

# Digital Board Game using Unity Game Engine

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**Abstract**—Making a board game with complex gameplay is difficult because it will make the player confused. But it can be easier if the game is a digital one. Unity is one of the game engine that can be used to make that kind of game.

**Keywords**—board; game; unity; tabletop;

## I. BACKGROUND PROBLEM

Board game is one kind of game that popular amongs people not only to certain groups but to almost everyone. There are some classic board games that almost everyone know like Chess or Monopoly. Nowadays board game has many variety adjusting to their user target. But the analog board game have a weakness that is the mechanic and component must not be complicated. If it complicated it will be many thing that have to be remembered and it will make the player confused and will not able to enjoy the game. To make it easier to play we can make the game digitally, so the complex calculation and the information can be stored and processed in the computer.

To make a digital game there are many tools dan can be used. There is a game engine that easy and free to use called Unity Game engine. It also support a wide variety of platform and it is possible to make the game online. Because of it the game will be made with this engine.

## II. INTRODUCTION

### A. Digital Board Games

A board game is a tabletop game that involves counters or pieces moved or placed on a pre-marked surface or “board” and have a set of rules. Some are based on pure strategy but also contain luck. A digital board game is a board game but played in software.

### B. Board Game Genres

There are many genres of board games :

#### 1) Classic Board Games or Family Games

These games require the player to race around the board or follow a designed path to reach their goal. Somethimes there will also be a points system involved. These games have a heavy reliance on luck, and have less strategy than modern board games. This Game work best with groups where the

game itself is not as important as the experience of playing together.

#### 2) Euro-Style Games

Euro-style games are often about gaining victory points, an arbitrary resource that allows you to win. They usually last a certain number of turns, or continue until one player has a certain number of victory points. These games have strong themes which inform much of the design. There is also usually a system of resource management, and some kind of "political" play between the players as they negotiate the sale and trade of resources. Finally, these games have fewer elements of luck or chance, and most issues the player experiences because of "bad luck" can be mitigated with strong strategic play.

#### 3) Deck-Building Games

Deck-Building Games (DBGs) are similar to Trading Card Games (TCGs) where each player has a deck of cards they use during play. The difference is that in DBGs the players all work from the same card collection, and the deck-building occurs as part of the game. These games usually come with 15-20 different card types, but only ten are used in a single game. This gives the games a lot of replay value. In these games players build their deck over time by purchasing available cards from the pool of cards. Games like this usually end when a certain number of card types are depleted, or when a specific situation occurs.

### C. Unity

Unity is a cross-platform game engine developed by Unity Technologies and used to develop video games for PC, consoles, mobile devices and websites.

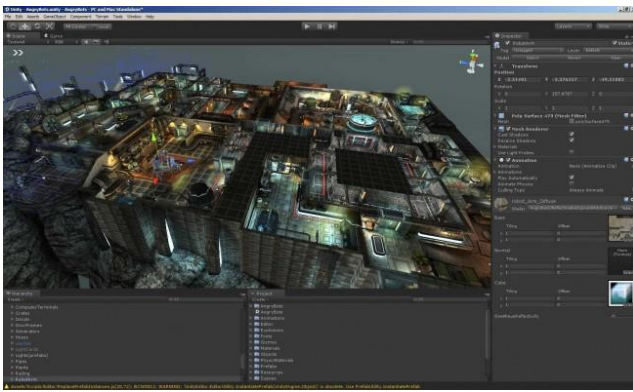


Figure 1 Unity Game Engine Screenshot

Features of Unity :

#### 1) Rendering

The Unity graphics engines use OpenGL, Direct3D, OpenGL ES for mobile platform (iOS, Android) and various APIs. There is also support of reflection, parallax and bump mapping. It provides features to render text and use of shadow maps for dynamic shadows. Various file formats of different software are supported. For instance, Adobe Photoshop, Blender and 3ds Max are supported.

#### 2) Scripting

Scripting is built on Mono, the open source platform for .NET Framework. Programmers write the UnityScript similar to JavaScript, C sharp and Boo.

#### 3) Asset Tracking

Unity has an asset server- control solution for developer scripts and game assets. It uses PostgreSQL as a backend system for audio and the Theora Codec for video playback. It also has a terrain and vegetation engine built in global illumination and light mapping and built-in path finding meshes

#### 4) Physics

The Unity engine provides built-in support for PhysX physics engine with real time cloth simulation on skinned meshes, collision layers and thick ray casts.

### III. METHOD

The game genre is a combination between *Deck-Building Games* and *Classic Board Games*. The concept of the game is each player move around the board to make the strongest deck which is in this game called party and defeat all players using the deck that player use and make during the game. In the board there will be tiles with unique effect. This section will be explaining the game rules and how to apply it using unity. Most of the code is applied using *Object Oriented Programming* in C# language.

#### A. Players

For representing the player, we make a class called Player. Class Player's attribute is Party(the deck), gem (currency in this game), position in the board, last position in the board, and the health of the player which make the player lose if it reaches zero. The Player class's script is attached to the Player sprite which is an unity object, in this game there will be 4 player so there are 4 player objects and to control those object moving around the board we make a script called PlayerController.

#### B. Tiles

We also made a class called Tile which is representing the tile on the board. The tile class is similiar to Tree data structure, the class have attributes id and neighbor. There are many kind of tile with different effect such as the player get or lose some gem, teleporting the player, the shop or random effect tile. To make that happen we add an attribute called type that will be processed in a script called EventController. There is also a script called TileController which is consist of list of Tile.



Figure 2 The Board

#### C. Party and Battle

There are many kinds of Party Character in this game. It is divided by race and have unique attribute. We make a parent class called Party and for each kind of Party Character will have each class. The attribute of Party class is id (unique per character), attack, defense, and speed. The party class also have 2 methods : buff and debuff.

Before the battle begins each player will select 5 kind of party character that they have to participate in the battle. There will be three phase in the battle between player in this game. First phase is debuff phase continued by buff phase then the damage calculation phase. The debuff phase will be calling the debuff method in the all party character involved in the battle. The buff phase also similar with the debuff phase instead it will

be calling the buff method then for the calculation phase will be use this formula :

$$\text{Damage} = (\text{This attack} - \text{Enemy defense}) * \frac{\text{this speed}}{\text{enemy speed}}$$

The formula above will be used in Party battle. It will be one versus one, calculate each damage and the one that have higher damage will win the battle and the damage will decrease the enemy Player's HP. In each Player battle there will be five Party battle.

#### D. Game Flow

This section will be explaining how to use the class and script that has been explained before into the game. First we made a plane using Unity 3d object that will represent the board. Then we made cylinders object representing the tiles and put the tile script in each cylinder with different attribute value. Then we put the TileController script to the plane.

Then we make 4 objects and put the player class script into it and put the PlayerController script to dummy object. The PlayerController script need the TileController to know all the tiles that available. The PlayerController that will be moving around the player in the tiles using the method in it.

The main controller of this game will be using script called EventController. It will be controlling the turn of each player. On their turn the player have to choose to roll dice, paying gem to go to exact tile or to get new party character by paying gem. Then if the player choose to roll dice or paying gem to go to exact tile the EventController will be the one to trigger the effect of the Tile. If the player past another player, it can choose to battle it or not. Because many blocking to wait for the player input will be happen each method in EventController will be a Corroutine.

#### IV. CONCLUSION

Unity is one of the Game Engine that easy to use. It is very possible to make a digital board game using it.

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#### DECLARATION

With this, I hereby declare that this paper which I wrote is my own writing, not an adaptation, or translation of other paper and is not a plagiation

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