

REQ4: Magical Items

Overview:

To achieve this feature, there will be five new classes (SuperMushroom, PowerStar, ConsumeAction, Wallet and PickCoinAction) in the extended system and two modified existing classes (Player and Status). The design rationale for each new or modified classes will be shown below.

ConsumeAction class

This class is use to update player's status and remove magical items from players inventory whenever player consumes the item. There is dependency between this class with the PowerStar and SuperMushroom class because we need to check which item is consume by players and update their status depending on item consumed.

- execute method is a method overridden from the parent class, Action class. It is use to update the player's status, adding capability to the player when player consumes the magical item. The item will then be removed from player's inventory. A description will then be display in the console showing which item is consumed by player (actor) using the menuDescription method.

```
@Override
public String execute(Actor actor, GameMap map) {
    if(item==powerStar){
        powerStar.updateStatus(actor);
        actor.removeItemFromInventory(item);
    }
    if(item==superMushroom){
        superMushroom.updateStatus(actor);
        actor.removeItemFromInventory(item);
    }
    return menuDescription(actor);
}

@Override
public String menuDescription(Actor actor) {
    return actor + " consumes a " + item;
}
```

Why i choose to do it that way:

Since ConsumeAction is an action, functions in the action class are required (displaying actions carried out by player's into the console) and hence need to extend the action class. The execute and menuDescription from the Action class are implemented and overridden as shown in the code block above. This class is created to deal with magical items collected by players because items picked up by players will be added into the player's inventory first instead of carrying out their respective effect immediately. Hence this class is needed to update player's status after player choose to consume the items.

Advantage:

Using this design, the Single Responsibility principle can be implemented as this class will only be used when used to update player's status upon consuming magical items, hence higher cohesion.

Disadvantage:

As the game develops further, more item will be available for players to pick up and gain different capabilities. It might cause confusion during methods implementation as more and more if-else statements will be needed in the execute method.

PickCoinAction

This class extends the Action class to allow player to pick up coins and then add the collected coins into the users wallet. This class has association relationship with the Coin class as there will be a coin attribute initialised in the PickCoinAction constructor so that it knows which coin (of what value) is picked.

```
private Coin coin;
public PickCoinAction(Coin coin) {
    this.coin = coin;
}
```

Description of method:

- addToWallet method adds the amount of coins collected by player into the player's wallet if player reaches location that contains coins. The coin will then be removed from the map after player collects it

```

public void addToWallet(Player player, GameMap map, Coin coin) {

    int itemLocation= coin.hashCode();
    int actorLocation= player.hashCode();

    if(itemLocation==actorLocation){
        map.locationOf(player).removeItem(coin);
        int current=player.getWallet().getBalance();
        player.getWallet().setBalance(current+ coin.getValue());
    }

}

```

Why i choose to do it that way:

Since PickCoinAction is an action, functions in the action class are required and hence need to extend the action class. This class is created for players to pick up coins instead of using the PickUpItemAction in the engine package because the PickUpItemAction in the engine package stores item picked by player into the inventory. However, this is not the case for coins. Hence I created this class to add values of coin into the player's wallet instead of into player's inventory.

Advantage:

Using this design, the Single Responsibility principle can be implemented as this class will only be used when used to pick up coins (which this class will then be used to increase the player's wallet balance) hence higher cohesion. Open Close Principle can also be implemented as this class extends the Action class, by adding functionality to the Action class without modifying its already available functionalities, in a way that does not change the way we use existing code in the Action class. This enables the Action class to support new functionalities as well as being added new methods easily. For example, the menuDescription method from the Action class can be override to display the amount of coin player received.

```

public String menuDescription(Player player) {
    return "Player receives " + coin.getValue() + " coins.";
}

```

Disadvantage:

N/A

PowerStar class

This class is a subclass of items. Players that consume it will be healed by 200 hit points (hp) and become invincible. The invincible effect replaces fading duration (aka, fading turn's ticker stops), and it lasts for another 10 turns. It fades and disappears from the game within 10 turns. Sets the player's status such that player does not need to jump to higher level ground, add 5 coins into player's wallet for every destroyed ground, make player immune to damage and enable player to attack enemy successfully

Description of method:

- `updateStatus` method that add capabilities(effects of PowerStar) to the player. This method will be call when player consumes the Power Star

```
public void updateStatus(Player player){  
    player.addCapability(Status.POWER_STAR_BUFF);  
}
```

Description of attributes:

- `HEALED_HIT_POINTS` is a public static integer attribute with value of 200 that indicates the hit points players can get healed by after consuming the Power Star

Why i choose to do it that way:

Since Power Star is an item, functions in the Item class are required and hence need to extend the Item class. I created this class in order to store information about this item, such as the effect it can bring to players and its ability to be traded for coins

Advantage:

This class is created using the Separation of Concern principle where the program is separated into sections with its own responsibilities, by having well- defined concerns and as little overlapping as possible. Which in this class, the class is only responsible for storing information about the Power Star. Excessive use of literals was also prevent by declaring `HEALED_HIT_POINTS` as private static attribute. This prevents confusion during coding process. Furthermore, if the value of `HEALED_HIT_POINTS` needs to be change, changes only need to be done at one place, which is at the line where that attribute is declared instead of going through entire code and changing the value all of the "200" . This minimise possibilities of producing errors too. Open Close Principle can also be implemented as this class extends the Item class, by adding functionality to

the Item class without modifying its already available functionalities, in a way that does not change the way we use existing code in the Item class. This enables the Item class to support new functionalities as well as being added new methods easily. For example, the PowerClass can use the addCapability method from the Item class to add capability to players.

Disadvantage:

Since player's status will be updated, two if-statements will be used in the execute() method and the SuperMushroom class. This reduces the efficiency of the game as time will be spent on checking conditions of whether player is under the effect of Power Star (immunity effect where all enemies' attack damage are 0) when player is being attacked by enemies. Furthermore, the Power Star provides player with the ability to reach higher level ground without jumping. Hence whenever player performs a jump action, an if statement may be needed to check if player is under Power Star effect too.

SuperMushroom class

This class is a subclass of items. The effect will last until it receives any damage (e.g., hit by the enemy). Once the effect wears off, the display character returns to normal (lowercase), but the maximum HP stays.

Description of attribute:

EXTRA_HP is a public static integer attribute with value of 50 that indicates the max hit points players can get after consuming the Super Mushroom.

Description of method:

updateStatus method that add capabilities to player such that:

- the display character evolves to the uppercase letter (e.g., from m to M).
- it can jump freely with a 100% success rate and no fall damage.
- increase max HP by 50

```
public void updateStatus(Player player){
    //display character evolves to the uppercase letter
    player.addCapability(Status.TALL);

    player.addCapability(Status.SUPER_MUSHROOM);
}
```

Why i choose to do it that way:

Since Super Mushroom is an item, functions in the Item class are required and hence need to extend the Item class. I created this class in order to store information about this item, such as the effect it can bring to players.

Advantage:

This class is created using the Separation of Concern principle where the program is separated into sections with its own responsibilities, by having well- defined concerns and as little overlapping as possible. Which in this class, the class is only responsible for storing information about the Super Mushroom. Excessive use of literals was also prevent by declaring EXTRA_HP as private static attribute. This prevents confusion during coding process. Furthermore, if the value of EXTRA_HP needs to be change, changes only need to be done at one place, which is at the line where that attribute is declared instead of going through entire code and changing the value all of the "50" . This minimise possibilities of producing errors too. Open Close Principle can also be implemented as this class extends the Item class, by adding functionality to the Item class without modifying its already available functionalities, in a way that does not change the way we use existing code in the Item class. This enables the Item class to support new functionalities as well as being added new methods easily. For example, the SuperMushroom class can use the addCapability method from the Item class to add capability to players.

Disadvantage:

Since player's status will be updated, an if statement may be used in the AttackAction class whenever the player is attacked by enemies to check whether player is under the Super Mushroom effect. This may reduce the efficiency of the game in terms of run time, time complexity and resources as the if-statement will always run to check if player has capability provided by the Super Mushroom.