SERIOUS GAME
FOR RAISING AWARENESS
IN
PROTECTING MALAYSIA
NATIVE WILDLIFE
(Born)

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Bachelor of Computer Science
(Graphics & Multimedia Technology)
with Honour

UNIVERSITI MALAYSIA PAHANG

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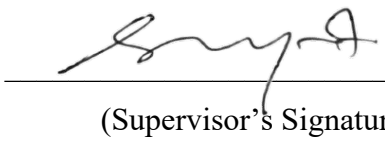

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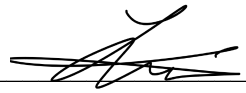

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SERIOUS GAME FOR RAISING AWARENESS IN PROTECTING MALAYSIA NATIVE WILDLIFE (Born)

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ABSTRAK

Sejak beberapa dekad yang lalu, kepupusan hidupan liar semakin meningkat dan cabaran mereka untuk terus hidup dalam hidupan liar telah muncul. Tumpuan Malaysia sering hilang oleh topik hangat hari ini dan tidak mengetahui topik yang tidak akan dibincangkan oleh media. Salah satu topik ialah masalah kepupusan Hidupan Liar Asli Malaysia. Mereka menghadapi ancaman di habitat mereka dan menghadapi cabaran untuk tinggal di tanah kita. Penebangan hutan merupakan masalah utama yang menyebabkan Hidupan Liar Asli Malaysia kehilangan habitatnya. Hutan ditebang untuk dijadikan ruang untuk penanaman seperti kelapa sawit dan tanaman lain. Aktiviti pembalakan dan perladangan telah memusnahkan litupan hutan Malaysia, mengakibatkan kemerosotan alam sekitar yang ketara. Sebagai contoh, populasi Orang Utan telah menurun sebanyak 40% dalam tempoh 20 tahun yang lalu kerana penebangan hutan dan salah satu spesies asli Malaysia yang jarang ditemui, Malayan Flying Lemur, terancam akibat penebangan hutan dan kehilangan habitat semula jadinya. Kesedaran tentang masalah hidupan liar asli Malaysia harus dibangkitkan dan diberi tumpuan oleh rakyat Malaysia. Jadi, projek ini akan memilih 3 hidupan liar utama sebagai hidupan liar utama untuk diselamatkan iaitu Orang Utan, Malayan Tapir dan Malayan Flying Lemur. Ini adalah untuk membangunkan permainan serius yang dipanggil "Born" yang memberi tumpuan kepada meningkatkan kesedaran tentang isu kepupusan Hidupan Liar Asli Malaysia di kalangan pelajar. Objektif projek ini adalah untuk mengkaji mekanik permainan permainan serius platform 2D yang dibangunkan, membangunkan permainan serius untuk melindungi Hidupan Liar Asli Malaysia dan menilai kefungsian permainan yang dibangunkan. Projek ini dibangunkan dengan menggunakan Rapid Application Development (RAD), yang bertujuan untuk pembangun individu yang perlu menyiapkan keseluruhan projek dalam tempoh masa yang singkat. Permainan ini dibangunkan dengan menggunakan enjin Unity 2D, Photoshop, Clip Studio Paint dan Medibang. Produk akhir digunakan pada platform PC dan ia akan tersedia di Itch.io, platform untuk memuat naik dan memuat turun permainan secara percuma.

ABSTRACT

Over the past few decades, extinction of wildlife is increasing and their challenges to survive in wildlife have emerged. Malaysia's focus is often taken away by today's hot topic and doesn't aware of topics that will not be covered by the media. One of the topics is the Malaysia Native Wildlife extinction problem. They are facing threats in their habitat and facing challenges to live in our land. Deforestation is a major problem that causes Malaysia Native Wildlife to lose their habitat. The forest is being cut down to make space for plantations such as palm oil and other crops. Logging and farming activities have decimated Malaysia's forest cover, resulting in significant environmental deterioration. For example, the Orang Utan population has dropped by 40% in the last 20 years because of deforestation and one of the rare Malaysia native species, the Malayan Flying Lemur, is under threat due to deforestation and loss of its natural habitat. The awareness about Malaysia Native wildlife problem should be raised and focused by Malaysian. So, this project will select 3 main wildlife as the main wildlife to rescues which is Orang Utan, Malayan Tapir and Malayan Flying Lemur. This is to develop a serious game called "Born" which focuses on raising awareness of Malaysia Native Wildlife extinction issues among students. The objective of this project is to study the game mechanic of the developed 2D platform serious game, develop a serious game for protecting Malaysia Native Wildlife and evaluate the functionality of the developed game. This project is developed by using Rapid Application Development (RAD), which is intended for individual developers who need to complete the whole projects in short period of time. The game is developed by using Unity 2D engine, Photoshop, Clip Studio Paint and Medibang. The final product is deployed on PC platform and it will available on Itch.io, a platform to upload and download the game for free.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The concept of playing games extends back to antiquity and it is considered a fundamental feature of all societies. Playing video games has always fulfilled a purpose in our lives such as relaxation, enjoyment, socialization, challenge, achievement, and education. In modern days, games could be a meaningful and purposeful activity to an individual and it integrated into our lifestyles. Serious game is used for engaging the player via narractive game play, encounters to inform and experiences to convey meaning. (Apphia Jia Qi Tan, 2017).

Nowadays the world is flooded with new technology and application of digital technology. Most of the people are spending most of their time with these digital technologies and slowly adapted to this lifestyle. Digital technologies are electronic tools, systems or devices that can generate, process and store data. Examples of digital technologies include social media, games, and multimedia. But a lot of people are assuming these digital technologies as entertainment purposes. To prove that digital technologies are not only for entertainment purposes, serious games were developed to educate users in an engaging and entertaining manner. According to a study, the serious games keep the primitive gaming skills techniques but consistently to achieve goals and spread awareness (D. Gupta and K. Gupta, 2019). Since Covid-19 pandemic has caused the rise of e-learning, demand for using digital technologies is increasing rapidly. Some of the students have used this opportunity to play online games for relaxation and entertainment and this could be an advantage to develop serious games for students as an educational tool. Serious games are also a promising tool to raise awareness among players and the public. It can motivate and enhance students' interest in a specific topic and it only requires a small time-investment. According to research, in contrast to more

traditional media formats, games have attracted more attention and engagement in their topic and inspire a positive attitude toward learning and behavioral changes. (Bourgonjon, Valcke, 2010). In the market, there are plenty of games that require a longer time to finish and it is hard to incorporate students into the curriculum. Hence, serious games will be a better option because it only requires a little amount of time and allows them to focus on specific topics and learning objectives. (Illanas et al., 2011).

The goal of this project was to explore the effectiveness of serious game and its impact in raising awareness related to the Malaysia Native Wildlife extinction problem among the students. This project is aiming to make a game that can be fun, but it can educate students in raising awareness among students to save the Malaysia Native Wildlife. Serious games' educational value and potential to attract students make serious game potential tools for promoting public awareness. (Sayers, 2006). Through the introduction of serious games, this project hopes students can focus on problems that happen in Malaysia and make them want to explore more in the serious topic in Malaysia spontaneity and gain knowledge and fun from it.

1.2 Problem Statement

Game-based learning needs to expand in primary school and secondary school because learning sessions are boring and not fun for them. Educational games may be taken seriously since they are interactive and effective learning and training aids that can be played on a computer. (Arriaga et al., 2013) Students have experienced some of the drawbacks of traditional education such as lengthy hours spent sitting in front of laptops or gadgets and listening to teachers, countless theory and slides have made them feel unmotivated to learn new knowledge. Students not only need to study what will be taught in the syllabus and book, but they are required to learn extra things to enhance their knowledge. By using game-based learning, students can increase their memorization and retention of what they've learned. It could also be used to raise awareness for some topics such as environmental issues, cyber security issues, extinction issues, etc. Most of the students are unable to access these kinds of topics and it will lead to lack awareness of them.

In the light of covid-19 pandemic, Malaysia's focus is often taken away by today's hot topic and doesn't aware of topics that will not be covered by the media. One of the

topics is the Malaysia Native Wildlife extinction problem. They are facing threats in their habitat and facing challenges to live in our land. Deforestation is a major problem that causes Malaysia Native Wildlife to lose their habitat. The forest is being cut down to make space for plantations such as palm oil and other crops. Logging and farming activities have decimated Malaysia's forest cover, resulting in significant environmental deterioration. For example, the Orang Utan population has dropped by 40% in the last 20 years because of deforestation and one of the rare Malaysia native species, the Malayan Flying Lemur, is under threat due to deforestation and loss of its natural habitat. Besides this, massive expansion of the road network has caused Malayan Tapir to become an easy target for vehicles on highways due to their poor eyesight.

At the same time, serious games are a suitable platform to let students learn about the background of each Malaysian Native Wildlife and the threats and challenges they face. Serious game could raise awareness about the extinction problem of these wildlife and let the new generation have a better understanding of what has happened in Malaysia in the current moment. After research in the market, there are no games regarding Malaysia Native Wildlife. The information about Malaysia Native Wildlife is too boring for teenagers or students. So, this project wants to raise awareness among Malaysia Native Wildlife and improve the usefulness of serious game in education in Malaysia.

1.3 Objectives

There are three objectives in this project which are:

1.) To study game mechanics of a single player serious game for Malaysia Native Wildlife.
2.) To develop a serious game for protecting Malaysia Native Wildlife.
3.) To evaluate the functionality of the developed game.

1.4 Scope

There are scopes in this project:

1.) To create a maximum of 3 Chapters which each level is describing Malaysia native wildlife and its challenges.
2.) To create the maps that consists of Malaysia native wildlife's habitat elements to let user experience the actual look of habitats.

3.) To create a storyline for every wildlife to let player can gain knowledge of each wildlife and the challenges they face.

4.) To create a game that easy to understand and control for all ages.

CHAPTER 2

LITERATURE REVIEW

2.1 Reviewing Existing System

There are three existing systems that are available on the market that will be analyzed and discussed here. The details and information of these games will be discussed in core gameplay, storyline, graphic, music, and reviews of its platform. The games selected are serious games that are suitable for students to play.

2.1.1 Alba: A Wildlife Adventure

Alba: A Wildlife Adventure is an open world adventure game developed by Ustwo Games. This game is focusing on exploring the world and conserving wildlife on the island. There is a lot of wildlife that players need to discover and record. This game was released on December 11, 2020 for iOS, macOS through Apple Arcade exclusive and Microsoft Windows, and for Nintendo Switch, PlayStation 4, PlayStation 5, Xbox One on June 9, 2021. This game is more of an educational game to wildlife and the story background was at Secarral which is a fictional island town in Valencian Community, Spain. Alba Singh is the main character of this game and she travels to the United States for a week to visit her grandparents. She and her friend join a wildlife rescue of a stranded dolphin. The following day, the mayor reveals that a luxury hotel would be built on the site of a local nature reserve that was destroyed by a wildfire. To stop this, Singh decided to resolve it by collecting signatures from residents. They assist with a variety of cleanup and animal rescue projects, as well as photographing and cataloging local animals in order to promote awareness.

Figure 2.1: Alba: a wildlife adventure Wallpaper

Figure 2.2: Alba: a wildlife adventure in-game screenshot

Alba: A wildlife adventure is a single player adventure game that allows the player to walk around the island freely and identify all the animals on this island. There are 62 different animals including dolphins, cats, chickens, birds, etc. A lot of the animals can be found all over the island and some of the animals need to trigger a storyline to find them. In this game, there are 8 biomes which contain different animals which are beach, farmland, forest marshland, mountain, rice fields, terraces, and town. Each biome has its own characteristics and it brings the importance of ecology for the player.

Figure 2.3: Alba: a wildlife adventure in-game screenshot

This game has plenty of storyline that is related to issues and threats that are facing wildlife now. Each storyline has brought out different issues such as climate change, waste pollution and deforestation. By playing this game, the player can know more about the importance of protecting wildlife's habitat so that their next generation can live safely on this planet. Beside this, players can raise awareness of climate change and the impact of humans on the ecological system on this planet.

Figure 2.4: Alba: a wildlife adventure in-game screenshot

The art style in "Able: A Wildlife Adventure " is presented in 3D except for the user interface, main menu, loading screen and in-game panel. Main character, wildlife, NPC, environment is animated, and characters have simple emotions and smooth movement. The game has a different soundtrack based on different biomes and storyline to make the

game feel interesting. Character movement sounds also different based on the material of ground that character stepped on.

The core game control is using W, A, S and D to move forward, backward, left and right. The player movement is easy to control and suitable for all ages to play. The game has tutorials for introducing new game mechanics and is user friendly to users that are not playing the game usually. The game is using a vivid environment to attract user attention and let them be willing to complete the game. The user can walk around in the game freely because it is an open world game and all of the animals will stay in specific places and biomes and wait for the player to discover them. The wildlife will walk or fly around its place and it will tell the user if it is an unidentified species. The player is able to use a smartphone to identify the wildlife species by taking photos of wildlife and scanning them. There is a book that will list down all of the species and biomes that the player found.

Figure 2.5: Alba: a wildlife adventure Overall Rating on Steam

Alba: A Wildlife Adventure has an overwhelmingly positive review on Steam. This game had the most reviews when it was released on Steam and it's starting to drop when this game is not a trending game on Steam anymore. The reviews are increasing at the end of March, June, September and December because of promotions made on Steam.

All of the reviews are still positive but there are some of the negative reviews on this game.

Based on the game review of Alba: a Wildlife Adventure in Steam, user suggest this game for younger generation because the information of wildlife could bring clearly for them and can learn easily by using gamification way. It provides a fun way to teach players about the conservation of wildlife and nature. The animation and model of every wildlife is realistic and vivid. These could easily tell the player the species and characteristics of wildlife. The gameplay of Alba: A Wildlife Adventure is easy to play and interesting to make players spend a lot of time exploring the environment and finding wildlife.

By looking at the negative reviews of Alba: a Wildlife Adventure from Steam, users stated that the duration to finish this game is short compared to other games. It only needs 3 hours to finish the game and it is an expensive price for it. The game has a small delay when capturing the photo of the wildlife and entering next biomes. The game has great music but it will not loop and it only last 10 seconds for each scene. The game is using the same mechanics until the end of the game, some of the player will feel bored because there are no new mechanics and new gameplay in the end.

2.1.2 Beyond Blue

Beyond Blue is an educational underwater diving adventure game developed and published by E-Line Media. This game was inspired by BBC's Blue Planet II nature documentary series. It was released on Apple Arcade on 17 April 2020 and on Windows, macOS, PlayStation 4 and Xbox One on 11 June 2020. The game's main character is named Mirai and he is a deep-sea researcher who leads a research team to investigate ocean life. Certain parts of the ocean are under severe pressure and disruption, while others are reviving as a result of increased worldwide action to reduce human impact. Players can discover the ocean besides learning about contemporary climate crises that really happened in this world such as warming the ocean, the flow of waste & plastic and growing noise pollution. The noise pollution has become a serious threat to large social animals who are using sound to communicate. An increasing sense of main character and wonder for the ocean has led to an enthusiasm for exploration of this largely undiscovered

environment. In this game, it has the same feature like Alba: A Wildlife Adventure which is it can identify the species of ocean fish and study the characteristics of the fish.

Figure 2.6: Beyond Blue Wallpaper

In this game, there are 8 different dives where the player can explore the untouched world of the ocean and use technology of understanding. Each dive takes place in a separate ocean atmospheric pocket. The storyline is progressed through waypoints, but the player is able to explore the realistic environment at their own leisure. Players can track sea creatures, unravel mysteries and interact with the ocean. When the player finds the pinpointed creatures, the player can use a drone to have a close look at it and record their marking. The player can identify the species of the ocean creatures and do documentation of it. Players can learn the habitat of ocean creatures besides knowing every characteristic of these creatures. The environment of Beyond Blue is realistic and dive environments range from shallow water tropical reefs to dark, lightless chasms with rumbling hot water vents, they are all recreated after real-life biomes. The ocean wildlife are exactly replicas and their swim animation is also recreated based on real-life creatures.

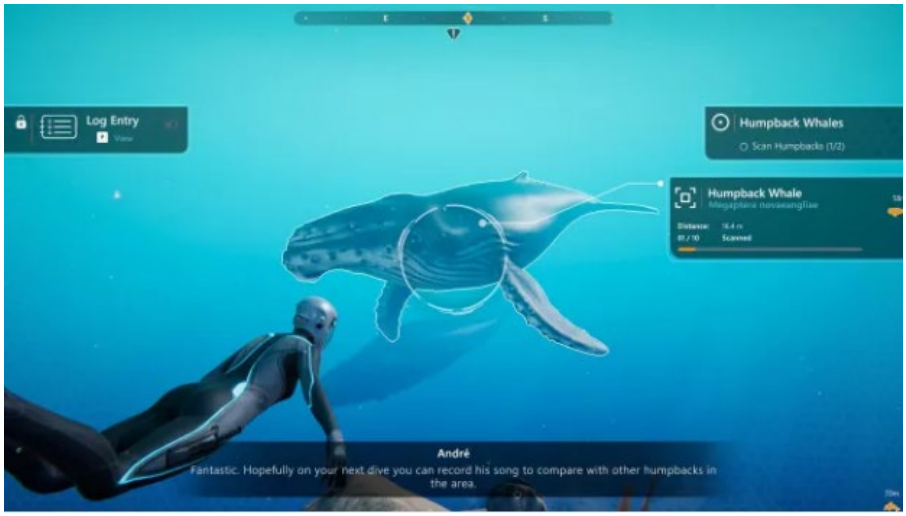


Figure 2.7: Beyond Blue in-game screenshot

In this game, there is a main storyline that will assist players to find new marine creatures and explore the ocean. There are threats that marine creatures face in real life and in-game which are climate change, plastic waste and overfishing that causes tremendous damage to them around the world. These threats will come with a storyline and there will be a narrator who will explain to the player. Player main task is to gather this information and learn human-made threats to the sea besides raising awareness to protect the sea.

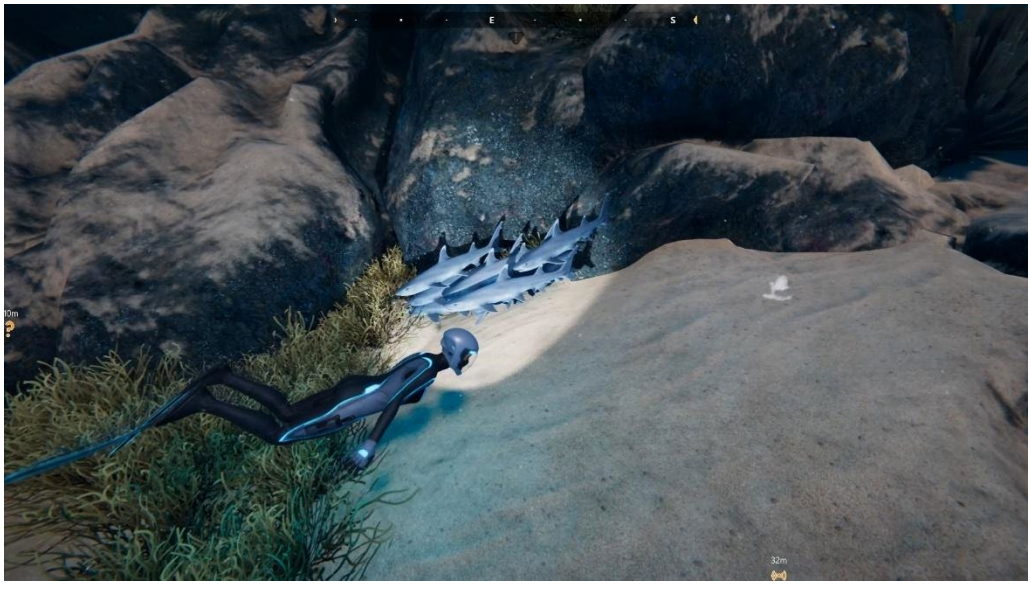


Figure 2.8: Beyond Blue in-game screenshot

The artstyle of this game is very realistic because it is recreated based on BBC's Blue Planet series. Developer of E-Line Media is planning to develop a video game called Beyond Blue that focuses on the scientists who are trying to understand the impact of

human-made threats to the ocean. The game 3D models are recreated by referring to real-life creatures which the player can gain more knowledge of the ocean wildlife on Earth. The software that was used to create the 3D model is Autodesk Maya, ZBrush and Substance 3D painter and the game engine used by E-Line media to develop this game is Unity. The developer team uses realistic graphics and animation to attract people and let them feel more in it. Beyond Blue's original soundtrack is produced by legendary music supervisor Karyn Rachtman and her son Otis Rachtman. There are 13 soundtracks in this game and each soundtrack is reflecting the diversity of the characters, discovery, and impermanence of the oceans. The soundtrack will be unlocked in different levels, from the upper level of the ocean to the deep sea.

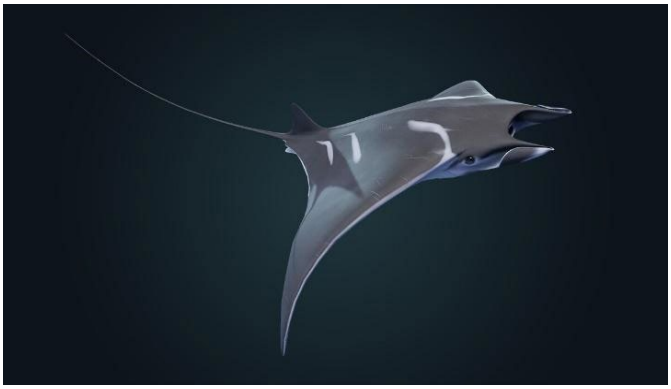


Figure 2.9: Beyond Blue Example of Ocean Wildlife

The aim of E-Line Media is to be sure that we are addressing many challenges that are affecting our planet today, but to do so in a manner that would inspire hope to save our planet and wildlife. The game’s themes are realistic, as are the resources it provides for individuals who wish to make positive change to the world. The company is encouraging players to participate in events such as World Oceans Week and wants players to think about human-made impact on the planet. The world is getting worse day by day, but people don't realize it and lack awareness of it. By playing this kind of game, players could learn about the crisis on the Earth and get to know each wildlife that is involved in the game. Reading articles could be boring and most of the students don't get interested in it, but by changing the form of learning which is game-based learning, it would be a better way to let players be willing to learn by themselves.

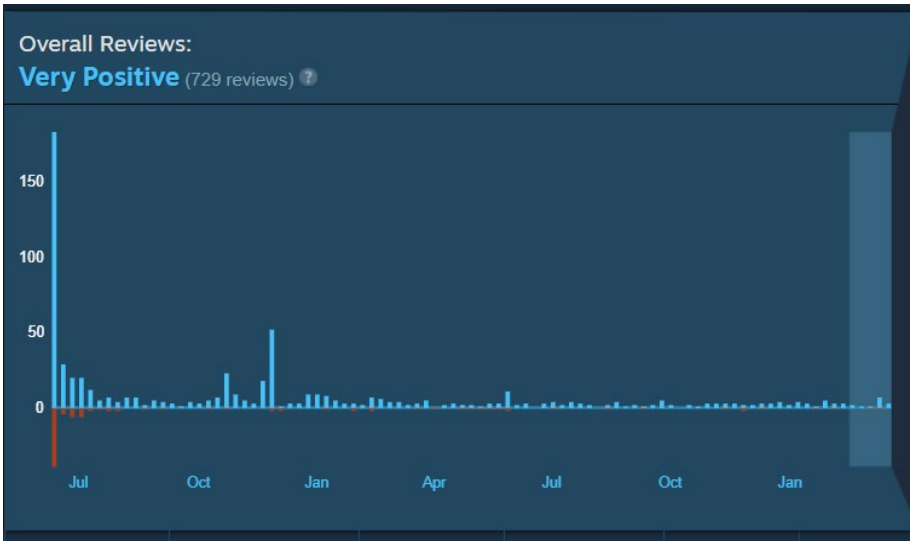


Figure 2.10: Beyond Blue Overall Review

Beyond Blue overall review is rated "Very Positive" by 729 players, Beyond Blue reviews is lower than market expectations and number of reviews also lower than Alba: a Wildlife Adventure. Beyond Blue has received most of the reviews in the first month it was released on Steam. Its popularity had been dropping but this game only received bad reviews in the first month. The first month received the highest negative review because the game did not meet their expectations.

Based on the positive reviews on the Steam review Section, the player likes the realism and authenticity of the environment and wildlife in the game. The game artstyle has received the most positive reviews. The diving mechanic is unique and interesting for some players who have never dived before and they are able to take a look at marine wildlife and learn something from them. The soundtrack from this game and voice actor's narrative is very suitable and fit for the scene and environment. From these reviews, it has been proven that environment design and graphic design is one of the important things to make a game interesting and catch player attention. The gameplay is unique and it requires some skills to play and it takes around 3-4 hours to complete this game.

By looking at bad reviews of Beyond Blue on Steam, most of the players are requiring a neutral review on steam but they have this option so they use bad reviews instead. These players love this game but they are looking for more game mechanics and extra gameplay in this game. The gameplay remains the same from beginning until end of the game, only the storyline might be different for each wildlife. Player felt bored in the late game. Although the diving mechanic is unique, some of the players said that

diving animations are not smooth, and control is chunky. Beyond blue has marked this game as an open world game but it ends with a limited path for the player to force them to trigger the storyline and advance the plot. However, the game's idea and concept are good and it is an educational game for students and players to learn about the crisis that ocean life faces.

2.1.3 Endling

Figure 2.11: Endling Wallpaper

Endling is an adventure indie game developed by Herobeat Studios and published by HandyGames. Endling plays out like a side-scrolling platformer. This game was released on Steam for Microsoft Windows in 2021. This game is about a mother fox trying to look after her cubs in an unpleasant future where forests are being destroyed. Their habitat is being destroyed and polluted, animals in the forests are being hunted to near extinction. The game starts as a sort-of-scrolling adventure before transitioning into a sandbox environment. Player's main goal is to look after little fox babies, which means the player will leave cubs to find food for them. Because wildlife cannot stay at a single spot for a long time to avoid other predators, they will always find a new spot to hide and live there. Players need to always find a new place to hide and carry their cubs to new habitats.

As a mother fox, the player will feel aimless and helpless to stay alive in a forest which is polluted. Player needs to catch mice and rummage through trash to bring back food for her cubs. But once they grow up a little, they will start adventures with players. Players can see the hunter is patrolling in the maps and see humans pouring the toxic into the river. Each cub has their own ability to help their mum but if the mother has lost all

of the cubs, the game will be over. The excessive use of natural resources by mankind has led to environmental pollution and endangering the lives of wildlife. The player will have a better understanding of how human culture generates ripples that extend throughout the world, often with disastrous consequences.

Figure 2.20 Endling trailer Screenshot

Endling's style is influenced by media such as video game "This War of Mine ", "the Film Okja " and "Documentary Cowspiracy ", which deal with social impact topics and themes with subtle narrative sensitivity. The goal of Ending is to create spaces of doubt in the player's mind through the game's narrative and mechanics, then encourage them to come up with their own solutions and suggestions. The map of this game is forest but most of the place is being polluted and human. Humans have cut down all of the trees and started to build concrete jungle which harms wildlife's habitat. In this game, there are some hunters in the forest who try to hunt you and it reflects the overhunting problem in real life. Deforestation problem also happens in this game and their habitat is full of waste and the water source of wildlife is also polluted by toxins. Endling is attempting to raise awareness about conservation and climate change issues and create compelling gameplay experiences for players.

Figure 2.12: Endling in-game screenshot

From some of the positive comments in the discussion section, the artstyle is highly praised because the colour palette used has made a huge difference between fox and environment. The environment of this game is using a dark theme to describe the environment that has been polluted and fox is using a light theme to show an obvious look in the game. All of the players enjoyed playing this game because it required some skills to complete the level. The player can learn about the environmental issues in the forest and have fun in this game.

From some bad reviews from this game, the player thinks that the game concept and idea is too cruel and serious and makes them feel guilty and stressed while playing this game. Beside this, the gameplay of this game is limited which means the player cannot go through all places in this map and it is more like a 2.5D platformer which forces the player to walk on a selected path to complete the task. Sometimes, the player doesn't know what they should do at that time because they don't have any clue about it.

2.2 Comparison table of Three Existing Systems

Systems	Alba: a Wildlife Adventure	Beyond Blue	Endling
Platform	● Nintendo Switch ● Xbox ● PlayStation ● PC ● Mobile	● Nintendo Switch ● Xbox ● PlayStation ● PC ● Mobile	● Nintendo Switch ● Xbox ● PlayStation 4 ● PC
Target System	● Windows ● Xbox One ● PlayStation 4 & 5 ● macOS ● iOS ● Apple Arcade	● Windows ● macOS ● iOS ● PlayStation 4 ● Xbox One	● Windows ● PlayStation 4 & 5 ● Xbox One
Operating System	● Windows 7 or later ● iOS 13.0 or later ● macOS 10.15.0 or later	● Windows 10 or later ● iOS 13.0 or later ● macOS 10.15.0 or later	● Windows 10 or later
Game Engine	● Unity	● Unity	● Unreal Engine 4
Price	● RM 34.00 (Steam, Xbox and PlayStation) ● RM21.40 per month (Apple Arcade)	● RM 39.00 (Steam, Xbox and PlayStation) ● RM21.40 per month (Apple Arcade)	Free (demo)

In-app purchase	● No	● No	● No
Graphic	● 3D	● 3D	● 3D
Network Connection	● No	● No	● No
Game Mode	● Single Player	● Single Player	● Single Player
Difficulty	● Easy	● Medium	● Hard
Availability in Malaysia	● Yes	● Yes	● Yes
Advantage	● Cute and friendly graphic to attract student and children to play ● Easy to play and understand about the storyline ● Doesn't require network ● Can gain knowledge of each wildlife	● Interesting storyline and narrative ● Diving mechanic ● Open world and player can explore in deep sea ● Doesn't require network	● Easy control ● Cartoon-like artstyle to attract more player ● Unique game mechanic ● Unique storyline, environment and music

Disadvantages	● Expensive ● The game mechanic is same from beginning to end and it might bored in late game	● Expensive ● Diving is hard to control for new user	● Hard to play for some students ● Might lost inside the game because there are lack of instruction

Table 2.1: Comparison between system

From Table 2.1, comparison can be made between each attribute of three games. Alba: a Wildlife Adventure and Beyond Blue can be played on multiple platforms such as Nintendo Switch, Xbox, PlayStation, PC and Mobile. But Endling could only play on Nintendo Switch, Xbox, PlayStation and PC. All of the games require the player to make payment to play the game. If the player is an iOS user, the player needs to pay monthly fees to Apple Arcades to access the game. All of the games have no in-app purchase. All three games require a higher requirement of specification because there are 3D games and open worlds which require higher performance of devices to make sure the game is smooth and does not crash during gameplay. Alba: a Wildlife Adventure is requiring Windows 7 or later version but other games are requiring a higher version of Windows which is Windows 10. This is because Alba: a Wildlife Adventurer's 3D models are low poly and it is easy to render if compared to other games. Alba: a Wildlife Adventure and Beyond Blue can be played on iOS devices but they are not available on Android devices. All of the games are indie games which means it doesn't require a network to play and all of them are available in Malaysia and ready to purchase. This game is a single player game only and it doesn't support multiplayer.

Alba: A Wildlife Adventure and Beyond Blue are easy for children and students because the game mechanic is easy to control and their aim is very clear. Players can follow storyline and narrative to complete the task and find a new task. Although these games are open-world games, there are some clues or some place that force players to walk through to trigger the storyline which can help users to adapt to the current situation and learn during this process. Endling is the most difficult game for children and students

because it requires high skills to complete this game. The game mechanic is complex and too many for children and they might not understand what they should do next time.

2.3 Single-Player Video Game

A single-player video game is a game that is designed for one player to play at a time. Other players are not allowed to connect and simultaneously play by more than one player. Single player games could deliver a story to the player in a way that multiplayer games are unable to reach story to multiplayer. Otherwise, multiplayer games are played online live with other players around the globe. If single player is enriched by storyline, multiplayer would be enriched by its gameplay. Multiplayer games required teamwork and cooperation with other teammates to succeed in goals and missions in the games. It required an internet connection to play simultaneously with other players.

The single player game could be designed in 2D and 3D. There will be a lot of game genres that could be developed in single player games such as adventure games, shooter games, story-based games, puzzle games, etc. Single player games will be focused on a storyline which the player cannot experience the feeling in a multiplayer game. In this project, the game will be developed in 2D platformer and story-based games. Players could experience the challenges of the wildlife and have an adventure to send them to a safe place.

The reason that I chose to develop a single player game is because only story-based games could let players experience the storyline and the feeling of wildlife. It enables the player to have substantially broader variety and depth of emotion. Multiplayer games cannot deliver the exact feeling and awareness to the player. Single player games also given the opportunity to further enjoy the graphic artwork and music to enhance the gameplay experience for player.

2.4 Game Development Lifecycle Models

In this topic, we will discuss the development lifecycle models that exist for game Development. Each lifecycle model is used in a different situation and purpose. All of the lifecycle models have their advantages and disadvantages. Developers need to investigate which lifecycle model is the most suitable for the current situation. There are 3 development lifecycle models that will be discussed are Waterfall model, Agile Model and Rapid Application Development.

2.4.1 Waterfall Model

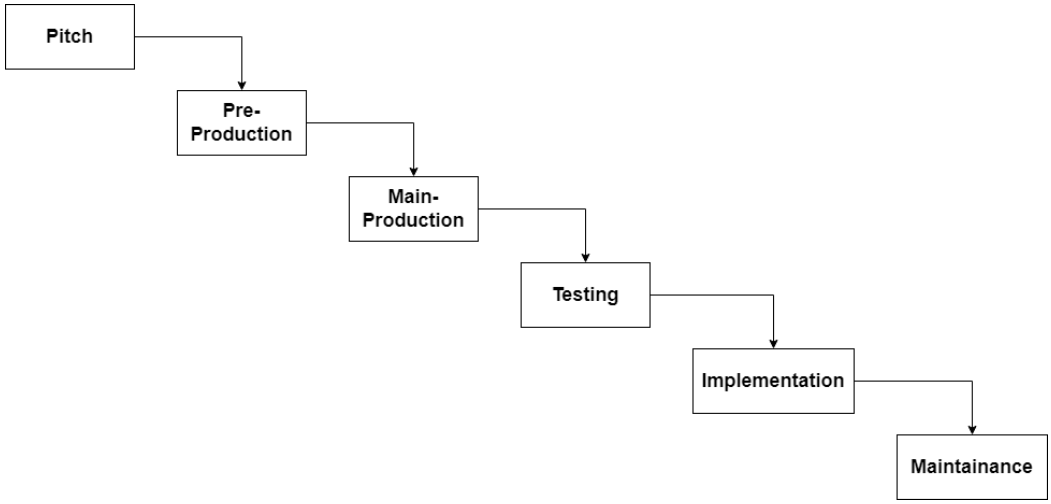


Figure 2.13: Waterfall model

Waterfall model is a software development process in which the major activities are requirements, design, coding, testing, maintenance. In game development, the process of development is quite different compared to the waterfall model in software development which is pitch, pre-production, main-production, testing, implementation and maintenance. Each phase is gated and we cannot move on to the next phase until we have completed the previous phase.

Waterfall model in game development starts from pitching. In this phase, the developer needs to create an initial idea and game concept. Simple game description and game art will also come out during this phase. Brainstorming is important in this phase to get a better game design and concept. After the pitching phase is done, we will move to the Pre-production phase. This phase is the first and foremost phase in the production

cycle. It involves the creation and the revision of game design and creation of game prototype. Game design focuses on defining game genre, gameplay mechanics, storyline, characters, challenge, fun factors in game design documents (GDD). After this, a prototype will be developed to access game design and ideas of the game. Next, the production phase will start if the prototype is done. Production is the core process which revolves around the assets creation, source code creation and the integration of both elements. After the whole game is done, we will start to test the game function usability and playability. Formal details testing will be conducted using playtest to assess the features functionality and the game difficulty. The alpha test and beta test will be conducted in this phase too. Next, implementation will be stated after the testing phase is done. During this phase, the game build has reached the final stage and is ready to be released to the public. And developers will do maintenance if there have occurred any bugs or updates to the game.

The advantage of the waterfall model is its more suitable for smaller projects where the requirement of the project is clear and least to do. Waterfall model can determine the end goal early because small projects with clear goals can ensure that your team is aware of the general aim from the start and it could reduce the risk of becoming lost in the details as the project progresses. It is simple and easy to understand and use, so it is easy to manage due to rigidity of the model and each phase has specific deliverables to make the project have clear goals for each phase. It is also easy to arrange tasks and well understood milestones at every phase.

The disadvantage of this model is that it doesn't allow much reflection and revision in this project, and it is difficult to go back and make changes on things from the previous phase. Waterfall models usually have a higher risk if compared to other development models because they cannot adjust scope during the lifecycle. If a developer has changed an idea or game mechanic of the game, he will be forced to restart the model from the beginning of this development model. So, this is very risky to be chosen as the development model for this project.

2.4.2 Agile Development

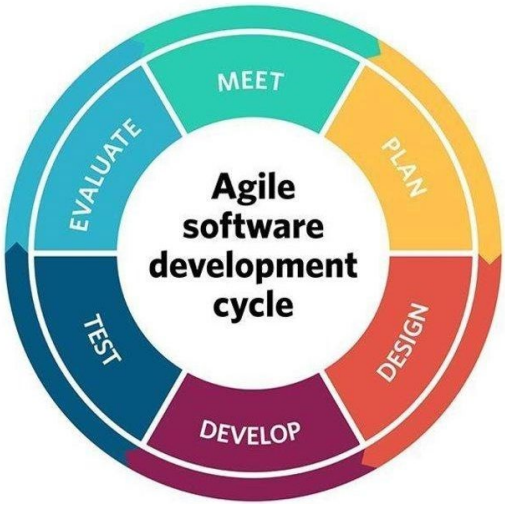


Figure 2.14: Agile Development model cycle

Agile development is a project management strategy that focuses on people working together and the project requirements and product evolving over time. The essential aspect is that the project team and stakeholders adjust the project plan depending on reality.Agile development also emphasizes iterative delivery of functionality. These characteristics are ranked according to the value they provide to the customer. These strategies allow for reactive and predictable growth. Keith (Keith, 2014).

When huge defense and IT projects began to fail in increasing numbers in the 1980s, agile techniques began to gain traction. People began to look for and write about improved techniques. Some of these techniques advocated for incremental product development through iterations rather than a sequential staged approach. All of the steps of a single iteration are included in a single iteration.

Planning in the Agile development process is iterative in nature and it can adapt new changes based on requirements. This model is more people oriented and lesser importance is placed on processes with the option to skip those unnecessary things or phases which have lower value to do it. The progress of the project can be easily measured since the working features are delivered frequently during projects. The project will keep looping and it means that we have a new version of the game until the final product is complete.

Agile development model is recommended to be chosen as the game development lifecycle model because it could reduce the risk that might delay the progress of a project. When new ideas and game concepts need to be added to the project, it will be easier to implement it by using the Agile model.

2.4.3 Rapid Application Development (RAD)

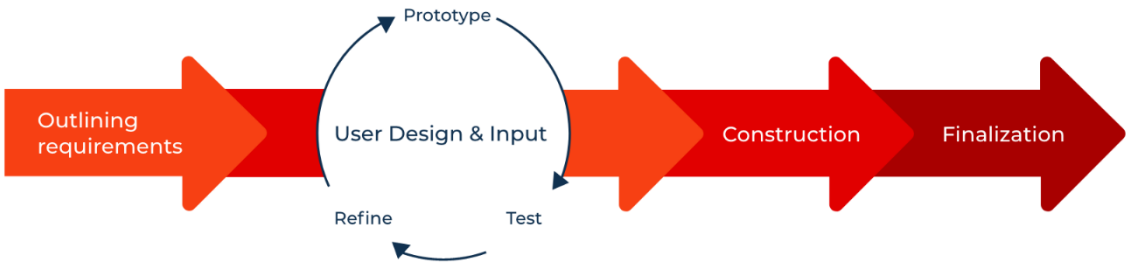


Figure 2.15: Rapid Application Development Model

RAD model is a software development process based on prototyping without any specific planning without any specific planning with basic concept of project. In the RAD model, there is less attention paid to planning but more priority given to the development task. It provides quick feedback over long drawn out development and testing cycles. Developers can make multiple iterations and updates to the game and ensure the final product is more quality-focused and fit user requirements. The difference between the waterfall model and Rapid Application Development is that developers can go back and make changes to the core functions and features.

In RAD model architectures, there have using spiral model as a base model which can help to reduce risk and keep adjusting the game mechanic or requirement to fit the final goals of project. RAD model has a spiral model in prototype circle which consists of demonstration, refine and build process and developer can loop in this cycle to adjust the project and encapsulate the process of reiterating.

RAD model is also an agile project management strategy and it is an attractive choice for developers working in a fast-paced environment. It is minimizing the planning phase and maximizing prototype development. By reducing planning time and emphasizing prototype iterations, it allows developers to measure progress and improve communication between developer and supervisor in real time on evolving issues and changes on projects. The RAD model is the most suitable model to be chosen in game

development because the requirement is always changing and the game concept might not be exactly the same as the initial idea. So, the RAD model could focus on iterative design and construction to adapt the change.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This section will continue on previous discussion of three different game development methodology, which were Waterfall, Agile and Rapid Application Development. Each model has its own set of benefits and drawbacks to consider. The project size will be smaller when compared to the requirements of a single developer project. However, the waterfall model is risky for game development because changes were made difficult and Agile methodology is not suitable for smaller projects and it takes longer time to develop a project. Hence, the methodology selected for this project is Rapid Application Development (RAD). The reason RAD is selected is due to one of the objectives in this project is deliver a viable product under estimated time. Rapid Application Development (RAD) is an application development methodology and it focuses on developing applications through rapid prototyping and quick feedback cycles. It is an adaptive application development that can make frequent modifications based on continuous evaluation. RAD is a development lifecycle that is designed to produce significantly more rapid development and higher quality outputs than those obtained through the traditional lifecycle method. It is designed to take the maximum advantage of the advanced development software.

3.2 Gantt Chart

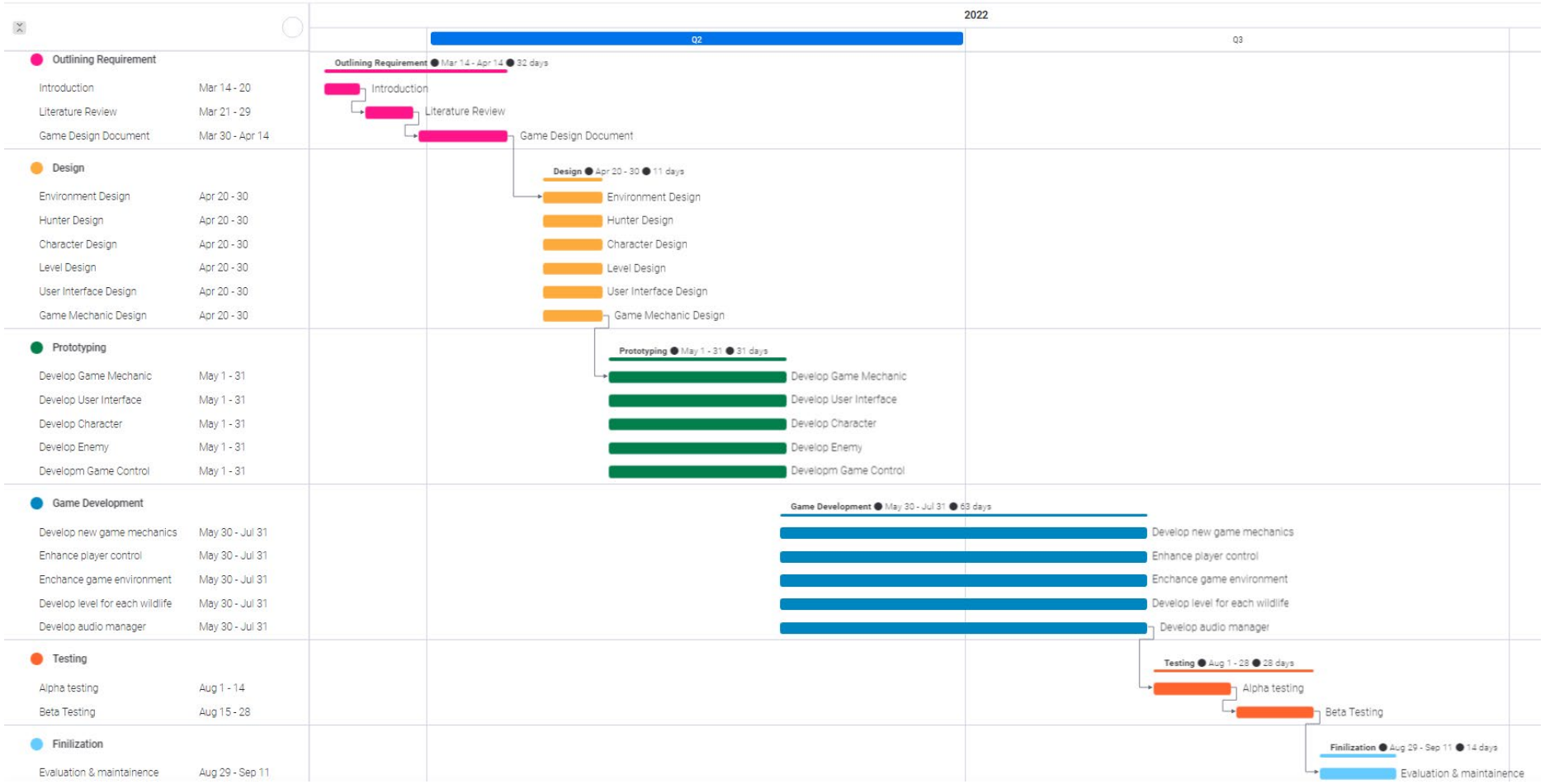


Figure 3.1: Gantt Chart of Born

3.3 Work Breakdown Structure

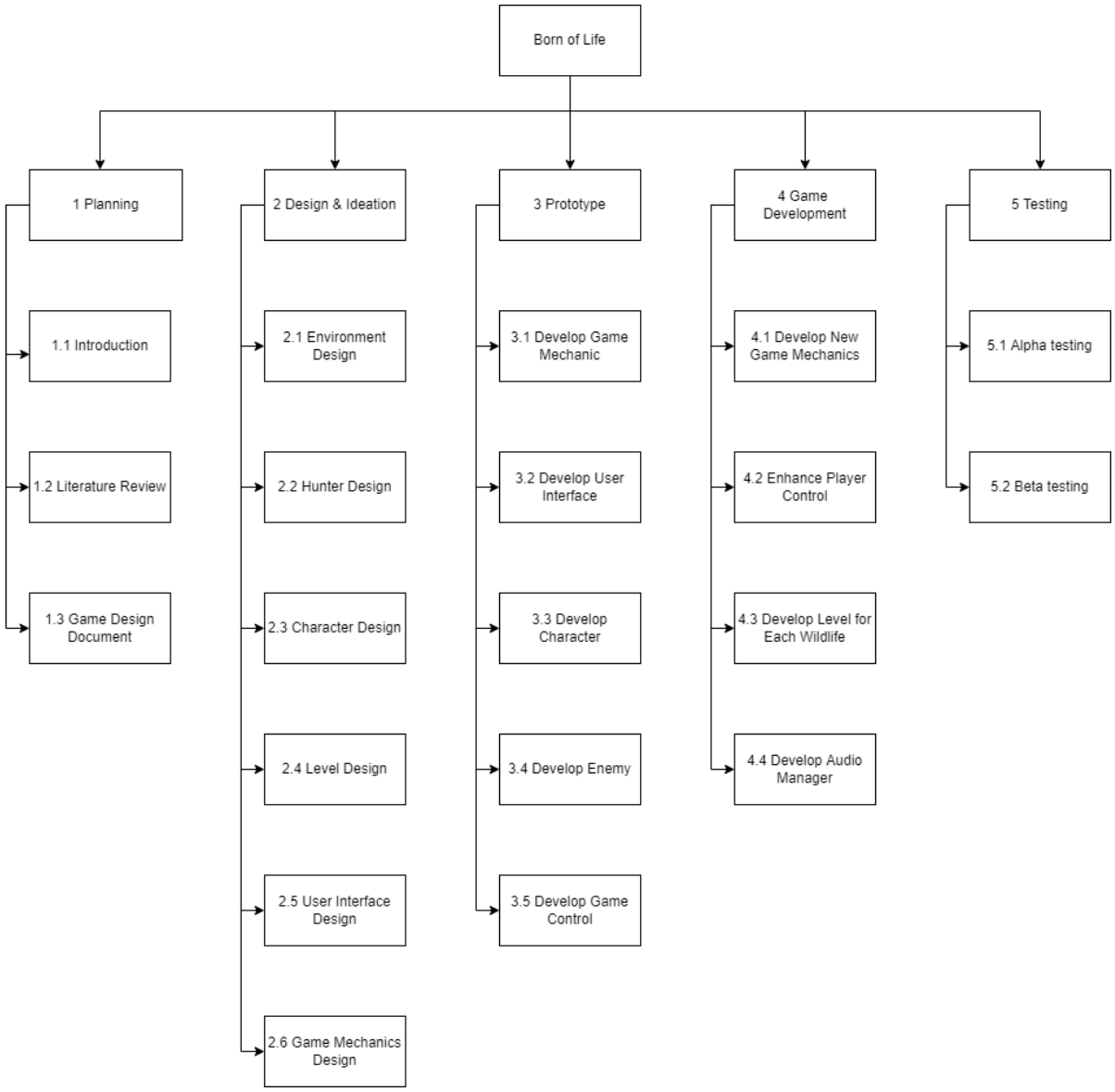


Figure 3.2: Work Breakdown Structure of Born

Work Breakdown Structure is a hierarchical decomposition of the work that have to be carried out to achieve the project goals and produce the necessary deliverables. It is designed to ensure the same comprehension of the scope in the project. Work Breakdown Structure encompasses all of the work that have to plan, design & ideation, prototype, game development and testing. The first level of Work Breakdown Structure of Born is the project phases and there have sub-level under each phase. This structure could make sure all works have completely covered deliverables under project's scope.

3.4 Phase 1 – Outlining Requirements

3.4.1 Planning

The planning phase is also known as the requirement planning phase. In this phase, user requirement and project scope will be determined as well as goal and expectations will be decided. As a breakdown in this phase, it is necessary to research the current problem and finalizing the requirement of this project to get the potential issues and risk that would be need to be addressed during development of this project.

3.4.2 User Requirement

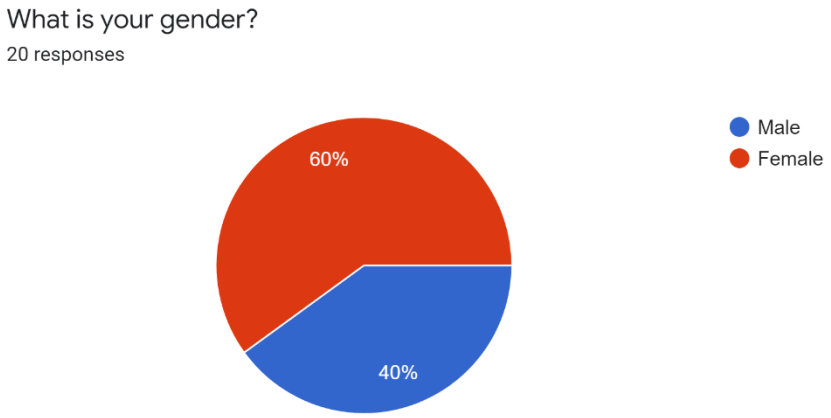


Figure 3.3: Result for "What is your gender?"

From the figure, our respondent group are consisting12 females (60%) and 8 males (40%).

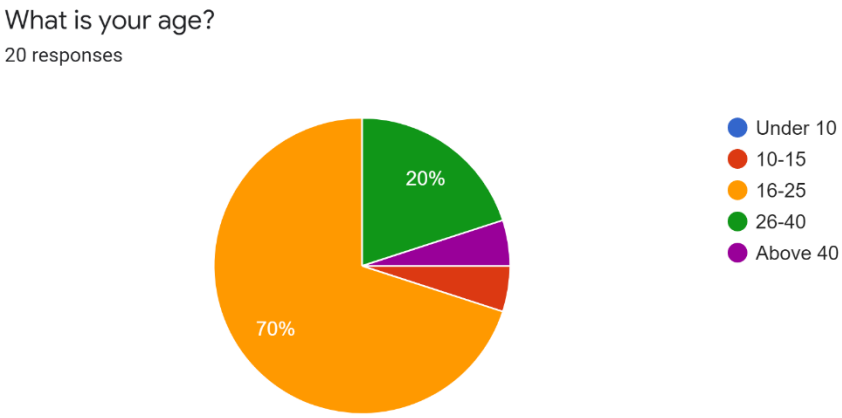


Figure 3.4: Result for "What is your age?"

Majority of the respondents' age are between 16-25 which are 24 respondents (70%). 20% of the respondents' age are between 26-40 which are 4 respondents and there are 1 respondent for both age range which is 10-15 and Above 40.

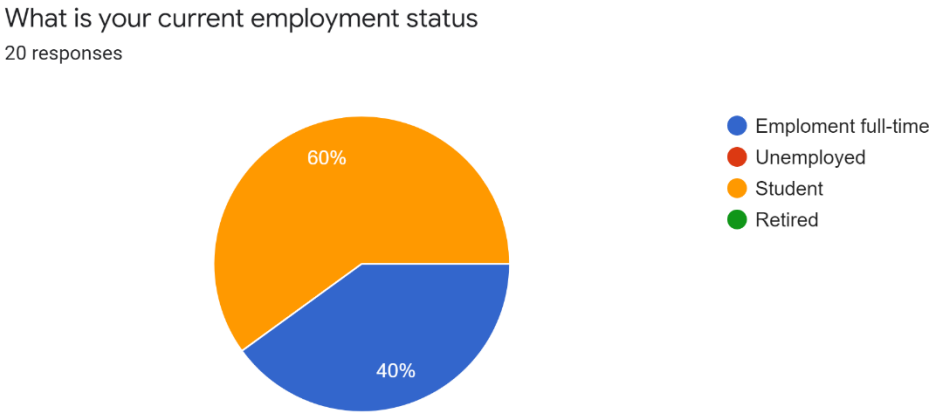


Figure 3.5: Result for "What is your current empolyment status?"

Based on the figure above, majority of the respondents are student which are 12 respondents (60%) and 40% of respondents are employment full-time which are 8 respondents. There are 0% of respondent are unemployed and retired.

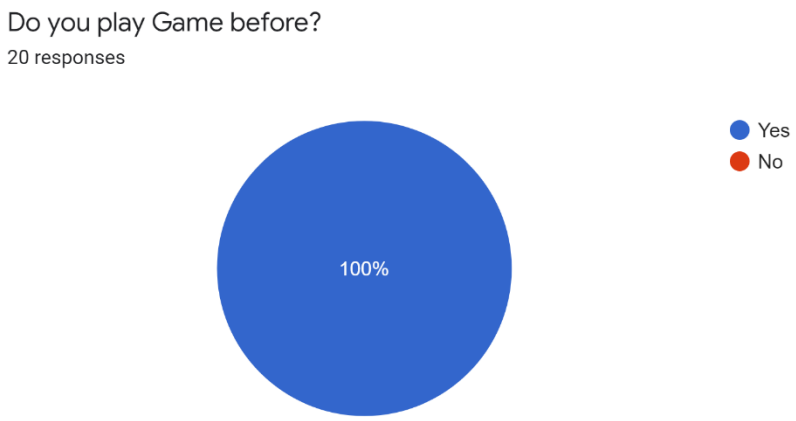


Figure 3.6: Result for "Do you play game before?"

Based on the figure above, all of the respondents have play game before.

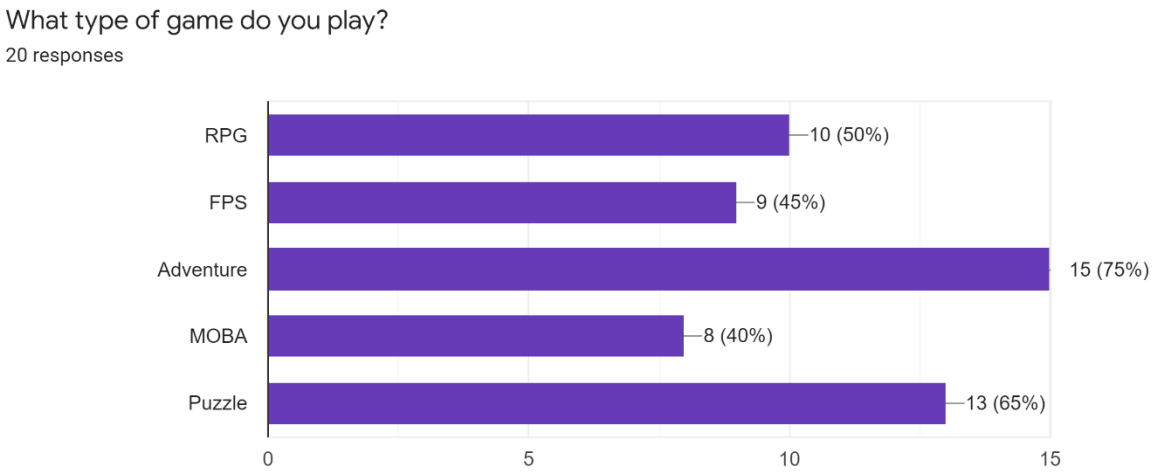


Figure 3.7: Result for "What type of game do you play?"

Based on the figure above, most of the respondents have play adventure game which are 15 respondents (75%). Then, the second high result in type of game is Puzzle game which are 13 respondents (65%). RPG is the third highest game type which respondent play with which are 10 respondents (50%). There are 9 respondents (45%) are playing FPS game and 8 respondents (40%) are play MOBA game.

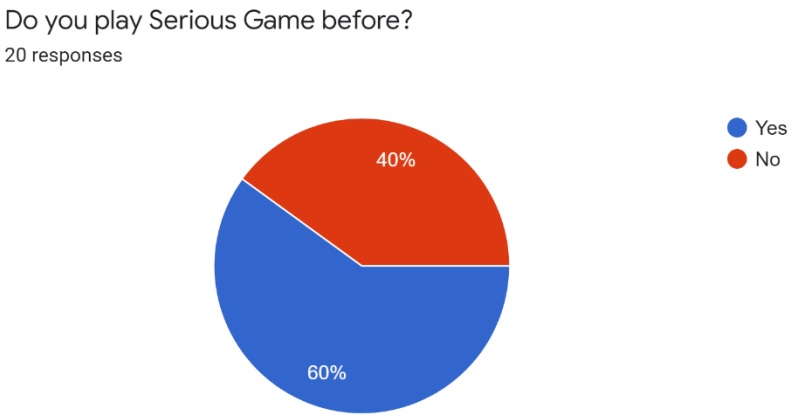


Figure 3.8: Result for "Do you play Serious Game before?"

Based on the figure above, majority of the respondents have play serious game before which are 12 respondents (60%) and 40% of respondents do not play with serious game which are 8 respondents.

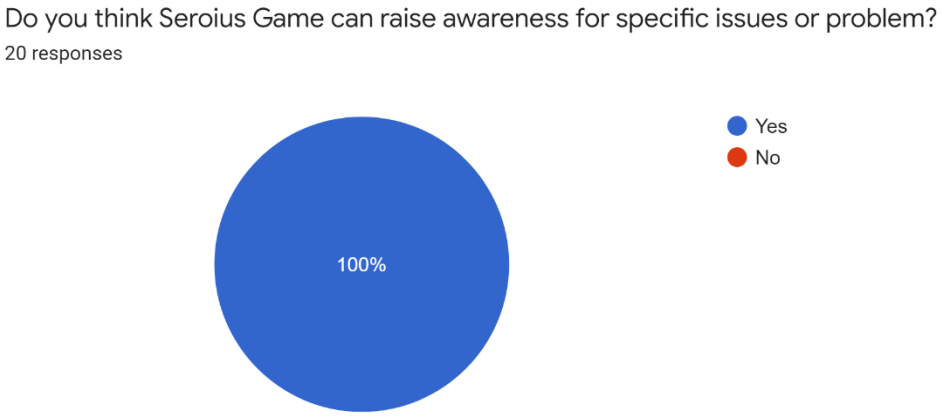


Figure 3.9: Result for "Do you play Serious Game before?"

Based on the figure above, all of the respondents agree that serious game can raise awareness for specific issues and problem.

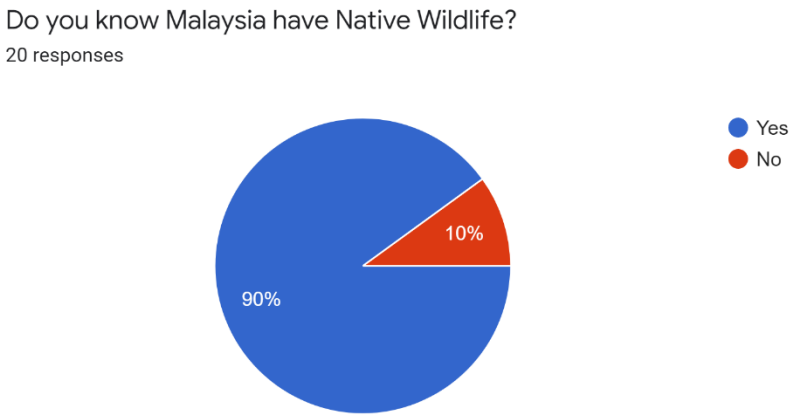


Figure 3.10: Result for "Do you know Malaysia have Native Wildlife?"

Based on the figure above, majority of the respondents know Malaysia have Native Wildlife which are 18 respondents (90%). Only 2 respondents don't know Malaysia have Native Wildlife.

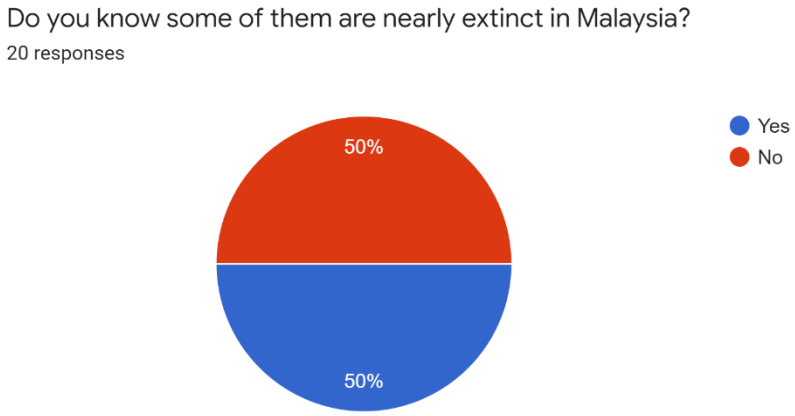


Figure 3.11: Result for "Do you know some of them are nearly extinct in Malaysia?"

Based on the figure above, half of the respondents which are 10 respondents (50%) know that Malaysia Native Wildlife are nearly extinct in Malaysia and the rest of the respondents don't know about this statement.

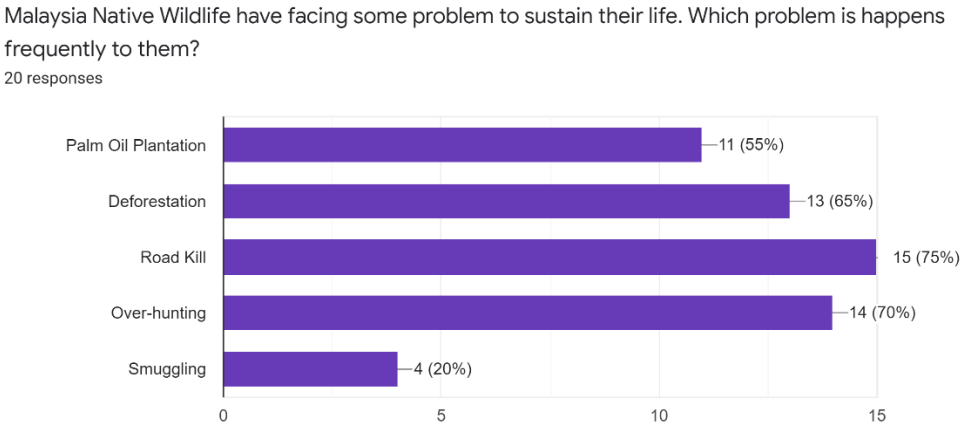


Figure 3.12: Result for Malaysia Native Wildlife have facing some problem to sustain their life. Which problem is happens frequently to them?

Based on the figure above, most of the respondents agree that Road kill is the most frequent problem that happens to Malaysia Native Wildlife which are 15 respondents (75%). Over-hunting have 14 respondents (70%) and deforestation have 13 respondents (65%) agree that these problems have happens frequently to Malaysia Native Wildlife. There are only 11 respondents (55%) are agreed that these problems have happens frequently to Malaysia Native Wildlife. Smuggling has the least respondents to vote which are 4 respondents (20%).

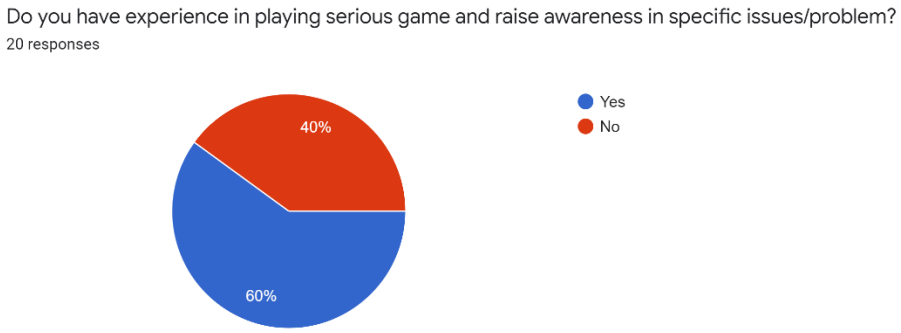


Figure 3.13: Result for Do you have experience in playing serious game and raise awareness in specific issues/problem?

Based on the figure above, majority of respondents have experience in playing serious game and raise awareness in specific issues which are 12 respondents (60%) and 8 respondents (40%) doesn't have experience on it.

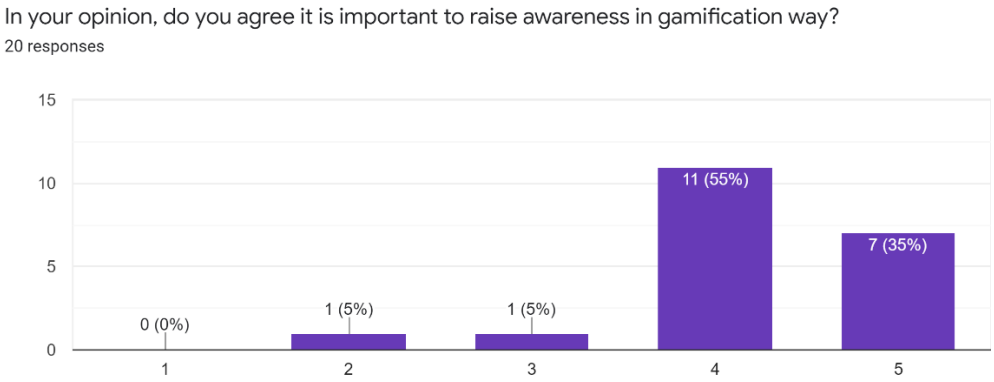


Figure 3.14: Result for "In your opinion, do you agree it is important to raise awareness in gamification way"

Based on the figure above, majority of respondents agree that it is important to raise awareness in gamification way which are 11 respondents (55%) and 7 respondents (35%) are strongly agree with it. Besides that, there are 1 respondent (5%) is neutral in this statement and 1 respondent (5%) is disagree with it.

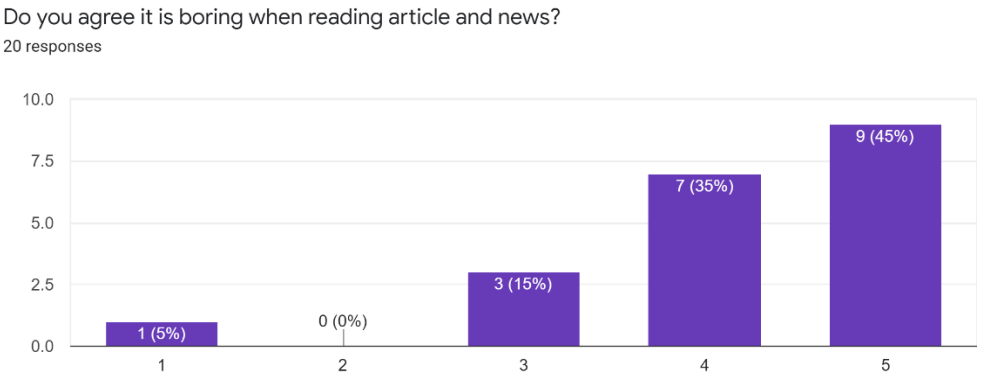


Figure 3.15: Result for "Do you agree it boring when reading article and news?"

Based on the figure above, majority of respondents strongly agree that it is boring when reading article and news which are 9 respondents (45%) and 7 respondents (35%) are agree with it. Besides that, there are 3 respondent (15%) is neutral in this statement and 1 respondent (5%) is strongly disagree with it.

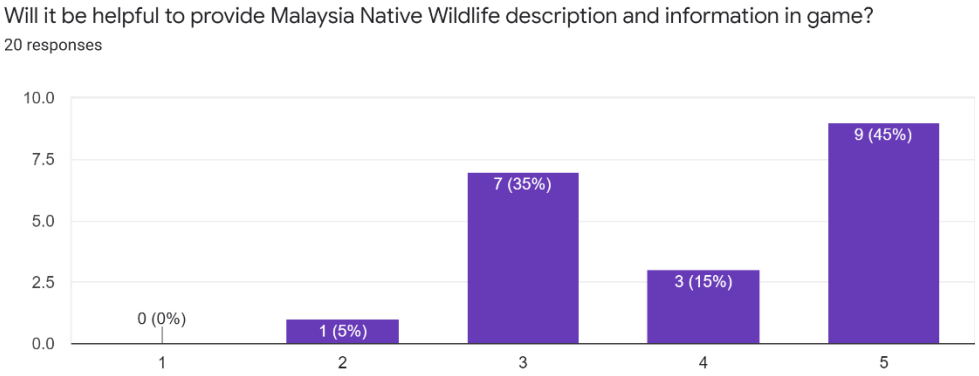


Figure 3.16: Result for "Will it be helpful to provide Malaysia Native Wildlife description and information in game?"

Based on the figure above, majority of respondents strongly agree that it will be helpful to provide Malaysia Native Wildlife description and information in game which are 9 respondents (45%) and 3 respondents (15%) are agree with it. Besides that, there are 7 respondent (35%) is neutral in this statement and 1 respondent (5%) is disagree with it.

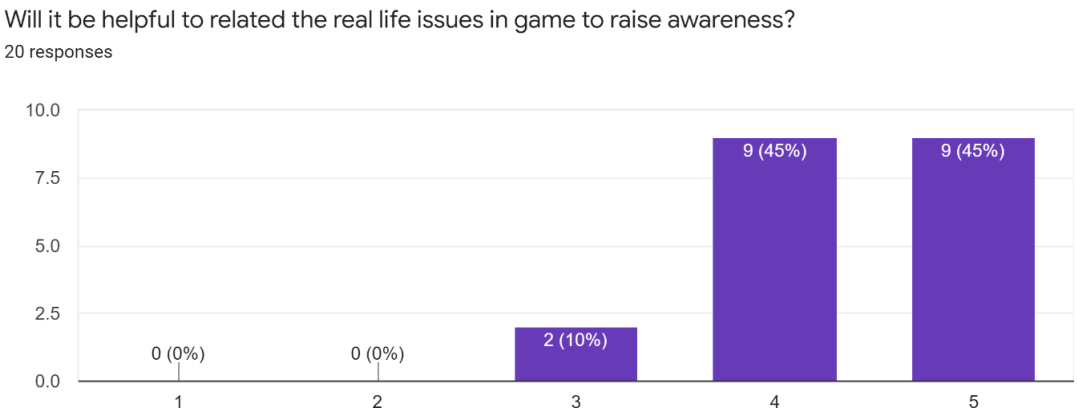


Figure 3.17: Result for "Will it be helpful to related the real life issues in game to raise awareness?"

Based on the figure above, majority of respondents strongly agree that it will be helpful to relate the real life issues in game to raise awareness which are 9 respondents (45%) and 9 respondents (45%) are agree with it. Besides that, there are 2 respondent (10%) is neutral in this statement.

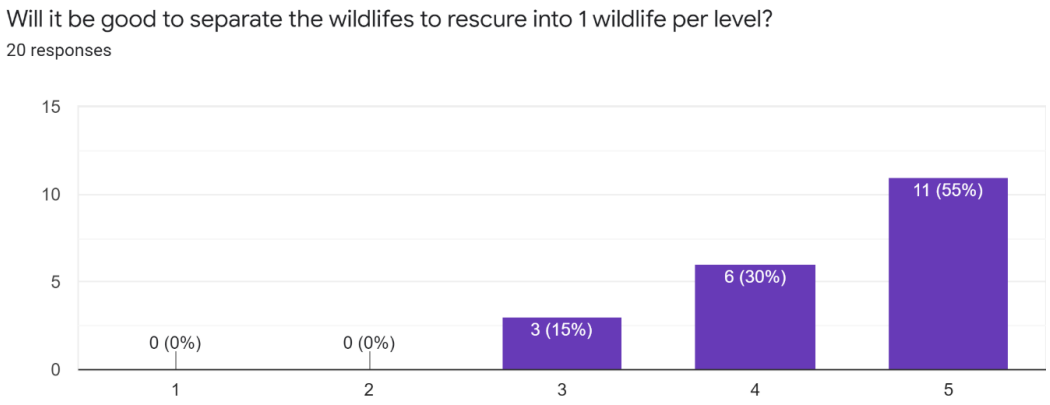


Figure 3.18: Result for "Will it be good to separate the wildlifes to rescue into 1 wildlife per level?"

Based on the figure above, majority of respondents strongly agree that it will be good to separate the wildlife to rescue into 1 wildlife per level which are 11 respondents (55%) and 6 respondents (30%) are agree with it. Besides that, there are 3 respondent (15%) is neutral in this statement.

3.4.3 Analysis

Through analysis from existing systems or games and development methodology, it provides clear understanding to developer of what proposed project is all about. It will gathering all the specific details and requirements for this project as well as determining the first idea in prototype. In this phase, defining prototype requirements and evaluate alternatives to existing prototype is necessary to ensure the project workflow is riskless.

3.4.4 Functional and Non-Functional Requirement

System requirements can be classed into Functional requirement and non-functional requirements.

3.4.4.1 Functional Requirement

1.) The project should allow the player to use the control key to move left and right.

2.) The game should allow user to control the character to jump when pressing the jump key.

3.) The game should allow user to damage the monster to decrease the monster's health bar by using melee attack key.

4.) The game should restart when player is being attack by monster or seek by monster.

5.) The game should allow user to view the memories of past.

6.) The game should allow player go through to next level by reaching the portal.

7.) The game should allow user to collect the seed to grow up the plant.

8.) The game should play the sound effect and background music in the game.

9.) The game should allow player to pick up the wildlife and bring them to portal.

3.4.4.2 Non-functional Requirement

1.) Any interaction between user and game should not exceed 1 second.

2.) The game will run on PC devices only.

3.) The game will not require internet connection to play.

4.) The game will free to play game on itch.io.

3.4.5 Constraint and limitations

3.4.5.1 Constraint

1.) When player is stepped on animal trap, the game will be end and player need to restart the game.

2.) When player is shoot by hunter, the game will be end and player need to restart the game.

3.) When player cannot pass through the limitation of camera in every level.

4.) Player cannot attack on the enemy and player can only dodge them and hide from them.

3.4.5.2 Limitation

1.) The game is available on PC platform only.

2.) The player could only walk on pre-created platform.

3.) Player have only one health and player need to restart the game if player is getting damage by enemies.

3.5 Phase 2 – User Design

3.5.1 Game Design Document (GDD)

In this section, it will contain all the design process, diagrams, gameplay information, storyboard and analysis of the proposed serious game for Malaysia Native Wildlife which is Born.

3.5.1.1 Game Genre

Game genre of Born is 2D platformer and it will be presented in a puzzle game. Player needs to pass through all the obstacles such as holes, animal traps and turbulent rivers in the maps. Player needs to observe the terrain in this map and find the ways to reach the portal to the next game. Player needs to use the items such as stone or vine in this game to unlock some place to continue the journey.

3.5.1.2 Game World

Born is using a 2D space world and it will have a horizontal map that links from the beginning to end of a level. When the player has reached the portal of that level, the player will proceed to the next level. The game world of this game is demonstrating the actual environment and habitat of Malaysia native wildlife. Players can explore Malaysia forest and enjoy the beauty of nature in Malaysia forest. Beside this, players can experience the deforestation that happens in Malaysia.

The perspective of view in this game is side on, which means the player can move left, right, up and down in the game and the game camera will follow the character from side to side.

3.5.1.3 Storyline

Storyline of Born is about a wildlife conservator that realizes our native wildlife is facing serious problems such as overhunting, roadkill, deforestation and palm oil plantation. There are species that are nearly extinct in Malaysia and they are still facing these challenges and it is hard for them to survive in their habitat. This wildlife conservator is planning to save Malaysia native wildlife and help to send them to safe places. Cutting machine is still cutting off trees in their habitat, and hunters are still hunting wildlife in the forest. She needs to carry wildlife babies and help them to pass through these challenges and help them to continue their new life in a place that is safe for them.

3.5.1.4 Level Design

The game consists of 3 chapters and each chapter will introduce different challenges and human threat to wildlife. Each Chapter will contain 2-3 level and each level will introduce their habitat and the scene that was destroyed by human beings.

The scene will start at Malaysia Forest that before the deforestation. There has different level design with different game mechanic. Chapter 1 game environment will be Malaysia Forest. Chapter 2 game environment will be deforestation and wildfire. Last, Chapter 3 game environment will be palm oil plantation and residential area. Player needs to find the Malayan tapir baby and save it to the safe place. Player needs to see the memories of the wildlife and explore the maps. The clue will be given in every level and player need to always alert to the clue. The machine can be used by player to lift them to higher place.

3.5.1.5 Game Mechanics

Game mechanics are the rules that guide player action and response to the game. The game mechanics will be focused on interactivity and activity in the game. It will utilize the rules and structures of games and create engaging experiences for the player. Game mechanics are also known as “fun factors” to make the game more interesting and unique. By applying a unique game mechanic, the player can experience the same feeling as the main character in rescuing wildlife in game. Game mechanics can outline the main way which player will interact with the game world. Players can use game mechanics in this

game to achieve game goals, take player action and advance strategies to help them complete the game.

This section will talk about all the essential components and sections that are used to build the game.

3.5.1.6 Main Character

Player can do basic movement in this game by using “A and D” to move in 3 directions which is left and right. Player can press on “W and S” to climb up and down on the rope. Player also can press “W” key to jump in the game and it could help player to jump over the obstacles or jump to higher place. There is a machine that is available in the game, players need to press the “E” button to interact with the machine to stop them from destroying the forest and interact with signboards and NPC to get information from them. the player can press on “Space bar” to grab a stone and it can help the user to reach a higher place without using basic jumps to reach it. Main character doesn’t have health bar and not take any damage in this game, but it will still die when she is washed away by the river, fall down from the ground and stepped on animal trap. Player will restart at the last checkpoint and continue its journey.

The objective of the player is to reach the portal of the game to proceed to the next scene. If a player has fulfilled a level requirement, the game will automatically load to the next scene.

3.5.1.7 Enemy

Hunter is the enemy in this game. Hunter will also be patrolling in the maps and the player needs to get away from his eyesight to avoid attack from him. Hunter will hold a gun and he will start shooting when he saw something in front of him. Player cannot attack the hunter because player is only come with bear hand. Player can only hide and escaped from hunter.

3.5.1.8 Character Assets

There are few characters that will be available in Born. All the assets will be hand drawn without taking any asset from other sources. So, Born is a free from copyright game.

For the main character, she will be a girl dressed as a wildlife conservationist. The design will be based on a wildlife conservationist uniform. Main character will be animated to do various types of animation such as running, climbing, jumping, on air, etc.

Figure 3.19: Main character of Born

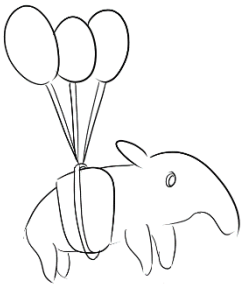


Figure 3.20: Tapir in Born

For the hunter, the design will be based on a reallife hunter wearing a hunter suit. Hunter suits will be designed in green and brown color to enhance the preference of hunters in the forest. The hunter will be designed based on adults and the size of the hunter will be larger than the main character in the game.

Figure 3.21: Hunter in Born

The game will start in the habitat of wildlife. The maps will be designed based on the actual forest to let players immerse in it. The environment will be slowly polluted and destroyed by humans. Other game assets will be used in the game are stone, tree, tree that is being cut down, grass, seed, leaves and river.

3.5.1.9 Reward & Punishment

In general, the physical reward of this game has following:

- Unlock more environments by advancing to a higher level.
- Unlock more wildlife levels by completing levels.
- Unlock level by fulfilling requirements of that level.

the abstract reward in this game is:

- Learning the knowledge of Malaysia Native Wildlife
- Able to complete the level by using critical thinking and logical thinking
- Raise awareness about the problem that facing by Malaysia Native Wildlife

Punishment in this game is:

- Fall into deep pit have to restart the level
- If player touch the enemies or getting shot by hunter, the game will over and have to restart the level
- If player is getting flushed by river, player need to restart the level

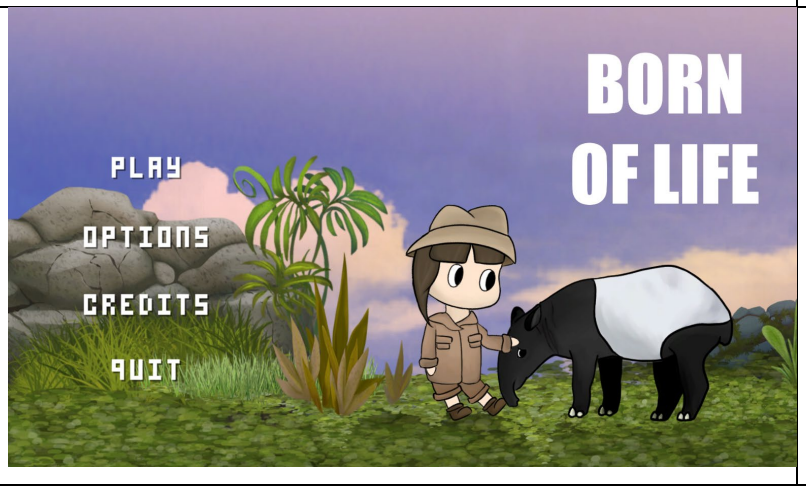
3.5.1.10 Victory Condition

In every level, there is a portal located in the end of the level. When player have touched the collider of the portal, he will teleported to next level. The transition will be applied when player is entering next level.

3.5.1.11 Challenges

Player needs to use everything in each level and think about the purpose of the items in this game. Player needs to observe the environment of the game and think of the best path to complete all missions in every level. By increasing the level, the challenges will be harder, and it needs higher logical thinking to complete the level. Player needs to be alert at the obstacles to avoid touching them or drop to it. Player needs to use abilities to pass through all obstacles to complete the mission.

3.5.2 Storyboard

PAGE TITLE: UI – Main Menu	Storyboard Number: 1.0
	Elements: FONT: SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Animation 1 – button animation Animation 2 – tree leaves in background

Description:

The diagram shows the illustration of the main menu for this game. They have shown the main character and wildlife babies sitting on the grass and enjoying the sunlight. There are 4 buttons included in the main menu, including Play, Options, Credit and Quit buttons.

Clicking the “Play” button will continue with choosing the level in the next scene and start the game.

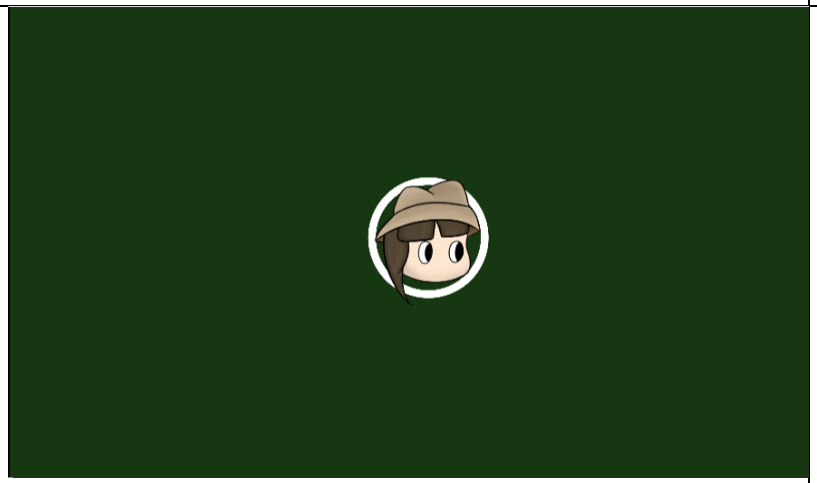
Clicking the “Option” button will open the setting menu, where players can adjust resolution and music volume.

Clicking the “Quit” button will close the application.

PAGE TITLE: UI – OPTIONS	STORYBOARD NUMBER: 1.1
	ELEMENTS: FONT: SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Tree leaves in background
DESCRIPTION: This is the setting menu for Born. In this UI. Players can adjust the volume of music and game resolution of the game. Player can click “BACK” button to go back to main menu.	

PAGE TITLE: UI – CREDIT	STORYBOARD NUMBER: 1.2
	ELEMENTS: FONT: SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Tree leaves in background
DESCRIPTION: This is the credit menu for Born. In this UI. Players can see the credit of the game. Player can click “BACK” button to go back to main menu.	

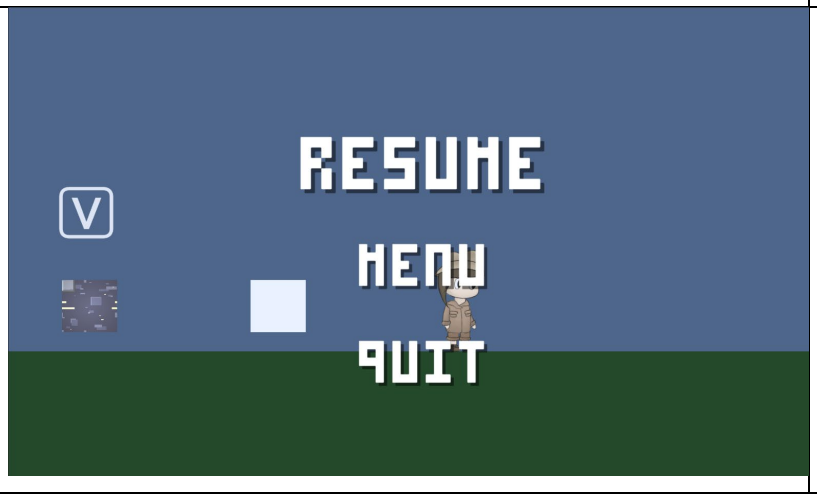
PAGE TITLE: UI – LEVEL SELECT	STORYBOARD NUMBER: 1.3
	ELEMENTS: FONT: SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Tree leaves in background
DESCRIPTION: This is the Level Select Menu for Born. In this UI. The button will be represented in the image of wildlife. Player can choose the image of wildlife to play the level. Player can click “BACK” button to go back to main menu.	

PAGE TITLE: UI – LOADING SCREEN	STORYBOARD NUMBER: 1.4
	ELEMENTS: - FONT: - SOUND EFFECT: - MUSIC: copyright free BGM ANIMATION: Wipe Animation

DESCRIPTION:

This is the Level Select Menu for Born. In this UI. The button will be represented in the image of wildlife. Player can choose the image of wildlife to play the level.

Player can click “BACK” button to go back to main menu.

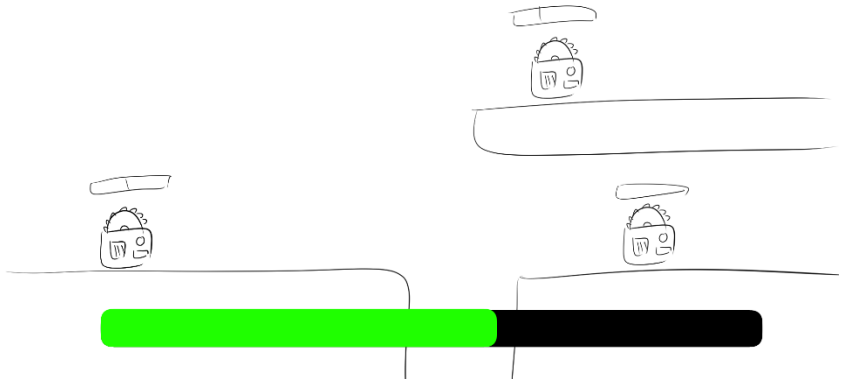
PAGE TITLE: UI – PAUSE MENU	STORYBOARD NUMBER: 1.4
	ELEMENTS: - FONT: - SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Button Animation

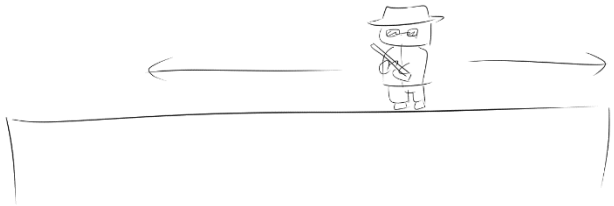
DESCRIPTION:

The diagram shows the Pause menu of the game. Player can press on ESC button to activate it and player can click on “Resume”, “Menu” and “Quit”. Player can click on “Resume” button to resume the game, “Menu” button to go back to main menu and “Quit” to quit the game.

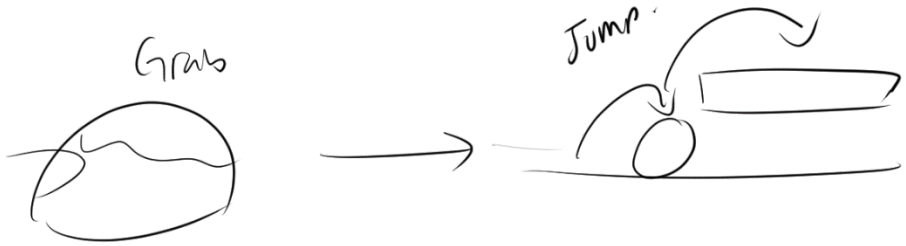
PAGE TITLE: UI – WIN UI	STORYBOARD NUMBER: 1.4
	ELEMENTS: - FONT: - SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Button Animation
DESCRIPTION: The diagram shows the Win UI of the game. Player can press on ESC button to activate it and player can click on “Retry Level”, “Menu”. Player can click on “Retry Level” button to retry the level and “Menu” button to go back to main menu.	

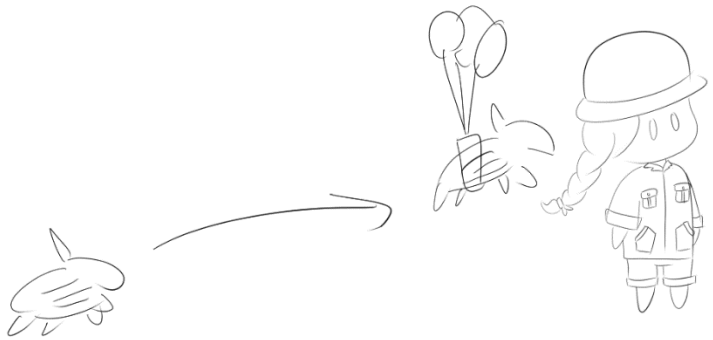
PAGE TITLE: UI – LOSE UI	STORYBOARD NUMBER: 1.4
	ELEMENTS: - FONT: - SOUND EFFECT: Game button SFX 1– hover Game button SFX 2 – clicked MUSIC: copyright free BGM ANIMATION: Button Animation
DESCRIPTION: The diagram shows the Lose UI of the game. Player can press on ESC button to activate it and player can click on “Retry Level”, “Menu”. Player can click on “Retry Level” button to retry the level and “Menu” button to go back to main menu.	

PAGE TITLE: Game Mechanics – cutting machine	**STORYBOARD NUMBER: 2.0**
	ELEMENTS: FONT: SOUND EFFECT: Turn off sound MUSIC: copyright free BGM ASSETS REQUIRED: Main character, cutting machine ANIMATION: Cutting machine animation
DESCRIPTION Player needs to turn off the cutting machine to stop time to destroy wildlife's habitat.	

PAGE TITLE: Game Mechanics – Hunter	**STORYBOARD NUMBER: 2.1**
	ELEMENTS: FONT: SOUND EFFECT: Shooting sound MUSIC: copyright free BGM ASSETS REQUIRED: Hunter ANIMATION: Hunter walking animation, Hunter shooting animation
DESCRIPTION Player needs to get away from hunter eyesight to avoid shooting from the hunter. If a player is getting shot by a hunter, the player needs to restart the level.	

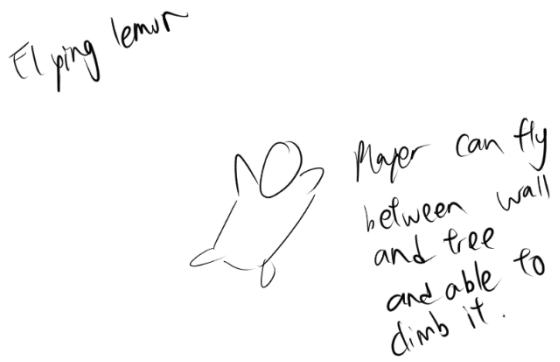
PAGE TITLE: Game Mechanics – Swimming	**STORYBOARD NUMBER: 2.2**
	ELEMENTS: FONT: SOUND EFFECT: Swimming Sound MUSIC: copyright free BGM ASSETS REQUIRED: Main Character, Water ANIMATION: Swimming animation, water animation
DESCRIPTION Players can swim up the river to reach another place. Animations will be implemented when the character is swimming up the river.	

PAGE TITLE: Game Mechanics – Grab Stone	STORYBOARD NUMBER: 2.3
	ELEMENTS: FONT: SOUND EFFECT: Grabbing stone MUSIC: copyright free BGM ASSETS REQUIRED: Main Character, Stone ANIMATION: Grabbing animation
DESCRIPTION Players can grab the stone in maps and put it down. Players can use stone as a platform to jump to another place.	

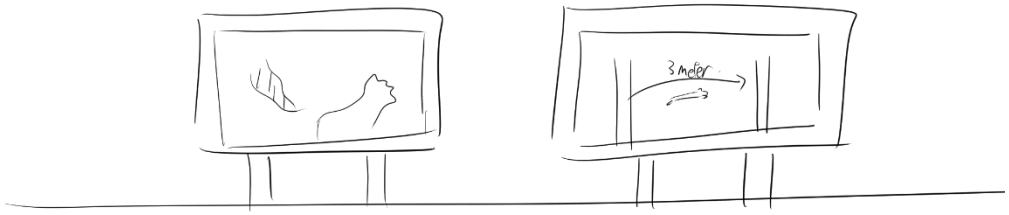
PAGE TITLE: Game Mechanics – Grab wildlife baby	STORYBOARD NUMBER: 2.4
	ELEMENTS: FONT: SOUND EFFECT: Grabbing sound MUSIC: copyright free BGM ASSETS REQUIRED: Main Character, Stone ANIMATION: Balloon Animation

DESCRIPTION

In every level, players need to grab a wildlife baby and help it to send it to a safe place. Main character will tie the balloon on it and it will follow behind the main character.

PAGE TITLE: Game Mechanics – Fly between trees	STORYBOARD NUMBER: 2.5
	ELEMENTS: FONT: - SOUND EFFECT: Flying sound MUSIC: copyright free BGM ASSETS REQUIRED: Main Character, trees ANIMATION: Flying Animation
DESCRIPTION In this level, the player can get abilities from wildlife, and she is able to fly between the trees to avoid hunters.	

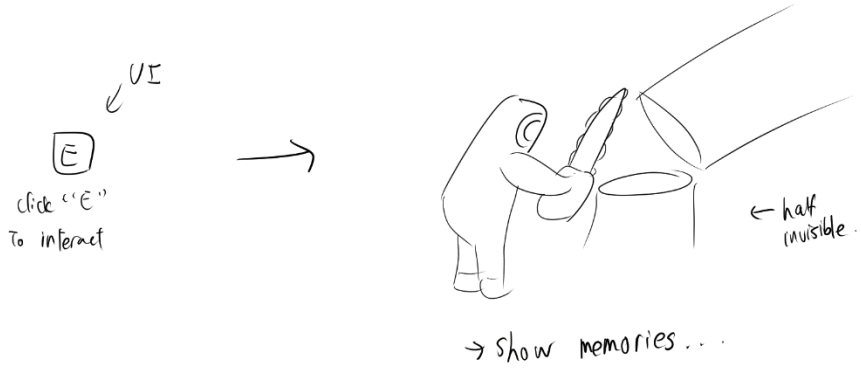
PAGE TITLE: Game Mechanics – Hiding	**STORYBOARD NUMBER: 2.6**
	ELEMENTS: FONT: - SOUND EFFECT: - MUSIC: copyright free BGM ASSETS REQUIRED: Main Character, grass ANIMATION: hiding animation
DESCRIPTION In this level, players can get abilities from wildlife, and they can hide in grass and hunters will not discover players in the grass.	

PAGE TITLE: Game Mechanics – Signboard	**STORYBOARD NUMBER: 2.7**
	ELEMENTS: FONT: - SOUND EFFECT: - MUSIC: copyright free BGM ASSETS REQUIRED: Signboard ANIMATION: -

DESCRIPTION

There are some signboards in early scenes and it will give some information about the gameplay and wildlife.

PAGE TITLE: Game Mechanics – Portal	**STORYBOARD NUMBER: 2.8**
	ELEMENTS: FONT: - SOUND EFFECT: Seed Grow Up Sound Effect MUSIC: copyright free BGM ASSETS REQUIRED: Seed, Plant ANIMATION: Grow up animation
DESCRIPTION Players need to collect the seed in the maps and bring it to portal and let the plat grow up. Players need to step on the plant and teleport to next level.	

PAGE TITLE: Game Mechanics – Memories	STORYBOARD NUMBER: 2.9
	ELEMENTS: FONT: - SOUND EFFECT: Memories sound effect MUSIC: copyright free BGM ASSETS REQUIRED: Memories assets ANIMATION: -
DESCRIPTION Players can interact with the button to view the memories which happens earlier.	

PAGE TITLE: Game Mechanics – Background changing	STORYBOARD NUMBER: 2.10
	ELEMENTS: FONT: - SOUND EFFECT: - MUSIC: - ASSETS REQUIRED: Maps assets ANIMATION: -
DESCRIPTION The maps will slowly destroy by human by increasing of level.	

3.5.3 Flowchart

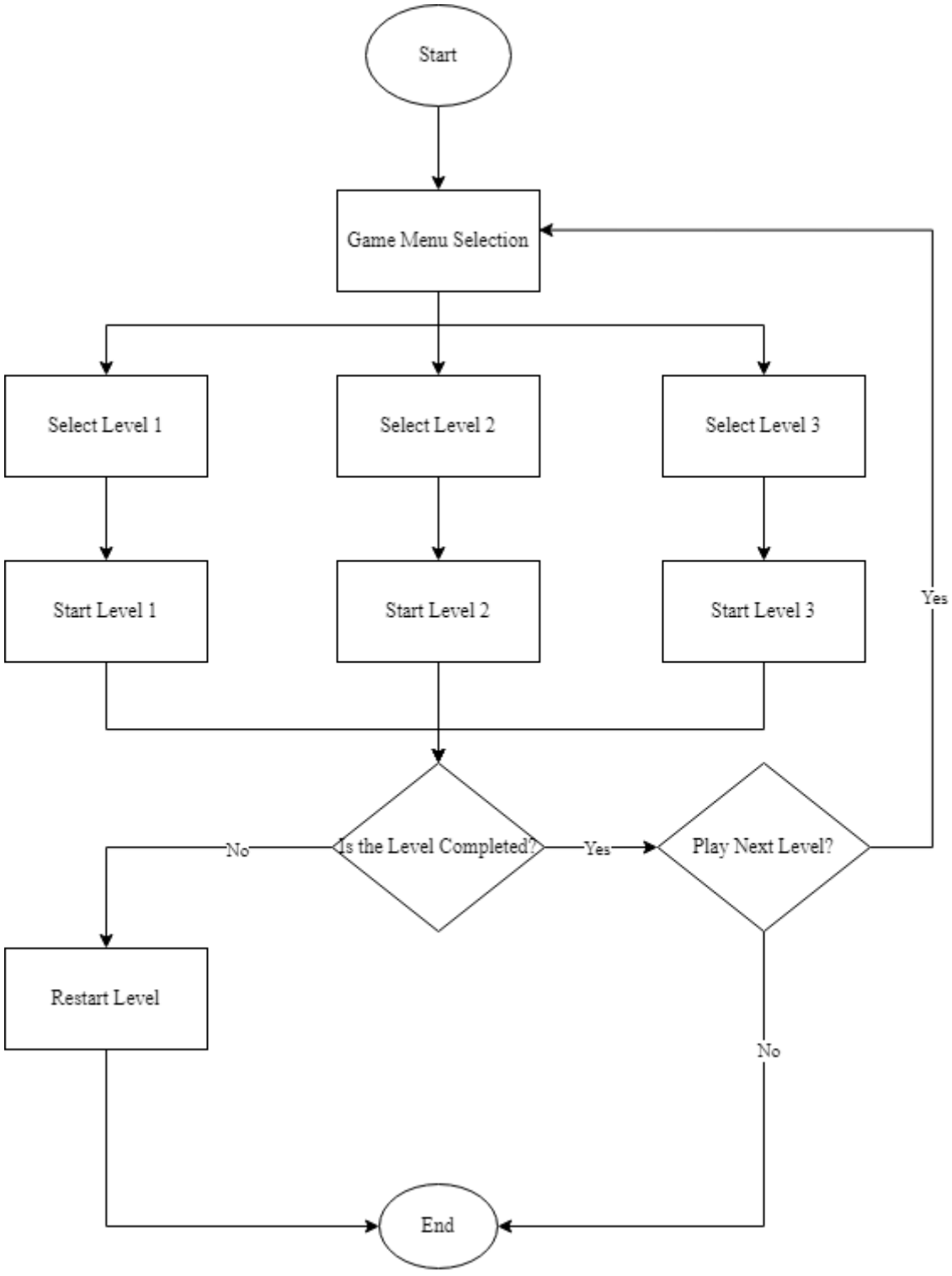


Figure 3.22: Flow Chart of Born

3.5.4 Game Technology

The game will be developed using Unity Engine, a cross-platform game engine that supports a variety of PC and mobile platforms. It can be used to develop 2D and 3D games. The game will be developed in 2D and a PC platform will be chosen. Unity came with native 2D tools and plug-ins such as 2D lights, tilemaps and Sprite Shaper & tools to extend the potential of the game. Unity used an object-oriented approach for their game engine. This allows the developer to manage the file and variable easily in the game engine.

Born does not require network connection and it is an offline game. Players can play the game without internet connection. The game requires a mouse to click the button in the game and a keyboard to control the player and interact with the NPC and enemies.

No.	Software	Description
1.	Adobe PhotoShop CC 2020	To edit and design the user interface, color, background, and game assets.
2.	Adobe Audition CC 2020	To edit and adjust the background music and sound effect of the game.
3.	Unity 2020	To create and design the game of Born. The game will be exported by using this game engine.
4.	Visual Studio 2020	An integrated Development environment (IDE) that is used in Unity for scripting.
5.	Clip Studio Paint	To design and sketch the game asset.
6.	Office 365 Word	Use for documentation.

Table 3.1: List of Software Used to Develop

No.	Hardware	Description
1.	Illegear Onyx Ryzen Laptop	The core device that is used for developing games, game scripting, editing assets, designing levels and exporting games.
2.	Huion Kamvas 16 pro 2020	To sketch and design user interface, game assets, character and non-player characters.

Table 3.2: List of Hardware Used to Develop

3.5.5 Context Diagram

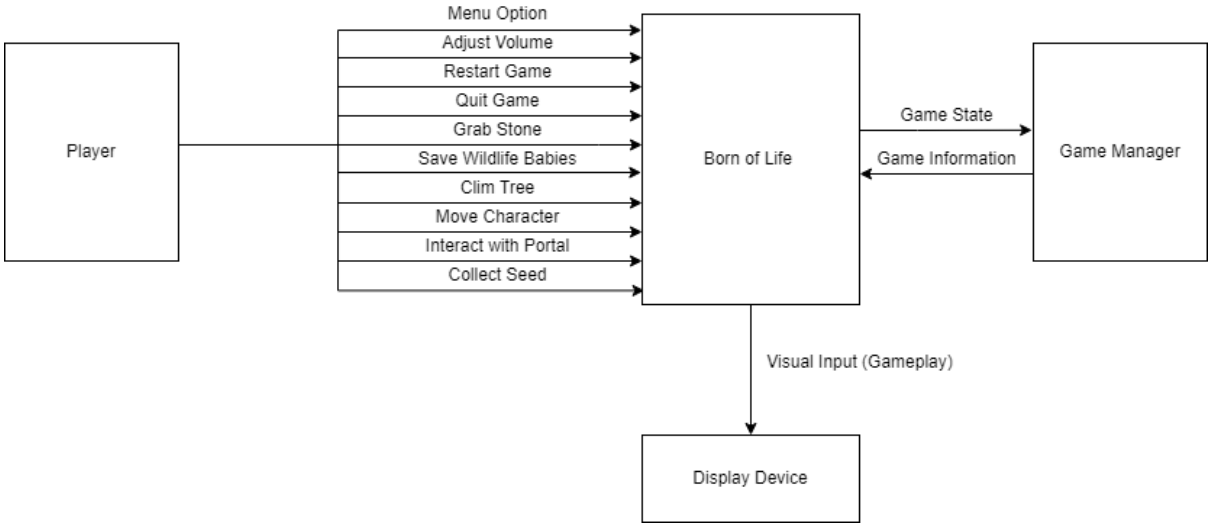


Figure 3.23: Born Context Diagram

In this Context Diagram, there are 3 major components which are Player, Display Device and Game Manger. Player can interact with the button in this game such as Menu, Restart, Quit, Credit and Option. Player can do basic movement such as move left and right and jump by using command key. Player also able to climb up the tree and using rope to swing between the trees. Player can grab stone and place it on ground and using stone to climb up to other place. Player can collect seed to growth it up and climb it to reach next level.

The PC or Laptop is the display device for the visual of the game. Player can use Display Device to see the graphic of the game and using input device to control the main character. The Game Manager is an abstraction of multiple managers such as UI manager, Scene Manager, Input Manager, Event Manager and Audio Manager. The Game Manager will deal with the state of the game and it will process all the game information that generated by user.

3.5.6 Prototyping

The development of project will start here and prototyping will included game mechanic, game design and features to test out the concept of the game. It is representing as a early sample of design that allows user to visualize or interact with it before a final product is developed and visualise. With prototyping, developer can explore alternative design solution and exploring new idea for the project and systems.

3.6 Phase 3 - Construction

3.6.1 Implementation

a. Refine

After gathering feedback from supervisor and respondents regarding to the user requirement and game design of this project, the prototype will enter refinement phase. Based on the feedback obtained, the idea could be refined to more practical concept and it could test assumptions in the real world to remove uncertainty.

b. Implementation plan

In this phase, the final product will be developed and ready for testing phase. Developers will finish touches in the form of testing, conversion, interface and user training. Once the final product is assessed for factor such as stability and longevity and it would be ready to be delivered to testing user.

3.6.2 Testing Plan

Game is a software system which demanding requirement such as stability, performance and compatibility. Game testing is needed to ensure that the final product does not have any errors or bugs before published. Game testing has 2 purpose which is identifying bugs and demonstrate the game to test the flow of the game. In this project, it will be using functionality acceptance test (FAT) in Alpha Test and user acceptance test (UAT) in Beta Test to test the functionality of the game and find out the problem of game. The purpose of functionality test is to identify any bugs that may existed inside the game or user interface. Game stability, game mechanics, mechanical issues, graphics and asset integrity will be included in this functionality test. Hence, User Acceptance Testing (UAT) will be using to test the game application can be accepted by tester before published. It will be the final stage of the development lifecycle. UAT will be carry out by using survey in google form and let user to fill in the testing result.

User Acceptance Form

No	Module	Activity	Status		Comments
			Yes	No	
1.	Main Menu	Play button			
2.		Choose Level			
3.		Option Button			
4.		Adjust volume			
5.		Credit Button			
6.		Quit Button			
7.		Back Button			
8.	Malayan Tapir Level	Player Control			
9.		Grab Stone			
10.		Water Ladder Mechanics			
11.		Destroy Cutting machine			
12.		Hunter Attack			
13.		Top-down Mechanics			
14.		NPC Dialogue			
15.		Signbox Dialogue			
16.		Collect Seed			
17.		Activate Portal			
18.		Collect Wildlife Baby			
19.		Pause Menu			
20.		Resume Button			
21.		Main Menu Button			
22.		Quit Button			
23.		Proceed to next level			

Figure 3.24: User Acceptance Form 1

No	Module	Activity	Status		Comments
			Yes	No	
24.	Orang Hutan Level	Player Control			
25.		Grab Stone			
26.		Water Ladder Mechanics			
27.		Destroy Cutting machine			
28.		Hunter Attack			
29.		Relieve Memory			
30.		NPC Dialogue			
31.		Signbox Dialogue			
32.		Collect Seed			
33.		Activate Portal			
34.		Collect Wildlife Baby			
35.		Pray for wildlife			
36.		Pause Menu			
37..		Resume Button			
38.		Main Menu Button			
39.		Quit Button			
40.		Proceed to next level			
41.		Grappling Rope			
42.		Swing on Rope			
43.	Malayan Lemur	Player Control			
44.		Grab Stone			
45.		Water Ladder Mechanics			
46.		Destroy hitting machine			

Figure 3.25: User Acceptance Form 2

No	Module	Activity	Status		Comments
			Yes	No	
47.		NPC Dialogue			
48.		Signbox Dialogue			
49.		Collect Seed			
50.		Activate Portal			
51.		Collect Wildlife Baby			
52.		Climb Tree			
53.		Fly from tree to tree			
54.		Pause Menu			
55.		Resume Button			
56.		Main Menu Button			
57.		Quit Button			
58.		Proceed to next level			
59.	Quit Menu	Quit Game			
60.		Back Button			

The test is performed by:

Name	
Signature	
Date	

Figure 3.26: User Acceptance Form 3

3.7 Phase 4 - Finalization

After testing phase have done, the game will continued to maintenance phase. In this phase, bug fixing and additional features and game mechanic will added into final product. Perfective maintenance is the process of improving the game over project development lifecycle.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

In section 3.4, the SDLC process of implementation is discussed about the development and preparation of testing. So, chapter 4 will discuss about the development, implementation and preparation of Born, the 2D platformer serious game for public.

4.2 Implementation Process

4.2.1 Project Setup

Before the development and implementation process have been start, the project needs to set up by using variety of software and plug-in. Software Installation and Unity Package will be used in this project. The software used in this project is shown in Table 4.1 below, and Table 4.2 is the Unity package used in this project.

Software/Tools	Description
 Unity Engine	Unity Engine is a game engine that used to develop game. The version that will be used to develop game is 2020.3.22f.
	Clip Studio Paint is a sketching and drawing software. It used to draw and design the game asset that will be used in the game.

Clip Studio Paint	
 **Adobe PhotoShop**	Adobe PhotoShop is an editing software that used to adjust the colour of the game asset. It also used to bend and design the game terrain.
 **Adobe Audition**	Adobe Audition will bed used to fine tune the soundtrack and sound effect (SFX) for the game.
 **Visual Studio**	Visual Studio is a coding software. It used to code and make the game mechanic work.

Software/Tools	Description
Universal Renderer Pipeline (URP)	Universal Renderer Pipeline (URP) is a prebuilt Scriptable Render Pipeline. URP is used to optimized graphic and adding lighting in 2D environment.
2D PSD Importer	2D PSD Importer allow PhotoShop Big (PSB) file format can be imported into Unity. PSB file need to import to Unity because of this file format can include layering of each image. It could created skeleton by using Skinning editor in Unity.
Timeline	Unity Timeline is used to create cinematic content and storyline. The output of this package is to create an short clip in the game.
2D IK	Provides necessary editor tooling to set up kinematics and animations for 2D character.

4.2.2 Main Menu UI

The user interface of the game is using Unity UI to show the user interface in the game. Main menu of this game is the first ever page that user have entered to this game. There have several buttons that can be clicked by user and each button have different function. When player have clicked on “Play” button, player will be led to Select Level Menu. Player can choose level to start. Besides that, player can click on “Option” button to adjust the master volume of the background music. When Player have clicked on “Quit” button, the game application will be closed.

Figure 4.1: Main menu of Born

Figure 4.2: Level Select in Born

Figure 4.3: Volume setting of Born

4.2.3 Character Design and Game Asset Design

The game environment and character will be entirely designed in-house without using assets from other sources. The game asset will be fully draw by myself to give the game its own uniqueness. By drawing and preparing the game assets by myself can give freedom to create any environment and suitable game asset for the scene. The tools that used to design the sprites and game asset are Clip Studio Paint and Adobe Photoshop. Clip Studio Paint is used to designing, sketching and colouring. The art style of this game is vector and realistic. The file format to export main character, machine, wildlife and hunter is PSB format. It is because PSB format will containing layers of the game asset. It is used to add skeleton into the character and to adjust animation to them.

4.2.3.1 Character Design

The character of this game is a girl dressed as a wildlife conservationist. The design will be based on a wildlife conservationist uniform. The draft of the character will be design first and several change will be done on this character to make the character's design smoother and detailed. The separated layer needs to be done during designing the character such as head, left arm, right arm, left leg, right leg and body. The file will be exported as PSB file and the separated layer can be added weight and skinning, which can allow the animation lot smoother and easier.

Figure 4.4: Character design in PhotoShop

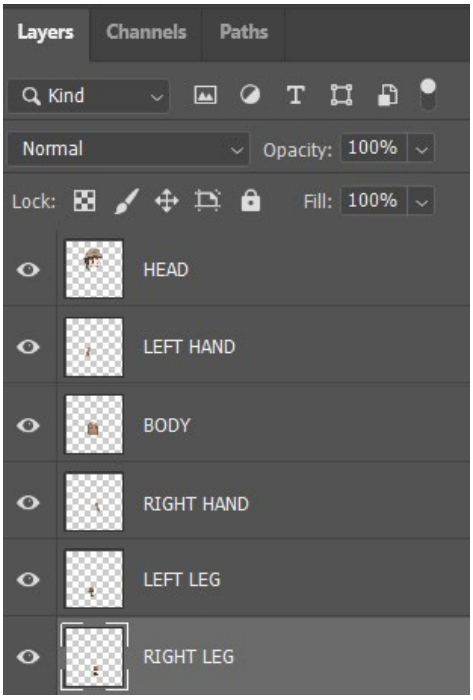


Figure 4.5: Layers of Character

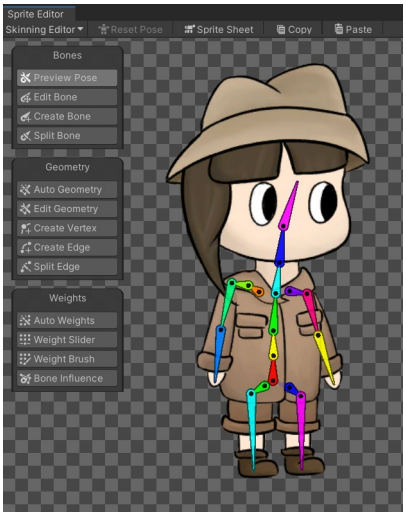


Figure 4.6: Rigging of Character.

The Skeleton can be insert into Character by using Skinning Tool in Unity Editor. The Skeleton will be created based on hand, leg, body and head. When creating the skeleton, joint need to be considered for connecting the bone. After skeletons are created, geometry and weight will be added to make the skeleton is fitted into the sprite. The bone influence will be adjusted to make sure the total area of move will not influence to other body part. Bone Influence is important to adjust in Sprite Editor because the layers will be move together when the bone influence is same. It will affect the performance of the animation. So, each layer will be assigned different bone influence and different layer. Then, IK manager 2d will be added to Main character to setup inverse kinematic for 2D character. There are 4 solvers need to be added to Main character which is both legs and both hands. It allows to adjust their hand and legs with a limit distance to avoid over stretching main character's body.

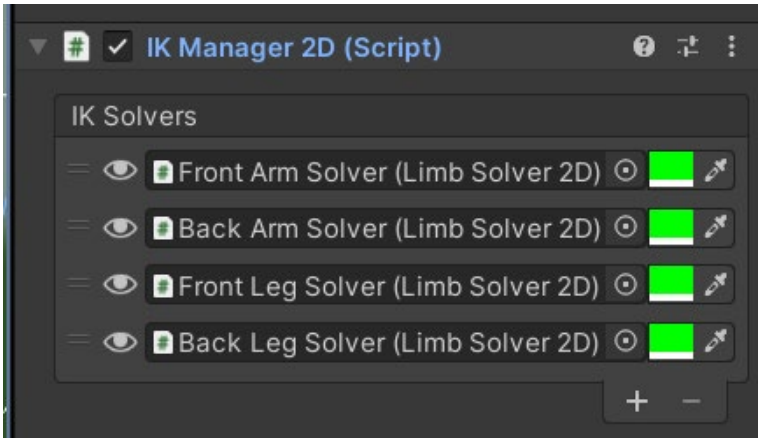


Figure 4.7: IK manager for solver in Character.

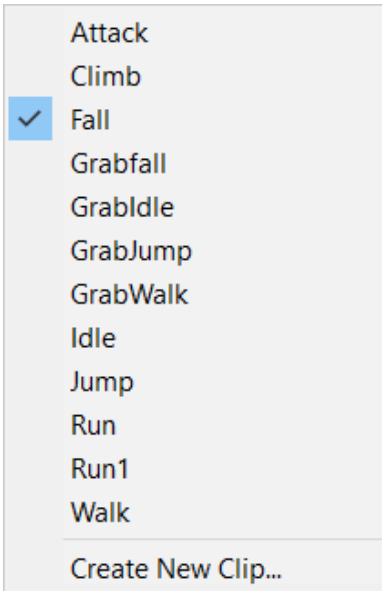


Figure 4.8: Animation clip of Character.

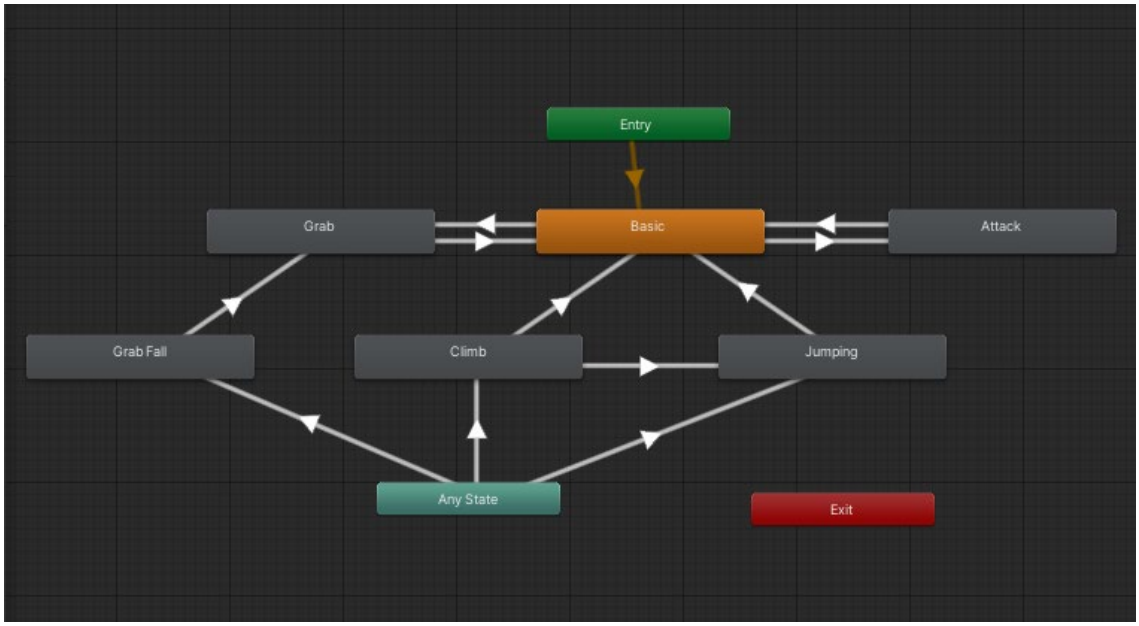


Figure 4.9: Animator of Character

Figure have shown an animator working on character's animation transition. Each animation has its condition to be trigger. There have 6 animations in this animator including 3 blend trees. In "Basic" animation, there have idle, walk and run animation. In "Grab" animation, there have grab walk and grab idle animation. In "Basic" animation, there have idle, walk and run animation. In "Jump" animation, there have jump and fall animation. The other animations that exclude from blend tree is GrabFall, Climb and Attack.

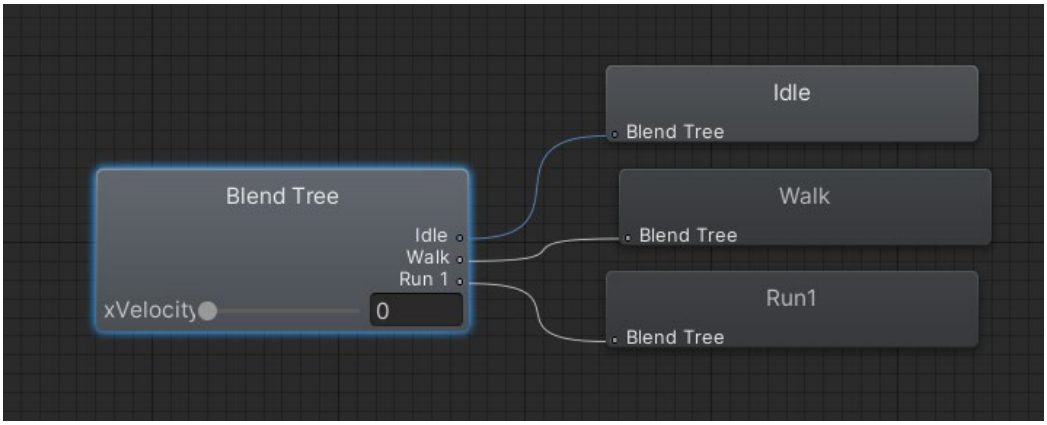


Figure 4.10: Basic Movement Blend Tree of Character.

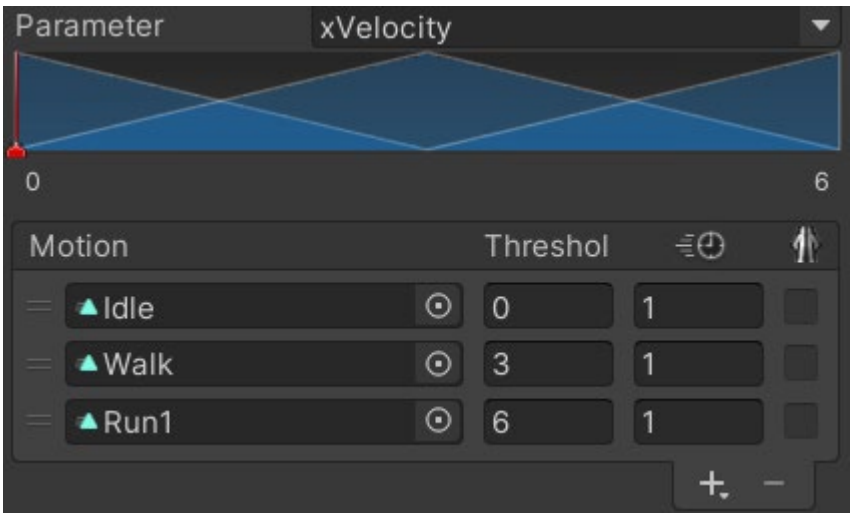


Figure 4.11: Parameter of Basic Movement Blend Tree of Character.

In the Main Movement Blend Tree, there are 3 animations will be triggered with different condition. This blend tree will be managed the movement of the player. xVelocity will be used in this blend tree and the value will be increased or decreased when player is moving. When Player is not moving, then the xVelocity value will become 0 and Idle animation will be played. When player is walking, the xVelocity will become 3 and Walk animation will be played and when player is running, xVelocity will become 6 and Run animation will be played.

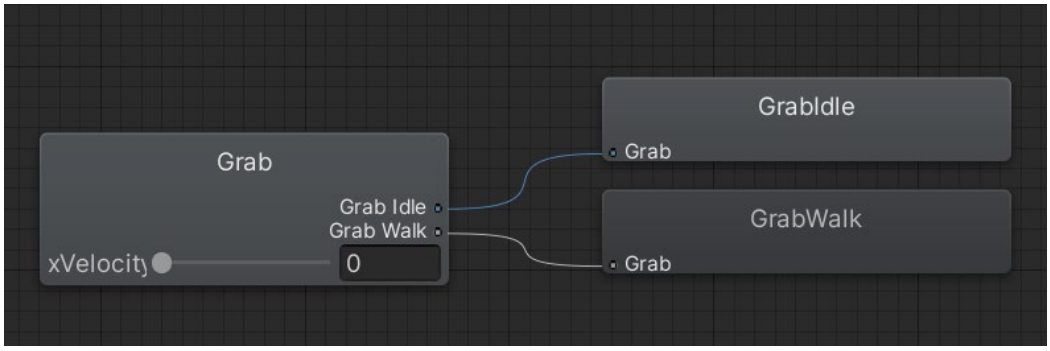


Figure 4.12: Grab Movement Blend Tree of Character.

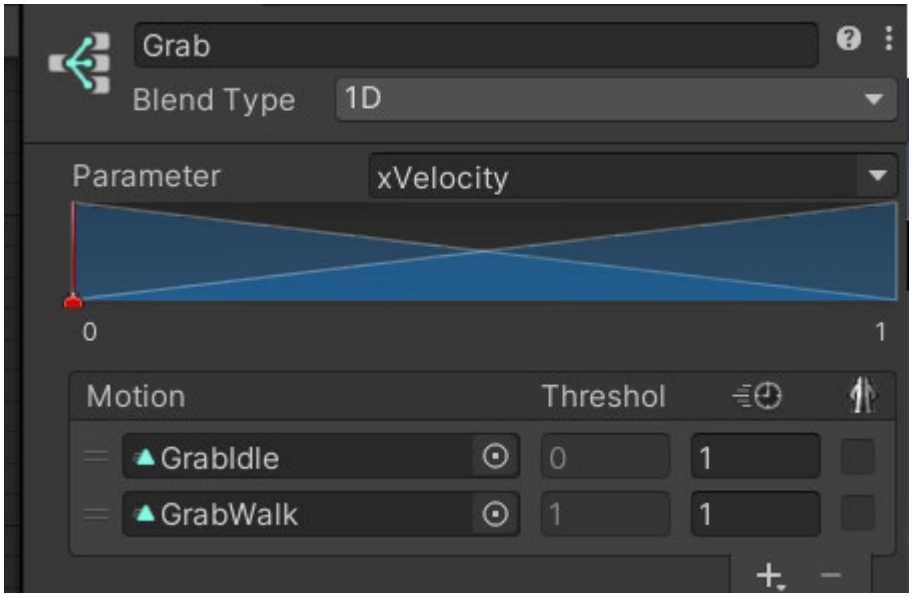


Figure 4.13: Parameter of Grab Movement Movement Blend Tree of Character.

Grab Blend tree is same with the Basic Movement Blend Tree, there have a Trigger condition which is “Grabbed”. When Player is grabbing stone or metal pail, it will set the Grabbed tigger to true. Then, the Grab Blend Tree will be play based on the xVelocity.

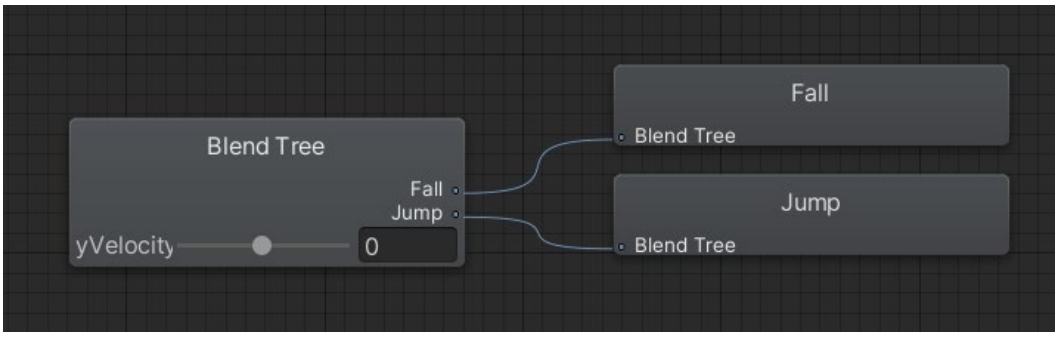


Figure 4.14: Fall Blend Tree of Character.

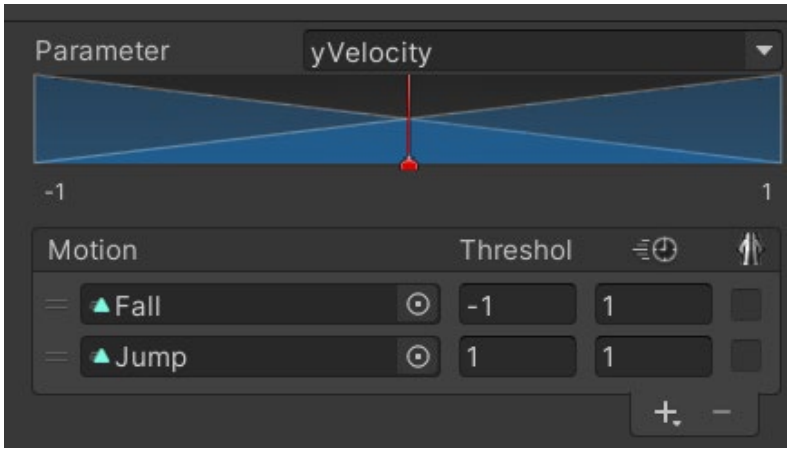


Figure 4.15: Parameter of Fall Movement Blend Tree of Character.

Fall Blend Tree is used to play fall animation when player is falling to ground. It will detect the yVelocity which is the height of the player. It will increase when player is jumping and decrease when player is falling. When player's yVelocity is increased, it will play the Jump animation and play the Fall Animation when yVelocity is decreased.

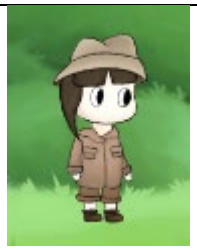
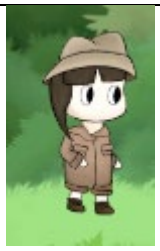
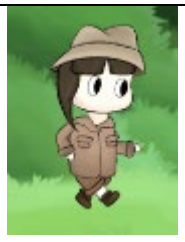
Basic Blend Tree	**Screenshot**
Idle	
Walk	
Run	

Table 4.1: Basic Movement Blend Tree Screenshot

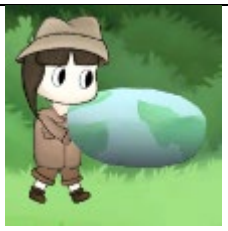
Grab Blend Tree	Screenshot
Grab Idle	
Grab Walk	
Grab Jump	

Table 4.2: Grab Movement Blend Tree Animation Screenshot.

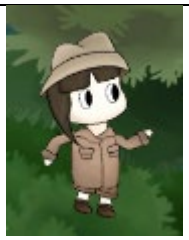
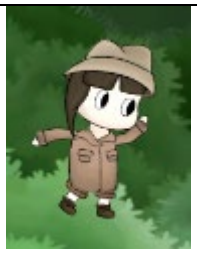
Jump Blend Tree	Screenshot
Jump	
Fall	

Table 4.3: Jump Blend Tree Animation Screenshot.

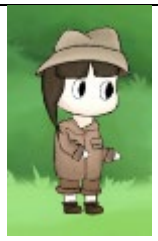
Other Animation	Screenshot
Grab Fall	
Attack	
Climb	

Table 4.4: Other Animation Screenshot.

- Script Control

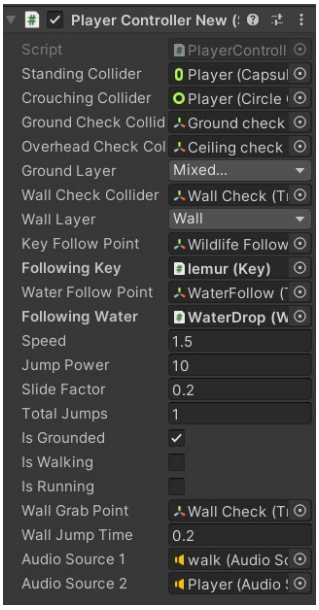


Figure 4.16: Player Controller Editor in Unity.

The script attached to Main Character where can controlled by Player to move. The Standing Collider will be detecting the ground layer to decide character walk or fall. The overhead check and ground check will also detect player have touch the ground to decide the animation. There has some adjustable variable in this movement script which is speed, jump power, slide factor, total jump and wall jump time. The audio source will also be added in this script to play walk sound when player is walking and run sound when player is running.

Pseudocode 1: Character Movement

```
Algorithm_CharacterMovement
BEGIN
    IF Walking Inputs are pressed THEN
            Move Left and Right THEN
    ENDIF
    IF Jumping Input is pressed THEN
            Jump
    ENDIF
ENDIF
    IF Player is walking THEN
            Play Walking Sound
    ELSE IF Player is Running THEN
            Play Running Sound
    ENDIF
ENDIF
```

4.2.3.2 Game Environment Design

Born's game perspective is from a side-view scrolling and it is a 2D platformer. This game is going to perform a changeable terrain to make it different from each level. All of the terrain is using box collider and edge collider. The terrain is including the grass land, land and road. All of the terrain is hand-draw using Clip Studio Paint. The game environment of Born is referring to Malaysia Forest and palm oil plantation area. So, all the assets will be draw alike to real life environment.

Figure 4.17: Game Asset in Born 1

Figure 4.18: Game Asset in Born 2

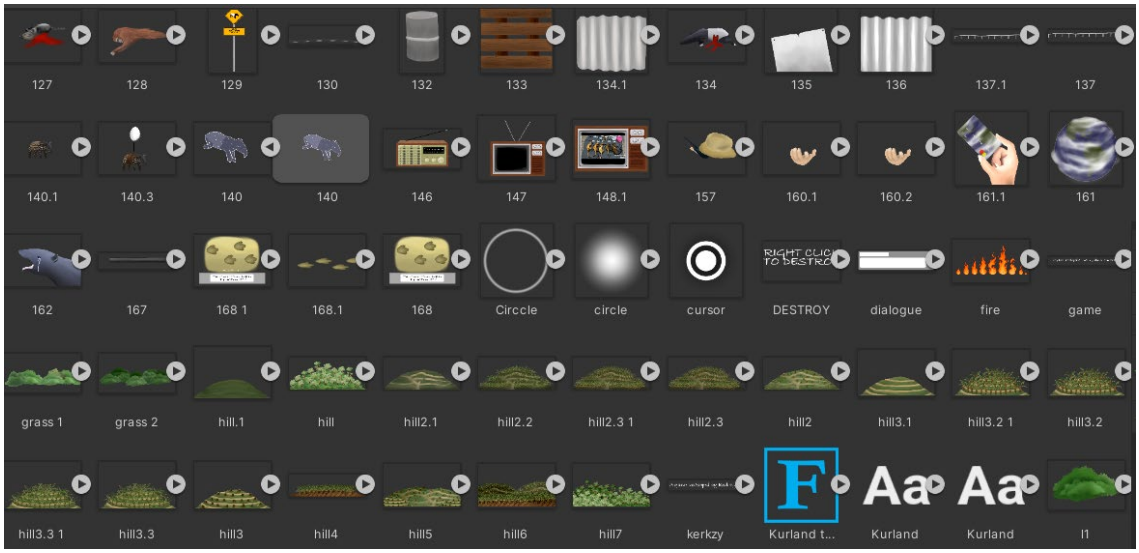


Figure 4.19: Game Asset in Born 3

The figure above shows the hand-drawn game asset that will be used in game environment. In this game, there will be 4 main environment which is forest, destroy forest, palm oil field and factory. The game environment between these environments will be different to give a sense of substitution for player. The background and environment are using parallax background which the moving rate at front layer will moving faster and the layer at the back will moving slower. It creates an illusion of depth to the environment and give a 3D effect to player. Chapter 1 which included Level 1 to 3 will be the forest of Malaysia. Chapter 2 which included Level 4 and 5 will be the deforestation. Last, Chapter 3 will be the palm oil plantation and residential area. The layer of the maps will be divided into 3 layers which are foreground, middle-ground and background. The purpose

Figure 4.20: Game Environment of Level 1.

Figure 4.21: Game Environment of Level 2.

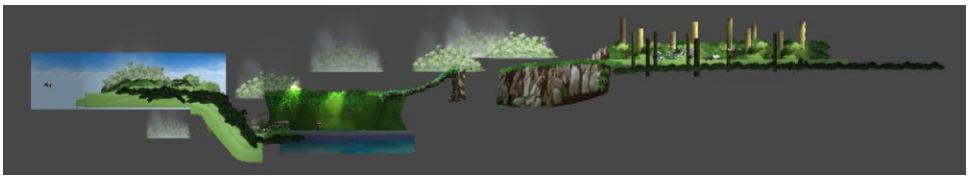


Figure 4.22: Game Environment of Level 3.

Figure 4.23: Game Environment of Level 4.

Figure 4.24: Game Environment of Level 5.

Figure 4.25: Game Environment of Level 6.

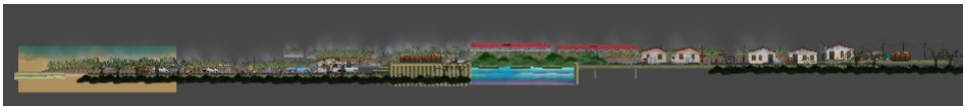


Figure 4.26: Game Environment of Level 7.

Figure 4.27: Game Environment of Level 8.

4.2.3.3 URP system and Lightning

Universal Render Pipeline (URP) is a pre-built Scriptable Render Pipeline which made by Unity. It optimised game's graphics and provides better 2D Rendering to deliver real-time light and shadow in the game. The trees in forest have provide shadow and URP

light can be added to enhance the reality of the forest. It will bake the area of light and shadow in the maps. The Area light will be added in every levels and it will light up every corner of the level. Point Light will be added as sun ray in the maps. The Point light will also add to instruction in the game which can enhance the visibility of instruction.

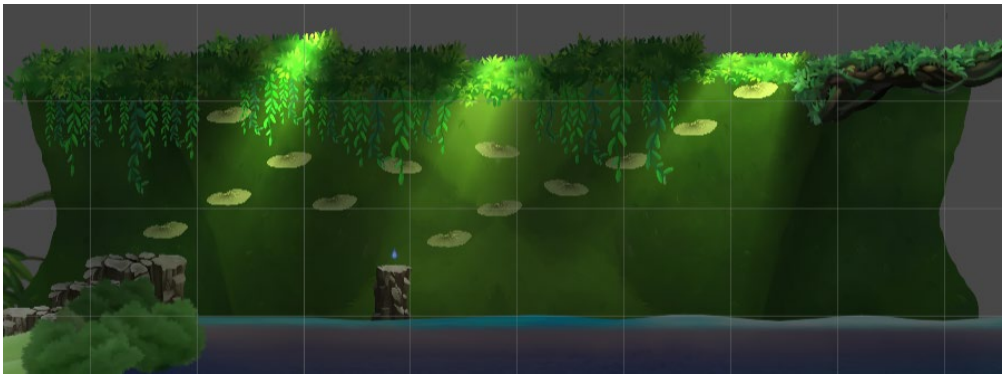


Figure 4.28: URP ligthing in Born.

4.2.4 Audio Composition

The Background Music in Born is commissioning a music composer and it is an important step in creating an immersive and engaging experience for players. A good background music score can help to set the tone and atmosphere of the game and can also serve to enhance the emotional impact of key moments in the game. When commissioning a background music composer, it's important to have a clear idea of the style and mood that want the music to convey, as well as the overall vision for the game.

When commissioning a composer, it's also important to make sure he understands the game and its mechanics, so that he can create music that enhances the gameplay experience. This might involve discussing the different levels or areas of the game, as well as the types of actions and events that take place within them. It's also important to give the composer some creative freedom, so that can come up with their own unique ideas for the music. A total of 3 background music have been produced and each background music is used for each chapter.

Figure 4.29: Picture of Audio Composition.

Figure 4.30: Screenshot of Audio Composition Software.

4.2.5 Vocal Recording

Commissioning a vocal recording for this game is an important step in creating an immersive and engaging experience for players. Vocals can be used to create a sense of realism, convey emotion, and provide a more human touch to the game. When commissioning a vocal recording, it's important to have a clear idea of the style and mood that want the vocals to convey, as well as the overall vision for this game. It's also important to communicate well with vocal artist and keep lines of communication open throughout the development process to ensure that the vocals are meeting your expectations and fitting the game perfectly. Furthermore, recording quality and sound

design need to be consider to ensure vocals are being recorded in the highest quality possible and making them fit seamlessly into the game.

Figure 4.31: Process of Vocal Recording.

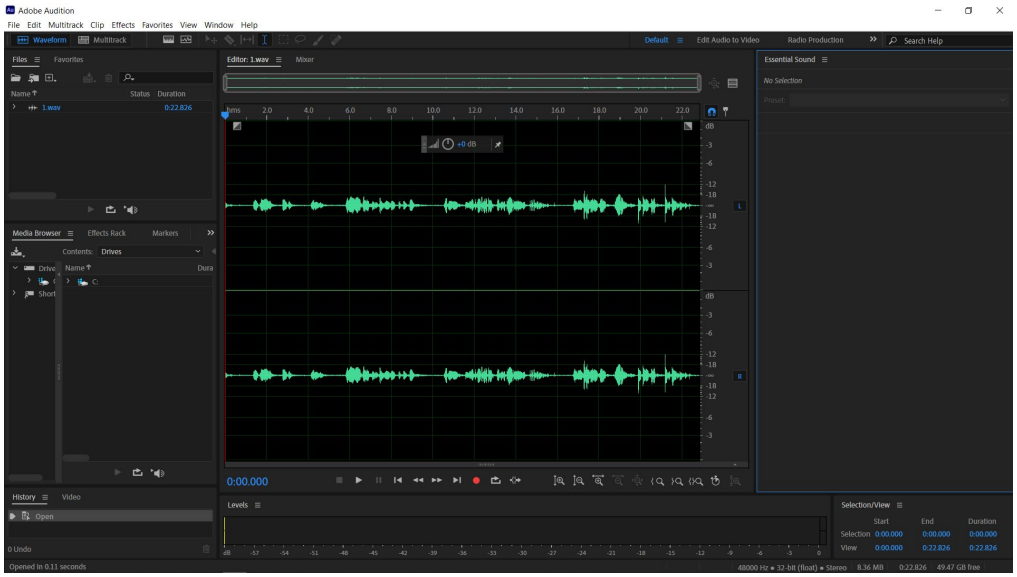


Figure 4.32: Vocal Recording using Adobe Audition.

4.2.6 Implementation of Features

4.2.6.1 Water Drop

The water drop is one of the game mechanics and it used to grow up the plant or tree. These water drops can be found in the maps and can be collected by touching the collider of the water drop. The water drop will follow player and it will go to plant location and grow them. The water drop will be hidden in the log or other player to force player to explore the maps and enjoy the environment. The collider of water drop is using isTrigger Collider and it will detect the player's tag when player is touching the collider and trigger it.

Figure 4.33: Water following Character.

Figure 4.34: Water when touch plant's collider.

When the water drop have reach the destination, the water drop will automatically send to the center of the plant. It will trigger by collider and read the character's tag.

Figure 4.35: Plant grow when water have delivered.

When the water drop is successfully reach the destination, the plant before grow sprite will be set to inactive and play the animation of growing plant. The collider will be active in the end of animation keyframe. It could make sure player will not be affected during plant growing. When the plant is grown, it becomes a platform for player to step on it.

Pseudocode 2: Water Follow

```
Algorithm_WaterFollow
BEGIN
    IF isTrigger Collider is trigger by “Player” tag THEN
            Follow Player
    ENDIF
ENDIF
```

Pseudocode 3: Plant Grow

```
Algorithm_PlantGrow
BEGIN
GET PlayerController
IF Plant Grow is Waiting to activate THEN
    IF Water Drop is following Player THEN
            IF Player is trigger Plant Collider
                    Sent Water to Plant Position and Play plant grow
                    Animation
            ENDIF
    ENDIF
ENDIF
```

4.2.6.2 Grabbing Stone

There will be some stone that can be grabbed by player can stepped on it as a platform to jump to higher place. Player can grab the stone to anyway and used it on the suitable place.

The code as usual to start a detection behaviour. It checks the object in front of player whether the object is tagged as stone or not. If the item is a stone, the player can press the “E” jet to grab the stone. When the player pressed the “E” key again, player can drop the stone with a throw force. When player is grabbing a stone, animation of character will be changed to grabbing animation.

Figure 4.36: Grabbing Stone.

Figure 4.37: Throwing Stone.

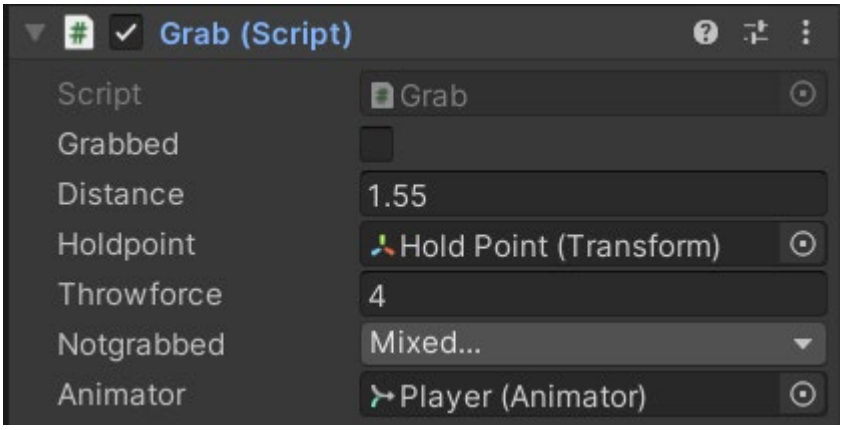


Figure 4.38: Grab in Editor.

Pseudocode 4: Grab

```
Algorithm_Grab
BEGIN
IF Stone have been detected by draw gizmos THEN
    IF Player is Pressing “E” button THEN
            Player grabbed the stone
    ELSEIF Player is grabbing the Stone THEN
            Drop the Stone
                    Animation
            ENDIF
    ENDIF
ENDIF
```

4.2.6.3 Grabbling Rope

Grabbling Rope is one of the unique mechanics in this game which allow player to shoot out the rope and it will retract to hang the player in air. This mechanic will detect the upper collider to catch on it. The rope helps player to swing between the obstacle and tree to avoid player fall into water or ground. The grabbling rope need 2 scripts to perform it which is Rope and Grabbling Gun. In the Grabbling Gun Script, it detect the distance between player and collider to ensure there have enough distance to let the rope stick with the collider and it will follow player mouse location to decide it can be stick on it or not. When player have successfully shoot out the rope, the spring joint which inside the Player will be active to connect between player and the rope. When the Grabbling gun have set the position to stick the rope, the Rope Script will run to set the rope between the destination and player. It will draw line act as the rope to swing.

Figure 4.39: Character using Grappling Rope.

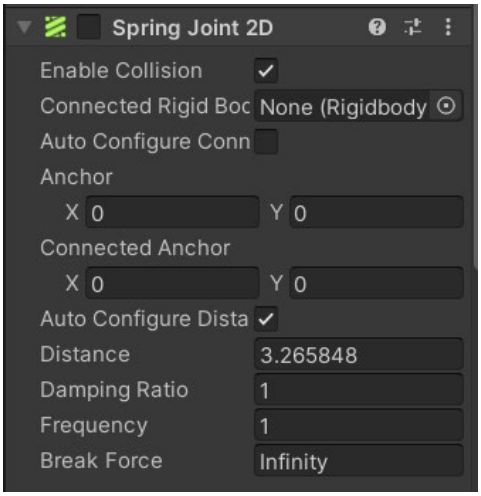


Figure 4.40: Spring Joint in Character.

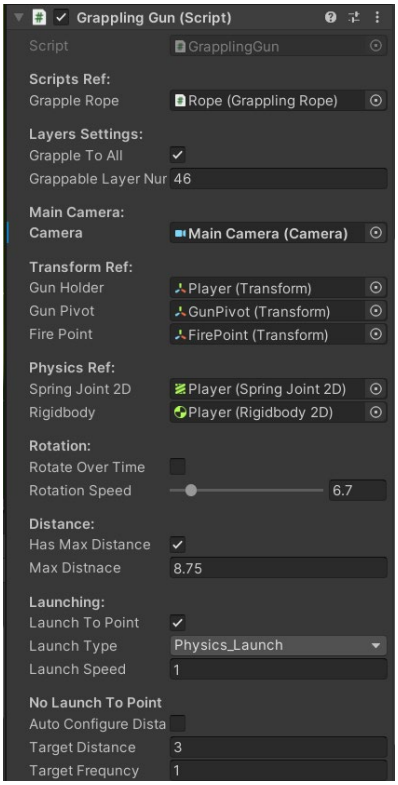


Figure 4.41: Grappling gun script in Editor

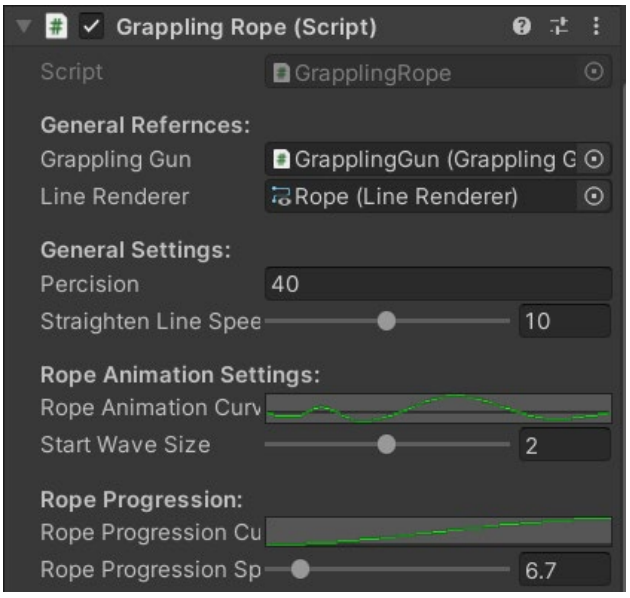


Figure 4.42: Grappling Rope script in Editor

Figure 4.43: Shooting Rope Animation Curve.

The figure above have shows the Rope Animation Curve. The animation when the rope is shooting out can be adjust by adjusting the curve.

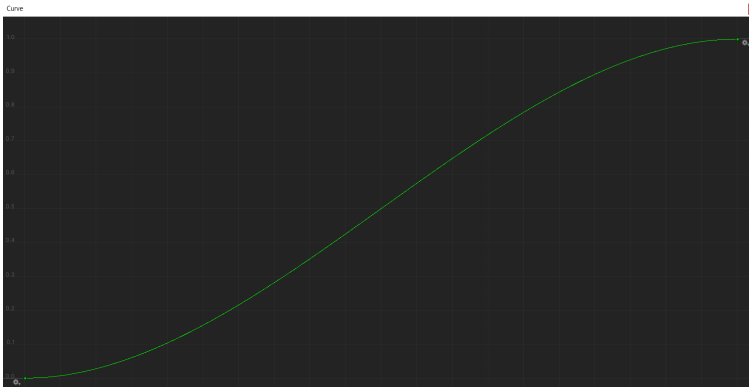


Figure 4.44: Rope Progression Curve.

The figure above has shown the Rope Progression Curve. The rope progression curves is referring to the speed of the rope when shooting out.

Pseudocode 5: Grappling Gun

```
Algorithm_GrapplingGun
BEGIN
IF Player have pressing Mouse Left Click THEN
    IF Detecting the distance between player and collider THEN
            Set grapple point and grapple to destination
            Set RigidBody to 3
    ELSEIF Distance is not enough THEN
            Not launch grapple
    ENDIF
```

Pseudocode 6: Rope

```
Algorithm_Rope
BEGIN
IF Player have pressing Mouse Left Click THEN
    IF Detecting the distance between player and collider THEN
            Enable Draw Line
    ELSEIF Distance is not enough THEN
            Disable Draw Line
    ENDIF
ENDIF
```

4.2.6.4 Melee Attack

Melee attack is used to attack some machine and vine that blocked the way. Player can press on Mouse Right Key to active the attack animation and deal damage to the Game Object. Every Game Object will appear health bar on their top and it will decrease when Player's attack point is collapse with the Game Object. There will have a hint to player when player is nearby with the Game Object which can be attacked. The Attack range and Attack Damage can be adjusted. There will have cool down time to avoid player keep pressing the key to do a huge damage in short time.

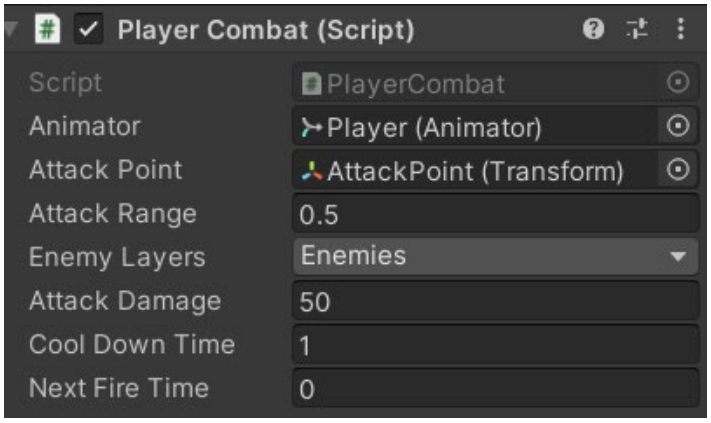


Figure 4.45: Player Combat Script in Editor.

Figure 4.46: Player hitting Machine in game.

Pseudocode 7: Melee Attack

```
Algorithm_MeleeAttack
BEGIN
IF Player have pressing Mouse Right Click THEN
    Attack
    Play attack animation
    ENDIF
ENDIF
```

4.2.6.5 Sprite Mask

The Sprite mask will be used to see the thing inside the log. There will have some game object that hide inside the log and player can using sprite mask to find out them. The Sprite Mask will insert as a child under Player. While to the log, It need to set the mask interaction to Visible Outside Mask. So, when player have enter this sprite, the circle sprite mask will make the Log's Sprite become visible.

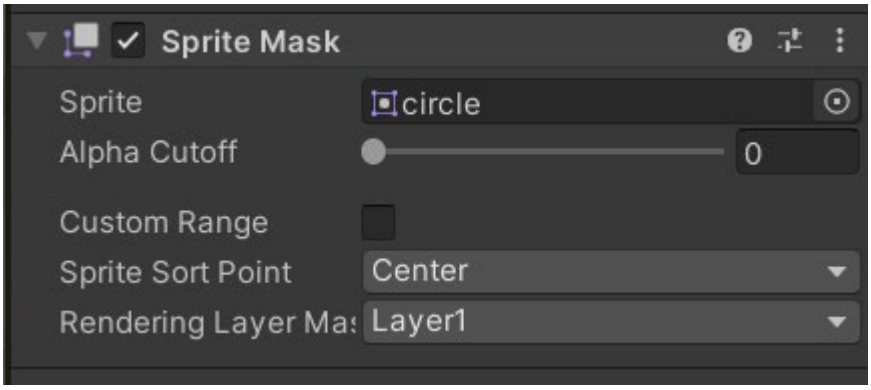


Figure 4.47: Sprite Mask in Editor.

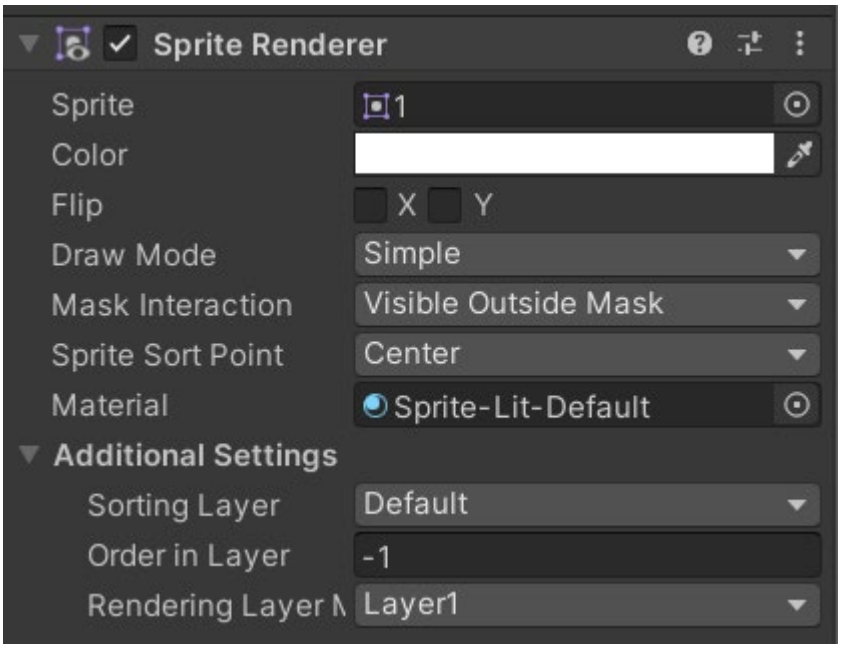


Figure 4.48: Sprite Renderer in Editor.

Figure 4.49: The use of sprite mask in game.

4.2.6.6 Falling Platform

The falling platform is usually use in branches on the tree. When player have stepped on the falling platform, the platform will be fall down and player will fall onto ground or other place. This falling platform is using RigidBody to add gravity and let the platform fall down. The collider of falling platform need to assign used by effector and Platform Effector 2D need to add to the falling platform. The Falling Platform script will be assigned into the falling platform. When the player collider have trigger the Falling Platform's collider, it will read the collider's tag first and start the fall function.

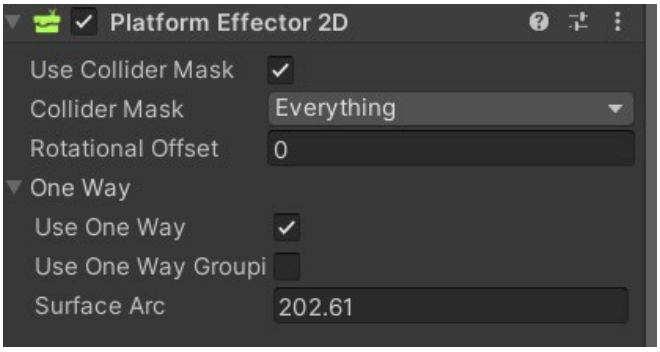


Figure 4.50: Platform Effector 2D in Editor.

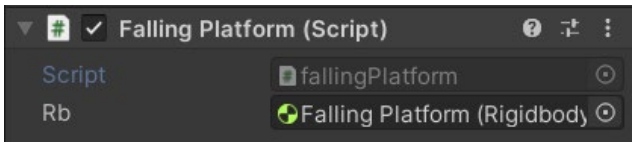


Figure 4.51: Falling Platform Script in Editor.

Figure 4.52: Platform Effector 2D in game.

Pseudocode 8: Falling Platform

```
Algorithm_FallingPlatform
BEGIN
IF Player have trigger the collider THEN
    Add gravity to the falling platform
    Destroy the platform with destroy delay
    ENDIF
ENDIF
```

4.2.6.7 Jump Pad

Jump pad is use as a jumping platform to let player can reach higher place. The jump pad is using collider Enter 2D to read the player's tag. If the collider that stepped by "Player" tag, it will add force to player to bounce the player to higher place. The bounce force can be adjusted to let player can jump higher or lower.

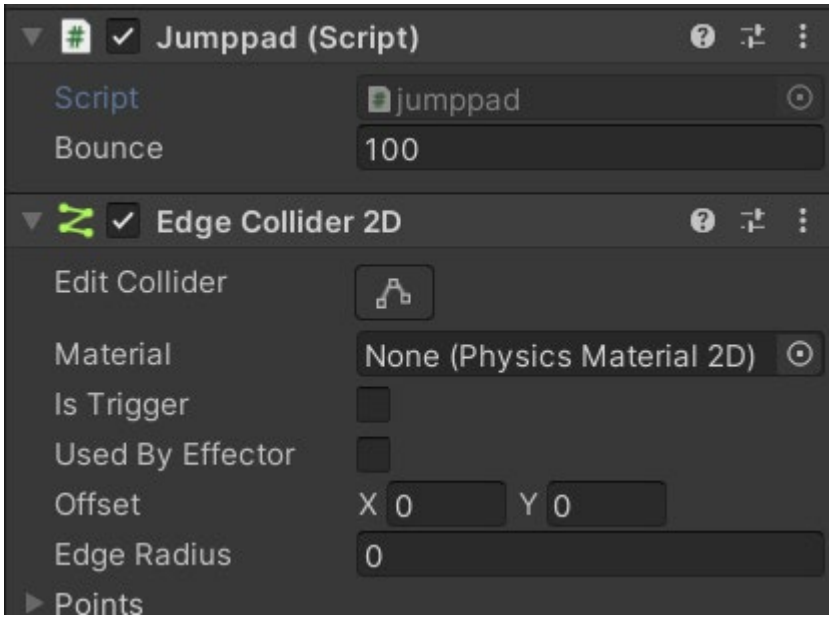


Figure 4.53: Jump Pad Script in Editor.

Figure 4.54: Jump pad in the game.

Pseudocode 9: Jump Pad

```
Algorithm_JumpPad
BEGIN
IF Player have trigger the collider THEN
    Added Bounce force to player
    ENDIF
ENDIF
```

4.2.6.8 Subtitle System and Voice Follow

The subtitle system with a voice follow is an important and vital system to this game. The game is not using UI to give hint and storytelling to user. It will be using subtitle and real vocal voice. It could enhance the gameplay and increase the uniqueness of the game. It provides a hearing experience and player can keep track the progress by viewing the subtitles. It could avoid player have missed the instruction while focussing on the game. The subtitle will set at the bottom of the game to provide better perspective to player. The subtitle and vocal can make sure player don't miss anything while playing the game. The voice will be followed by the correct subtitles and it is using array to set the time of subtitles appear to match the voice's time. The subtitle and voice will be trigged by player when player have triggered the collider.

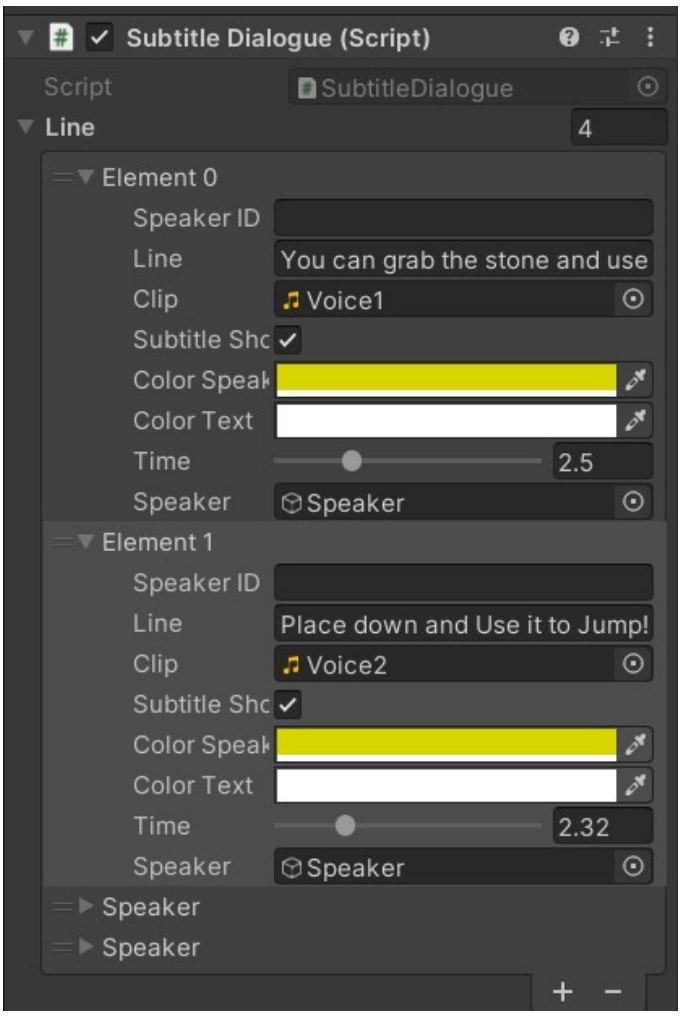


Figure 4.55: Subtitle Dialogue Script in Editor.

Pseudocode 10: Subtitle Dialogue

```
Algorithm_SubtitleDialogue
BEGIN
GET LineSubtitle
FOR LineLength is more than 1 THEN
    Set speaker ID, Line, Colour of Text and voice
    Add Line
    GetAudioSource
    END IF
IF Player have triggered the Subtitle Dialogue
    Play subtitles and voice
    ENDIF
ENDIF
```

In Subtitle Dialogue script, array have been added and it could insert the Speaker ID, Line, Clip, Subtitle show, Colour Speaker and text and time. Player can insert the subtitle in the Line and insert the following clip in Clip. It could also adjust the time length which fit the voice's time length. The colour of text can be change to others colour.

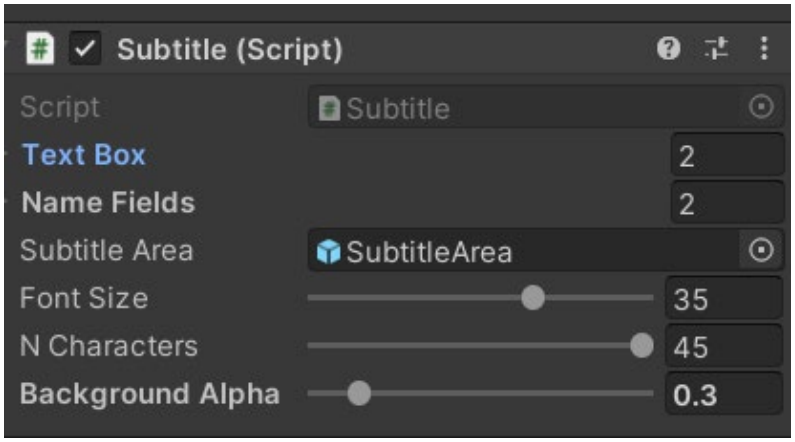


Figure 4.56: Subtitle Script in Editor.

Pseudocode 11: Subtitles

```
Algorithm_Subtitles
BEGIN
FOR TextBox is more than 1 THEN
    Set the font size , background Alpha and colour
    Add TextBox
    END IF
ENDIF
```

Subtitle Script is using in Unity UI and it can adjust font size and background alpha. It could customise the design of the subtitle area.

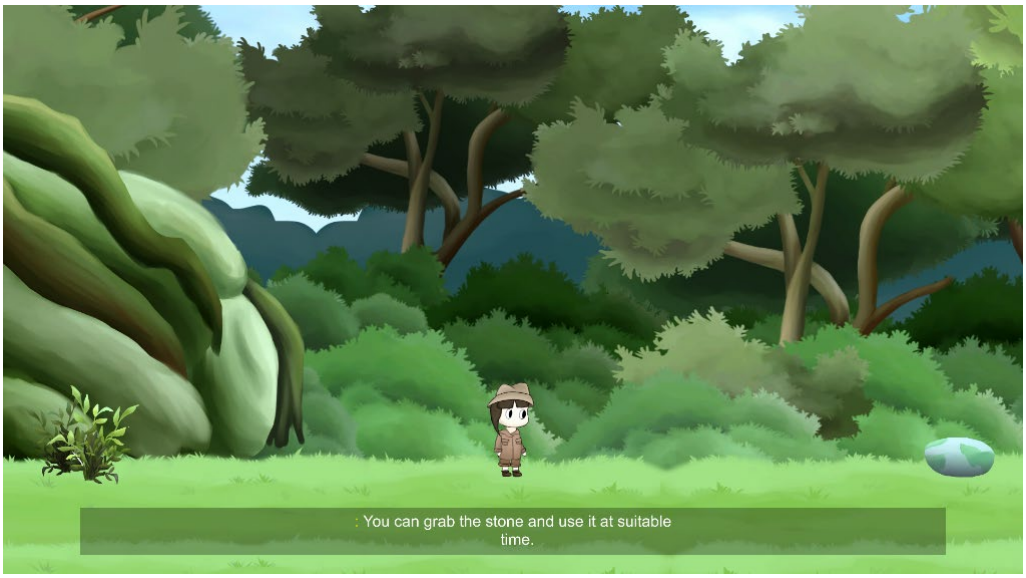


Figure 4.57: Subtitles in the game.

4.2.6.9 Dialogue Manager

The Dialogue Manager is handling the dialogue of NPC. It is because the conversation is always move player forward in the game and it have keep the player involved to keep the story moving. The aim of using dialogue in this game is giving player a clear direction while playing the game and give hint and instruction to player. There will have a trigger collision on the NPC to detect the player and when player si inside the collider, player can press “V” to activate the dialogue. Player can interact with the NPC and viewing the message that delivered by NPC. Player can click on “Continue”

Button to continue the dialogue and end the conversation. When the player has left the trigger collider range, the dialogue will be closed automatically. The contain of dialogue can be changed in the inspector and increasing the line of the dialogue. The UI of the dialogue is using animation to let the dialogue come out from bottom and goes down for closing the dialogue.

Figure 4.58: Dialogue in the game.

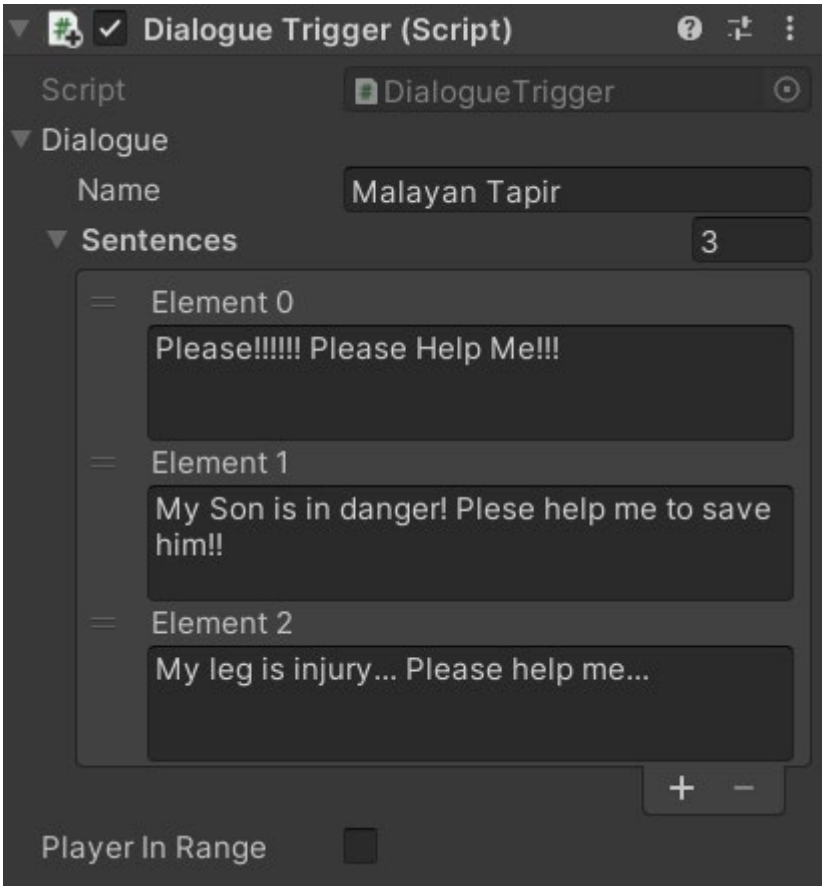


Figure 4.59: Dialogue Trigger Script in Editor.

Pseudocode 12: Dialogue Trigger

```
Algorithm_DialogueTrigger
BEGIN
GET DialogueManager
IF Player have pressing E key THEN
    IF Detecting player's tag and collider THEN
            Set Line and NPC name
    ENDIF
ENDIF
```

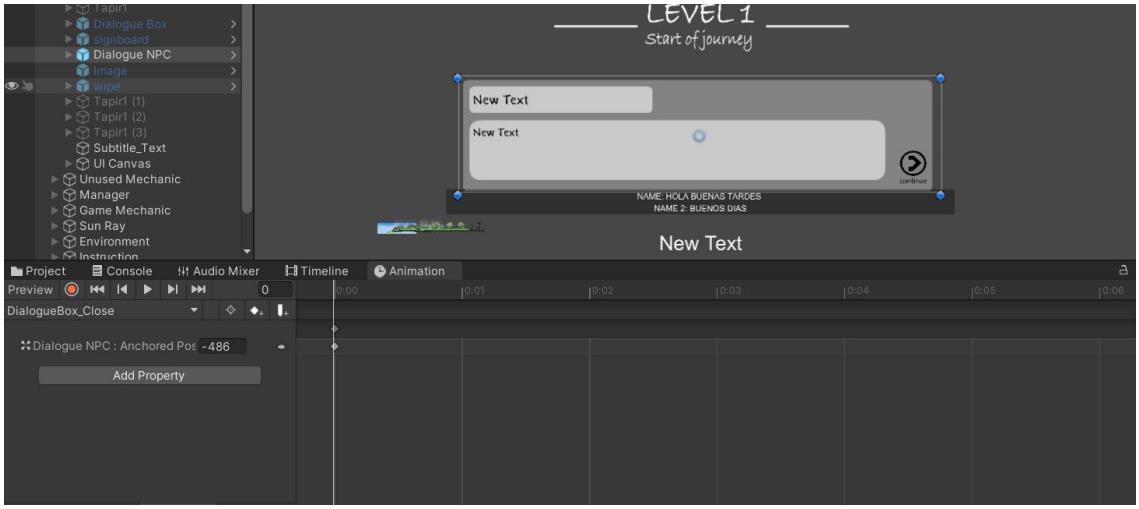


Figure 4.60: Animation of Dialogue UI.

4.2.6.10 Hunter

Hunter is Ai Enemy is using Finite State Machine that will have several conditions such as attack, patrol and idle. The Hunter is played as an enemy in this game and it could not be hurt or destroy. Hunter will be assigned an isTrigger collider on to detect the player. When player is triggering this collider, hunter will change its state from patrolling or idle to attack. When hunter is attacking, it will shoot out the bullet to player and player need to dodge it. Beside this, Hunter is using way point to patrolling in selected area. When hunter have reached the position of way point, it will change to idle state and wait for few seconds.

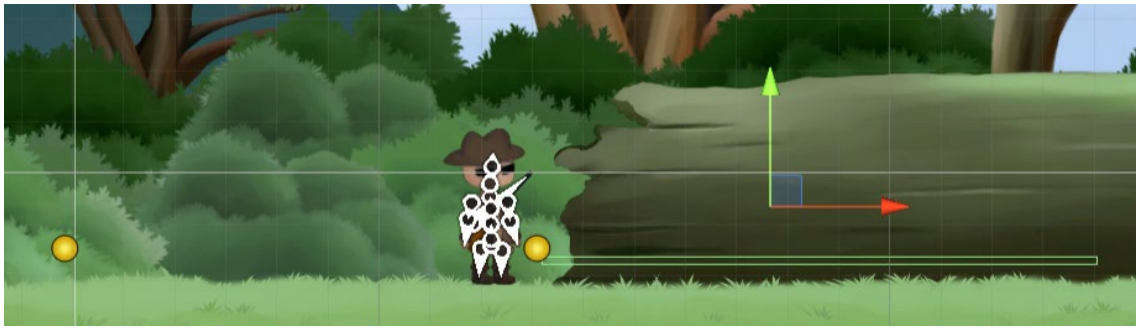


Figure 4.61: Hunter in the game.

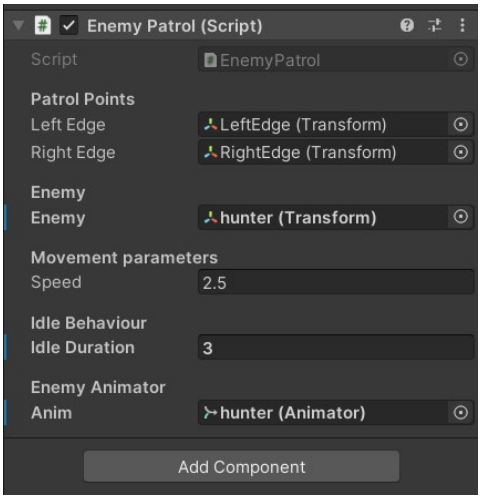


Figure 4.62: Enemy Patrol Script in Editor.

Pseudocode 13: Enemy Patrol

```
Algorithm_EnemyPatrrol
BEGIN
IF Hunter is touching Left Point THEN
    Move Right
    Change Direction
ELSE IF Hunter is touching Right Point THEN
    Move LEFT
    Change Direction
    ENDIF
ENDIF
```

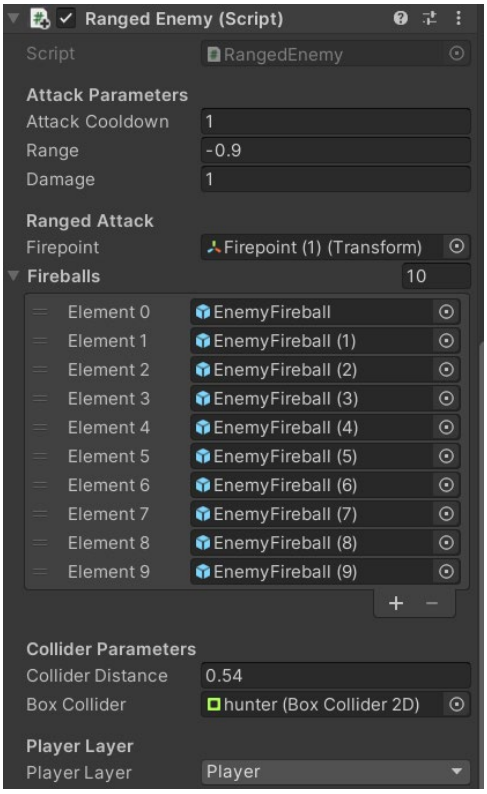


Figure 4.63: Ranged Enemy Script in Editor.

Pseudocode 14: Ranged Enemy

```
Algorithm_RangedEnemy
BEGIN
GET EnemyPatrol
IF Player is in fron of Hunter THEN
    Trigger Attack Animation
    Attack player
    Get Cooldown
    ENDIF
ENDIF
```

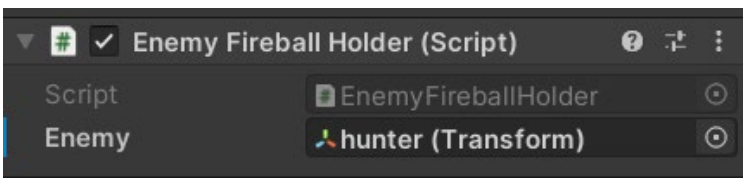


Figure 4.64: Enemy Fireball Holder Script in Editor.

4.2.6.11 Climbing

In this game, player can climb up the vine and reach higher place. The LadderMovent Script will be applied in Main Character. Then, the vine will be added a collider and set the collider to isTrigger. Besides this, when player have touched the collider of the vine, it will read the vine collider's tag. If the tag is equal to "Ladder", player can press "W" key to climb up the vine. This game mechanic allows player to reach higher place.

Figure 4.65: Vine for climbing in the game.

Pseudocode 15: Ladder Movement

```
Algorithm_LadderMovement
BEGIN
IF Collider tag = “Ladder” THEN
    Player’s gravity scale = 0f
    Player moves up by speed
    ENDIF
ELSE
    Player’s gravity scale = 1.5f
ENDIF
```

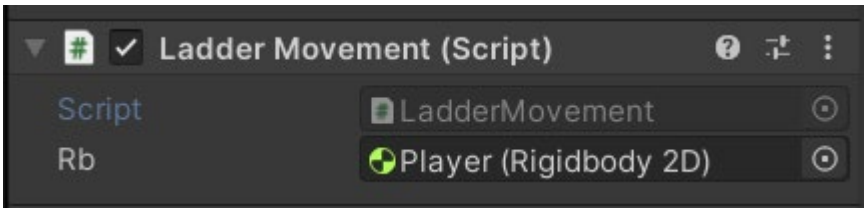


Figure 4.66: Ladder Movement Script in Editor.

4.2.6.12 Memory

Memory in this game is used to trigger the animation of past memory which have happened at that location. This mechanic is a trigger mechanic which the animation will be trigger when player have touched the collider of animation. There have 3 state of animation which is idle, trigger and leave. Idle animation is a blank animation which will show nothing before triggered. When player have touched the collider of the memory, Trigger Animation will be trigger and stay at the end of the animation. When player have leaved the trigger collider, Leave Animation will be played which will set the alpha value to 0.

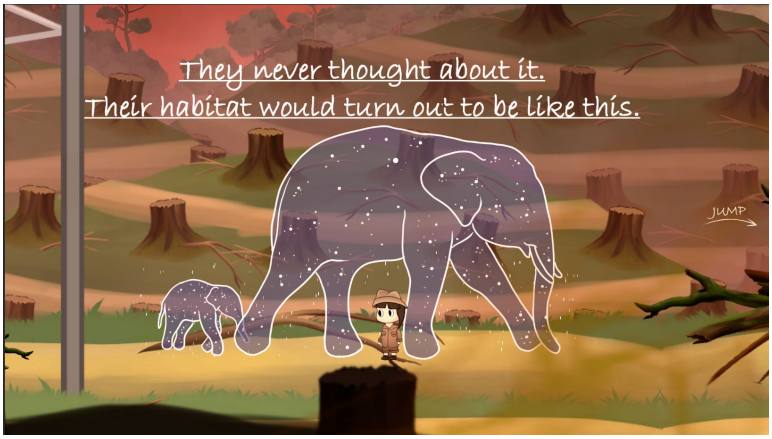


Figure 4.67: Memory in the game.

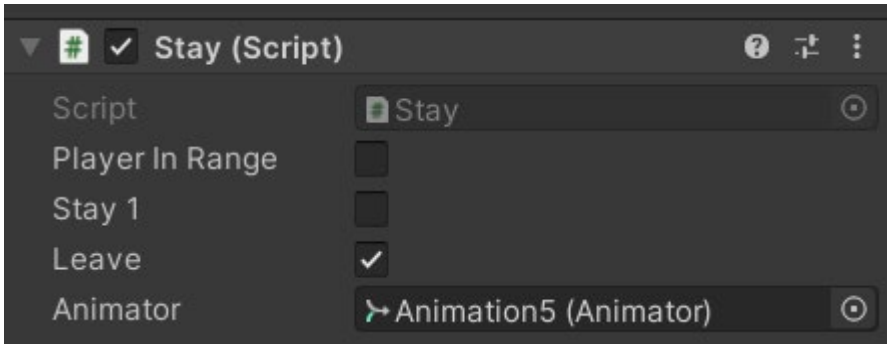


Figure 4.68: Stay Script in Editor.

Pseudocode 16: Stay

```
Algorithm_Stay
BEGIN
IF OnTriggerStay2D THEN
    Play “Trigger”
    ENDIF
ELSE IF OnTriggerExit2D THEN
    Play “Leave”
ENDIF
```

4.2.6.13 Television and Radio

Television and radio will be used as information teller to player. Player can use the television and radio to see information or clue of the specific level. If player is activating the television, a photo of news will be show and information will be shown as dialogue. If player is activating the radio, clue and news information will be play using dialogue system. The information of news will be taken from the actual news in Malaysia.

Television and Radio will be applied a 3D audio source which will play buzz sound when player is nearby the television and radio.

Figure 4.69: Television in the game.

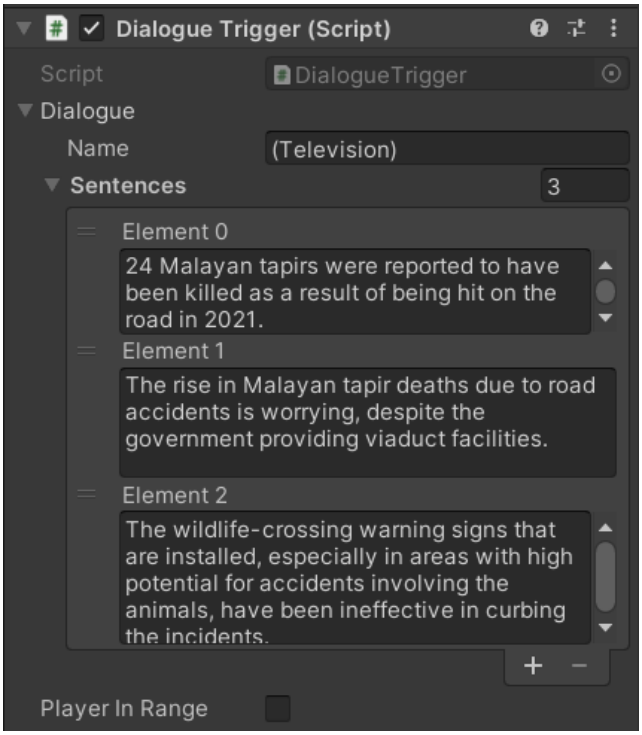


Figure 4.70: Dialogue Trigger Script in Editor.

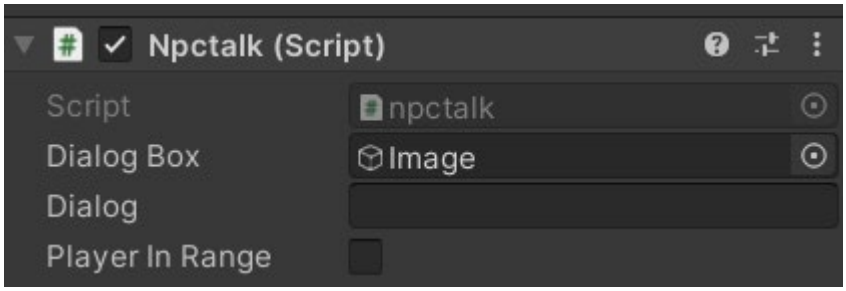


Figure 4.71: NPC Talk Script in Editor.

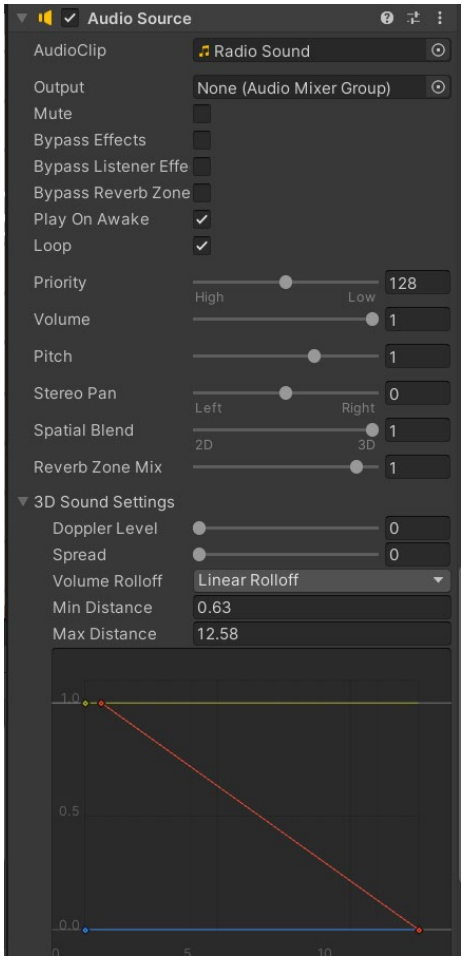


Figure 4.72: Audio Source for 3D audio.

Pseudocode 17: Dialogue Trigger

```
Algorithm_DialogueTrigger
BEGIN
GET DialogueManager
IF Player have pressing E key THEN
    IF Detecting player's tag and collider THEN
            Set Line and NPC name
    ENDIF
ENDIF
```

4.2.6.14 Check Point

In this game, main character is not using health system which will be deducted the health when get damaged from enemy or falling down. Thus, a check point system will be applied to saving the player location before getting damage. Check Point system in this game is containing 4 main item which is game master, checkpoint, PlayerPos and fall detector. The game master in this game is used to stored and save the last check point in every levels. A trigger collider will be put in the Check Point and when player have touched the Check Point Collider, the position of player will be saved and stored into Game master. So, when player have touched the fall outside the maps, layer will respawn in last saved Check Point. The Fall Detector is used to detect player's collider. When player is falling down and trigger the Fall Detector's collider, it will send player to last checked position by restart the level scene.

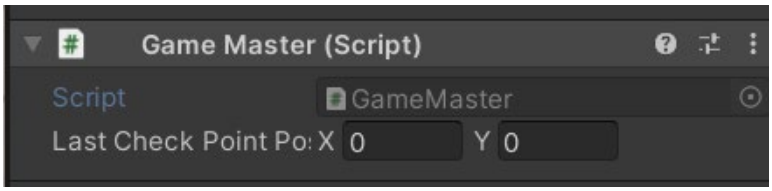


Figure 4.73: Game Master Script in Editor.

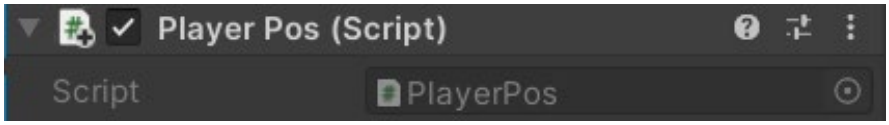


Figure 4.74: Player Position Script in Editor.

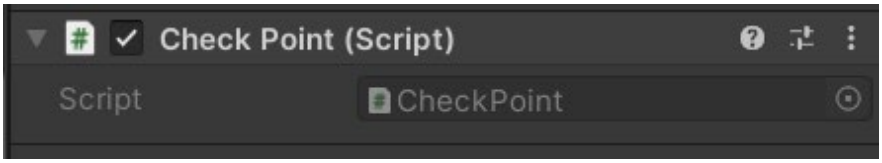


Figure 4.75: Check Point Script in Editor.

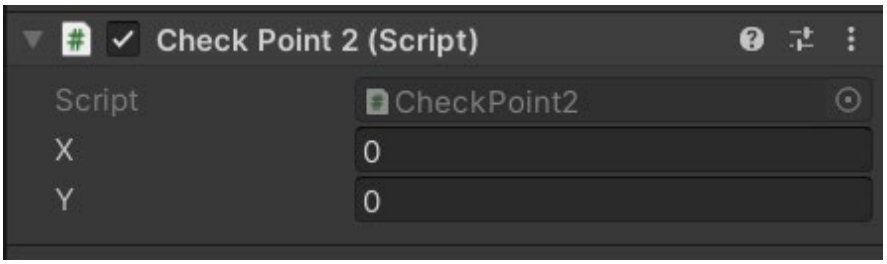


Figure 4.76: Check Point 2 Script in Editor.

Pseudocode 18: Game Master

```
Algorithm_GameMaster
BEGIN
IF Instance == null THEN
    Instance = this
    DontDestroyOnLoad(instance)
ENDIF
ELSE
Destroy(gameObject)
ENDIF
```

Pseudocode 19: Player Position

```
Algorithm_PlayerPos
BEGIN
Get GameMaster
Player position = gamemaster last check point position
IF OnTriggerEnter2D THEN
    IF Collision tag = Fall Detector
            Load Scene
    ENDIF
ENDIF
```

Pseudocode 20: Check Point

```
Algorithm_CheckPoint
BEGIN
Get GameMaster
IF OnTriggerEnter2D THEN
    IF Collision tag = Player
            GameMaster last Check Point Position = Player Position.
    ENDIF
ENDIF
ELSE
```

4.2.6.15 Audio Manager

Audio Manager in this game is used to apply the sound effect easily to each action such as grappling rope, button, melee attack, etc. The Audio Manager worked as a storage of audio and it stored sound effect as array in Editor. Each sound effect can be adjusted volume and pitch. The audio will be played when an action has been called in specific function. It can ease the work because it don't need to assign audio source in each game object.

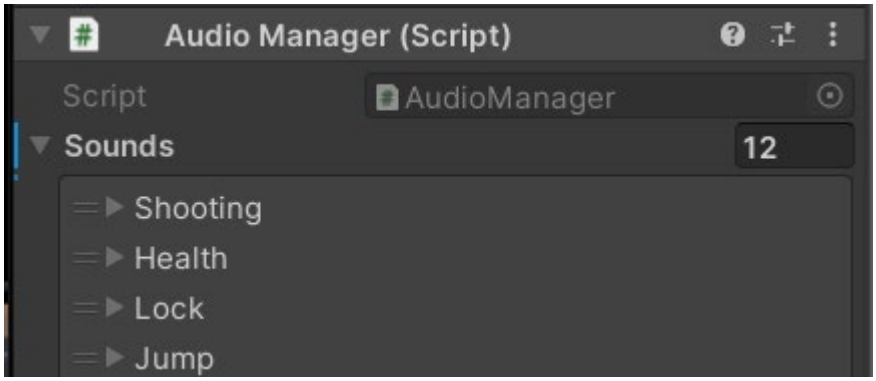


Figure 4.77: Audio Manager Script in Editor.

Pseudocode 21: Audio Manager

```
Algorithm_AudioManager
BEGIN
FOREACH(Sound in Sounds)
    Add Component Audio Source
    Source Volume = volume
    Source Pitch = Pitch
ENDIF
```

4.2.6.16 Background Music Manager

Background Music Manager in this game is used to changing the background music based on level. The background music will play consistently if player is passing through level 1 to 3, level 4 to 5 and level 6-8. This manager will check for the level id to assign the background music. When player is passing from level 3 to level 4, the background music will be changed from opening background music to middle background music. It will be the same from level 5 to level 6. This Manager will be played as a static instance in the background of the game.

Figure 4.78: Sound Manager Script in Editor.

Pseudocode 22: Sound Manager

```
Algorithm_SoundManager
BEGIN
IF level ID == 1 || 2 || 3
    IF Audio ID = 1
            Audio ID =1
    ENDIF
    ELSE IF Audio ID != 1
            Stop Audio
            Audio Clip = BGM1
            Play Audio
            Audio ID = 1
    ENDIF
ENDIF
IF level ID == 4 || 5
    IF Audio ID = 2
            Audio ID =2
    ENDIF
    ELSE IF Audio ID != 2
            Stop Audio
            Audio Clip = BGM2
            Play Audio
            Audio ID = 2
    ENDIF
ENDIF
IF level ID == 6 || 7 || 8
    IF Audio ID = 3
            Audio ID =3
    ENDIF
    ELSE IF Audio ID != 3
            Stop Audio
            Audio Clip = BGM3
            Play Audio
            Audio ID = 3
    ENDIF
ENDIF
```

4.2.6.17 Cursor Manager

The cursor manager is used to change cursor texture in this game. The aim to change the texture of cursor is enhance the visibility of cursor while playing game. The cursor will be originally designed by myself and free from copyright. The cursor was designed by using Clip Studio Paint.

Figure 4.79: Cursor.

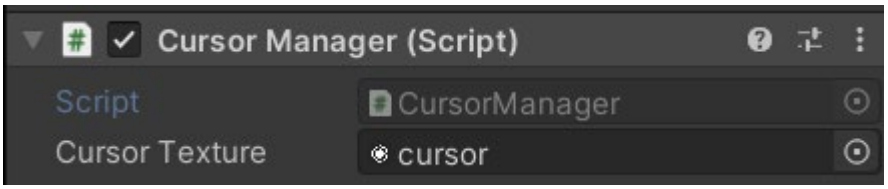


Figure 4.80: Cursor Manager Script in Editor.

Pseudocode 23: Cursor Manager

```
Algorithm_CursorManager
BEGIN
Cursor Hot Spot = new vector
Set Cursor to new texture and Cursor Hotspot
ENDIF
```

4.2.6.18 Game Camera

The game camera in this game is a 2D camera which will following player in the game. There has some limit area of the camera in every level which is sides, top and bottom of the level. The camera will stop moving while player have reached the limit area in the level. The minimum and maximum of camera position will be set and the value will be different in other level. Then a smooth factor will be added in the camera

and it will smoother the camera movement and provide better gameplay experience for player.

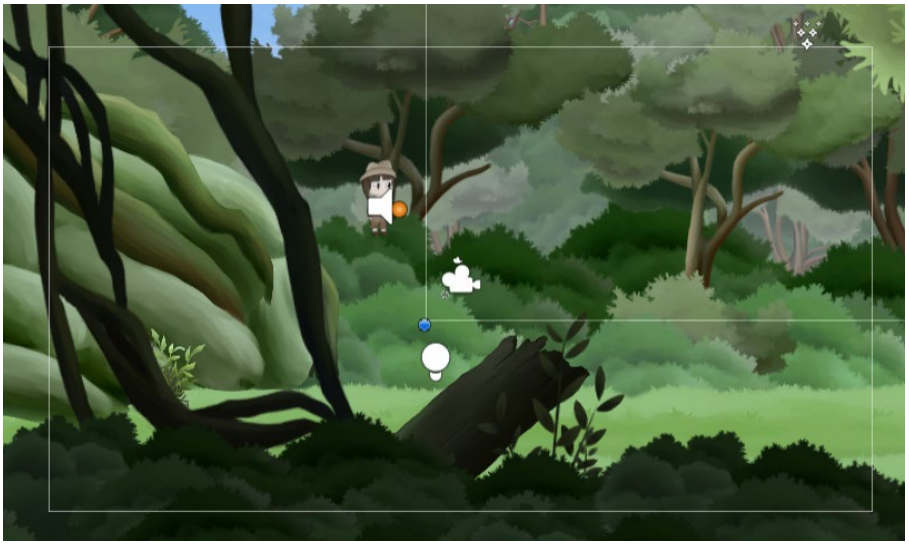


Figure 4.81: Camera in the game.

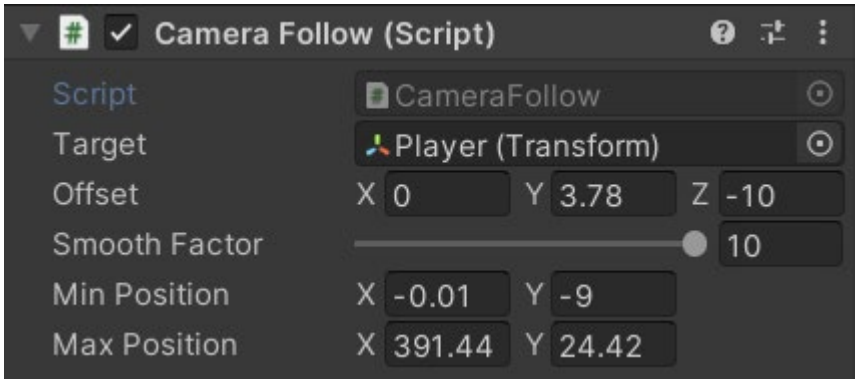


Figure 4.82: Camera Follow Script in Editor.

Pseudocode 24: Camera Follow

```
Algorithm_CameraFollow
BEGIN
    Target Position = position + offset
    Transform position = smooth position
    Minimum Position = min position
    Maximum Position = max position
ENDIF
```

4.2.6.19 Portal

Portal in this game is used to teleport player to the next level. There is no game object to be shown as portal. There will applied a trigger collider in the level and when player have touched the collider, player will be teleport to next level. Then, an end transition will be played when trigger the portal's collider and start transition will be played when player enter next level successfully. Then end and start transition will be set up by using animation. There have transition time which will be stayed at the end of End Transition and it could be adjusted in Editor.

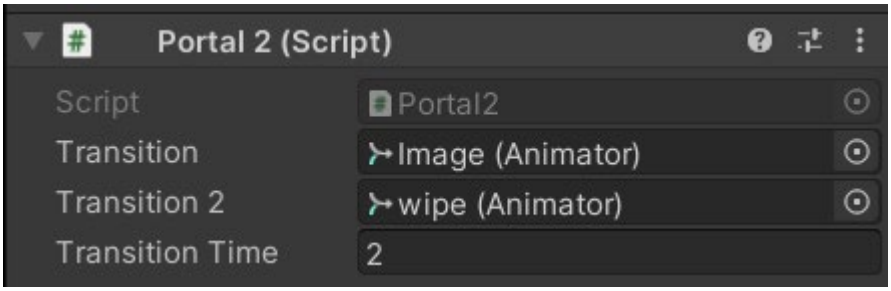


Figure 4.83: Portal Script in Editor.

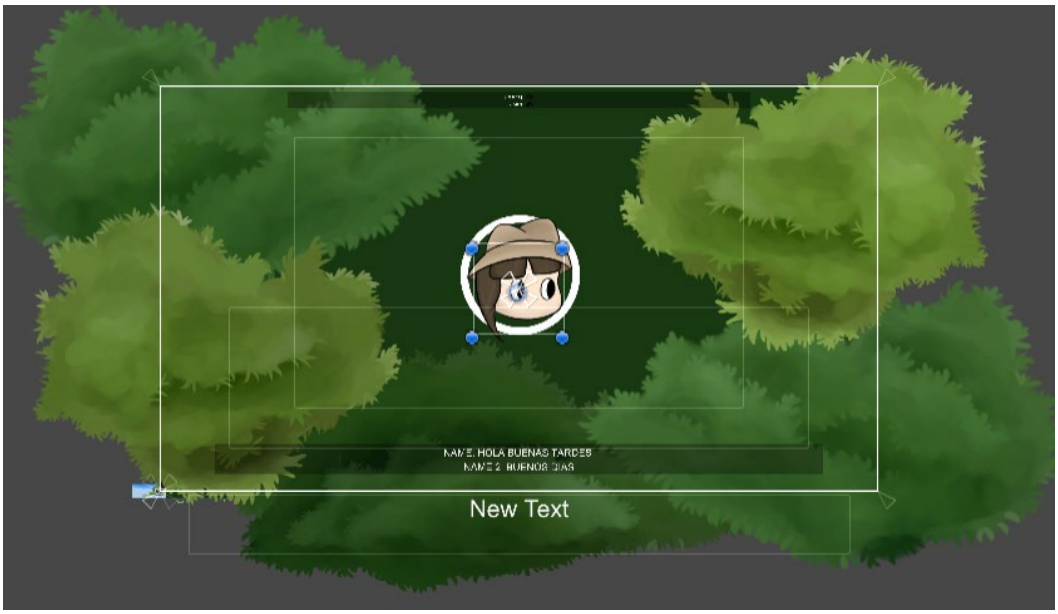


Figure 4.84: Start Animation of Transition.

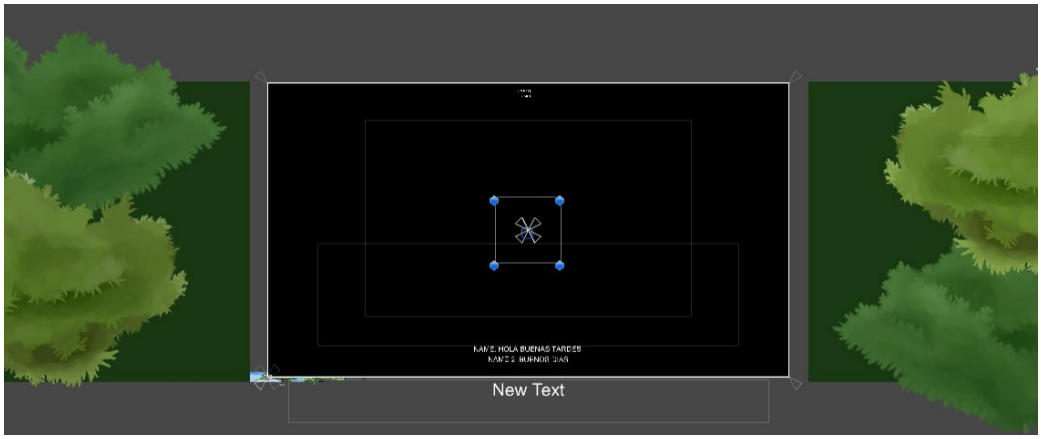


Figure 4.85: EndAnimation of Transition.

Pseudocode 25: Portal

```
Algorithm_portal
BEGIN
    IF OnTriggerEnter2D
            IF GameObject Tag == Player
                    Load Scene
                    Transition Set Trigger Start
                    Transition Set Trigger END
                    Wait For Second (Transition Time)
            ENDIF
    ENDIF
END
```

4.3 Discussion

This section discusses the test format for the project Born. Born will going to do alpha testing and beta testing. The alpha testing for Born will use Functional Acceptance Testing (FAT) to test the functionality of project and User Acceptance Test (UAT) used for beta testing.

4.3.1 Alpha Testing

Tester Name: Kerk Zhi Yuan				
Test Case 1: Main Menu				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Go to Level Select menu.	Click on the chapter to start from that level.	The game will start from the chapter that the player presses.	PASS
2	Go back to the main menu.	Click on the back button in level select menu.	The main menu will show up back.	PASS
3	Adjust volume.	Click on the setting button in Main Menu.	The volume of game could be adjusted.	PASS
4	Credit Information.	Click on the Credit button in Main Menu.	The credit Information could be shown on the screen.	PASS
5	Quit the game Application.	Click on the Quit Button in Main Menu.	The game will be closed.	PASS

Table 4.5: Test Case 1 (Main Menu).

Test Case 2: Level Selection				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Start the game from the specified level.	Click on the chapter to start from that level.	The game will start from the chapter that the player presses.	PASS

2	Go back to the main menu.	Click on the back button in level select menu.	The Main Menu will show up back.	PASS

Table 4.6: Test Case 2 (Level Select).

Test Case 3: Gameplay Level 1				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Character can do conversation with NPC.	Move to NPC nearby and press on E key.	Dialogue could be trigger and player could click on the continue button to close it successfully.	PASS
4	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
5.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS

6	Player can grab Stone.	Player pressing “E” key.	The Stone can be grabbed by player.	PASS
7	Sprite Mask will make sprite invisible.	Player reaches the location of Tree Log.	The Tree log sprite will become invisible when player have entered the Tree Log.	PASS
8	Leaves animation and Animal animation will be trigger.	Player reaches the location of Leaves and	The Leave and animal animation could be trigger successfully when player have trigger it.	PASS
	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
9	Player able go to next level	Player reached the end of the level and trigger the collision of portal.	The scene load to next level.	PASS

Table 4.7: Test Case 3 (Level 1).

Test Case 4: Gameplay Level 2				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of	PASS

			movement either left or right	
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Character can attack enemy.	Press on Mouse Right Key.	The character can attack the enemy with right animation and can deal animation to GameObject.	PASS
4	Character can shoot out the grabbling rope.	Click on Mouse Left key.	The grabbling rope will be shoot out on the collider and hanging player in air.	PASS
5	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
6.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS
7	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
8	Sprite Mask will make sprite invisible.	Player reaches the location of Tree Log.	The Tree log sprite will become invisible when player have entered the Tree Log.	PASS

9	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
10	Player able go to next level	Player reached the end of the level and trigger the collision of portal.	The scene load to next level.	PASS
11	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS

Table 4.8: Test Case 4 (Level 2).

Test Case 5: Gameplay Level 3				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS

4	Character can do conversation with NPC.	Move to NPC nearby and press on E key.	Dialogue could be trigger and player could click on the continue button to close it successfully.	PASS
5	Character can shoot out the grabbling rope.	Click on Mouse Left key.	The grabbling rope will be shoot out on the collider and hanging player in air.	PASS
6	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
7.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS
8	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
9	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
10	Player able go to next level	Player reached the end of the level and trigger the collision of portal.	The scene load to next level.	PASS

11	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS

Table 4.9: Test Case 5 (Level 3).

Test Case 6: Gameplay Level 4				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS
4	Character can hear news by using Radio.	Move to Radio nearby and press on E key.	Dialogue could be trigger and player could click on the continue button to close it successfully.	PASS
5	Character can shoot out the grabbling rope.	Click on Mouse Left key.	The grabbling rope will be shoot out on the collider and hanging player in air.	PASS

6	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
7.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS
8	Player can use Jump pad to jump to higher place.	Player stepped on the Jump pad (mushroom).	Player will be applied jump force to jump higher.	PASS
9	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
10	Hunter can attack the player.	Player reaches in front of hunter.	The Hunter will stop on patrol or idle and change to attack state to attack player.	PASS
11	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS
12	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
13	Player able go to next level	Player reached the end of the level and	The scene load to next level.	PASS

		trigger the collision of portal.		

Table 4.10: Test Case 6 (Level 4).

Test Case 7: Gameplay Level 5				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS
4	Character can hear news by using Radio.	Move to Radio nearby and press on E key.	Dialogue could be trigger and player could click on the continue button to close it successfully.	PASS
5	Character can shoot out the grabbling rope.	Click on Mouse Left key.	The grabbling rope will be shoot out on the collider and hanging player in air.	PASS

6	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
7.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS
8	Player can use Jump pad to jump to higher place.	Player stepped on the Jump pad (mushroom).	Player will be applied jump force to jump higher.	PASS
9	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
10	Hunter can attack the player.	Player reaches in front of hunter.	The Hunter will stop on patrol or idle and change to attack state to attack player.	PASS
11	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS
12	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
13	Player able go to next level	Player reached the end of the level and	The scene load to next level.	PASS

		trigger the collision of portal.		

Table 4.11: Test Case 7 (Level 5).

Test Case 8: Gameplay Level 6				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS
4	Character can hear news by using Television.	Move to Television nearby and press on E key.	Dialogue could be trigger and player could click on the continue button to close it successfully.	PASS
5	Character can shoot out the grabbling rope.	Click on Mouse Left key.	The grabbling rope will be shoot out on the collider and hanging player in air.	PASS

6	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
7.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS
8	Player can use Jump pad to jump to higher place.	Player stepped on the Jump pad (mushroom).	Player will be applied jump force to jump higher.	PASS
9	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
10	Player can climb out the vine	Player reaches the location of vine.	Player can use "W" to climb up the vine and "S" to climb down the vine.	PASS
11	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS
12	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
13	Player able go to next level	Player reached the end of the level and	The scene load to next level.	PASS

		trigger the collision of portal.		

Table 4.12: Test Case 8 (Level 6).

Test Case 9: Gameplay Level 7				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS
4	Character can hear news by using Television.	Move to Television nearby and press on E key.	Dialogue could be trigger and player could click on the continue button to close it successfully.	PASS
5	Character can shoot out the grabbling rope.	Click on Mouse Left key.	The grabbling rope will be shoot out on the collider and hanging player in air.	PASS
6	Deal damage to GameObject.	Press Mouse Right Key.	The damage could be deal to Game Object	PASS

			and health bar of Game Object would be deducted.	
7	Collected Water Drop.	Player reaches the Water Drop's position.	The Water Drop could collect by player and it will follow at the back of player.	PASS
8.	Activate the plant grow by using Water Drop.	Player reaches the Plant's position by bringing the Water Drop.	Water Drop will be delivered to plant and the plant grow animation will be trigger.	PASS
9	Hunter can attack the player.	Player reaches in front of hunter.	The Hunter will stop on patrol or idle and change to attack state to attack player.	PASS
10	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
11	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS
12	Parallax background	Player moves left and right.	The Parallax Background will make every layer of background moves in different speed.	PASS
13	Player able go to next level	Player reached the end of the level and	The scene load to next level.	PASS

		trigger the collision of portal.		

Table 4.13: Test Case 9 (Level 7).

Test Case 10: Gameplay Level 8				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Character can jump.	Press on W key.	The character jump smoothly.	PASS
3	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS
4	Push Game Object	Press on D key and move to Game Object.	The Game Object will be pushed by player.	PASS
5	Player can grab Stone.	Player pressing "E" key.	The Stone can be grabbed by player.	PASS
6	Player can Respawn in Check Point	Player falls out of maps	Player will respawn in last Check Point	PASS
7	Parallax background	Player moves left and right.	The Parallax Background will make every layer of	PASS

			background moves in different speed.	
8	Player able go to next level	Player reached the end of the level and trigger the collision of portal.	The scene load to next level.	PASS

Table 4.14: Test Case 10 (Level 8).

Test Case 11: Gameplay Ending				
No	**Functionality**	**Pre-condition**	**Expected Outcome**	**Result**
1	Character can move left and right.	Press on A/D keys or left/ right arrow keys.	The character response on the correct key of movement either left or right	PASS
2	Player can trigger the memory animation.	Move to the memory's location.	The memory will be triggered when player have go to memory location.	PASS
3	Subtitles and Voice follow can be played.	Player triggers the subtitles and voice follow.	The subtitles and voice follow can be played automatically.	PASS
4	Player able back to main menu.	Animation of Ending have end.	Player will be led to Main Menu.	PASS

Table 4.15: Test Case 11 (Ending).

Test Case 12: Pause Menu				
No.	**Pre-condition**	**Expected Outcome**	**Result**	
1	Pause the game	Player can press the pause button (Esc key) when the game is paused.	The game will be paused when the pause button is pressed. The pause menu will appear and when player pressed the button again, pause menu will be closed.	PASS
2	Resume the game	Player presses the resume button.	The game will be resumed when the game is pausing. Pause menu will be hidden after player clicking Resume Button.	PASS
3	Back to Main menu	Player presses the Back to Main Menu Button.	Player will be led to main menu when pressed “Back to Main Menu” button.	PASS
4	Quit	Player presses the Quit Button.	The game will be quit.	PASS

Table 4.16: Test Case 12 (Pause Menu).

4.3.2 Beta Testing

During the beta testing phase, Born is made available on a website called itch.io, which specializes in hosting and discovering indie games. Any interest parties can access the game by visiting the project's webpage and downloading it to play. Additionally, the project's webpage includes a feedback form through a google form for testers to provide feedback and share their thoughts. The testers come from a diverse range of backgrounds, including individuals from general public and those working in the education field.

1. What is your highest education level?

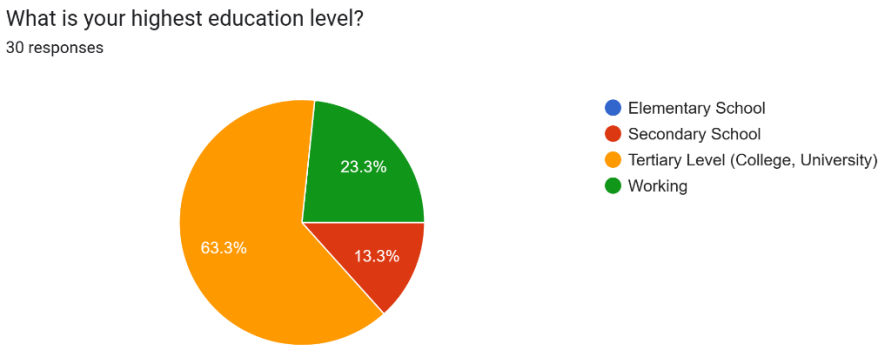


Figure 4.86: Result of "What is your highest Education Level?"

Most of the respondents are at least studying in college or university, which take up 19 respondents (63.3%) of the 30 total respondents, followed by those who are working (23.3%) and those who have a secondary level of education (13.3%). The data shows that the majority of respondents have a tertiary level of education. Moreover, the person who have tertiary level of education and work can make the survey more meaningful.

2. Do you think Born's gameplay is fun and interesting?

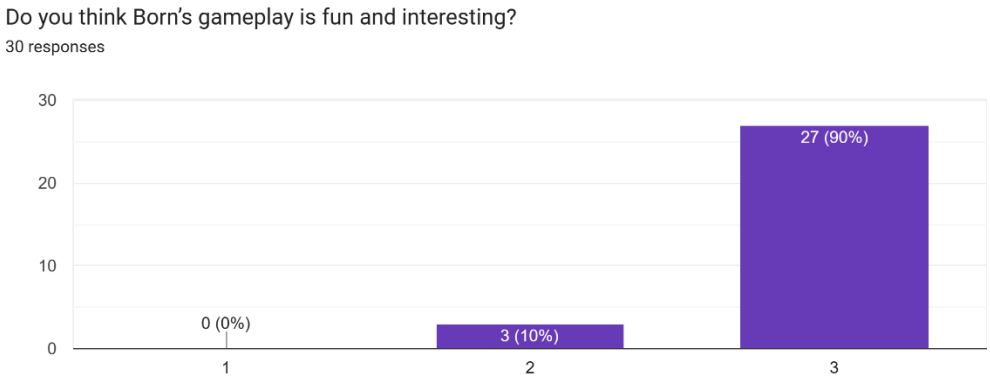


Figure 4.87: Result of "Do you think Born's gameplay is fun and interesting?".

The data shows that the majority of respondents (90%) agree that Born's gameplay is fun and interesting. Only a small percentage (10%) of respondents have a neutral opinion about Born's gameplay. This suggests that the majority of player finds Born's gameplay enjoyable and engaging. The high percentage of agreement among player indicates that Born's gameplay is well-received by the player.

3. Do you think Born is easy to understand?

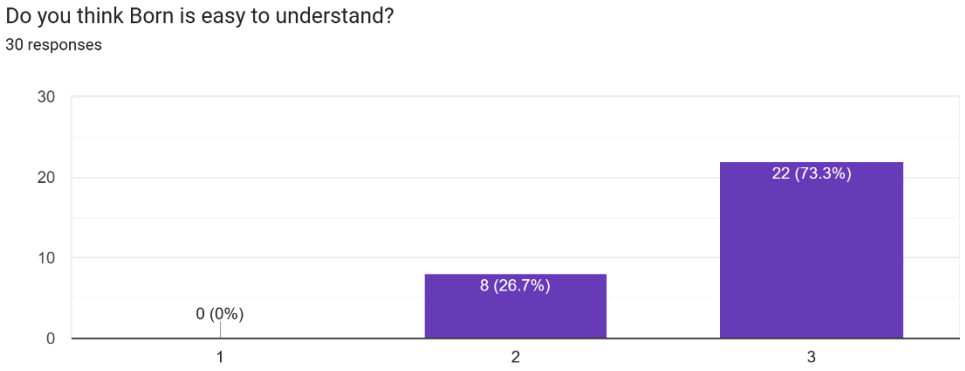


Figure 4.88: Result of "Do you think Born is easy to understand?".

The data shows that the majority of respondents (73.3%) agree that Born is easy to understand, while a significant percentage (26.7%) have a neutral opinion. This suggest that most players find Born's mechanics and controls easy to understand and navigate,

making it accessible to a wide range of players. The majority of players are able to quickly understand how to play the game and start enjoying it.

4. Do you think Born can deliver awareness to audience?

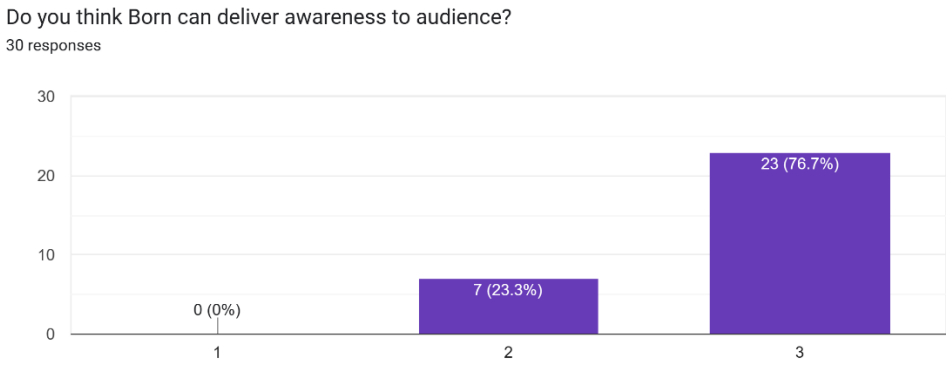


Figure 4.89: Results of “Do you think Born can deliver awareness to audience?”.

The data shows that the majority of respondents (76.7%) agree that Born can deliver awareness to audience, while a significant percentage (23.3%) have a neutral opinion. This suggests that most players believe that Born's gameplay, themes or messages can effectively deliver awareness and educate the audience about certain issues or topics. The majority of players find Born to be an effective medium for raising awareness among players.

5. Do you think Born is too difficult to play?

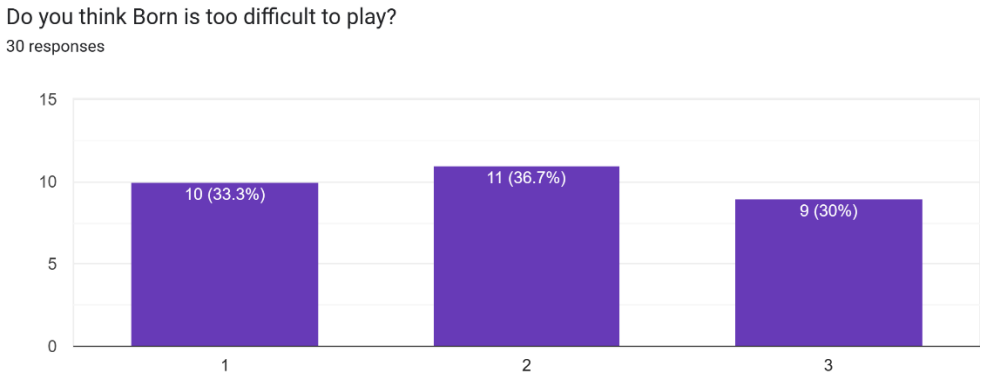


Figure 4.90: Results of "Do you think Born is too difficult to play?".

The data shows that a significant percentage (30%) of respondents agree that Born is too difficult to play, a similar percentage (36.7%) have a neutral opinion and a third of respondents (33.3%) disagree that Born is too difficult to play. This suggests that some players may find Born's gameplay to be challenging or difficult, but not all players share this opinion. A similar percentage of respondents have a neutral opinion, which means they neither agree nor disagree that the game is too difficult.

6. Does Born have a lot of bug and glitches?

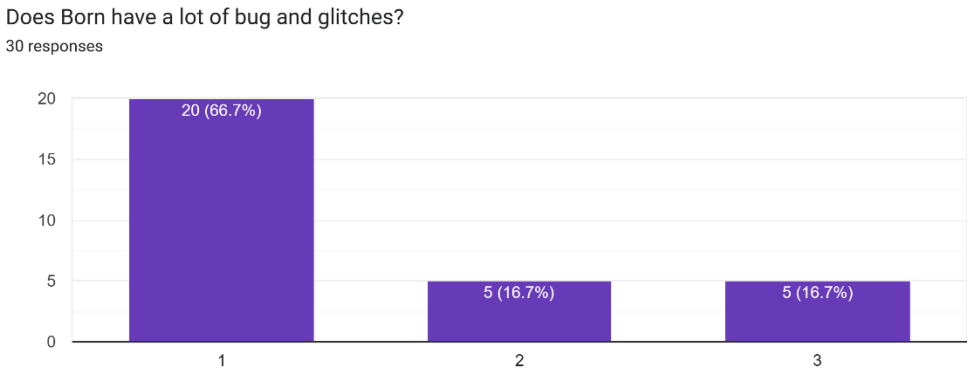


Figure 4.91: Results of "Does Born have a lot of bug and glitches?".

The data shows that a relatively small percentage of respondents (16.7%) agree that Born has a lot of bugs and glitches, a similar percentage (16.7%) have a neutral opinion, and the majority of respondents (66.7%) disagree that Born has a lot of bugs and glitches.

This suggests that the majority of players do not experience a significant amount of bugs or glitches while playing Born. A small percentage of respondents have a neutral opinion, which means they neither agree nor disagree that the game has a lot of bugs and glitches.

7. Do you think Born combines with storytelling is suitable?

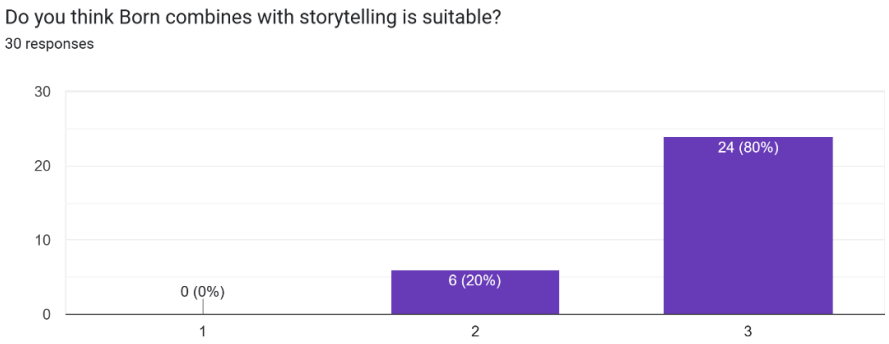


Figure 4.92: Results of "Do you think Born combines with storytelling is suitable?".

The data shows that a large majority of respondents (80%) agree that Born combines with storytelling is suitable and a smaller percentage (20%) have a neutral opinion. This suggests that most players believe that Born's gameplay and storytelling complement each other well and create a cohesive and immersive experience for the players. The majority of players find the combination of gameplay and storytelling in Born to be effective and suitable.

8. Which chapter give you the most memories after playing?

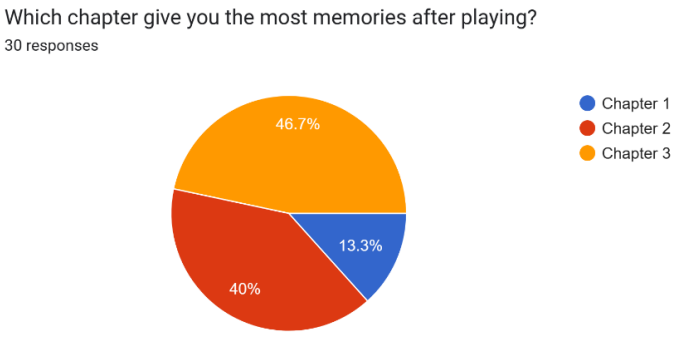


Figure 4.93: Results of "Which chapter give you the most memories after playing?".

The data shows that the majority of respondents (46.7%) found chapter 3 to give them the most memories after playing, followed by chapter 2 (40%), and a smaller percentage of respondents (13.3%) found chapter 1 to give them the most memories after playing. This suggests that the majority of players found chapter 3 to be the most memorable and impactful chapter of the game. This could be due to a variety of reasons such as the plot, the characters, the gameplay, or the atmosphere of the chapter. A good number of players found chapter 2 also memorable and impactful.

9. Which Chapter do you think too difficult to complete?

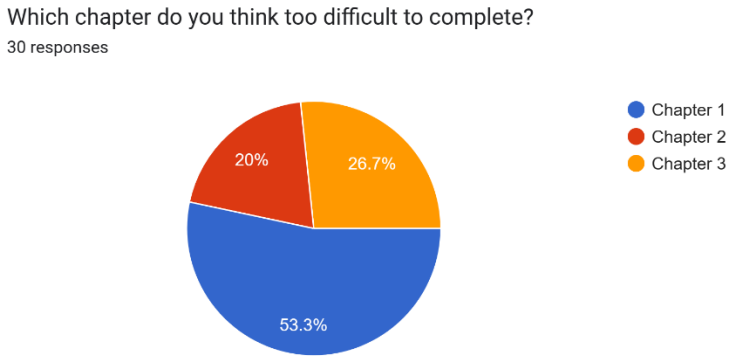


Figure 4.94: Results of "Which Chapter do you think too difficult to complete?".

The data shows that the majority of respondents (53.3%) found chapter 1 to be too difficult to complete, followed by a smaller percentage of respondents (26.7%) found chapter 3 and (20%) found chapter 2 to be too difficult to complete. This suggests that the majority of players found chapter 1 to be the most challenging and difficult chapter of the game. The high percentage of agreement among players indicates that players found it challenging to complete chapter 1 of the game. A smaller portion of players found chapter 3 and 2 to be challenging.

4.3.3 Test Analysis

From the previous chart collected from testers, Born has a positive reception in term of game play and achieving its intended goals. From the question 2 and 3, the majority of testers found the game is fun and easy to understand, as well as suitable for public to play. However, some tester had neutral responses, suggesting that is still room for improvement to make the game more appealing to its target audience. Moreover, question

4 and 5 ask about can Born deliver awareness to audience and difficulty to complete level. The majority of tester have positive results too but there have some neutral and disagree result on question 5. The results show that some testers felt that the game is quick difficult for them. Hence, Born still have to adjust the gameplay difficulty. Then, Question 6 asks about the frequency of the occurrence of bugs and glitches in the game, majority of testers agree that Born doesn't occurs bugs and glitches frequently. There have some testers have neutral and agree statement in this question. The developer is aware of the strange interactions between certain elements, but since it does not cause a significant problem for the system, it has been put aside for now in favor of focusing on more important features. Hence, Question 7 asks about the combination of storytelling with serious issues. Most of the testers have positive results in this question. But have some testers have neutral response to this question. It results that the dialogue system and storytelling skills in this game still need have a room to improve.

Finally, Question 8 and 9 asks tester which chapter is most difficult and most memorable for them. The majority of testers found Chapter 3 to be the most memorable. This chapter highlights a significant change in wildlife habitat due to a palm oil plantation. It has the most wildlife related content and may have contributed to testers having a stronger memory of this chapter. Finally, majority of testers found Chapter 1 to be most difficult chapter to play, but they still do think that it was the most fun chapter they played. This could be attributed to the difficulty level of the challenges in the chapter. Testers may have felt a sense of satisfaction and happiness when they were able to successfully solve the challenging the chapter 3.

4.4 Chapter Summary

In conclusion, this chapter discuss the implementation of Born, testing result of the application and the discussion of the application. The features implemented are also discussed in detail on how they work and are implemented. In summary, the testing results and discussion of Born also have been focused in this chapter which the Functional Acceptance Test in Alpha Test and User Acceptance Test in Beta Test. In the following chapter, the limitations and potential enhancements of the project will be discussed.

CHAPTER 5

CONCLUSION

5.1 Introduction

In summary, this project talks about the goal and development phase of Born, a Serious Education to raise awareness to protect Malaysia Native Wildlife. Born uses an creative and indirect puzzle solving level to let player enjoy the gameplay of serious educational game. Player can learn challenges that wildlife has faced in Malaysia and raise awareness to protect them. Besides this, method of puzzle-solving helps to develop critical thinking skills and piques their interest in learning.

This project is an attempt to raise awareness to protect Malaysia Native Wildlife in public of Malaysia today where these issues have always ignored by the public. Instead of using traditional method to let public read from book or internet, incorporating the educational element into entertainment would be more suitable approach to achieve the goals of project. A serious educational game can be an effective platform for educating public about the backgrounds of Malaysia Native Wildlife, as well as the threats and challenges they face. By raising awareness about the issue of extinction, these games can help the next generation have a better understand the current situation of Malaysia. Three existing serious game were researched and discussed in Chapter 2 to investigate their advantage and disadvantage. From the analysis, we can then propose a solution that incorporate the strengths while addressing and eliminating any identified weakness.

The development of Born involves various aspects such as art design, animation, code implementation, audio recording and audio engineering. All the game assets, including the background music, are completely developed by me and are free of any copyright restrictions. The levels are specially designed to be accessible for public and combining storyline in the game while still providing a challenge for players of all ages. The game

utilizes a realistic art style to let player immersed and leave a strong impression in their mind.

Born is a PC Windows game that can be downloaded from Itch.io and played any time. Born is free to play and has low system requirements, making it easily accessible to the general public.

5.2 Limitation

During the development phase of this game, a minor issue arose with the cutscene of the ending. Due to the project is handled by a single developer, there was a lack of experience and time dedicated to fine-tuning the cutscene in ending, resulting in some animation in cutscene not being as polished as desired. However, this setback did not have a significant impact on the overall development process. The cutscene animation problem have been solved by using animator to clip all animation in ending instead of using cutscene. With the proper guidance or additional time, the animation could be further improved.

Another limitation that was encountered during development was the tight deadline. As game development is a complex process that often requires more time than initially anticipated. The game assets were all hand-drawn by the developer, which added an additional time constraint of over 3 months to complete. Additionally, the background music was commissioned from an audio engineer which also added to the time constraints. Despite these challenges, the game development and testing were completed successfully in the end, although it took longer than expected.

5.3 Future Work

Despite the success of the game's development, there were still several improvement and features that could be added but were not added due to time constraints. The first improvement is to add more levels and chapters. Born only has 3 chapter that containing total of 8 levels. This means that player may finish the game relatively quickly and may not find it as engaging or replayable as it could be. By adding more levels, the game would have more variety and challenge for players, which would increase the replayability and overall enjoyment of the game. By increasing the level, player can get more knowledge in challenges that facing by wildlife in Malaysia. Additionally, adding

more chapters would provide a more comprehensive and well-round story, as well as new environment and characters for player to interact with. This would greatly increase the game’s appeal and overall value for players.

The next improvement that can be added is implement save and load system to save progress of the player. Currently, players are not able to save their progress and must start over from the beginning of the level when they exit the game. This can be frustrating for players, especially if they have made significant progress and don't want to lose it. By adding a save and load system, players would be able to save their progress at any point and pick up where they left off the next time they play. This would greatly enhance the player's experience and make the game more convenient to play. Additionally, the save and load system would allow players to come back to the game after a break and continue from where they left off, this would increase the replayability and overall enjoyment of the game.

Last improvement that could be made to the game is to add more dialogue and cutscenes to the story. Currently, the story may not be as engaging or interesting as it could be, due to a lack of dialogue and cutscenes. By adding more dialogue and cutscenes, the game would be able to provide more depth and context to the story. This would make the game more immersive and engaging for players, as they would have a better understanding of the game's world and characters. Additionally, cutscenes can be used to showcase important plot points and reveal backstory, which can make the game more interesting and compelling. Furthermore, adding more dialogue options in the game can offer more flexibility and choices for the player to make, creating a more personalized experience. This would greatly increase the game's appeal and overall value for players.

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APPENDIX A
BCC 3012 UNDERGRADUATE PROJECT I - A SURVEY FOR SERIOUS GAME IN PROTECTING MALAYSIA NATIVE WILDLIFE (BORN OF LIFE)

Section 1 of 3

BCC 3012 UNDERGRADUATE PROJECT I - A Survey for Serious Game in Protecting Malaysia Native Wildlife (Born of Life)

Good Day!

My Name is Kerk Zhi Yuan (CD19033) from Faculty of Computing (FKOM), Bachelor of Computer Science (Graphics and MultimediaTechnology) from Universiti Malaysia Pahang (UMP). I have conducted a survey about Serious Game in protecting Malaysia Native Wildlife. This survey is for educational use and it will be used for user requirement of this Serious game. The objective of this survey is to:

1: To determine the factor of extinction of Malaysia Native Wildlife
2: To analysis the user requirement to Serious Game

The Survey will be seperate to 2 section which are:
1: Demographic Profile
2: User Requirement

This survey only takes 5-10 minutes to answer. All of the information collected would be confidential and annoumous. Thank you for spending your time to fill this survey.

Section 2 of 3

Section 1: Demographic Profile

Description (optional)

What is your gender? *

- ○ Male
- ○ Female

What is your age? *

- ○ Under 10
- ○ 10-15
- ○ 16-25
- ○ 26-40
- ○ Above 40

What is your current employment status *

- ○ Emploment full-time
- ○ Unemployed
- ○ Student
- ○ Retired

Do you play Game before?

- ○ Yes
- ○ No

What type of game do you play? *

- ☐ RPG
- ☐ FPS
- ☐ Adventure
- ☐ MOBA
- ☐ Puzzle

Do you play Serious Game before? *

- Yes
- No

Do you think Seroius Game can raise awareness for specific issues or problem? *

- Yes
- No

Section 3 of 3

User Requirement

Description (optional)

Do you know Malaysia have Native Wildlife? *

- Yes
- No

Do you know some of them are nearly extinct in Malaysia? *

- Yes
- No

Malaysia Native Wildlife have facing some problem to sustain their life. Which problem is happens frequently to them? *

- [ ] Palm Oil Plantation
- [ ] Deforestation
- [ ] Road Kill
- [ ] Over-hunting
- [ ] Smuggling
- [ ] Other...

Do you have experience in playing serious game and raise awareness in specific issues/problem? *

- ( ) Yes
- ( ) No

In your opinion, do you agree it is important to raise awareness in gamification way? *

	1	2	3	4	5	
Disagree	( )	( )	( )	( )	( )	Agree

Do you agree it is boring when reading article and news? *

	1	2	3	4	5	
Disagree	( )	( )	( )	( )	( )	Agree

Will it be helpful to provide Malaysia Native Wildlife description and information in game? *

	1	2	3	4	5	
Disagree	( )	( )	( )	( )	( )	Agree

Will it be helpful to related the real life issues in game to raise awareness? *

	1	2	3	4	5	
Disagree	○	○	○	○	○	Agree

Will it be good to separate the wildlifes to rescure into 1 wildlife per level? *

	1	2	3	4	5	
Disagree	○	○	○	○	○	Agree

Suggestion:

Long-answer text

APPENDIX B
BORN FEEDBACK FORM

Born Feedback Form

Good day everyone, thank you for playing Born and I hope everyone is enjoying this game. Born is a serious game that was developed for public to raise awareness to protect Malaysia Native Wildlife. Malaysia Native wildlife have faced a lot of challenge to survive in Malaysia. This Survey form will ask opinions on the game level design and the impact of raising awareness among public.

Born Download Link
Born by Kerkzy- (itch.io)

What is your highest education level? *

- ○ Elementary School
- ○ Secondary School
- ○ Tertiary Level (College, University)
- ○ Working

Do you think Born's gameplay is fun and interesting? *

	1	2	3	
Disagree	○	○	○	Agree

Do you think Born is easy to understand? *

	1	2	3	
Disagree	○	○	○	Agree

Do you think Born can deliver awareness to audience? *

	1	2	3	
Disagree	○	○	○	Agree

Do you think Born is too difficult to play? *

	1	2	3	
Disagree	○	○	○	Agree

Does Born have a lot of bug and glitches? *

	1	2	3	
Disagree	○	○	○	Agree

Do you think Born combines with storytelling is suitable? *

	1	2	3	
Disagree	○	○	○	Agree

Which chapter give you the most memories after playing? *

- ○ Chapter 1
- ○ Chapter 2
- ○ Chapter 3

Which chapter do you think too difficult to complete? *

- ○ Chapter 1
- ○ Chapter 2
- ○ Chapter 3