Explanation

Global Variables

- ReadersCount - Counts number of readers present in critical section at given time.
- Resource - Resource which is shared among various threads.

Mutex

Three Mutexes are used-
- Reader_mtx - Provides mutual exclusion to ReadersCount variable which counts number of readers in critical section.
- Queue_mtx - Maintains order of arrival of readers and writers.
- Writer_mtx - Prevents readers and writers or multiple writers to be present in the critical section at same time.

Functions

1) Reader function

Entry section -
It acquires required mutexes to enter the critical section.
Reader tries to acquire Queue_mtx initially, if it is unavailable, reader is added to queue for the given mutex.
After acquiring Queue_mtx, it tries to acquire Reader_mtx to modify ReadersCount.

If it is the first reader, it tries to acquire Writer_mtx to confirm there are no writers in the critical section.
It releases Queue_mtx and Reader_mtx before entering the critical section.

Critical section - Reader reads the shared Resource in this section.

Exit section -
It releases the acquired mutexes.
Reader tries to acquire Reader_mtx to modify ReadersCount.
If it is the last reader, it releases Writer_mtx.
It releases Reader_mtx at the end.

2) **Writer function-**

Entry section -
This section acquires required mutexes to enter the critical section.
Writer tries to acquire Queue_mtx initially, if it is unavailable, writer is added to queue for the given mutex.
After acquiring Queue_mtx, it tries to acquire Writer_mtx and enter the critical section.
It releases Queue_mtx before entering the critical section.

Critical section - Writer modifies the shared Resource in this section.

Exit section -
This section releases the acquired mutexes.
Writer releases the Writer_mtx mutex.

3) **init()**- to initialize Label Array
4) **CreateThreads()-** for creation of threads
5) **JoinThreads()-** for joining of threads

Main function-

- Calling init() to initialize Label array
- Initialization of mutexes.
- CreateThreads() for creation of threads and JoinThreads() for joining of threads.
- Finally, all initialized mutexes are destroyed.