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2D Roguelike Game: Final Report

1. List the features you implemented (from part 1 and 2 where you listed the features you were planning to implement/requirements you listed). Show Final class diagram, discuss benefits of designing before coding.

Added start and in-game menu with volume control
Added high score saving ability that persists data
Player can now attack enemies
Added weapons and armor for the player to pick up
Generated enemies based on power levels
Added new abstract enemy class (flyingenemy)
Added a Mario themed skin to game

Designing before coding helped immensely with the development! The design laid out the roadmap which we need to follow. Development was simply a matter of translating our diagrams into code.

Design made the development more organized. We never had to wonder what to do. And everybody had already agreed on what to implement so teamwork was consistent with the same plan.

Teamwork was more effective. While Josh worked on creating the enemy factory, Tyler was able to make more enemies. While Tyler worked on the score saver, John was able to make the Menu options for saving scores. Because they worked with the same design, their collaboration coordinated perfectly.

2. Design patterns

We used the factory design pattern for enemies. This greatly simplified level generation and the addition of enemies. We were able to give a higher power level to our enemy factory for higher levels so that it would randomly generate stronger enemies. Adding enemies to our game only required adding it to our enemy factory list.

We used the strategy design pattern for the selection of enemy movement patterns.

We added a flying enemy subclass of the enemy class. It overrides the enemy movement method. Because of Liscov Substitution Principle, we can still generate a flying enemy from our enemy factory.

In the original code, the data for food was hard coded into the player class. This is bad coupling and is in violation of the Single Responsibility Principle. So we refactored food into its own class.

We made a Collectable interface for the food, weapons, and armor to implement. We made an Attackable interface for enemies and walls to implement. This allowed us to reuse similar abstract traits buts still encapsulate what varies in the classes.

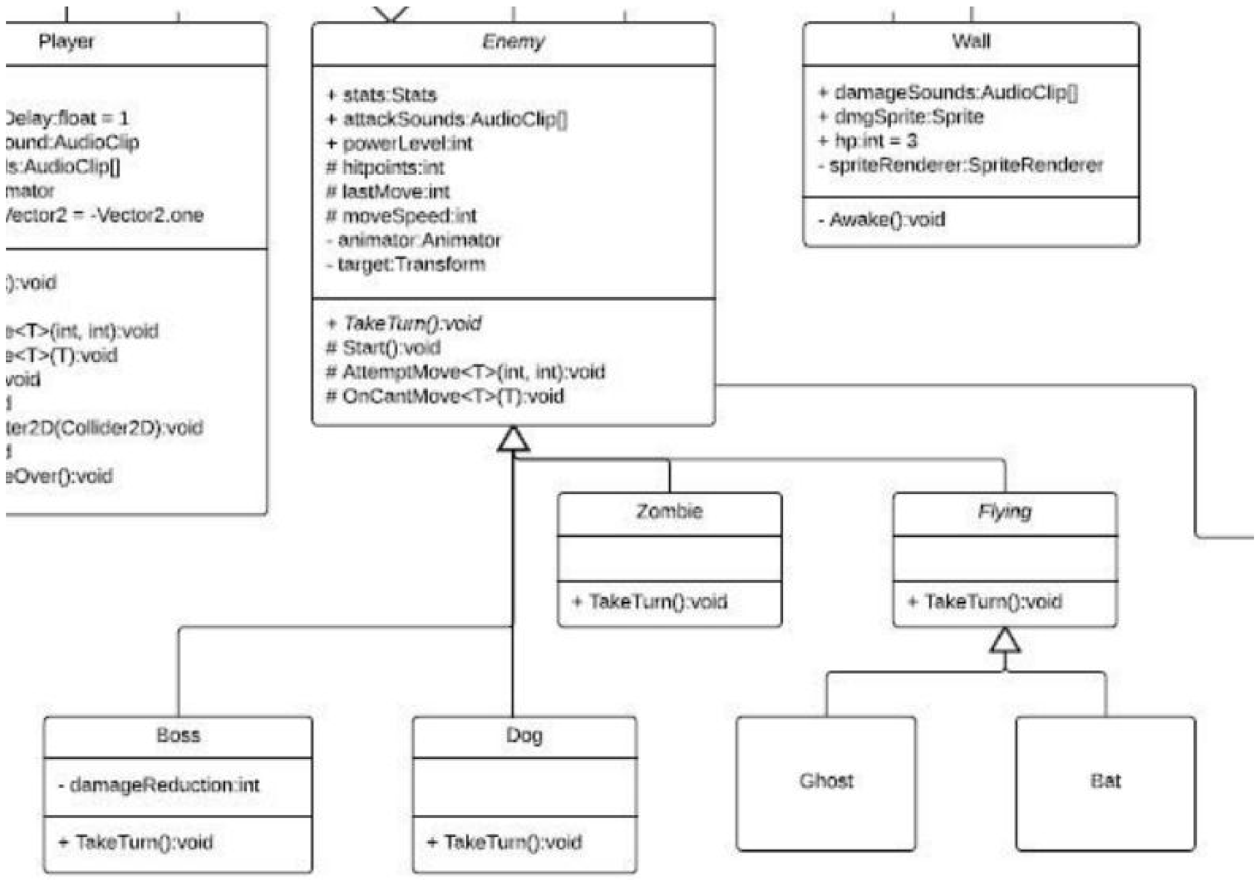
We refactored player and enemy health points by introducing a parameter objects, Stat, which can then be composed into player and enemy. We did this because of its “duplicate code” bad code smell.

3. Compare your Part 2 class diagram and your final class diagram - include part 2 class diagram and point out the necessary changes. You can answer why you didn't realize you needed things during the design and/or how next time you will be able to make a better design after this learning experience.

Our final class diagram changed a bit from the part 2 class diagram. But it still remained true to the original intent.

We moved around the enemy classes because we felt that it was better for gameplay. We made the boss class a subclass of flying so that it could attack and move diagonally. We felt that this made the boss a more appropriate difficulty for the player. We couldn’t have realized this at design time because we need to play the game.

Upon implementing the enemy functionalities, we found that it was easier to considering walking and flying enemies separately by using the strategy design pattern. This was a better way to implement it.



4. What did you learn about analysis and design?

We learned that analysis and design is incredibly helpful for project development!

We learned not to rush into development because time is much better spent in design at first. We saw first hand how days of design saved us weeks of development. We saw how it greatly reduced the complexity of code to implement in our project.

We learned that design greatly increases the visibility of our code. It’s hard to look at code and see the big picture. But by looking at our class diagrams, design patterns in our project became self-evident. By asking ourselves “where can I use this design pattern?” or “what design pattern fits here?”, we were able to refactor our code to make it cleaner and more expandible.

We learned how analysis helps communication between customers and vendors and between developers within the project. Dr. Boese was effectively our customer in this project. By making use case, requirement, and activity diagrams, we were able to effectively communicate to her what were our project deliverables. Amongst ourselves, we were able to more effectively provide those deliverables because of the plan we laid out in our class diagrams.

Thank you very much for this learning opportunity, Dr. Boese.