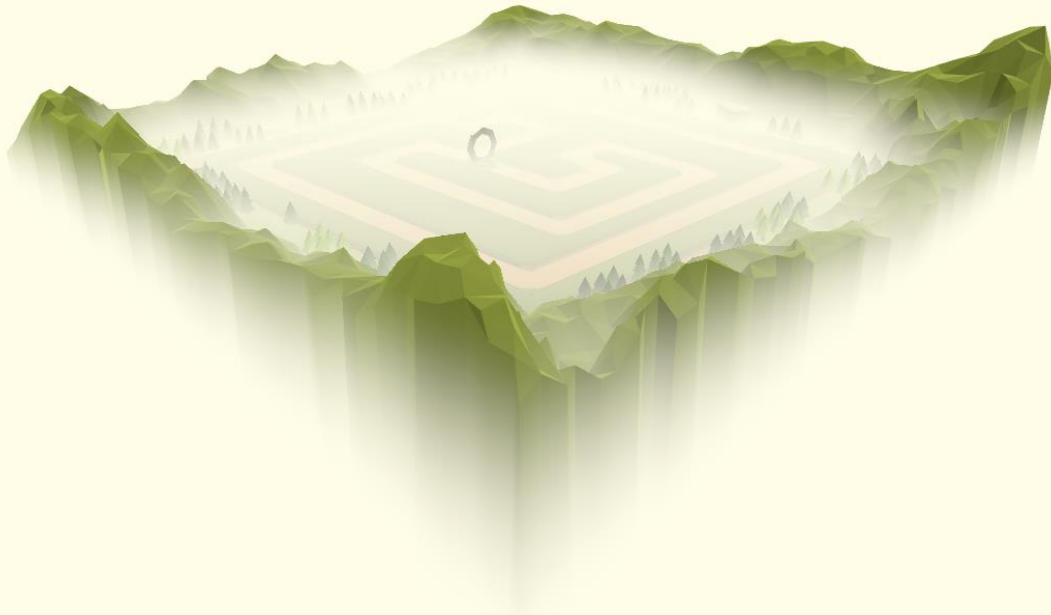


SAMSARA



Samsara

Game Design Document

Seven Guys

Last Updated: 12/06/2020

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Overview

Premise

Samsara is a single player tower defense game where the player is supposed to defend 2 waves of monsters and keep the number of monsters less than a limit number. There will be a final Boss in the third wave. Players should defeat the final boss in limited time to win the game.

Inspirations

Our team wants to create a tower defense game, but different from the common tower defense games, we are inspired by a recent popular game mode: Auto Chess. Instead of giving a list of preset towers, we will design dozens of towers that several traits can be activated if assigned towers are existing on the playground together.

Gameplay Overview

The player will touch different tower buttons to choose a tower and place it in the available position in the map. The tower will automatically beat enemies within its attack range. The player will earn coins after killing enemies, and then use coins to build more towers or reroll towers in the store.

Goals

The player will need to manage coins to build towers properly and survive 3 waves. The player will win the game after defeating the final boss in the last wave.

Engineering

The platform will be iOS. Unity will be used to implement the game.

Key Features

1. 15 types of towers are built in the game. Each tower has a unique attack attribute and can automatically be upgraded by combining three same towers.
2. Combination of different types of towers can trigger different traits.
3. Enemies trigger their special skills when they have half life.
4. The dragon boss releases multi skills when its life is under 4000.

Target Demographic

The audience we are aiming to target our tower defence game at is people who are known to play games on a regular basis. Since there is no violent content or mature dialogue in the game, the target people are those who are above 10 years old. While the game is designed

in a fantasy polygon style, the game is more relaxed to play and can refresh people who are stressed during work time or study time.

Similar Games

Game	Target Demographic	Other statistics
<p>Defense Grid : The Awakening</p> 	Everyone above 10 years old. It contains fantasy violence and mild language.	Most popular tower defense game on PC in 2009.
<p>Dota Auto Chess</p> 	There is no official ESRB rating for the game as it is centered around online interaction.	Most popular DOTA2 creative workshop map at the beginning of 2019, with an average of 300,000 people online every day.

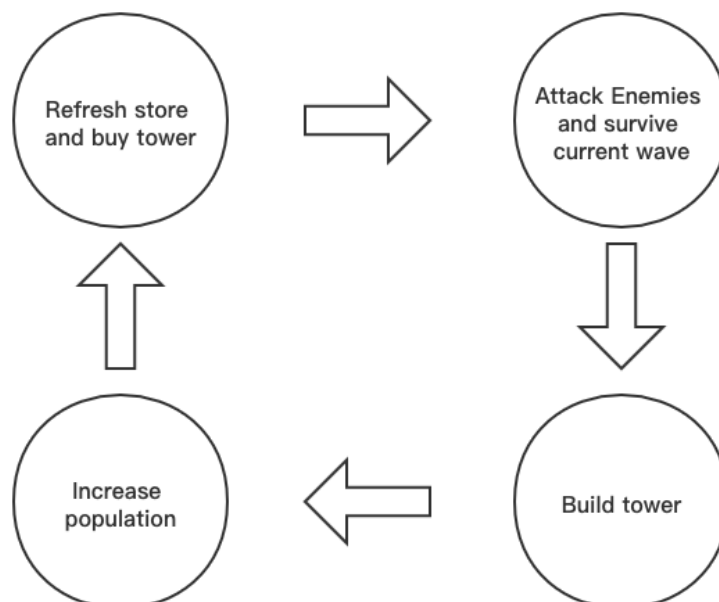
Gameplay

Overview

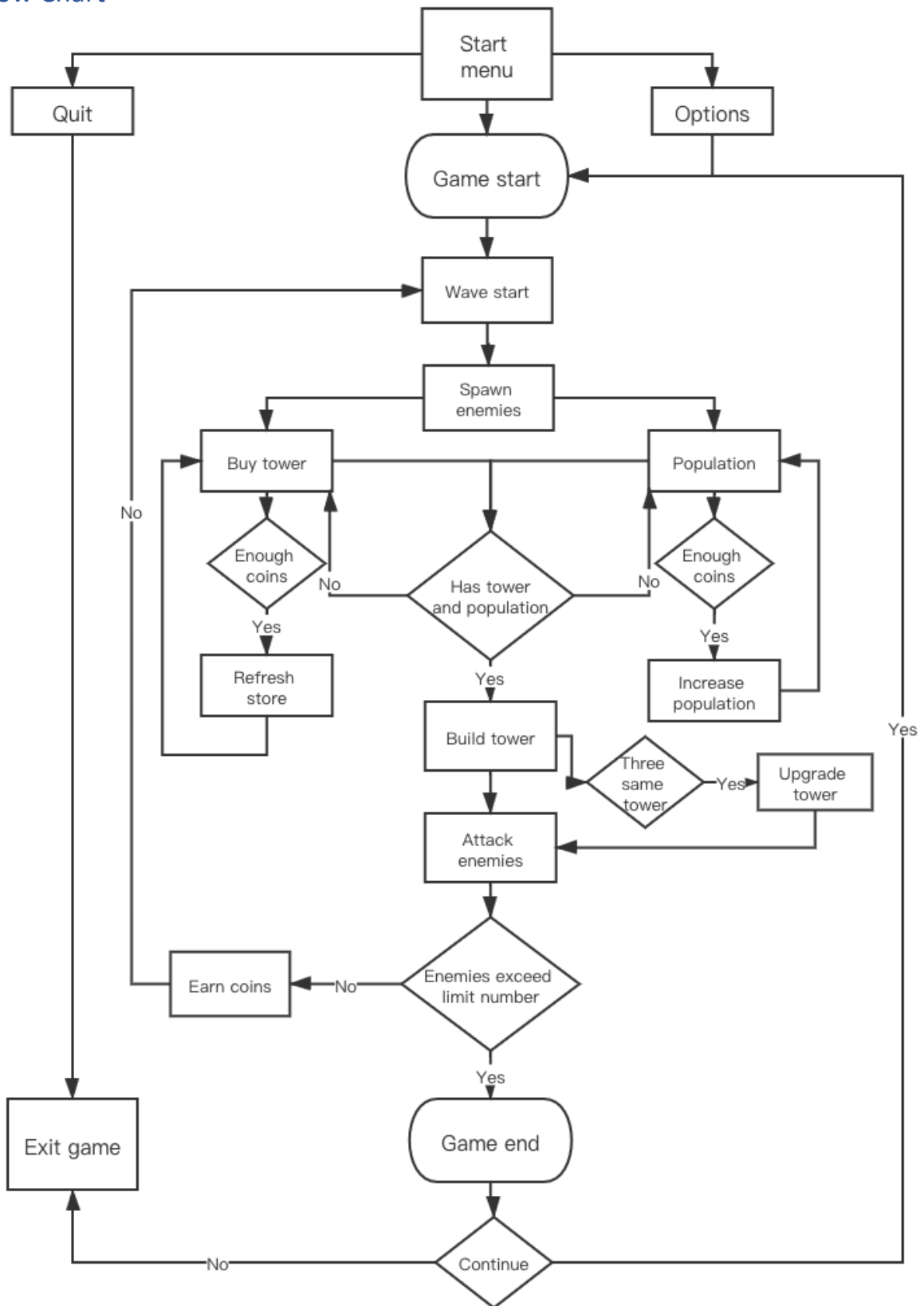
Monsters are spawned at the gate and keep running in the map shown below. The map is divided into two parts: inner circle and outer circle. In the inner circle, enemies appear in the south part of the gate and move along the road. In the outer circle, enemies keep moving counterclockwise until players kill them. The priority job is to keep the total number of monsters fewer than the maximum until the last wave and destroy the final boss.



Game Loop



Flow Chart



Control Scheme

The players use their fingers to control the game.

Motion	Function
short press	refresh store, buy towers, build towers, increase population
long press	right click on towers can show the detail information of that tower
multi fingers open or close	zoom in or out the game scene
swipe up	move up the game scene
swipe left	move left the game scene
swipe down	move down the game scene
swipe right	move right the game scene

Core Mechanism

1. Enemies

The game has 3 waves of enemies in total. Each wave is designed as a different combination of enemies. In the last wave, the boss appears and releases multi skills which make the game challenging. The detailed information of enemies are shown in the enemies part below.

2. Towers

There are 15 different types of tower in the game and most towers have three levels. The tower automatically upgrades while there are three identical towers in the game. After upgrading the tower, the damage per second of the tower increases. The detailed attributes of towers are shown in the towers part below.

3. Traits

Traits are activated when assigned towers exist on the playground at same time. Each trait has a group of towers that can trigger it. When three or more types of tower in this group exist at the same time, the trait is activated which is shown as a buff or special effect. Details can be found in the traits part below.

4. Coin

The player has some coins at the beginning of the game. After surviving a wave, the player will earn some coins. Coins can be used to refresh the shop and increase population.

5. Shop

The shop provides 3 random towers at one time. Players can purchase 1 of 3 towers only or spend money refreshing the shop.

6. Bag


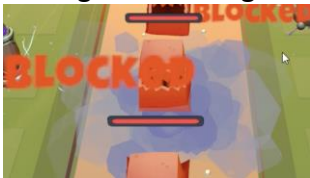


Players have a bag with 9 slots. Towers purchased in the shop go to the bag directly. Players can click towers' icons and then click an available place in the playground to build the towers.

7. Level

Population can be increased by buying levels with some coins. The level limits the maximum number of towers players can build. The level can be increased by using coins. Nevertheless, higher levels will increase the probability of higher rarity towers in the shop.

Enemies

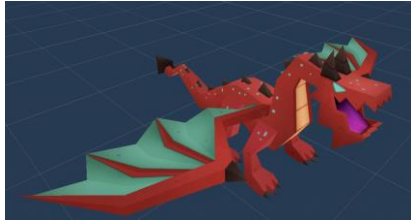
The game has several types of normal enemies and a boss. The attributes of enemies are moving speed, rotating speed, physical defense, magical defense and life. The boss only appears in the third wave and it can use magic to release three skills. The enemies are attacked by all towers in their range and have dead animation when life = 0. The player can see the remaining life of the enemy through a percentage live bar on the head of the enemy. When the enemy loses half of its life, special skill will be triggered. All enemies are imported from the Toon Enemies packet from the asset store. The table below shows the information of normal enemies in the game.

Name	Model	Attribute	skill
Ghost		Speed: 3 Rotate Speed: 8 Life: 360 Physical Defense: 25 Magical Defense: 0	generate smoke which blocks damage in the range 
Archer		Speed: 3 Rotate Speed: 8 Life: 450 Physical Defense: 30 Magical Defense: 5	generate an accelerate range 

Golem		Speed: 3 Rotate Speed: 8 Life: 600 Physical Defense: 30 Magical Defense: 20	recover 50 life per second 
Skeleton		Speed: 3 Rotate Speed: 8 Life: 830 Physical Defense: 40 Magical Defense: 0	generate a healing circle which adds 100 life per second to all enemies in the range 
DeathKnight		Speed: 3 Rotate Speed: 8 Life: 500 Physical Defense: 35 Magical Defense: 10	generate a shield which adds 10 physical defense and 10 magical defense 
Bat		Speed: 3 Rotate Speed: 8 Life: 240 Physical Defense: 20 Magical Defense: 0	no skill




Boss

In the final wave, the dragon boss appears. Players need to kill the boss to win the game. The basic information of the boss is shown in the following table.

Name	Model	Attribute
Dragon		Speed: 3 Rotate Speed: 8 Life: 4500 Physical Defense: 30 Magical Defense: 10



















When the boss is under 4000 life, it generates a shield and releases 3 skills cyclically.





























Skill one: Summon Enemy	Skill two: Stone Turret	Skill three: Healing All
<p>The dragon summons three enemies to attract fire.</p> 	<p>The dragon blocks an active turret in the map randomly.</p> 	<p>The dragon generates a healing circle under all enemies and recover 50% of lost life.</p> 

Towers

15 types of tower are designed in the game for players to kill enemies. All towers are imported from TowerDefense_Vsquad packet from the asset store. Each tower has an unique attacking method. The base attributes of towers are physical base damage(ATK), magical base damage(MAT) and attack range. The rarity of towers are R, SR and SSR. R is the lowest rarity and SSR is the highest. Attack range is divided by distance: short, middle and long distance. Most towers have three levels and will automatically upgrade while there are three identical towers in the game. The table below shows the information of towers in the game.

Name	Level 1	Level 2	Level 3	Attribute	Trigger Traits
EL_bat				Rarity: R ATK: 40/50/60 MAT: 0/0/0 Distance: middle	Physical Attack Middle-distance Attack Elves Tower
EL_draco				Rarity: SSR ATK: 0/0/0 MAT: 24/31/39 Distance: middle	Magical Attack Middle-distance Attack Elves Tower
EL_electric				Rarity: SR ATK: 0/0/0 MAT: 20/27/35 Distance: long	Magical Attack Long-distance Attack Elves Tower
EL_splash				Rarity: R ATK: 0/0/0 MAT: 18/25/32 Distance: long	Magical Attack Long-distance Attack Elves Tower
FE_catcher				Rarity: R ATK: 41/51/61 MAT: 0/0/0 Distance: short	Physical Attack Short-distance Attack Fairy Tower
FE_moth				Rarity: SSR ATK: 0/0/0 MAT: 24/31/39 Distance: middle	Magical Attack Middle-distance Attack Fairy Tower

FE_scorpio				Rarity: R ATK: 40/50/60 MAT: 0/0/0 Distance: middle	Physical Attack Middle-distance Attack Fairy Tower
FE_toothfish				Rarity: SR ATK: 43/53/64 MAT: 0/0/0 Distance: middle	Physical Attack Middle-distance Attack Fairy Tower
GB_ballista				Rarity: R ATK: 40/50/60 MAT: 0/0/0 Distance: middle	Physical Attack Middle-distance Attack Goblin Tower
GB_Crystal				Rarity: SSR ATK: 37/45/54 MAT: 19/24/31 Distance: middle	Physical + Magical Attack Middle-distance Attack Goblin Tower
GB_Pyro				Rarity: R ATK: 31/39/46 MAT: 15/20/25 Distance: long	Physical + Magical Attack Long-distance Attack Goblin Tower
GB_sandglass				Rarity: SR ATK: 0/0/0 MAT: 22/30/38 Distance: short	Magical Attack Short-distance Attack Goblin Tower
HM_cannon				Rarity: R ATK: 40/49/58 MAT: 0/0/0 Distance: long	Physical Attack Long-distance Attack Human Tower
HM_Fire				Rarity: SR ATK: 0/0/0 MAT: 20/27/35 Distance: long	Magical Attack Long-distance Attack Human Tower
HM_Poison				Rarity: SR ATK: 0/0/0 MAT: 20/27/35 Distance: long	Magical Attack Long-distance Attack Human Tower

Traits

Traits are activated when assigned towers exist on the playground at same time. 10 types of traits are designed in the game and are divided into 3 categories: attack type, attack range and race. The information of 10 traits are shown below and the information of each trait contains which tower can be found in the tower table above. The initial name and full name of attributes in the table are:

ATK – physical base damage

MAT – magical base damage

DEX – hit rate

SPD – attacking frequency

CRI – crit rate

Category based on Attack Type

Link 1

Name: Physical Attack Group

Lv.1 Buff

Condition: 3 Types

Effect: ATK + 10%

Lv.2 Buff

Condition: 4 Types

Effect: ATK + 15%, SPD + 10%

Lv.3 Buff

Condition: 5 Types

Effect: ATK + 20%, SPD + 15%, CRI + 10%

Link 2

Name: Magical Attack Group

Lv.1 Buff

Condition: 3 Types

Effect: MAT + 10%

Lv.2 Buff

Condition: 4 Types

Effect: MAT + 15%, SPD + 10%

Lv.3 Buff

Condition: 5 Types

Effect: MAT + 20%, SPD + 15%, CRI + 10%

Link 3

Name: Physical + Magical Attack Group

Lv.1 Buff

Condition: 2 Types

Effect: ATK + 10%, MAT + 10%

Lv.2 Buff

Condition: 3 Types

Effect: ATK + 15%, MAT + 15%, SPD + 10%

Category based on Attack Range

Link 4

Name: Short-distance Attack Group

Lv.1 Buff

Condition: 2 Types

Effect: DEX + 10%, CRI + 10%

Lv.2 Buff

Condition: 3 Types

Effect: DEX + 15%, CRI + 15%

Link 5

Name: Middle-distance Attack Group

Lv.1 Buff

Condition: 3 Types

Effect: SPD + 10%, DEX + 10%

Lv.2 Buff**Condition:** 4 Types**Effect:** SPD + 15%, DEX + 15%**Lv.3 Buff****Condition:** 5 Types**Effect:** SPD + 20%, DEX + 20%*Link 6***Name:** Long-distance Attack Group**Lv.1 Buff****Condition:** 3 Types**Effect:** SPD + 10%, CRI + 10%**Lv.2 Buff****Condition:** 4 Types**Effect:** SPD + 15%, CRI + 15%**Lv.3 Buff****Condition:** 5 Types**Effect:** SPD + 20%, CRI + 20%

Category based on Race

*Link 7***Name:** Elves Tower**Lv.1 Buff****Condition:** 3 Types**Effect:** MAT + 15%**Lv.2 Buff****Condition:** 4 Types**Effect:** MAT + 20%**Lv.3 Buff**

Condition: 5 Types

Effect: MAT + 25%

Link 8

Name: Goblin Tower

Lv.1 Buff

Condition: 3 Types

Effect: ATK + 15%

Lv.2 Buff

Condition: 4 Types

Effect: ATK + 20%

Lv.3 Buff

Condition: 5 Types

Effect: ATK + 25%

Link 9

Name: Fairy Tower

Lv.1 Buff

Condition: 3 Types

Effect: SPD + 15%

Lv.2 Buff

Condition: 4 Types

Effect: SPD + 20%

Lv.3 Buff

Condition: 5 Types

Effect: SPD + 25%

Link 10

Name: Human Tower

Lv.1 Buff

Condition: 3 Types

Effect: ATK + 5%, MAT + 5%, SPD + 5%

Lv.2 Buff

Condition: 4 Types

Effect: ATK + 10%, MAT + 10%, SPD + 10%

Lv.3 Buff

Condition: 5 Types

Effect: ATK + 15%, MAT + 15%, SPD + 15%

Damage Calculation

Each tower has a critical rate. If it crits, the damage changes into critical damage.

Damage = $\text{ATK} * (1 + \text{BUFF}) - \text{DEF} * (1 + \text{BUFF}) + \text{MAT} * (1 + \text{BUFF}) - \text{MDF} * (1 + \text{BUFF})$

Critical Damage = Damage * 2

Story

Introduction

One day, a warp gate suddenly appears in a valley. The gate is connected to the Dark Land which has many monsters living there. Monsters come to the valley through the gate and then attack humans. The king of the nearby country offers a big reward for people who can close or destroy the gate. Instead of closing the gate, a magician builds an enchantment in the valley which can mislead direction and monsters would move counter clockwise continuously in the valley. However, the enchantment can only affect a limited number of monsters. When monsters exceed a limited number, the enchantment will disappear.

Since it is too dangerous for people to kill monsters in the valley, the kingdom develops several automatically attacking towers and a system to control the towers. The player is a new system controller and willing to face the challenge.

Main game loop

The player who acts as a new system controller has a fixed amount of coins at the beginning. The player uses coins properly to increase the population and buy towers to kill enemies. The trait system and the tower upgrading system gives players abundant ways to survive 20 waves and kill the boss.

Ending

After defeating the boss in the 20th wave, the player feels a shock and then wakes up in his bed. This is only a long dream.

Art

Map design

The map is constructed using the environment prefab in the TARBO Tower Defense Pack in unity asset store. First, we construct the landscape of the valley in the scene using the

Terrain tool. Then, use cubes to design the basic places to build towers and roads for enemies to move. A set of empty objects called nav points is used to set the points to make a turn. Then, use grass prefab to decorate the tower places and ground prefab for road. Nevertheless, some rock and tree prefabs are added to the edge of the map and use white fog to cover the scene outside the map to form a beautiful map.

UI design

The start scene is shown as the picture below. After click play, it changes to the main scene.



The main game scene is shown as the picture below. The user interface mainly contains several functional parts.



The bottom part contains the information about the game and the store. From left to right of the bar on the upper side, it shows

- 1) the current level of the game
- 2) the possibility of towers with different rarity that would appear in the shop, i.e., level R has a 100% chance, SR / SSR 0%. Possibility would change as the play levels up, meaning that the player would have a higher chance of getting towers of level SR and SSR.
- 3) number of coins the player has
- 4) current number of towers placed/total number of towers could be placed
- 5) current wave number

6) number of existing enemies

The store is on the bottom. Three towers are available for the player to choose from. The player uses 2 coins to refresh the store and choose one of the three random level one towers shown in the blocks. Nevertheless, the player can use some coins to buy a level, also called population, which increases the maximum number of towers that could be placed on the map. The coins of buying one level increase after each level purchase.

Inventory is on the right. There are 9 slots in the backpack. The tower will automatically be shown in the backpack once the player buys it from the store. The player clicks on the tower in the bag and then clicks an available space in the map, the tower will build on that space.

Wave countdown is on the top center of the interface, showing when the next wave of enemies would come.

Triggered traits are shown on the left. Maximum 9 traits can be triggered in the game.

Finally the pause/resume button is on the upper right corner. After clicking the pause button, the screen is shown as below. Players can choose to continue the game, retry the game or go back to the start menu.



Similarly, when the remaining enemies exceed limit number, the game over scene shows. Players can choose to retry the game or go back to the start menu.



Animation

The animation is divided into two parts. The first part is the move and die animation of enemies. The second part is the attacking animation of towers and the bullet animation. All animations are imported from the TowerDefense_Vsquad packet and the Toon Enemies packet from the asset store.

Special effect

The special effects are used to show the traits have been triggered in the scene. All effects are imported from the Hovl Studio packet from the asset store.

Trait	Effect Name
Physical Attack Group	blood
Magical Attack Group	Lighting
Physical + Magical Attack Group	soap
Short-distance Attack Group	fire
Middle-distance Attack Group	shine
Long-distance Attack Group	smoke

Elves Tower	water
Goblin Tower	meteor
Fairy Tower	white
Human Tower	gold

Nevertheless, a rainy effect is added to the map when the boss appears. The effect is shown as the picture below.



Sound and Music

Sound effect

The sound effects of 15 towers are different and we plan to let the clip play at the beginning of attack animation. We are going to apply the following sound clips from different packages to different towers.

Tower	Clip	Package
EL_bat	crossbow	Shooting Sound
EL_draco	BulletImpact 14	Free Sound Effects Pack
EL_electric	electronic_02	Shooting Sound
EL_splash	electronic_01	Shooting Sound
FE_moth	AMP_Fire_cast_04	Demo Ancient Magic Pack FREE
FE_scorpio	Magic Spell_Electricity Spell_1	Free Sound Effects Pack
FE_toothfish	AMP_Ice_Impact_01	Demo Ancient Magic Pack FREE
GB_ballista	AMP_Lightning_Impact_06	Demo Ancient Magic Pack FREE
GB_Crystal	Magic_Spell_Short reverse	Free Sound Effects Pack
GB_Pyro	Flare gun 5-2	Free Sound Effects Pack
GB_sandglass	Dark_magic_03	Demo Ancient Magic Pack FREE
HM_cannon	Cannon impact 9	Free Sound Effects Pack
HM_Fire	Gunshot10	FuturisticGunSoundFX
HM_Poison	AMP_Fire_Impact_01	Demo Ancient Magic Pack FREE
FE__Catcher	Monster Bite	Free Sound Effects Pack

Music

A special bgm plays at the start of the game and after the boss appears. We have not decided which bgm to use.

Production

Team Members

Name	Email	Position
ChenXin Zhou	chenxinz@usc.edu	Lead Designer, Engineer
Xiaolei Zheng	xiaoleiz@usc.edu	Sound Designer, Engineer
Haotian Chen	haotianc@usc.edu	Map Designer, Engineer
Xiaowei Li	xli17070@usc.edu	Art Designer, Engineer
Tianyu Wang	twang246@usc.edu	UI Designer, Engineer
Yiyuan Ren	yiyuanre@usc.edu	Balance and Traits Designer, Engineer
Han Huang	huanghan@usc.edu	Enemy Designer, Engineer

Week Plan

Week	Tasks	Status
Week 1 & 2	Brainstorm Ramp up with Unity 3D	Completed
Week 3	Set up the project Build up map and basic functionalities Find enemy and tower assets	Completed
Week 4	Design and test data balance Apply tower models Apply enemy models Design towers' traits	Partially completed

Week 5	Apply tower models Apply enemy models Improve map Design UI	Partially completed
Week 6	Implement shop and bag UI Design towers' traits Apply tower models Apply enemy models	Completed
Week 7	Modify map Modify UI Apply towers' traits Apply start scene	Completed
Week 8	Apply towers' traits Add special effects of traits Apply tower upgrade system Apply boss model Test sound effect	Completed
Week 9	Adjust buff system and fix bugs Add effect prefab to the buff system Implement enemies' buffs and debuffs Add sound effect Design more traits	Completed
Week 10	Design different buffs for different traits Build website Modify UI Update map	Completed

Week 11	Adjust enemy buffs Combine buffs and traits Build website Modify UI	Completed
Week 12	Update effects for all the traits and add skills to enemies and boss Test sound effect Build website Update map details	Completed
Week 13	Switch platform to mobile and adjust waves Update trait color Update website Update GDD	Completed
Week 14	Test and debug game on iOS platform Update website Update GDD Record game video	Completed
Week 15	Final Demo	Completed