 5 3
Page Reference Sequence: 1 2 3 1 5 3
Frames at stage [1]: 1 - -
Frames at stage [2]: 1 2 -
Frames at stage [3]: 1 2 3
Frames at stage [4]: 1 2 3
Frames at stage [5]: 5 2 3
Frames at stage [6]: 5 2 3
Total Page Faults: 4
```

LRU



```c
#include <stdio.h>
#include <stdbool.h>

int main()
{
    int capacity, pages, pageFaults = 0;

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

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

    int incomingStream[pages];
    int indexes[capacity];
    int set[capacity];
    bool pagePresent[capacity];

    for (int i = 0; i < capacity; i++)
    {
        indexes[i] = -1;
        pagePresent[i] = false;
    }

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

    for (int i = 0; i < pages; i++)
    {
        if (pagePresent[incomingStream[i]])
        {
            // Page is already in memory, do nothing
        }
        else
        {
            if (pageFaults < capacity)
            {
                int emptySlot = -1;
                for (int j = 0; j < capacity; j++)
                {
                    if (!pagePresent[j])
                    {
                        emptySlot = j;
                        break;
                    }
                }

                if (emptySlot != -1)
                {
                    set[emptySlot] = incomingStream[i];
                    pagePresent[emptySlot] = true;
                    indexes[incomingStream[i]] = i;
                }
            }
            else
            {
                int minIndex = pages + 1;
                int victimPage;

                for (int j = 0; j < capacity; j++)
                {
                    if (indexes[set[j]] < minIndex)
                    {
                        minIndex = indexes[set[j]];
                        victimPage = j;
                    }
                }

                pagePresent[victimPage] = false;
                set[victimPage] = incomingStream[i];
                pagePresent[victimPage] = true;
                indexes[incomingStream[i]] = i;

                pageFaults++;
            }
        }
    }

    printf("Total Page Faults: %d\n", pageFaults);

    return 0;
}
```



```
Enter the number of pages: 13
Enter the reference string:  7 0 1 2 0 3 0 4 2 3 0 3 2
Enter the number of page frames: 4
Page Frames after page 1: 7
Page Frames after page 2: 7 0
Page Frames after page 3: 7 0 1
Page Frames after page 4: 7 0 1 2
Page Frames after page 5: 7 0 1 2
Page Frames after page 6: 3 0 1 2
Page Frames after page 7: 3 0 1 2
Page Frames after page 8: 3 0 4 2
Page Frames after page 9: 3 0 4 2
Page Frames after page 10: 3 0 4 2
Page Frames after page 11: 3 0 4 2
Page Frames after page 12: 3 0 4 2
Page Frames after page 13: 3 0 4 2

Total Page Faults: 6
```

BOOKS AND WEB RESOURCES:

- "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne
- "Operating Systems: Three Easy Pieces" by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau

- GeeksforGeeks
- Tutorialspoint

Conclusion:
In this study, we implemented and compared FIFO and LRU page replacement algorithms in C language. Both algorithms were tested with the same reference string "1 2 3 4 1 2 5 1 2". The FIFO algorithm, replacing the oldest page, and the LRU algorithm, replacing the least recently used page, both resulted in 9 page faults. These findings highlight the importance of considering specific application requirements and access patterns when choosing the appropriate page replacement strategy.