# Milestone 3 - Test Plan

Team 10 - Soulless

### **Instructions to Start the Game:**

1. In the project folder, run:
   * cmake .
   * make
2. After building, run ./soulless
3. Ensure that your machine's audio is on.

### **Game Mechanics and Controls:**

#### Player Movement:

* **Movement Keys**: Player can move in 8 directions (N, S, E, W, NW, NE, SW, SE) using W, A, S, D.
  + Holding two keys, such as WA, moves diagonally (e.g., NW).
  + Movement is independent of mouse position.

#### Shooting Mechanics:

* **Mouse Direction**: Shooting direction is based on mouse position, allowing for any direction.
* **Shooting Action**: Left-click to shoot first spell in queue; Right-click to shoot second spell in queue; cooldown prevents rapid firing / rapid healing (there is a cooldown for left click/q and right/e)
  + Player character should turn to face closest cardinal or intermediate direction towards the mouse when shooting a spell
* **Drop Spell and Heal:** Press q to drop the left spell. Press e to drop the right spell (shares same cooldown as its shoot counterpart)
* **Projectile**: See Spell Mechanics below.
* **Enemy Interaction**: Damaging spells reduce enemy health on impact; enemies disappear only when their health reaches 0.
* **Audio Cue**: Ensure sound effects for fireball, lightning, water, and enemy hits trigger at appropriate times.

#### Health Mechanics and Invincibility:

* **Damage and Cooldowns**: Player takes damage upon contact with enemies or their projectiles, indicated by an impact sound.
  + **Damage Lock**: Player is invincible for a short time after taking damage.
  + **Visual Indicator**: Player flashes red when damaged, and then becomes slightly transparent to indicate the damage lock.
* **Health Bar**: Health bar is shown above player and enemies, and corresponds to their current health. Player begins with 100 HP (which is also the maximum). Enemies have varying HP.
* **Health Recovery**:
  + Player: Regain 10 HP by walking over a campfire (if health is not full)
  + Archer (enemy type): When in fleeing mode they will regenerate health until it reaches 30HP.

#### Additional Controls:

* **FPS Toggle**: Press Shift + F to toggle FPS display in the top-right corner.
* **Game Over Shortcut**: Press "J" to force a game over.
* **Debug Mode:** Press “K” to enter debug mode, visualizing bounding boxes, collisions, and debug logs
* **Force Spawn Powerup Collectible:** (requires debug mode) “P” to initiate spell spawn event
* **Tutorial mode**: Explained later in the document

#### Spell Mechanics:

* **Spell Types**:
  + **Fire Projectile**: Shoots in a straight line, damaging the first enemy hit or disappearing after a certain distance.
  + **Lightning Strike**: Hits a large area after a short delay, damaging multiple enemies. (large radius).
  + **Water Barrier**: Orb around the player that blocks the next enemy projectile or lasts 1 second.
  + **Wind Pillar**: A tornado that can be placed that does continuous damage over its lifetime of 10 seconds when an enemy collides with it.
  + **Plasma**: Shoots in a straight line, flies slow then fast and damages first enemy hit.
  + **AOE Spells**: Lightning and wind can damage multiple enemies within their range.
* **Spell Queue**: Spell queue holds up to 8 spells, adding a random spell when one is used
  + **Spell Display**: Current spell shown at the bottom of the screen.

#### Camera and Visuals:

* **Fixed Camera**: Camera follows the player as they move, stops at world boundaries.
* **Collision Visualization**: In debug mode, collision boxes are shown for entities with motion.
  + **Mesh Collisions**: Player collides with entities only when the bounding box collides with the player’s mesh.
  + **Map Boundaries**: Ensure the player remains within map boundaries.
* **Rain:** During the duration of the game a rain effect should consistently be playing
* **Background Generation**: A randomly generated, grassy/muddy background with shrubs should be visible throughout the game’s playtime

#### Animation:

* **Player Animations**: Includes idle, walking and spell-casting animations. Animations align with the 8 directions in the game.
* **Spell Animations:** Water, lightning, and wind spells are animated during their cast
* **Other Animations:** Campfire burning

### **Game Start, Tutorial, and Pausing:**

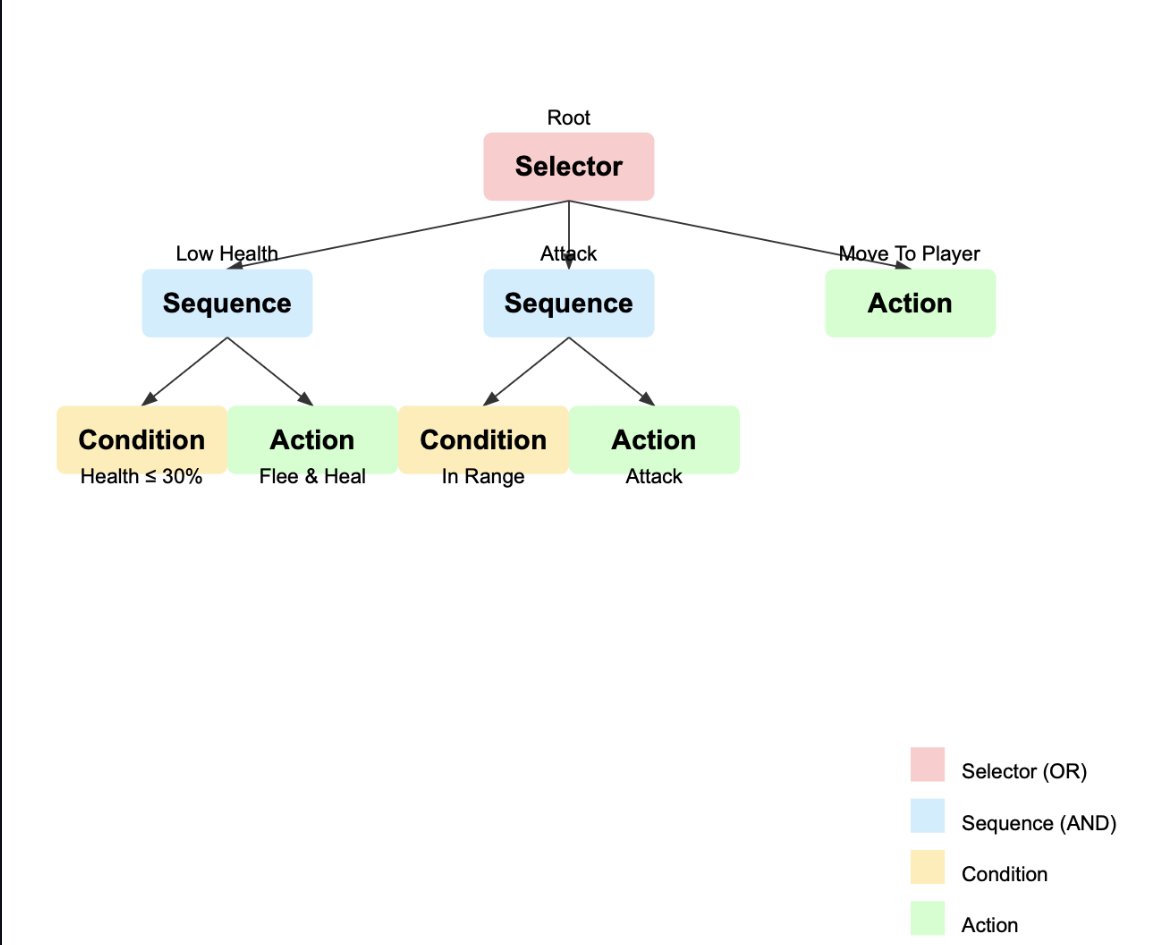
* **Tutorial Screen**: Game begins with a tutorial showing controls. Press space or mouse click to exit the tutorial or pause screen.
  + **Pause / Resume**: Press shift + T to pause or open the tutorial during gameplay. Game loop should also pause/resume.
  + **Navigation:** There are three pages in the tutorial screen, navigate with keys “1”, “2”, and “3”
  + **Gameplay:** Description of the objectives, story, and events to look for in the game
  + **Controls:** Describes the player controls for the game
  + **Settings:** Additional controls for debugging and testing

### **Enemy Behaviour:**

* **Enemies Overview**

Enemies spawn incrementally, and will move towards the player and try to attack them.

* + **Knights**: Spawn from the start, new one will spawn every 8 seconds.
    - Ranged attack: periodically throw pitchforks which deal 10 damage.
    - Colliding with the player will also deal 5 damage.
  + **Archers**: Spawn after 1 minute, new one will spawn every 16 seconds
    - Ranged attack: periodically fire arrows which deal 20 damage.
    - Will retreat on low health (see below)
  + **Paladin:** Spawn after 2 minutes, new one will spawn every 20 seconds
    - “Tank” enemy (has a lot of HP)
    - Melee attack: sword swing which deals 35 damage
    - Colliding with the player will also deal 15 damage
  + **Slasher**: Spawn after 3 minutes, new one will spawn every 20 seconds
    - Fastest enemy, runs at player
    - Melee attack: forward dash/slash which deals 20 damage
  + **Dark Lord(Boss):** Spawns after 4.5 minutes.
* **Enemy AI**:
  + **Low Health Retreat**: Only archers retreat when health is ≤ 30%, with a slower speed as they are wounded until their health reaches 30% or just above it.
  + **Move closer to player**: If the player is outside of the enemy’s range, they will move closer to the player.
  + **Attack and Range**: Enemies approach and attack if within range. Ranged enemies stop upon reaching their attack range and will not move closer to the player.



* **Boss Features**:
  + Dark lord periodically casts its attack every five seconds
  + Its attack’s speed follows a sigmoid curve: plateaus followed by steep increase until it plateaus again
  + Drops the exclusive plasma spell upon defeating it, which does not periodically spawn unlike other spells

### **Load and Save Game:**

* **Can save game while in the tutorial/pause game screen by pressing “s” – takes a bit of time so a couple of seconds may be needed**
  + **Cannot save game if the player is dead**
  + **Should save in data.json file:**
    - **Enemies: health, position, cooldown, and spawn timers (ex. Paladins spawn X minutes into the game. If the player has survived X minutes before saving, then when they load the saved state, Paladins should continue to spawn without having to wait X minutes)**
    - **Player: health, position, and spell queue**
* **Can load game while in the tutorial/pause game screen by pressing “l” (loads features above)**

### **Death and Loss Condition:**

* **Player Death**:
  + **Background Music Change**: Changes upon death and reverts after the reset.
  + **Rotation**: Player rotates 180 degrees on death.
  + **Disable Input**: Player cannot move, cast spells, or take damage after death.
  + **Defeat Announcement**: Mage announces defeat with a unique audio cue.
  + **Game Reset**: After ~6 seconds, game resets with the player in the center, and all enemies and projectiles removed.

### **Audio Testing:**

#### Background Music:

* **Start**: Background music plays at the beginning.
* **Death**: Music changes on player death and resets after respawn.

#### Sound Effects:

Verify sound effects for:

* Fireball, Lightning, Water, Wind, and Plasma spells
* Spell collectible spawn
* Spell collectible pickup
* Enemy hit
* Player damage
* Player death announcement

### **Debug and Testing:**

#### Debug Controls:

* **Visualise Collisions**: "K" to show debug collision boxes.
* **Force Spawn Powerup Collectible:** (requires debug) “P” to randomly spawn missing spell collectible
* **Force Game Over**: "J" to immediately trigger game over.