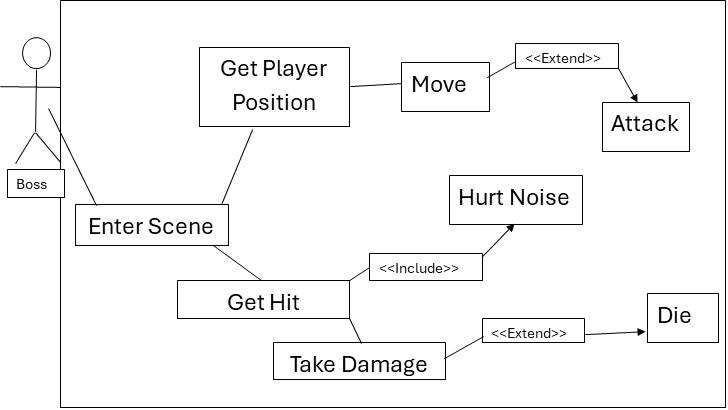
Name: **Jonathan Palmer** Mark \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/50

## Brief introduction \_\_/3

In our pirate-themed sidescroller, the boss fight serves as a key challenge, testing the player's skill and strategy. I am responsible for designing and implementing the boss’s behavior, attack patterns, and interactions with the player. My focus is on creating a dynamic and engaging encounter that adapts to the player’s actions, ensuring a balanced yet thrilling fight. By structuring the boss’s AI and mechanics efficiently, the encounter can be fine-tuned for difficulty and seamlessly integrated into the game.

## Use case diagram with scenario \_\_14

### Use Case Diagrams



### Scenarios

### **Scenario 1: Boss Enters Scene**

**Actors:** Boss

**Preconditions:** The player has reached the designated boss fight area.

**Main Flow:**

1. The boss spawns into the scene.
2. The boss retrieves the player’s position.
3. The boss initiates movement towards the player.
4. The boss begins its attack pattern based on proximity.

**Postconditions:** The boss is now actively engaging the player in combat.

### **Scenario 2: Boss Attacks the Player**

**Actors:** Boss

**Preconditions:** The boss is in range of the player.

**Main Flow:**

1. The boss retrieves the player's position.
2. The boss moves toward the player.
3. The boss extends its behavior to execute an attack.

**Postconditions:** The player is at risk of taking damage if they do not evade the attack.

### **Scenario 3: Boss Takes Damage**

**Actors:** Boss

**Preconditions:** The player successfully lands an attack on the boss.

**Main Flow:**

1. The boss registers a hit from the player.
2. The boss initiates the "Take Damage" process.
3. The boss plays a "Hurt Noise" sound effect.
4. The boss's health is reduced accordingly.

**Postconditions:** If the boss’s health reaches zero, it proceeds to the "Die" sequence.

### **Scenario 4: Boss Dies**

**Actors:** Boss

**Preconditions:** The boss’s health reaches zero.

**Main Flow:**

1. The boss initiates the "Take Damage" process.
2. The boss extends the process to trigger the "Die" sequence.
3. The boss plays a defeat animation and is removed from the game.

**Postconditions:** The player has successfully defeated the boss, allowing progression in the game.

## Data Flow diagram(s) from Level 0 to process description for your feature \_\_\_\_\_\_\_14

### Data Flow Diagrams

### Process Descriptions

### **1. Boss Update Process**

**Trigger:** Game loop updates.

**Description:**

* **Retrieve Player Location:**
  + Get the current position of the player.
  + Determine proximity to the boss.
* **Decide Boss Behavior:**
  + IF the player is outside a certain range → Go toward.
  + IF the player is within attack range → Execute attack behavior.
* **Update Boss Position:**
  + Adjust movement based on player location and movement patterns.
  + Check for obstacles and adjust path.
* **Attack Execution (if applicable):**
  + Determine attack type based on player position and boss attack cooldowns.
  + Execute attack animation and apply weapon effect.
* **Loop:** Continue updating the boss's state and actions each frame.

### **2. Boss Attack Process**

**Trigger:** Player is detected within attack range.

**Description:**

* **Detection Phase:**
  + Monitor player’s position relative to the boss.
  + IF the player is within attack range → Proceed to attack preparation.
* **Attack Preparation:**
  + Apply attack cooldown to prevent excessive attacks.
  + Play attack effects.
* **Execute Attack:**
  + Activate attack hitbox or fire projectile if ranged.
  + Check for collision with the player.
* **Post-Attack Cooldown:**
  + Apply a short delay before the next attack can be triggered.
* **Reset:** Return to the detection phase and repeat process.

### **3. Boss Damage Handling Process**

**Trigger:** Boss is hit by a player attack.

**Description:**

* **Collision Detection:**
  + Check if the boss’s hitbox overlaps with an active player attack.
* **Calculate Damage:**
  + Apply damage to boss health based on player weapon stats.
* **Apply Effects:**
  + IF damage is taken → Reduce boss health, trigger "Hurt Noise" sound effect.
  + IF health reaches zero → Initiate death sequence.
* **Loop:** Continue monitoring for further damage events.

### **4. Boss Death Process**

**Trigger:** Boss health reaches zero.

**Description:**

* **Trigger Death Animation:**
  + Play the appropriate boss death effects.
  + Remove the boss entity from active gameplay.
* **Drop Rewards:**
  + Spawn any collectible items or unlock progression elements.
* **Update UI:**
  + Inform the player of the boss defeat.
* **End Boss Encounter:**
  + Allow the player to proceed to trigger story events.

## Acceptance Tests \_\_\_\_\_\_\_\_9

### **1. Boss Movement**

* **Test Case 1: Basic Movement**
* **Input:** Boss enters the scene and starts tracking the player’s position.
* **Expected Output:** The boss moves toward the player based on its movement pattern.
* **Test Case 2: Obstacle Handling (Boundary Case)**
* **Input:** An obstacle is placed between the boss and the player.
* **Expected Output:** The boss stops, changes direction, or adjusts its movement path to avoid the obstacle.
* **Test Case 3: Player Leaves Movement Range (Exception Case)**
* **Input:** The player moves out of the boss's tracking range.
* **Expected Output:** The boss either stops moving or enters an idle state until the player returns within range.

### **2. Boss Attack**

* **Test Case 1: Basic Attack Execution**
* **Input:** The player enters the boss’s attack range.
* **Expected Output:** The boss initiates an attack animation and attempts to damage the player.
* **Test Case 2: Attack Missed Due to Player Movement (Exception Case)**
* **Input:** The player moves out of range just as the boss attacks.
* **Expected Output:** The attack does not connect, and the boss resets or prepares for another attack.
* **Test Case 3: Edge of Hitbox (Boundary Case)**
* **Input:** The player is positioned at the very edge of the boss’s attack hitbox.
* **Expected Output:** The attack connects if the hitbox reaches the player; otherwise, it misses.

### **3. Boss Taking Damage**

* **Test Case 1: Player Lands a Successful Hit**
* **Input:** The player attacks the boss with a valid weapon.
* **Expected Output:** The boss takes damage, reducing its health accordingly.
* **Test Case 2: Invincibility Frames Active (Exception Case)**
* **Input:** The player attacks while the boss is in an invincible state.
* **Expected Output:** The boss does not take damage, and the attack is ignored.
* **Test Case 3: Boss Takes Lethal Damage (Boundary Case)**
* **Input:** The player deals just enough damage to reduce the boss’s health to exactly zero.
* **Expected Output:** The boss immediately transitions to the death sequence.

### **4. Boss Death**

* **Test Case 1: Standard Death Sequence**
* **Input:** The boss’s health reaches zero.
* **Expected Output:** The boss plays a death animation, stops all attacks, and is removed from the game.
* **Test Case 2: Death-Triggered Ability (Exception Case)**
* **Input:** The boss has an ability that activates upon death (e.g., an explosion).
* **Expected Output:** The ability triggers before the boss is removed.
* **Test Case 3: Multiple Hits on Death Frame (Boundary Case)**
* **Input:** The player attacks multiple times as the boss’s health reaches zero.
* **Expected Output:** The boss dies correctly without duplicate death animations or errors.

## Timeline \_\_\_\_\_\_\_\_\_/10

### Work items

|  |  |  |
| --- | --- | --- |
| Task | Duration (hours) | Predecessor Task(s) |
| 1. Requirements Gathering | 2 | - |
| 2. Research Boss AI Patterns | 4 | 1 |
| 3. Design Boss Behavior Flow | 2 | 1 |
| 4. Add Movement Logic | 4 | 3 |
| 5. Add Detection Logic | 3 | 3 |
| 6. Add Attack Logic | 4 | 3 |
| 7. Implement Exception Handling | 2 | 4, 5, 6 |
| 8. Testing for Each Feature | 3 | 4, 5, 6 |
| 9. Integrate Game Engine | 2 | 7, 8 |
| 10. Bug Fixes & Optimization | 2 | 9 |
| 11. Final Testing & Debugging | 2 | 10 |

### Pert diagram

### Gantt timeline

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Step |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hours | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |