**EXPERIMENT 18**

**Construct a C program to simulate producer consumer problem using semaphores.**

## AIM :

To construct a C program to simulate producer consumer problem using semaphores.

## ALGORITHM :

1. Include Libraries: Include necessary libraries such as stdio.h, stdlib.h, pthread.h for threads, and semaphore.h for semaphores.
2. Define Constants: Define constants such as the size of the buffer (maximum number of items), number of producer and consumer threads, etc.
3. Declare Global Variables: Declare global variables including the buffer (an array to hold the items), indices to track the next position for inserting and removing items, and semaphores for synchronization.
4. Initialize Semaphores: Initialize semaphores for controlling access to the buffer, tracking empty spaces in the buffer, and tracking available items in the buffer.
5. Create Producer and Consumer Threads: Create threads for producers and consumers. Each thread should have its own unique identifier (for example, an integer value).
6. Define Producer and Consumer Functions: Implement functions for producers and consumers. These functions will be executed by the corresponding threads. The producer function will generate items and insert them into the buffer, while the consumer function will remove items from the buffer.
7. Implement Buffer Operations: Implement functions for inserting items into the buffer (enqueue operation) and removing items from the buffer (dequeue operation). Use semaphores to control access to the buffer and update the indices accordingly.
8. Synchronize Producer and Consumer Threads: Use semaphores to synchronize the producer and consumer threads. The producer should wait if the buffer is full, and the consumer should wait if the buffer is empty.
9. Handle Thread Joining and Cleanup: After creating the threads, ensure that the main program waits for all threads to finish their execution. Use pthread\_join for this purpose. Also, clean up any resources allocated during the program execution.
10. Compile and Run: Compile the C program using a C compiler (such as gcc) and run the executable. Observe the behavior of the producer and consumer threads, ensuring that they are properly synchronized and the buffer operations are correctly implemented.

## OUTPUT :

A black screen with white text

Description automatically generated