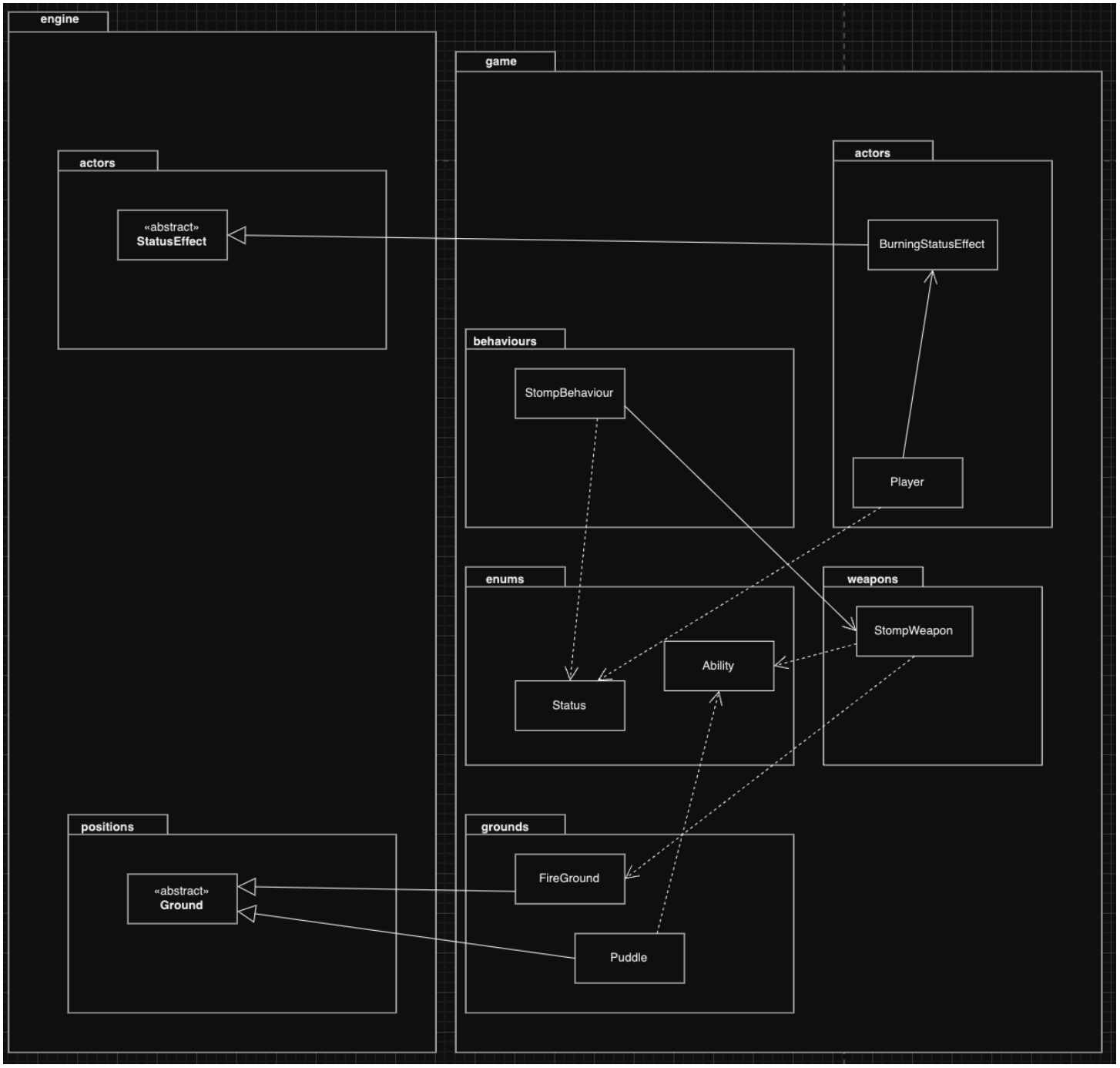
REQUIREMENT 4



StompWeapon:

- Role: Handles the Furnace Golem's primary stomp attack, with a 10% chance of causing an explosion.
- Responsibilities:
    - Direct attack on targets (e.g., Tarnished).
    - Potential explosion that causes damage and sets the ground on fire.
    - Ensures some actors (e.g., the Furnace Golem) are immune to the explosion and fire damage.
- Interaction: Causes explosions, interacts with nearby actors, and triggers fire effects on the ground.

FireGround:

- Role: Manages the burning effect on the ground for 5 turns.
- Responsibilities:
    - Turns normal ground into burning ground, dealing 5 damage per turn to actors standing on it.
    - Tracks and reverts the ground to normal after the burning effect ends.
- Interaction: Works with StompWeapon to apply fire effects, damages actors without fire resistance.

BurningStatusEffect:

- Role: Applies fire damage to actors on burning ground.
- Responsibilities:
    - Deals ongoing fire damage while actors stand on burning ground.
    - Stops damage when actors leave the area or after a set number of turns.
    - Tracks the duration of the burning effect.
- Interaction: Works with FireGround and actors affected by the burning status.

Puddle:

- Role: Represents fire-resistant ground where burn effects don't apply.
- Responsibilities:
    - Acts as a safe zone, preventing actors from taking burn damage.
    - Cannot be turned into burning ground.
- Interaction: Remains unaffected by FireGround or explosions from StompWeapon.

Ability Enum:

- Role: Represents special traits like fire resistance.
- Responsibilities:
    - Defines the FIRE_RESISTANT ability for actors and ground types immune to fire.
- Interaction: Used by actors (e.g., Furnace Golem) and ground types (e.g., Puddle) to resist fire damage.

Key Design Considerations:

1. Explosion and Collateral Damage:
    - The StompWeapon class manages the core logic for the explosion and its consequences. When an explosion is triggered, it applies damage to all surrounding actors except those with the FIRE_RESISTANT ability.
    - The design handles collateral damage effectively by checking actor and ground properties before applying damage, ensuring that unintended damage to allies or fire-resistant actors is avoided.
2. Burning Ground Mechanics:
    - The FireGround class ensures that the ground in the vicinity of the Golem's explosion is set on fire for a limited duration (5 turns). This ground will damage any actor standing on it (except fire-resistant ones) and revert to its original state once the duration ends.
    - By separating the burning ground logic from the weapon logic, the design maintains low coupling. Changes to how fire behaves can be isolated within FireGround without needing to change the StompWeapon.
3. Actor Status Effects:
    - The BurningStatusEffect class manages the ongoing damage to actors on burning ground. It applies the fire status, deals periodic damage, and ensures the effect is removed after a certain time.
    - The separation of status effects into a distinct class improves cohesion since the responsibility for status management is centralised, simplifying future modifications or additions of new status effects.
4. Ground Types:
    - The introduction of Puddle as a non-burnable ground type illustrates the system's flexibility in accommodating different ground behaviours.
    - Open-Closed Principle is followed here: we can easily add new ground types (e.g., ice, sand) without modifying the existing ground logic, simply by creating new classes with specific abilities or properties.

SOLID Principles Applied:

- Single Responsibility Principle (SRP): Each class has a well-defined role. For instance, StompWeapon handles attack and explosion logic, while FireGround manages the state and behaviour of burning areas. This clear separation enhances maintainability.
- Open-Closed Principle (OCP): The design allows for easy extension (e.g., new ground types or attack behaviours) without modifying the existing codebase. For instance, adding a new ground type like "lava" would require creating a new class, not altering FireGround.
- Liskov Substitution Principle (LSP): The system ensures that all subclasses or new classes (such as different types of grounds or weapons) can be used interchangeably without affecting the correctness of the program. A Ground can always be replaced with another subtype like FireGround or Puddle without breaking the game logic.
- Interface Segregation Principle (ISP): Each class implements only the functionality it needs. For example, StompWeapon only implements the weapon interface to provide the attack method, while Ground classes focus on their respective ground behaviours.
- Dependency Inversion Principle (DIP): High-level modules (like FurnaceGolem or actors) do not directly depend on low-level modules (like FireGround). Instead, they depend on abstractions like Weapon and Ground, making the system more flexible and decoupled.

Pros:

- Low Coupling: The system is designed with low coupling between components. For example, the StompWeapon only cares about dealing damage and triggering the explosion—it doesn't manage how ground burning works, which is handled by FireGround.
- High Cohesion: Each class has a single, focused responsibility, enhancing clarity and maintainability.
- Flexibility: Adding new ground types, status effects, or even new types of enemies with similar behaviours (e.g., a Lava Golem that leaves behind lava instead of fire) would be straightforward without modifying existing code.
- Extensibility: Future extensions (such as new elemental effects or ground interactions) can easily be added using the current design structure.

Cons:

- Complexity: Managing multiple new status effects and ground transitions introduces additional complexity. Developers must carefully track how these effects are applied and removed to avoid unintended consequences, such as actors being burned multiple times incorrectly.

Interactions:

1. Furnace Golem's Attack:
    - When the FurnaceGolem uses its StompWeapon, it will attempt to hit the target (Tarnished or another actor) with a basic attack.
    - There is a 10% chance of triggering an explosion, damaging all actors in the surrounding area. If this happens, FireGround will be created around the Golem.
2. Burning Ground:
    - Once the ground is set on fire by the explosion, it will deal 5 damage per turn to any actor standing on it, unless they possess the FIRE_RESISTANT ability.
    - The ground remains in this state for 5 turns, after which it reverts to its original state.
3. Safe Zones (Puddles):
    - Puddles serve as safe zones where actors can avoid the burning ground. They do not catch fire due to their FIRE_RESISTANT ability, providing players with strategic opportunities to evade the burning effect.