Trial of the Elements

Jack Rathbone - 2282711 - Group 7

Reflection Document

introduction:

Trial of the Elements is a top down 2D puzzle game, in which the player must get to the end of the level by pushing objects out of the way and maneuvering through various challenges. Its main mechanics and the overall focus of the game is that certain objects, called elements, are not just pushable but combine with each other to create new elements that open up paths for the player. The player is faced with various roadblocks and they are required to make use of both space and elements across the level by pushing and combining them to solve the puzzle and get to the end.

The game focuses on a slower more casual approach to challenges, with the player not required to use twitch skill or timing, and instead solely focusing on the entire level, working out the exact order to move and combine elements and objects to win. The theme of the game is that of an exam for magic, with the player being a student, with each level acting as a section of the overhaul practical examination. This is reflected in the layout of levels, with each level having a general focus on a specific set of mechanics or solutions. Players are also given a grade at the end of each level, which serves as a score, with the best grades coming from completing the level as quickly as possible, based on an average time to beat for each level.

planning:

The beginning of the planning process started with a discussion on the core mechanics of the game, which quickly focused around the idea of having a box pushing puzzle game, like the Japanese classic *Sokoban* (1981). This game used movement, space and manoeuvring as the core puzzle challenge, but was limited to that single mechanic. The group's idea was to mix this style of gameplay with that of the mobile game *Doodle God* which has the player mixing elements together to create new elements, in order to meet various goals. Thus the original core concept became to make a box pushing game where you push elements across a map to get through various obstacles, pushing elements into each other in order to create new elements that then have their own specific uses.

Starting out as a group effort, planning of the game project was always done with the knowledge that it would be iterated on at various points when the game would be

worked on by individuals. This focus on iteration was carried on through every stage of the planning and actual process of making the game. While planned around the skills, strengths and weaknesses of every group member, no plan based on averages is likely to be followed 100% by every individual who follows it.

The iterative nature of the project also meant that playtesting became a very important part of the process of making the final game, with playtester input used at various stages of development to push iteratives changes to the original plan. For this reason certain parts of the mechanics and especially the level design was left vague or not really discussed at all, with the idea being that playtesting response would lead the development of this part of the game.

Apart from the iteration and the playtesting elements, the planning followed a clear path with three levels of focus/goals. These goal tiers went in order of importance and necessity to the game, with primary being the mechanics and systems required for the most basic version of the game to run, secondary being elements that added to the overall feel and experience, and tertiary being things that would most likely not be added but if there was time and resources they would be good to have. These tiers helped to focus the design process by highlighting the order in which various elements should be created, as well as suggesting ways in which extra time could be utilized to further add to aspects of the game.

process:

Iterating on the Project Plan

Often there are blindspots in plans that don't seem obvious until someone has to sit down and start following them, but before the first script had even been typed it already became obvious that the project plan had some issues that needed to be evaluated and rethought out. The process had begun by working on the primary goals of the project plan, following the schedule, which started off with various basic mechanics such as the character controller and object interaction system. The issue here was the vagueness of the plan, using words such as '2D grid based movement' which while maybe evocative, can also mean vastly different things to different people. So from these vague terms an actual solid mechanic had to be derived, in this case with the game using a movement system with grid snapping where the player moves between the centre of grid squares, one at a time.

On the other hand the object interaction system was straight forward, x object should collide with y object and then destroy both and spawn object z. But this was a point where it became necessary to think about every object in the game, how they

interacted and what they contributed to gameplay. What was found was that the plan had contained mentions of certain object combinations that did not seem to have a clear use and did not fit in with all the other objects laid out in the plan. For example water and fire elements were to combine to create steam, which stated that "'steam' objects can pass through certain walls to activate switches". This mechanic would contradict the existence of grates which are walls that allow any object to be pushed through except the player, and also mention the existence of switches which are not brought up anywhere else nor how they fit in with the rest of the named objects.

This raised a glaring issue with the project plan in general, it lists many different elements and objects that exist and do things, but at no point fully delves into all of them and how they relate, leaving the most central part of the game very vague. In order to fix this, the first major iteration was done, which took the project plan and removed any references to a number of objects, focusing instead solely on a core list of objects, making it very clear how they all related and interacted with each other. This redraft got rid of many superfluous mechanics, which also helped to focus the game as the project plan had decided on having six levels only, so having less possible combinations meant less would have to be crammed into each level.

Overall the project plan actually did not require that many changes to it, as the main areas of the game that needed work were the level design and UI, both of which were touched upon but not specified in any detail in the project plan. Item 2 in the appendix shows the updated and edited project plan, with some highlights showing newly added text and strikethroughs showing major pieces of text that were removed.

Scheduling Adjustment

While the original schedule in the project was pretty accurate to the time needed for each task to be complete, the creation of the game faced two large issues which set back the time and meant that the last few stages of development were rushed. The first being that simply, despite being allocated five days towards level layout and design, this time was not efficiently used because of concurrent tasks such as the score system and art asset creation taking more time than expected. The main reason for this was also that despite playtesting being scheduled for later after the creation of all the levels, it quickly became apparent that it was very hard to decide if a level was engaging or working well as a puzzle, without some sort of playtesting and feedback process.

So the level design stage continued past the five days and actually right up until the 24th of June, instead of the 17th, because multiple stages of playtesting and feedback were used as each level was made, which led to further edits and changes in previous levels. Then on the 20th a technical error with Github led to most levels being deleted,

and so the process had to start again. While the other work did finish on time, working on the final tasks such as time allocated for juice and effects, was abandoned to focus on the level design entirely. This meant certain secondary goals, and all tertiary goals, were abandoned in favour of levels.

The positive of this was that levels got a lot of input from playtesters during the entire process, and plenty of space was given to making the best player experience based on the repeated stages of feedback. Item 1 in the appendix shows the results from a playtest questionnaire done after playtesters tried the 3rd build of the game (second last build). The questionnaire seemed to show that the tutorial level, which was redone three times, was effective in conveying the mechanics to players. In earlier versions the tutorial level just taught movement and specific mechanics were introduced in each level which meant overall having more text that the player had to read in each level.

The main issue highlighted by feedback was the grade system, which the project plan states exists to push players to replay levels. This did not seem to be the case for every player, with two in this particular set of feedback stating they didn't choose to replay levels to get a better grade. While the majority did, there obviously could be more done to encourage players to replay levels, whether this is simply changing the scoring system or actually making the levels themselves more replayable with alternate routes or something like that.

The Art Swap

A very minor change from the plan, this time something discussed in the presentation specifically and not the project plan itself, but the format of the art assets was changed. Originally the group decided on using vector art, saying that this was easy to do and meant there would not be issues with rescaling levels or the art assets if needed. But when work started on the game this raised an issue for me personally, firstly I had no experience with vector art, and secondly learning it would only make art implantation take longer. So while it may have made sense as a group, as an individual it became much better to instead move to pixel art, something I am much more comfortable with. The format on the art assets had no tangible effects on the creation of the rest of the game.

reflections:

With the game completed, after rounds of feedback and even a formal questionnaire, it is interesting to look back at how much the game differs from its original conceptualisation. This change is down to firstly how the project plan describes the game actually differing from mechanics it lays down, to changes made in the process of iterating the game. What was interesting in the end is that actually the role of

combining elements specifically, as opposed to pushing elements into relevant objects, was actually not that big of a feature in the game. For example, the fire element was originally supposed to combine with water to make steam but as stated earlier this was removed, so now fire only combines earth, but this produces lava and not another element. So that entire concept of mixing elements actually became a mechanic where elements mix with objects to create elements, and with each other to create objects.

An example of what this looks like in gameplay is that the player would push a water element into lava in order to make an earth element, which they then would push into a hole so they can cross over and reach the end of the level. While this is still a combination, it is more like transformation, and this would have been a better way of putting it in the project plan and explaining it to players. But only once the game had been made did this fundamental change to its concept become clear, but it does not seem to detract from the games engagement and how it works as a puzzle.

The changing of the score system from one that used stars, from 1-3, into a grading system, A-C, was simply a visual choice to bolster the identity of the game as being an examination, and functions mechanically the same. The use of an average time for each level, while it seemed to work well enough for playtesters, felt a bit difficult to gauge in terms of what was fair. Using a different more objective system, like having multiple paths, or maybe a counter of moves used etc., could have made it both easier for the design of levels and the understanding of the player.

Despite the playtesting there is still much to be desired from the level design, with room for making more complex levels that manage to keep a more consistent difficulty. The current mechanics give just about enough content for six levels without repeating any level layouts, but levels are short and tend to focus just as much on moving about than actually thinking about what has to go where. This means half of every level is just busy work as the player moves objects across the map, already knowing how they will solve the puzzle. It is hard to strike the balance between over cluttered and confusing levels and those where the main solution becomes too obvious, and *Trial of the Elements* strays across this line both ways in many of its levels.

But overall the game did come out pretty close to the parameters of the project plan, and feedback shows that playtesters found it an enjoyable experience with puzzles that gave a good challenge. Obviously with more time, and probably better preparation and discussion of the mechanics in the project plan, *Trial of the Elements* could be a stronger game, but it is still generally successful in meeting its primary goals and having enough content to be engaging.

appendices:

[Item 1. Playtest Questionnaire from the 3rd build]

Question	Yes	No
1. Did you feel the mechanics of the game were well explained in the tutorial?	5	0
2. Did you replay any levels to get a better grade?	3	2
3. Are the combinations in the game logical and make sense to you?	5	0
4. Did you feel the challenge was fair?	4	1

Question	Long	Alright	Short
5. Is six levels a good amount of content or did it feel too long/short?	0	5	0

Comments (Question 6):

Name	Comments
Diyanka (peer)	I really liked the premise of a wizard exam and how you incorporated it through the mechanics and UI
Juliette (peer)	I have nothing to suggest because it was an interesting concept and the puzzles felt engaging. The movement mechanic was satisfying because of the way the wizard slid into the squares. The only thing I could suggest at this stage is sound, because that would elevate the satisfying feeling of creating a new element, or destroying something.
Michaela (peer)	Maybe cut down on the tutorial levels text, it looked a bit overwhelming at first. The hole in the ground didn't make sense to me at first, then I realised that the stone filled it by replaying the level.
Daniel	I liked how the elements tied to the environmental challenges. and were used as a way to overcome them

Jonah	Fun game which challenges you. I had a bug with the ice where if I hit into a rock from the ice I couldn't move afterwards

[Item 2. Updated Project Plan]

WSOA3003A: Project Plan

Trial of the elements

Imaan Abusamra 1839590
Kamogelo Maimela 2103503
Justin Perumal 1452891
Jack Rathbone 2282711

Game Concept

Basics and Gameplay

Trial of The Elements is a 2D top-down, action puzzle game, designed for PC. It is a single-player game, in which the player must work through and complete a series of challenging escape puzzles in order to progress. Through each puzzle, the player is required to interact with and make use of various different elements. This is done by pushing elements around within the various levels, in a grid-based movement style. The game starts off with three basic elements – fire, water, and earth – which can be combined with each other and objects to solve challenges. ~~Every element has their own, unique abilities and possible uses, presenting the player with the opportunity of having multiple different solutions to the same puzzle.~~ New elements and mechanics are progressively introduced to the player, as they complete each level - resulting in increasingly more challenging puzzle levels as the player progresses within the game.

Narrative and Theme

Trial of the elements takes place in the dungeon beneath a school of wizardry and witchcraft. The player takes on the role of a student, taking part in their school exam. Each level is presented in the form of a ‘puzzling’ exam question. Upon completion of each level, the player is graded and receives a score based on their performance. The faster they solve each puzzle, the higher their score - being rewarded an average grade for simply making it out of each puzzle alive. Within each puzzle, the player is tested on their magic knowledge by using the various elements found within each level to aid them in completing each challenge. The elements help them overcome obstacles within the levels, as well as allow them to protect and defend themselves from the creatures that lurk in the depths of the school dungeon.

Project duration

The allocated time period for the creation of *Trial of the elements* is from Monday, 31st of May, through to Friday, 25th of June. Making up a total of 26 days, including weekends and personal days.

Design Methodology

Through the development of *Trial of the elements*, the iterative design methodology will be implemented. The various different features of the game will be playtested upon individual completion, and before the implementation of further game features and assets.

Project outcome and requirements

We want to create a game that:

- Is an engaging and entertaining pass-time for players (casual gameplay).
- Has a simple control system that allows for multiple possible actions and uses.
- Is readable and well communicated in its interface design.
- Contains simple, understandable mechanics.
- Contains puzzles that allow for exploration of mechanics.
- Encourages thought and strategizing through its challenging puzzles.
- Develops and encourages the use of logic, rather than twitch skill.
- ~~Offers players a variety of different approaches and options in solving puzzles.~~
- Encourages interaction and experimentation.
- Has at least six playable levels, available to players.

Feature List

Player Movement

- Player can move in four directions, going one grid space at a time
- Player moves across the grid at the same speed as all other objects

Pushing Objects

- Player walks into a pushable object to move it in the same direction the player is moving, as long as there's space for it to move in that direction
- Pushing objects is the main way that the player interacts with objects in the game

Combination System

- Elements, which are a type of object, can be pushed by the player into each other

- When two compatible elements are pushed together, they are destroyed and form a new element or object on the spot
- Each element has a unique gameplay function, so the player uses pushing to create new elements in order to solve the puzzle
- Non element objects can also ‘combine’ in the sense they create a new state on contact with another object, such as earth filling in holes in the ground and certain elements killing enemies on contact while also being destroyed

Obstacles

- Static obstacles exist to block the players movement and present a challenge
- Basic obstacles like doors can be destroyed using basic elements, such as fire in the doors case
- Other obstacles like grates allow objects to pass through but not the player, they cannot be destroyed
- Ice and lava work like obstacles but combine with elements to make new elements, with lava killing the player and enemies and ice forcing the player to keep moving in the same direction until they hit a wall

Enemies

- Enemies function like obstacles that kill the player on contact, and also cover multiple tiles at the same time
- Patrol enemies move along a route back and forth, and can be destroyed by pushing elements into their path so they eventually walk into the element
- Ranged enemies fire continuously in a set direction, and are also killed by elements being pushed into them
- Basic enemies are vulnerable to any element killing them, while elemental enemies can only be killed by a specific element ie water enemies are killed by the water element

Score & Star System

- Players are awarded a score at the end of every level, from A to B to C like a grade ~~1 to 3 stars~~
- The score is given based on the time the player takes to finish a level, with each level having its own scale for how quickly it should be completed
- Adds replaybility to each level, with A being given for the player completing the level faster than the average time, B being an average score, and C being for time going over the average amount of time
- Multiple routes to solve the level usually account for the time differences between a low and high score

Example Level Score (average time being 3-5 minutes):

Time in Level	> 5 minutes	3-5 minutes	< 3 minutes

Score	A	B	C

Task breakdown & Dependencies

Task breakdown (technical)

Trial of the Elements will contain a variety of features. This section will break them down and will separate them into primary, secondary, and tertiary goals, where primary goals are necessary for the final game, secondary goals should be present but are not necessary for the game to function and tertiary goals would include tasks that would improve the overall game but are not necessary at all. Tasks will be done by all members of the team but certain members will be in charge of certain tasks and will oversee progress.

Primary goals:

- Top down, grid-based movement
    - Movement will only be in the four cardinal directions (up, down, left, right). Movement will only be allowed if the previous movement command has been completed.
    - The movement of objects and characters will be at a constant speed for all entities (players and enemies).
- Pushing objects
    - Objects will be pushed along the predefined grid and will only move if the requirements are met (empty space to move to, suitable element to combine with or interact with)
    - Different objects will react differently when being pushed and have different movement conditions. Certain objects will react when pushed onto other objects, while some may be pushed through walls for a specific purpose.
- Elemental Objects
    - The game will feature a variety of elemental objects. There will be three primary elements (Fire, Water, Earth) and four secondary elements (Steam, Lava, Mud, Ice). These elements will have their own unique use.
    - Each element should be created as a prefab for easier placement and functionality when designing levels.
        - Example: ‘Fire’ objects can burn obstacles and create a path for the player
        - ~~Example: ‘Steam’ objects can pass through certain walls to activate switches~~
- Elemental combinations
    - This is the core mechanic and feature of the game and must be implemented properly for most of the other features to work properly. As such this task must take priority during the development stage.
    - Combination will happen when colliders for appropriate elements come into contact. If elements cannot combine, their objects will not move and the push movement will not occur.

        - ~~Example: Water + Fire → Steam: Steam: Passes through certain walls~~
        - Example: Earth + Fire → Lava: Blocks paths completely and defeats enemies
- Obstacles and enemies
    - There will be many obstacles and enemies that hinder the player's progress.
    - Obstacles are physical objects that block off paths or affect how the player progresses.
        - Example: Wooden Doors: Block player off from certain areas. Can be destroyed by fire.
        - Example: Ice: forces the player to continue in one specific direction until stopped by a wall or end of the ice path.
    - Enemies will either be static and remain in one spot, patrol a predetermined path, or shoot projectiles along a specified line. Should the player come into contact with either an enemy or projectile. The level will fail and it must restart.
    - Enemies will be split into two categories. Basic and elemental. Basic enemies are vulnerable to any element type. While elemental enemies are weak to specific element types
        - Example: Fire elemental enemies will be destroyed by fire elemental objects.
- Scoring and Star System (Rating)
    - Players will be rated at the end of each level and will be given stars to indicate how well they did. The quicker a player completes a level, the better their ranking will be. Each level should have its own time milestone to indicate star level.
- At minimum six playable levels at launch.
    - Each level should focus on a separate element or challenge at its core.

Secondary Goals:

- Quick and easy restart functionality
    - Restarting a level should be as easy as clicking a button on screen or by pressing a specific button on the keyboard
- Basic/accessible control scheme.
- Audio and music implementation.
    - Ambient music, combination sounds
- Animations.
    - idle, pushing, walking, etc.
- Increasing difficulty in levels
    - First few levels will teach the player basic mechanics while later levels will test the player on all the things they have learnt
- Levels will allow for potentially multiple solutions
- Levels will allow for exploration of the game's mechanics through interaction and experimentation.
- Due to games casual nature, players should be allowed to quit at any time and come back to play a level in their own time (Level select)
- UI that provides the player with meaningful feedback

Tertiary Goals:

- Scoreboards
    - compare player scores to one another
- More/better animations
- Co-op multiplayer
- Hint system
    - This will give the player a small hint that will assist them in completing their current level
- More levels implemented
- Skins for characters, as well as character selection options
- F to scream.
    - AaaaAAaaAah

Dependencies

Due to the nature of development. Secondary and Tertiary goals will be dependent on Primary goals. This means that the development of these goals will only begin once all primary goals have been implemented. However some tasks and goals may overlap and development will be done continuously. All improvements to game feel and feedback will be done at the end of the development stage.
Development is not dependent on external assets (art, animations, sounds, music) for this project and these will be implemented as they become available.

Risks

Risks that pose a threat to the progression of our project:

Risk	Mitigation Plan	Contingency Plan
1. Power outages	Have meetings at university where backup generators are available.	Develop a schedule around when the power cuts occur.
2. Falling sick	Hold online meetings to reduce the risk of infecting anyone else.	Restructure the project's schedule until the group member recovers from illness.
3. Internet Service issues	Hold meetings at school where stable internet connection is available.	Hold team meetings on zero-rated Wits platforms such as BBB.

4. Project conflicts not resolved in a timely manner.	Hold regular team meetings to look out for arising conflicts.	When aware, take conflicts up to the project manager to resolve.
5. Scheduling errors.	Track schedules every day. Raise errors as early as possible.	Escalate errors to project manager.

Milestones

- **Game concept approval from tutor:**
  Once the game concept is approved by Marco (our tutor), this will serve as a go-ahead for the team to begin working on the project.

- **Assigning tasks to group members:**
  Allocating the right personnel for each task will lead us into new phases of the project and set openings that will move the group forward.

- **Creating a prototype:**
  Creating a visual representation of the game concept will allow us to assess the features and best possible ideas for creation.

- **Project phase milestones:**
  - First iteration (Core mechanics and code framework):

    We want to have the base framework and core mechanics of the game completed.

  - Second iteration (UI and art implementation)

    We want to have a prototype which provides effective communication feedback towards the player.

  - Third iteration (Level Design)

    We want to have a prototype which includes various interactions which pace the player to emulate levels.

  - Fourth iteration (Finalization of project)

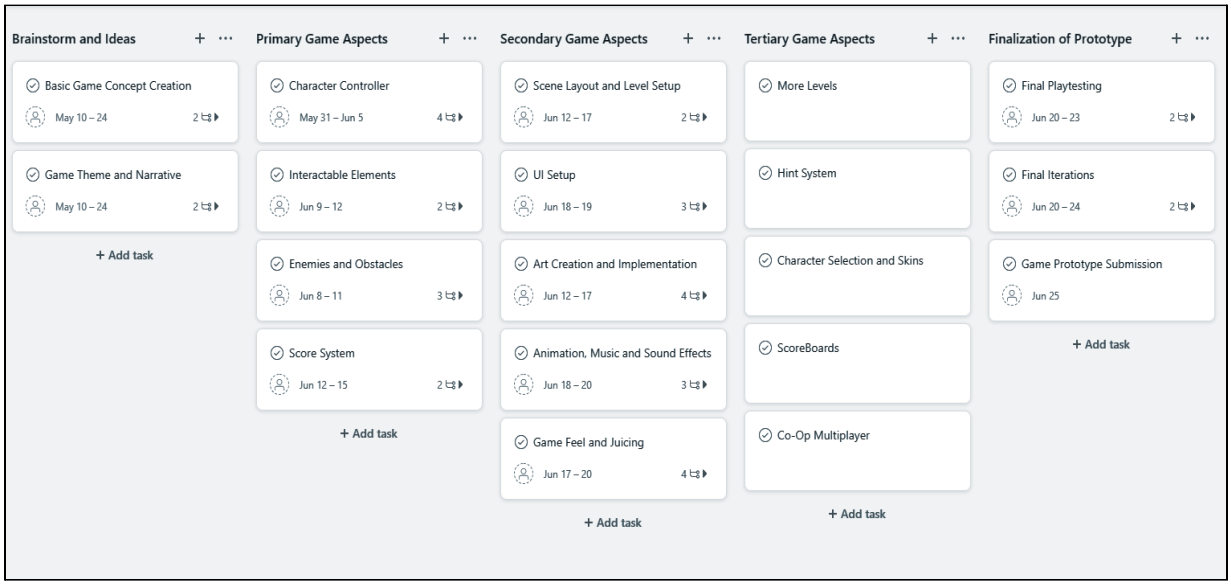
    We want to implement the tertiary goals of the game, as well as adding game juice and feel - if time allows for it.

- Fixing and polishing weaknesses

- Presenting for final approval

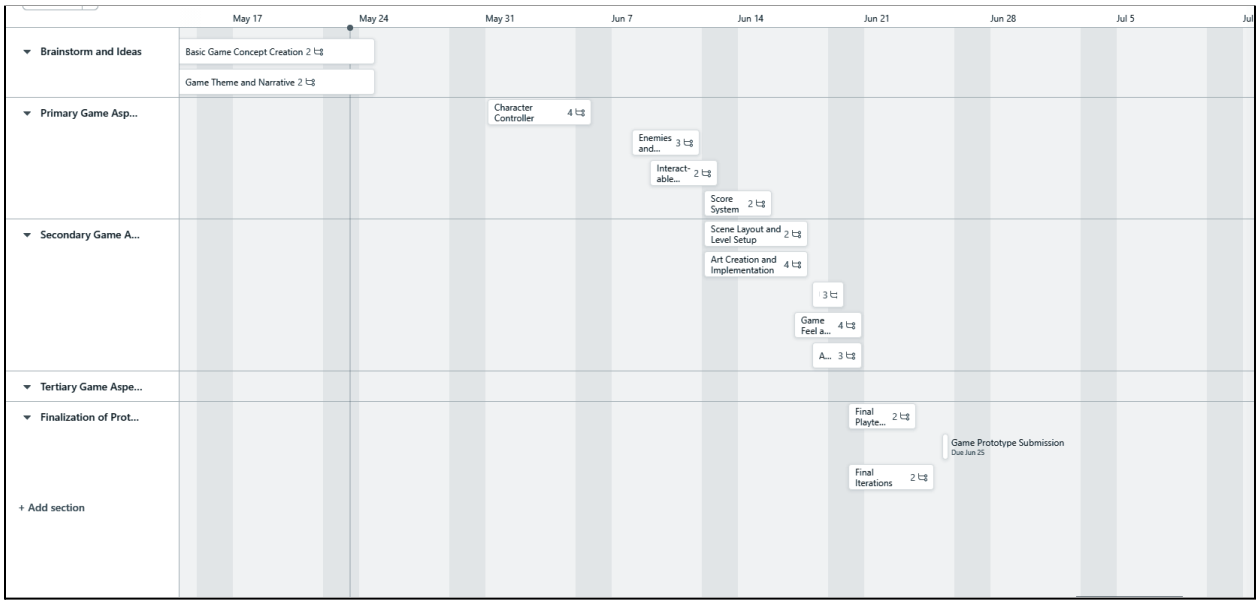
Task Breakdown

The project tasks are broken down, and categorized in terms of the various stages they will be worked on. They are divided into subtasks, as well:



Scheduling

Tasks are planned out and spread over the course of 26 days. This takes into consideration the possible risks of the project:



references:

Sokoban. (1981). Hiroyuki Imabayashi.

Doodle God. (2010). JoyBits.