LAB Assignment 9

Operating Systems (UCS-303)

Instructions: The instructor is required to discuss the concept of Multithreading and semaphore with the students and the students have to implement following.

1. Write a C program to implement **multithreading** where:

   - The first thread calculates the **sum** of all elements in a shared integer array int data [10].
   - The second thread finds the **maximum** value in the array.
   - The **main thread** should wait for all three threads to complete using appropriate thread synchronization (e.g., pthread_join()) and then print their results.

2. Write a C program using **semaphores** to simulate two threads (thread1 and thread2) updating a **shared variable** inside a **critical section**. Ensure that only one thread can access the critical section at a time to **prevent race conditions**.
3. Write a C program using **semaphores** to solve the **Producer-Consumer Problem**, where:
   - The **Producer thread** generates data items and places them into a bounded buffer.
   - The **Consumer thread** removes items from the buffer and processes them. Use semaphores to ensure mutual exclusion and proper synchronization between threads.