2D Endless Runner Mobile Game

"SNOWFLAKE"

By

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Submitted in Partial Fulfillment of the Requirements for Bachelor in Computer Science

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13 May 2020

DEDICATION

This project cannot be done without all those who supported me behind the scenes

DECLARATION

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Bachelor of Science in *(Computer Science)* is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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ABSTRACT

Because smartphones occupy our lives, people are now using their smartphones to break the waiting time, so the first thing they do is take out the phone and search for the first game in the list of applications, because the best entertainment way to spend this time is playing mobile games, so it is not surprising that games whether they require an internet connection or not, have become one of the most widespread and widely used applications among smartphone users around the world.

This document presents the Life Cycle Process of the SNOWFLAKE game and it shows the game scene and the environment of it, game objects and the materials, etc ...

The game developed from scratch using Unity engine and all 3D objects are carved using Maya.

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CHAPTER ONE

1 INTRODUCTION

1.1 ENDLESS RUNNER GAMES

Endless runner games are games in which the player is continuously moving forward through the game's infinite environment. Game controls are limited to making the character jump, attack, moving or perform special actions.

Examples of endless runner games :

- Subway Surfers
- Crossy Road
- Agent Dash
- Alto’s Adventure
- Bendy in Nightmare Run

1.2 ABOUT SNOWFLAKE

SNOWFLAKE is a type of endless runner games, it is aimed to develop the player's focus skills indirectly by the methodology of moving objects in the game. The game may look easy to play because of the simplicity of the game environment and the shape of the objects, but it is not. The player must be very concentrating while playing to get points because any wrong move causing decreasing player points.

The SNOWFLAKE is similar to reality to make the player interactive in the right way while playing. The SNOWFLAKE was inspired by the winter semester and the snowy nights, while you play the game you must concentrate to be safe and not lose health points, so you have to stay away from crystal boards.

SNOWFLAKE is cross-platform, that means it can be built on the Facebook platform, Android platform, and IOS platform, until now SNOWFLAKE built for the Android platform. The game went through several stages during development starting with basic environment and objects movement till the last version as shown in chapter three section 3.3.

CHAPTER TWO

2 LITERATURE REVIEW

A mobile game is a video game accessed and utilized on a portable digital device such as a smartphone, smartwatch, or tablet. The history of mobile gaming starts with the launch of the game Snake on the Nokia 6610 in 1997. Due to the limitations of the device at that time, mobile games had low-quality graphics and bad controls. Mobile games were not an essential feature for people when considering mobile technologies. [21] However, Snake changed the way people see phones: it became a potential gaming device. Mobile games were not necessarily attractive until 2007 when the iPhone launched and defined the smartphone. The iPhone has a high resolution and sensitive touchable screen, which are optimized for running complex video games. For example, Angry Birds, released in 2009, has beautiful cartoon graphics, and the game mechanics contained physical calculations. The gameplay also takes advantage of the touch screen. As of 2010, this game had sold 12 million copies via Apple's App Store. [21] People realized mobile games could be fun to play. Nowadays both the iPhone and Android have become successful gaming platforms because they are open and adaptive for every kind of game genre.

The endless runner is a game genre of mobile games in which the player controls a character to move forward through random obstacles generated by the platform until the character dies by colliding with those obstacles. In fact, the concept was developed from a Xbox 360 and PS3 game Mirror's Edge, developed by EA in 2008. It is a first-person parkour style game allowing players control a character to run and jump over buildings. However, the first endless runner mobile game released on App Store, Monster Dash, developed by Halfbrick, was not released until 2010. Monster Dash is a 2D pixel art style endless runner game. Because of the quality of gameplay, this game did not sell well compared to Fruit Ninja. However, it did demonstrate the potential of endless runner games. Eventually, endless runner games became one of the most popular genres of mobile games as a result of the 2011

release of Temple Run, developed by Imangi Studios. It has high-quality 3D graphics; the gameplay allows players to control the characters as they escape from evil monkeys by swiping fingers on the touch screen.

As of 2014, it successfully hit 1 billion downloads on smartphones. Temple Run pushed the endless runner game genre to a new high level. After that, other popular endless runner games such as Kiloo's Subway Surfer and Gameloft's Minion Rush emerged in the market (see Figure 2.1).

Figure 2.1 The Examples of Well Known Endless Runner Games

Mobile gaming has become a popular form of gaming for video game players. Therefore, from a game designer's perspective, investing in the study of the relationship between mobile games and their players to improve the games is well worth the effort. In considering the gaming industry, an increasing number of research studies focusing on personalities in the field of PC and console gaming have emerged in recent years. People believe researching personality is a good way to analyze player behaviors and help game designers create better gaming environments and experiences. Therefore, a proper personality theory is needed to develop the research into the applications of that theory as it relates to endless runner games.

The Bartle taxonomy of player types is the first one to consider. It is a well-known method to classify video game players in massive multiplayer online role playing games (MMORPGs). It was developed by Richard Bartle in 1996. Based on his player theory,

multiplayer online game players can be categorized via one of the four following traits: killers, achievers, socializers, and explorers. They are measured by a quadrant model with X and Y axis. The X axis represents the player's likelihood to interact with other players or explore the environment; the Y axis represents the player's preference for interaction with someone or to act alone. [1] In the multiplayer online game context, achiever-type players are described as the players who always seek points, levels, achievements, equipment, or other measurements of rewards. When this type of people plays a game, they prefer to reveal, unlock, or obtain as much content as possible. Explorer-type players want to discover everything in the game, exploring unknown areas, completing maps, and finding hidden Easter eggs (which is special hidden content) in games. They feel more comfortable playing sandbox games. Socializer-type players primarily care about other players. They prefer to interact with people in the online game environment and do not focus on completing tasks or gaining achievements in games. Socializers enjoy filling their friends list by meeting random people. Killer-type players act aggressively and thrive to defeat other players. Their primary goal in the game is to win every battle against other competitors. [1]

The Bartle taxonomy of player types was introduced in Designing Virtual Worlds by Bartle in 2003; this work served as a fundamental to guide MMORPG designers to construct interactivity in games. He added four more combo types and expanded the original four-type model into an eight-type model to more precisely describe more complex player styles.

The test to classify a player's type is called the Bartle Test of Gamer Psychology and is based on the work of Bartle, though it was designed by Erwin Andreasen and Brandon Downey. It is question-based test featuring 30 multiple-choice questions. Players who take the test are characterized as a particular type based on their behaviors in the virtual environment. According to Bartle himself, the test "offers potentially very useful information for designers".

However, Andrzej Marczewski disagreed with the Bartle taxonomy of player type. He thinks the terms Bartle used are not accurate to explain the traits of players because many players share similar behaviors in MMORPGs. Also, Marczewski argued that Bartle's personality types are superficial: the actual difference between players is their degree of willingness to

play the game. [19] He suggested game designers step back and think about the player's motivations and created a five-type model: player, 14 14 socializer, free spirit, achiever, and philanthropist. In this model, socializer and achiever are exactly the same as Bartle's types of those names.

Player-type players are people who are literally willing to play the game. They simply enjoy the game itself and like to consume any content include collecting, leveling up, and battling. Playing the game makes them happy. Marczewski notes that the three remaining types are defined as not willing to play the game; they prefer something above the game itself. Free spirit-type players are unrestricted players. They do whatever they want to make their own journey and wish to avoid being judged. They are somewhat alone and autonomic in games. Philanthropist-type players are selfless people who would like to help other players. Offering helps enrich their enjoyment.[19] Unlike Bartle's taxonomy of player types, the Marczewski player type model focuses on the willingness of players.

Both the Bartle taxonomy and Marczewski's adjustments to that taxonomy were observed and developed from an MMORPG environment where characters are allowed to walk around and do anything freely. Those theories are designed to study players in MMORPGs as well. It would be difficult to apply these approaches to endless runner games because players are not able to freely explore the world or communicate with people; they are only allowed to compete. Whether one uses Bartle's or Marczewski's personality types, the fact remains that these types do not apply effectively to endless runner games. Therefore, it is necessary to look to the field of psychology.

In psychology the most common personality model is known as the Big Five personality traits, or the Five Factor Model. The traits are extraversion, agreeableness, conscientiousness, neuroticism, and openness. The Big Five Model is considered to be the most comprehensive accepted personality model in academic psychology. This theory begins with the work of D.W. Fiske in 1949 and developed by other psychologists over the past 50 years. [6]

In the Big Five Model, extraversion is defined as people being outgoing and socially active. Individuals with high extraversion want to gain new experiences through social situation; they gain excitement and stimulation through social interaction. In contrast people with low

extroversion, otherwise known as introversion, tend to behave defensively and do not actively seek interaction in public social situations. Agreeableness is a dimension composed of trust, kindness, and empathy. People with high agreeableness usually like to listen to other people, and they act cooperatively with other people. Individuals with low agreeableness show more competitiveness and tend to disagree with others. Conscientiousness is the ability of an individual with regard to thinking and self-organizing. High conscientiousness means people are able to develop and follow a plan to achieve their goals. Neuroticism is the instability of emotional expression. Individuals with high levels of neuroticism have unstable emotional statuses including anxiety, sadness, and anger. Those with low neuroticism tend to be calm and have significant inner peaceful. Openness is a trait that features imagination, creativity, and a broad range of interests. People with high openness are very creative and adventurous; they like to learn and accept new things. People with little openness are somewhat inflexible. [5]

There are various methods to test where people fall within the Big Five personality traits. Depending on their needs and purposes, an organization certified in the Big Five can provide different versions of tests to adapt to different situations. The original standard test is called the Neo Personality Inventory (the IPIP-NEO) which has 300 five-point Likert Scale questions designed by Paul Costa and Robert McCrae in 1978. [17] It can provide accurate and detailed feedback. The feedback contains the evaluation of the respondent's primary Big Five personality trait and 30 sub-traits. However, due to the complexity of the original standard test, Costa and McCrae developed a shorter version, the Revised Neo Personality Inventory (the NEO PI-R), which has 120 questions. It also measures the respondent's Big Five personality trait and 30 sub-traits of personality.[2] Generally speaking, these two tests are for all-purpose uses. Besides those, there is another version of the Big Five personality test offered by Penn State University which has been adapted for college students. The test has been revised to only 46 five-point Likert Scale questions to assess a student's personality. In this version, the results show the evaluation of 16 16 the respondent's Big Five personality traits in percentiles only. [8] For example, people with high percentile on extroversion means they exhibit high extroversion.

The Big Five personality traits have been used in many fields. However, this model is complex. Not only is it time-consuming for the respondent to complete the assessment, the calculation of the results and the subsequent evaluation to determine the Big Five traits as well as the 30 sub-traits is likewise time consuming, making the post-analysis quite difficult. For the purposes of the current study, a simpler, more practical theory that provides feedback via a quick visual comparison between different personality types is preferred.

To that end, the Type A and Type B Personality Theory, or the Type A/B personality, developed by Meyer Friedman and Mike Jordan in the 1950s, was selected to conduct the research. The theory defines the Type A personality as having free-floating hostility, competitiveness, time urgency, impatience, and mentally-driven achievement. In contrast type B individuals are easy-going, relaxed, socially-oriented, and often lack the overriding sense of urgency and impatience. [12]

The Type A/B personality model was previously limited to medical cardiology experimentation. Originally, cardiologist Meyer Friedman spent eight years observing a group of healthy men between the ages of 35 to 59. He found that some subjects with similar personality traits such as aggression and competitiveness had the double risk of coronary heart disease (CHD) in comparison to other participants. He labeled this kind of person type A and the rest type B in his book Type A Behavior and Your Heart, published in 1974. [15] Afterward, psychologist Carl Thoresen confirmed that the Type A/B personality model was applicable to all ages of people by investigating 1,013 heart attack survivors in the 1970s. The theory has been advanced further over recent years. In 2014, R.K.N.D. Darshani further observed the behavior of type A individuals but for a non-medical purpose. His research examined this theory in work and family environments and discovered that type A personality traits would also take control of both work and family roles. The approaches of type A individuals tend to be aggressive when dealing with 17 17 day-to-day life scenarios. They are likely to take the leading position in their work and family lives in comparison to the type B individuals. [16] This study suggests the possibility of using the Type A/B personality model in other fields including gaming.

However, Johan Denollet debated the theory. He suggested that the Type A/B personality should add a third type called Type D personality. People with Type D personality seem to have more distress across their life experiences. Based on clinical observations of cardiac patients, Denollet found that 18% to 53% of them had distressed personality traits. He argued that these non-Type A personality traits can cause Type A traits eventually, resulting in increased risk of CHD. For example, negative affectivity traits such as worry and gloom can cause irritability and aggressiveness. Obviously, worry and gloom are not symptoms of Type A, so Denollet labeled the personality with worry and gloom Type D. [14]

Nonetheless, the Type D personality is still under debate. This theory has not proven its applicability in other fields beyond medicine. Monica Hill also confirmed: "The Type A/B personality is much more well known and much more developed than type D personality. Researchers would like to use something that has been already accepted in the field and stands away from something still questionable." [11]

It is undeniable that the Type A/B personality is widely applied in studies of such areas as work, family, and school. It is an efficient and effective choice to test personality types: "This theory is less complicated to determine personalities than other theories. It can separate people quickly into two polar groups of personality." [11] It saves time and effort on the part of the researcher. With both Type A and B personality traits clearly outlined, this theory proves its usefulness in the evaluation of personality types. Therefore, the Type A/B personality is the most appropriate and efficient method to utilize in the current research.

CHAPTER THREE

3 METHODOLOGY

3.1 SDLC PROCESS

SDLC is the process of developing software to meet a need or solve a problem and like any software SNOWFLAKE has gone through all the stages of the SDLC shown below.

Figure 3.1 The SDLC (Software Development Life Cycle) Process

3.1.1 INITIAL PHASE

In this phase, I wrote the outline of the software by write down these questions

- Which age stage will play the game?

  The game is for all age stages, so that is a big challenge to make the game suitable for all.

- What is the aim of the game?

  Entertainment is the main goal, but this game also aims to develop the player's focus skills indirectly.

- What is the type of the game?

  2D Endless runner game.

- How does the player move?

  The player drags his finger on the phone screen, so the player object in the game moving by following the finger moves on the x and y-axis.

- How do the player get points?

  Collecting things to get points and to raise the score, the score increases by one point when the player destroys other snowFlakes.

- How do the player lose points?

  The losing method is so simple, we need a health bar and connecting it with an object that when it is destroyed the health bar points decreasing. So when the players colliding with crystal boards they destroy it and decreasing health bar points by 10.

- How the health bar points can increase?

  Adding one more object called thunder to destroy it and to get 10 points in the health bar, this feature could make the game more exciting.

- What is the design of the game?

  The theme of the game is winter semester, so the player is a snowflake and the background is snow mountains.

- How the player get motivated?

  Motivation words that appear when the player gets 10 points by collecting snowFlakes, like Wow!, keep going, etc..

- When the player losing?

  There are conditions causing lousing(Game over panel),

  First is decreasing health bar points until it becomes zero when the SnowFlake colliding with the crystal board.

  Second is to get out the player of the screen border at x, -x_axis and –y_axis.

- What type of music and sounds should suit the game?

  The music background I chose for the game is giving the effect of the fast-moving object in the game.

  The game dependent on colliding, so I add different sounds for each colliding, when the player colliding with other snowflakes the sound effect is smash glass, when it colliding with the crystal boards the sound effect is an explosion and when it colliding with the thunder the sound effect points up.

- What is the scenario of the game?

  The events of the game revolve around reaching points when the player hits snowflakes, and he may lose if his total health points reach zero when he collides with the crystal boards, but there is an opportunity to increase his health points by taking the thunder, so the player must avoid the crystal boards as much as possible.

  To control the player just move your finger on the screen. Figure 3.2 shows the sketch of the game to understand how the game will be.

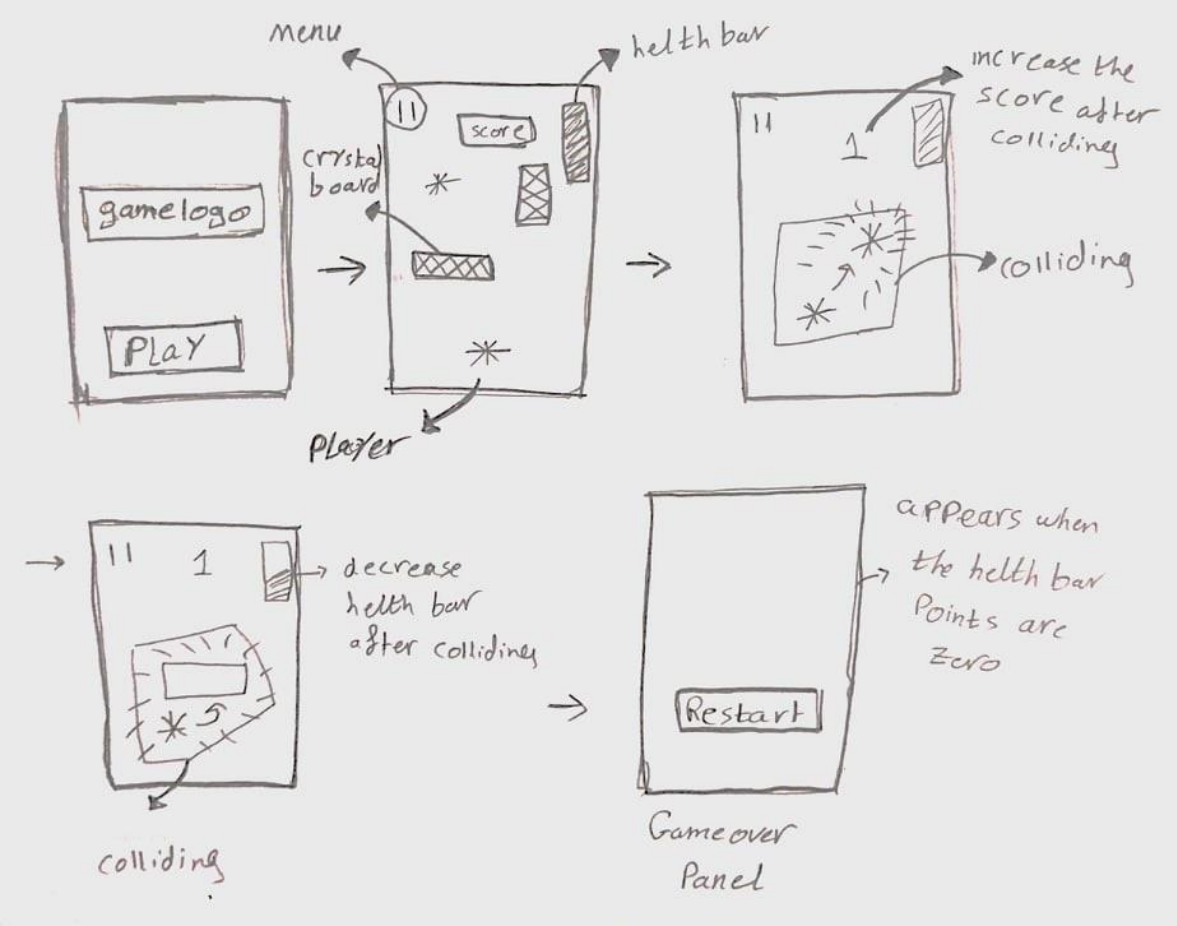


Figure 3.2 Sketch of the game

3.1.2 DESIGN PHASE

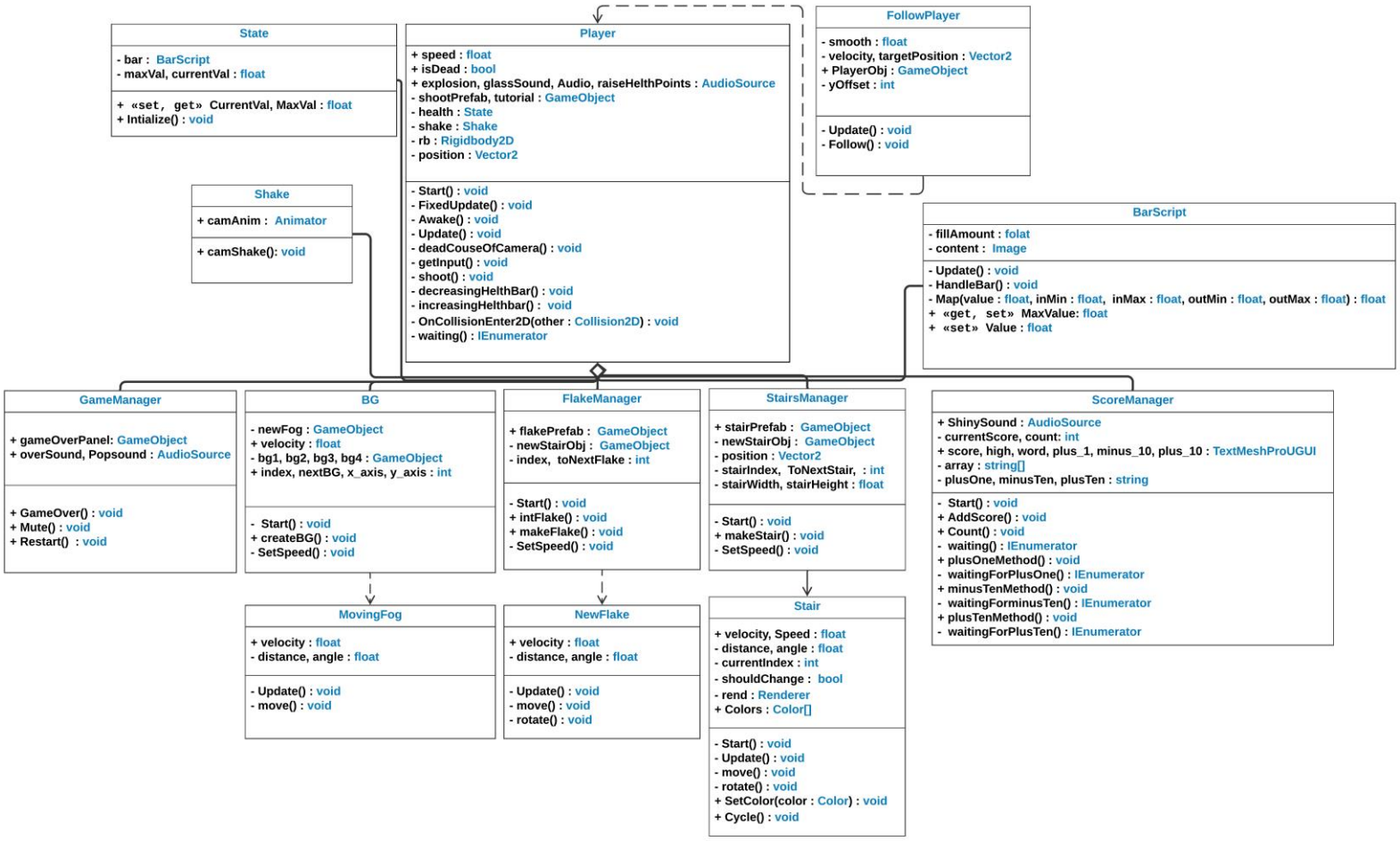


Figure 3.3 UML Class

3.1.3 IMPLEMENTATION PHASE

- **Coding**

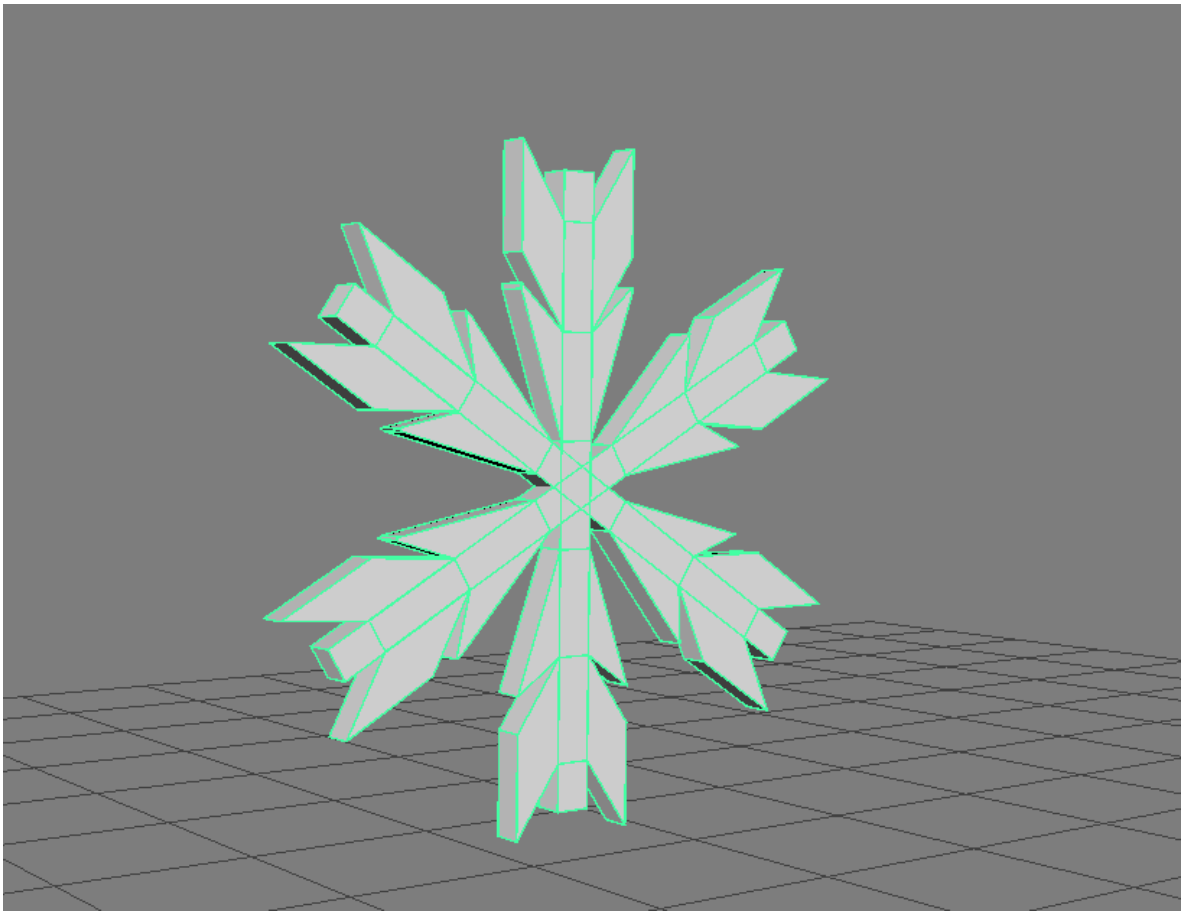
Nowadays, there are many game engines that allow people to create their own games in an easier and more convenient way, and Unity is one of the most suitable game engines for the beginner. Unity3D used to develop video games for multiple platforms, such as Web, PC, MAC, IOS and ANDROID, etc. On the other hand, Unity3D supports a variety of programming languages, which enables the programmers to program with their familiar language.

C# is an accurate, simple and object-oriented programming language derived from C and C++. Also, C# inherits the powerful features of C and C++. At the same time, C# gets rid of some complex characteristics from C and C++. On the other hand, C# does not apply to write very high-performance code, and lack of key features that high-performance applications required, so C# is the programming language that I am using to develop the SNOWFLAKE game.

- **Design**

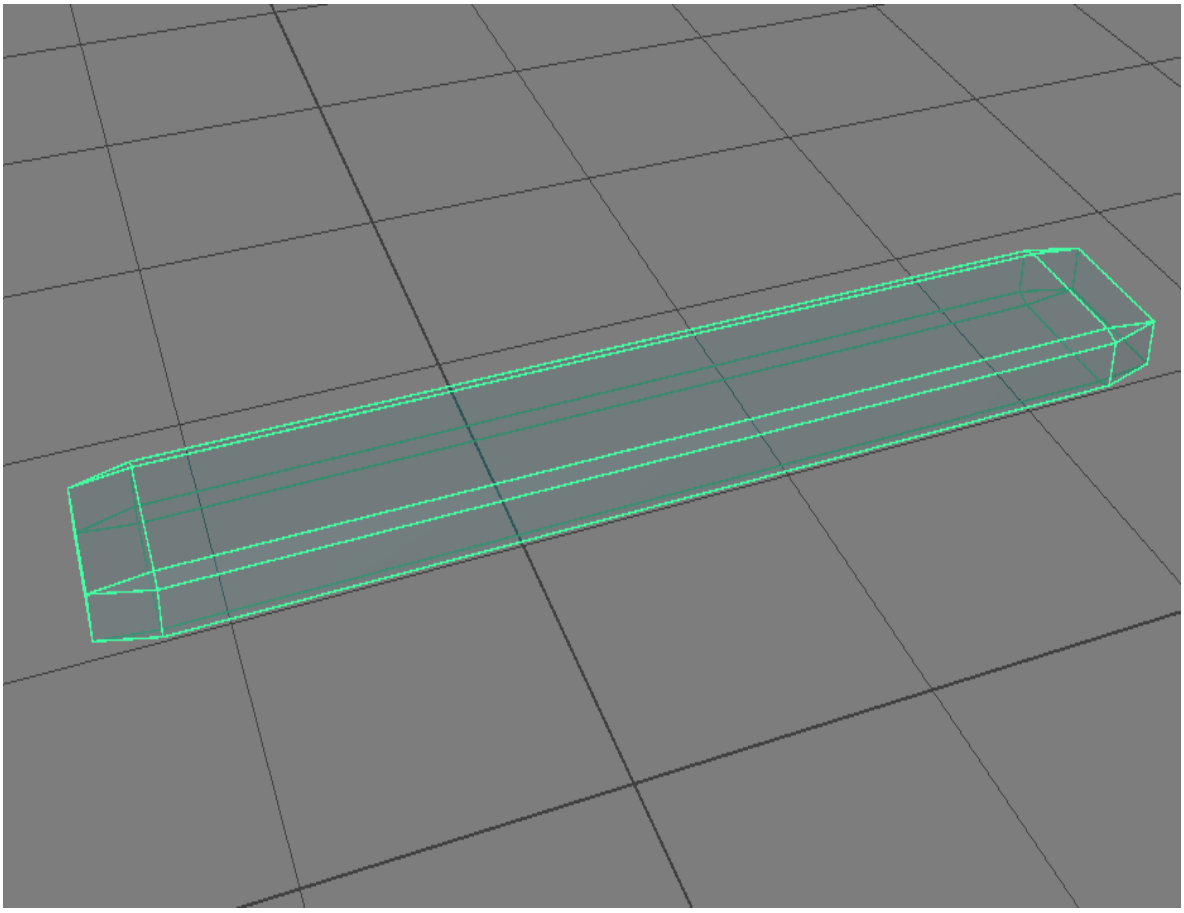
  - Game objects

    I used Maya to design the snowflake and the crystal board, the reason why I am using 3D shapes in a 2D game is I did not find shapes like what in my mind, so I decided to creat it by my self. Figure 3.4 shows the game objects in Maya environment.



(a)

Figure 3.4 3D Game objects : (a) snowflake, (b) board



(b)

Figure 3.4 (Continued)

- Game scene

Before starting creating the game, I need to first set up an environment to make the game work properly. In the Unity3D engine, the scenes are responsible for providing such an environment. Scenes contain all the objects of the game. They also allow creating other parts of the game, such as the main menu, the different game levels and other details. In addition, scenes can be used as an independent game level, so we can create different game levels by switching the scenes. SNOWFLAKE contains two scenes one is for the start panel and the other is for the main scene. Until now SNOWFLAKE has one level.

To design the background of the main scene I use separate pictures and combine theme in Unity and to add life to it I add fog and write a code to make it move. Figure 3.5 shows the game background from Unity environment. Figure 3.6 shows the pictures and the finel background after combine them.

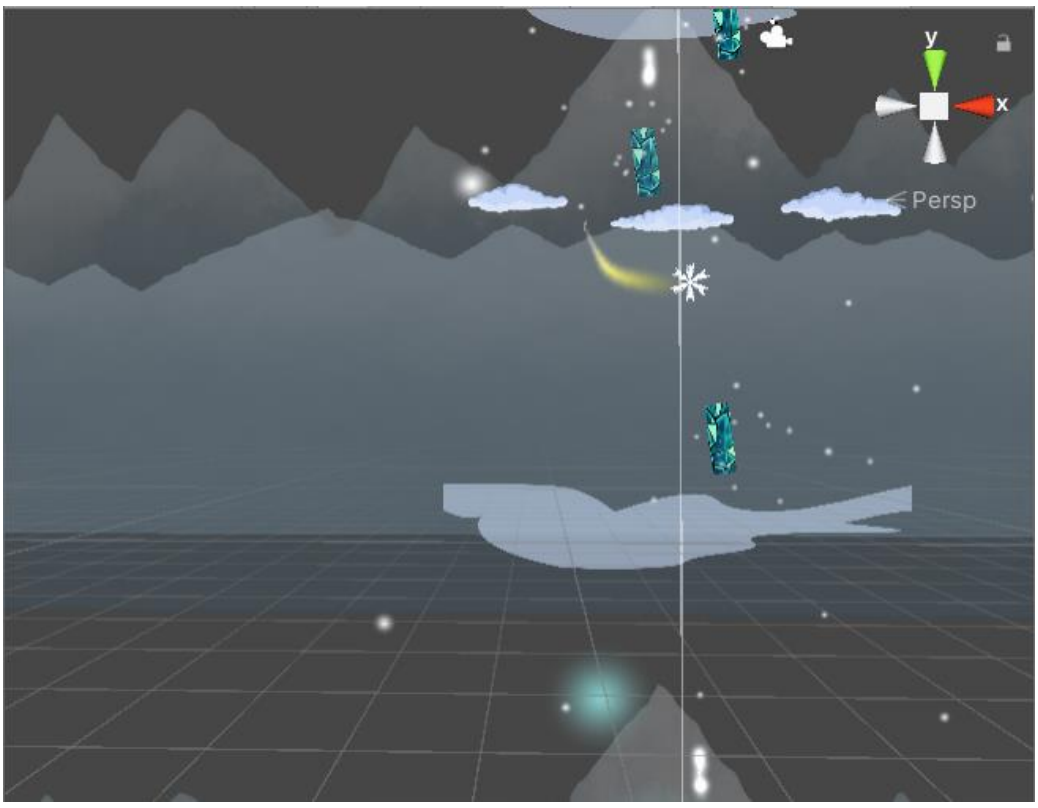
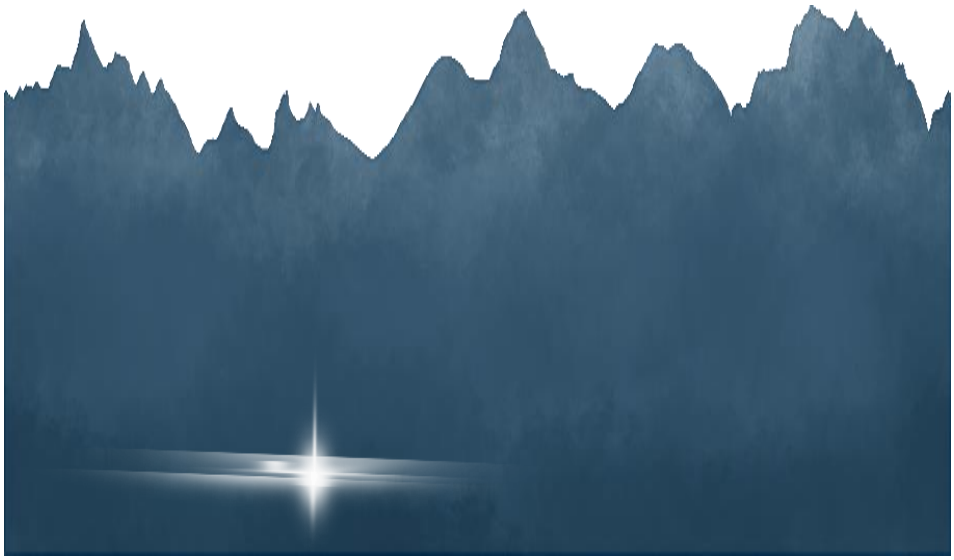


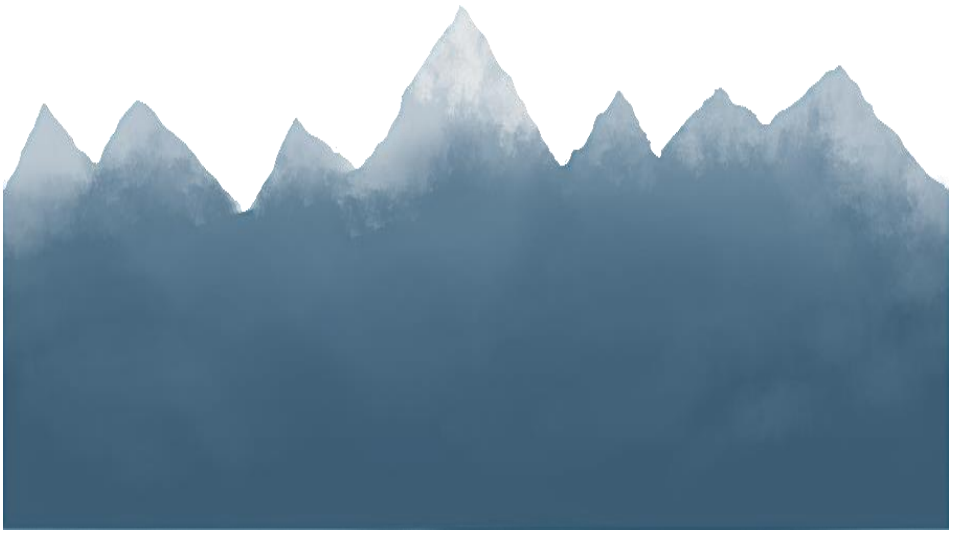
Figure 3.5 Game background from Unity environment

(a)



(b)

Figure 3.6 Game background



(c)

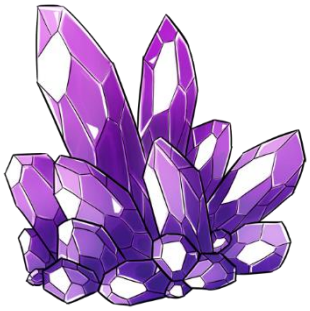
(d)

Figure 3.6 (Continued)

- Materials

When i put the objects into the game, i need to add materials in order to make these objects looks more realistic the materials I used in the game is colored crystal and ice cube. Table 3-1 shows the materials I used in the game. Figure 3.7, Figure 3.8 and Figure 3.9 shows how materials are used on the game objects.

Table 3-1 Materials used in the game

		
A	**B**	**C**

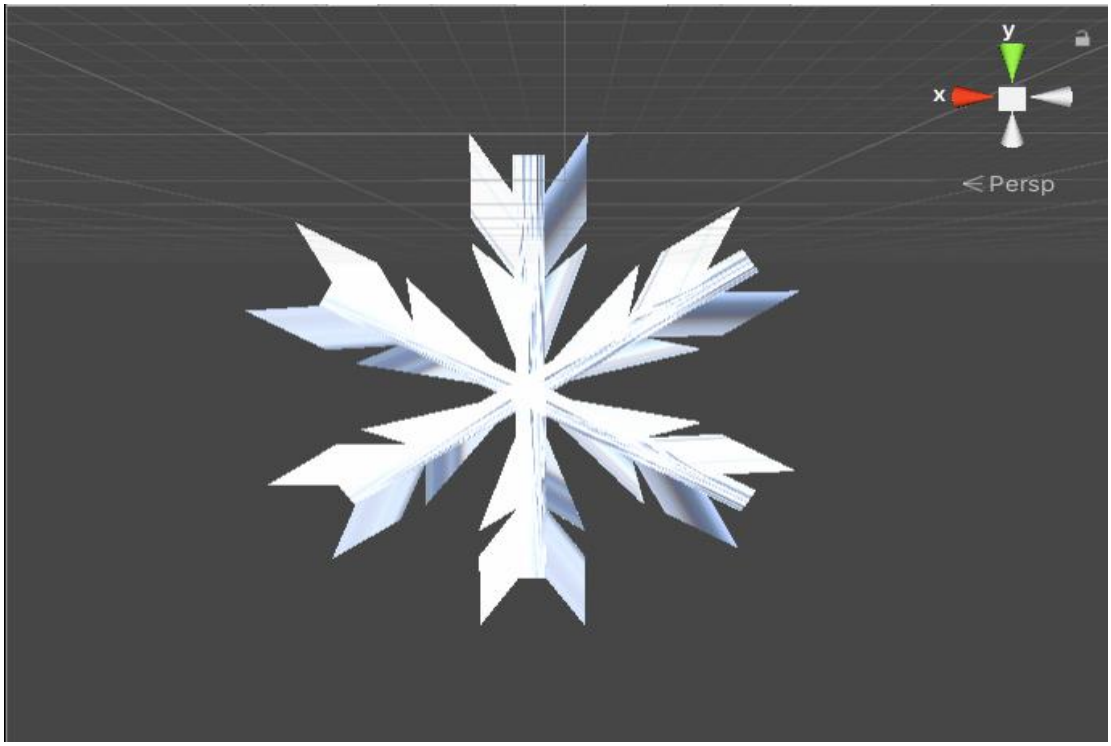


Figure 3.7 Material A used on the player

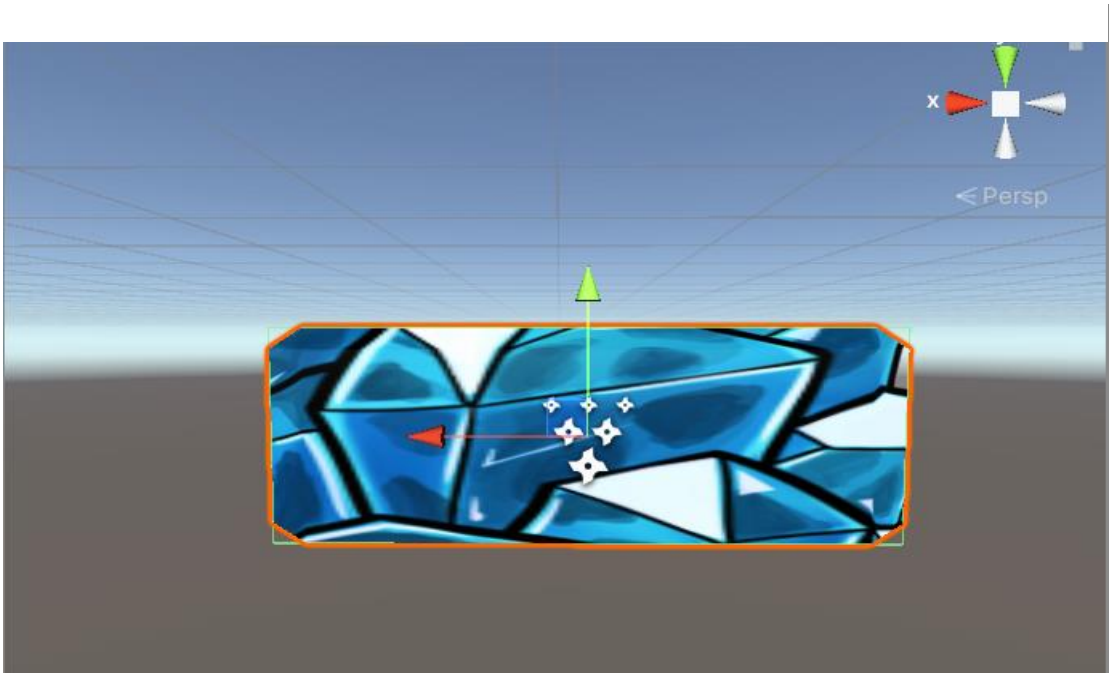


Figure 3.8 Material B used on the boards

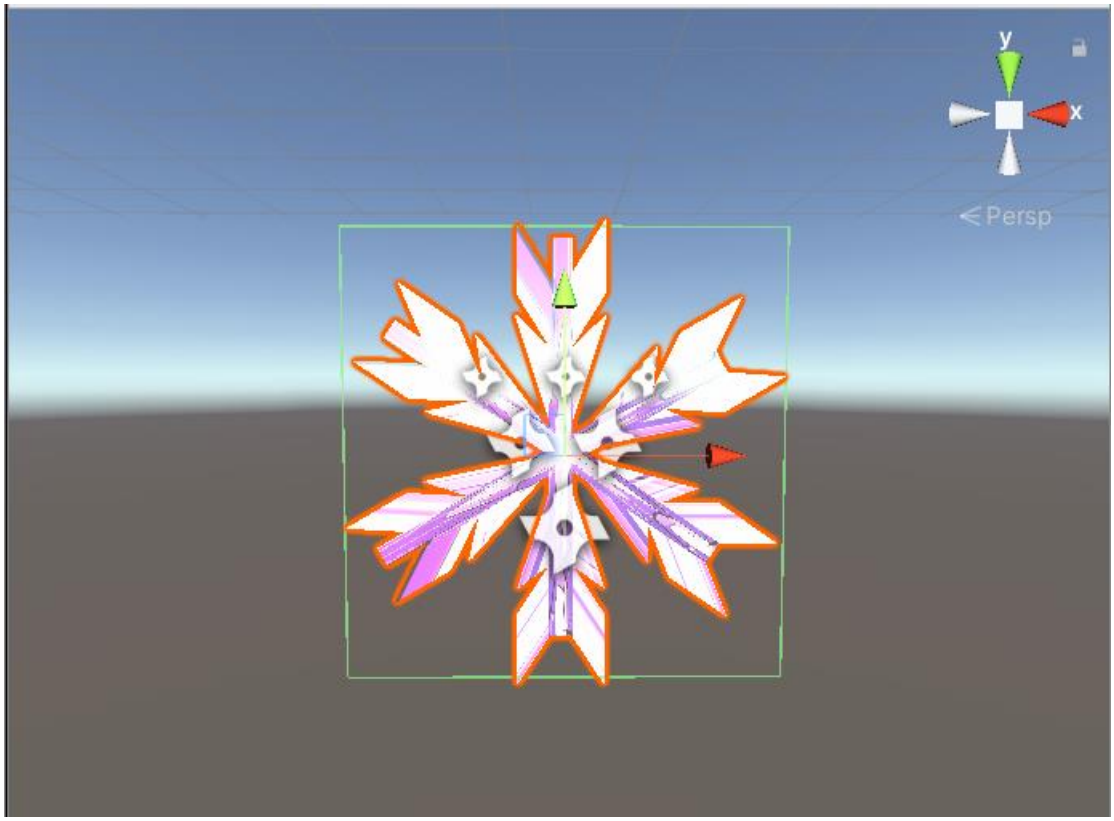


Figure 3.9 Material C used on the snowflakes

➢ In-Game user interface

When we play a game, game UI is related to all the interactions we made during the game. Also, game UI refers to the interaction between player and smart phone, the operating logic and the overall beautiful design of game interface. In addition, a good UI design is not only make the product fits personal preferences, but also make the production became more comfortable, simple, free and fully reflect the characteristics of the game. Normally, a game UI includes the game menu, keyboard control, mouse control, in-game icons and all the elements players could be interacted in the game. As Table 3-2 shows.

Table 3-2 Examples of game UI

				
A	**B**	**C**	**D**	**E**
Exit button	Resume button	Play button	Restart button	Mute button
				
E	**F**	**G**	**H**	**I**
Unmute button	Loading bar	Tutorial	Pause button	Health bar

3.1.4 TESTING PHASE

The testing method I used is an interview with players and let them play the game 10 minutes then ask theme questions, the testing divided by the age stages of the players. As Table 3-3 shows.

Table 3-3 Age stages of players

Group	Age Stages	Interests
A	5 - 14	This group focus on entertainment only, they are playing without understanding the rules so the fun is the only goal. They do not need any tutorial to show them how to play because the first thing they do when the game start is swiping on the screen and colliding objects in the game.
B	15 - 24	This group focus on winning and achievements, they are playing with a passion and challenge. So this age stage is targeted to increase their skills to focus indirectly while playing.
C	25 - and more	This group focus on go high as possible and get points as they can. However this age stage is quiet than other stages so they can focus while playing than the other.

So I asked them questions by the group.

- Group A

  - What is the most thing they like in the game?

    The answer was the music and the other sounds, like smashing and colliding things it makes them more interactive with the game. They are focuses on the game environment and the object shapes and colors.

  - What is the most thing they do not like in the game?

    The answer was the crystal board they said that we wish if there are no crystal bords to continue playing without losing. However, this shows that they do not like to lose so the big challenge for them was the crystal boards, this may be evidence of the game's success.

  - what is the thing that can keep the passion on while playing?

    The passion is naturally included at this age stage, so the entire game makes the passion on while playing.

- Group B

  - What is the most thing they like in the game?

    The answer was the shapes and the way of moving objects. They minshined the background and the colored crystal boards and the effects of colliding.

  - What is the most thing they do not like in the game?

    They said that the distance between the crystal boards is too small and this makes them confused.

  - what is the thing that can keep the passion on while playing?

    The answer was the motivation and the way of getting score points and losing health point it makes them concentrating.

- Group C
  - What is the most thing they like in the game?

    The did not mention a specific thing they said that the game is good enough to play and having fun.

  - What is the most thing they do not like in the game?

    There is nothing they do not like but they wish if there is more things make the game harder than what is now.

  - what is the thing that can keep the passion on while playing?

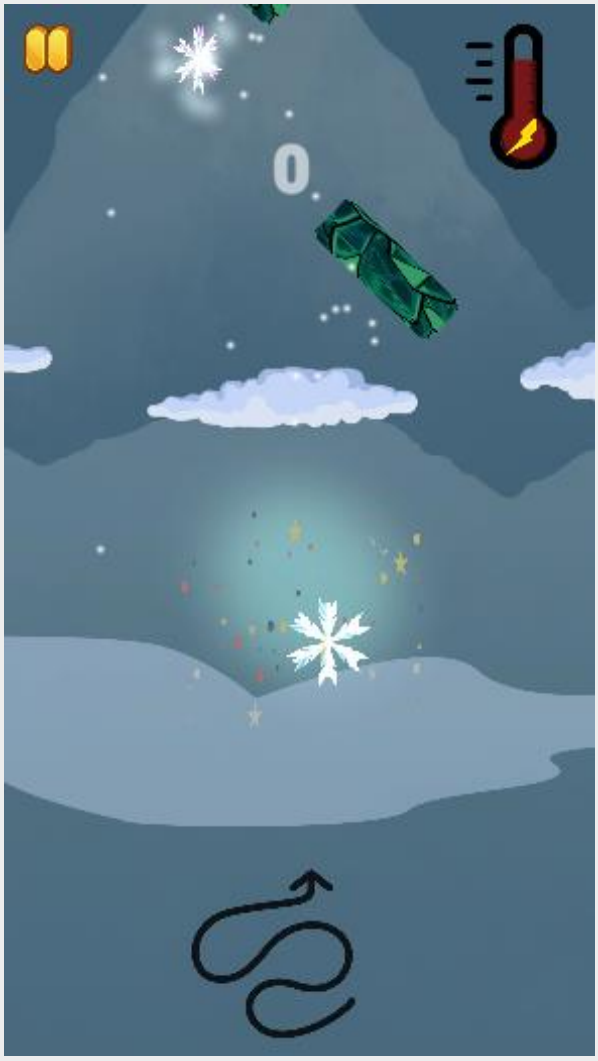
    The answer is like group B.

3.2 GAME SCREENSHOTS

Table 3-4 Game screenshots

SCREENSHOT	DESCRIPTION
	This screen shows the game logo and the play button.

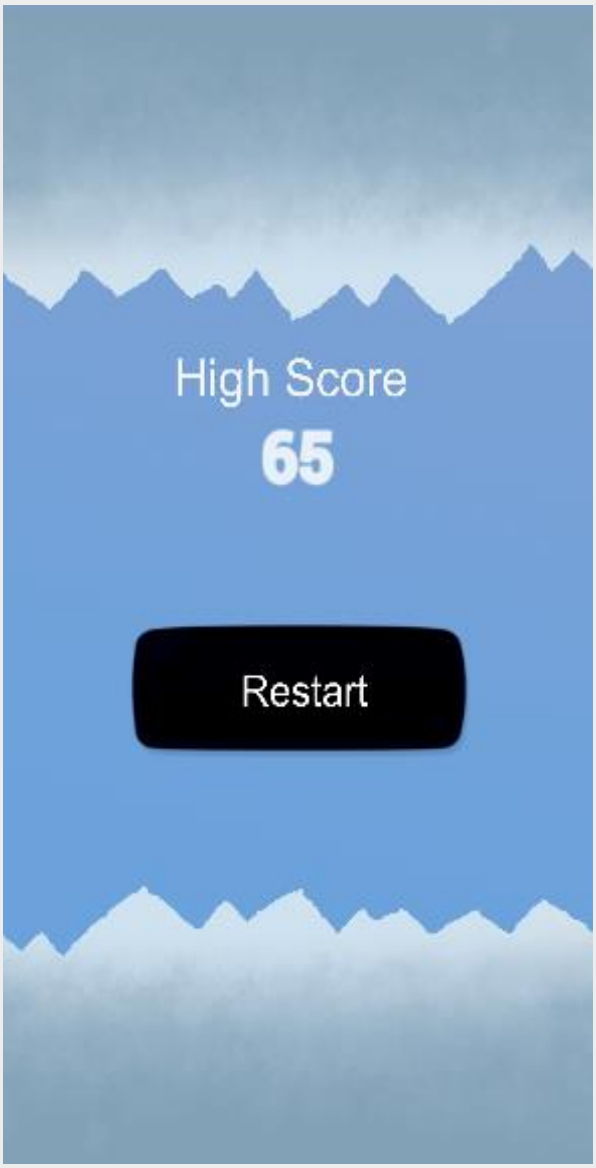
	This screen shows the loading bar, we use the loading bar in the games to break the waiting time between loading the scenes, the loading bar time depends on the wight of the seen that will be load. So if the scene is heavy it means more waiting time.

	This screen shows the menu button, health bar, tutorial and the score counter.

	This screen shows that when the player gets 10 points by colliding with other snowflakes the motivation words appear. The score counter increasing by one every time the snowflake colliding with other snowflakes.

	This screen shows that when the player colliding with crystal board, the health bar decreasing by 10 points.

	This screen shows when the player colliding with the thunder, the health bar increasing by 10 points.



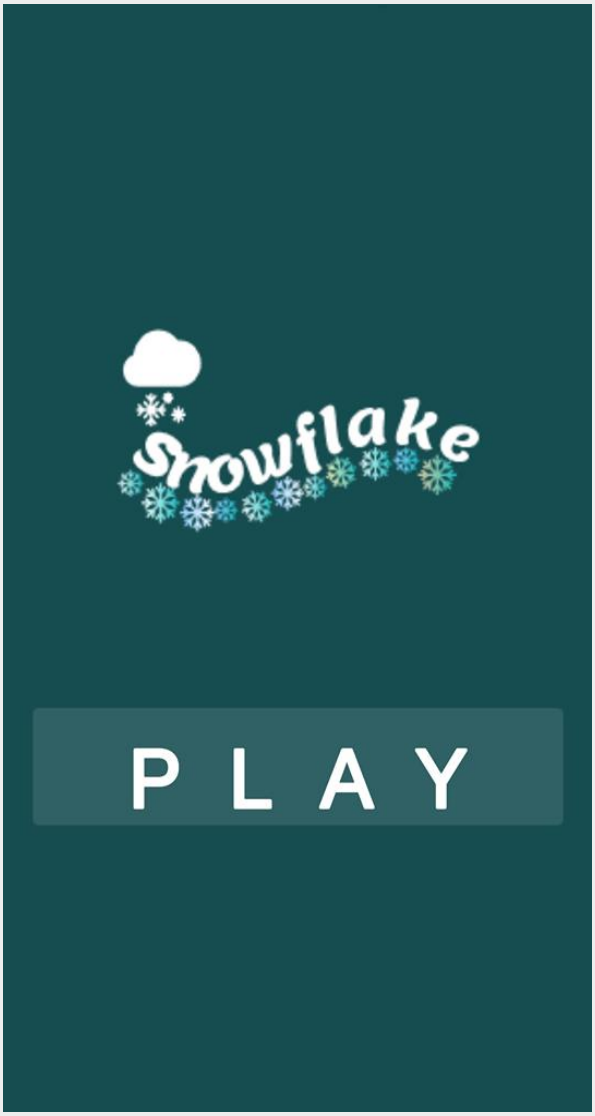
This screen shows the game over panel and it contains the restart button and the high score counter.

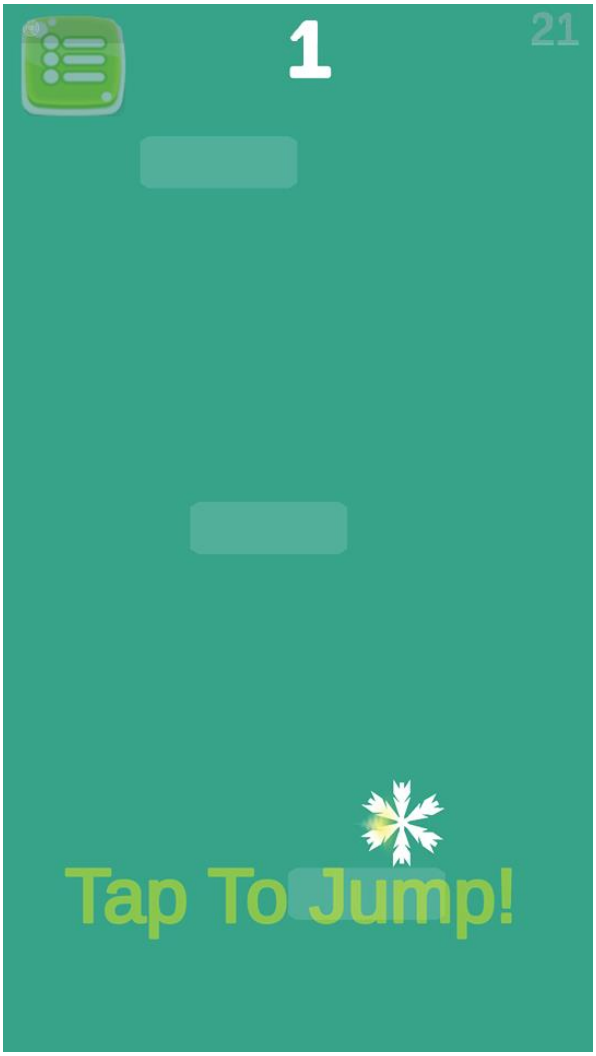
The difference between a score and high score is that the score starts counting from 0 between playing sessions, but the high score saves the last score the player gets and keep it even if he plays in multiple sessions, the score must be bigger than the last score to save it in high score.

	This screen shows that the menu panel and it contains three button, First is the mute button. Second is the resume button. Third is the exit button.

3.3 COMPARING BETWEEN THE FIRST AND LAST VERSION OF SNOWFLAKE

Table 3-5 Screenshots of the first version of SNOWFLAKE

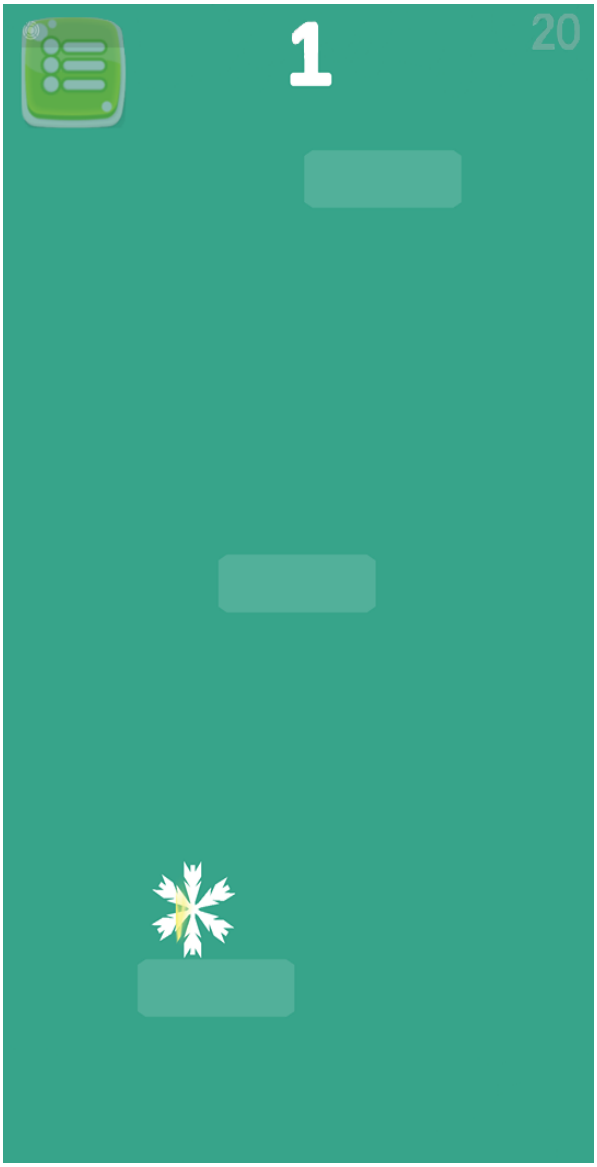
SCREENSHOT	DESCRIPTION
	This screen shows the game logo and the play button as you see this screen is very simple, the background is a solid color and the button has a simple shape with a transparent background.

	This screen shows the menu button, score counter, high score counter and the tutorial. The first version did not contain a health bar. The game was very different, so the methodology of playing was to jumping on the boards, the player taps at the screen to make the snowflake jump and another tap to make it land at the boards. When the snowflake landing at these boards the score increases by one point.

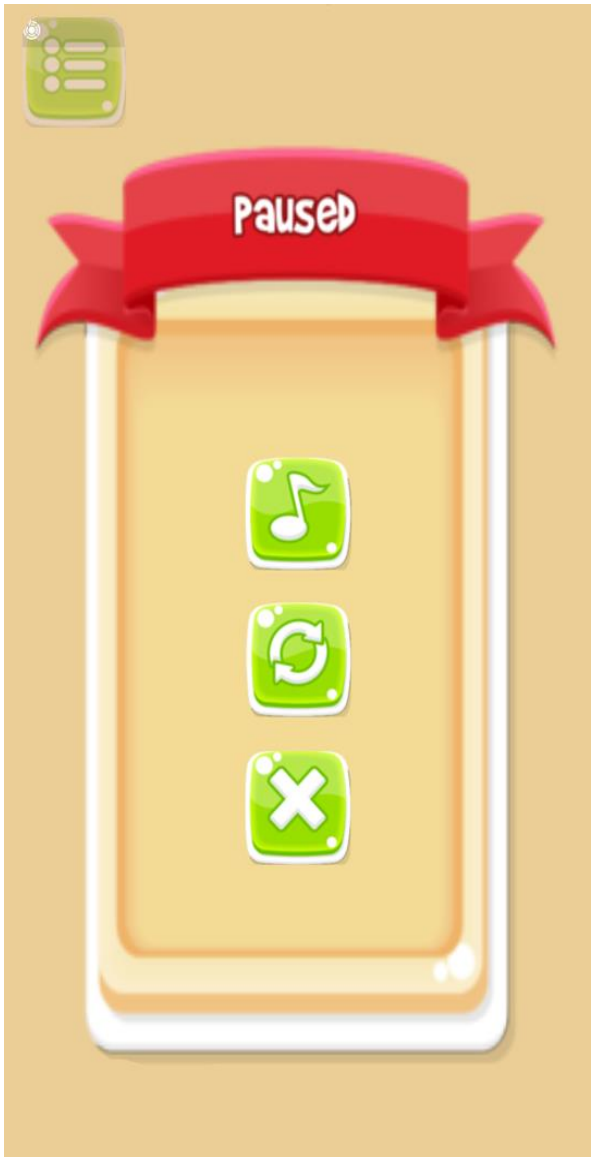
This screen shows that when the player gets 15 points by landing

on the boards, the motivation words appear.

This feature is the same on the last version but the difference is the number of points.

	This screen shows the movement of the boards, it was at x-axis only, not like the last version it is moving at x-axis and rotating at z-axis and the boards did not contain any materials.

	This screen shows the game over panel and it contains the restart button. The game over in the first version was contacted with the player position, so if the player falling he will lose directly, there was no chances or health bar like the last version.



This screen shows that the menu panel and it contains three button,

First is the mute button.

Second is the resume button.

Third is the exit button.

CHAPTER FOUR

4 CONCLUSION

The aim of this graduation project was to design an interactive game that helps people to spend their time in an entertaining way and keep them concentrate.

As shown in this document I mentioned just the only done scene in the game, the scene tested by players in different age stages, and the result was good enough, I took their opinions to improve this scene and create more creative scenes.

By using the snowflake shape as a player and the snow mountains as a background it makes the user not get bored while playing because these objects are not common in the other games.

By using materials like crystal and ice it gives the reality effect of the objects it makes the environment consistent with each other.

This version is not the last version of the game, the game still needs more features to improve the entertainment.

CHAPTER FIVE

5 FUTURE WORK

- The game will contain 10 locked objects at least the player must get 100 points to unlock each object, these objects are different shapes and materials of the snowflake and boards like Matale, wooden, etc…

- The game will contain a new dangerous feature which is a bubble, the bubbles will fall from the top, and if it hits the player it will pull it down and cause the game over.

- The game will contain the ability for players to see each other points to create the spirit of competition.

- The game will contain different levels each level has a different story as example there will be a fighting scene, the objects in this scene will be ghosts, saw, etc…

CHAPTER SIX

6 BIBLIOGRAPHY

[1] B. Stewart, "Gamasutra - Personality And Play Styles: A Unified Model", Gamasutra.com, 2016. [Online]. Available: http://www.gamasutra.com/view/feature/6474/personality_and_play_styles_a_.php?print=1. [Accessed: 20- Jul- 2016].

[2] "Career and Personality Tests, College of Information Sciences and Technology," Ist.psu.edu, 2016. [Online]. Available: https://ist.psu.edu/students/careers/resources/search/tests. [Accessed: 20- Jul- 2016].

[3] C. Kerr, "How did Temple Run reach 1 billion downloads?", pocketgamer.biz, 2016. [Online]. Available: http://www.pocketgamer.biz/asia/the-charticle/59253/how-did-temple-run-reach-1-billiondownloads/. [Accessed: 29- May- 2016].

[4] Denollet, J., Sys, S. U., Stroobant, N., Rombouts, H., Gillebert, T. C., & Brutsaert, D. L. (February 1996). "Personality as independent predictor of long-term mortality in patients with coronary heart disease". Lancet 347 (8999): 417–21. doi:10.1016/S0140-6736(96)90007-0. PMID 8618481.

[5] D, M, M. Häfner, and J. Förster.(2012)"He Just Wants to Play How Goals Determine the Influence of Violent Computer Games on Aggression." Personality and social psychology bulletin 37.12: p. 1644- 1654.

[6] G. Matthews, I. Deary and M. Whiteman, Personality traits. Cambridge, U.K.: Cambridge University Press, 2003.

[7] I. Granic, A. Lobel and R. Engels, 'The benefits of playing video games.', American Psychologist, vol. 69, no. 1, pp. 66-78, 2014.

[8] J. Johnson, "Short Form for the IPIP NEO-PI, Introductory Information", Personal.psu.edu, 2016. [Online]. Available: http://www.personal.psu.edu/~j5j/IPIP/ipipneo120.htm. [Accessed: 31- Aug- 2016].

[9] J. Momoda, 'Endless Runner Games: Evolution and Future - Game Analysis', Game Analysis, 2013. [Online]. Available: http://jerrymomoda.com/analysis-endless-runners/. [Accessed: 18- Nov- 2015].

[10] Kim, Jimin; Chang, Younghoon, and Park, Myeong-Cheol, (2013) Why Do People Like to Play Social Network Games with Their Friends? A Focus on Sociability and Playability . PACIS 2013 Proceedings. Paper 78.

[11] M. Hill, 'The interview with Monica Hill', Drexel University, 2015.

[12] M. Friedman. Type A Behavior: Its Diagnosis and Treatment. New York, Plenum Press. 1997. pp. 31–147.

[13] N. C. Worth, A. S. Book. “Dimensions of video game behavior and their relationships with personality”. Department of Psychology, Brock University, St. Catharines, Ontario, Canada. 2015.

[14] Pedersen, S. S., & Denollet, J. (2006). "Is Type D Personality Here to Stay? Emerging Evidence Across Cardiovascular Disease Patient Groups" (PDF). Current Cardiology Reviews 2 (3): 205.doi:10.2174/157340306778019441.

[15] Psych.uncc.edu, 'Personality type A/B', 2015. [Online]. Available: http://www.psych.uncc.edu/pagoolka/TypeA-B-intro.html. [Accessed: 27- Jul- 2015].

[16] R.K.N.D.Darshani, (2014) A Review of Personality Types and Locus of Control as Moderators of Stress and Conflict Management, International Journal of Scientific and Research Publications, Volume 4, Issue 2, ISSN 2250-3153 [17] S. Srivastava, "Personality and Social Dynamics Lab", Pages.uoregon.edu, 2016. [Online]. Available: http://pages.uoregon.edu/sanjay/bigfive.html. [Accessed: 15- Aug- 2016].

[18] S. Shi, "Parkour Game: From Slience To revive", Chuapp.com, 2015. [Online]. Available: http://www.chuapp.com/2015/02/11/126691.html. [Accessed: 29- May- 2016].

[19] Y. Chou, "User and Player Types in Gamified Systems - Yu-kai Chou: Gamification & Behavioral Design", Gamification & Behavioral Design, 2013. [Online]. Available:

http://yukaichou.com/gamification-study/user-types-gamified-systems/. [Accessed: 20- Jul- 2016].

[20] "The Future of PvP in Mists of Pandaria - WoW", World of Warcraft, 2016. [Online]. Available: https://worldofwarcraft.com/en-us/news/6176110. [Accessed: 31- Aug- 2016].

[21] M. Haggerty, "The State of Mobile Game Development", GamesIndustry.biz, 2016. [Online]. Available: http://www.gamesindustry.biz/articles/2012-11-28-the-state-of-mobile-game-development. [Accessed: 31- Aug- 2016].