Technical Report: Bunny Tidy Up

LB02 Group 3
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1. Introduction/Background

With the development of technology and digital literacy, especially in the younger generations, many forms of online entertainment have become popular. One of the most popular forms is gaming. In research done by Mirabella & Tiatri (2023), it showed that the province of DKI Jakarta alone holds the highest rate of internet addiction with most of these focusing on online gaming. The COVID-19 pandemic has proven to boost these statistics as people were forced to stay at home with the internet as the only medium to socialize. Due to this advancement, it is safe to say that gaming has become a permanent part of our daily lives and is starting to be introduced to children at young ages. According to the National Center for Educational Statistics, 97 percent of 3-to-18-year-olds had internet access in 2021. As children are prone to absorb any information that they listen to or see, it is extremely vital to filter and ensure that the content these children consume is clean and educational.

Moreover, it is no secret that waste management has been a problem in Indonesia for a long time. Out of the 7.8 million tons of plastic waste, 4.9 million tons are not managed properly, with 83% being tossed into the ocean. Based on The Ministry of Environment and Forestry (KLHK), the volume of waste in Indonesia has reached 68.5 million tons which is double the amount of trash 10 years ago. The lack of improvement in this sector leads to the stunting of achieving SDG goals 11 and 12 which are “Sustainable cities and communities” and “Responsible consumption and production”, respectively. This has been a deeply concerning issue and requires immediate action. The article “The Importance of Education in Preventing Environmental Pollution” from the Medium platform states that the lack of education is one of the primary causes of environmental pollution in the world as children do not understand the importance of disposing garbage properly for a clean environment.

Understanding the problems faced, we have come to the conclusion that it is vital for children to grasp the importance of waste management at a young age in order to properly implement proper practice towards garbage. Therefore, we have decided to contribute to these SDGs by creating a novel educational game that is appealing to children and teenagers whilst building a sense of responsibility to manage waste for a better environment. What differentiates this application from other games is that it focuses on cleaning the environment instead of just mindless fun. The purpose and drive

to decrease waste pollution is built as users move on to next levels of the game. With this, it is our hope that our game is able to contribute to achieving the 11th and 12th SDG goals in Indonesia.

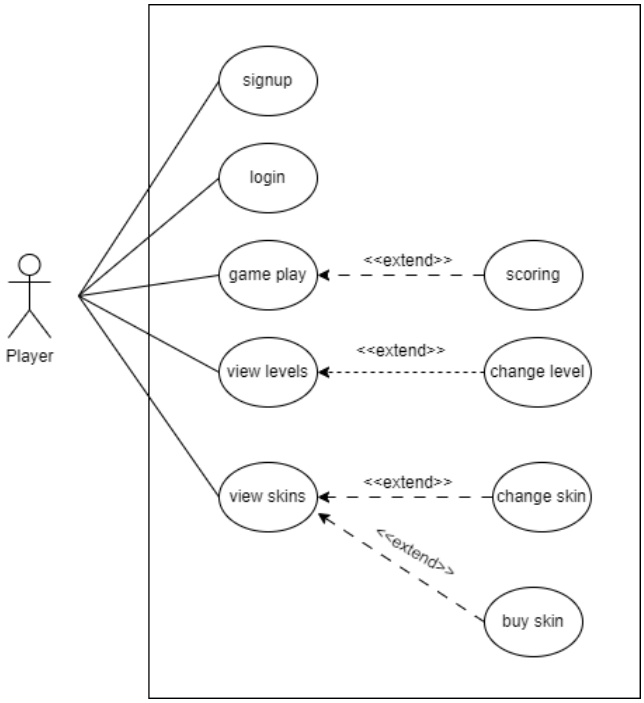
2. Description of the Software

2.1. Description and Features

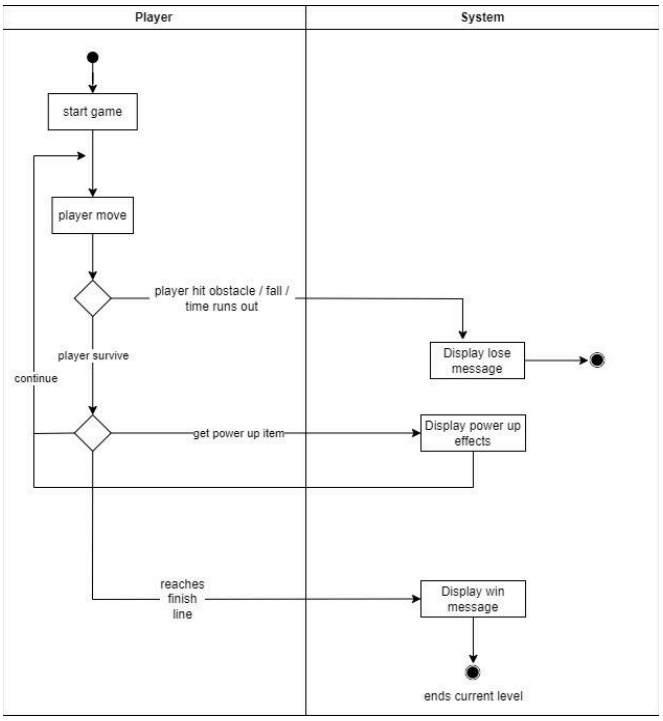
The name of our game is “Bunny Tidy Up” which follows the story of a group of rabbits who are disappointed with the state of their homes filled with trash and, therefore, decide to clean it up. However, they do not only clean up their home. They also expand and clean cities and fields that are all covered in trash. This game is a 2D platform game that is created through collaboration using the Unity application. The features included in this game are as follows:

a. Character movement (forward, backward, jump, crouch)
b. Collect trash
c. Collect power-up items
d. Shoot enemies (power up feature)
e. Level select
f. Save progress
g. Cutscene/Story
h. Restart/Respawn

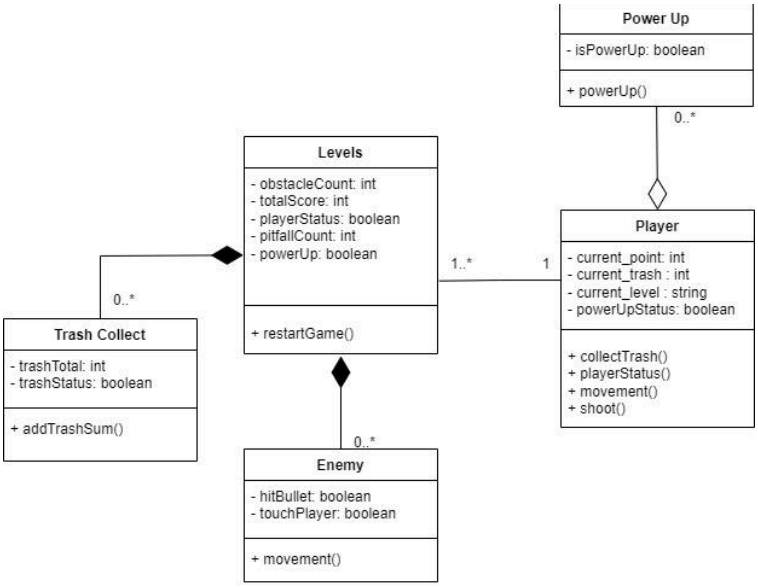
2.2. Use Case Diagram



2.3. Activity Diagram



2.4. Class Diagram

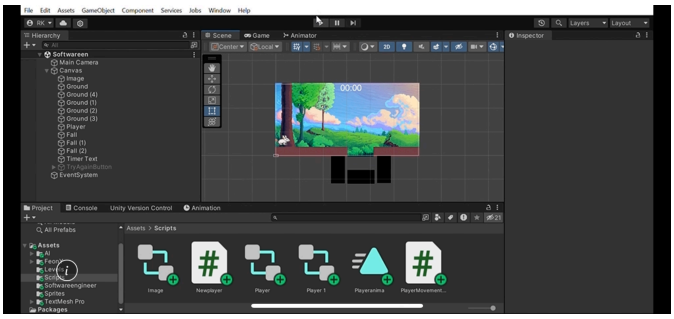


3. Process

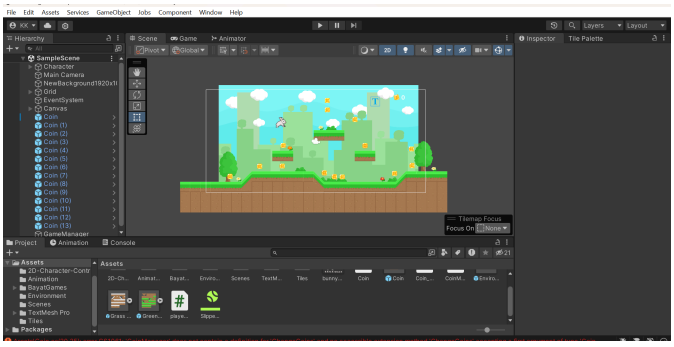
The process model that we have chosen for this project is the **Evolutionary Prototyping model**. The evolutionary prototyping model is an incremental and risk-oriented life cycle model that consists of 6 main phases:

a. Planning
b. Analysis
c. Design
d. Prototype
e. Implementation
f. Testing

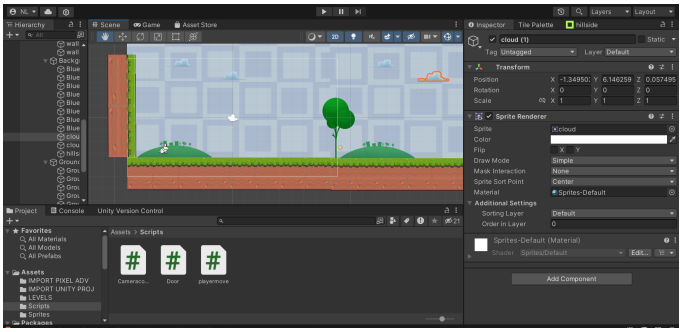
Along the iterations, a prototype can be created from the early stages of the cycle which allows us to implement additional requirements from the reviewing stages. As the model iterates, we are expected to learn more about the software as it slowly comes into shape while identifying more potential risks and developing ways to prevent them. We have decided to move forward with the spiral model because our project did not have complete requirements in the planning stage and one of our main concerns is the possible risks that may arise in the process. Therefore, with this process model, we can easily add or remove any requirements as necessary while meticulously recognizing and averting risks. The documentation of the spiral model being executed is as follows:



Prototype 1



Prototype 2



Prototype 3

4. Cyclomatic Complexity Score

The cyclomatic complexity score was made based on the activity diagram made in **2.3.**

Calculation:

Decision + 1 = 3
Closed area + 1 = 3
Number of independent paths = **3**

Independent Paths:

a. Start game → Player move → Display win message
b. Start game → Player move → Display power-up effects → Player move → Display win message
c. Start game → Player move → Display lose message

5. Effort Estimation

The effort estimation is calculated using Functional Point Analysis and estimated into days and months required for 4 members to complete the project.

Link: Functional Point Analysis Table Calculation

6. Risk Table

	Insignificant 1	**Minor 2**	**Significant 3**	**Major 4**	**Severe 5**
5 Almost certain					
4 Likely					
3 Moderate					Script Security

2 Unlikely		Difficulty balancing		Performance Capabilities	Incompatibility
1 Rare					Collision bugs

Risk	Impact	Probability	Description	Mitigation
Collision bugs	5	1	Bugs that occur during runtime that involve collision between game objects. Example: level completes when a player reaches the finish line, killing enemies when the bullets hit, and displaying the "Game over" screen after falling into the pitfall or colliding with enemies.	Perform automated testing to find unusual collision scenarios, while relying on beta testers to spot issues in common collision scenarios.
Difficulty balancing	2	2	Players may feel unmotivated due to the difficulty imbalance (too easy/too hard)	Use questionnaires to gain feedback from both beta testers and players who played after release.
Script Security	5	3	The game script is easily accessed from local directories and manipulated by a third party or players.	Implement code obfuscation and encrypt sensitive scripts.
Performance Capabilities	4	2	Players experience lags, crashes, and slow load time.	Conduct performance profiling, optimize file management system, evaluate assets formats for their efficiency, stress testing, and rearrange load distribution if needed.
Incompatibility	5	2	The game may not be supported on every PC platform, which limits the potential player count.	Perform various compatibility testing before releasing the game publicly. Then list the incompatible platforms to fix them while informing players.

7. Final Presentation Slide

The final presentation slide was made on Canva, summarizing all the points in this technical report.

Link: Bunny Tidy Up Final Presentation Slide

8. Final Product

The final product is a game file "softwareengineer.exe". The file can be accessed through github or the binusmaya submitted file

Link: BunnyTidyUpGithub

9. GamePlay Video

The gameplay video can be accessed through the onedrive link below which demonstrates the Bunny Tidy Up game.

Link: BunnyTidyUpDemonstration

10. Test Case

No	Test Case	Expected Result	Actual Result	Pass/Fail
1	When the game starts, the player will move by **pressing left, right, or up**. If the player avoids pitfalls or enemies, then **the player survives.** They will be able to **reach the finish line** and win the game. This is represented by a **win message that is displayed**	Win message is displayed, signaling the player wins the level	Win message is displayed, signaling the player wins the level	**Pass**
2	When the game starts, the player will move by **pressing left, right, or up**. If the player **collides with a power up strawberry**, then they will have the power up displayed which is **the ability to shoot at the enemies (slime) and destroy them.** The player will **continue moving** to avoid obstacles, gain more power up, and collect trash to survive. They will be able to **reach the finish line** and win the game. This is represented by a **win message that is displayed**	Win message is displayed, signaling the player wins the level	Win message is displayed, signaling the player wins the level	**Pass**
3	When the game starts, the player will move by **pressing left, right, or up.** If the player **falls in a pitfall** or **collides with an enemy** or **the time runs out**, the player will **lose and die.** This is represented by a **lose message that is displayed**	Lose message is displayed, signaling the player lost the level	Lose message is displayed, signaling the player lost the level	**Pass**

11. Conclusion

Bunny Tidy Up is a fun, simple, and educational game that is appropriate for children and teenagers who are prone to spend most of their time online or playing digital games. The features of this game are all functional and perform accordingly with their expected outcome. The message that comes with Bunny Tidy Up, to properly manage waste for a clean environment, is successfully delivered to the players as it is the main goal of the game itself. With this, Bunny Tidy Up can contribute to resolving the 11th and 12th SDGs in Indonesia.

12. References

Mirabella, & Tiatri, S. (2023). An overview of online game addiction among Indonesian early adulthood during the COVID-19 pandemic. *International Journal of Application on Social Science and Humanities*, *1*(2), 1334–1343. https://doi.org/10.24912/ijassh.v1i2.26353

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Sustainable Development Solutions Network. (n.d.). *Sustainable development report 2024*. Sustainable Development Report 2024. https://dashboards.sdgindex.org/profiles/indonesia

13. Peer Review

Kelila Karenza Kumala – 45%
Nicole Livia Alexandra – 45%
Neilvan Davis Thesman – 5%
Roderick Kangson – 5%