



**EAST WEST UNIVERSITY**

**Department of CSE**

**Course Code: CSE325**

**Course Title: Operating Systems**

**Project Report**

**Project Title: Movie Ratings Problem**

**Submitted by-**

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## **Project Title: Movie Ratings Problem**

### **Description:**

Movie ratings problem deals with all kinds of movie details and searches movies in decreasing order of popularity ratings and prints all movies too.

We have a set of processes in this project that search the movie database from keywords. In order that the database server does not become overloaded by many search processes, we allow at most five processes at any instant. When a sixth (or seventh or...) process attempts to make a search, it has to wait until one or more running search processes finish working with the database and signal the semaphore.

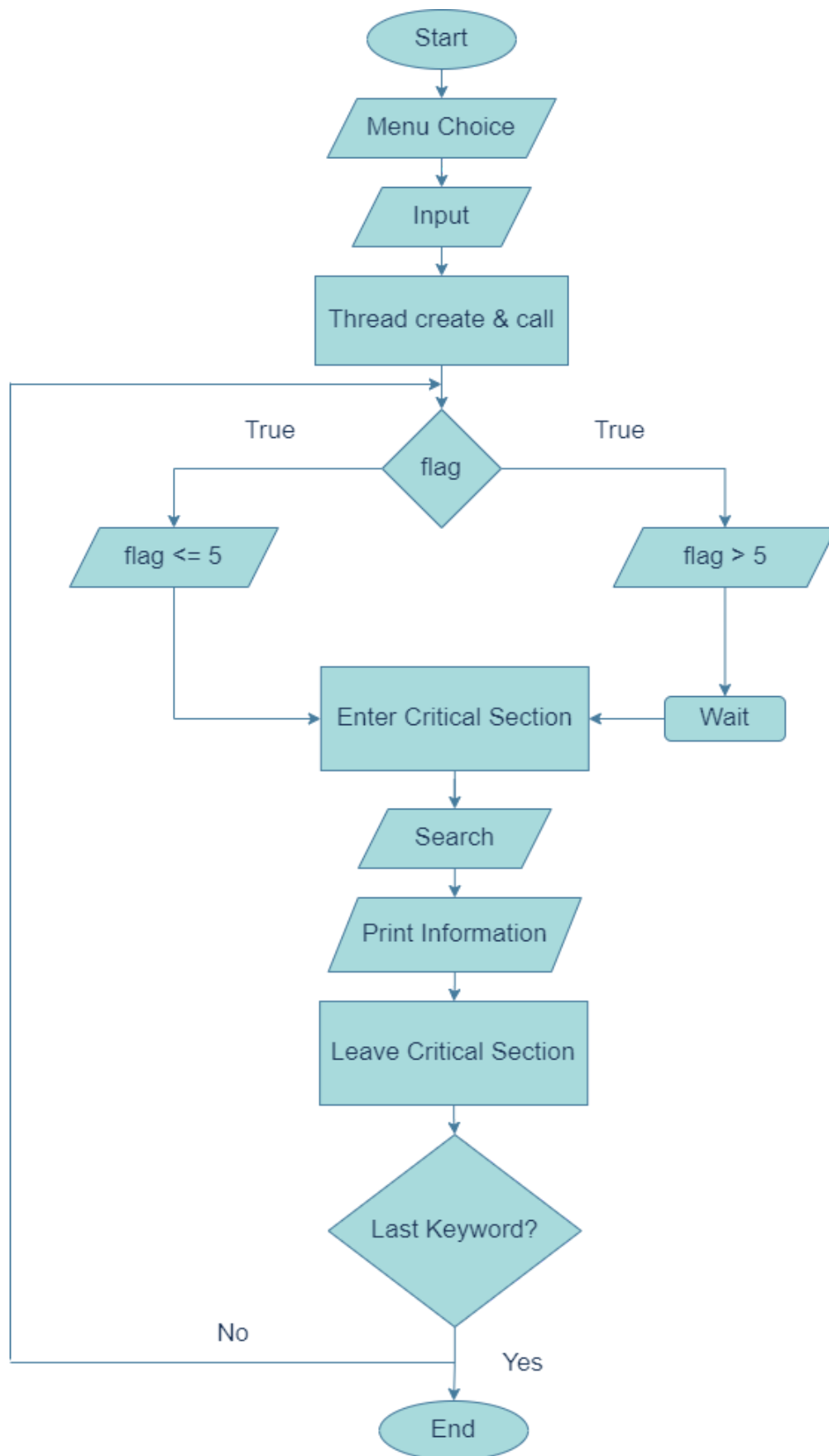
We use process, thread and counting semaphore to implement this problem.

- ☐ A process is execution of an individual program.
- ☐ A thread represents an abstract entity that executes a sequence of instructions.
- ☐ Counting Semaphore uses a count that helps tasks to be acquired or released numerous times. It is a mechanism for synchronizing multiple threads.

### **Objective:**

- To find movies easily and faster.
- To save both paper and time of authority and people.

**Flowchart:**



**Code:**

```
#include<stdio.h>
#include<stdlib.h>
#include<semaphore.h>
#include<pthread.h>
#include<unistd.h>

#define LIMIT 5 // process limit

int flag = 0; // count of number of thread

pthread_mutex_t mutex; // mutex to provide mutual exclusion

sem_t z; // semaphore for updating flag value n times
sem_t ksem; // semaphore for updating flag value

// function to synchronize threads
void *thread(void *keyword)
{
    sem_wait(&z); // lock semaphore

    if(flag >= LIMIT)
    {
        printf("\n\tSearch is on wait for keyword: %s ...\n", keyword); // processes on wait
    }

    // counting semaphore
    sem_wait(&ksem); // entry section
    flag++; // increment value
    printf("\n\tSearch has started for keyword: %s\n", keyword); // started processes

    pthread_mutex_lock(&mutex); // locks mutex
    usleep(3);
    printf("\n\tSearching for keyword: %s\n", keyword); // start searching

    // print movie titles
    output(keyword, pthread_self()); // pthread_self() get current thread id

    printf("\n\tSearching for keyword: %s has finished.\n\n", keyword);
```

```

pthread_mutex_unlock(&mutex); // unlocks mutex
sem_post(&ksem); // exit section

flag = 0; // initialize flag to 0 to continue searching until program exits
}

// function to print movie title
void output(char str[], int id)
{
    if(str[0] == 'h' && str[1] == 'a' && str[2] == 'r' && str[3] == 'r' && str[4] == 'y') //harry
    {
        printf("\n\t\t\t-----");
        printf("\n\t\tMatches found for %s\n", str);

        printf("\n\t\tName: HARRY POTTER AND THE DEATHLY HALLOWS: PART 2\n");
        printf("\n\t\tDirector: David Yates\n");
        printf("\n\t\tRelease Date: Jul 15, 2011\n");
        printf("\n\t\tRating: 8.3\n");

        printf("\n\t\tName: HARRY POTTER AND THE DEATHLY HALLOWS: PART 1\n");
        printf("\n\t\tDirector: David Yates\n");
        printf("\n\t\tRelease Date: Nov 19, 2010\n");
        printf("\n\t\tRating: 7.1\n");

        printf("\n\t\tName: HARRY POTTER AND THE HALF-BLOOD PRINCE\n");
        printf("\n\t\tDirector: David Yates\n");
        printf("\n\t\tRelease Date: Jul 15, 2009\n");
        printf("\n\t\tRating: 7.1\n");

        printf("\n\t\t\t\t\t-----\n");
    }
    else if(str[0] == 's' && str[1] == 'p' && str[2] == 'i' && str[3] == 'd' && str[4] == 'e' &&
str[5] == 'r') //spider
    {
        printf("\n\t\t\t\t\t-----");
        printf("\n\t\tMatches found for %s\n", str);

        printf("\n\t\tName: SPIDER-MAN: INTO THE SPIDER-VERSE\n");
        printf("\n\t\tDirector: Bob Persichetti, Peter Ramsey, Rodney Rothman\n");
    }
}

```

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printf("\t\tRelease Date: Dec 14, 2018\n");
printf("\t\tRating: 8.8\n");

printf("\n\t\tName: SPIDER-MAN: NO WAY HOME\n");
printf("\t\tDirector: Jon Watts\n");
printf("\t\tRelease Date: Dec 17, 2021\n");
printf("\t\tRating: 7.9\n");

printf("\n\t\tName: SPIDER-MAN: FAR FROM HOME\n");
printf("\t\tDirector: Jon Watts\n");
printf("\t\tRelease Date: Jul 2, 2019\n");
printf("\t\tRating: 7.4\n");

printf("\t\t\t-----\n");
}
else if(str[0] == 'f' && str[1] == 'a' && str[2] == 's' && str[3] == 't') //fast
{
printf("\n\t\t\t-----");
printf("\n\t\tMatches found for %s\n", str);

printf("\n\t\tName: FAST & FURIOUS PRESENTS: HOBBS & SHAW\n");
printf("\t\tDirector: David Leitch\n");
printf("\t\tRelease Date: Aug 2, 2019\n");
printf("\t\tRating: 6.1\n");

printf("\n\t\tName: FAST & FURIOUS 6\n");
printf("\t\tDirector: Justin Lin\n");
printf("\t\tRelease Date: May 24, 2013\n");
printf("\t\tRating: 6.1\n");

printf("\t\t\t-----\n");
}
else if(str[0] == 'g' && str[1] == 'a' && str[2] == 'm' && str[3] == 'e' && str[4] == 's') //games
{
printf("\n\t\t\t-----");
printf("\n\t\tMatches found for %s\n", str);

printf("\n\t\tName: THE HUNGER GAMES: CATCHING FIRE\n");
printf("\t\tDirector: Francis Lawrence\n");
printf("\t\tRelease Date: Nov 22, 2013\n");

```

```

printf("\t\tRating: 7.6\n");

printf("\n\t\tName: THE HUNGER GAMES: MOCKINGJAY, PART 2\n");
printf("\t\tDirector: Francis Lawrence\n");
printf("\t\tRelease Date: Nov 20, 2015\n");
printf("\t\tRating: 6.5\n");

printf("\n\t\tName: THE HUNGER GAMES: MOCKINGJAY, PART 1\n");
printf("\t\tDirector: Francis Lawrence\n");
printf("\t\tRelease Date: Nov 21, 2014\n");
printf("\t\tRating: 6.3\n");

printf("\t\t\t\t-----\n");
}
else if(str[0] == 'd' && str[1] == 'o' && str[2] == 'c' && str[3] == 't' && str[4] == 'o' &&
str[5] == 'r') //doctor
{
printf("\n\t\t\t\t-----");
printf("\n\t\tMatches found for %s\n\n", str);

printf("\n\t\tName: DOCTOR STRANGE\n");
printf("\t\tDirector: Kevin Feige\n");
printf("\t\tRelease Date: Nov 4, 2016\n");
printf("\t\tRating: 7.3\n");

printf("\n\t\tName: DOCTOR STRANGE IN THE MULTIVERSE OF MADNESS\n");
printf("\t\tDirector: Kevin Feige\n");
printf("\t\tRelease Date: May 6, 2022\n");
printf("\t\tRating: 6.5\n");

printf("\t\t\t\t-----\n");
}
else if(str[0] == 'f' && str[1] == 'i' && str[2] == 'n' && str[3] == 'a' && str[4] == 'l') //final
{
printf("\n\t\t\t\t-----");
printf("\n\t\tMatches found for %s\n\n", str);

printf("\n\t\tName: FINAL DESTINATION 5\n");
printf("\t\tDirector: Steven Quale\n");
printf("\t\tRelease Date: Aug 12, 2011\n");

```

```

printf("\t\tRating: 5.9\n");

printf("\n\t\tName: FINAL DESTINATION 3\n");
printf("\t\tDirector: James Wong\n");
printf("\t\tRelease Date: Feb 10, 2006\n");
printf("\t\tRating: 5.1\n");

printf("\t\t\t-----\n");
}
else
{
    printf("\n\t\tNo matches found for %s!\n\n", str);
}
}

int main()
{
    int choice; // menu choice

    while(1)
    {
        printf("\t\t\t\t\t-----Movie Ratings Problem-----\n\t\t\t\t\t\t\tMenu");
        printf("\n\t1. Search Movies by Keywords\n\t2. Exit\n");

        printf("\n\tEnter your choice: ");
        scanf("%d", &choice);

        if(choice == 1)
        {
            int n; // number of keywords
            printf("\n\tAvailable keywords: Harry, Spider, Fast, Games, Doctor, Final\n");
            printf("\n\tEnter the number of searching keywords: ");
            scanf("%d", &n);

            pthread_t key[n]; // n number of threads
            char arr[n][100]; // keyword array

            pthread_mutex_init(&mutex, NULL); // mutex initialization
            sem_init(&z, 0, 0); // semaphore initialized to 0
            sem_init(&ksem, 0, LIMIT); // semaphore initialized to 5

```



```

printf("\n\tEnter your keywords: \n");

for(int i = 0; i < n; i++)
{
    printf("\tKeyword %d: ", i + 1);
    scanf("%s", arr[i]);

    pthread_create(&key[i], NULL, thread, (void *)&arr[i]); // create threads
    getchar();
}

for(int i = 0; i < n; i++)
{
    sem_post(&z); // signal semaphore to update flag value
}

for(int i = 0; i < n; i++)
{
    pthread_join(key[i], NULL); // waiting for threads to terminate
}

printf("\n\tAll threads have finished its search\n\n\n");

pthread_mutex_destroy(&mutex); // destroy mutex
sem_destroy(&z); // destroy semaphore
sem_destroy(&ksem);
}
else if(choice == 2)
{
    exit(0);
}
else
{
    printf("\n\tTry Again!\n\n\n");
}
}
}

```

## Output:

```
Ubuntu 64-bit - VMware Workstation 16 Player
Player
Activities
Terminal
Sat 06:50
user@ubuntu: ~/Documents

File Edit View Search Terminal Help
user@ubuntu:~/Documents$ ./a.out

-----Movie Ratings Problem-----
Menu

1. Search Movies by Keywords
2. Exit

Enter your choice: 1

Available keywords: Harry, Spider, Fast, Games, Doctor, Final

Enter the number of searching keywords: 6

Enter your keywords:
Keyword 1: harry
Keyword 2: lost
Keyword 3: conjuring
Keyword 4: last
Keyword 5: fast
Keyword 6: final

Search has started for keyword: harry
Search has started for keyword: lost
Search has started for keyword: conjuring
Search has started for keyword: last
Search has started for keyword: fast
Search is on wait for keyword: final ...

Searching for keyword: harry

-----
Matches found for harry

Name: HARRY POTTER AND THE DEATHLY HALLOWS: PART 2
Director: David Yates
Release Date: Jul 15, 2011
Rating: 8.3

Name: HARRY POTTER AND THE DEATHLY HALLOWS: PART 1
Director: David Yates
Release Date: Nov 19, 2010
Rating: 7.1

Name: HARRY POTTER AND THE HALF-BLOOD PRINCE
Director: David Yates
```

```
Ubuntu 64-bit - VMware Workstation 16 Player
Player
Activities
Terminal
Sat 06:51
user@ubuntu: ~/Documents

File Edit View Search Terminal Help

Director: David Yates
Release Date: Jul 15, 2009
Rating: 7.1
-----

Searching for keyword: harry has finished.

Search has started for keyword: final
Searching for keyword: final

-----
Matches found for final

Name: FINAL DESTINATION 5
Director: Steven Quale
Release Date: Aug 12, 2011
Rating: 5.9

Name: FINAL DESTINATION 3
Director: James Wong
Release Date: Feb 10, 2006
Rating: 5.1
-----

Searching for keyword: final has finished.

Searching for keyword: conjuring
No matches found for conjuring!

Searching for keyword: conjuring has finished.

Searching for keyword: last
No matches found for last!

Searching for keyword: last has finished.
```

```
Ubuntu 64-bit - VMware Workstation 16 Player
Player | Sat 06:52
user@ubuntu: ~/Documents

No matches found for Last!

Searching for keyword: last has finished.

Searching for keyword: fast
-----
Matches found for fast

Name: FAST & FURIOUS PRESENTS: HOBBS & SHAW
Director: David Leitch
Release Date: Aug 2, 2019
Rating: 6.1

Name: FAST & FURIOUS 6
Director: Justin Lin
Release Date: May 24, 2013
Rating: 6.1
-----

Searching for keyword: fast has finished.

Searching for keyword: lost
No matches found for lost!

Searching for keyword: lost has finished.

All threads have finished its search

-----Movie Ratings Problem-----
Menu
1. Search Movies by Keywords
2. Exit
Enter your choice:
```