Exercise – Finite State Machine

Exercises:

1. Implement your own Finite State Machine. This should consist of:
    a. A State Machine class that will handle state changing.
    b. A State base class containing pure virtual Enter, Update and Exit functions.
    c. A separate class for each state, these should inherit from the State base class.

    Your State Machine will need functions to:
    a. Update the current state.
    b. Change to a new state.
    c. Return the current state.
    d. Return the previous state.

2. Open up the Guard Patrol project and finish it off. Add in your state machine and create three states to govern the agents AI:
    a. **Patrol** State: The agent should patrol the 4 blue waypoints placed around the level. If the mouse moves within the agents red sight area then the agent should **attack**!
    b. **Attack** State: The agent should chase the mouse until it moves out of the red sight area, then the agent should **search** to see if it can find the mouse again.
    c. **Search** State: The agent should wander around randomly for 3 seconds and attempt to find the mouse again. If it does then **attack**, otherwise go back to **patrolling.**
    d. When each state first begins, it should change the agents colour using its SetColour() function. Green for Patrolling, Orange for Searching and Red for Attacking.

3. CHALLENGE: Give the agent some self-preservation. Each time the agent touches the mouse it loses 15 life while if it touches the health pickup, it is restored to full health. Add in a fourth state to go pick it up when needed.
    a. **Pick Up** State: The agent should move towards the health pickup and touch it. Regardless of what state it is currently in, it should switch to this state if its health falls below 50. It should also change to this state if its health is less 100 and it's in the **patrol** state.
    b. While in the **Pick Up** state, the agent should change colour to be blue.
    c. Once its health is restored to 100, it should go back to whatever its previous state was.