**EE 463 (Operating Systems)**

**Section: C3**

**Semester: Winter 2023**

Multithreaded C Program for Patient Room Access Control In A Hospital Using Pthread

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# **Main:**

Text

Description automatically generatedfunction initializes random number of doctors and visitors, creates the display thread, and creates the doctor and visitor threads. It then waits for the display thread to finish, sends cancellation signals to all other threads, waits for them to finish, and releases all resources.

Text

Description automatically generated

Text

Description automatically generated

# **Display Thread:**

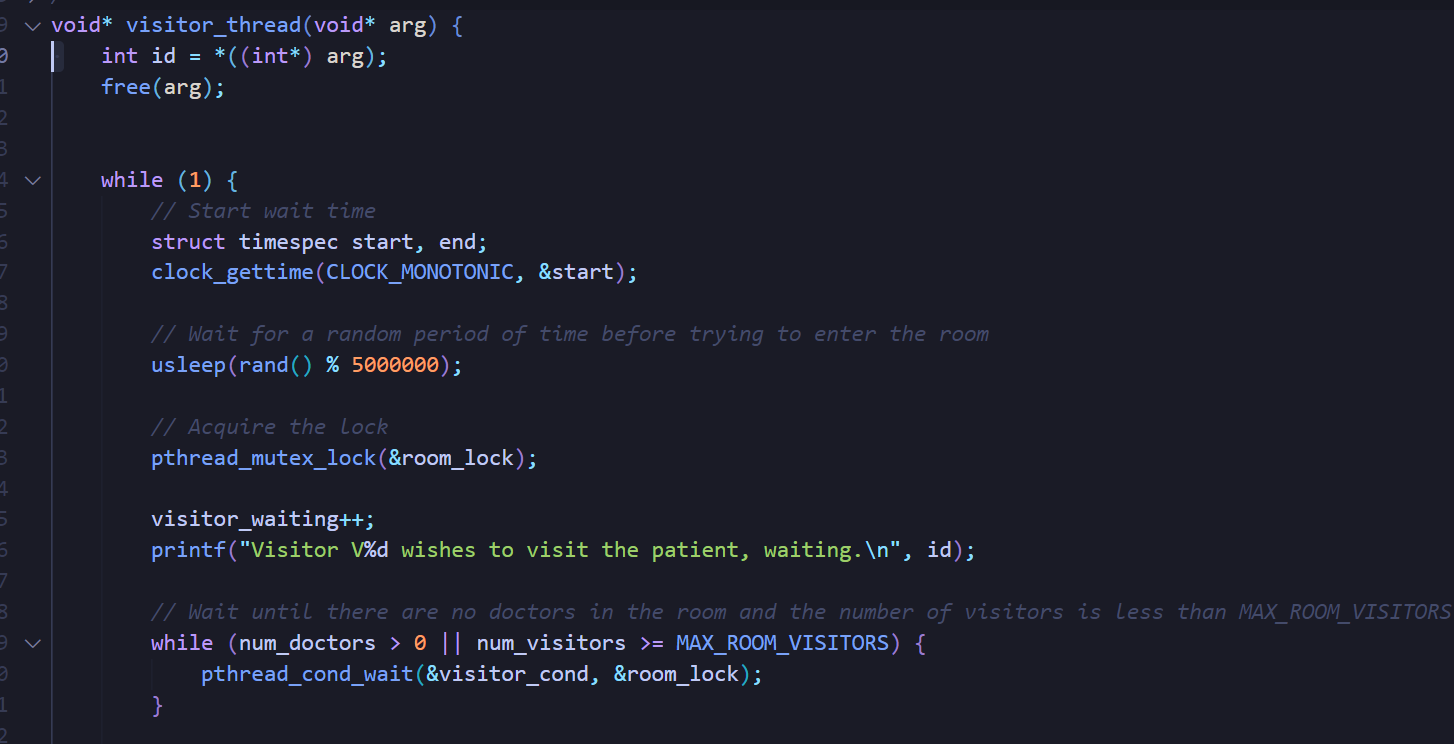
The function waits for a random period of time before printing the current status of the room. It acquires the room lock, prints the number of doctors and visitors in the room, and releases the lock.

Text

Description automatically generated

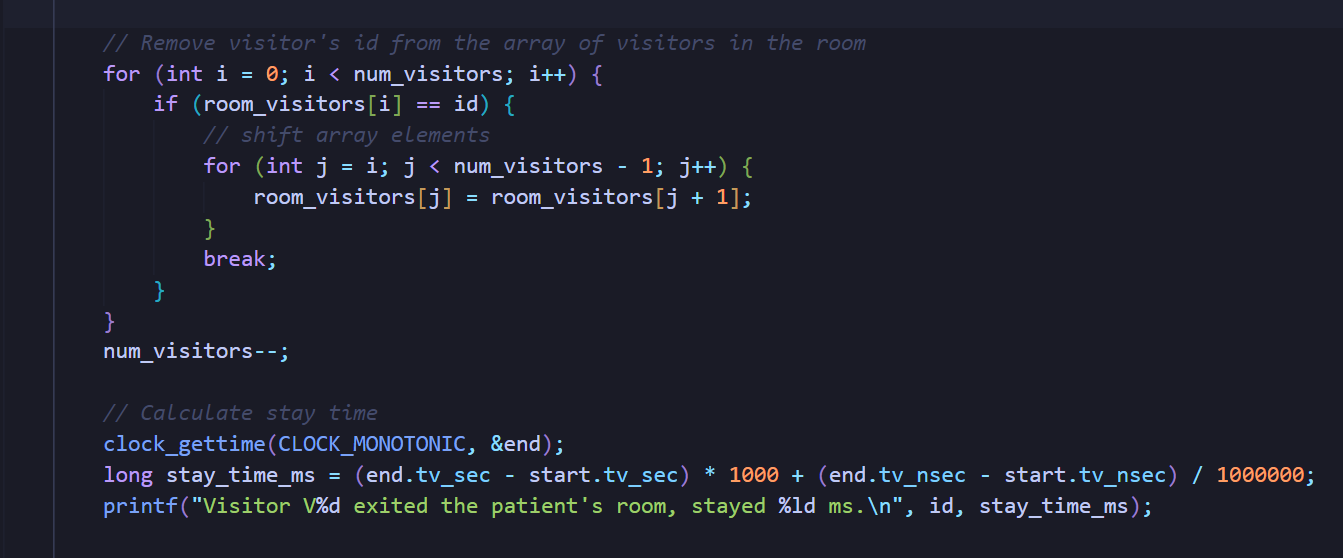
# **Visitor Thread:**

The function first waits for a random period of time before attempting to enter the room. Then, it acquires the lock on room\_lock and waits on visitor\_cond until there are no doctors in the room and the number of visitors is less than MAX\_ROOM\_VISITORS. Once it is allowed to enter, it increments num\_visitors and prints a message indicating that it has entered the room. The thread then releases the lock and waits for a random period of time before attempting to leave the room. When it is time to leave the room, it acquires the lock again, decrements num\_visitors, prints a message indicating that it has left the room, and broadcasts on visitor\_cond to unblock any waiting threads.



Text

Description automatically generated

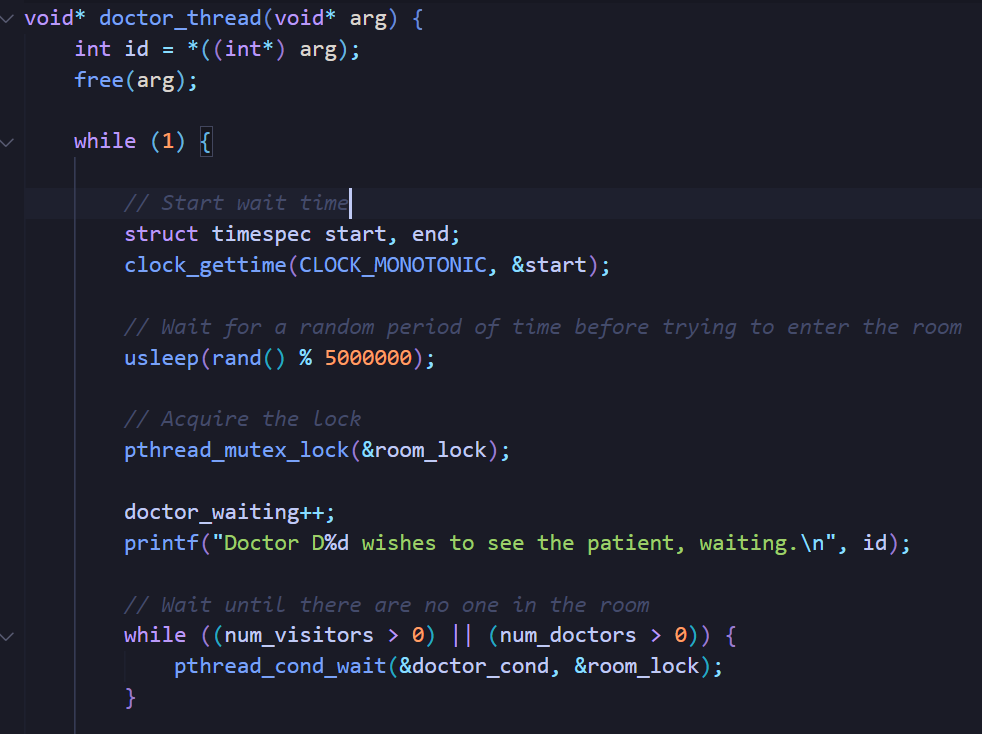


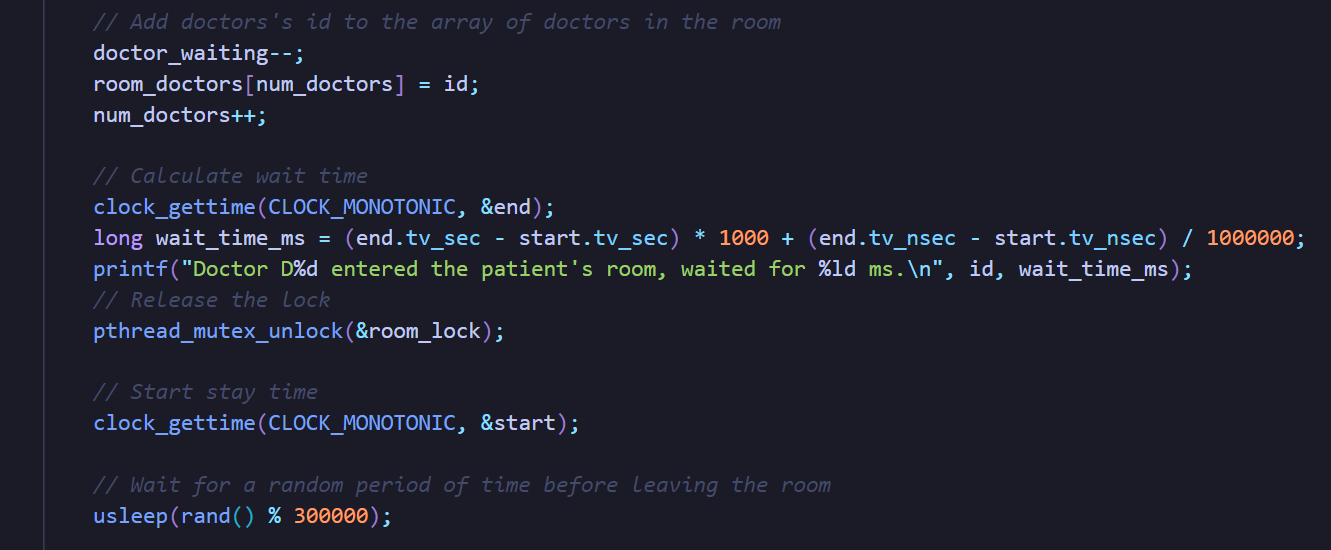
A screenshot of a computer

Description automatically generated with medium confidence

# **Doctor Thread:**

The function first waits for a random period before attempting to enter the room. Then, it acquires the lock on room\_lock and waits on doctor\_cond until there are no visitors in the room. Once it is allowed to enter, it increments num\_doctors and prints a message indicating that it has entered the room. The thread then releases the lock and waits for a random period before attempting to leave the room. When it is time to leave the room, it acquires the lock again, decrements num\_doctors, prints a message indicating that it has left the room, and broadcasts on doctor\_cond and visitor\_cond to unblock any waiting threads.





A screenshot of a computer

Description automatically generated

Text

Description automatically generated

**Unit Tests for all the program can be found in the Tests Folder**