S1 2022

FIT2099 Object-Oriented Design and Implementation

Assignment 2: Develop Implementation

Lab_14Team6:

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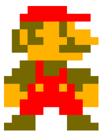


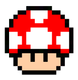
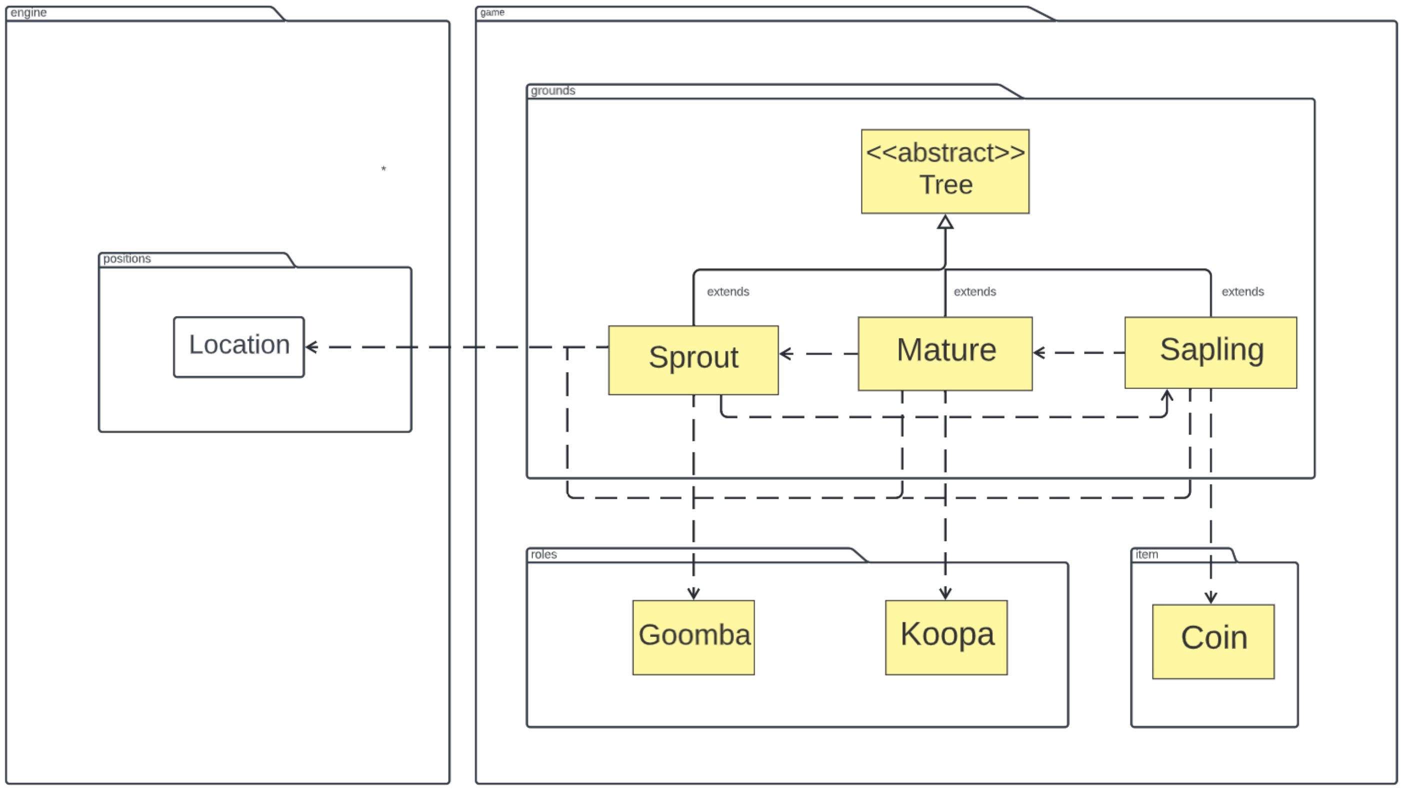


Table of Contents

UML and Design Rationale

REQ 1 : Let it Grow !🌳



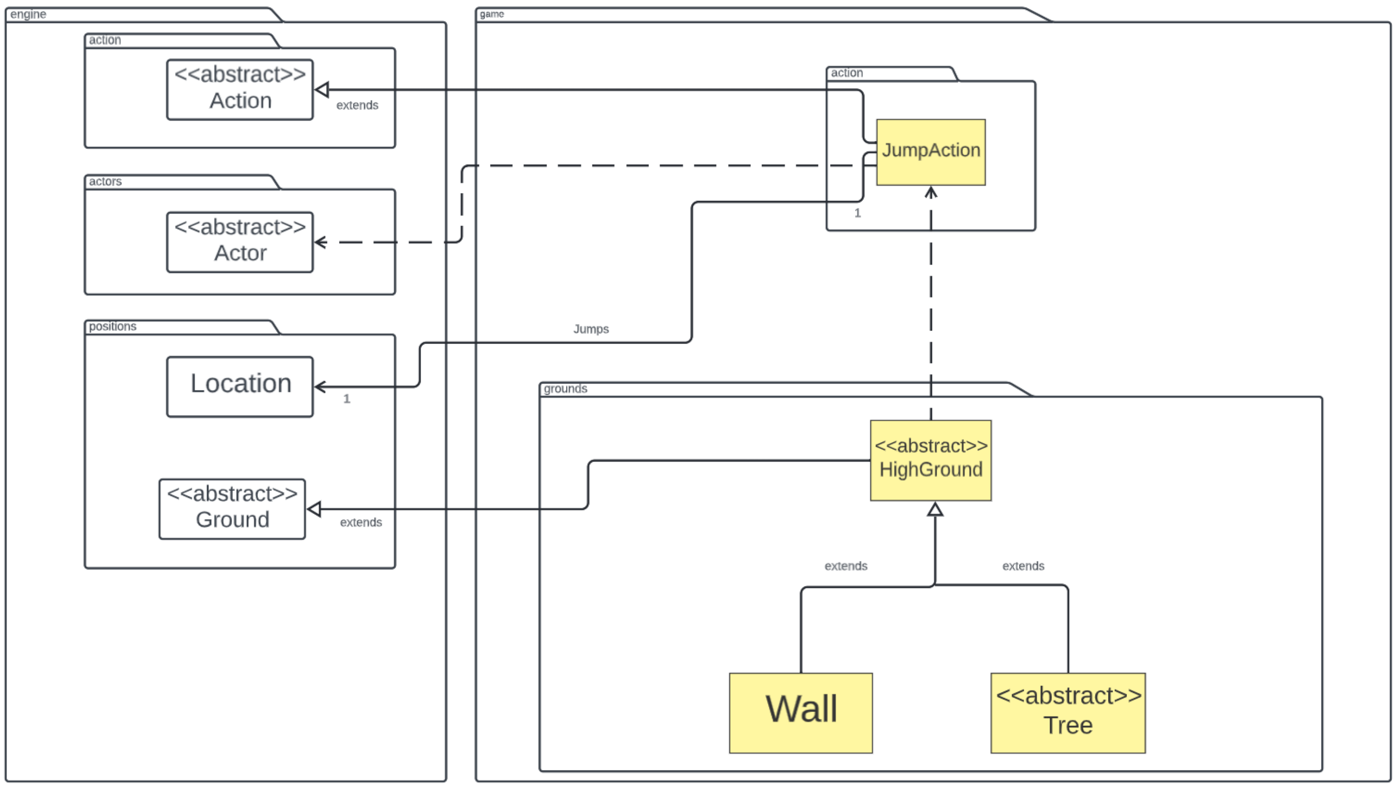
Tree class is made abstract and Sprout, Sapling and Mature extend the Tree class: While abstract Tree class extends abstract HighGround class which extends abstract Ground Class.Sprout,Sapling and Mature extend the abstract Tree Class.These classes extend the Tree class as we can implement and override methods and each subclass can have it's own properties without violating the Liskov Substitution Principle. This will help us follow the Single Responsibility Principle as we are not overburdening the Tree class with all the methods.

Sprout has dependence on Sapling and Goomba,Sapling has dependence on Mature and Coin, and Mature has dependence on Sprout and Koopa:.The Sprout can grow to Sapling and the Sapling can grow to Mature and Mature can grow Sprout around when the area around is fertile.Sprout can spawn Goomba,Sapling can drop a Coin and Mature can spawn Koopa. This can be done by overriding the tick methods in Sprout,Sapling and Mature

Sprout,Sapling and Mature has a dependence with Location:

The older implementation of implementing actor with ActorLocationIterator method did not work during execution and therefore we used methods from the Location for better implementation.Improved the UML for task one based on the interviewer's suggestion and added more detailed dependencies

REQ 2 : Jump Up, SuperStar! 🌟



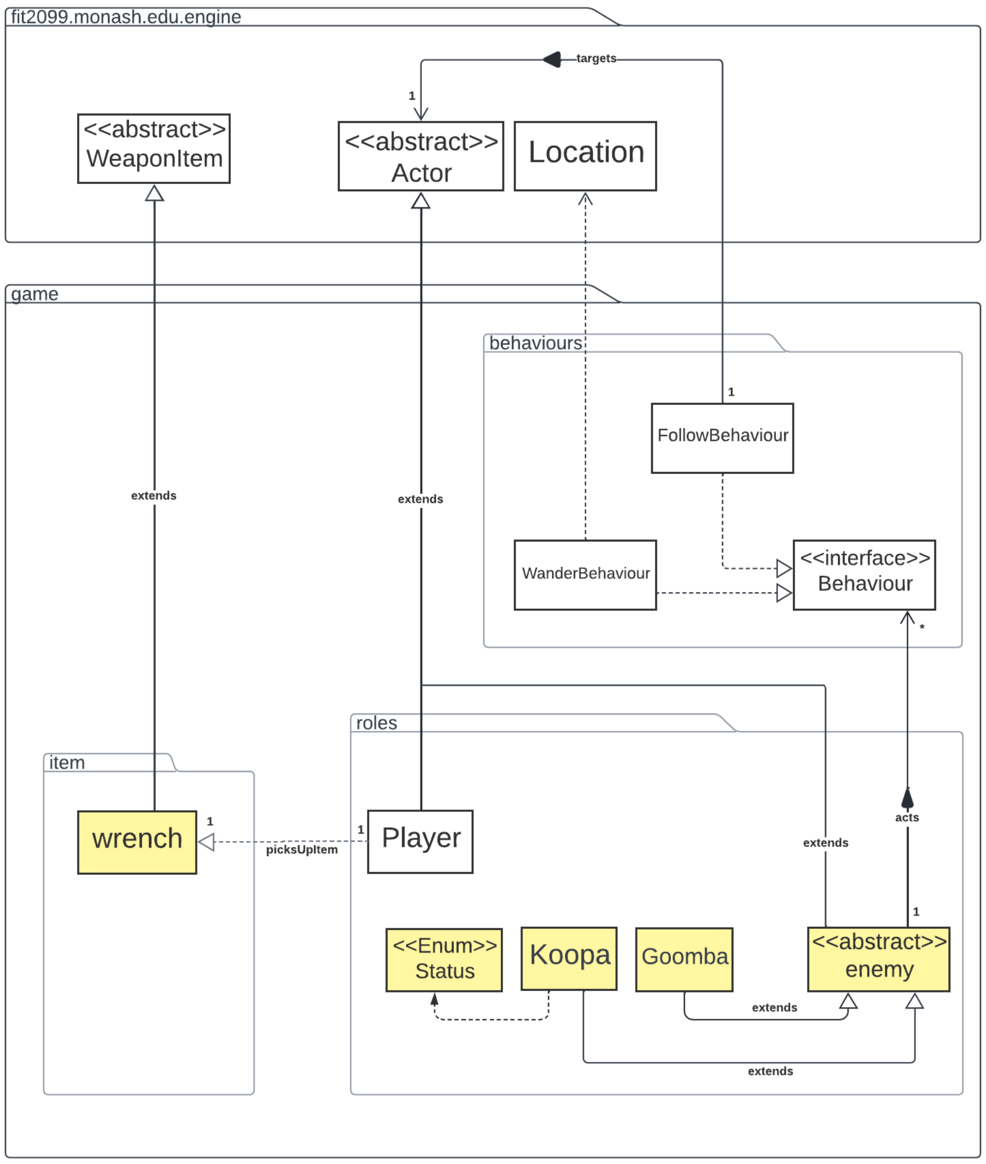
Abstract HigherGround class created that extends Ground. Wall and Tree extends HighGround: Since you can Jump only on HighGround class has been created. This will make it easier to design and implement Jump as we have to override methods only in HighGround class and also helps in better design as we dont have to repeatedly override methods in Wall and Tree class. It also follows dependency inversion priciple as there are no dependencies with any of the concrete classes with each other but instead relies on abstraction. It adheres to the Liskov Substitution Principle as grounds which come under subclasses of HighGrounds will be the only grounds that allows the player to jump.

Creating a JumpAction class that extends Action class: We override the execute method and check for the type of High Ground and implement conditions for the success rate of the jumps.

JumpAction has an association with Location and a dependence with Actor.

In the newer implementation, we used HighGround for JumpAction instead of linking Wall and Tree to it as it would be a better design decision as explained above. The check for SuperMushroom is done using an enum so it is not necessary to show it in the UML diagram. JumpAction has a dependence with Actor instead of Player due to easier code implementation. But canActorEnter return false so that actors can enter it without a JumpAction

REQ 3 : Enemies☠️

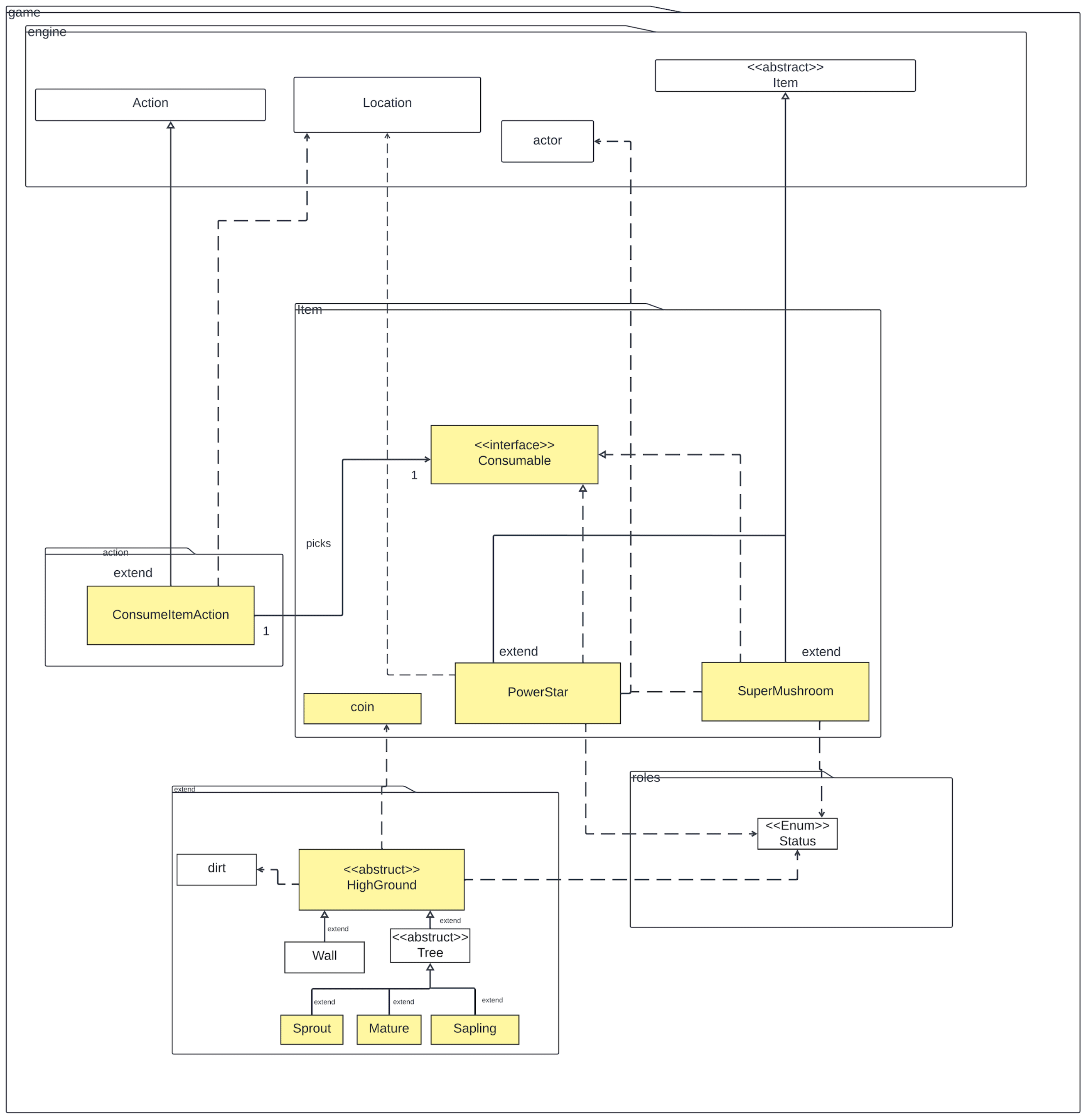


The new Wrench class will inherit the abstract WeaponItem class, which has Item capability to access the parent class of Weapon interface from the weapons package in the engine. This will allow Wrench to also inherit Item class's other packages: Action, Location, Printable and Capable. Retrieving abstract open parameter methods from WeaponItem abstract class such as damage(), verb() and chancetoHit().

We will implement a new Enemies class which is an abstract class with open constructor parameters for **Koopa and Goomba classes** to inherit implementations from. In this case, Koopa and Goomba are each a class that extends the Actor class in Actor packages. The principle of Open-Closed is implemented here, although Koopa and Goomba impact on Player directly, they will be implemented within a behaviours package interconnected with the <<abstract>> enemy class.

The <<enum>> status will be used for all roles within the game, for example, Koopa's dormant state. The <<abstract>> actor class will include methods to activate for Player to use Wrench and attack Koopa, following that, initiate the following behaviour for enemies to player. The <<interface>> behaviours consist of methods to instantiate a new enemy body with new implementation of behaviour methods, this will be re-implemented to suit the Koopa as well.

REQ 4 : Magical Items 🍄



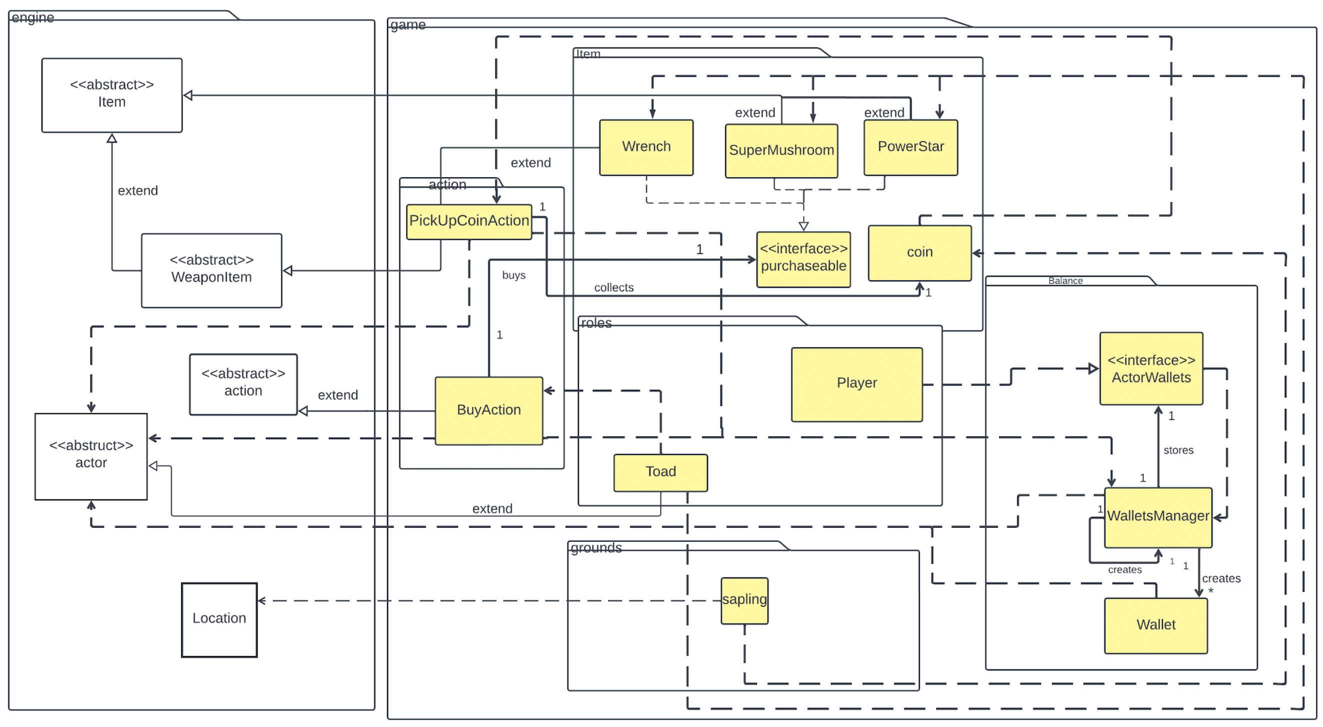
Design Rationale:

SuperMushroom and PowerStar implement Consumable. Those concrete classes can inherit the same methods from Consumable and override the methods if those items have different functionalities. Moreover, if there are more Consumable items to be implemented, they can be implemented directly that meets the Open Closed Principle. Since powerstar and super mushroom have implemented Consumable interface, therefore they can be downcasted from Item to “Consumable” item. Hence, ConsumableItemAction can recognise which items can be consumed by the actor. ConsumableItemAction will check if the inventory has the item, yet not it will generate a new item in the inventory.

Actor consumes SuperMushroom and PowerStar. SuperMushroom and PowerStar will change the actor's <<Enum>> status to its particular status after the actor consumes Super mushroom or powerStar.

walls and trees extend HigherGround. Once the actor has power star status, the player can walk on walls and trees by setting the HigherGround's canActorEnter to be true. We use a HigherGround abstract class that satisfies the LISKOVE substitution principle(LSP). So that walls and trees will have the functionality of the high ground that generates the coin after the actor breaks the high ground. Therefore, the same methods can only be implemented in the HigherGround once.

REQ 5 : Trading 💰



SuperMushroom and PowerStar extends Item. SuperMushroom and PowerStar inherit Item so that SuperMushroom and PowerStar have the methods of Item. Hence, when we add more items to the game, we can just extend the concrete class from Items such as SuperMushroom and PowerStar. The Items class is able to be extended without modifying itself that meets the open-closed principle.

Wrench extends WeaponItem. Wrench is a weapon. When the wrench extends the weaponItem, it can be defined as a weapon Item in the game since it inherits all the methods from weaponItem.

SuperMushroom, PowerStar, and Wrench implements purchasable that allows BuyAction to buy them. Those items can be purchased by implementing the purchasable. According to the Open-close principle, it is able to extend for more items to be purchasable. Since BuyAction can implement those items that have implemented purchasable items directly. BuyAction meets the SRP principle so that one class has one function.

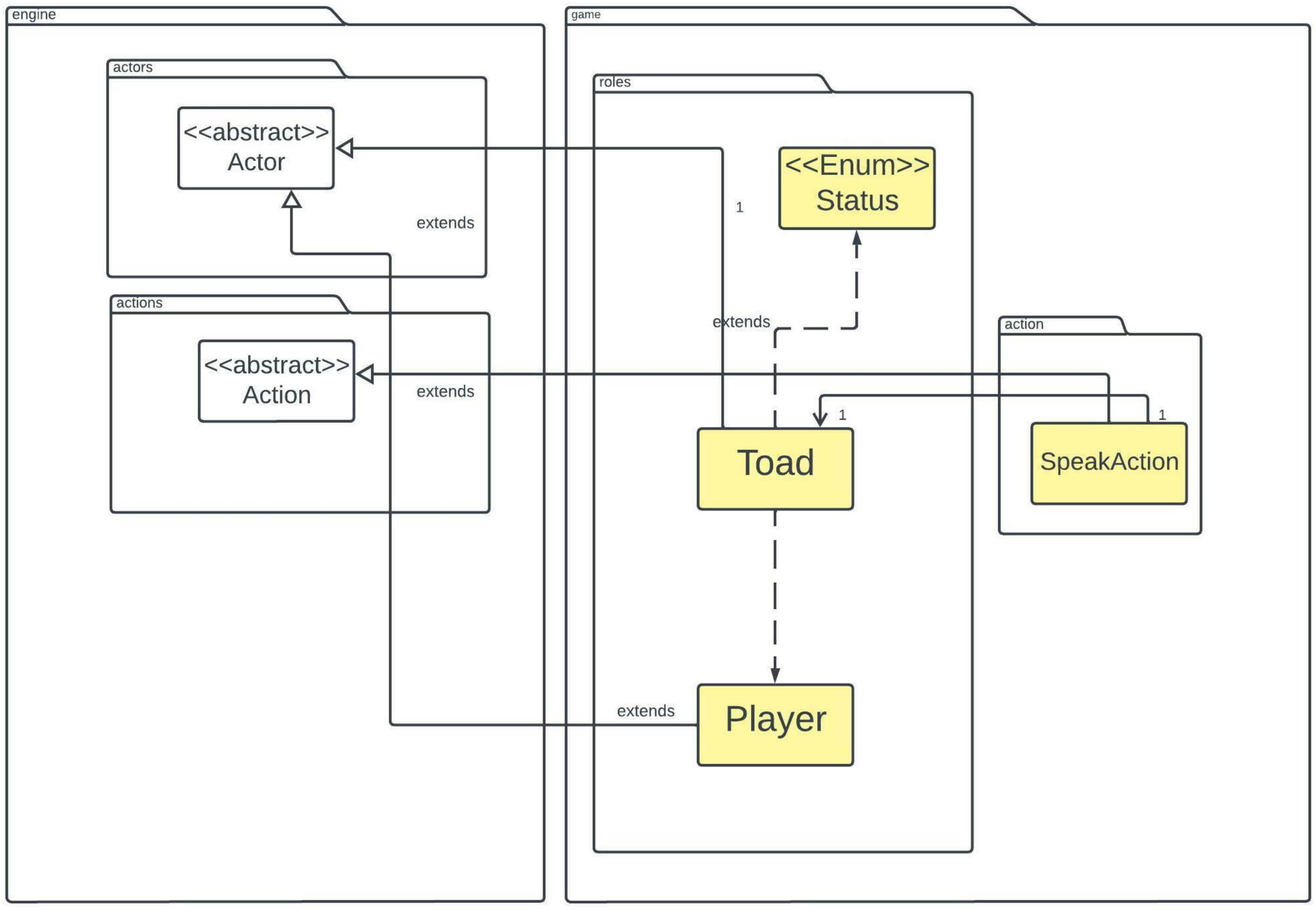
BuyAction extends the action. BuyAction inherits the action class. BuyAction interacts with those items in Buy Actions methods, therefore we have dependency for Toad.

Toad extends Actor. Referring to LSP, Toad inherits everything from the actor. The toad has dependency between purchasable items. There are dependencies for Power Star, Wrench, super mushroom. Since, from the AllowableAction of each item that will check if the actor is near toad. Then return the price of items to the player.

Sapling creates Coins around sapling. Coins are spawned by sapling, coins will generate 5 dollars.

PickUpCoinAction collects coins and increases its balance in the Wallet from the WalletManager. WalletManager is using the static factory method that would store the actors and wallets in the hashmap. Since there is an ActorWallet interface. Implementing this to the player, it can add a method from the player's constructor. So that Player can be included in the WalletsManager. Therefore, it satisfies the open-closed principle. If more actors need to have a wallet as an extension, they can just implement this interface. Then WalletsManager can store their particular wallet in the hashmap.

REQ 6 : Monologue 💬



and Toad extends Actor: Since Toad is a friendly actor, we create a subclass extending Actor class named SecondaryActor. Adhering to Single Responsibility Principle, we identify Toad to have its own properties such as appearing as an NPC character calling the Enum of status created for character to have as an capability.

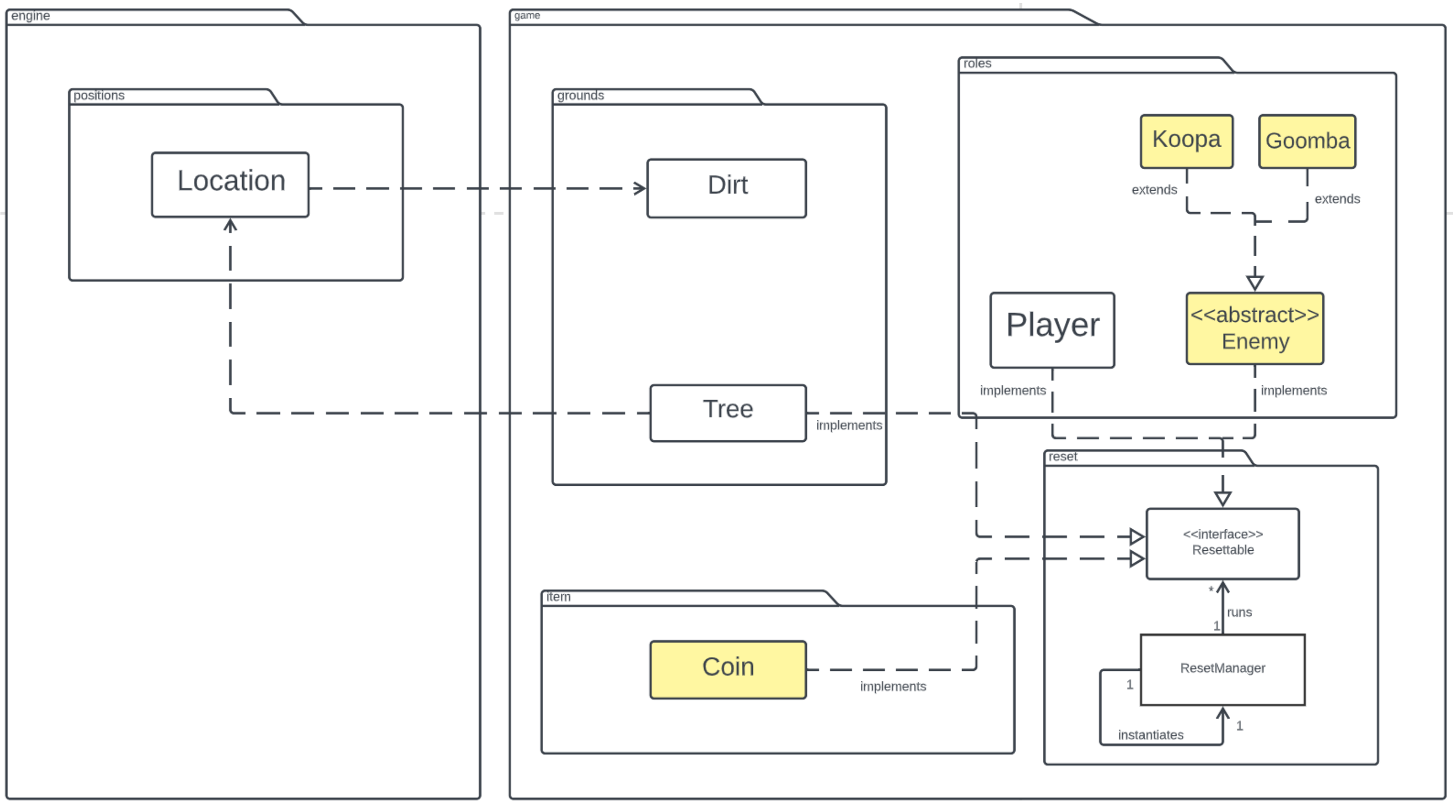
SpeakAction extends Action: Since Toad can speak, a new Action subclass has been created, called SpeakAction which stores the sentences it can say in an Arraylist and can randomly generate one of the four sentences listed in the requirement. Creating a SpeakAction class. The checks for statement(s) that can't be said will be done using conditional checks.

SpeakAction extends Action: A new SpeakAction class has also been created. The SpeakAction class checks the Player's proximity to Toad so that the Toad's Speak Action is available. SpeakBehaviour might be necessary in the future as there might be more actors that can be put into the game who can do multiple actions like SpeakAction,AttackAction hence making the design of the code better and easier to read.

SpeakAction adheres to the Single Responsibility Principle, where it is only applicable to Actors when needed; Toad. The idea behind the SRP is to keep the effect of SpeakAction only to the desired class.

Toad has a dependence on Player: Since the dialogues said by the Toad are dependent on whether the player has the WeaponItem Wrench, SuperMushroom and PowerStar.

REQ 7 : Reset Game ⏱️



Coin, Tree, Player and Enemy class implements Resettable interface: All the requirements that need to be reset have to implement the resettable interface such as Coin (All coins need to be removed from the ground), Tree(Tree has a 50% chance of converting back to dirt),Player(Player status needs to be reset) and Enemy(All enemies need to be killed).

Tree has a dependence with Location and Location has an association with Dirt: Since Tree has a 50 percent chance to convert to dirt, and Tree extends Ground, setGround in Location can convert the Ground type from Tree class to Dirt class which is a dependence.

The ResetManager instantiates itself: The ResetManager class has a list that stores all the requirements that need to be reset. Since a player can reset the game only once, getInstance Method checks if the instance is null, and if true, Reset Manager instantiates itself

Work Agreement Breakdown

The work agreement breakdown is located in our shared GIT folder in the docs folder. Here is a view of the committed WBA.

```
WORK BREAKDOWN AGREEMENT

Task allocation: The process for allocating tasks was undertaken during the group meeting.
Requirements 1-7:
JavaDoc:
Q1~Q2 Ashton Sequeira
Q3: Kenda Wan (Special Consideration:12th May 11:55 pm)
Q4~Q5 Junhao Li
Q6: Team Task(Ashton Sequeira,Kenda Wan,Junhao Li)(Special Consideration:12th May 11:55 pm)
Q7: Kenda Wan (Special Consideration:12th May 11:55 pm)

Kenda responses to generate the Javadoc once everything has been completed.

#UML and Rationale
Q1~Q2 Ashton Sequeira
Q3:Kenda Wan (Special Consideration:12th May 11:55 pm)
Q4~Q5 Junhao Li
Q6:Team Task(Ashton Sequeira,Kenda Wan, Junhao Li) (Special Consideration:12th May 11:55 pm)
Q7:Kenda Wan (Special Consideration:12th May 11:55 pm)

#Code
Ashton Sequeira: Q1~Q2 abstract Tree,Sprout,Sapling,Mature,abstract HighGround,JumpAction
Junhao Li: Q4~Q5 Player,SuperMushroom, PowerStar,Wrench, Coin, BuyAction, Building Wallet
System, Consumable.
Kenda: Q3,Q7 (Special Consideration:12th May 11:55 pm)
Team Task: Q6 (Special Consideration:12th May 11:55 pm)

Diagram developer: Designs diagram to satisfy features and stories from the tasks. They are
responsible for their designed diagram that meets the requirements of the tasks
appropriately.
They need to provide the reasons why they use Interface, Abstract, Class, and Enum under
different
situations. Attends group meetings in any forms to update the progress to team.

Diagram reviewer: Reviews and checks the diagram that is designed for quality assurance. The
diagram reviewer needs to review diagram designed by other diagram developer. Hence, a new
perspective will be likely discovered so that the diagram can be improved.
Currently, assigned to: Everyone (Each person responses to different questions)

By signing below, we agree to the WBA stated above:
Junhao Li
Kenda Wan
Ashton Sequeira
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