Step 1: Implementing the Game as in the Attached File

The code is in the file linked named “Multithreaded_Space_Shooter_Game_Step1.cs”.

Step 2: Answer the Questions

Q1: Why do we need a separate thread for the enemy behavior ?

A separate thread is needed for the enemy behavior to allow the player and enemy to act independently and simultaneously. This ensures that the enemy continues moving and attacking while the main thread is handling player input and updating the game state. Without separate threads, the game would have to wait for player actions before updating the enemy behavior, making it less dynamic.

Q2: What would happen if we removed the `lock (lockObject)` statement ?

Without the lock statement, both the main thread and the enemy threads could attempt to access or modify shared data (like positions and health) simultaneously, which could lead to race conditions. This could cause unpredictable behavior, such as the player’s health or enemy's position being updated incorrectly.

Q3: What is the purpose of `Thread.Sleep(100)` in the main game loop ?

The `Thread.Sleep(100)` introduces a brief pause in the main loop, which simulates the passing of time between game updates. It prevents the CPU from being overwhelmed by continuously running the loop without a break and ensures that game updates and player input processing happen at a reasonable pace.

Q4: Why do we use `enemyThread.Join()` at the end of the game ?

The `enemyThread.Join()` ensures that the main thread waits for the enemy thread to finish its execution before exiting the program. Without this, the main thread could finish and terminate the program while the enemy thread is still running, potentially leading to crashes or incomplete game logic.

Step 3: Adding a Second Enemy

In the code, I added a second enemy (`enemy2`) with its own thread (`enemyThread2`). This enemy starts at position 0 and behaves similarly to the first enemy, with its own movement and attack behavior in the `Enemy2Behavior` method.

The code is in the file linked named “Multithreaded_Space_Shooter_Game_Step3.cs”.