

### **11. Illustrate the concept of multithreading using a C program.**

#### **Aim:**

To illustrate the concept of multithreading in C, where multiple threads are executed concurrently.

#### **Algorithm:**

1. Initialize the main thread.
2. Create additional threads using `pthread_create()`.
3. Each thread executes a function.
4. The main thread waits for all threads to finish using `pthread_join()`.
5. The threads perform a task, and the main thread handles the synchronization.

#### **Procedure:**

1. Include the necessary header for pthreads: `<pthread.h>`.
2. Define a function that will be executed by each thread.
3. Use `pthread_create()` to create new threads.
4. Use `pthread_join()` to ensure the main thread waits for the other threads to finish.
5. Display a message from each thread and the main thread to show parallel execution.

#### **Code**

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

```
#include <pthread.h>
```

```
void* print_message(void* thread_id) {
```

```
    long tid = (long)thread_id;
```

```
    printf("Hello from thread %ld\n", tid);
```

```

    return NULL;
}

int main() {
    pthread_t threads[3];
    long t;

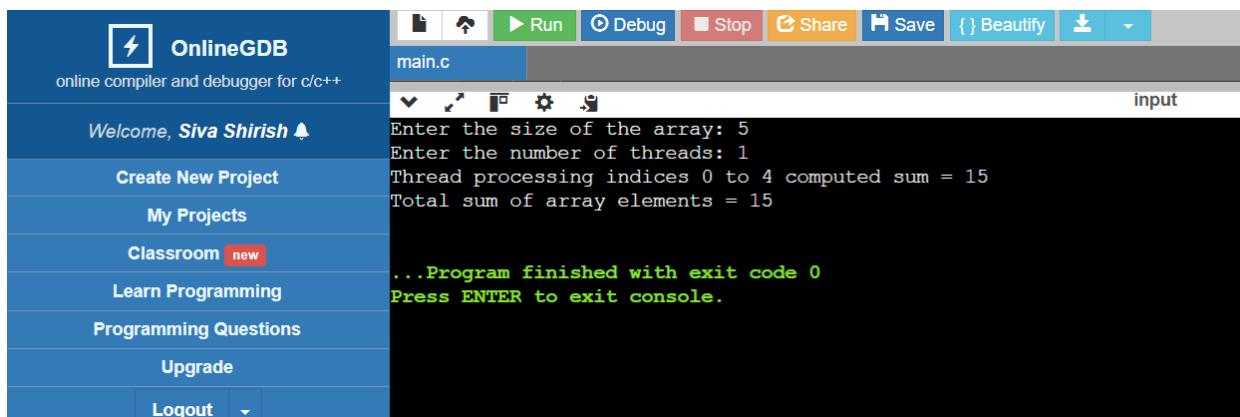
    for (t = 0; t < 3; t++) {
        pthread_create(&threads[t], NULL, print_message, (void*)t);
    }

    for (t = 0; t < 3; t++) {
        pthread_join(threads[t], NULL);
    }

    printf("Hello from main thread\n");
    return 0;
}

```

### Output:



The screenshot shows the OnlineGDB interface. The sidebar on the left contains the following links: Welcome, Siva Shirish, Create New Project, My Projects, Classroom (new), Learn Programming, Programming Questions, Upgrade, and Logout. The top toolbar includes buttons for Run, Debug, Stop, Share, Save, Beautify, and a dropdown menu. The main editor area shows a file named 'main.c'. The console window on the right displays the following output:

```

Enter the size of the array: 5
Enter the number of threads: 1
Thread processing indices 0 to 4 computed sum = 15
Total sum of array elements = 15

...Program finished with exit code 0
Press ENTER to exit console.

```