Second presentation - Project Rukmaksii

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S2 project

Contents

1 Introduction

1.1 Origin and nature of the project

Our project is a video game, more precisely a MOBA (Multiplayer Online Battle Arena) with a TPS (Third Person Shooter) perspective. With it, we wish to create an experience centered on two players versus two players matches to fight for the control of objectives. We want to create a game where strategy, good positioning and accuracy are key to success and which is very dynamic, even for the prejudice of realism. As for the general ambiance and artistic direction, the game will be held in the not too distant future and the scenery will be composed of both abandoned buildings and a jungle environment. We do not plan of creating a rich storyline around our game, focusing instead on the gameplay and leaving the player free to imagine the surrounding world. The game was inspired by many games we enjoy playing in our free time such as Anthem, Paragon, League of Legends, SMITE or Overwatch.

Figure 1: Screenshot of Anthem's gameplay

1.2 Narrative of the realisation

From the beginning of this year, we worked every Friday night together. Since we have great consideration for machine rooms we ate in the corridor in front of the class. We code every Friday for at least 7 hours.

Figure 2: Photograph of the team working on the game

2 Advancement

2.1 AI

The AI is implemented in the minions which are summoned by the player.

They can follow those strategies:

- "Defend" : Defends a point on the map. It will, in the future, be able to defend a player.
- "Protect" : Protects the player and stands by his side.
- "Attack" : Attacks and follows the nearest enemy.

Figure 3: Screenshot of a minion.

The player can change which strategy he wants his minion to follow.

2.2 Multiplayer

The multiplayer section is about the implementation of local and online multiplayer.
All the multiplayer was implemented using the Unity supported **netcode for gameobjects** preview package. Due to the fact that the package is still in preview, there were some lags during the game. Still, as the project goes, the package will go on getting more stable which will increase the overall stability of the game.
For this defense, we have therefore added the ability to switch to Photon's servers by changing a simple build flag.
Currently, most of the players' stats are or will be synchronized on the server, allowing the game at its current state to be played as a multiplayer TPS (like Quake for example) with the weapons' visuals synchronized.

Figure 4: Screenshot of several players paying together.

2.3 Sound

The sound section is about, as its name suggests, the soundtrack of the game, the shooting, moving and ambient sounds, etc.
The sound has currently been implemented for some of the test guns. We didn't work a lot on it because we changed some scheduled task in order to finish the base of the game for this presentation and so there only remains some visuals and some of the sound design, some game details and some bugs to fix for the final presentation.

2.4 3D

This section concerns the implementation of all the 3D assets, with their respective animations.

Between the first and second defense, not much 3D assets have been added/improved. In fact, since we already had the basic assets for most of our game, the only ones which have been added are the ones for the items that we implemented, which are the Fuel Booster and the Grenade.

Figure 5: Screenshot of the Fuel Booster item.

Figure 6: Screenshot of the Grenade item.

For the animations, we had to animate the weapons again since we changed their implementation. In fact, the visuals of the weapons were not synchronized with the network in the previous defense. Other than that, no new animation has been added to the game.

2.5 Arena

2.5.1 Incoming

Future work on objectives will consist of creating rewards for taking control of control points. We will also have to implement other structures such as working bases and shops.

2.5.2 Game-loop

We started to implement the game loop. The game loop is the system which manages the game from the beginning to the end. Currently for the game loop we create a timer and every 5 minutes the point that can be captured change and each team has to capture this point to deactivate the enemy's shield and destroy the enemy's base. Once a base is destroyed, it's the end of the game.

We also add a regulation of the number of monsters, this number is currently at 4 but it can be changed and even be modified during the game to add difficulty. Currently each time we kill a monster an other one spawns randomly on the map.

2.5.3 Shields

For this presentation we implement the shields that protect the bases. They are, for the moment, invisible but they will be modified so the players can see whether they are active or not. The shields usually forbid the enemy team from attacking a base but do not offer any protection once disabled. There are two shields on the map and only one of them can be deactivated at once. The shields only work against enemies, so a team can go through its shield and protect itself against enemies and monsters.

2.5.4 Objectives

For the previous defense, we implemented basic objectives which could be captured by a player standing on it and which changed color according to the team's color.

For this defense, we improved the objectives, getting even closer to a final version. Now, not only can the points be captured, but they can also be fought over as a captured objective can now change team. If a player stands on an objective which another team started capturing, he can now "un-capture" the point before controlling it.

Moreover, points are now properly implemented in the general game loop.

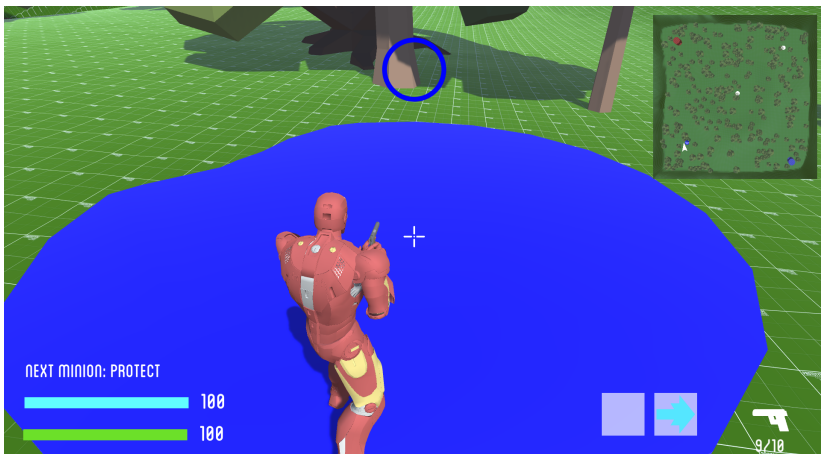


Figure 7: Screenshot of an objective being captured.

2.6 TPS

The TPS (or Third Person Shooter) section is about the very basics of the game, in short the common ground between every modern shooter. Just like the first presentation, this whole section is already in a very good shape; each of the following items are either completed and in need of minor changes or well started.

2.6.1 Classes

For this second defense, a base class has been implemented for testing purposes, in order to make fairly easy the creation of new classes. All attributes linked to the base class (movement speed, health points, etc.) can be modified easily without changing the inner working of the base player.

For instance, we are planning to implement the Scout class, which will have as a special power: see through its minions' eyes as if using a drone.

2.6.2 Weapons

For the previous defense, we had a proper weapon implementation allowing us to easily create weapons of all types in a few lines of code. We had already implemented basic weapons to demonstrate the different possibilities.

For this defense, we worked on other areas such as being able to drop weapons on the ground and pick them back up. This allows the player to give a weapon to his teammates.

Figure 8: Screenshot a dropped weapon.

Alongside those tangible implementations, we also did some heavy improvements behind the scenes, moving the weapons and the hit registering systems to the server.

2.6.3 Items

The items category is about all the consumables which will be available during the game.
For the second presentation, we did implement all the technical logic for both items and abilities. Items will be sold in shops during the game and can be gained by killing monsters.

For this defense, we have implemented a few items in order to demonstrate the different possibilities:

- a fuel booster, which, when consumed, improves the player's jet-pack duration
- a grenade, which can be thrown and explodes after a few seconds, damaging monsters and players standing close to it

In the future, we plan on having a broader selection of items to improve the player's mobility and fighting experience such as:

- healing packs, which, when consumed, regenerate health
- teleportation devices, which can be thrown and teleport the player when entering in contact with something
- a stealth mine, which can be placed by a player and explodes, dealing damage when walked on

2.6.4 Abilities

The ability core is now implemented in the game and synchronized on the network. However, none have been created yet but some of those we would like to add are:

- Permanent strength boost
- Permanent jet-pack boost
- Permanent health boost

The abilities will be chosen by each player through an ability tree which will restrain them to follow a certain path of abilities once the first one has been chosen.

2.6.5 Movement

The movement section is about all the player's movements. This includes fundamentals such as walking and sprinting but also other features to make the game more dynamic:

- a dash: on pressing the A key, the player dashes very quickly in the direction he is going
- a jetpack: when double pressing the space key, the player can freely fly around as long as his fuel reserves are not depleted

Consequently a fuel reserve has been added. When the player is on the ground, it slowly fills up and when the player is in the air, it quickly empties itself. The filling up and emptying speed of the fuel reserve are parameters which may be affected by classes or items. The amount of fuel remaining is displayed on the screen in the HUD (cf HUD) alongside the health bar.

2.6.6 HUD

Up to that point, we had a basic Heads-Up Display with essential elements such as

- a crosshair: in the middle of the screen to allow the player to aim
- a fuel bar: in the bottom left-hand corner to show the remaining player's fuel
- a health bar: in the bottom left-hand corner to show the player's health
- a dash indicator: in the bottom right-hand corner to show whether the dash is available
- a weapon indicator: in the bottom right-hand corner to show which weapon is held and the ammunition remaining

To improve the user's interface we have added a Mini-Map in the right-hand corner of the screen. The map displays an upper view of the arena alongside other crucial information:

- the player which is represented by a white arrow
- the monsters surrounding the player are represented by red points
- the friendly minions surrounding the player are represented by blue points
- the status of the different objectives

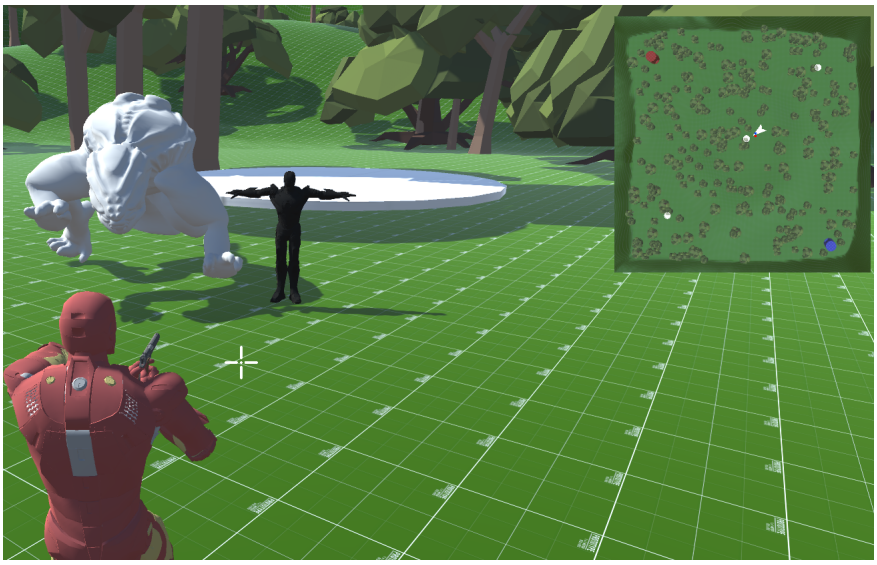


Figure 9: Screenshot the Mini-Map.

To improve the way one can select an item, we implemented an item wheel. This item wheel can be opened by pressing the E key and allows the player to select the item he wants to use by moving its cursor.

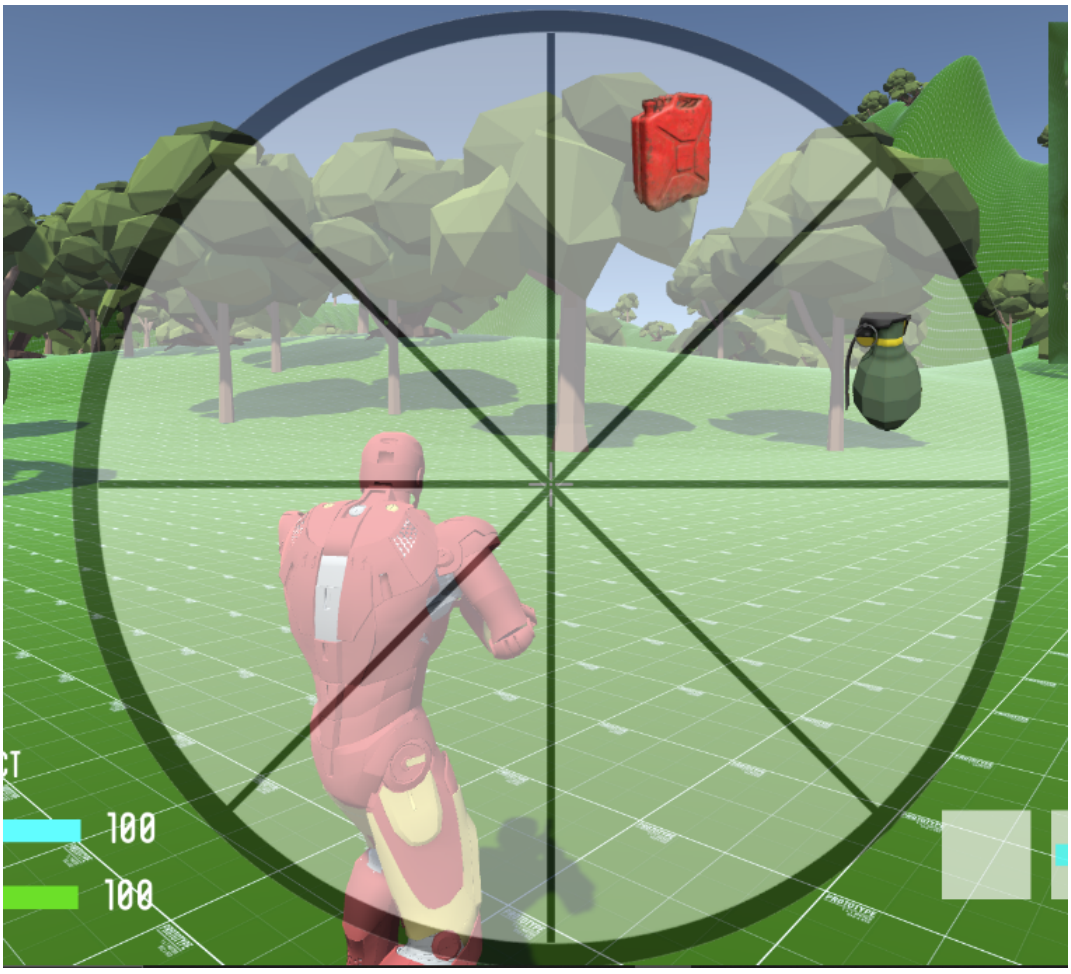


Figure 10: Screenshot the Item Wheel.

Also, the player can know and change the strategy of the next minion that he will spawn.

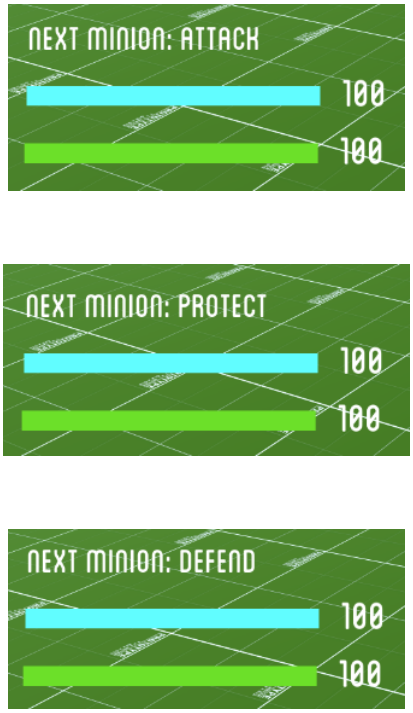


Figure 11: Screenshot the different strategies.

2.7 Money

In-game currency can be gained by killing players or jungle monsters. When players are killed they also give money depending on the weapons they bought instead of leaving their weapons. All kind of shops in the game will depend on this currency.

2.7.1 Shops

When a team will have captured control points, it will unlock a shop for the players to buy items like shields, health regeneration packs or hand grenades. Player bases will feature shops but with far less items than in mid-map shops. Shops will be represented later on by a building next to the capture point that will not be accessible unless point captured by the team. As the game will go, content in shops will get better.

2.8 Website

For this defense, we have made a website in order to display basic information such as

- a short presentation of our game
- a section to download the latest version
- an "about us" section to present ourselves

As for a technical standpoint, the website was made using the React library and is hosted on Github Pages at the following link:

https://rukmaksii.github.io/website/

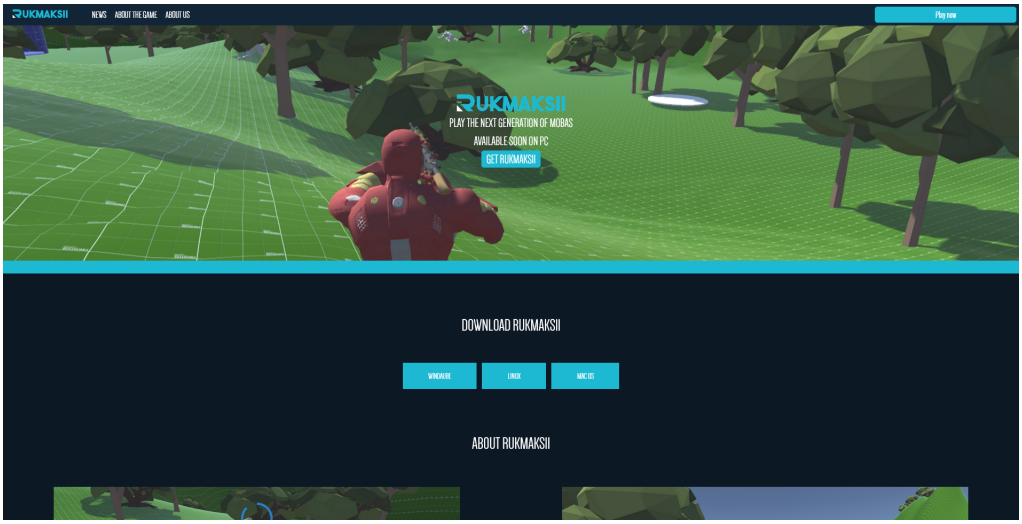


Figure 12: Screenshot of the website.

3 Role distribution

Task	Romain	Lucas	Alban	Emmanuel
Website	X			o
AI		o	X	
Multiplayer	X		o	
Installer			X	o
Sound		o	X	
3D				
Map		X		o
Characters	X		o	
Weapons	o			X
Minions	o		X	
Arena				
Map		o		X
Objectives			X	o
Events		X	o	
TPS				
HUD	o			X
Shoot	X			o
Weapons	o	X		
Items		o		X
Movement	X		o	
Classes		X	o	

For each task we have appointed someone in charge and a substitute.

- X: in charge,
- o: substitute.

We have made sure that everyone in the team has about an equal work load.

4 Schedule

The following table shows our updated schedule; for the most part we managed to reach our expectations but there have been some changes. For instance, the map overall still needs a lot of work whereas the objectives, the items and the animations have reached a satisfying point.

Task	**First pres**	**Second pres**	**Final pres**
Website		XX	XXX
AI	X	XX	XXX
Multiplayer	XXX	-	-
Installer			XXX
Sound		X	XXX
3D			
Map	X	X	XXX
Characters	X	XX	XXX
Weapons	XX	XXX	-
Minions		XX	XXX
Arena			
Map		XX	XXX
Objectives	X	XXX	-
Events		XX	XXX
TPS			
HUD	XX	XX	XXX
Shoot	XX	XXX	-
Weapons	XXX	-	-
Items	X	XX	XXX
Movement	XX	XXX	-
Classes	XX	XX	XXX

For each task we have evaluated the necessary advancement at the First presentation, the Second presentation and the Final presentation.

- X: started,
- XX: well started,
- XXX: finished,
- -: previously finished.

5 Tools

5.1 Game

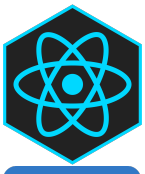
Unity has been the core element of our project since we used this game engine to create the diverse scenes needed. We also used native Unity components such as colliders to ease our task.

Rider has been used as our main IDE over VS Studio since we already use it in prog classes. Moreover its integration of git and unity has greatly simplified our experience.

Blender has been used to edit assets we found alongside creating new 3D assets.

Mixamo has been used to import animations such as running animations or flying animations for our players.

5.2 Website



React

TypeScript

6 Conclusion

Making this game allows each one of us to practice programming a lot and to learn lots of new things. Furthermore, since we all are working in group, it is a first sight at what projects could be in a later work. We all learn from this months of project how to work together as a team and how to manage a team for the project manager. Finally, we worked well during this two runs and mainly succeeded in our goals but there are still a lot of things to do. (cf Schedule)