Project Zero

Game developed for the Game Development course at Unifi.

Authors and roles

- Angelo Rosa
  - Enemies AI and movement patterns
  - Weapon logic and managing
  - Main Menu
  - Points management and gameplay logic
- Roberto Magrini
  - Level Design
  - Enemies and weapons prefabs
  - Animations
  - Gameplay UI

Brief Description:

Project Zero is a top-down 2D shooter focusing on parrying, shooting, and fast-paced gameplay. Similar games include Hotline Miami 1 & 2, Door Kickers, and Nuclear Throne.

Setting:

The game is set shortly, aboard a space station orbiting Jupiter. A twisted competition, similar to a Hunger Games scenario, is played and streamed to the Metanet (or Hypernet, if we want a more serious tone). You are one of the competitors, and your objective is to survive, escape, and collect as much cash as possible. To succeed, you'll need to paint the station red with blood.

Game Mechanics:

Movement:

- **Movement** Standard top-down movement, using `WASD` for movement and the mouse to aim.
- **Dash** Press [Space] to dash a short distance. The dash direction is determined by the mouse pointer.
- **Jump** There is no jump mechanic.
- **Free camera** Hold `shift` for a free camera view
- **F equip secondary**
- **Q shoot with secondary**
- **Mouse left button** shoot with primary
- **Mouse right button**, leave the primary weapon on the ground

When the ammo of a weapon finished, you can throw a gun at an enemy and kill it eventually. But this is not valid for all weapons, only for those one which are decided to be throwable.

Weapons:

Weapons are divided into **Primary** and **Secondary** categories. Enemies can use **Primary** based on an internal list of equipable weapons, but cannot equip/use any secondary.

Primary Weapons:

Primary weapons are your main damage-dealers, and they are subdivided into **Ranged** and **Melee** weapons.

Ranged Weapons:

Ranged weapons are effective at long range but have limited ammunition.

List of Ranged Weapons:

- **Pistol**:
    - Firing Rate: Medium
- **Assault Rifle**:
    - Firing Rate: High

Melee Weapons:

Melee weapons are effective only at close range, don't require ammunition, and can parry enemy melee attacks with [Left Click].

Parry mechanic: Timing is key. If you successfully parry, the enemy becomes stunned for a short period, then if you swing again in that period and the enemy gets hit, it dies.

List of Melee Weapons:

- **Sword**:
    - Range: Low
    - Swing Speed: Medium

Secondary Weapons:

Secondary weapons are items activated with [Q].

- **Teleport**:
    - Effect: Teleports the player to the cursor's position
    - Charges: 3 (Not Rechargeable)

All weapons can be left on the ground because of a weapon switch or for whatever other reason. All current ammo and reload stats, are saved in the

spawned weapon prefab, so if re-euipped, the previous status is restored. These conditions are valid unless the ammo and reloads for a weapon are finished, and in the last case, the weapon gets automatically unequipped and destroyed without the possibility to be pickable again by enemies or the player. But, if the weapon was a primary throwable weapon, the weapon get throwed at a certain position making enemies targettable, before to despawn and being unavailable anymore.

Levels:

Levels are handcrafted and consist of multiple areas (scenes). Each area contains enemies that patrol predefined paths or guard specific points. Weapons and equipment spawn in special objects called **E-Boxes**. The player begins at one end of the map, and the exit is located on the opposite side. The exit unlocks when all enemies in the scene are killed. If the player dies before reaching the exit, the level resets, and all equipment is lost. Weapons that have a blue background are primary weapons, and weapons that have an orange background are secondary.

Enemies' movements:

- **Patrol Movement**

  Moves around a specified pattern. When another movement is activated, before to start again the patrolling movement, a repositioning of the character is needed until the first base patrol point is not reached.

- **Chase Movement**

  Chases the enemy and handles repositioning using waypoints for avoiding obstacles. The chase lasts until the maximum time of chasing is reached. When the alert status of an enemy is disposed, the movement switches to the patrol one, which eventually handles repositioning. When the player is detected, the enemies leaves `0.5s` of time before to start shooting and the same amount of time is used each time the enemy was using chase waypoint for repositioning.

- **Weapon Finder Movement**

  If an enemy starts unequipped or an enemy finishes its ammo, it tries to reequip the closest equipable weapon based on its list of equipable weapon types. Weapons left on the ground by the player are equippable by the enemies too. Some certain weapons can be marked as `Available to the player only` and those weapons are equippable by the player only at the first time. Then, if the player leaves the same gun on the ground, it will be available to the enemies too. If an enemy is trying to reach a weapon spot and the player is detected nearby, the player is ignored. If instead,

there is no available weapon on the ground equipable, the coward movement is activated wheter the player is detected or not.

- **Coward Movement**

  When an enemy does not have a weapon equipped and no weapon is available on the ground, it starts to run away from the player until eventually, another weapon is available and pickable by that enemy. This remains valid even if the weapons have been picked up by other enemies, leading to have a dynamic decisional weapon status by the enemies.

- All movements are based on the graph and graph theory for reaching a certain point on the map. And so, before to start each scene, a graph is computed for using the BFS algorithm for finding a path and a KDTree structure is used as well for mantaining a tree of all available points and finding a closer one considering raycasting or not.

Enemies:

Enemies are categorised into:

- **Goon**: Basic enemy, killed with a single shot from any damage-dealing weapon. It can equip any Ranged and Melee weapon.

- **Dog**: Fast, melee-based enemies that rush the player at sight. It does not equip Ranged nor Melee weapons (such as a sword), but it is considered a melee weapon itself.

Reward System:

- **Scoring:** Every kill earns points. The points are calculated based on a formula:

```
*  More shots → higher score
*  The term w₁·S grows linearly with shots delivered.
*
*  Less chase time → higher score
*  The term w₂·(1/(T+ε)) is largest when T is small, and falls
off as T increases.
*
*  Plus base points
*  Simply add existing GetBasePoints().
* in other words:
*
* - The less the TotalChasedTime is, the higher the point will be
* - The higher the total shots delivered by enemies, the higher
the point will be
* - sum the base points to the calculation done on the first 2
```

UI

Main Menu:

The main menu has an animated background and three buttons: 1. **Start**: Starts the game. 2. **Stats**: Shows the previous scores. 3. **Options**: Opens the options UI. 4. **Quit**: Exits the game and returns to the operating system.

Video gameplay