**M226B/IPT-6**

**MyPlattformer**

Documentation

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# Introduction

This project was developed as a part of an IPT-6 project. The goal being practicing and consolidating experience in object-orientated programming(OOP).

I have chosen to further improve my experience with the Unity Game engine and continue the development of my platforming game.

# Used Tools

## Applications

Visual Studio 2022  
Unity 2021.3.0f1  
GitHub  
[Wireframe.cc](https://wireframe.cc/)

## Used Sources

[Gamedev.tv](https://www.gamedev.tv/) (<https://www.gamedev.tv/p/unity-2d-game-dev-course-2021>)  
YouTube

## Used Sprites

All sprites used were included in the GameDev.tv course.

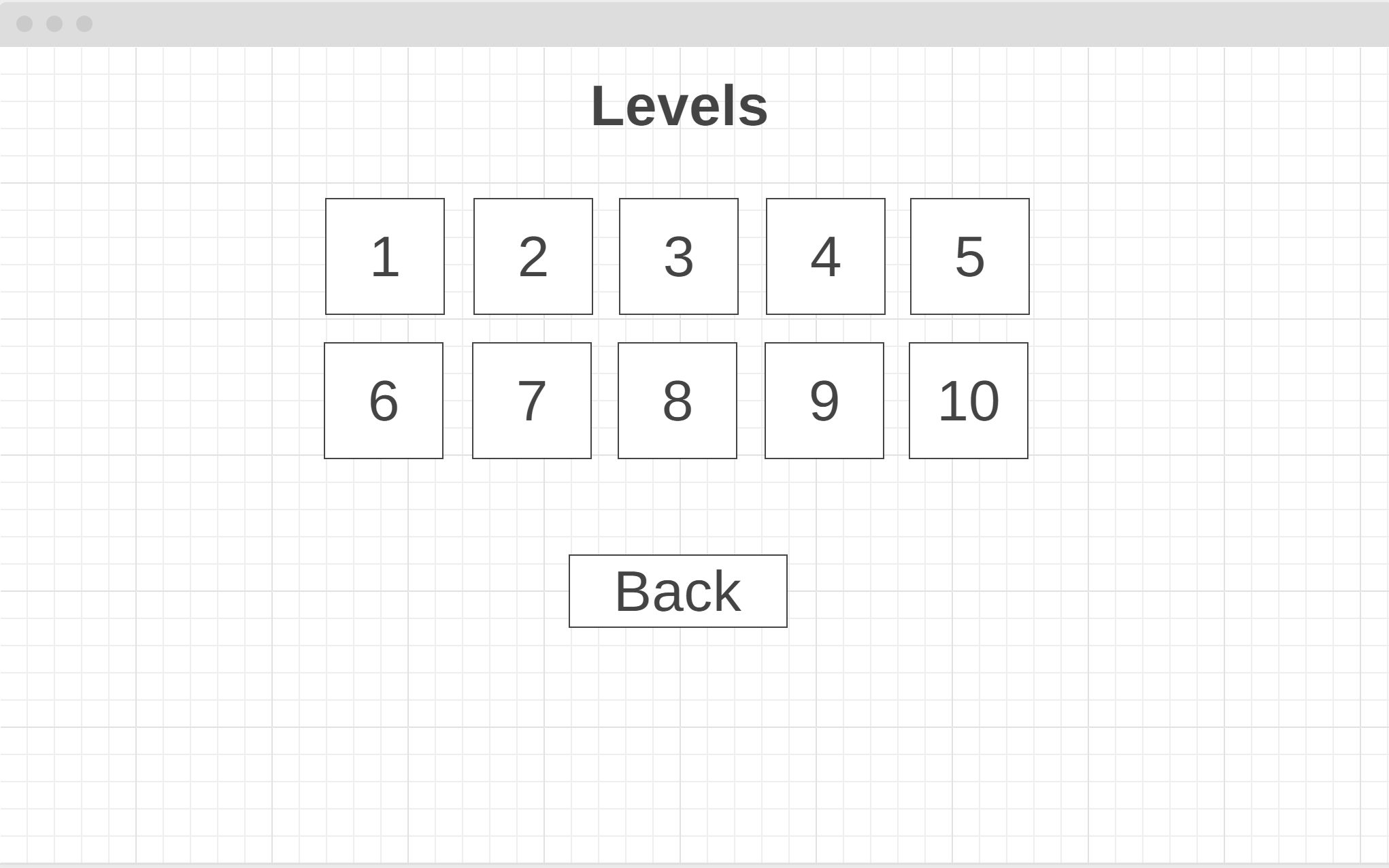
# User Stories

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Title | User Story | Acceptance Criteria | Priority | Expected time usage (h) | Status |
| Platforming mechanics | As a player, I want to be able to use common platforming mechanics like jumping, climbing, and sprinting. | When the player presses the jump key, the player jumps.  When the player pressed the up key while standing on a ladder, the player should climb on the ladder. The player should not fall while standing on the ladder.  When the player presses the running Key, the player should run 50% faster. | 1 | 4 | Complete |
| Finishing and progressing in levels | As a player, I want to be able to complete a level and go to the next level. | When the player reaches the end of the level, the level should be completed and load the next level. | 1 | 0.5 | Completed |
| Player mortality | As a player, I want to be able to be killed by objects like enemies or spikes and restart the level. | If the player touches objects like enemies, spikes, or water all movement abilities should become locked, a blood particle effect should be played, and the player should be knocked away. | 1 | 1 | Complete |
| Animation handling | As a player, I expect that animations changes depending on the current action. | The following animation should be implemented and changed when the player state changes:  Idling (doing nothing)  Running  Climbing  Dying | 1 | 2 | Completed |
| Camera transitions | As a player, I would appreciate it if the camera behaved differently depending on my current action. | The camera should zoom out when running and zoom even more when climbing. The camera should zoom in after idling for 2 seconds. | 2 | 1.5 | Completed |
| Main menu | As a player, I want to have a basic main menu where I can start the game and exit the game. | When starting the game, or when the player presses the game, the main menu should appear, where the player has the option to “Continue/Play” the game or “Exit” it. | 2 | 2 | Completed |
| Ability to jump on ladders | As a player, I want to be able to jump on ladders. | The player can jump even when standing on the ladder. | 2 | 2 | Completed |
| Ability progression | As a player, I want to unlock new abilities like double jump as I progress further into the game. | When the player completes a predefined level, new ability like extra jumps gets unlocked | 2 | 4 | Completed |
| Enemy mortality | As a player, I want to be able to kill enemies. | The player can kill enemies by rotating his swords. | 2 | 1 | Completed |
| Projectiles | As a player, I expect enemies to shoot projectiles. | Enemies can shoot projectiles. | 3 | 3 | Completed |
| Reflecting of projectiles | As a player, I want to be able to reflect incoming projectiles. | The player can reflect projectiles with his swords. | 3 | 2 | Completed |
| Projectiles kill players and enemies | As a player, I expect that projectiles kill me or any enemies on contact. | The player or an enemy instantly gets killed if it gets in contact with a projectile. | 3 | 1.5 | Completed |
| Progress saving | As a player, I would appreciate it if my current progress would be saved and loaded when I open the game again. | The player’s current progress gets saved in a .json file. | 3 | 2 | Completed |
| Level selector | As a player, I want to be able to open a level selector in the main menu and select levels. | The player can access the level selector via the main menu and select individual levels. | 3 | 2.5 | Completed |
| Volume setting | As a player, I want to be able to change the volume in the main menu. | The player can access the audio setting via the main menu and change the volume. | 4 | 1.5 | Completed |
| graphic setting | As a player, I want to be able to change the resolution in the main menu. | The play can access graphic settings via the main menu and change the resolution. | 4 | 1.5 | Completed |

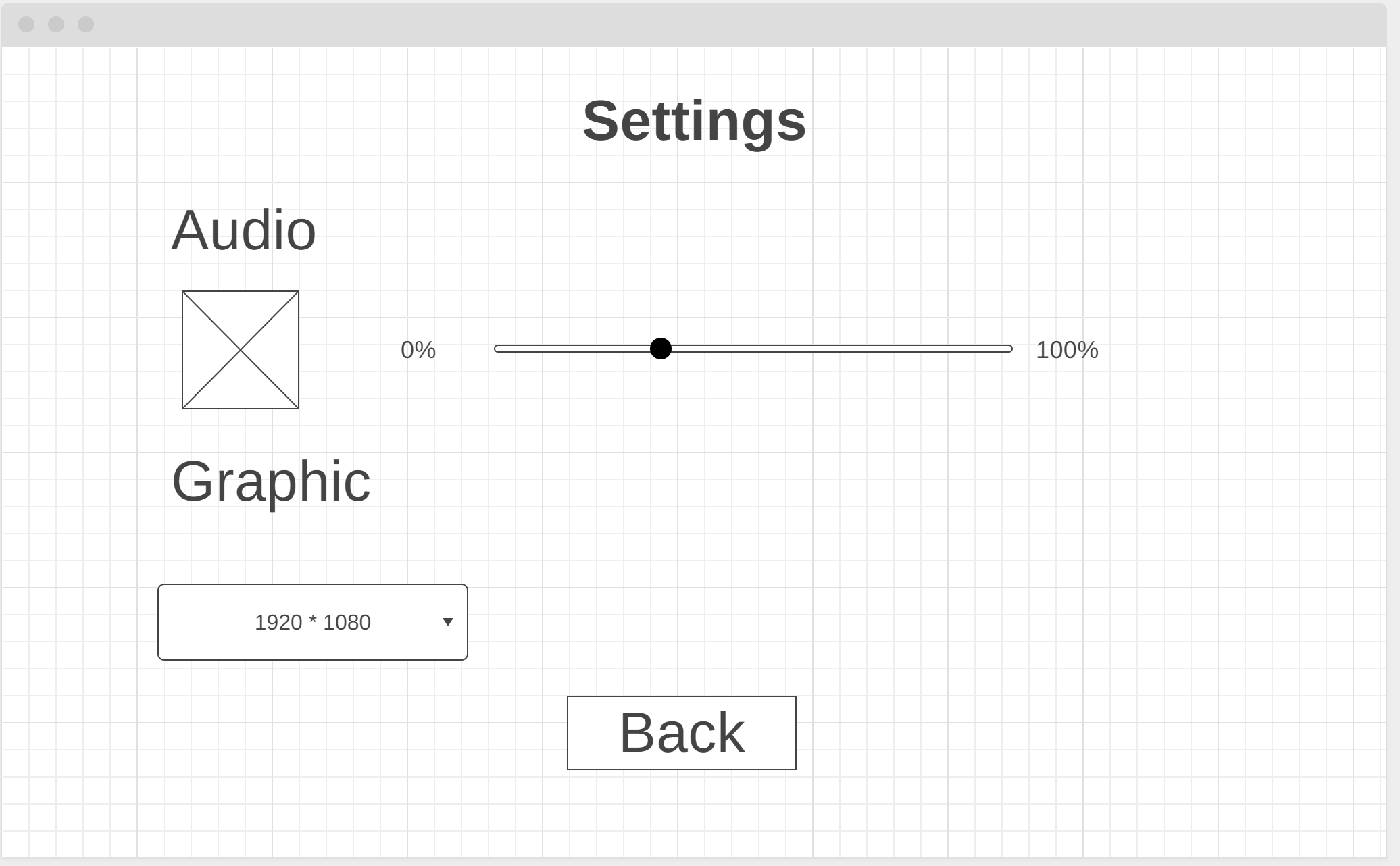
# GUI

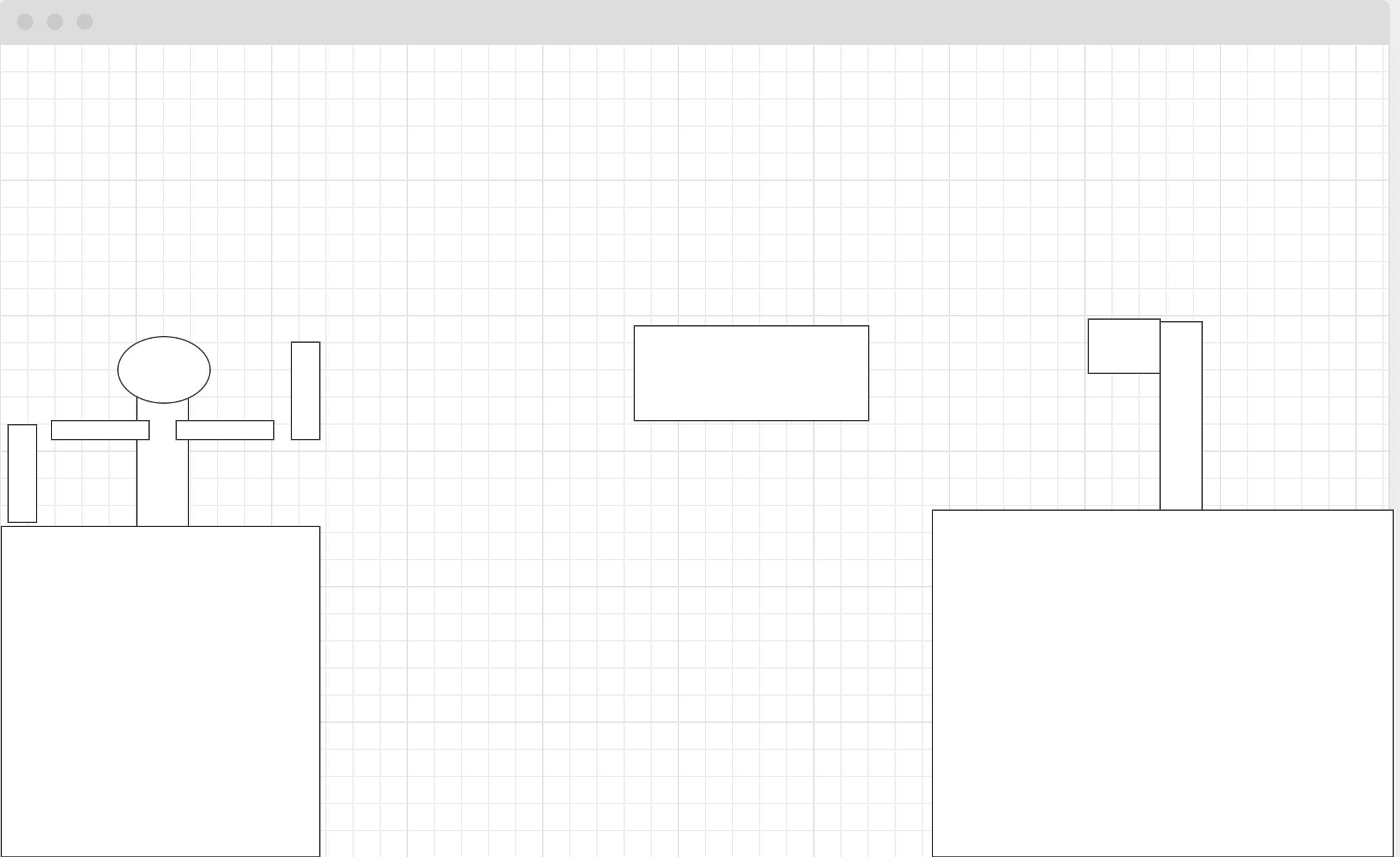
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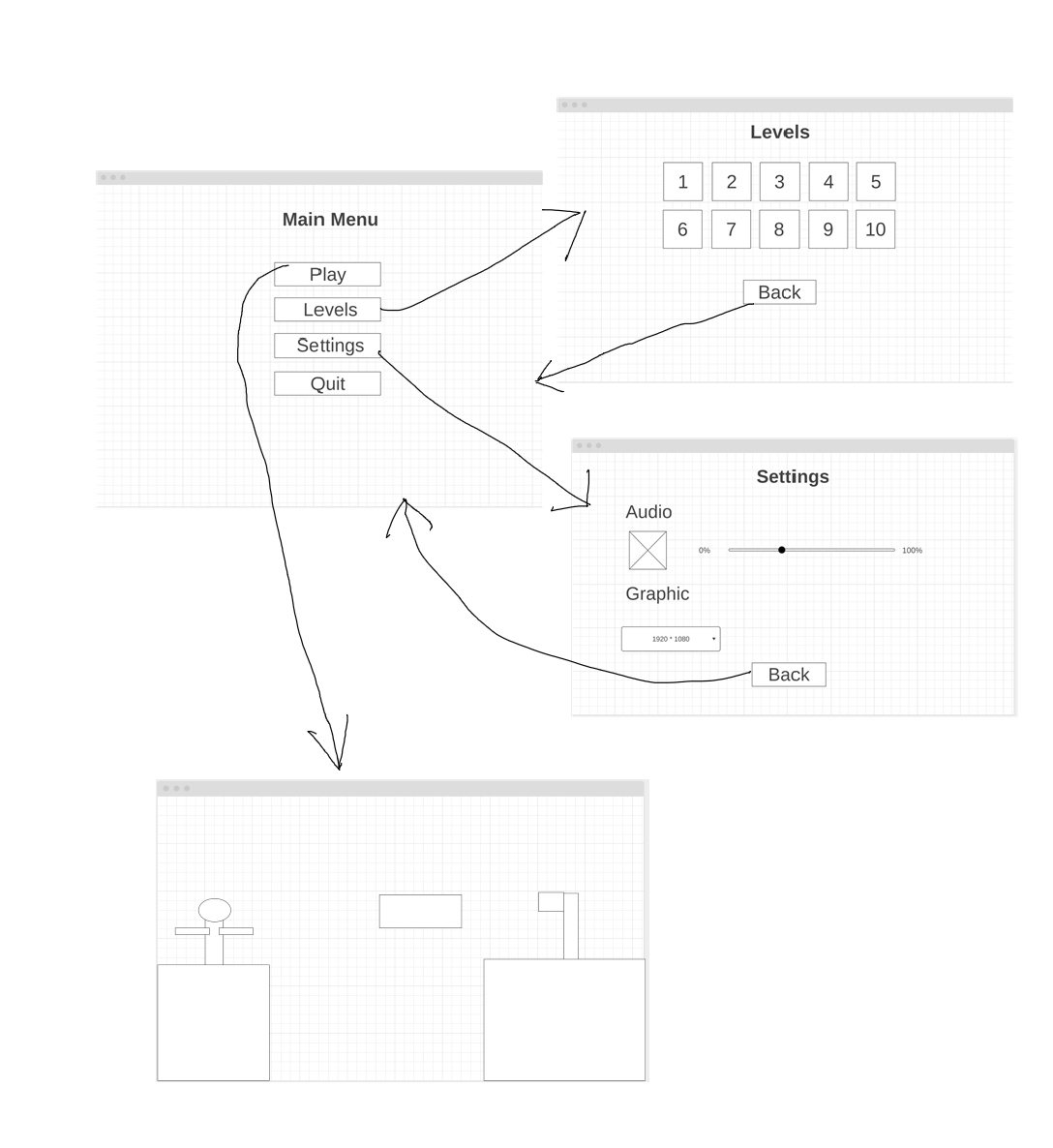
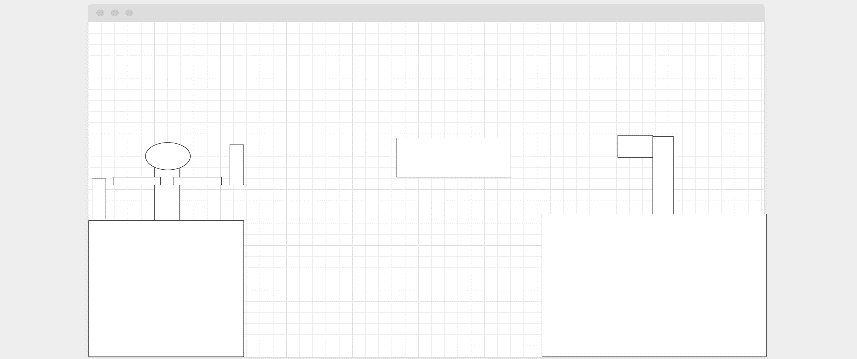
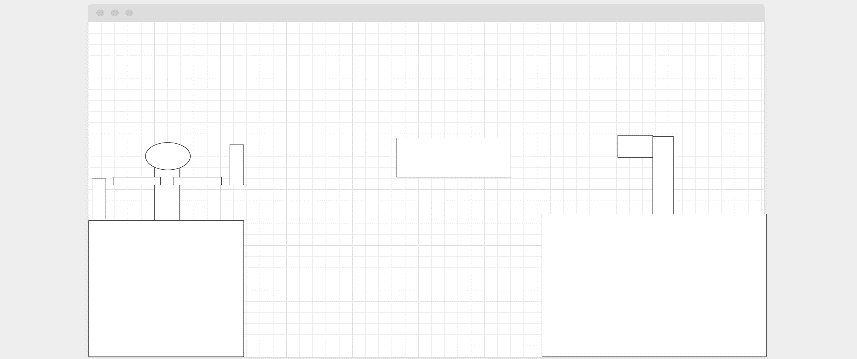
Automatisch generierte Beschreibung



Ein Bild, das Text, Person, Spieler, schlagend enthält.

Automatisch generierte Beschreibung





# User manual

## UI navigation

### Main Menu

#### Play

To start the game, press “play”.

#### Levels

To select certain levels, press “levels”.

#### Setting

To change the setting, press “setting”.

#### Quit

To Quit the game, press “Quit”.

### Setting

#### Audio

##### Mute

To mute the game, press the button on the left side

##### Change volume

To change the volume, use the sidebar to select your wished volume intensity.

#### Graphic

To change the resolution, press the dropdown menu and select your intended resolution

#### Back

To go back to the main menu, press “Back”.

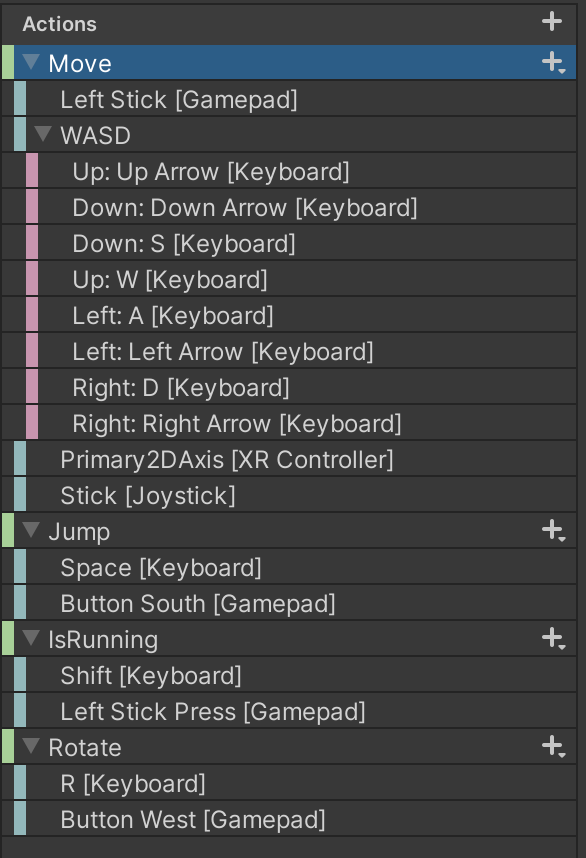
### Levels

To select the wished level, click on a level box with the wished number.

#### Back

To go back to the main menu, press “Back”.

## Game navigation



As you can see in the Actions list. MyPlattformer has full support for keyboard and controller. This documentation will therefore refer to generalized terms like “jump key” or “up key”.

### Movement

Press any left or right key, to move left or right.  
 Press any up key, while standing on ladders, to climb on ladders.  
 Press any jump key, to jump.  
 Press any key in the “IsRunning” category to enter a sprinting state, making you move faster and jump a greater distance.

### Combat

Press any key in the “Rotate” category to rotate your swords.

# Learning journal

## Multijump mechanic

22.05.2022

|  |  |
| --- | --- |
| What I have done | I first implemented a single jump mechanic, when OnCollisionEnter2D(Collider2D collider) would get called, it would check if the tag is equal to “Ground” (later “Ladder” and “Towers” too) and then set the bool “isGrounded” to true. |
| What was the problem | Firstly non-collidable objects like ladders wouldn’t set “isGrounded” to true, since OnCollisionEnter2D(Collider2D collider) would never get called. Secondly, a bool “isGrounded” doesn’t work with multi jumps since multi jumps are performed mid-air. |
| How I solved it | I reworked the collision system and used instead Layers. I called CheckGrounding() inside the update method, it would check with collider.isTouchingLayers(LayerMask), if the player is currently grounded. When it returns true the currJumpAmount would be reset to JumpAmount. |
| What I learned | Working with Tags and Layers helped me understand the advantages and disadvantages of both systems. I learned in which situation which system is more optimal. |

## Jumping on Ladder mechanic

23.05.2022

|  |  |
| --- | --- |
| What I have done | The ladder would set the player’s gravity to 0 while the player was standing on the ladder, so he wouldn’t fall when idling. |
| What was the problem | If I then tried to jump, it would result in a very high jump, because no gravity was pulling the player object down while he was on the ladder. |
| How I solved it | I took some time to think about the current problem and my goal. The problem was that the gravity was 0 when jumping, the goal was that the gravity would be flipped back to normal while the player started jumping. I soon realized that I had to “define” what a jump is. I introduced a timer, which would track how much time passed since the last jump. I then implemented a HandleJumpOnLadder() method, which managed the gravity when jumping on a ladder. |
| What I learned | I realized, that it is sometimes important to just stop and think of a solution. I first tried many things without really thinking about what I needed to achieve. |

## Wall Jumping

30.05.2022

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| --- | --- |
| What I have done | As explained in the first log, the jump amount would reset when the player touched any “grounding” Layer (“Ground”, ”Ladder”, “Towers”) |
| What was the problem | Since the player object had one collider, he could just press himself against the wall, which would “ground” him and grant him unlimited jumps. The player could skip any walls with this bug. |
| How I solved it | I introduced a second collider, a collider for the player’s “feet”, which was thinner than the body collider. Instead of checking the body collider if it is touching any “grounding” layer, I checked the feet collider. When the player pressed himself against the wall, only the body collider would touch the wall and therefore it would not reset the currJumpAmount. |
| What I learned | There are often creative solutions, which may not be obvious at first glance. |

## Enemies turning at mushrooms

05.06.2022

|  |  |
| --- | --- |
| What I have done | I introduced enemies with an EnemyMovementScript. The basic idea was, that the slime had a trigger in front of him, which was also sticking into the ground. Whenever he would go to the end of a platform or hit a wall, he would stop “triggering” and it would call OnTriggerExit2D(Collider2D collision), flipping the enemy sprite. I, therefore, deactivated every layer collision, the slime could only collide with “Ground”, “Player” and “Enemies”. |
| What was the problem | The enemy would turn whenever he exited a mushroom collider, which was deactivated in physics2D. |
| How I solved it | With many tests, I derived that triggers don’t count as collisions. Even though the slime couldn’t collide with any mushroom, OnTriggerExit2D(Collider2D collision) would still be called. I just added a simple if statement, that checks and returns the function, if the collision tag is equal to “mushroom” |
| What I learned | Even though any collisions between 2 layers are deactivated in Physics2D, triggers will still get triggered. |

## Swords bugged out when turning

20.06.2022

|  |  |
| --- | --- |
| What I have done | I created a simple script, which tracked in which direction the player was facing and how the swords should be displayed. The swords were child objects under the player object. When the player turned(flippedSprite), the sword positions (for example rSwordUp, lSwordDown) should stay. I called the OnRotate(InputValue value) in the Update method providing null as the parameter. If player input called OnRotate(InputValue value) value would be not null.  I now could check regularly if the sword positions were correctly set up. |
| What was the problem | When the player turned(flippedSprite) the swords would correct themselves, but it took one frame until the sword updated. When the player would walk fast left and right, the player could keep up 4 swords (alternating 2 swords each frame), making many levels easy. |
| How I solved it | I reworked the whole RotateSwordScript, the swords now aren’t child objects under the player object. The script is now simpler only updates the swords when he gets called by player input, which is better in terms of performance. |
| What I learned | I now truly understood the correlation between a parent object and a child object and how the parent’s position affects the child’s position. Furthermore, I learned, that sometimes the best option is starting over again. |