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

Aim:

To demonstrate the concept of multithreading in C by creating multiple threads that execute concurrently.

Algorithm:

1. **Start**.
2. Initialize the program and include the necessary libraries.
3. Define the functions that will be executed by the threads.
4. Create threads using the pthread_create function.
5. Execute the threads concurrently.
6. Use pthread_join to wait for threads to finish execution.
7. Print the results from each thread to demonstrate multithreading.
8. **End**.

Procedure:

1. Import pthread.h and stdio.h libraries.
2. Define the function for thread execution logic.
3. Use pthread_create to create multiple threads and pass the function as an argument.
4. Use pthread_join to ensure main program waits for all threads to finish.
5. Compile and run the program to observe concurrent thread execution.

Code:

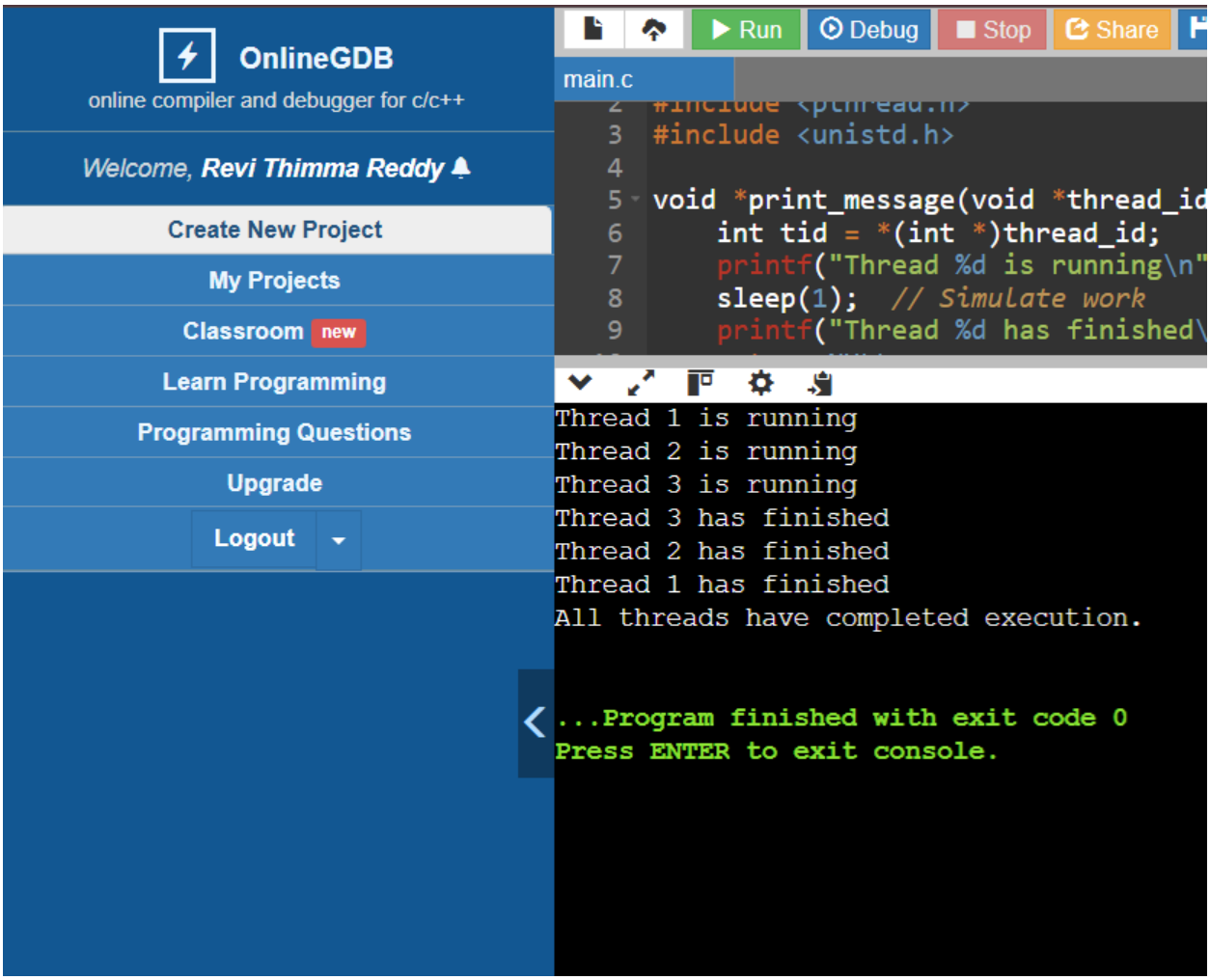
```
#include <stdio.h>

#include <pthread.h>

#include <unistd.h>



void *print_message(void *thread_id) {

    int tid = *(int *)thread_id;

    printf("Thread %d is running\n", tid);

    sleep(1);  // Simulate work
```

```
    printf("Thread %d has finished\n", tid);
    return NULL;
}

int main() {
    pthread_t threads[3];
    int thread_ids[3];

    for (int i = 0; i < 3; i++) {
        thread_ids[i] = i + 1;
        pthread_create(&threads[i], NULL, print_message, &thread_ids[i]);
    }

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

    printf("All threads have completed execution.\n");
    return 0;
}
```

Result:

When executed, the program creates three threads. Each thread prints its start and end message, demonstrating concurrent execution

Output:


OnlineGDB
online compiler and debugger for c/c++
Welcome, Revi Thimma Reddy
Create New Project
My Projects
Classroom new
Learn Programming
Programming Questions
Upgrade
Logout
Run
Debug
Stop
Share
main.c
#include <unistd.h>
void *print_message(void *thread_id
int tid = *(int *)thread_id;
printf("Thread %d is running\n"
sleep(1); // Simulate work
printf("Thread %d has finished\
Thread 1 is running
Thread 2 is running
Thread 3 is running
Thread 3 has finished
Thread 2 has finished
Thread 1 has finished
All threads have completed execution.
...Program finished with exit code 0
Press ENTER to exit console.