

Team Syntax Soil

Project Secret Feature Plan

## Features

1. Large bullets can push smaller bullets – the large bullet can split into smaller bullets when it hits a wall.
2. Screen is flipped (horizontally or vertically) by the boss's attack. All the objects on the screen thus change their position/velocity based on the flip. (Player would stay facing the other direction if flipped horizontally, they'd be shooting down instead of up.)

### Plan for Feature 1

We believe this feature will be the more straightforward one to integrate. We can add some new component that entities can have, like "PusherComponent" and "PushableComponent". Then we can add a check in the CollisionSystem to apply the push force if the colliding objects have these components. The Pushable entity will have its VelocityComponent modified based on the Pusher component's data.

For the large bullet splitting into multiple smaller ones, we need an event when the bullet hits the boundary, then just have our EntityManager spawn smaller bullets. We could also create a new Component "BulletContainer" that holds BulletData and number to spawn that can be used for creating the smaller bullets. When the large bullet touches the bounds, look in that component and create however many and whatever type of bullets desired. Then despawn the larger bullet. We could add a check in the OffScreenDeletion system if the entity being deleted has the BulletContainerComponent, then spawn all the bullets before despawning.

Changes Summary: Adding more components, new logic in CollisionSystem

Possible Useful Design Patterns: Composite (bullets composed of smaller bullets)

### Plan for Feature 2

We can utilize Monogame's SpriteEffects class which is an Enum with FlipHorizontally, FlipVertically. Then we use this when calling Monogame's draw function to draw our sprites. So we just need to know if the screen is currently flipped, draw the sprites with that SpriteEffect applied. We will also have to modify the entity's positions so they flip across the vertical or horizontal split, which should be simple enough since we have the playable area rectangle. To get it to animate, it would be tricky.

Changes Summary: Modify Draw logic for sprites and background UI in the gameplay scene.

Possible Useful Design Patterns: Command (boss sends the flip screen command when attacking), Observer (gameplay scene observes the boss and is told when the boss is flipping the screen with their attack).