FIT2099 Assignment 1, 2, & 3 [Updated from Assignment 2]

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Note

[Assignment 2]

We have removed and changed some parts of design rationale, class diagram, and interaction diagram required for group of 3 due to a member leaving the group.

[Assignment 3]

Selected structured mode for flexible requirements.

Design Rationale

Player and Estus Flask

Application creates our Player instance, Unkindled, Player class extends Actor class to inherit attributes and methods as an actor in game. Displaying the player's HP, weapon, and soul in console is possible by overriding playTurn and toString methods inherited to include additional player's description.

As an actor, Unkindled can store items in inventory. Two items are added to the inventory, a Broadsword instance and an EstusFlask instance. Both instances are subclasses of Item thus allowing them to be created and added to inventory, storing inside inventory is preferable because inventory of each actor is traversed while the game runs and can provide actions. Items can be added either when Player is constructed or created in Application first before added after the Player is constructed. We selected the first option as it is simpler and will not be confused with creation of other items or components in Application.

EstusFlask class is created which extends abstract class Item instead of PortableItem as EstusFlask cannot be dropped. EstusFlask has a charge attribute, which can be checked to indicate if drink action is available. To enable future extension of possible drinks or other actors as consumers (Open-closed principle and Interface segregation principle) and reduce dependency (RED principle) of EstusFlask to an action, DrinkAction is created and extends Action, which accepts instances of Drinkable and Consumer. Any drinking action should provide these, therefore Player class implements Consumer interface and EstusFlask implements Drinkable interface. Using these interfaces also allows the Dependency Inversion and Injection principle to get max HP from a consumer to provide information needed by the drink method in Drinkable when DrinkAction is executed.

Bonfire

[Optional] Reset the enemies' position, health, and skills /Implemented/

Application creates a single Bonfire instance, Firelink Shrine, positioned in the middle of the map. Bonfire class is created which extends abstract class Ground to enable display in the game map and provide interaction with Unkindled through ResetAction. To prevent other actors interacting with Bonfire, an additional check is added to provide ResetAction

only for actors (Player) with rest ability. ResetAction has an attribute lastBonfireRested which is useful to select which Bonfire to spawn back Unkindled in the future, it is set to static to enforce all ResetAction to have the same Bonfire to be selected. ResetAction extends Action and provides two constructor, this is needed to be able to handle two situations, one to handle player resting and another to handle player soft reset when he dies (further explanation for this situation in Soft Reset/Dying in the game). The ResetAction is designed this way to enable reuse on all scenarios requiring reset and avoid repetition (DRY principle) of creating multiple actions, such that we only need to add a few checks and adjustments before running the reset manager.

When RestAction is executed to handle player resting, lastBonfireRested is updated before reset manager is run. Running reset manage singleton will reset all Resettable instances (Single-Responsibility principle) accordingly based on their requirement. Therefore, all these classes: Player, Enemy, and EstusFlask should implement Resettable and should be registered during construction and override resetInstance method. Player and EstusFlask reset will only overwrite HP and charge attributes, but resetting enemies on the other hand requires more work since there are two possible scenarios (enemy is removed or reset and repositioned at initial location created). To handle this, we separate the work into Enemy class which will handle enemies that are removed during reset and a subclass of it, ResettableEnemy class, implements Repositionable interface to allow reposition of enemies. Each enemy will extend from one of these two classes and in their playTurn method will return RemoveActorAction or RepositionActorAction when reset is called.

Souls

All classes which relate to Soul including Player, Enemies, and TokenOfSoul should have some mechanisms to enable exchanging, subtracting, or adding souls which is achieved by implementing the provided Soul interface. The methods in each class are overridden, the Player class should be able to transfer, add, and subtract souls as he is the only one collecting and using the souls while the Enemy class should only be able to transfer souls and TokenOfSoul class can transfer and add souls. In addition to this, each class has a soul attribute to indicate the number of souls it holds, which is used as a parameter for soul related methods. To collect souls from enemies is only possible if the enemy dies from an attack, thus an additional check is added in AttackAction to transfer souls from enemy to player when it dies.

Enemies

[OPTIONAL] Enemies cannot enter floor, cannot attack each other, can randomly use active skills from a weapon /Implemented/
[OPTIONAL] Undead has 10% chance of dying in each turn if not under attack or not following player /Not Implemented/
[OPTIONAL] Lord of Cinder drops Cinder of Lord when it dies /Not Implemented/

Enemy class is added in which extends the actor class to provide interactions with actors and capabilities. Undead extends Enemy class while Skeleton and LordOfCinder classes extend ResettableEnemy class. LordOfCinder class is set as an abstract class as Yhorm the Giant is not the only possible enemy of type Lord of Cinder, therefore lord enemies, YhormTheGiant class, extends LordOfCinder class. Alternatively, we can ignore

creating Enemy class and directly extend Undead, LordOfCinder, and Skeleton classes to Actor class. We selected the first option to provide polymorphism to different enemies and use inheritance, overriding, abstraction, and interfaces to implement different requirements applying to different types of enemies. By default, Skeletons and Lord of Cinders are created by application at the start of the game and Undeads are spawned by cemeteries placed in the maps (more information about spawning in Terrains). To extra messages or modification when an enemy is dead from an attack, the attack action's execution can be modified. Note that non player actors will drop non portable items if they die, this can be used to implement a situation where Lord Of Cinder drops CinderOfLord which extends PortableItem when it's dead by adding it to inventory during construction. Additional information about HP and weapon hold in the console is done by overriding the toString method.

For enemies that wander around (Undead and Skeleton), WanderBehaviour is added to their behaviour during construction. To enable the following player, Enemy class' getAllowableActions method is overridden to add FollowingBehaviour if the other actor interacting with the enemy is a player, additionally the resetInstance in ResettableEnemy class will remove this behaviour when game is reset. To prevent other actors entering the floor, an additional check is added to allow actors (Player) with floor entry ability to enter. To enable attack action from enemy to player only, an additional check is added to allow actors (Player) with hostile to enemy status to be granted with an AttackAction, the same applies to enable attack action from player to enemy, an additional check is added to allow instance of enemy only to get AttackAction from player.

While processing enemies each turn, different enemies will have different customization inside the playTurn method to determine action taken. In general the enemies will return one of these consecutive orders, either an action associated with the reset, attack or weapon action, behaviour action, or do nothing action is returned. Applying Single Responsibility principle, playTurn strictly gets the actions by parameter or calling other methods after some checks to return the action. To enable random active AttackAction, a method is implemented to filter out all attack and weapon action and randomly returns one to be executed in playTurn if available (also Single Responsibility Principle). Depending on the enemy, additional checks can be added to set, perform things, or return an action can be added (e.g., checking stunned status, consciousness, checking if undead is removed on 10% chance, etc) before calling super in enemy class for basic check for attack or do nothing action.

Terrains (Valley and Cemetery)

Both valleys and cemeteries are areas in the map and they should be added in as classes which extend from the Ground class to provide display, capabilities, and interactions with actors. Application should create several cemeteries. Valley class overrides methods to guarantee only actors with fall ability (player) can step on them and reduces player's HP to zero.

While the game is running, in each process of the player's turn, cemeteries may randomly spawn an undead. A method can be created separately (Single-responsibility principle) inside the Cemetery class that creates and returns an Undead object or null by the given probability, and this method is invoked for each cemetery in each turn inside the World class. If successful and return is not null, the World class will add the Undead inside the game map. Alternatively, we can calculate probability beforehand in the World class for each cemetery to determine if an Undead is created and construct an Undead by calling a method

in Cemetery that always returns an Undead instance if the boolean value is true. We decided to go with the first option as it is clearer and if in the future refactoring is needed such as if the criteria of spawning Undead changes, we only need to refactor the spawn method itself.

Soft reset/Dying in the game

When the player dies then everything in the game will be reset and the player will respawn at the latest bonfire. We can reuse the implementation of the resetAction (DRY principle) described earlier in Bonfire. Prior to running reset manager, we need to put Token of Souls at the last location and spawn the player at last bonfire rested. Both information can be received from the player's attribute and map method to determine location. To solve the problem when a player dies in a valley, an enum Direction is created separately to handle things related with direction (Single Responsibility Principle), including calculating the latest location before falling from the hotkey selected and the valley's location. Afterwards, the Player creates an instance of TokenOfSoul and transfers his number of souls to the token before adding the token at their last dying location. TokenOfSoul extends PortableItem to enable pick up action later in the game. If the player picks up the token, the token adds it's number of souls to the player and gets removed from the map - which we can achieve by creating a PickUpToken action which extends PickUpAction and overrides getPickUpAction method to return PickUpToken action .

Weapon

[OPTIONAL] Dullness passive skill for Storm Ruler /Not Implemented/

Weapons are created and added to the actor's inventory if he can carry a weapon. Each weapon will have its own class for instance, Broadsword class, GiantAxe class, StormRuler class, and YhormMachete class which extends the MeleeWeapon class. These classes are created to enable customization for their own unique attribute, active skills, and passive skills. StormRuler is the weapon that can be equipped by the player that is placed next to Yhorm the Giant, thus the application creates an instance of StormRuler that is placed inside the game map. To enable switching the current weapon with the weapon on ground, PickItemAction can be overridden to execute SwapWeaponActionwhich automatically discards the current weapon and adds the other weapon to a player's inventory. In order to implement skills depending on type of skills, passive skills don't need creation of action as they can be directly done by overriding available methods accordingly either in parent class or calling super and adding additional modifications afterwards. Active skills on the other hand should be created as a subclass of WeaponAction as different abilities require different implementation. The instance for subclasses of WeaponAction can be provided by adding abilities to specific weapons which will generate the instance of the WeaponAction. In addition to extending WeaponAction, these subclasses can provide constructor accepting combinations of weapon instance, target, and direction as parameters using Dependency Inversion and Injection to avoid downcasting. To add effects on actor, ground, or weapon itself for the active skills, capabilities can be added or removed accordingly and additional checks can be added in each game turn. These weapon actions can be set to be returned either from getPassiveSkills or getAllowableAction depending if the active skills require another actor or not.

[FIXED REQUIREMENTS]

New Map and Fog Door

The new map, Anor Londo, is simply instantiated from gameMap class in application. To connect the map and enable it to be placed, fogDoor class extending Ground class is created. To enable moving the player from a door to another, we avoid creating redundant action (DRY principle) and reuse MoveActor action through allowable actions.

Updated Bonfire
[OPTIONAL] Bonfire which player teleported to is the last bonfire interacted /Implemented/

Bonfire manager is added to handle information relating to all bonfires and their location in games including resetting the latest bonfire interacted (Single-Responsibility principle). This also allows for future extension relating to any methods or information that should be stored inside the manager (Open-Closed principle). We decided to remove the location attribute in bonfire in the initial code as the information is redundant (DRY principle) given that it is now stored in the manager instead. We have two options in creating the manager, either making the manager as a static singleton or creating an instance in application to pass to each bonfire constructed. We went for the latter option as bonfire manager singleton is not beneficial for many classes unlike reset manager singleton that is used by many instances in the game. To enable saving latest bonfire location interacted while still adhering Single-Responsibility Principle, we purposefully let bonfire manager instance as a middleman to connect interaction between bonfire and player, such that when player interacts with any bonfire, bonfire manager of the bonfire will reset the attribute storing last location of bonfire interacted in player. Note that the location of the last bonfire interacted is stored inside the player instead of the bonfire manager as the bonfire manager is not responsible for the location of the last bonfire interacted, it should be the responsibility of the player that interacts with the bonfire. We also removed dependency (RED principle) between player and bonfire as the player now only needs to remember the location of the bonfire instead of the bonfire itself.

To enable transporting between bonfire and litting bonfire, transportAction and litAction are created extending Action class. As stated before, each execution of the action will update the latest bonfire interacted by using the bonfire manager to update the location of bonfire interacted with the player. Another application of Single-Responsibility principle is also shown in the transporting mechanism as we require information of all current active bonfires in game, which can be simply added inside the bonfire manager to loop and check through all bonfires stored.

Aldrich the Devourer
[OPTIONAL] Aldrich's second phase / Implemented/
[OPTIONAL] Aldrich's reset / Implemented/
[OPTIONAL] Darkmoon's Fire Arrows Active Skill /Not Implemented/
[OPTIONAL] Lord of Cinder drops Cinder of Lord when it dies (optional in assignment 2) /Not Implemented/

Aldrich has similarity with Yhorm as another Lord of Cinder. To avoid redundancy (DRY principle) and make use of parent class, the functionality applying to all lord of cinder

actors is extracted out from Yhorm and placed inside parent class LordOfCinder. Yhorm and Aldrich as children of LordOfCinder now should use these methods and can simply override and call super if additional modification is needed (Liskov Substitution principle). Similar to other enemies, playTurn will do additional checks for any action specific to Aldrich as child of LordOfCinder/ResettableEnemy/Enemy. Additional information regarding the playTurn method, the only playTurn method that has been implemented in the parent classes is the main parent itself Enemy (handles attack and does nothing action by default). We could have override ResettableEnemy and LordOfCinder such that we can reduce the number of checks for different situations for the children classes, however different children may have slight different checks which occurs in between thus overriding ResettableEnemy and LordOfCinder can be confusing and may lead to modifications to multiple classes in the future that breaks Open-Close principle therefore we stick to just implementing playTurn only for the main parent that is Enemy class.

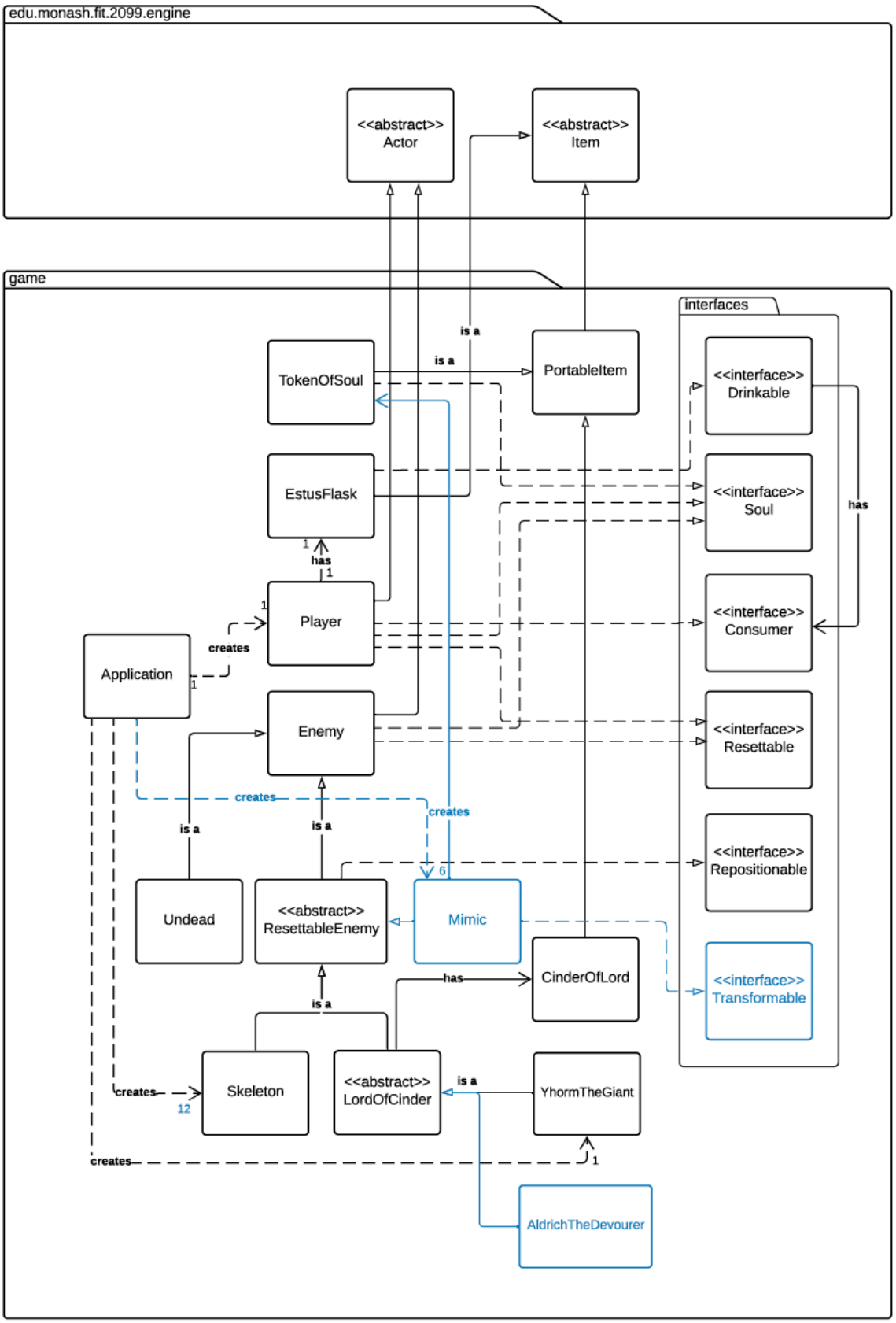
The Darkmoon weapon used by Aldrich is a ranged weapon unlike all previous weapons introduced which are melee weapons. Therefore, we interpreted the GameWeaponItem class to be a ranged weapon or in other words any weapon that is not used for close combat attack like MeleeWeapon. Any modification to the type of ranged weapon can now be applied directly to this class and weapons of this type (in our example, the Darkmoon) can simply create a new class and inherit from this class (Open-Close principle). The GameWeaponItem class handles detection of targets in range as well as checking if an attack is blocked in several methods separated (Single-Responsibility principle). Additionally, if the ranged weapon is held by an enemy, it adds following behaviour to the enemy towards the target which can be evaluated in playTurn method. We will have several constructors created to accommodate different holders to support the following behaviour for cases where the holder is an enemy. Finally, we realized that both GameWeaponItem and MeleeWeapon are both types of weapon and should not be instantiated, thus we declared both classes as abstract classes.

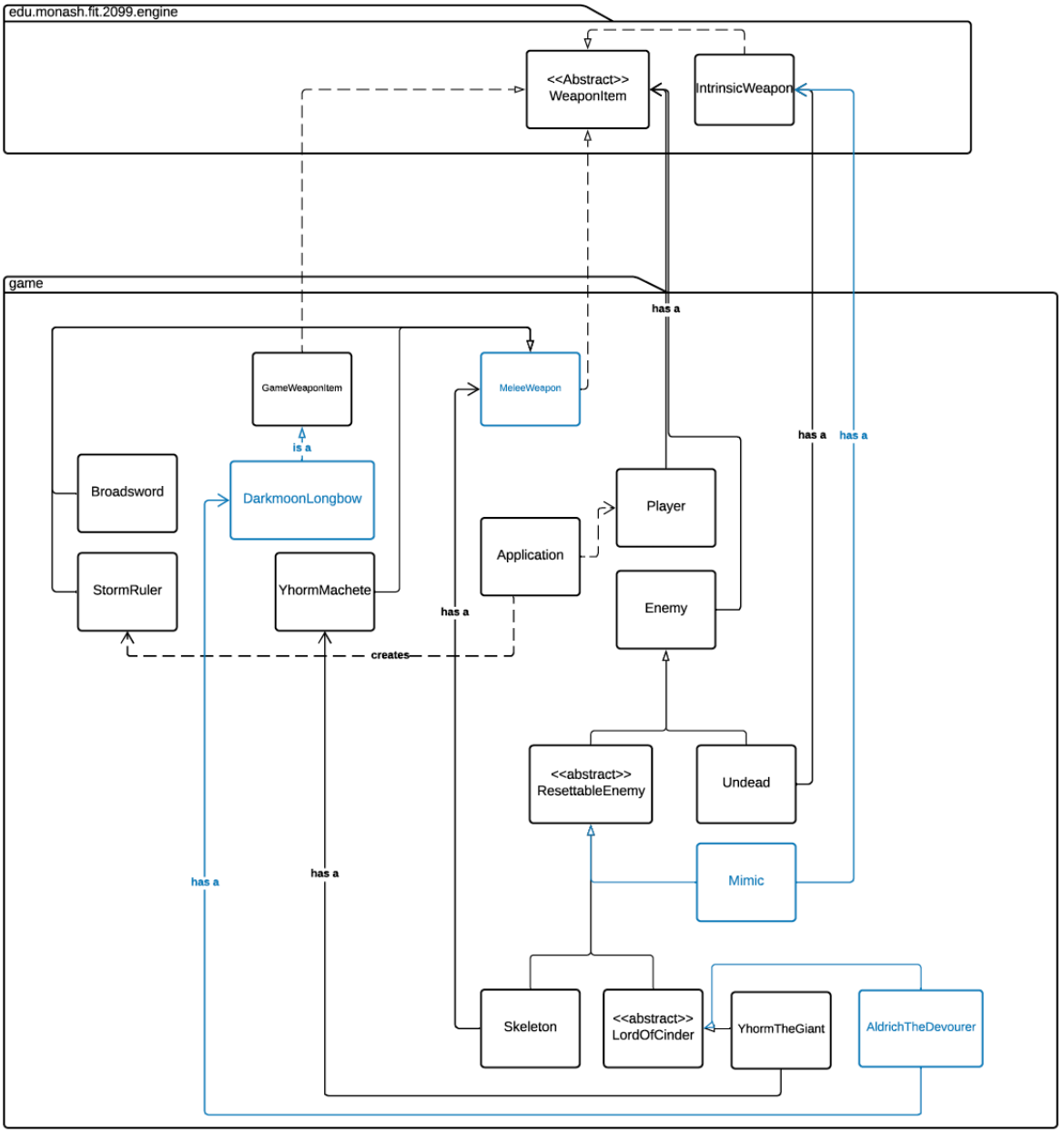
[FLEXIBLE REQUIREMENT]

Mimic / Chest

Mimic extends ResettableEnemy class as it can be resetted regardless of the fact that it can transform from a chest to a mimic enemy. The token to drop can be added to inventory directly during instance construction instead of adding it during the transformation (Single-Responsibility principle). We added and removed statuses accordingly in construction, reset, and transformation to indicate whether mimic has transformed and enable or disable attack. To enable the transformation mechanism, we opted for a Transformable interface which is strictly used as a contract to handle any possible transformation instead of forcing the mechanism to mimic itself. It is possible to do so, but for easy refactoring and extension, an interface is more suitable (Interface Segregation Principle and Open-Close principle). With the interface provided, we can also make use of the Dependency-Inversion principle combined with the Dependency Injection concept to create a transformAction class extending the Action class to handle every object in game that is deemed transformable, which in our current case is chest/mimic. Construction injection is selected in transformAction class to take mimic as a transformable, and use method in contract to call the transformation needed.

Class Diagrams

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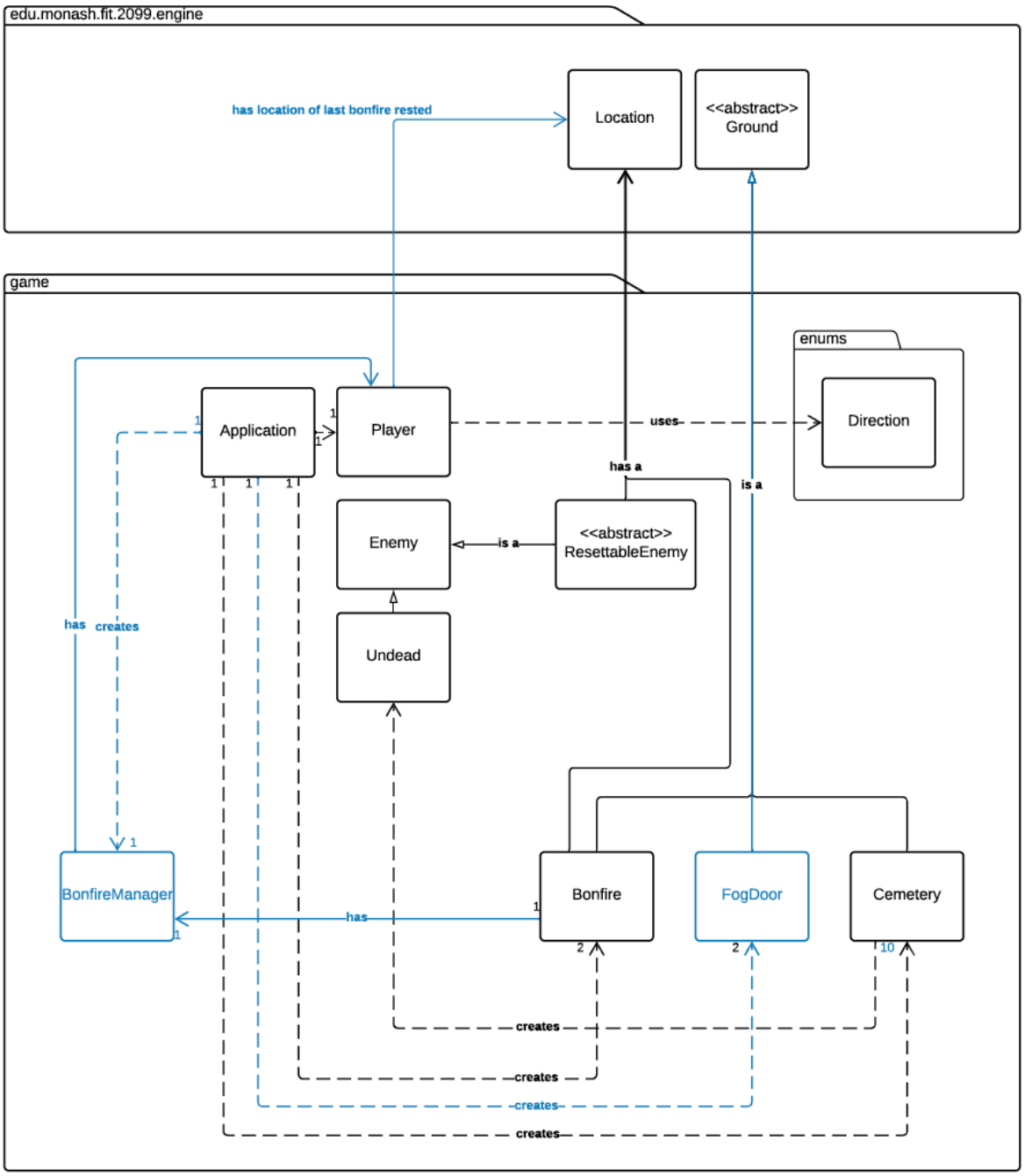
AldrichTheDevourer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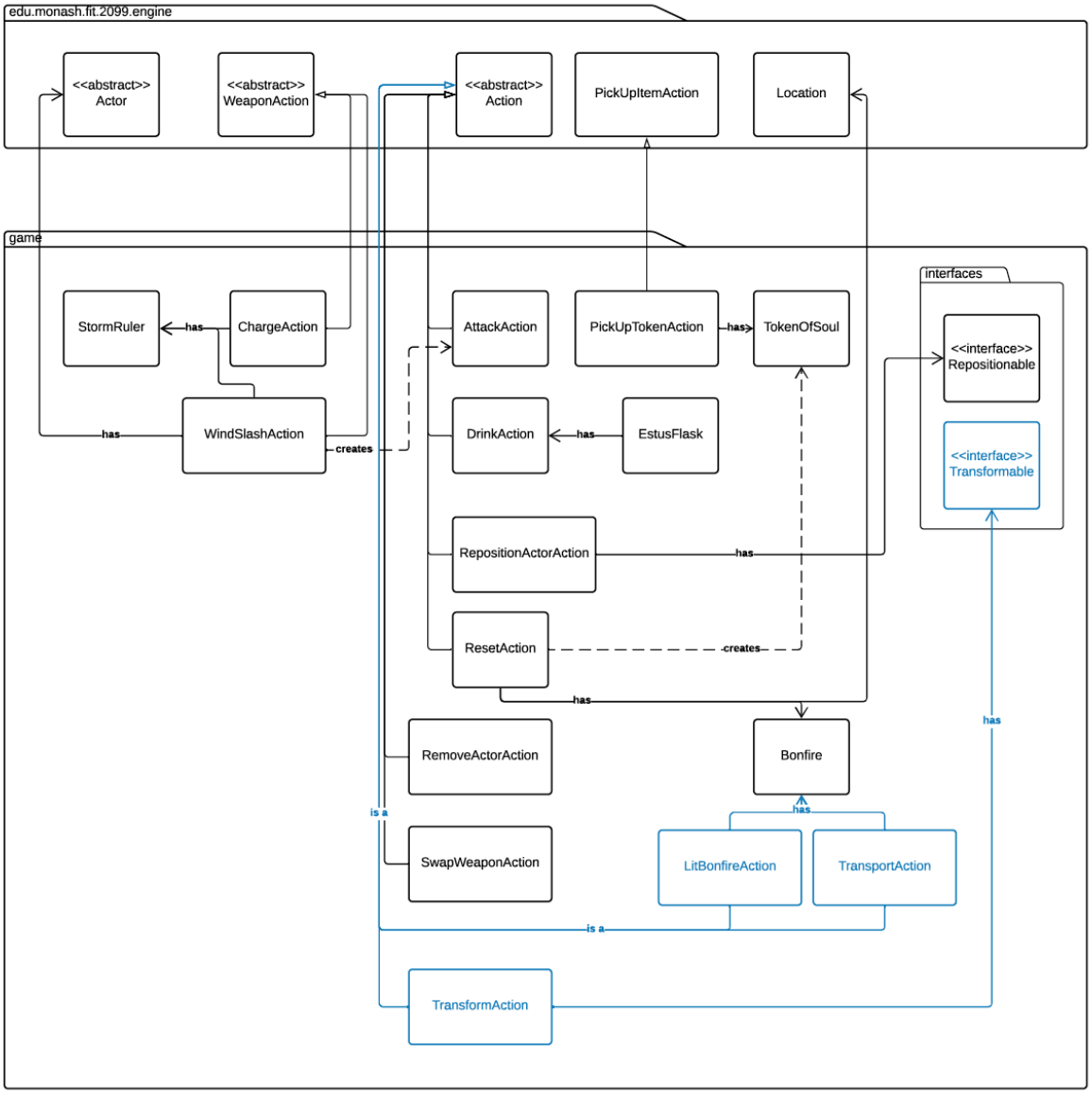
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Bonfire
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SwapWeaponAction
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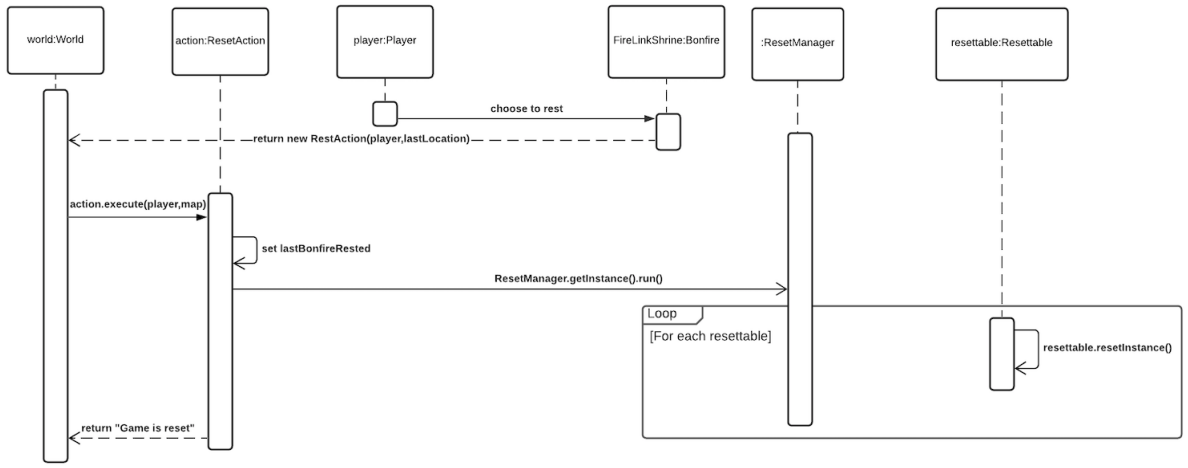
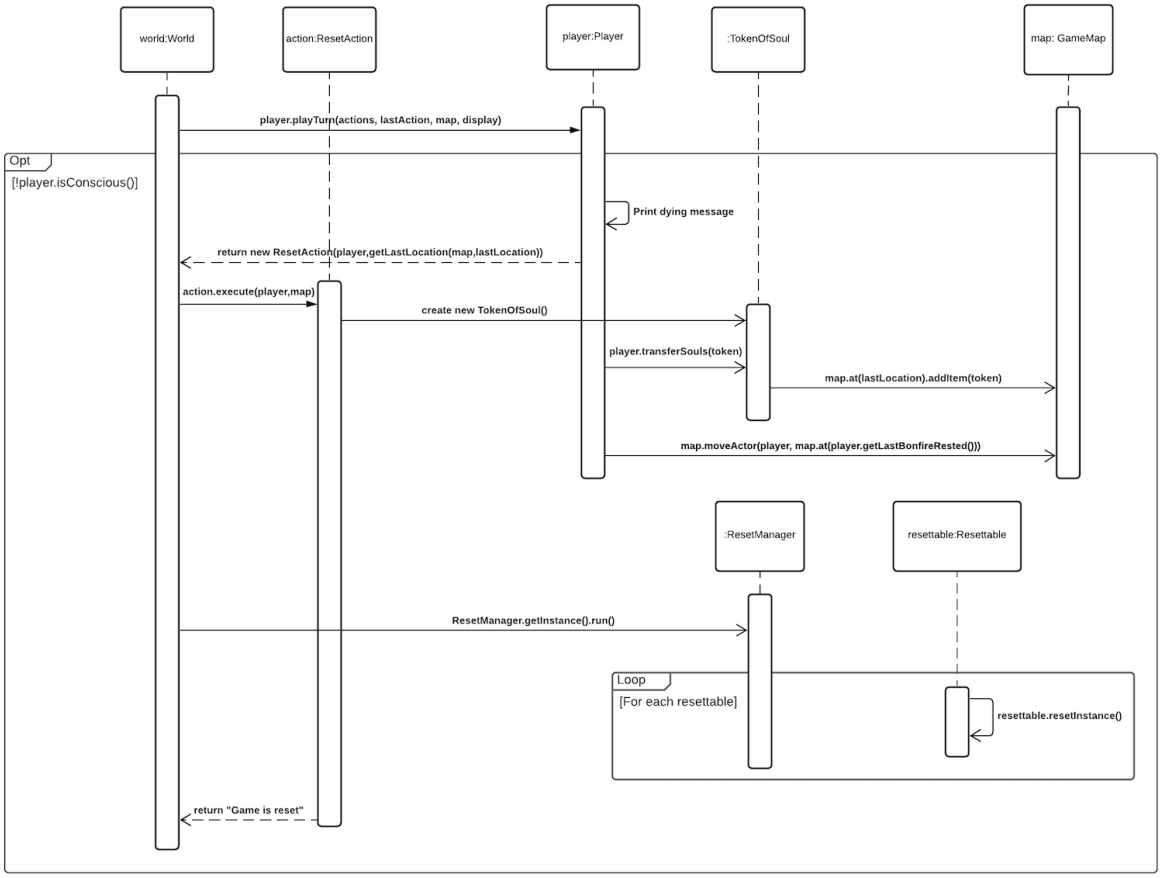
LitBonfireAction
TransportAction
is a
TransformAction
has

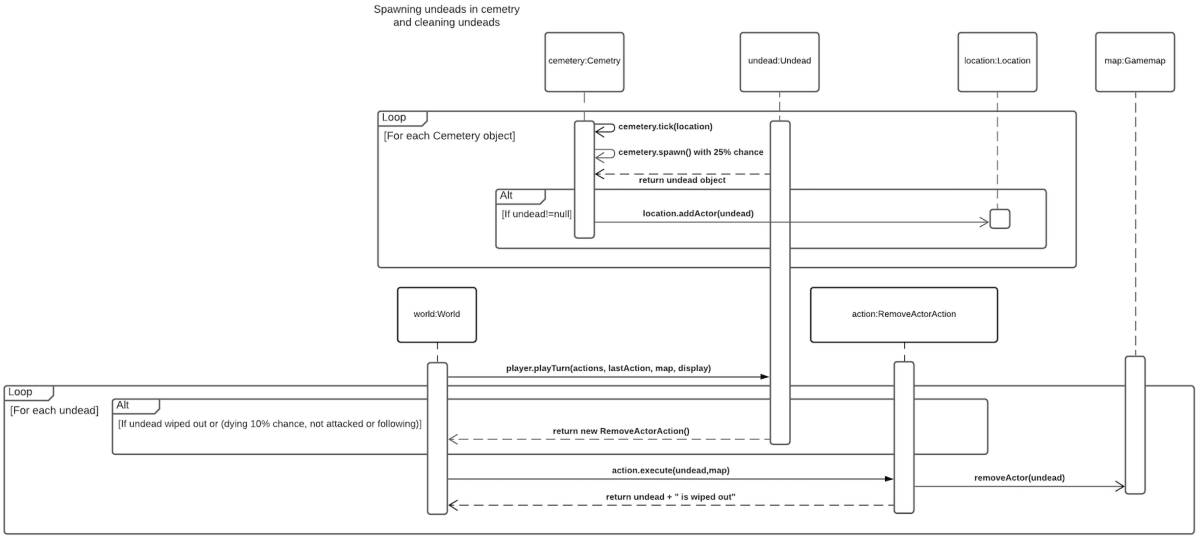
Interaction Diagrams

Player resting at bonfire sequence



Player die / soft reset sequence





Mimic/chest transformation sequence