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# | Project Overview

## | Project Overview: Game of Ethics - Boeing 737 MAX Dilemma

The "Game of Ethics" is an online multiplayer interactive game that aims to immerse students in a real-life industry setting, focusing on the ethical challenges surrounding the Boeing 737 MAX incidents. Through role-playing and decision-making, students will explore the complexity of working in an organization and contemplate the ethics, governance, and unintended consequences of building systems, fostering a reflective practice.

---

### Project Objectives:

1. Create an engaging online game that simulates real-life scenarios, encouraging students to explore their behavior in a mock environment.
  2. Design a decision-tree based system to allow multiple outcomes, which will be used as teaching tools to illustrate the complexity of organizational decision-making.
  3. Encourage students to contemplate various aspects of their decision-making process, such as governance, ethics, and managing people.
  4. Promote a reflective practice among students by allowing them to analyze the outcomes of their decisions and learn from real-life industry challenges.
  5. Create a user-friendly and immersive experience that can be easily integrated into classroom activities and discussions.
- 

### Project Structure

| Project Overview

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| General Process Document

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| Requirements Analysis

---

| Product Backlog

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| Sprint Planning

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| Meetings

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| Game Design

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| Development

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| Testing

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| Deployment & Release

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| Bin

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### This page contains following directories:

| Project Background & Objectives

---

| Project Scope & Motivational Model

---

| Challenges & Risks

---

# | Project Background & Objectives

Version Date	Editor	Comment
23 Mar 2023	Yu Hsien Chiang	V 1.0

## Product Overview

The objective of this project is to create an interactive online game that simulates a realistic working environment for educational purposes. The game aims to encourage students to reflect on the ethics, governance, and unintended consequences of building systems. Through the game, students will encounter the complexity of decision-making and the conflicting information they may engage in real-world scenarios. Ultimately, the students will have a deeper understanding of ethics, improve their critical thinking skills, and enhance their problem-solving abilities. The main goal of this project is to improve the game developed by the previous team by fixing technical issues, improving its user experience, and enhancing its resilience.

## Game Background

The game is built on the Boeing 737 Max accident case study. Each of the 5 players plays a different role in the airline industry and must make critical decisions based on different information. The 5 roles are:

- The Boeing executive
- Software Developer
- Airplane pilot
- Aeronautical engineer
- Federal Aviation Administration (FAA) worker

The players progress through the game by making their decisions using decision-making trees.

## Client Goals

The game was previously developed by a different team and has been handed over to the RedBack team. However, the game has numerous bugs and issues that negatively impact its performance and user experience.

Therefore, the primary goals of this project are to:

1. Conduct comprehensive testing and debugging to ensure that the code is efficient and effective
2. Enhance the game's robustness and resilience to prevent future issues and bugs and to improve scalability
3. Deploy the game onto the AWS service to improve its accessibility and scalability.

# | Project Scope & Motivational Model

## Project Scope

According to the requirements of clients, our project aims to fulfil the following scopes:

#	Scope
1	Make sure the game is deployed online. Hosting service options can be <a href="#">AWS, Heroku or other alternatives</a>
2	The game can be used to teach students about how AI ethical questions are applied. Take the example of Boeing air crash scenario
3	Ensure the game can be running stable, without bugs.

## DO-BE-FEEEL

Role		Do	Be	Feel
Students /Teachers	Participate in decision-making	Develop decision-making skills through gameplay	empowered to make informed choices	Accountable for decisions
		Develop ethical thinking skills through gameplay	able to navigate complex ethical issues	Accountable for decisions
		Analyse the ethical dilemmas	Mindful and self-aware	Accountable for decisions
Facilitate ethical discussions		Monitor students' progress and engagement with the game	Organized and strategic	Approachable
		Provide constructive feedback and assess students' learning outcomes and growth in ethical understanding.	Responsible for the consequences of decisions	Thought-provoking
Students	Learn the responsibilities and ethical codes of the five characters	Apply ethical principles learned from the game to real-life situations	Informed and knowledgeable about the professional duties of each role	Empathetic
	Create a safe environment for players to express their thoughts and opinions	Reflect on the potential consequences of players' actions		Engaged /Open to learning

## GOAL MODEL

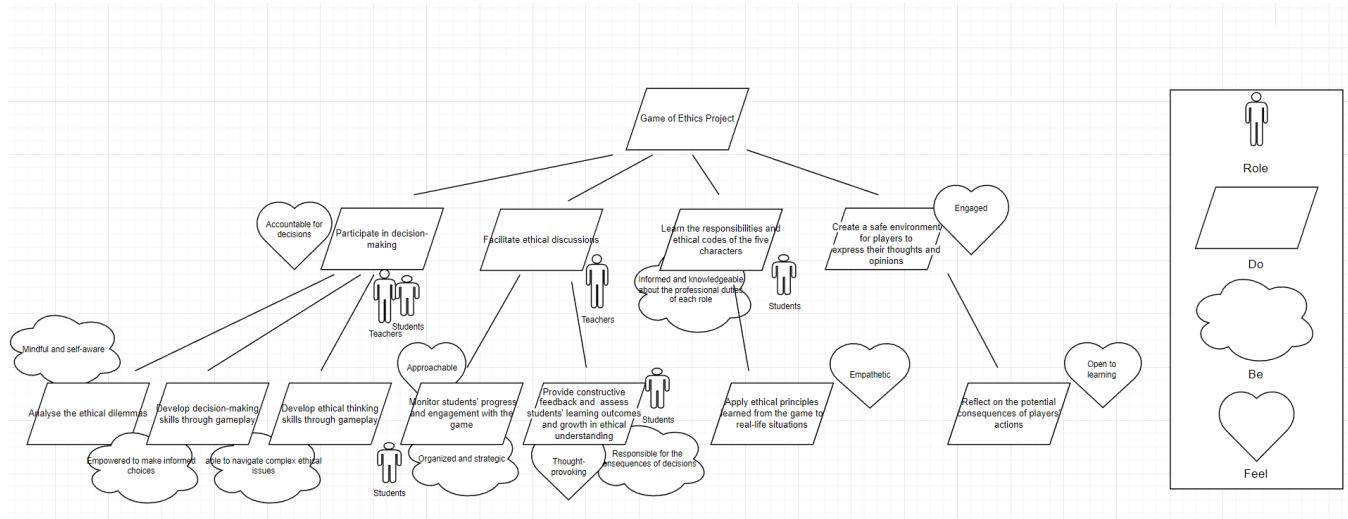


Figure 1: Motivational Goal Model



# | Challenges & Risks

## Challenges:

- Cultural and linguistic: Projects might face challenges with cultural differences and language communication. For example, when translating game content, one needs to ensure that the information is accurately communicated to users of different languages. In addition, considering the cultural backgrounds of different countries, the game design needs to take care to avoid content that may cause misunderstanding or offense.
- Maintenance and Updates: Over time, projects might need to be maintained and updated to fix bugs, improve functionality, or adapt to new technical requirements. This requires an investment of ongoing resources and effort to ensure the stable operation of the project.
- User experience: The project needs to take full account of user experience so that bu'tongbu'tong' different types of players can easily understand and participate in the game. This required optimizing the game interface, interaction design, and other aspects. At the same time, it was necessary to ensure that the game content was educational for various characters so that players could reflect on the different outcomes at the end of the game.

## Risk

- Technical implementation: Although the project is not a video game, implementing multiplayer online interaction still requires some technical skills. Problems such as network latency and high server load may be encountered. At the same time, code optimization and performance tuning are required to ensure the game runs smoothly.
- Laws and regulations: Depending on the laws and regulations of different countries and regions, some of the content may need to be adjusted to comply with local regulations. For example, regulations regarding data storage and transmission may vary from country to country and require the project to be adjusted accordingly.
- Security: Projects deployed on AWS may face the risk of data security and privacy breach. To protect user data and project information, appropriate security measures need to be implemented. Such as data encryption, access control.

# | General Process Document

This page contains following directories:

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| Communication Plan

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| Roles and Responsibilities

# | Communication Plan

Stakeholder	Objective	Format	Frequency	Owner	Importance
Client	Report progress updates and clarify project team questions	Sprint review - Zoom	Fortnightly	Product Owner	High
	Provide documentation of team progress, decisions, and Sprint review meeting conclusions	Email	Weekly	Product Owner	High
	Answer project team questions about requirements	Email	when needed	Product Owner	High
	Identify the resource needs of the development team	Email	when needed	Product Owner	High
	Quick discussion, clarification, and decision-making	Slack / Zoom	when needed	Product Owner	Medium
Supervisor	<ul style="list-style-type: none"> <li>• Stand-up meetings</li> <li>• Report progress updates, project plans, questions, and issues</li> </ul>	Zoom	Weekly	Scrum Master	High
	Short questions	Slack	when needed	all team	Medium
Project Team	<ul style="list-style-type: none"> <li>▪ Specify the user stories that need to be done and discuss how they will be done</li> <li>▪ Confirm the expected outcome</li> </ul>	Sprint planning meeting - Zoom	Beginning of a sprint	Scrum Master	High
	Showing currently completed functions	Sprint review meeting - Zoom	Weekly	Scrum Master	High
	Keep track of task allocation and progress	Trello	Daily	Scrum Master	Medium
	Internal discussion, issue report, daily interaction	Live Chat Tools / Slack	when needed	all team	Low

# Roles and Responsibilities

Roles		Responsibilities	Name
Scrum Master		<ul style="list-style-type: none"> <li>Help the team to self-organise and make sure the team is fully functional and productive.</li> <li>Arrange and lead Scrum meetings: Sprint planning, Supervisor meeting, and Sprint reviews</li> <li>Ensure close cooperation between Dev Team members</li> <li>Protect the Dev Team from outside interference and remove obstacles that hinder project progress</li> </ul>	Quechen Yang
Product Owner		<ul style="list-style-type: none"> <li>Confirm product features, release dates, and contents</li> <li>Define and prioritise the product backlog</li> <li>Maintain close contact with stakeholders to provide timely feedback on team progress and ensure the product backlog is refined and updated regularly</li> <li>Ensure that the Dev Team understands the product requirements and features by creating detailed user stories</li> <li>Make critical decisions about the product and provide guidance to the team on what features should be developed and when</li> </ul>	Yu Hsien Chiang
Dev Team	Frontend Developer	<ul style="list-style-type: none"> <li>Ensure the user interface is visually appealing, responsive, and optimised for performance, response speed, and compatibility</li> <li>Work with the backend development team to integrate the front-end with the server-side</li> <li>Write clean, modular, and maintainable code for the client side of web applications.</li> </ul>	Hongwei XIANG Quechen Yang BoHan ZHANG
	Backend Developer	<ul style="list-style-type: none"> <li>Write clean, scalable, and well-documented code that meets the project requirements</li> <li>Optimise and modify back-end codes for code scalability, efficiency, and performance to meet the project requirements</li> <li>Implement APIs for communication between the front-end and the backend</li> <li>Work closely with the database engineer to ensure data is stored and retrieved efficiently</li> </ul>	Zhuofu LIU Yu Hsien Chiang Quechen Yang
	Database Developer	<ul style="list-style-type: none"> <li>Design, implement, and maintain the database schema and architecture</li> <li>Optimise database performance by creating indexes, optimising queries, and tuning database parameters.</li> <li>Work closely with the backend development team to ensure that the application is integrated with the database properly</li> </ul>	Zhuofu LIU
	Tester	<ul style="list-style-type: none"> <li>Develop and execute test plans, test cases, and test scripts to ensure the quality of the software product</li> <li>Perform manual and automated testing of the software product and report defects to the development team.</li> <li>Collaborate with the development team to ensure defects are fixed and retested.</li> <li>Participate in the continuous improvement of the testing process and the automation of the testing</li> </ul>	Hongwei XIANG BoHan ZHANG

# | Requirements Analysis

This page contains following directories:

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| Personas

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| Functional Requirements

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| Non-Functional Requirements

# | Personas

To support project needs, three personas were developed to help with requirements validation. These personas are based on research and discussions with industry partners while being inclusive and diverse.

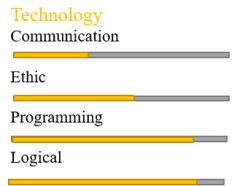
Type	Bio	Goals
Student V2.0	An aerospace engineering student with a passion for the field of aviation. He has a strong interest in ethical decision-making and corporate governance.	The student hopes to use the game to better understand the issues involved in ethics, corporate governance and unintended consequences in the aerospace industry and to prepare for his future career.
Software Developer	A software developer who is taking a vocational training course to improve her skills in ethical decision-making and risk management.	Through this game, she hopes to improve his skills in decision-making, teamwork and communication in a simulated realistic environment.
Corporate Trainer	A corporate trainer who is responsible for providing ethics, corporate governance and decision-making training to corporate employees.	He hopes the game will be an innovative teaching tool that combines realistic examples with interactive elements to help employees improve their awareness and skills in ethics and decision-making in a safe simulation environment

# [Persona] Student

Ethan Turner



- Age: 23
- Work: aerospace engineering student
- Family: Both-parents family
- Location: Melbourne VIC



## Goals

- Use the game to better understand the ethics, corporate governance, and unintended consequences involved in the aerospace industry.
- prepare for future career.

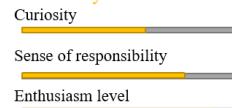
## Frustrations

- He is focused on his studies and is very unfamiliar with games, and multiplayer games are a challenge for him.
- It is difficult for him to learn the theoretical aspects of ethics

## Motivation

- Enhanced knowledge and skills
- Enthusiasm and interest.
- Personal fulfillment
- Career development

## Personality



## Bio

Ethan Turner, 23, was born into a two-parent family and is a college student with a passion for aerospace engineering. He has had a curiosity and passion for flying vehicles and space exploration since he was a child. Despite excelling in academics, he is relatively weak in interacting with people in his daily life.

During his college years, Ethan became interested in ethical decision making and corporate governance, realizing the importance of these areas in the aerospace industry. To deepen his understanding and improve his skills in this area, he decided to try a game that could simulate a realistic environment. In this way, he hopes to explore the ethical, corporate governance and unintended consequences involved in the aerospace industry in a safe and simulated environment, and to be well prepared for his future career.

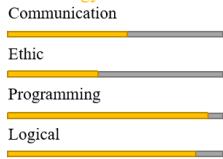
# [Persona] Software Developer

Sophia Clark



- Age: 32
- Work: Software Developer
- Family: Married
- Location: Melbourne VIC

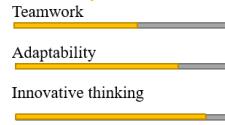
## Technology



## Goals

- Improve skills in ethical decision-making teamwork and communication in a simulated realistic environment by participating in vocational training courses and playing games

## Personality



## Frustrations

- Lack of sufficient practice opportunities in real life work to improve her skills in ethical decision making and risk management.
- The ethical dilemmas and risk management issues that she may encounter in the workplace cause her to feel uneasy and stressed when making decisions.

## Bio

Sophia Clark, 32 years old and married, is a talented software developer with many years of industry experience. She graduated from a top university with a degree in Computer Science and has held key positions at several well-known technology companies. Sophia became interested in a game that simulates a realistic environment, which she hopes will improve her skills in decision making, teamwork and communication. As a software developer, she understands that having these skills is critical to career growth in a fluid technology field.

## Motivation

- Self-improvement
- Enthusiasm and interest.
- Career Development
- Teamwork and communication

# [Persona] Corporate Trainer

Benjamin Cooper



- Age: 37
- Work: Corporate Trainer
- Family: Divorced
- Location: Melbourne VIC

## Technology

Communication

Ethic

Programming

Logical

## Goals

- Find an innovative teaching tool that combines real-life examples and interactive elements to increase employee awareness and skills in ethics and decision making
- Provide high-quality ethics, corporate governance and decision-making training to corporate employees to help them succeed in the workplace..

## Personality

Innovative

Sense of responsibility

Dedicated

## Bio

Benjamin Cooper, 37 years old and divorced, is an experienced corporate trainer dedicated to providing ethics, corporate governance and decision-making training to corporate employees. He graduated from a leading university with a background in education and psychology, giving him the knowledge and skills needed to succeed in the field of workplace training. In recent years, Benjamin has begun to focus on educational innovation, looking for a novel approach to teaching that combines real-life examples with interactive elements to increase employee awareness and skills in ethics and decision making. He is always on the lookout for innovative teaching tools that can meet this need to optimize existing training courses and improve their effectiveness.

## Frustrations

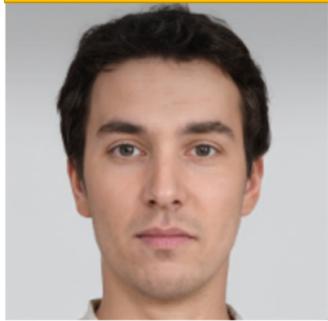
- He is focused on his studies and is very unfamiliar with games, and multiplayer games are a challenge for him.
- It is difficult for him to learn the theoretical aspects of ethics

## Motivation

- Educational innovation.
- Developing Employee Competence
- Professional fulfillment

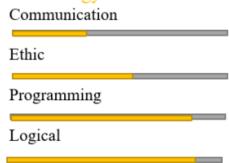
# [Persona]Student V2.0

Ethan Turner



- Age: 23
- Work: aerospace engineering student
- Family: Both-parents family
- Location: Melbourne VIC

## Technology



## Goals

- Use the game to better understand the ethics, corporate governance, and unintended consequences involved in the aerospace industry.
- prepare for future career.

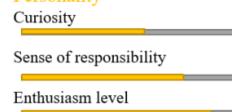
## Frustrations

- He is focused on his studies and is very unfamiliar with games, and multiplayer games are a challenge for him.
- It is difficult for him to learn the theoretical aspects of ethics

## Motivation

- Enhanced knowledge and skills
- Enthusiasm and interest.
- Personal fulfillment
- Career development

## Personality



## Bio

Ethan Turner, 23, was born into a two-parent family and is a college student with a passion for aerospace engineering. He has had a curiosity and passion for flying vehicles and space exploration since he was a child. Despite excelling in academics, he is relatively weak in interacting with people in his daily life.

While in college, Ethan became interested in ethical decision making and corporate management, realizing the importance of these areas in the aerospace industry. He decided to try a game that would simulate a realistic environment. He wanted to explore the ethics, corporate governance, and unintended consequences involved in the aerospace industry in a safe, simulated environment. In this simulation, Ethan's goals and frustrations played a positive role in the project and helped the team to consider ethics, corporate governance and unintended consequences in more detail when validating the system design. His challenges motivated the project team to focus on different user needs and to better optimize and design the game based on them.

# | Functional Requirements

## Versions

Version ID	Date	Editor	Description
1.0	22 Mar 2023	Hongwei XIANG	<ul style="list-style-type: none"><li>Analyse and ensure these requirements are consistent with the scope of the project and completely cover the new capabilities required by the client</li></ul>

---

V 1.0

## Existing Requirements

1. The game must enable up to five students to assume several professions in a scenario modelled after the business world, especially those of a Boeing executive, software developer, pilot, aeronautical engineer, and Federal Aviation Administration (FAA) employee.
2. The game must be created such that players may influence the company's outcome through their choices.
3. The game's goal is to get students thinking about system design's unexpected effects, governance, and ethical implications while also promoting reflective practice.
4. To deliver various results depending on the players' choices, the game must employ decision-making trees.
5. The background information, such as the grounding of Boeing 737 MAX aircraft, the creation of the maneuvering characteristics augmentation system (MCAS), and the reasons for the crashes, must be the basis for the game.
6. Governance, ethics, people management, and other decision-making aspects must be included in the game.
7. The game must be created to be utilised as a teaching tool, both to highlight the intricacy of organisational work and to guide students in thinking through the effects of their choices.
8. To find and fix any errors or problems, the game must be tested on other students.
9. The game has to be created to increase teaching effectiveness and classroom participation.
10. Concentrating on the enjoyment of the game but also having to concentrate on ethics.

## New Requirements

1. At the start of the second semester of 2023, the game can be used by lecturers at the University of Melbourne to develop ethical skills with their students
2. The game needs to be hosted remotely so that the users can access it through the Internet using browsers anytime

# | Non-Functional Requirements

## Versions

Version ID	Date	Editor	Description
1.0	23 Mar 2023	<a href="#">Yu Hsien Chiang</a>	

---

## V 1.0

1. Testing and debugging the previous version of the game to ensure the product is error-free
2. The application needs to be hosted on AWS and accessed by users through web browsers
3. Each game instance should have 5 players
4. The game needs to be able to run multiple instances for different groups of players simultaneously

# | Product Backlog

- The table shows an overview of the backlog and the plans
- Trello is used to document the backlog as well, you can access the board [here](#)

Backlog	Sprint 1	Sprint 2	Sprint 3	Sprint 4
Is02: Is02: Restructure Database's decision list. Record the character's current progress	Create description of the project	Review Frontend code	Is07: Resolve server overload to prevent disconnection and game freezing	
Is04: Revise routes settings for connecting frontend and backend	Create General Process Documents	Review Backend code	Game Deployment	
Is04-1: Address async data fetching issues in Background component by displaying it only when data is available.	Decide the role of each member	Review databases		
Is04-2: Address async data fetching issues in ChapterBackground component by displaying it only when data is available	Analyse requirements	Deploy game locally		
Is06: Improve UI settings	Create Personas	Research on different hosting services		
Is06-1: Shorten in-game text for better player experience and engagement	Create User Stories	Is01: Eliminate duplicate code segments to prevent missed updates		
Is06-2: Enable players to track their current progress in the game	Set up Git repository	Is01-1: Enhance code readability in JoinGame component and prevent global style leakage		
	Create development environment	Is01-2: Remove unnecessary code and relocate inline styles in NewGame component for better maintainability		
	Create plans for next sprint	Is01-3: Utilise v-slot directive in Ready component to access playerName directly, improving code quality		
		Is01-4: Replace getGameOutcome() function with arrow function in Outcome component to improve maintainability		
		Is03: Adjust Backend structure of question and options		
		Is05: Revise game's Rejoin mechanism		
		Is05-1: Ensure players receive role-specific questions and descriptions in the game		
		Is05-2: Implement proper name validation when players rejoin a game to maintain player count		

This page contains following directories:

---

| User Story List

---

| Priority Ranking

# | User Story List

## Versions

Version ID	Date	Editor	Description
3.1	18 Apr 2023	Yu Hsien Chiang Quechen Yang	<ul style="list-style-type: none"> <li>• Add issue ls07</li> <li>• Add due date</li> </ul>
3.0	10 Apr 2023	Yu Hsien Chiang	<ul style="list-style-type: none"> <li>• Refine and regroup issue lists</li> </ul>
2.0	03 Apr 2023	Yu Hsien Chiang	<ul style="list-style-type: none"> <li>• Replace user stories with issue lists</li> </ul>
1.0	23 Mar 2023	Hongwei XIANG	<ul style="list-style-type: none"> <li>• prompt used and parts of user stories were generated with chatGPT</li> </ul>

## Priority mechanism

- **High** All sub-projects related to the basic functioning of the game will be set as high priority and will receive the development team's attention and resource allocation first, to ensure the implementation of the game's fundamental features.
- **Medium** sub-projects related to code optimization and performance enhancement will be given attention and resource allocation as medium priority.
- **Low** Sub-projects related to UI and text optimization will be given attention and resource allocation as low priority after the first two priorities have been fulfilled, to ensure UI and text optimization and improvement.
- In any case, priority needs to be dynamically adjusted based on actual situations, to ensure the development team can quickly respond to market and customer needs while maintaining a balance between code quality and development efficiency.

## V3.1

Issues		Sub-issues		Priority	Due Date
ID	Description	ID	Description		
ls01	Eliminate duplicate code segments to prevent missed updates	ls01-1	Enhance code readability in JoinGame component and prevent global style leakage	Medium	14 Apr 2023
		ls01-2	Remove unnecessary code and relocate inline styles in NewGame component for better maintainability	Medium	14 Apr 2023
		ls01-3	Utilise v-slot directive in Ready component to access playerName directly, improving code quality	Medium	14 Apr 2023
		ls01-4	Replace getGameOutcome() function with arrow function in Outcome component to improve maintainability	Medium	14 Apr 2023
ls02	Restructure Database's decision list. Record the character's current progress			Medium	10 May 2023
ls03	Adjust Backend structure of question and options	ls03-1	Incorrect question data and option data	High	16 Apr 2023
		ls03-2	Unclear and incorrect question and option dataset structure	High	16 Apr 2023
ls04	Revise routes settings for connecting frontend and backend	ls04-1	Address async data fetching issues in Background component by displaying it only when data is available.	Medium	10 May 2023
		ls04-2	Address async data fetching issues in ChapterBackground component by displaying it only when data is available	Medium	10 May 2023
ls05	Revise game's Rejoin mechanism	ls05-1	Ensure players receive role-specific questions and descriptions in the game	High	14 Apr 2023
		ls05-2	Implement proper name validation when players rejoin a game to maintain player count	High	14 Apr 2023
ls06	Improve UI settings	ls06-1	Shorten in-game text for better player experience and engagement	Low	10 May 2023

		<b>Is06-2</b>	Enable players to track their current progress in the game	Low	10 May 2023
<b>Is07</b>	Resolve server overload to prevent disconnection and game freezing			High	08 May 2023

## V3.0

Issues		Sub-issues			Priority
ID	Description	ID	Description		
<b>Is01</b>	Eliminate duplicate code segments to prevent missed updates	<b>Is01-1</b>	Enhance code readability in JoinGame component and prevent global style leakage		Medium
		<b>Is01-2</b>	Remove unnecessary code and relocate inline styles in NewGame component for better maintainability		Medium
		<b>Is01-3</b>	Utilise v-slot directive in Ready component to access playerName directly, improving code quality		Medium
		<b>Is01-4</b>	Replace getGameOutcome() function with arrow function in Outcome component to improve maintainability		Medium
<b>Is02</b>	Restructure Database's decision list. Record the character's current progress				Medium
<b>Is03</b>	Adjust Backend structure of question and options				High
<b>Is04</b>	Revise routes settings for connecting frontend and backend	<b>Is04-1</b>	Address async data fetching issues in Background component by displaying it only when data is available.		Medium
		<b>Is04-2</b>	Address async data fetching issues in ChapterBackground component by displaying it only when data is available		Medium
<b>Is05</b>	Revise game's Rejoin mechanism	<b>Is05-1</b>	Ensure players receive role-specific questions and descriptions in the game		High
		<b>Is05-2</b>	Implement proper name validation when players rejoin a game to maintain player count		High
<b>Is06</b>	Improve UI settings	<b>Is06-1</b>	Shorten in-game text for better player experience and engagement		Low
		<b>Is06-2</b>	Enable players to track their current progress in the game		Low

## V2.0

Issue ID	Scenario Description	Expected Behaviour	Actual Behaviour	Priority
IS_001	When a player rejoins the game, a window should pop up and ask for a gameId and a player name.	<ul style="list-style-type: none"> <li>A pop-up window shows up when the Rejoin button is clicked</li> <li>Players can join the game only if the gameId is related to a game that is still running</li> <li>Player can rejoin only if the provided player's name matches one of an absent player's name</li> </ul>	<ul style="list-style-type: none"> <li>Anyone can join even if the provided name doesn't match any of the absent players' names</li> <li>Extra players can join the game using the "Rejoin" functionality, causing a game having more than 5 players</li> </ul>	Medium
IS_002	To navigate through the game, players will read and understand the descriptions, questions, and options.	<ul style="list-style-type: none"> <li>Players should be able to read through the descriptions, questions, and options within the time limit and understand the context.</li> </ul>	<ul style="list-style-type: none"> <li>The texts in the game are too long</li> <li>Players don't have the patience to read through the texts</li> </ul>	Low

IS_003	The players proceed to the next level when all the players finish their questions.	<ul style="list-style-type: none"> <li>▪ All the players read through the descriptions, questions, and options.</li> <li>▪ Submit the desired options and wait for all the other players to finish their questions</li> <li>▪ The game proceeds to the next level after all the players submitted their choices.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At some point in the game, all the players will get stuck on the waiting page even if all the players have submitted their choices.</li> </ul>	High
IS_004	Players get specific questions based on the role they play in the game.	<ul style="list-style-type: none"> <li>• The descriptions, questions, and options the players get in each level should match the role they play.</li> </ul>	<ul style="list-style-type: none"> <li>• Some roles are getting descriptions and questions that belong to other roles.</li> <li>• Software Developer - level 1 - get a description and a question belong to the Test Pilot</li> <li>• Aeronautical Engineer - level 1 - get a description and a question belong to the Test Pilot</li> </ul>	Medium
IS_005 (Background)	The code has a problem with asynchronous data fetching. The function getBackground uses an asynchronous API call to fetch the game's background information. However, created() method calls this. getBackground() synchronously, which may result in an empty background value being rendered before the data is fetched.	we should make sure that background is not empty before rendering the component and handle the asynchronous data fetching properly.	use a loading state while the data is being fetched, and only display the component when the data is available.	Low
IS_006 (Chapter Background)	problem with asynchronous data fetching. The function getChapterBackground uses an asynchronous API call to fetch the chapter background information. However, created() method calls this. getChapterBackground() synchronously, which may result in an empty chapterBackground value being rendered before the data is fetched	make sure that chapterBackground is not empty before rendering the component, and handle the asynchronous data fetching properly	loading state while the data is being fetched, and only display the component when the data is available	Low
IS-007 (JoinGame)	global styles leakage may occur. readability need to improve.	Use arrow functions instead of let vm = this for easier readability. Use async/await instead of .then() and .catch() for better readability.	Use the scoped attribute in the style tag to avoid global styles leakage	Medium
IS_008 (NewGame)	There are commented-out lines of code related to the timed game and round duration. If these features are not needed, it's better to remove them for cleaner code	Move inline styles to the style section for better separation of concerns and easier maintainability.	Move inline styles to the style section for better separation of concerns and easier maintainability.	Low
IS_009 (Outcome)	There are no significant issues with the code. However, there is a minor improvement that can be made by using arrow functions to avoid the need for the vm variable	Replace the function getGameOutcome()	Replace the function getGameOutcome()	Medium
IS_010 (Ready)	need make a minor improvement	make a minor improvement by using the v-slot directive to access the user's name directly in the template	In the template, replace {{this.\$store.state.playerName}} with {{playerName}}	Low

## V 1.0

Story ID	As	I want	So that	Source	MoSCoW Priority	Size Estimation	Sprint	Achieved
US_001	Student	Play a real-life industry simulation game and play different roles,	I can understand what the consequences of different choices would be.	Prompt: Decision-making	Must have	Medium	2	in progress
US_002	Student who interests in playing the role of a Boeing executive.	Make decisions to impact the company's performance	I can better consider the impact of my actions to avoid any negative impact on the company or its stakeholders.	Prompt: user role as Boeing executive, decision-making to avoid negative impact.	Should have	Small	3	in progress

US_003	Student who interests in playing the role of a software developer.	Make decisions that result in the creation of secure and dependable software while taking into account the user's experience, expenses, and time constraints.	So that I can better consider the impact of my actions to further optimise the software.	Prompt: user role as software developer, decision-making to create more safe and reliable software	Should have	Small	3	in progress
US_004	Student who interests in playing the role of an airplane pilot	Make decisions that Although keeping operational effectiveness and financial effects of my decisions in mind, I place a higher priority on passenger and staff safety.	So that I can better consider the impact of my actions to further improve my Professionalism	Prompt: user role as airplane pilot, decision-making to improve professionalism while avoid negative impact	Should have	Small	3	in progress
US_005	Student who interests in playing the role of an aeronautical engineer.	Make decisions that assure the safety and dependability of aviation systems while simultaneously balancing performance, cost, and other technical concern.	So that I can better consider the impact of my actions to assure the safety and dependability of aviation system and avoid any potential negative impacts.	Prompt: user role as aeronautical engineer, decision-making to create safety and dependability of aviation system while avoid negative impact	Should have	Small	3	in progress
US_006	student who interests in playing the role of a Boeing executive.	Understand my duty to the public, the shareholders, and the environment.	so that I can make decisions that are ethical and have a positive impact on society.	ChatGPT Prompt: Ethics, decision-making.	Must have	medium	2	in progress
US_007	game player	Have the opportunity to reflect on my own ethical values and decision-making processes.	so that I can apply them to real-life situations.	ChatGPT Prompt: Ethics	Should have	Large	3	in progress
US_008	game player	Be able to discuss and debate ethical issues that arise during the game with my fellow players.	so that I can learn from their perspectives and opinions.	ChatGPT Prompt: Ethics	Better have	Large	3	in progress
US_009	game player	See the consequences of my decisions on the outcome of the game.	so that I can better understand the impact of my actions in real-life situations.	ChatGPT Prompt: Ethics	Must have	Large	2	in progress
US_010	student	Play a real-life industry simulation game to learn about decision-making in an organisation	so that I can better understand how the real-life industry simulation game operate.	ChatGPT Prompt: decision-making	Must have	Medium	2	in progress

# Is01: Eliminate duplicate code segments to prevent missed updates

## Issue Description:

Is01 is a software development best practice that recommends eliminating duplicate code segments to prevent missed updates. This practice involves identifying and consolidating code segments that perform the same or similar functions in different parts of the codebase. By eliminating duplicate code, developers can reduce the amount of code that needs to be maintained and updated, which in turn reduces the risk of introducing errors or inconsistencies into the codebase. This practice can lead to more efficient and effective software development, as well as improved code quality and reliability.

## Expected Outcome:

- All Redundant code and components in Rejoin was deleted, no more global style leakage was found.
- All unnecessary code in NewGame were removed.
- code reliability and maintainability were improved after utilized v-slot directive in Ready component.
- two background functions won't operate at the same time, and no empty value created.

## Analysis:

### Asynchronous data fetching

The getBackground and getChapterBackground functions fetch game background and chapter background information through asynchronous API calls. However, in the created() method, we call these two functions at the same time, which may result in empty values being rendered before the data is fetched.

### performance:

- the performance issues of the getRoleTexts() and updateRoles() methods. Currently, these two methods are called repeatedly by setInterval() every second. To optimize performance, we can consider using a WebSocket to push updates from the server to the client.
- the updateRoles() method need to further optimize for reduce requests to the server by only updating the state when there are changes in the roles.
- the chooseRole() method could benefit from improved error handling and error messaging, providing better feedback to the user.

### Readability:

- separate the loading animation from the title text for better readability.
- The hover effect of the buttons can be simplified and reused, improving code maintainability.
- Extracting the loading animation into a separate component will make the structure clearer.

### Global Style Leakage

need to the scoped attribute in the style tag to avoid global style leakage.

## Solution

deletion of redundant and unnecessary code led to the resolution of the following sub-issues:

Sub-issue 1: Enhance code readability in JoinGame component and prevent global style leakage.

# Is03: Adjust Backend structure of question and options

## Issue Description

- The assigning rules for issue ID and option ID are unclear
- The data does not match the latest decision tree documentation (v4)

## Solution

### New question ID system

The new question ID is constructed with 4 digits.

Digit #1	Digit #2	Digit #3	Digit #4
Role Indicator	Level Indicator		Question Indicator

Digit #1 ranges from "1" to "6". "1" ~ "5" represent the 5 roles. "6" mean that the question is a group question.

Example:

- 3012: The second question at level 1 for Role 3
- 4035: The fifth question at level 3 for Role 4
- 2113: The third question at level 11 for Role 2
- 6113: The third question at level 11 for Group question

### New option ID system

The new option ID is constructed with 5 digits by adding an extra digit at the end of the question ID that the option belongs to.

Digit #1	Digit #2	Digit #3	Digit #4	Digit #5
Role Indicator	Level Indicator		Question Indicator	Option Indicator

Example:

- 30124: The forth option that belongs to the second question at level 1 for Role 3
- 40351: The first option that belongs to the fifth question at level 3 for Role 4
- 21132: The second option that belongs to the third question at level 11 for Role 2

### Document and Decision Tree Mismatch or Error

Entity	Property	Original	Fixed
option 60713	next	question 6091	question 6081
question 0	(self)	question 0	delete the question
question 1	(self)	question 1	delete the question
question 2	(self)	question 2	delete the question
question 3	(self)	question 3	delete the question
question 4	(self)	question 4	delete the question
question 404	(self)	question 404	delete the question
option 1	(self)	option 1	delete the option
option 2	(self)	option 2	delete the option
option 3	(self)	option 3	delete the option
option 4	(self)	option 4	delete the option
option 5	(self)	option 5	delete the option

option 10416	description	Grant a 5% raise to both departments, this is what was originally planned	Grant a no raise to both departments, this will cut project costs substantially since a portion of budget is freed up, but this will upset the teams
-----------------	-------------	---------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------

# Is05: Revise game's Rejoin mechanism

## Issue Description

- Implementing a robust rejoin mechanism for a five-player game project utilizing state management and client-server communication.
- Solve 4pre1post inherited issue

## Expected Outcome

Players can seamlessly rejoin the game and continue from their last state, ensuring a smooth user experience.

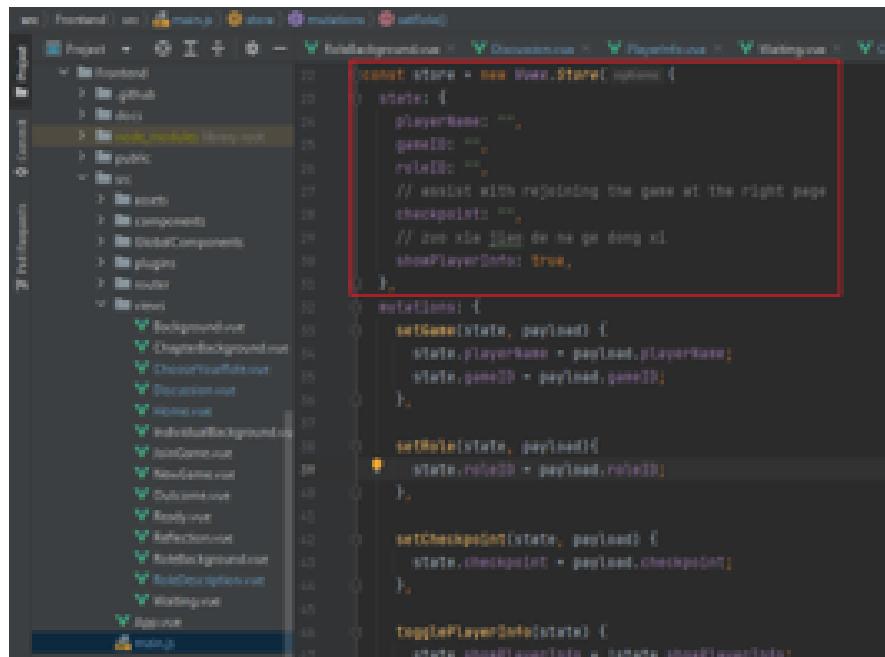
## Expected Outcome

The implemented rejoin mechanism met the expected outcome and resolved two sub-issues.

## Analysis

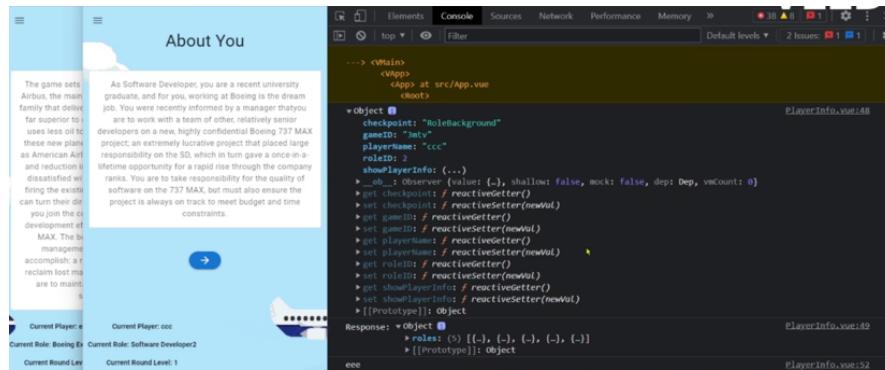
### Transition of Views

To maintain a coherent front-end user interface, the application state is managed using the Vuex store, and the back-end is contacted through HTTP GET requests containing the current state. Ensuring the browser's state integrity or allowing users to update the Vuex store dynamically guarantees accurate page rendering.



```
const store = new Vuex.Store(options) {
  state: {
    playerName: '',
    gameId: '',
    roleID: '',
    // wasList with rejoining the game at the right page
    checkpoint: '',
    // see the file doRejoin doing all
    showPlayerInfo: true,
  },
  mutations: {
    setPlayerName(state, payload) {
      state.playerName = payload.playerName;
      state.gameID = payload.gameID;
    },
    setGameID(state, payload) {
      state.gameID = payload.gameID;
    },
    setCheckpoint(state, payload) {
      state.checkpoint = payload.checkpoint;
    },
    togglePlayerInfo(state) {
      state.showPlayerInfo = !state.showPlayerInfo;
    }
  }
}
```

267pxfig.1. vuex instance



The screenshot shows the browser's developer tools with the 'Elements' tab selected. A component named 'PlayerInfo.vue' is being analyzed. The component tree shows a main element with a slot named 'top'. The component itself has several properties: 'checkpoint: "RoleBackground"', 'gameID: "347"', 'playerName: "ccc"', and 'roleID: 2'. It also has methods for setting these values. The component is rendered into an 'About You' card. The card contains text about a software developer's dream job at Boeing and displays player information: 'Current Player: ccc', 'Current Role: Software Developer', and 'Current Round Level: 1'. The developer tools also show the component's props and slots, and a detailed view of its internal state and methods.

fig.2. example of state inside a browser

As shown here, due to the fact that Node.js is based on a single-threaded event loop mechanism, when two or more players choose an option at the same time (which is highly likely, especially when multiple games start simultaneously in a classroom), the backend may ignore some requests from the frontend or accept two requests but only return data from MongoDB once, leading to the problem where the frontend displays "submit" as successful.

However, as demonstrated by the "rejoin" method, users can reload the game on any browser without affecting the progress of other players' games.

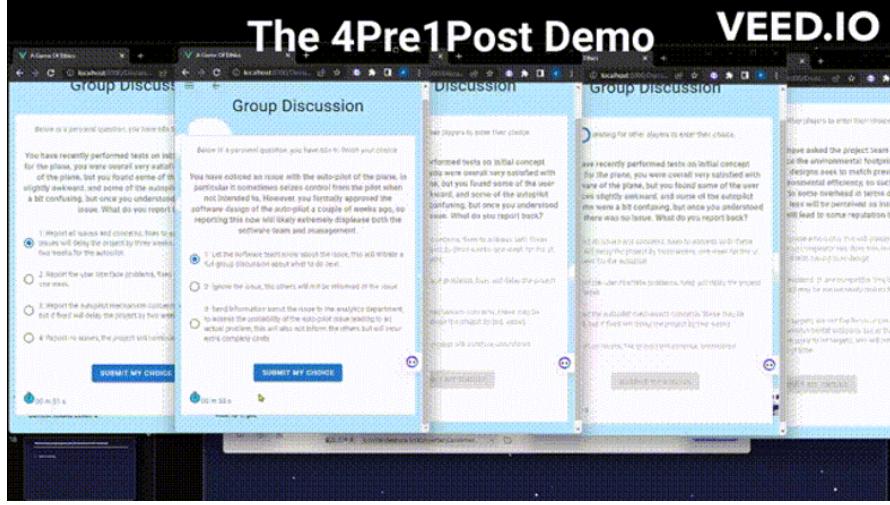


fig.3. 4Pre1Post issue

## Actions and Prerequisite

### > playerInfo

this is a vue global component, as states of game store in the vuex instance for each browser, we can use a tracker to read the status of each player. The global component applies to every page. It consists of four attributes:

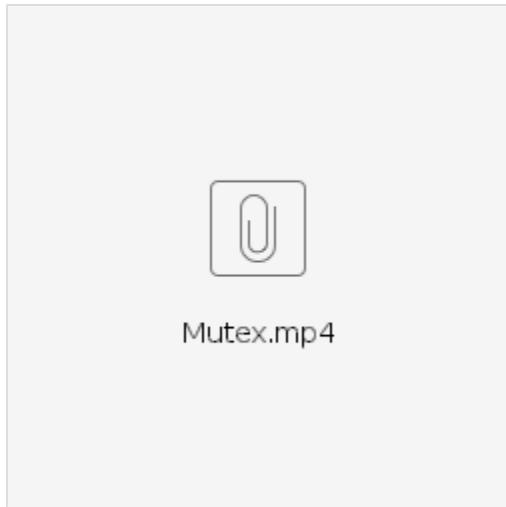
- Current Player: track the player name of the browser
- Current Role: track the player role of the browser, format: [Name + # of roles]
- Current Round Level: track which question the player is on
- All player's status; four possible status [Pre, Post, Ready, Waiting]



fig.4. example of playerInfo inside a page

In the rejoin method, crucial identifiers like gameId, playerName, and RoleID were incorporated to facilitate the rejoining process by mapping users to the correct game and role instances.

> Mutex Mechanism



## Real Outcome

The successful implementation of the rejoin mechanism led to the resolution of the following sub-issues:

- Sub-issue 1: Ensuring users receive role-specific questions, which is critical for game progression. Node.js's single-threaded event loop architecture can lead to concurrency issues when multiple players interact simultaneously. The rejoin method mitigates this problem by allowing users to reload the game on any browser without adversely affecting other players' progress or causing synchronization issues.
- Sub-issue 2: Implementing proper name validation when players rejoin a game to maintain player count and avoid duplicity. By invoking the back-end status API, a list of player names in a game can be fetched and cross-referenced to validate the authenticity of rejoining players.

#	Solution
1	Modify the Rejoin mechanism, ensure player can rejoin the corresponding game by their name, role and gameID
2	Replace the mongoDB address to sydney, improve the speed of backend reading
3	Add mutex lock to backend for track all requests from frontend

## Cascade bug resolution for the conflict between Front-end and Back-end

The back-end might disregard some front-end requests or process multiple requests but return data only once when querying MongoDB. This behavior leads to inconsistencies in the game state (4pre1post issue) and can compromise the gaming experience.

Example of Backend code in solving multiple requests from frontend - ChooseYourRole.vue:

```
const {Mutex} = require('async-mutex');
const chooseRolesMutex = new Mutex();
const chooseRoles = async function (req, res) {
    // Use mutex locks to ensure that only one request is updating the database at a time.
    const release = await chooseRolesMutex.acquire();
```

*code snippets from game-controller.js*

during the development process by implementing mutual exclusion mechanisms to ensure atomicity in client-server interactions. By employing a mutex (provided by the `async-mutex` library's `Mutex` class), the back-end is able to process requests sequentially, even when they are sent concurrently. This approach prevents request loss, race conditions, and promotes data consistency across the application. Note that this method may marginally impact the server's concurrent processing capacity, but it effectively addresses the 4pre1post issue and ensures a more reliable gaming experience.

# Is07: Resolve server overload to prevent disconnection and game freezing

## Issue Description

## Expected Outcome

During the main part of the game, which is answering a sequence of questions, players should be able to:

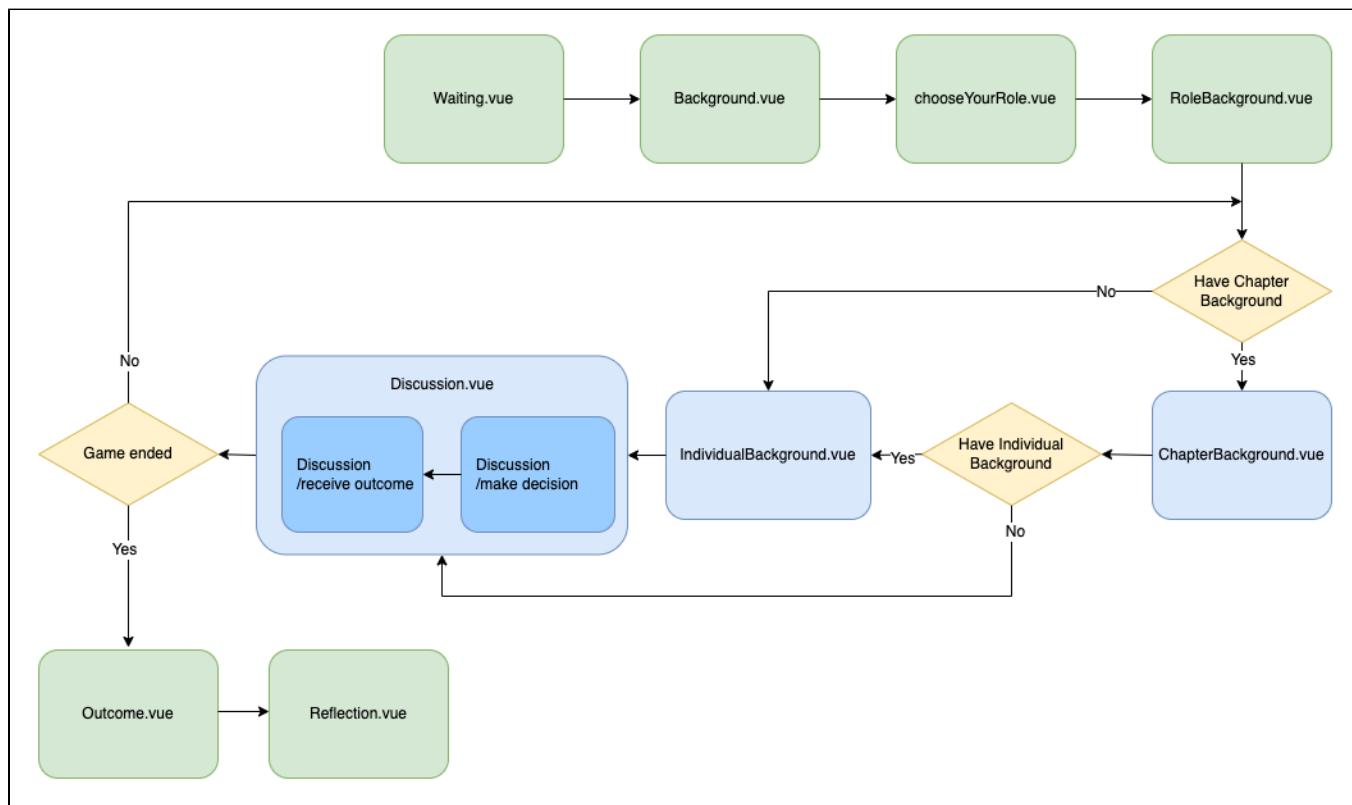
1. Receive information about the question
2. Receive the question text and option text
3. Choose and submit an option
4. Receive the outcome of the round
5. Proceed to the next question (level) after receiving the outcome of the round

## Actual Outcome

At some point in the game, the page for one or multiple players freezes at the round outcome loading view.

## Analysis

### Transition of Views



The views transit from one to another based on the relationships of the views, players' actions, and the status of all the players.

## The Status of Players

The Players will have 4 types of statuses:

Status	Meaning
Waiting	Waiting for players to join.
Ready	All the players have joined the game. The Roles of the players are undetermined. Ready to start the game.

Post	All players have submitted their options
Pre	The player has received the round outcome

## Actions and Prerequisite

The chart below describes the transition of some views, the prerequisite of the transition, and the effect on the players' status of those transitions.

Actions	Prerequisite	Side Effects
Waiting.vue Background.vue	5 Players have joined the game	Player Status: [Waiting, Waiting, Waiting, Waiting, Waiting] [Ready, Ready, Ready, Ready, Ready]
Discussion.vue/makeDecision Discussion.vue/receiveOutcome	5 Players have made their decisions	Player Status: [ Ready/Pre, Ready/Pre, Ready/Pre, Ready/Pre, Ready/Pre] [Post, Post, Post, Post, Post]
Discussion.vue/receive outcome Game Ended Decision	The player has received the round outcome	Player Status: Post Pre

## Main Issue

- We have observed that a player's page usually freezes when the view is transitioning from Discussion.vue/makeDecision to Discussion.vue/receiveOutcome.
- The player's status stays at **Post** and failed to be updated to **Pre**.
- This indicates that the frontend has failed to receive the return message from the backend server.
- The frontend is disconnected from the backend.

## Reason for The Disconnection of Front-end and Back-end

The disconnection is mainly caused by the frequent polling mechanism used by the front-end:

```
setInterval(backendAPI, time)
```

- The `setInterval()` method is used in different views, such as Waiting.vue, ChooseYourRole.vue, Menu.vue, and Discussion.vue, to fetch players and game status from the backend. Making frequent requests to the backend server by multiple players is placing large stress on the backend server.
- Since all the players are making frequent requests, it is highly possible that conflicts appear between requests.
- The slow data retrieval from a remote database deteriorates the issue.
- No request failure mechanism is implemented.

## Potential Solution

#	Solution
1	Replace the polling mechanism with WebSocket mechanism
2	Install the database on the backend server
3	Slightly modify the game flow logic so that the transition of the view doesn't depend on other players' status
4	Parallel process each player's request

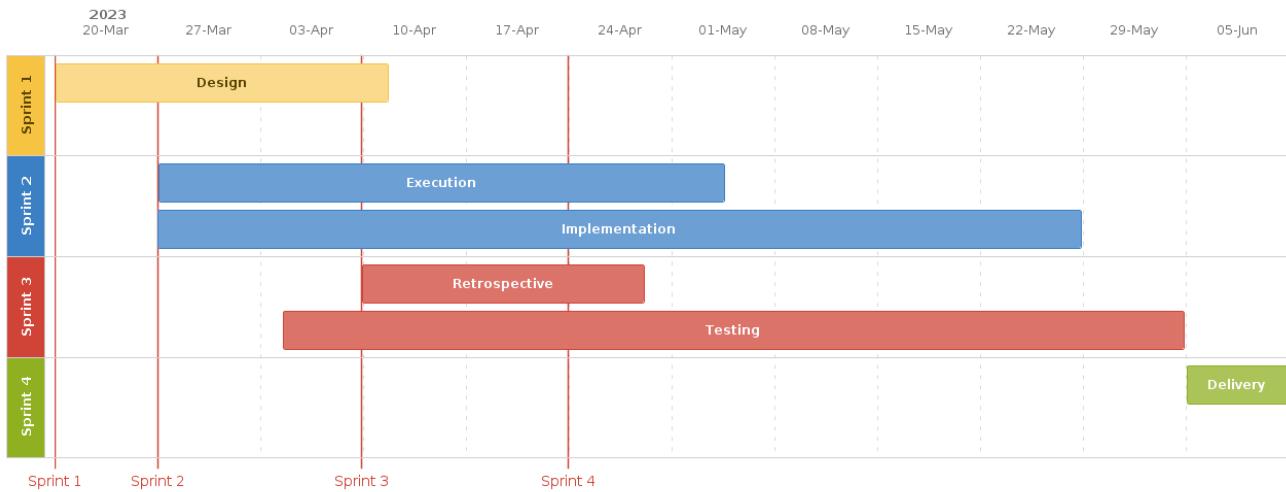
# | Priority Ranking

Priority will set first, then our team follows the due date:

Ticket	Created	Date	Field	Sprint
Supervisor Meetings	April 10, 2023 9:56 PM	April 20, 2023	Meetings, MileStone	3
Client Meetings/Sprint2 ends	April 10, 2023 7:41 PM	April 27, 2023	Meetings, MileStone	3
Sprint3	May 1, 2023 12:19 PM	May 1, 2023 May 31, 2023	MileStone	
Is04-1:Address async data fetching issues in Background component by displaying it only when data is available.	April 10, 2023 7:41 PM	April 17, 2023 May 10, 2023	Development, Tasks	
Is01-3:Utilize v-slot directive in Ready component to access playerName directly, improving code quality.	April 10, 2023 9:42 PM	April 11, 2023 April 14, 2023	Development, Tasks	2
Is01-2:Remove unnecessary code and relocate inline styles in NewGame component for better maintainability.	April 10, 2023 9:42 PM	April 11, 2023 April 14, 2023	Tasks	2
Is05-2:Implement proper name validation when players rejoin a game to maintain player count.	April 10, 2023 9:42 PM	April 14, 2023	Tasks	2
Is05-1:Ensure players receive role-specific questions and descriptions in the game.	April 10, 2023 9:42 PM	April 11, 2023 April 14, 2023	Tasks	2
Is01-4:Replace getGameOutcome() function with arrow function in Outcome component to improve maintainability.	April 10, 2023 9:43 PM	April 11, 2023 April 14, 2023	Development, Tasks	2
Is01-1:Enhance code readability in JoinGame component and prevent global style leakage.	April 10, 2023 9:43 PM	April 11, 2023 April 14, 2023	Development, Tasks	2
Is03:Adjust Backend structure of question and options	April 10, 2023 9:43 PM	April 11, 2023 April 16, 2023	Issues	2
Is02:Restructure Database's decision list. Record the character's current progress.	April 10, 2023 9:43 PM	April 20, 2023 May 10, 2023	Issues	3
Is01:Eliminate duplicate code segments to prevent missed updates.	April 10, 2023 9:43 PM	April 11, 2023 April 14, 2023	Issues	2
Server Config gathering	April 10, 2023 9:53 PM	April 10, 2023 April 20, 2023	Tasks	3
Is04-2:Address async data fetching issues in ChapterBackground component by displaying it only when data is available.	April 11, 2023 1:11 AM	April 17, 2023 May 10, 2023	Development, Tasks	
Is06-1:Shorten in-game text for better player experience and engagement.	April 11, 2023 1:11 AM	April 19, 2023 May 10, 2023	Tasks	
Is06-2:Enable players to track their current progress in the game.	April 11, 2023 1:11 AM	April 19, 2023 May 10, 2023	Tasks	
Is04:Revise routes settings for connecting frontend and backend	April 11, 2023 1:14 AM	April 17, 2023 May 10, 2023	Issues	3
Is05:Revise game's Rejoin mechanism	April 11, 2023 1:15 AM	April 11, 2023 April 14, 2023	Issues	2
Team meeting in discussing plan sprint2	April 11, 2023 1:15 AM	April 10, 2023	Meetings	2
Is06:Improve UI settings	April 11, 2023 1:18 AM	April 21, 2023 May 10, 2023	Issues	3

# | Sprint Planning

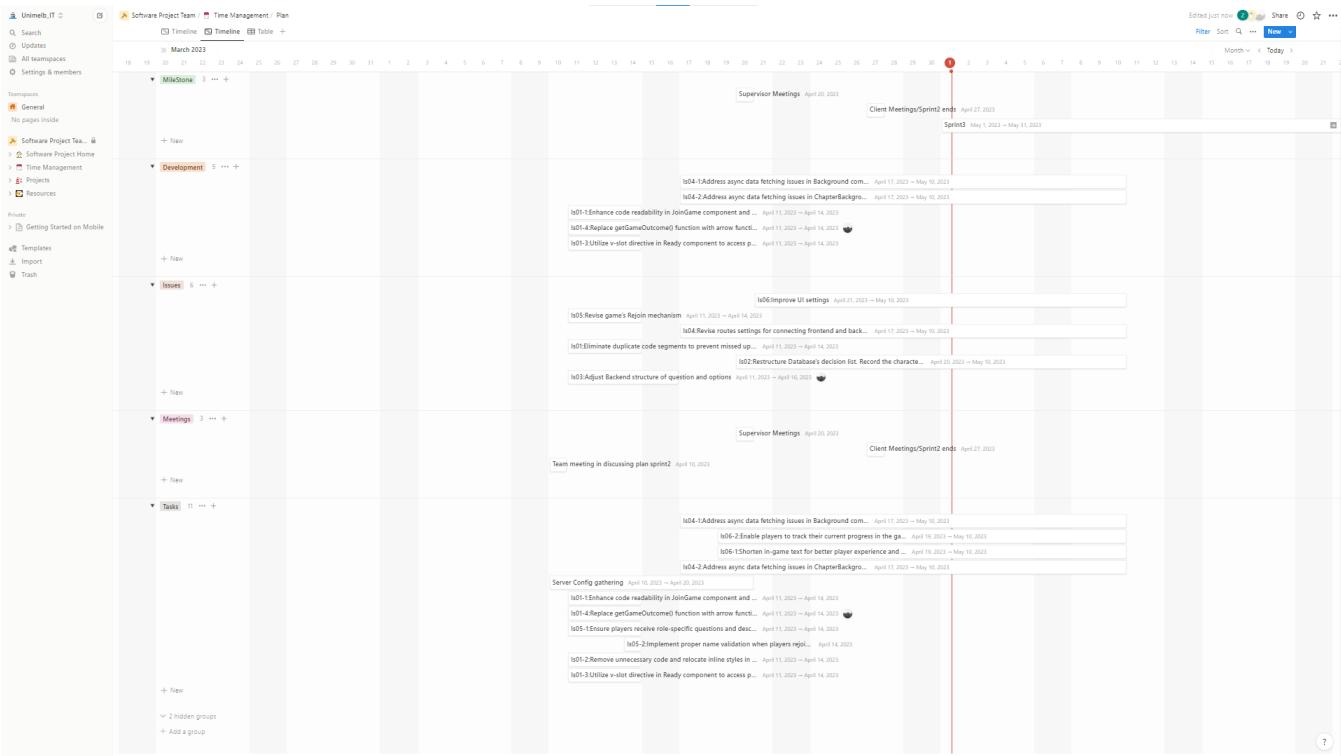
## Roadmap Planner:



## Miro:

COMP90082-2023-SM1-GE-RedBack Sprint Plan				
Deliverable	Sprint 1 (Design)	Sprint 2 (Development)	Sprint 3 (Development)	Sprint 4 (Product)
Sprint size	1 week	5 weeks	4 weeks	2 weeks
<b>Development Approach</b>	Mob-programming (work together as one team): Every members work in real time in different tasks: MM, Personas, User stories, Development environment, Plan, Meetings, Github.	Pair-programming (work together as three groups): First of all, all members are required to participate for AWS deployment tasks. For later development tasks, dev team will split into three groups: Front-end, Back-end and Database. There would be a testing team in advance if we have more time.	Pair-programming: From this sprint, dev team will later split one more group: Testing. Other groups will help to come up with any scenarios to trigger bugs for smoothly testing process as well. Later, the groups will provide additional features if time allowed.	Mob-programming: Every members work together to check if any other issues occur before the final product release. Play the games together as many times as we could to make sure the game can be played smoothly.
<b>Development experience</b>	<ul style="list-style-type: none"> <li>Collaborate as one team</li> <li>Go through project requirement</li> <li>Scrum master to organise stakeholders meeting</li> <li>Assign roles and different tasks</li> <li>Develop a project plan and Sprint 1 documentation</li> </ul>	<ul style="list-style-type: none"> <li>All members join deployment tasks</li> <li>Three little groups developing for different areas</li> <li>PR Review, each sub-team will and must review at least one code from other sub-team</li> </ul>	<ul style="list-style-type: none"> <li>Testing group mainly focus on trigger any errors and report them as tickets</li> <li>Fix any bugs or issues found during testing</li> <li>Front-end group need to double-check documentation</li> <li>Back-end and Database groups need to double-check deployment guideline, Github, DB</li> <li>Every members need to double-check final release on Github</li> </ul>	<ul style="list-style-type: none"> <li>In this stage, all team members only focus on making sure the game is good to deliver to the client.</li> <li>Try to reject any more additional features as much as possible.</li> <li>Fix any new issues as soon as possible to minimize the impact on the application.</li> </ul>
<b>Delivered</b>	1. MM 2. Personas 3. User stories 4. Development environment 5. Plan 6. Meetings 7. Github 8. Confluence 9. Trello	1. Project Documentation 2. Confluence updated 3. Trello updated (tickets) 4. Deployed application to AWS infrastructure 5. Version Control and PR Review 6. Game can be run locally/online 7. Github updated 8. Meeting documentation	1. Tested and less-bug application 2. Documentation on testing and debugging 3. Additional features added to the application 4. Improved user experience 5. Handover checklist 6. Github/ Confluence/ Trello updated 7. Meeting documentation	1. Tested and lesser-bug application 2. Detailed documentation 3. Code updated to most recently on Github 4. Presentation
<b>FOCUS</b>	1. What is this project about? 2. How are we developing this software solution to meet client requirement? 3. What tools are we adopting in our project?	1. What AWS services should we use? 2. Are we on track and fix up the tickets on time? 3. Should we do some simple testing on this sprint?	1. Are there any more issues? 2. Trade-off between no change & new features? 3. Will the new features delay our final release?	1. Do we meet all client's requirement? 2. If no, why and how we fix it? 3. If yes, self reflection what we have learned?

## Notion:



- Sprint 1: 1 | Sprint1 (20/Mar - 26/Mar) 20 Mar 2023 - 26 Mar 2023
- Sprint 2: 2 | Sprint2 (27/Mar - 01/May) 27 Mar 2023 - 01 May 2023
- Sprint 3: 3 | Sprint3 (02/May - 26/May) 02 May 2023 - 26 May 2023
- Sprint 4: 4 | Sprint4 (27/May - 09/Jun) 27 May 2023 - 09 Jun 2023

## This page contains following directories:

- | Workload & Time Management tool

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- 1 | Sprint1 (20/Mar - 26/Mar)

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- 2 | Sprint2 (27/Mar - 01/May)

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- 3 | Sprint3 (02/May - 26/May)

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- 4 | Sprint4 (27/May - 09/Jun)

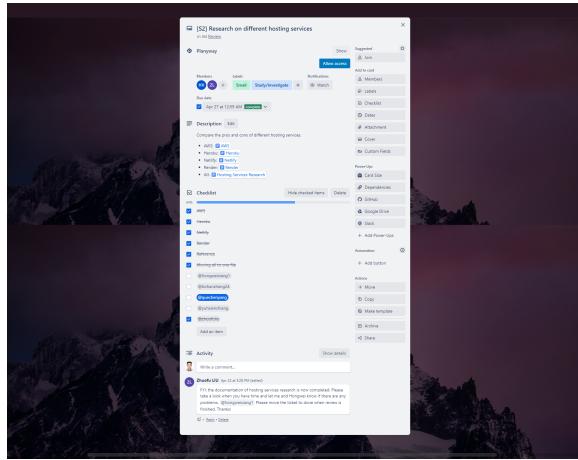
# | Workload & Time Management tool

## Trello

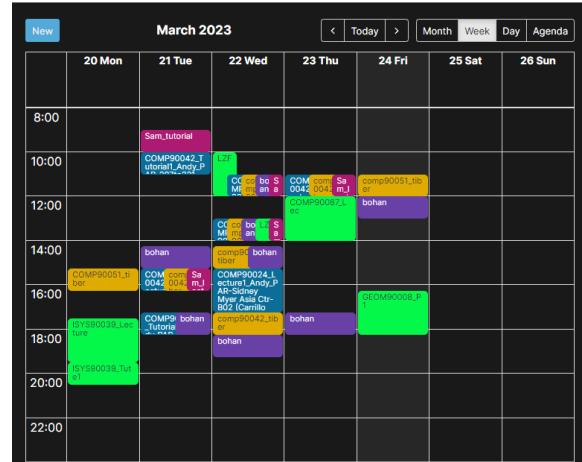
Our project follows an Agile development process using Trello. We create a new Trello Kanban board for each sprint, allowing our team members to better focus on the tasks at hand. For each Trello Kanban board, we create Trello cards to represent tasks, ensuring a standardized card structure:

- **Labels:** We utilize labels to categorize tasks by size (small, medium, large) and domain (e.g., development). Labels' colors allow for quick identification of task size, which is related to priority. Each task must have two labels - one for size and one for domain. This approach also facilitates tracking individual team members' contributions since all tasks are assigned to specific team members.
- **Due Date:** We include the due date, as established in the project plan, on each card.
- **Description:** A brief description of the task is provided.
- **Checklist:** A checklist is set up by the team member responsible for the task, to track progress.
- **Dependencies:** If there are dependencies between cards, we use the "Dependencies" feature to indicate the relationship between them.

Ticket Structure:



## Workload Dashboard



# 1 | Sprint1 (20/Mar - 26/Mar)

You can access our trello page through: [Trello Kanban](#)

<b>Duration</b>	1 week	
<b>Goals</b>	Priority: 1	Identify project requirements
	Priority: 1	Develop a project plan and sprint backlog
	Priority: 2	Define the technology stack and development environment
	Priority: 2	Design several user stories or user cases
<b>Tasks</b>	<ul style="list-style-type: none"><li>• Conduct stakeholder meetings and gather requirements</li><li>• Understand game mechanics and rules</li><li>• Determine decision tree structure</li></ul>	
<b>Deliverables</b>	<ul style="list-style-type: none"><li>• Project plan and sprint backlog</li><li>• Technology stack and development environment documentation</li><li>• User stories or user cases mockups</li></ul>	

## 2 | Sprint2 (27/Mar - 01/May)

You can access our trello page through: [Trello Kanban](#)

<b>Duration</b>	5 weeks	
<b>Goals</b>	Priority: 1	Deploy the software application to AWS infrastructure
	Priority: 2	Configure server environment
	Priority: 3	Test deployment and integration
<b>Tasks</b>	<ul style="list-style-type: none"><li>• Set up AWS infrastructure</li><li>• Run the application before first time deployment</li><li>• Deploy the application to AWS infrastructure</li><li>• Configure additional AWS services if needed</li><li>• Monitor and optimise application's performance</li><li>• Update documentation on Confluence/Trello/Github</li><li>• Find bugs and fix them (if time allowed)</li><li>• Testing for the Bug ticket</li></ul>	
<b>Deliverables</b>	<ul style="list-style-type: none"><li>• Documentation on AWS infrastructure</li><li>• Deployed application to AWS infrastructure</li><li>• Game can be run locally/online</li><li>• Documentation on Confluence</li><li>• Trello updated (tickets)</li><li>• Github updated</li><li>• Version Control and PR Review</li><li>• Meeting documentation</li></ul>	

Updates from Sprint1 feedback:

- Project Background, Client Goals, and Motivation - The document should provide more detailed background information, project overview, and objectives. Clearly define the project scope.
- Character Roles - Provide reasonable explanations for each role's goals, motivations, and frustrations. Explain how they help the team validate system design.
- Requirements Analysis (User Stories or Use Cases) - Add acceptance criteria for each user story, indicating the signs of feature completion. Clarify the meaning of priorities (high/medium/low), and provide a method for determining priorities.
- Development Environment - Document the feature management approach in the GitHub code repository, such as team branching strategy. Provide delivery process, client and supervisor information, and detailed changelogs. Discuss and explain the reasons for technology choices.
- Project Plan - Allow access to the Trello board. Ensure that user stories in the user story map are linked to actual user stories (via ID or similar) to understand which tasks are related to which stories.
- Iteration Planning - Emphasize the purpose of meetings, discuss each project with the development team, estimate the required workload, determine the product backlog based on priority, and create iteration to-do lists.

## 3 | Sprint3 (02/May - 26/May)

<b>Duration</b>	4 weeks
<b>Goals</b>	Priority: 1 Conduct testing and debugging to ensure the software is functioning properly
	Priority: 2 Add new features to the application as needed or refine existing ones
	Priority: 2 Conduct user acceptance testing
	Priority: 3 Document the software and its features
<b>Tasks</b>	<ul style="list-style-type: none"><li>• Open tickets when software is not working/ bug is found</li><li>• Fix any bugs or issues found during testing</li><li>• Improve user experience as needed (if time allowed)</li><li>• Conduct further testing</li></ul>
<b>Deliverables</b>	<ul style="list-style-type: none"><li>• Tested and debugged application</li><li>• Documentation on testing and debugging</li><li>• Additional features added to the application</li><li>• Improved user experience</li><li>• Handover checklist</li><li>• Github/ Confluence/ Trello updated</li><li>• Meeting documentation</li></ul>

## 4 | Sprint4 (27/May - 09/Jun)

<b>Duration</b>	2 weeks
<b>Goals</b>	Priority: 1 Deliver the most least-bug game so far
	Priority: 2 Document the software and its features
	Priority: 2 Presentation to the client
	Priority: 3 Add new features to the application as needed or refine existing ones
<b>Tasks</b>	<ul style="list-style-type: none"><li>• Focus on making sure the game is good to deliver to the client</li><li>• Try to reject any more additional features as much as possible</li><li>• Fix any new issues as soon as possible to minimize the impact on the application</li><li>• Update final version of the game and other documentations</li></ul>
<b>Deliverables</b>	<ul style="list-style-type: none"><li>• Tested and lesser-bug application</li><li>• Detailed documentation</li><li>• Code updated to most recently on Github</li><li>• Presentation</li></ul>

# | Game Design

**This page contains following directories:**

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| Decision Tree Design & Implementation

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| Characters & Scenarios Design Documentation

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| Interaction Design Plan

# | Decision Tree Design & Implementation

V1 Decision Tree Graph (Detailed version & Shortcut version) [for Shortcut version, please check Questions Options Checklist for id reference]:



Detailed Decision Tree Graph.pdf



Shortcut Decisio...n Tree Graph.pdf

V1 Questions Options Checklist (please download to check):



Questions Options Checklist.xlsx

# | Characters & Scenarios Design Documentation

# | Interaction Design Plan

# | Development

## About

This page is dedicated to listing important decisions, as well as their outcomes, made by one or more stakeholders in the project.

[New Page](#)

## Priority of things

| Code Review & Continuous Integration

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| Coding Standards & Best Practices

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| Architecture Decisions

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| Tools and Technologies

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# | Tools and Technologies

Our Project Requires:

Status	PROCESSED	
Stakeholders	Client: Mauro Mello Jr	
Outcome	Stack	Choice
	Frontend	VUE.js
	Backend	Node.js
Database	MongoDB	
Due date	10 Mar 2023	
Owner		

**Note:** More languages will be updated after complete negotiations and discussions are done by the team along with the Client and his technical team.

Currently, The team is involved in testing and validating the system produced by previous Unimelb team, to verify if the system is reliable for extendability.

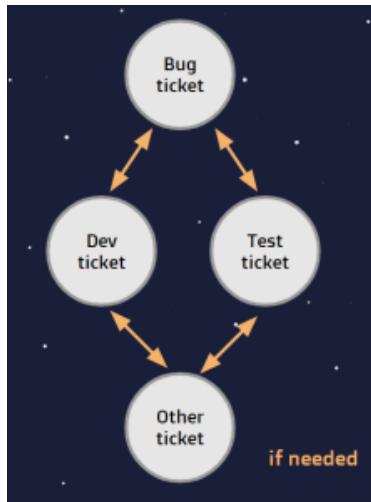
Color	Description
Red	No experience
Yellow	Partial experience
Green	Reasonable experience

Stack	Frontend								Backend						Database		
Tools/Technologies/Languages	JavaScript	CSS	HTML	React	Vue2	Vue3	SASS	Angular	Node.js	Java	Python	C	C++	C#	MySQL	PostgreSQL	MongoDB
@ Quechen Yang																	
@ Yu Hsien Chiang																	
@ BoHan ZHANG																	
@ Hongwei XIANG																	
@ Zhuofu LIU																	

# | Coding Standards & Best Practices

Redback team should cares about the following standards when developing:

1. **Code Formatting:** Use Prettier to automatically format code, ensuring a consistent style across the project. Configure Prettier with a shared configuration file for all team members to use.
2. **Linting:** Implement ESLint for both Vue.js and Node.js code to identify and fix code quality and styling issues. Customize your ESLint rules according to your team's preferences and standards.
3. **Git Workflow:** Adopt a Git branching strategy, such as GitFlow or Feature Branching, to better manage code changes and releases. Enforce descriptive commit messages to facilitate code reviews.
4. **Code Reviews:** Establish a code review process, using tools like GitHub or GitLab, to ensure that all code is reviewed by at least one other team member before merging into the main branch.
5. **Continuous Integration (CI):** Set up a CI pipeline using tools like Jenkins, GitLab CI, or GitHub Actions to automatically build, test, and report any issues in the codebase whenever new changes are pushed.
6. **Testing:** Write unit tests using testing frameworks like Jest (for Vue.js) and Mocha/Chai (for Node.js) to ensure code reliability. Strive for a high level of test coverage.
7. **Documentation:** Maintain comprehensive documentation, including code comments, README files, and API documentation. Utilize tools like JSDoc or VuePress to generate documentation automatically.
8. **Component-Based Architecture:** Structure your Vue.js frontend using a component-based approach for better maintainability and reusability.
9. **Modular Code:** Organize your Node.js backend into small, focused modules with clear responsibilities. Use the separation of concerns principle to improve maintainability.
10. **Database Design:** Follow MongoDB best practices for schema design, indexing, and data modeling to ensure optimal performance and maintainability.
11. **Security:** Implement secure coding practices, such as input validation, output encoding, and proper authentication and authorization mechanisms, to protect your application against common security vulnerabilities.



- Whenever a bug or issue is found, please create a Bug ticket for that.

- The Dev ticket is for development team use only;
- the Test ticket is for testing team use only.

- Other ticket such as related to updated documentation etc. can be created if needed.

In order to close/resolve/done a Bug ticket, please check if meets the following requirement (in sequence):

1. The Other ticket is finished;
2. The Dev ticket is finished if its related Test ticket is finished;
3. All dependencies tickets are confirm closed/resolved/done;
4. Hence the Bug ticket can be closed/resolved/done.

Please contact group members if you are having any problems.

CI/CD (Continuous Integration and Continuous Deployment) is a crucial aspect of the software development process that emphasizes automating the building, testing, and deployment of applications. In the context of developing a five-player synchronous game, CI/CD plays a vital role in ensuring the game's quality, reliability, and timely delivery.

1. **Continuous Integration (CI):** As the development team works on the game, they will be making changes to the source code. CI ensures that these changes are frequently merged into a shared repository and automatically built and tested. This practice helps identify and fix integration issues early, reduces the risk of introducing bugs, and minimizes the time spent on resolving merge conflicts.
2. **Continuous Deployment (CD):** After the CI process has successfully built and tested the game, CD automates the deployment of the application to various environments (e.g., staging, production). This ensures that the game is always in a releasable state, allowing for faster and more reliable updates. This is particularly important for a multiplayer game, where a smooth user experience and minimal downtime are crucial.

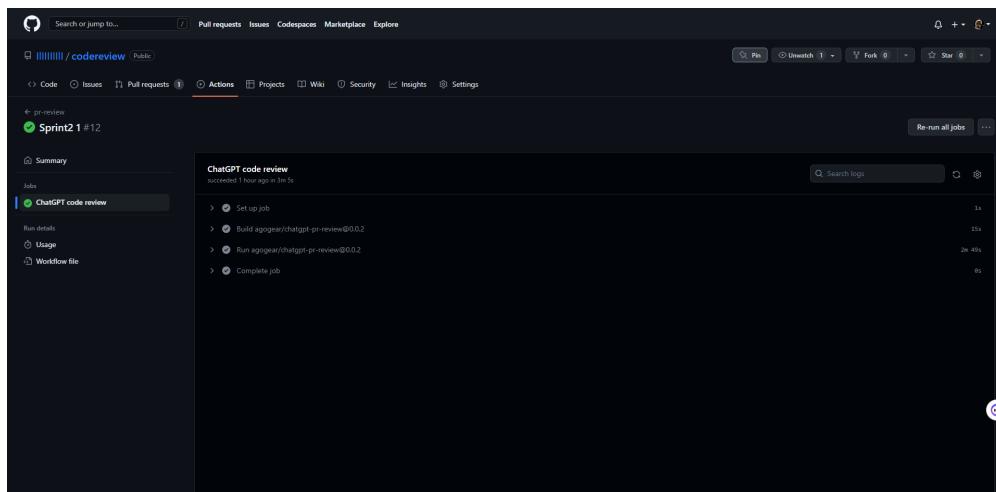
We should audit our code between commits. It helps the development team quickly identify and resolve issues, ensures the game is always in a releasable state, and promotes a faster, more reliable delivery of updates.

## Chatgpt code review standards:

1. Create a file [[github/workflows/pr-review.yml](#)] for code review

## pr-review.yml

```
name: pr-review
on:
  pull_request:
    types: [opened, synchronize]
jobs:
  review:
    name: ChatGPT code review
    runs-on: ubuntu-latest
    steps:
      - uses: agogear/chatgpt-pr-review@0.0.2
        with:
          openai_max_tokens: 1000
          files: "*.vue"
          openai_api_key: ${{ secrets.OPENAI_API_KEY }}
          github_token: ${{ secrets.GITHUB_TOKEN }}
          github_pr_id: ${{ github.event.number }}
```



src/Frontend/src/App.vue

... ... @@ -1,6 +1,7 @@  
1 1 <template>

github-actions (bot) 1 hour ago

ChatGPT review for src/Frontend/src/App.vue:

1. Documentation Defects:

- a. Naming: The names of the software elements are not descriptive enough. For example, the component named "PlayerInfo" does not give a clear indication of what it does.
- b. Comment: The code lacks comments that explain the purpose and functionality of the different sections.

2. Visual Representation Defects:

- a. Bracket Usage: The code has correct and consistent usage of brackets.
- b. Indentation: The code has correct and consistent indentation.
- c. Long Line: There are a few long code statements that could be split into multiple lines for better readability.

3. Structure Defects:

- a. Dead Code: There is some commented-out code that serves no meaningful purpose and should be removed.
- b. Duplication: There is no duplicate code in the provided code.

4. New Functionality:

- a. Use Standard Method: There are no single-purpose code statements that could benefit from a standardized approach.

5. Resource Defects:

- a. Variable Initialization: All variables are correctly initialized.
- b. Memory Management: There is no explicit memory management in the provided code.

6. Check Defects:

- a. Check User Input: There is no user input in the provided code.

7. Interface Defects:

- a. Parameter: There are no incorrect or missing parameters when calling functions or libraries.

8. Logic Defects:

- a. Compute: There are no incorrect logic during system execution.
- b. Performance: There is no performance issue in the provided code.

Recommended changes to improve the quality of the code:

1. Documentation Defects:

- a. Naming: Use more descriptive names for software elements to improve readability and understandability.
- b. Comment: Add comments to explain the purpose and functionality of the different sections of the code.

2. Visual Representation Defects:

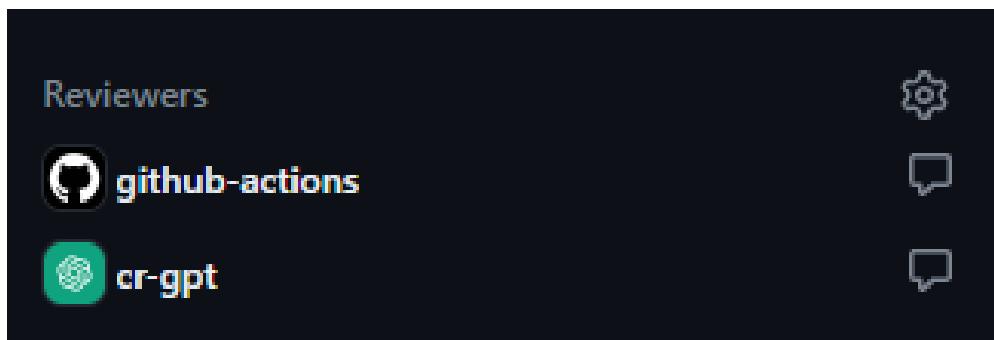
- c. Long Line: Split long code statements into multiple lines for better readability.

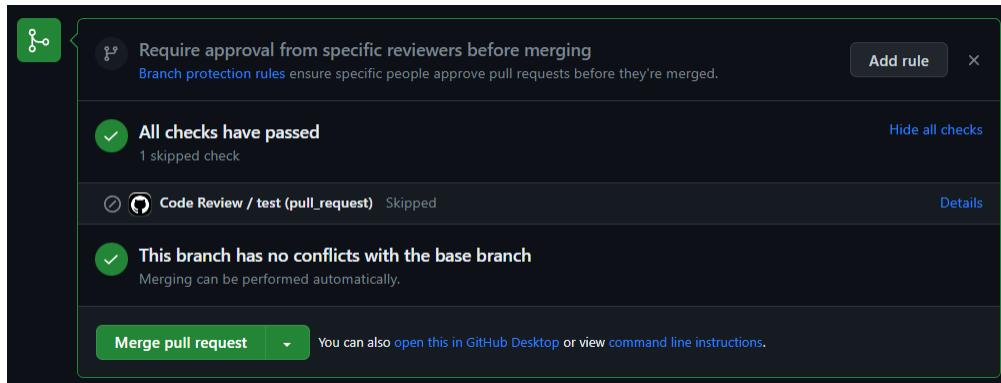
3. Structure Defects:

- a. Dead Code: Remove commented-out code that serves no meaningful purpose.

Overall, the provided code is well-structured and has no major defects. However, adding more descriptive names and comments can improve its readability and maintainability.

2. alternatively, we can use cr application





# | Code Review & Continuous Integration

In this sprint, our team debugged and made some optimizations to the front and back-end files in the project. Our group discussed and decided to use ChatGPT for code review. In the process, we tried to use the api interface provided by openAI and the plug-in provided by lecturer, but the results were not satisfactory, [like this](#). In the end, we copied and pasted the code on the web side of chatgpt, [in this way](#), we came up with the following table. The following is the code review through AI, and it is documented through a table.[COMP90082\\_TMPLT\\_CodeReview.xlsx](#)

ChatGPT Code Review										
In this										
Name and location of artifact (on GitHub) to be reviewed:	<a href="https://github.com/COMP90082-2023-SM1/GE-Redback">https://github.com/COMP90082-2023-SM1/GE-Redback</a>									
CODE REVIEW RESULTS										
File No.	Artifact (on GitHub)	Documentation Defects:	Visual Representation Defects	Structure Defects	New Functionality	Resource Defects:	Check Defects	Interface Defects	Logic Defects:	Recommandation
1	GE-Redback/blob/main/src/Backend/containers/game-controller.js	a. Naming: The names of software elements are generally descriptive and clear. However, official should be corrected to official. b. Comment: The quality of code comments is mostly adequate, but there are some inconsistencies in terms of format, and some blocks of code lack explanations.	Bracket Usage: There are no missing or incorrect brackets. b. Indentation: The indentation is mostly consistent, but there are some minor issues that can be fixed for better readability. c. Long Line: There are no overly long lines in the code.	a. Dead Code: There doesn't seem to be any dead code. b. Duplication: There is some code repetition when setting player roles and processing decisions that could be refactored.	Use Standard Method: No issues observed in this category.	Variable Initialization: There are no uninitialized or incorrectly initialized variables. b. Memory Management: No issues observed in this category.	Check User Input: The code seems to handle user input properly, without any evident issues.	Parameter: There don't seem to be any incorrect or missing parameters when calling functions or libraries.	Compute: No incorrect logic during system execution was identified. b. Performance: The efficiency of the algorithm used is not optimal but acceptable.	Correct the spelling of official to official. Improve code comments for better consistency and explanation. Fix minor indentation issues for better readability. Refactor the code to reduce duplication when setting player roles and processing decisions. Consider optimizing the algorithm used for better performance.
2	GE-Redback/src/Backend/routes/play.js	a. Naming: The quality of software element names is generally clear and descriptive. b. Comment: There are almost no code comments in the provided code, making it harder to understand the purpose and functionality of each part.	a. Bracket Usage: There are no missing or incorrect brackets in the code. b. Indentation: The indentation is consistent and follows standard conventions. c. Long Line: There are no overly long lines in the code.	a. Dead Code: There doesn't seem to be any dead code in the provided snippet. b. Duplication: No duplicate code statements were identified.	Use Standard Method: The code seems to use standard methods for single-purpose code statements.	a. Variable Initialization: There are no uninitialized or incorrectly initialized variables. b. Memory Management: No issues observed in this category.	Check User Input: The provided code does not directly handle user input, as it is mainly focused on routing.	Parameter: There don't seem to be any incorrect or missing parameters when calling functions or libraries.	a. Compute: No incorrect logic during system execution was identified. b. Performance: No issues observed in this category.	Add code comments to explain the purpose and functionality of each part of the code for better understanding and maintainability.
3	GE-Redback/src/Backend/build-tree.js	a. Naming: The quality of software element names is clear and descriptive. b. Comment: There is only one code comment at the beginning, which is not sufficient. More comments should be added to improve understanding.	a. Bracket Usage: There are no missing or incorrect brackets in the code. b. Indentation: The indentation is consistent and follows standard conventions. c. Long Line: There are no overly long lines in the code.	a. Dead Code: There doesn't seem to be any dead code in the provided snippet. b. Duplication: No duplicate code statements were identified.	Use Standard Method: The code seems to use standard methods for single-purpose code statements.	a. Variable Initialization: There is an issue with the variable initialization order in the code. - child1 and child2 are used before they are defined, which can lead to errors. They should be defined before being used in option1 and option2. b. Memory Management: No issues observed in this category.	Check User Input: The provided code does not directly handle user input, as it is mainly focused on building a decision tree.	Parameter: There don't seem to be any incorrect or missing parameters when calling functions or libraries.	a. Compute: No incorrect logic during system execution was identified. b. Performance: No issues observed in this category.	Add more code comments to explain the purpose and functionality of each part of the code for better understanding and maintainability. Fix the variable initialization order issue by defining child1 and child2 before using them in option1 and option2.

4	GE-Redback /src/Frontend/src/main.js	a. Naming: The quality of software element names is good and descriptive. b. Comment: The code comments are limited and not sufficient to explain the code. More comments should be added to improve understanding.	a. Bracket Usage: There are no missing or incorrect brackets in the code. b. Indentation: The indentation is consistent and follows standard conventions. c. Long Line: There are no overly long lines in the code.	a. Dead Code: There doesn't seem to be any dead code in the provided snippet. b. Duplication: No duplicate code statements were identified.	Use Standard Method: The code seems to use standard methods for single-purpose code statements.	a. Variable Initialization: No issues with variable initialization were observed. b. Memory Management: No issues observed in this category.	Check User Input: The provided code does not directly handle user input, as it is mainly focused on configuring the Vue application.	Parameter: There don't seem to be any incorrect or missing parameters when calling functions or libraries.	a. Compute: No incorrect logic during system execution was identified. b. Performance: No issues observed in this category.	Add more code comments to explain the purpose and functionality of each part of the code for better understanding and maintainability.
5	GE-Redback /src/Frontend/src/views/ChooseYourRole.vue	Naming: The quality of software element names is good and descriptive. b. Comment: Code comments are limited and not sufficient to explain the code. More comments should be added to improve understanding.	a. Bracket Usage: There are no missing or incorrect brackets in the code. b. Indentation: The indentation is consistent and follows standard conventions.	a. Dead Code: There doesn't seem to be any dead code in the provided snippet. b. Duplication: No duplicate code statements were identified.	Use Standard Method: The code seems to use standard methods for single-purpose code statements.	a. Variable Initialization: No issues with variable initialization were observed. b. Memory Management: No issues observed in this category.	a. Check User Input: The provided code does not directly handle user input, as it is focused on displaying roles and handling role selection.	Parameter: There don't seem to be any incorrect or missing parameters when calling functions or libraries.	Compute: No incorrect logic during system execution was identified. b. Performance: No issues observed in this category.	Add more code comments to explain the purpose and functionality of each part of the code for better understanding and maintainability.
6	GE-Redback /src/Frontend/src/views/Discussion.vue	a. Naming: The naming of variables and functions is generally good and descriptive. b. Comment: There are very few comments in the code. Adding more comments would improve the code's readability and maintainability.	a. Bracket Usage: No issues found. b. Indentation: The indentation is mostly consistent, but there are some minor inconsistencies, such as in the created() function.	a. Dead Code: No dead code found. b. Duplication: No significant code duplication found.	a. Use Standard Method: The code is using standard methods as expected.	a. Variable Initialization: No issues found. b. Memory Management: No issues found.	Check User Input: The code appears to handle user input appropriately.	Parameter: No issues found.	a. Compute: No issues found. b. Performance: The algorithm's efficiency seems reasonable, but some optimizations could be applied if necessary.	Add more comments to the code to improve readability and maintainability. Fix the minor indentation inconsistencies for better readability.
7	GE-Redback /src/Frontend/src/views/Home.vue	a. Naming: The names of software elements are generally clear and descriptive. b. Comment: The code comments are generally informative and accurate.	a. Bracket Usage: There are no issues with incorrect or missing brackets. b. Indentation: The indentation is consistent and follows best practices.	a. Dead Code: No dead code was found. b. Duplication: There is minimal code duplication.	Use Standard Method: The code appears to use standard methods for single-purpose code statements.	a. Variable Initialization: All variables seem to be initialized correctly. b. Memory Management: The memory management seems to be appropriate.	Check User Input: There could be more validation logic for user input to ensure the entered gameID, playerName, and roleID are valid.	Parameter: There are no issues with incorrect or missing parameters when calling functions or libraries.	a. Compute: There are no apparent logic issues during system execution. b. Performance: The efficiency of the algorithm used seems reasonable.	Add more validation logic for user input in the "rejoinGame" method to ensure the entered gameID, playerName, and roleID are valid before proceeding. Consider breaking down larger components into smaller, reusable components to improve code modularity and maintainability.
8	GE-Redback /src/Frontend/src/views/RoleDescription.vue	a. Naming: The software element names are clear and meaningful. b. Comment: The code comments are lacking. It would be helpful to have comments explaining the purpose of the Vue component and its methods.	a. Bracket Usage: The brackets are used correctly. b. Indentation: The indentation is consistent and properly used.	a. Dead Code: There is no dead code in the provided snippet. b. Duplication: There is no duplicated code.	Use Standard Method: The code uses standard methods appropriately.	a. Variable Initialization: The variables are initialized properly. b. Memory Management: There are no apparent memory management issues in the provided code.	Check User Input: There is no user input to check in this component.	Parameter: There are no issues with parameters when calling functions or libraries.	a. Compute: There is no incorrect logic in the provided code. b. Performance: The efficiency of the code seems appropriate for its purpose.	Add comments to provide more context about the component and its methods. Remove the "todo" comment if the task is already completed.

# Architecture Decisions

In terms of architecture, we have decided to maintain the existing framework for now.

The project currently employs a **timer-based polling approach** in its connection between frontend and backend.

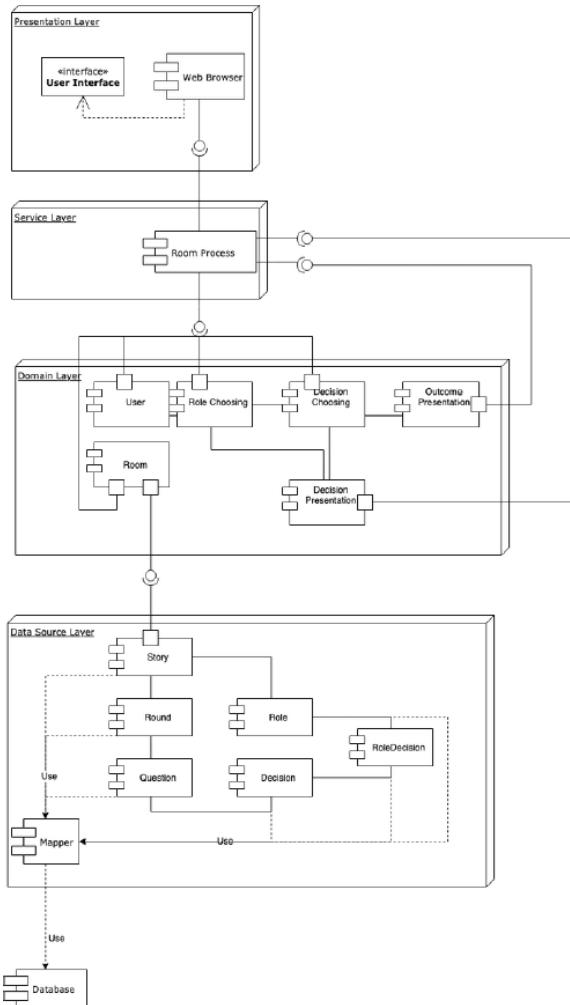
Below are some advantages and disadvantages of using timer-based polling for a five-player synchronous game:

Advantages:

- **Simplicity:** Timer-based polling is relatively easy to implement and understand, making it a straightforward solution for real-time data synchronization.
- **Compatibility:** Polling works across various platforms and environments, ensuring broader compatibility with different devices and systems.

Disadvantages:

- **Scalability:** Timer-based polling can become inefficient as the number of games increases (When there are multiple games being played simultaneously in a tutorial, the gaming experience will be poor), potentially leading to performance bottlenecks and increased server load.
- **Latency:** The inherent latency in polling can result in a less-than-optimal user experience, especially in a fast-paced synchronous game where low latency is crucial.
- **Resource Usage:** Frequent polling can consume more bandwidth and server resources compared to event-driven approaches, such as WebSockets or Server-Sent Events, which only send updates when necessary.



# | Testing

**This page contains following directories:**

---

| Test Cases & Plan

---

| Automated Testing Implementation

# | Test Cases & Plan

## The testing workflow:

1. Background (what trigger the issue/bug, why do we need to test it)
2. Purpose (what part of the game would be tested, is it going to make the game better or improve fairness etc.)
3. Procedure (preparation, assumption, specific plan(s)/step(s))
4. Actual Outcome (original system output)
5. Expected Outcome (expected output)
6. Testing Team Verified (verified if actual outcome = expected outcome)
7. Conclusion (should we have more tests or improvements)

When all test plan(s)/step(s) got verified from testing team, the testing ticket can be closed/resolved/passed.

## Test plan:

Test the following components of the front-end:

Home.vue JoinGame.vue NewGame.vue ChooseYourRole.vue

## Test results:

1. Create snapshot files of the HTML output.
2. Check if each page has the correct title and button list classes.
3. Check if each page can render the title correctly.
4. Check if each page can render buttons and determine if they are clickable.
5. Check if each button on each page can render the router correctly.
6. Check if the home page can render the Help button content correctly.

All tests have passed, and the front-end components are functioning as expected.

# Is03-1 Testing

**Tester: Steven**

## Background:

There are three roles that receive abnormal questions set from the start of the game:

**Aeronautical Engineer** role receives **Boeing Pilot** questions set.

**Boeing Executive** role receives **Aeronautical Engineer** questions set.

**Boeing Pilot** role receives **Boeing Executive** questions set.

---

Sam and Steven have reconstructed the code of questions.js and options.js in the Backend. And waiting for testing team to confirm the normal game process form the Frontend.

## Purpose:

1. To make sure the game can be process normally.
2. To make sure each player can receive their role-specific questions and options.
3. To make sure player will not have opportunity to know other roles' questions in advance.

## Procedure:

// In Role column:

- 1 for **Boeing Executive**
- 2 for **Aeronautical Engineer**
- 3 for **Boeing Pilot**
- 4 for **Federal Aviation Administration (FAA) Official**
- 5 for **Software Developer**

// In Question column:

- Cell with **blue background colour** indicates the first time trigger the question.

// In Planned Option column:

- Cell with **orange background colour** indicates the first time select the option.
- 

In order to trigger every question and every option for all roles, **six games** would be necessary.

To ease the checking procedure, will **replace question/option's description to their corresponding question/option Id.** (Check screenshot)

To confirm if the role receive the right questions and options in this round or the next round, we can check if their *Actual Selected Option* and *Actual New Question* match *Planned Option* and *Expected New Question*.

**Id with red colour** => not meet our plan/expectation.

## Plan 1:

Round	Role	Question	Planned Option	Expected New Question	Actual Selected Option	Actual New Question	Testing Team Verified
1	1	1011	10111	1021	10111	1021	
	2	2011	20111	2021	20111	2021	
	3	3011	30111	3021	30111	3021	
	4	4011	40111	4021	40111	4021	
	5	5011	50111	5021	50111	5021	
2	1	1021	10211	1031	10211	1031	
	2	2021	20211	2031	20211	2031	
	3	3021	30211	3031	30211	3031	
	4	4021	40211	4031	40211	4031	
	5	5021	50211	5031	50211	5031	
3	1	1031	10311	1041	10311	1041	
	2	2031	20311	2041	20311	2041	

	3	3031	30311	3041	30311	3041	
	4	4031	40311	4041	40311	4041	
	5	5031	50311	5041	50311	5041	
4	1	1041	10411	1051	10411	1051	
	2	2041	20411	2051	20411	2051	
	3	3041	30411	3051	30411	3051	
	4	4041	40411	4051	40411	4051	
	5	5041	50411	5051	50411	5051	
5	1	1051	10511	6061	10511	6061	
	2	2051	20511	6061	20511	6061	
	3	3051	30511	6061	30511	6061	
	4	4051	40511	6061	40511	6061	
	5	5051	50511	6061	50511	6061	
6	1	6061	60611	6071	60611	6071	
	2	6061	60612	6071	60612	6071	
	3	6061	60611	6071	60611	6071	
	4	6061	60612	6071	60612	6071	
	5	6061	60611	6071	60611	6071	
7	1	6071	60711	6081	60711	6081	
	2	6071	60712	6081	60712	6081	
	3	6071	60713	6081	60713	6081	
	4	6071	60711	6081	60711	6081	
	5	6071	60712	6081	60712	6081	
8	1	6081	60811	6091	60811	6091	
	2	6081	60812	6091	60812	6091	
	3	6081	60811	6091	60811	6091	
	4	6081	60812	6091	60812	6091	
	5	6081	60811	6091	60811	6091	
9	1	6091	60911	6101	60911	6101	
	2	6091	60912	6101	60912	6101	
	3	6091	60913	6101	60913	6101	
	4	6091	60911	6101	60911	6101	
	5	6091	60912	6101	60912	6101	
10	1	6101	61011	6111	61011	6111	
	2	6101	61012	6111	61012	6111	
	3	6101	61013	6111	61013	6111	
	4	6101	61014	6111	61014	6111	
	5	6101	61011	6111	61011	6111	
11	1	6111	61111	6121	61111	6121	
	2	6111	61112	6121	61112	6121	
	3	6111	61113	6121	61113	6121	
	4	6111	61114	6121	61114	6121	
	5	6111	61111	6121	61111	6121	
12	1	6121	61211	6131	61211	6131	
	2	6121	61212	6131	61212	6131	
	3	6121	61211	6131	61211	6131	
	4	6121	61212	6131	61212	6131	
	5	6121	61211	6131	61211	6131	
13	1	6131	61311	-	61311	-	
	2	6131	61312	-	61312	-	
	3	6131	61313	-	61313	-	
	4	6131	61311	-	61311	-	
	5	6131	61312	-	61312	-	

## Plan 2:

Round	Role	Question	Planned Option	Expected New Question	Actual Selected Option	Actual New Question	Testing Team Verified
1	1	1011	10112	1021	10112	1021	
	2	2011	20112	2021	20112	2021	
	3	3011	30112	3021	30112	3021	
	4	4011	40112	4021	40112	4021	
	5	5011	50112	5021	50112	5021	
2	1	1021	10212	1031	10212	1031	
	2	2021	20212	2032	20212	2032	
	3	3021	30212	3032	30212	3031	
	4	4021	40212	4031	40212	4031	
	5	5021	50212	5032	50212	5032	
3	1	1031	10312	1041	10312	1041	
	2	2032	20321	2041	20321	2041	
	3	3032	30321	3042	30311	3041	
	4	4031	40312	4041	40312	4041	
	5	5032	50321	5041	50321	5041	
4	1	1041	10412	1051	10412	1051	
	2	2041	20412	2051	20412	2051	
	3	3042	30421	3051	30412	3051	
	4	4041	40414	4052	40414	4052	
	5	5041	50412	5051	50412	5051	
5	1	1051	10511	6061	10511	6061	
	2	2051	20511	6061	20511	6061	
	3	3051	30512	6061	30512	6061	
	4	4052	40521	6061	40521	6061	
	5	5051	50512	6061	50512	6061	

### Plan 3:

Round	Role	Question	Planned Option	Expected New Question	Actual Selected Option	Actual New Question	Testing Team Verified
1	1	1011	10113	1021	10113	1021	
	2	2011	20113	2021	20113	2021	
	3	3011	30113	3021	30113	3021	
	4	4011	40113	4021	40113	4021	
	5	5011	50113	5021	50113	5021	
2	1	1021	10213	1031	10213	1031	
	2	2021	20213	2031	20213	2031	
	3	3021	30213	3033	30213	3031	
	4	4021	40213	4031	40213	4031	
	5	5021	50213	5031	50213	5031	
3	1	1031	10311	1041	10311	1041	
	2	2031	20312	2041	20312	2041	
	3	3033	30331	3042	30311	3041	
	4	4031	40311	4041	40311	4041	
	5	5031	50312	5041	50312	5041	
4	1	1041	10413	1051	10413	1051	
	2	2041	20413	2051	20413	2051	
	3	3042	30421	3051	30413	3051	
	4	4041	40414	4052	40414	4052	
	5	5041	50413	5051	50413	5051	
5	1	1051	10511	6061	10511	6061	
	2	2051	20511	6061	20511	6061	
	3	3051	30511	6061	30511	6061	
	4	4052	40522	6061	40522	6061	
	5	5051	50511	6061	50511	6061	

#### Plan 4:

Round	Role	Question	Planned Option	Expected New Question	Actual Selected Option	Actual New Question	Testing Team Verified
1	1	1011	10111	1021	10111	1021	
	2	2011	20111	2021	20111	2021	
	3	3011	30111	3021	30111	3021	
	4	4011	40111	4021	40111	4021	
	5	5011	50111	5021	50111	5021	
2	1	1021	10212	1031	10212	1031	
	2	2021	20214	2032	20214	2031	
	3	3021	30213	3033	30213	3031	
	4	4021	40214	4031	40214	4031	
	5	5021	50214	5032	50214	5032	
3	1	1031	10312	1041	10312	1041	
	2	2032	20321	2041	20312	2041	
	3	3033	30332	3041	30311	3041	
	4	4031	40312	4041	40312	4041	
	5	5032	50321	5041	50321	5041	
4	1	1041	10414	1051	10414	1051	
	2	2041	20411	2051	20411	2051	
	3	3041	30412	3051	30412	3051	
	4	4041	40414	4052	40414	4052	
	5	5041	50411	5051	50411	5051	
5	1	1051	10511	6061	10511	6061	
	2	2051	20511	6061	20511	6061	
	3	3051	30512	6061	30512	6061	
	4	4052	40523	6061	40523	6061	
	5	5051	50512	6061	50512	6061	

#### Plan 5:

Round	Role	Question	Planned Option	Expected New Question	Actual Selected Option	Actual New Question	Testing Team Verified
1	1	1011	10112	1021	10112	1021	
	2	2011	20112	2021	20112	2021	
	3	3011	30112	3021	30112	3021	
	4	4011	40112	4021	40112	4021	
	5	5011	50112	5021	50112	5021	
2	1	1021	10213	1031	10213	1031	
	2	2021	20211	2031	20211	2031	
	3	3021	30211	3031	30211	3031	
	4	4021	40211	4031	40211	4031	
	5	5021	50211	5031	50211	5031	
3	1	1031	10311	1041	10311	1041	
	2	2031	20311	2041	20311	2041	
	3	3031	30311	3041	30311	3041	
	4	4031	40312	4041	40312	4041	
	5	5031	50311	5041	50311	5041	
4	1	1041	10415	1051	10415	1051	
	2	2041	20412	2051	20412	2051	
	3	3041	30413	3051	30413	3051	
	4	4041	40412	4051	40412	4051	
	5	5041	50412	5051	50412	5051	

#### Plan 6:

Round	Role	Question	Planned Option	Expected New Question	Actual Selected Option	Actual New Question	Testing Team Verified
1	1	1011	10113	1021	10113	1021	
	2	2011	20113	2021	20113	2021	
	3	3011	30113	3021	30113	3021	
	4	4011	40113	4021	40113	4021	
	5	5011	50113	5021	50113	5021	
2	1	1021	10211	1031	10211	1031	
	2	2021	20212	2032	20212	2032	
	3	3021	30212	3032	30212	3031	
	4	4021	40212	4031	40212	4031	
	5	5021	50212	5032	50212	5032	
3	1	1031	10312	1041	10312	1041	
	2	2032	20321	2041	20321	2041	
	3	3032	30321	3042	30311	3041	
	4	4031	40311	4041	40311	4041	
	5	5032	50321	5041	50321	5041	
4	1	1041	10416	1051	10416	1051	
	2	2041	20413	2051	20413	2051	
	3	3042	30421	3051	30411	3051	
	4	4041	40413	4051	40413	4051	
	5	5041	50413	5051	50413	5051	

## Conclusion:

The issue is mostly fixed, however:

QuestionId 2031 can not be triggered.

Most error come from Role 3, high chance of bug reading corresponding QuestionId, need to review again.

Test ticket can be closed,

**Create a new ticket for Question 2031 and Role 3 QuestionId&OptionId into Trello Sprint 3.**

# Is03-1 Plan1 Screenshot

## Role 1 (Boeing Executive):

The screenshots show three separate instances of a web-based game interface titled "Group Discussion". Each instance has a blue header bar with tabs labeled "A Game Of Ethics" and a "Guest" button. The main content area is a white box with a blue border, titled "Group Discussion". Inside, there is a question: "Below is a personal question, you have 60s to finish your choice." followed by a timestamp (e.g., 1011, 1021, 1031). Below the question are three radio buttons labeled 1: 10111, 2: 10112, and 3: 10113. A "SUBMIT MY CHOICE" button is at the bottom, along with a timer showing "00 m 59 s" (or similar values like 52s or 53s). The background of the game area features a light blue sky with white clouds and a small airplane icon. A "Game Status" button is visible at the bottom left of each screen.

**Screenshot 1 (Top):**

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1011

1: 10111  
 2: 10112  
 3: 10113

SUBMIT MY CHOICE

00 m 59 s

**Screenshot 2 (Middle):**

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1021

1: 10211  
 2: 10212  
 3: 10213

SUBMIT MY CHOICE

00 m 52 s

**Screenshot 3 (Bottom):**

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1031

1: 10311  
 2: 10312

SUBMIT MY CHOICE

00 m 53 s

A Game Of Ethics x | A Game Of Ethics x + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1041

1: 10411  
 2: 10412  
 3: 10413  
 4: 10414  
 5: 10415  
 6: 10416

SUBMIT MY CHOICE

00 m 52 s

Game Status

A Game Of Ethics x | A Game Of Ethics x + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1051

1: 10511

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics x | A Game Of Ethics x + Guest

localhost:8000/Discussion?skip=true

Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6061

1: 60611  
 2: 60612

SUBMIT MY CHOICE

02 m 29 s

Game Status

Game Status

A Game Of Ethics

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6071

1: 60711

2: 60712

3: 60713

**SUBMIT MY CHOICE**

02 m 30 s

The screenshot shows a web-based application titled "Group Discussion". The main content area contains the following text: "As a group, discuss the following decision. You have 150s to finish your choice." Below this, there is a list of options:

- 1: 60811
- 2: 60812

At the bottom of the list is a blue button labeled "SUBMIT MY CHOICE". To the left of the list, there is a small circular icon with a blue dot and the text "02 m 29 s". The background features a light blue sky with white clouds. At the bottom right, there is a graphic of a white and blue airplane. The browser's address bar at the top shows "localhost:8000/Discussion".

The screenshot shows a web browser window with five tabs, all titled "A Game Of Ethics". The active tab displays a group discussion interface. The page has a light blue background with white clouds. At the top center, the title "Group Discussion" is displayed. Below the title, a message reads: "As a group, discuss the following decision. You have 150s to finish your choice." A timer at the bottom left shows "02 m 29 s". In the center, there is a list of three options, each preceded by a radio button:

- 1: 60911
- 2: 60912
- 3: 60913

A large blue button labeled "SUBMIT MY CHOICE" is centered below the options. At the very bottom left, a small box labeled "Game Status" is visible.

The screenshot shows a web browser window with five tabs, all titled "A Game Of Ethics". The active tab displays a "Group Discussion" page. The page has a light blue background with white clouds on the left and right sides. At the top center, the title "Group Discussion" is displayed in a large, bold, black font. Below the title, a text box contains the instruction: "As a group, discuss the following decision. You have 150s to finish your choice." A timer at the bottom of the box shows "02 m 29 s". In the center, there is a list of four options, each preceded by a radio button:

- 1: 61011
- 2: 61012
- 3: 61013
- 4: 61014

A blue rectangular button labeled "SUBMIT MY CHOICE" is positioned below the list. At the very bottom of the page, there is a small "Game Status" section featuring a white airplane icon.

The screenshot shows a web browser window titled "Group Discussion" from "A Game Of Ethics". The URL is "localhost:8000/Discussion". The main content area contains the following text: "As a group, discuss the following decision. You have 150s to finish your choice." Below this is a timer showing "6111". A list of five options is provided, each with a radio button:

- 1: 61111
- 2: 61112
- 3: 61113
- 4: 61114

A blue button labeled "SUBMIT MY CHOICE" is centered below the options. At the bottom left, there is a small icon of a white airplane with blue stripes and a timer indicating "02 m 29 s". The bottom right corner features a decorative graphic of a white airplane with blue stripes.

A Game Of Ethics

localhost:8000/Discussion Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6121

1: 61211

2: 61212

SUBMIT MY CHOICE

02 m 30 s

Game Status

A Game Of Ethics    Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6131

1: 61311  
 2: 61312  
 3: 61313

SUBMIT MY CHOICE

02 m 30 s



Game Status

### Role 2 (Aeronautical Engineer):

A Game Of Ethics    Guest

localhost:8000/Discussion

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

2011

1: 20111  
 2: 20112  
 3: 20113

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics    Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

2021

1: 20211  
 2: 20212  
 3: 20213  
 4: 20214

SUBMIT MY CHOICE

00 m 52 s



Game Status

A Game Of Ethics    +    Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

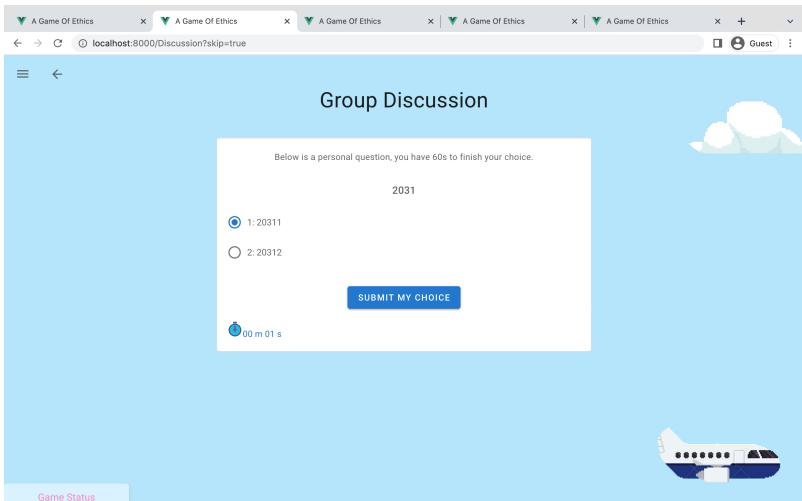
2031

1: 20311  
 2: 20312

SUBMIT MY CHOICE

00 m 01 s

Game Status



A Game Of Ethics    +    Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

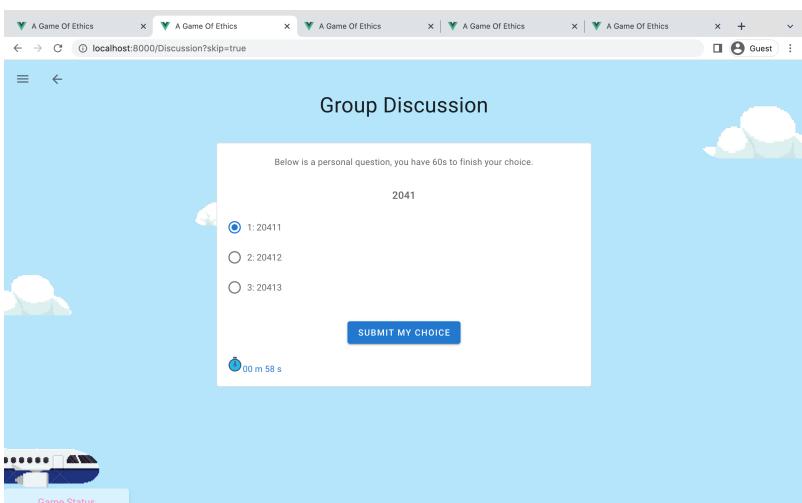
2041

1: 20411  
 2: 20412  
 3: 20413

SUBMIT MY CHOICE

00 m 58 s

Game Status



A Game Of Ethics    +    Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

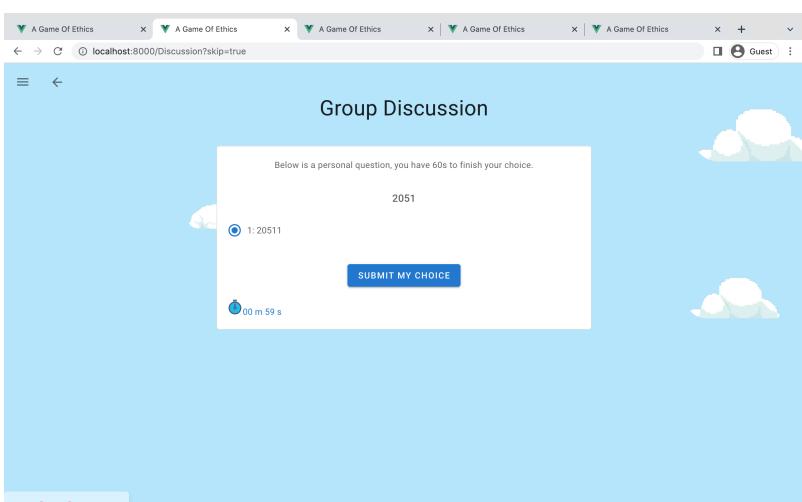
2051

1: 20511

SUBMIT MY CHOICE

00 m 59 s

Game Status



A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true

Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6061

1: 60611  
 2: 60612

SUBMIT MY CHOICE

02 m 27 s



Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion

Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6071

1: 60711  
 2: 60712  
 3: 60713

SUBMIT MY CHOICE

02 m 28 s



Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion

Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6081

1: 60811  
 2: 60812

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6091

1: 60911  
 2: 60912  
 3: 60913

**SUBMIT MY CHOICE**

02 m 07 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6101

1: 61011  
 2: 61012  
 3: 61013  
 4: 61014

**SUBMIT MY CHOICE**

02 m 29 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6111

1: 61111  
 2: 61112  
 3: 61113  
 4: 61114

**SUBMIT MY CHOICE**

02 m 29 s

Game Status

A Game Of Ethics    localhost:8000/Discussion Guest

### Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6121

1: 61211  
 2: 61212

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics    localhost:8000/Discussion Guest

### Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6131

1: 61311  
 2: 61312  
 3: 61313

SUBMIT MY CHOICE

02 m 29 s



Game Status

### Role 3 (Boeing Pilot):

A Game Of Ethics    localhost:8000/Discussion Guest

### Group Discussion

Below is a personal question, you have 60s to finish your choice.

3011

1: 30111  
 2: 30112  
 3: 30113

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3021

1: 30211  
 2: 30212  
 3: 30213

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3031

1: 30311

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3041

1: 30411  
 2: 30412  
 3: 30413

SUBMIT MY CHOICE

00 m 57 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3051

1: 30511  
 2: 30512

SUBMIT MY CHOICE

01 m 00 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6061

1: 60611  
 2: 60612

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6071

1: 60711  
 2: 60712  
 3: 60713

SUBMIT MY CHOICE

02 m 28 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6081

1: 60811  
 2: 60812

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6091

1: 60911  
 2: 60912  
 3: 60913

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6101

1: 61011  
 2: 61012  
 3: 61013  
 4: 61014

SUBMIT MY CHOICE

02 m 28 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6111

1: 61111  
 2: 61112  
 3: 61113  
 4: 61114

SUBMIT MY CHOICE

02 m 29 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6121

1: 61211  
 2: 61212

SUBMIT MY CHOICE

02 m 29 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6131

1: 61311  
 2: 61312  
 3: 61313

SUBMIT MY CHOICE

02 m 29 s

Game Status

#### Role 4 (Federal Aviation Administration (FAA) Official):

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

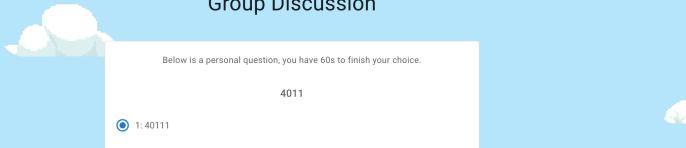
Below is a personal question, you have 60s to finish your choice.

4011

1: 40111  
 2: 40112  
 3: 40113

SUBMIT MY CHOICE

01 m 00 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

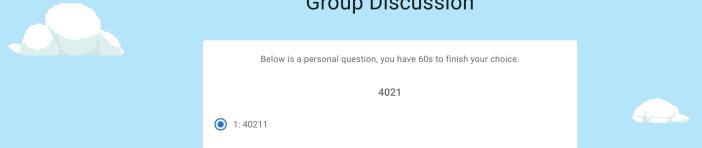
Below is a personal question, you have 60s to finish your choice.

4021

1: 40211  
 2: 40212  
 3: 40213  
 4: 40214

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

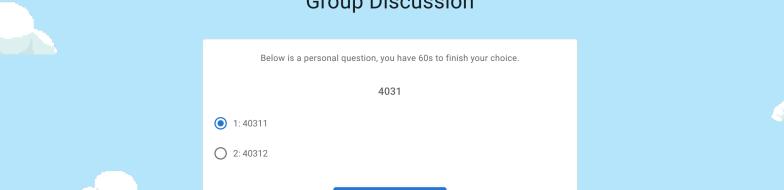
Below is a personal question, you have 60s to finish your choice.

4031

1: 40311  
 2: 40312

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4041

1: 40411  
 2: 40412  
 3: 40413  
 4: 40414

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4051

1: 40511

SUBMIT MY CHOICE

01 m 00 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6061

1: 60611  
 2: 60612

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6071

1: 60711  
 2: 60712  
 3: 60713

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6081

1: 60811  
 2: 60812

SUBMIT MY CHOICE

02 m 11 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6091

1: 60911  
 2: 60912  
 3: 60913

SUBMIT MY CHOICE

02 m 28 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6101

- 1: 61011
- 2: 61012
- 3: 61013
- 4: 61014

**SUBMIT MY CHOICE**

02 m 27 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6111

- 1: 61111
- 2: 61112
- 3: 61113
- 4: 61114

**SUBMIT MY CHOICE**

02 m 29 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6121

- 1: 61211
- 2: 61212

**SUBMIT MY CHOICE**

02 m 29 s



Game Status

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6131

1: 61311  
 2: 61312  
 3: 61313

**SUBMIT MY CHOICE**

02 m 29 s

Game Status



### Role 5 (Software Developer):

A Game Of Ethics | localhost:8000/Discussion | Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5011

1: 50111  
 2: 50112  
 3: 50113

**SUBMIT MY CHOICE**

01 m 00 s

Game Status



A Game Of Ethics | localhost:8000/Discussion?skip=true | Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5021

1: 50211  
 2: 50212  
 3: 50213  
 4: 50214

**SUBMIT MY CHOICE**

00 m 59 s

Game Status



A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5031

1: 50311  
 2: 50312

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5041

1: 50411  
 2: 50412  
 3: 50413

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5051

1: 50511  
 2: 50512

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6061

1: 60611  
 2: 60612

SUBMIT MY CHOICE

02 m 30 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion

Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6071

1: 60711  
 2: 60712  
 3: 60713

SUBMIT MY CHOICE

02 m 25 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion

Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6081

1: 60811  
 2: 60812

SUBMIT MY CHOICE

02 m 19 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6091

1: 60911  
 2: 60912  
 3: 60913

SUBMIT MY CHOICE

02 m 24 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6101

1: 61011  
 2: 61012  
 3: 61013  
 4: 61014

SUBMIT MY CHOICE

02 m 29 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6111

1: 61111  
 2: 61112  
 3: 61113  
 4: 61114

SUBMIT MY CHOICE

02 m 29 s



Game Status

Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6121

1: 61211  
 2: 61212

SUBMIT MY CHOICE

02 m 29 s

Group Discussion

As a group, discuss the following decision. You have 150s to finish your choice.

6131

1: 61311  
 2: 61312  
 3: 61313

SUBMIT MY CHOICE

02 m 29 s

# Is03-1 Plan2 Screenshot

## Role 1 (Boeing Executive):

A Game Of Ethics | Guest | ...

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

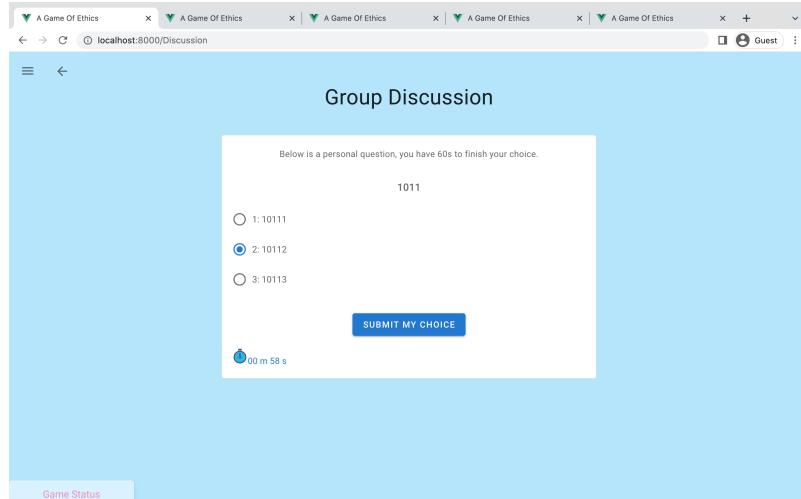
1011

1: 10111  
 2: 10112  
 3: 10113

SUBMIT MY CHOICE

🕒 00 m 58 s

Game Status



A Game Of Ethics | Guest | ...

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

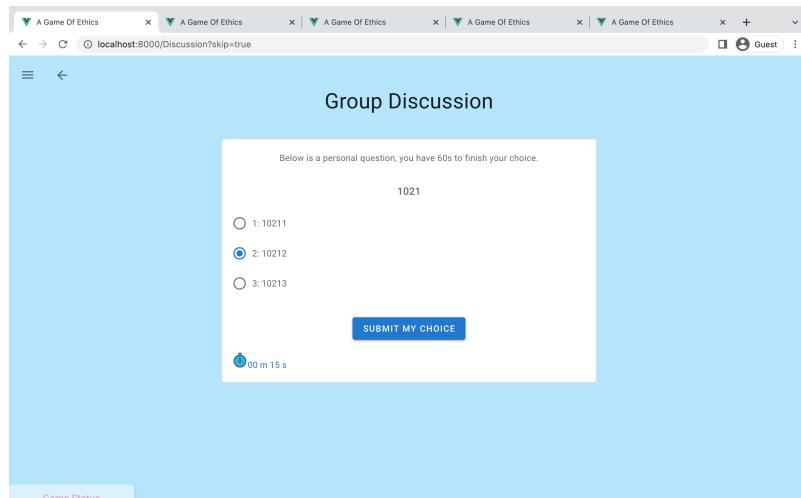
1021

1: 10211  
 2: 10212  
 3: 10213

SUBMIT MY CHOICE

🕒 00 m 15 s

Game Status



A Game Of Ethics | Guest | ...

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

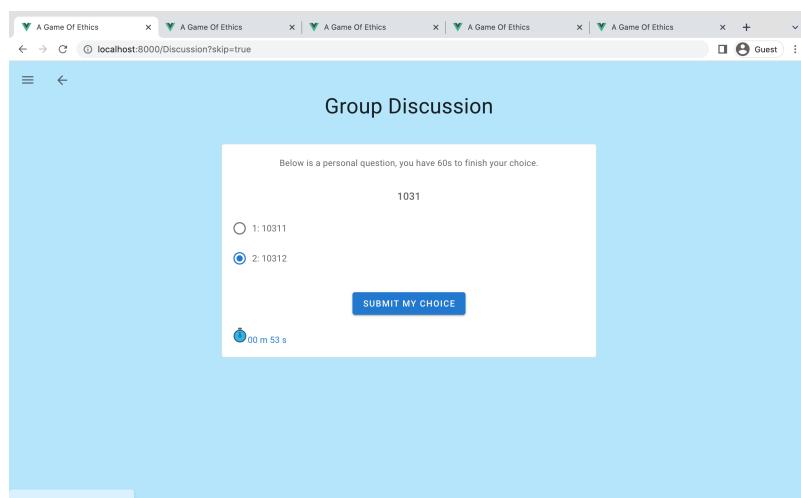
1031

1: 10311  
 2: 10312

SUBMIT MY CHOICE

🕒 00 m 53 s

Game Status



A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true    Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

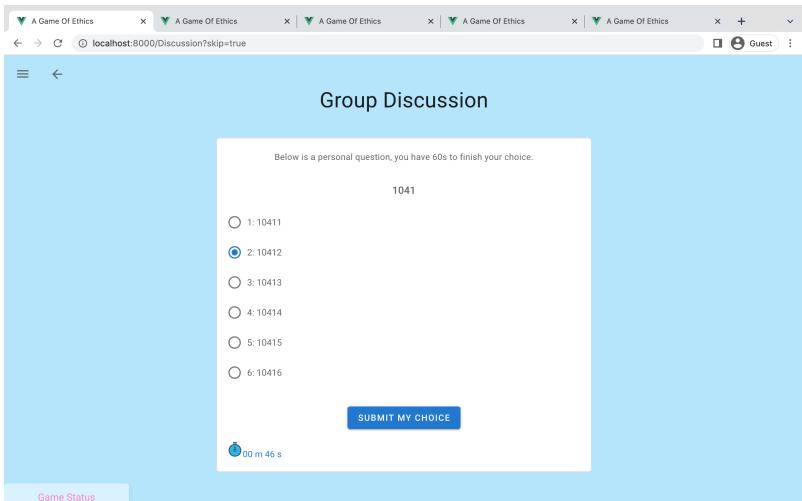
1041

1: 10411  
 2: 10412  
 3: 10413  
 4: 10414  
 5: 10415  
 6: 10416

**SUBMIT MY CHOICE**

00 m 46 s

Game Status



A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true    Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

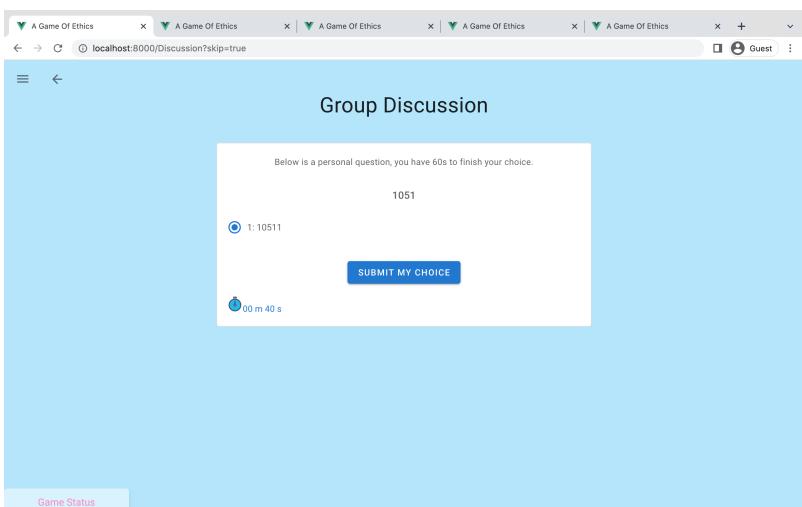
1051

1: 10511

**SUBMIT MY CHOICE**

00 m 40 s

Game Status



### Role 2 (Aeronautical Engineer):

A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion    Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

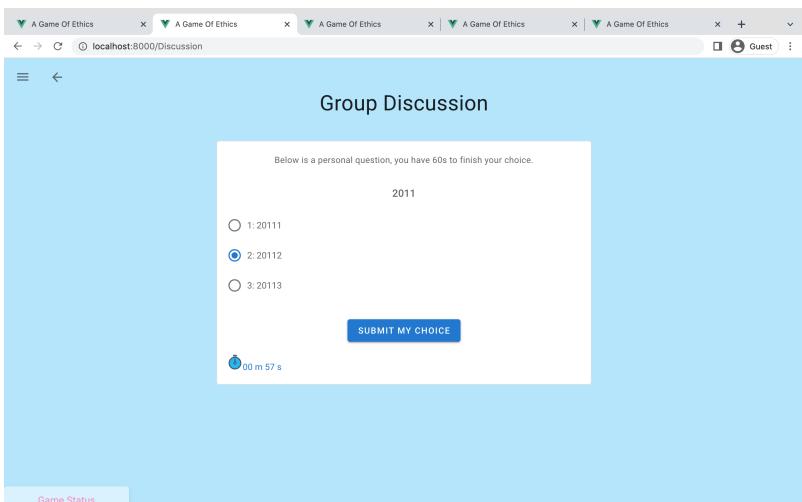
2011

1: 20111  
 2: 20112  
 3: 20113

**SUBMIT MY CHOICE**

00 m 57 s

Game Status



A Game Of Ethics    +    Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2021

1: 20211  
 2: 20212  
 3: 20213  
 4: 20214

SUBMIT MY CHOICE

00 m 49 s

A Game Of Ethics    +    Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2032

1: 20321

SUBMIT MY CHOICE

00 m 54 s

A Game Of Ethics    +    Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2041

1: 20411  
 2: 20412  
 3: 20413

SUBMIT MY CHOICE

00 m 52 s

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2051

1: 20511  
 2: 20512  
 3: 20513

SUBMIT MY CHOICE

00 m 59 s

Game Status

### Role 3 (Boeing Pilot):

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3011

1: 30111  
 2: 30112  
 3: 30113

SUBMIT MY CHOICE

00 m 58 s

Game Status

Group Discussion

Below is a personal question, you have 60s to finish your choice.

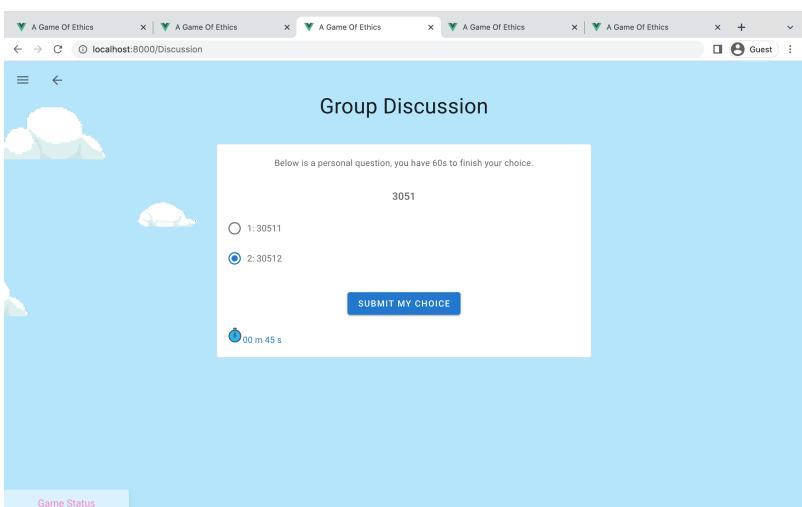
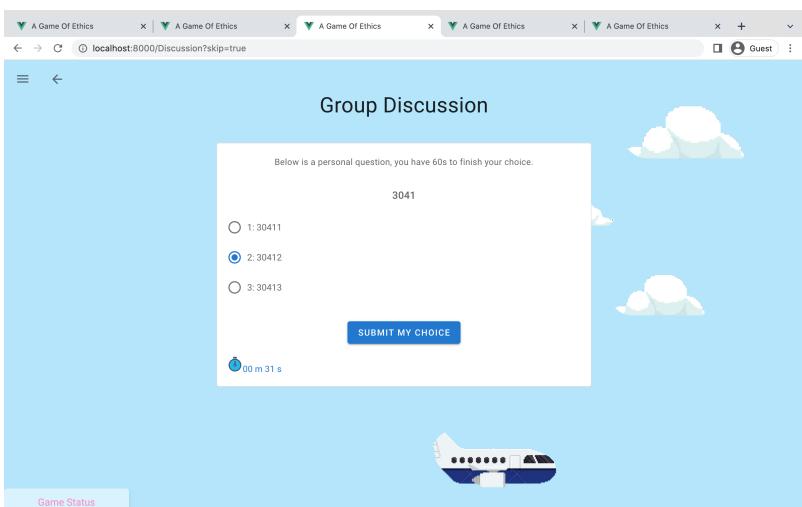
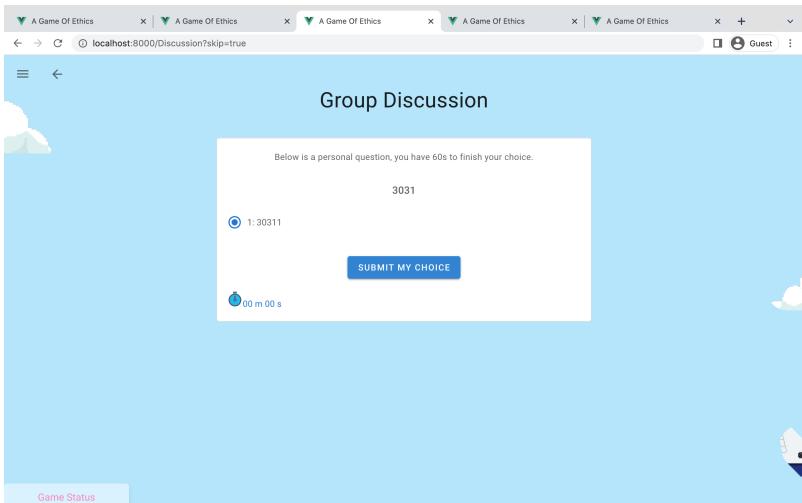
3021

1: 30211  
 2: 30212  
 3: 30213

SUBMIT MY CHOICE

00 m 00 s

Game Status



#### Role 4 (Federal Aviation Administration (FAA) Official):

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4011

1: 40111  
 2: 40112  
 3: 40113

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4021

1: 40211  
 2: 40212  
 3: 40213  
 4: 40214

SUBMIT MY CHOICE

00 m 51 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

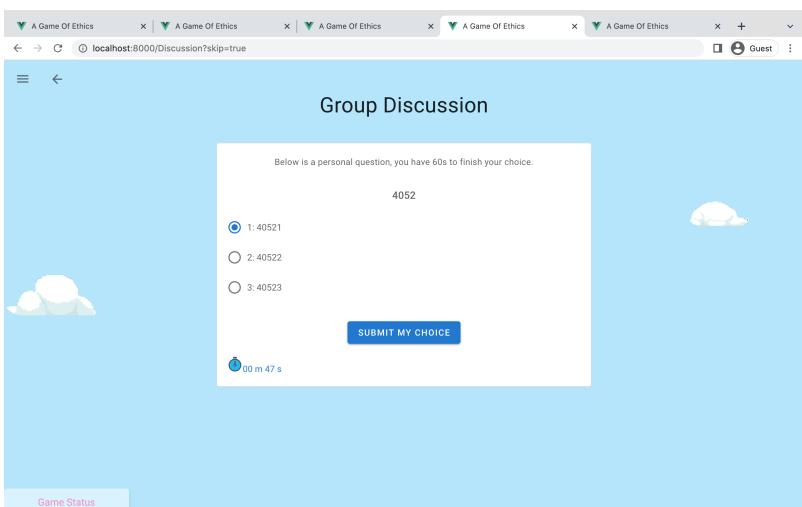
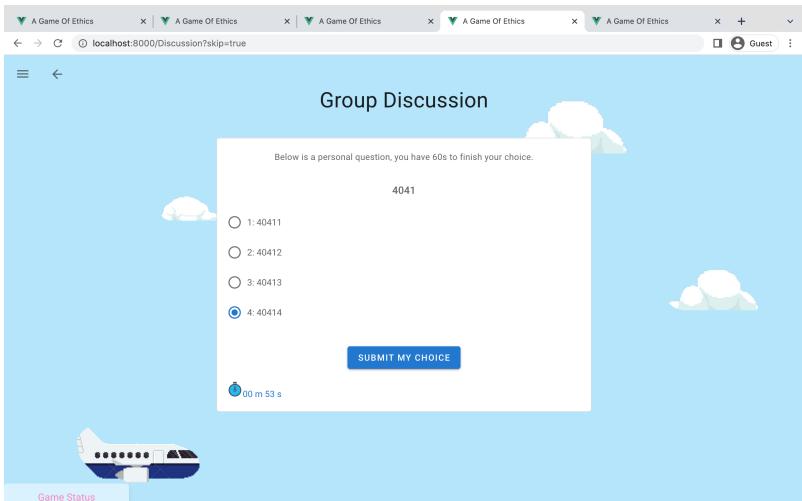
4031

1: 40311  
 2: 40312

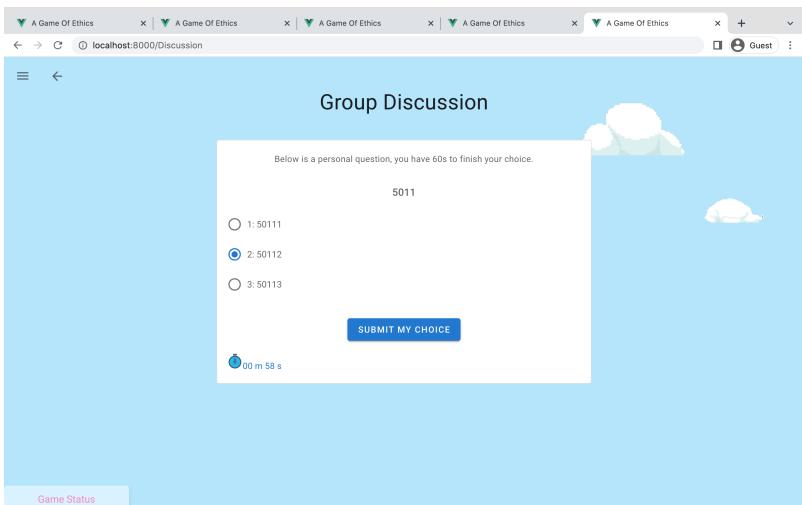
SUBMIT MY CHOICE

00 m 50 s

Game Status



### Role 5 (Software Developer):



A Game Of Ethics | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5021

1: 50211  
 2: 50212  
 3: 50213  
 4: 50214

SUBMIT MY CHOICE

00 m 52 s

Game Status

A Game Of Ethics | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5032

1: 50321

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5041

1: 50411  
 2: 50412  
 3: 50413

SUBMIT MY CHOICE

00 m 50 s

Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true

Guest

≡ ←

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5051

1: 50511

2: 50512

**SUBMIT MY CHOICE**

00 m 52 s

Game Status



The screenshot shows a web browser window with five tabs, all titled "A Game Of Ethics". The active tab displays a "Group Discussion" page. The page contains a question: "Below is a personal question, you have 60s to finish your choice." Below the question is the identifier "5051". There are two radio button options: "1: 50511" and "2: 50512", with the second option selected. A blue button labeled "SUBMIT MY CHOICE" is centered below the options. At the bottom left, a timer shows "00 m 52 s". A small white airplane icon is positioned at the bottom center of the page. The browser's address bar shows the URL "localhost:8000/Discussion?skip=true". The top right corner of the browser window indicates the user is "Guest".

# Is03-1 Plan3 Screenshot

## Role 1 (Boeing Executive):

A Game Of Ethics | Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

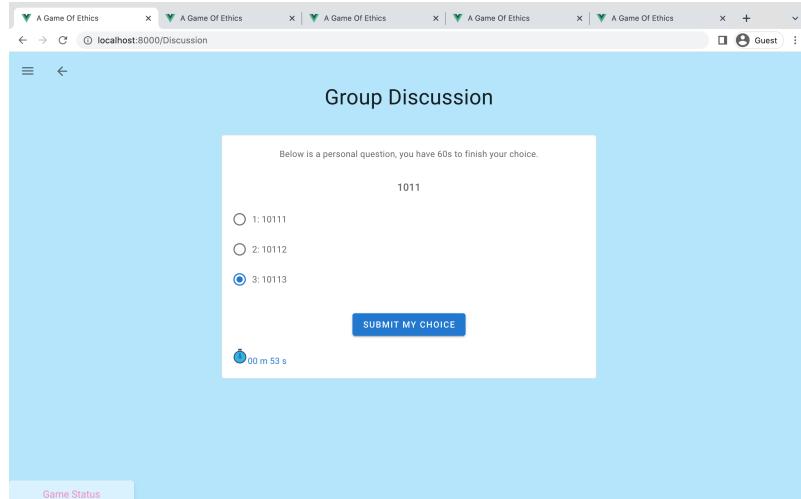
1011

1: 10111  
 2: 10112  
 3: 10113

SUBMIT MY CHOICE

🕒 00 m 53 s

Game Status



A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

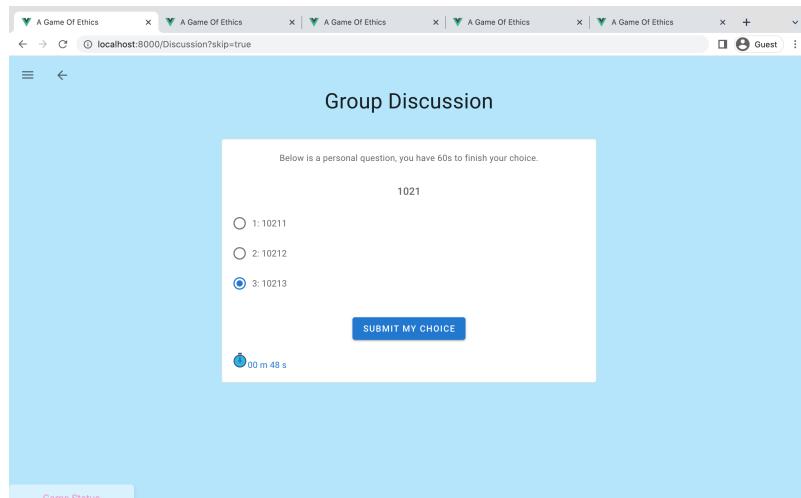
1021

1: 10211  
 2: 10212  
 3: 10213

SUBMIT MY CHOICE

🕒 00 m 48 s

Game Status



A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

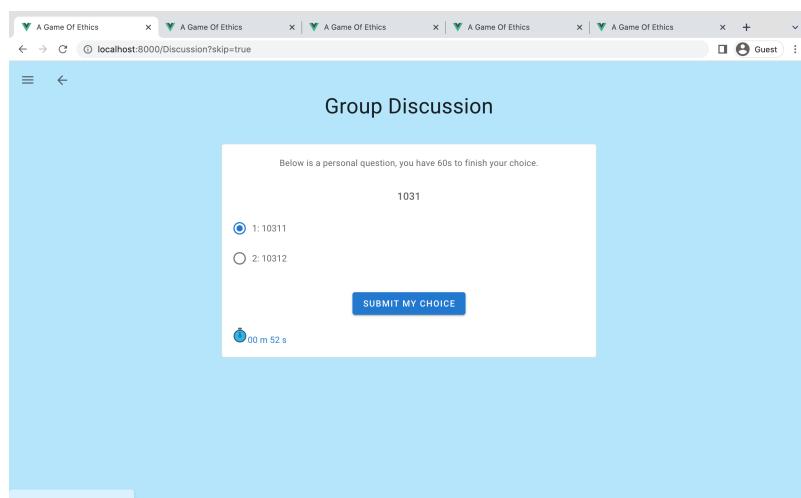
1031

1: 10311  
 2: 10312

SUBMIT MY CHOICE

🕒 00 m 52 s

Game Status



A Game Of Ethics    localhost:8000/Discussion?skip=true    Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

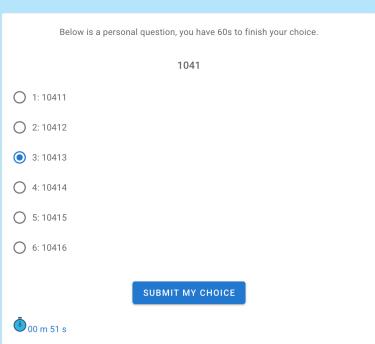
1041

1: 10411  
 2: 10412  
 3: 10413  
 4: 10414  
 5: 10415  
 6: 10416

**SUBMIT MY CHOICE**

00 m 51 s

Game Status



A Game Of Ethics    localhost:8000/Discussion?skip=true    Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

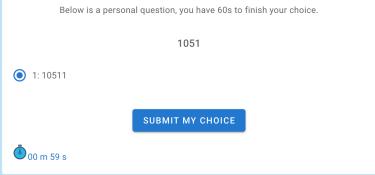
1051

1: 10511

**SUBMIT MY CHOICE**

00 m 59 s

Game Status



### Role 2 (Aeronautical Engineer):

A Game Of Ethics    localhost:8000/Discussion    Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

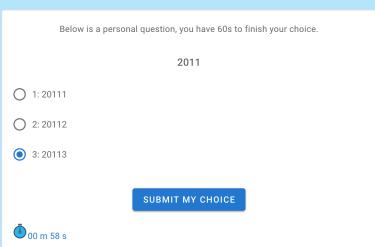
2011

1: 20111  
 2: 20112  
 3: 20113

**SUBMIT MY CHOICE**

00 m 58 s

Game Status



A Game Of Ethics x A Game Of Ethics x A Game Of Ethics x | A Game Of Ethics x + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2021

1: 20211  
 2: 20212  
 3: 20213  
 4: 20214

SUBMIT MY CHOICE

00 m 52 s

A Game Of Ethics x A Game Of Ethics x A Game Of Ethics x | A Game Of Ethics x + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2031

1: 20311  
 2: 20312

SUBMIT MY CHOICE

00 m 49 s

A Game Of Ethics x A Game Of Ethics x A Game Of Ethics x | A Game Of Ethics x + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2041

1: 20411  
 2: 20412  
 3: 20413

SUBMIT MY CHOICE

00 m 50 s

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2051

1: 20511

00 m 58 s

SUBMIT MY CHOICE

### Role 3 (Boeing Pilot):

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3011

1: 30111

2: 30112

3: 30113

00 m 59 s

SUBMIT MY CHOICE

Game Status

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3021

1: 30211

2: 30212

3: 30213

00 m 49 s

SUBMIT MY CHOICE

Game Status

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3031

1: 30311

00 m 59 s

**SUBMIT MY CHOICE**

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3041

1: 30411

2: 30412

3: 30413

**SUBMIT MY CHOICE**

00 m 38 s

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3051

1: 30511

2: 30512

**SUBMIT MY CHOICE**

00 m 45 s

#### Role 4 (Federal Aviation Administration (FAA) Official):

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4011

1: 40111  
 2: 40112  
 3: 40113

**SUBMIT MY CHOICE**

00 m 54 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4021

1: 40211  
 2: 40212  
 3: 40213  
 4: 40214

**SUBMIT MY CHOICE**

00 m 53 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4031

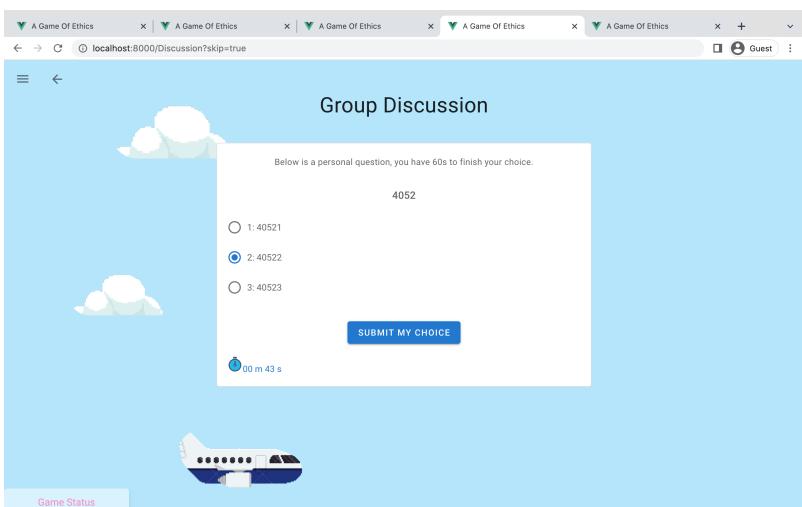
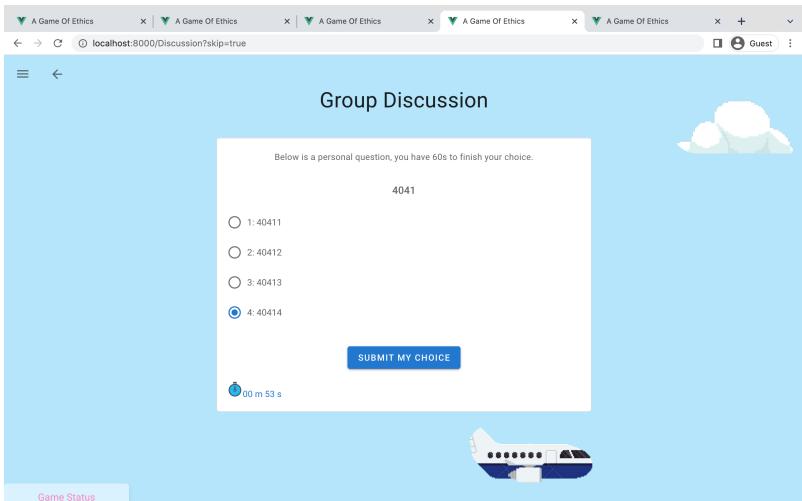
1: 40311  
 2: 40312

**SUBMIT MY CHOICE**

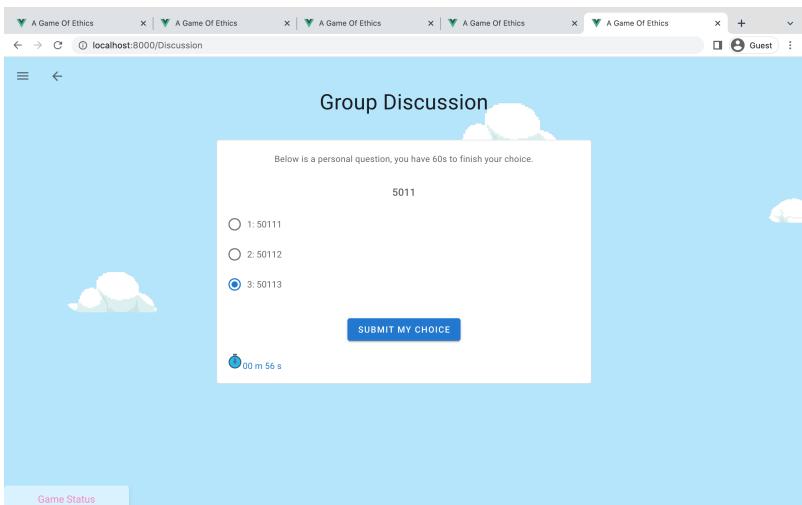
00 m 53 s



Game Status



### Role 5 (Software Developer):



A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5021

1: 50211  
 2: 50212  
 3: 50213  
 4: 50214

**SUBMIT MY CHOICE**

00 m 51 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5031

1: 50311  
 2: 50312

**SUBMIT MY CHOICE**

00 m 47 s

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5041

1: 50411  
 2: 50412  
 3: 50413

**SUBMIT MY CHOICE**

00 m 52 s

Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true

Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

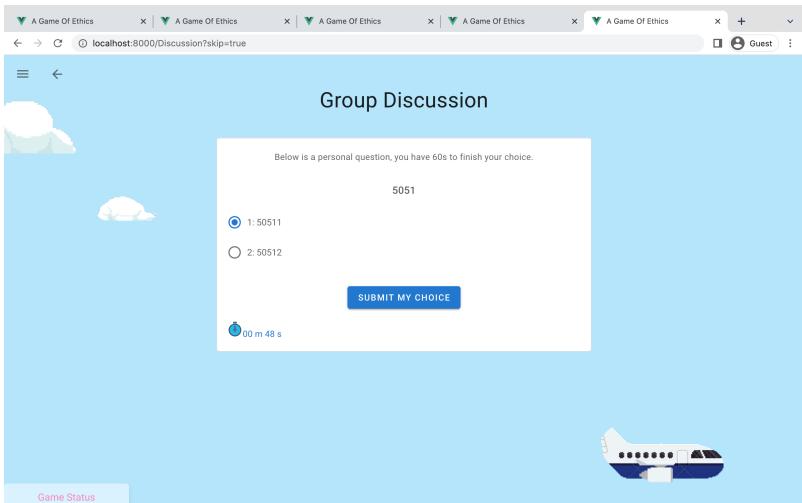
5051

1: 50511  
 2: 50512

SUBMIT MY CHOICE

00 m 48 s

Game Status



# Is03-1 Plan4 Screenshot

## Role 1 (Boeing Executive):

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1011

1: 10111  
 2: 10112  
 3: 10113

SUBMIT MY CHOICE

00 m 45 s

Game Status

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1021

1: 10211  
 2: 10212  
 3: 10213

SUBMIT MY CHOICE

00 m 51 s

Game Status

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1031

1: 10311  
 2: 10312

SUBMIT MY CHOICE

00 m 49 s

Game Status

A Game Of Ethics x A Game Of Ethics x | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1041

1: 10411  
 2: 10412  
 3: 10413  
 4: 10414  
 5: 10415  
 6: 10416

SUBMIT MY CHOICE

00 m 50 s

Game Status

A Game Of Ethics x A Game Of Ethics x | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1051

1: 10511

SUBMIT MY CHOICE

00 m 54 s

Game Status

### Role 2 (Aeronautical Engineer):

A Game Of Ethics x A Game Of Ethics x | Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2011

1: 20111  
 2: 20112  
 3: 20113

SUBMIT MY CHOICE

00 m 55 s

Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true

Guest

## Group Discussion



Below is a personal question, you have 60s to finish your choice.

2021

1: 20211  
 2: 20212  
 3: 20213  
 4: 20214

SUBMIT MY CHOICE

00 m 54 s



Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true

Guest

## Group Discussion



Below is a personal question, you have 60s to finish your choice.

2031

1: 20311  
 2: 20312

SUBMIT MY CHOICE

00 m 01 s



Game Status

A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics    A Game Of Ethics

localhost:8000/Discussion?skip=true

Guest

## Group Discussion



Below is a personal question, you have 60s to finish your choice.

2041

1: 20411  
 2: 20412  
 3: 20413

SUBMIT MY CHOICE

00 m 47 s



Game Status

Game Status

### Role 3 (Boeing Pilot):

Game Status

Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3031

1: 30311

00 m 59 s

SUBMIT MY CHOICE



Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3041

1: 30411

2: 30412

3: 30413

00 m 03 s

SUBMIT MY CHOICE



Game Status

A Game Of Ethics | + | Guest

localhost:8000/Discussion

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3051

1: 30511

2: 30512

00 m 53 s

SUBMIT MY CHOICE



Game Status

#### Role 4 (Federal Aviation Administration (FAA) Official):

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4011

1: 40111  
 2: 40112  
 3: 40113

**SUBMIT MY CHOICE**

00 m 52 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4021

1: 40211  
 2: 40212  
 3: 40213  
 4: 40214

**SUBMIT MY CHOICE**

00 m 47 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4031

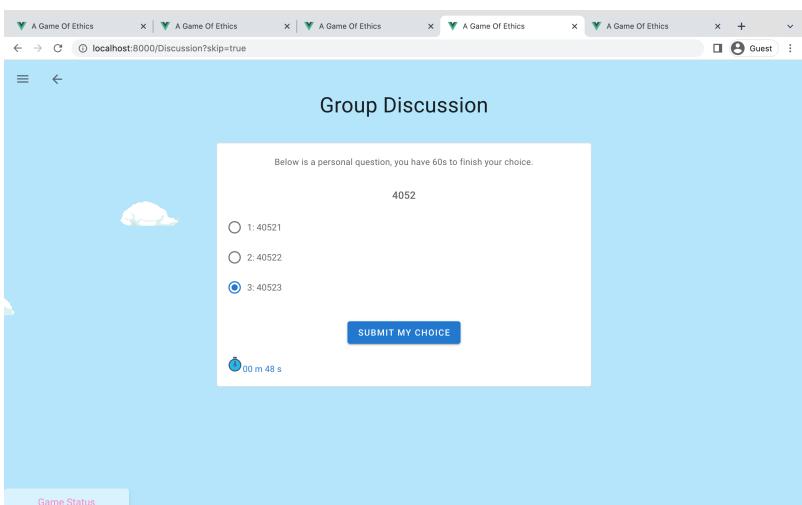
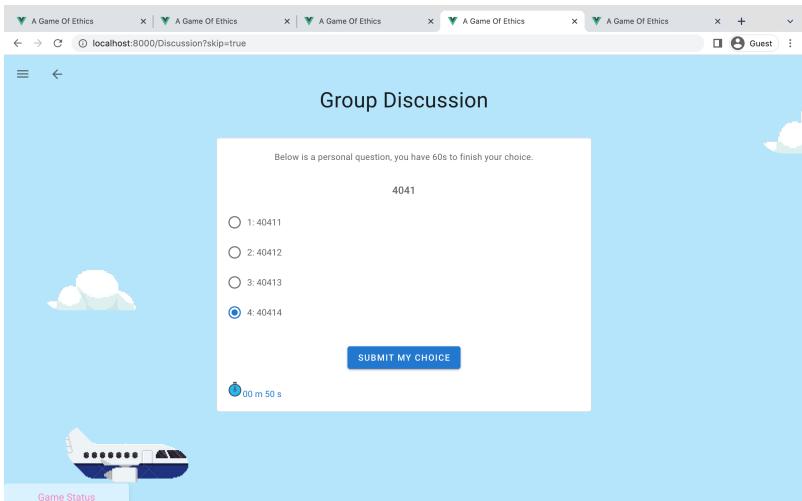
1: 40311  
 2: 40312

**SUBMIT MY CHOICE**

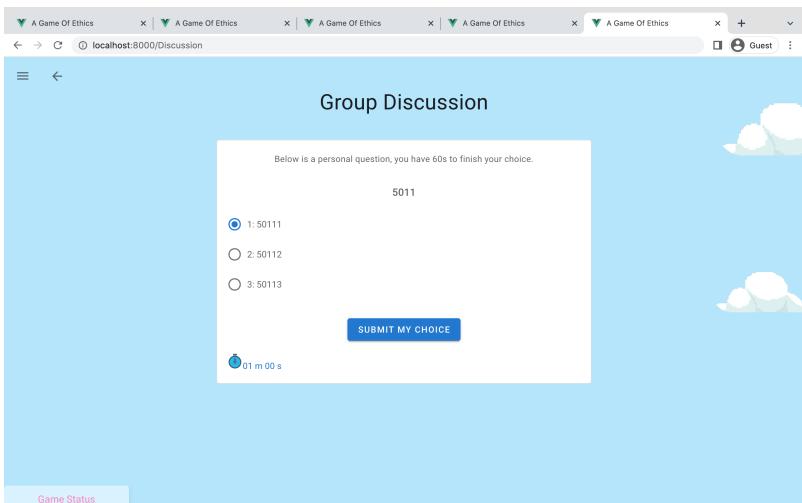
00 m 51 s



Game Status



### Role 5 (Software Developer):



A Game Of Ethics | + Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5021

1: 50211  
 2: 50212  
 3: 50213  
 4: 50214

SUBMIT MY CHOICE

00 m 48 s



Game Status

A Game Of Ethics | + Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5032

1: 50321

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | + Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5041

1: 50411  
 2: 50412  
 3: 50413

SUBMIT MY CHOICE

00 m 44 s



Game Status

The screenshot shows a web browser window with five tabs, all titled "A Game Of Ethics". The active tab has the URL "localhost:8000/Discussion?skip=true". The page content is titled "Group Discussion". It contains a question: "Below is a personal question, you have 60s to finish your choice." Below the question are two radio button options: "5051" (unselected) and "50512" (selected). A blue "SUBMIT MY CHOICE" button is centered below the options. At the bottom left, a timer shows "00 m 53 s". The background features a light blue sky with white clouds. A navigation bar at the top includes icons for back, forward, and search, along with a guest status indicator.

# Is03-1 Plan5 Screenshot

## Role 1 (Boeing Executive):

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1011

1: 10111  
 2: 10112  
 3: 10113

SUBMIT MY CHOICE

00 m 52 s

Game Status

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1021

1: 10211  
 2: 10212  
 3: 10213

SUBMIT MY CHOICE

00 m 53 s

Game Status

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1031

1: 10311  
 2: 10312

SUBMIT MY CHOICE

00 m 52 s

Game Status

Group Discussion

Below is a personal question, you have 60s to finish your choice.

1041

1: 10411  
 2: 10412  
 3: 10413  
 4: 10414  
 5: 10415  
 6: 10416

SUBMIT MY CHOICE

00 m 51 s

## Role 2 (Aeronautical Engineer):

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2011

1: 20111  
 2: 20112  
 3: 20113

SUBMIT MY CHOICE

00 m 53 s

Group Discussion

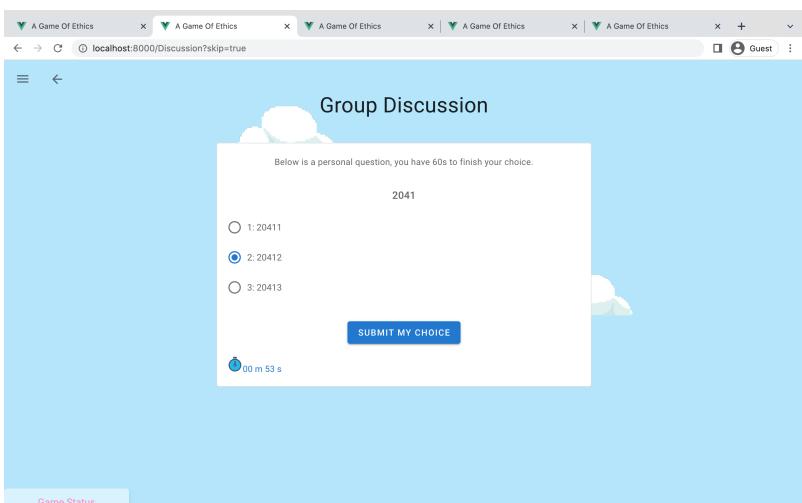
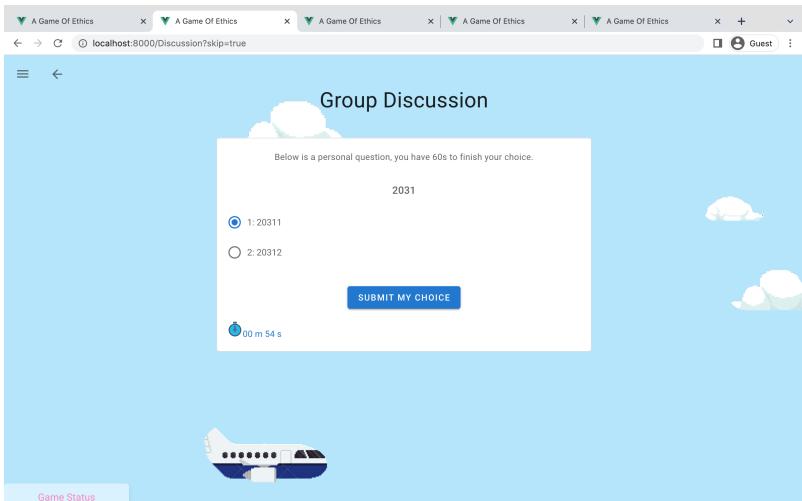
Below is a personal question, you have 60s to finish your choice.

2021

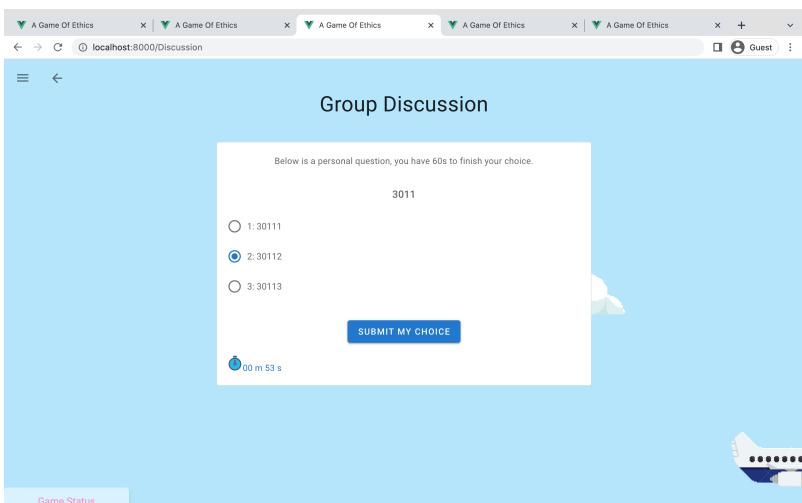
1: 20211  
 2: 20212  
 3: 20213  
 4: 20214

SUBMIT MY CHOICE

00 m 58 s



### Role 3 (Boeing Pilot):



A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3021

1: 30211  
 2: 30212  
 3: 30213

SUBMIT MY CHOICE

00 m 54 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3031

1: 30311

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

3041

1: 30411  
 2: 30412  
 3: 30413

SUBMIT MY CHOICE

00 m 49 s



Game Status

#### Role 4 (Federal Aviation Administration (FAA) Official):

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4011

1: 40111  
 2: 40112  
 3: 40113

SUBMIT MY CHOICE

00 m 57 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4021

1: 40211  
 2: 40212  
 3: 40213  
 4: 40214

SUBMIT MY CHOICE

00 m 45 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4031

1: 40311  
 2: 40312

SUBMIT MY CHOICE

00 m 54 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

4041

1: 40411  
 2: 40412  
 3: 40413  
 4: 40414

SUBMIT MY CHOICE

00 m 49 s

Game Status



### Role 5 (Software Developer):

A Game Of Ethics | Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5011

1: 50111  
 2: 50112  
 3: 50113

SUBMIT MY CHOICE

00 m 58 s

Game Status




A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

5021

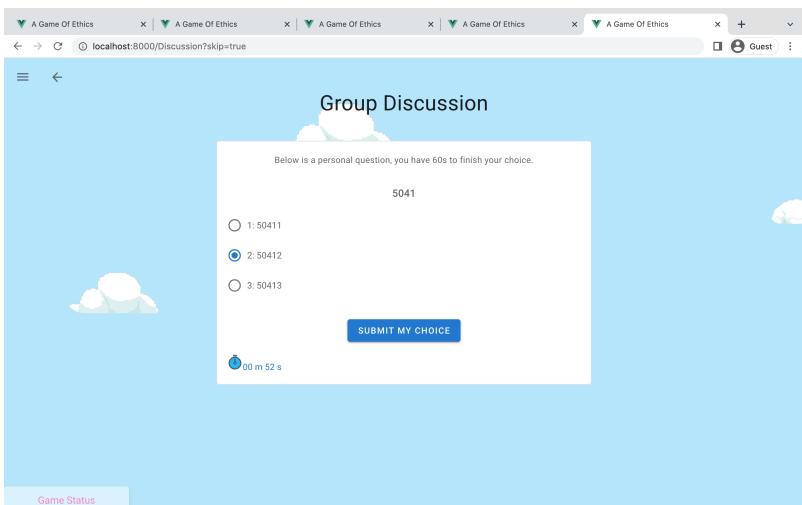
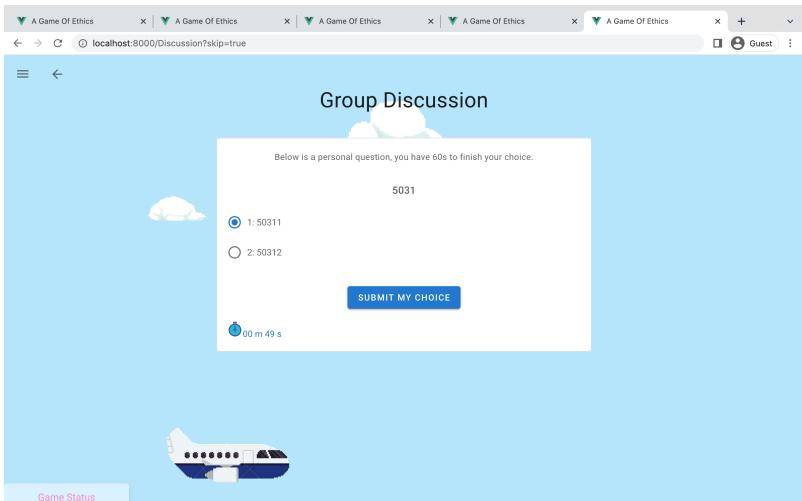
1: 50211  
 2: 50212  
 3: 50213  
 4: 50214

SUBMIT MY CHOICE

00 m 51 s

Game Status





# Is03-1 Plan6 Screenshot

## Role 1 (Boeing Executive):

A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

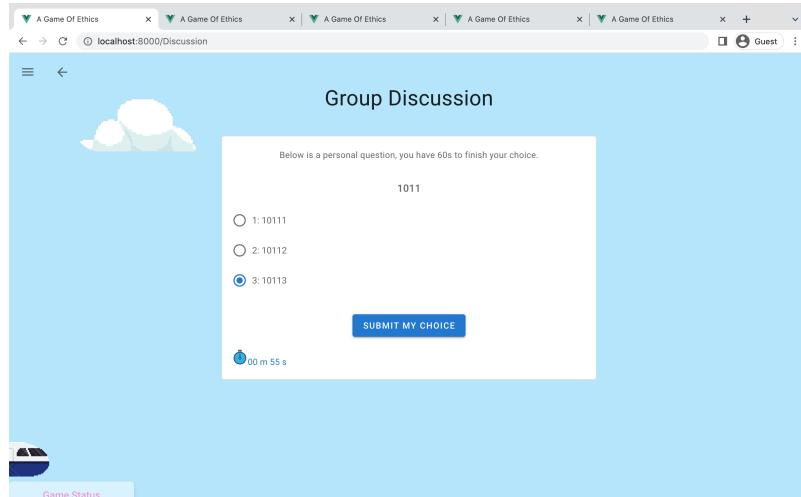
1011

1: 10111  
 2: 10112  
 3: 10113

SUBMIT MY CHOICE

00 m 55 s

Game Status



A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

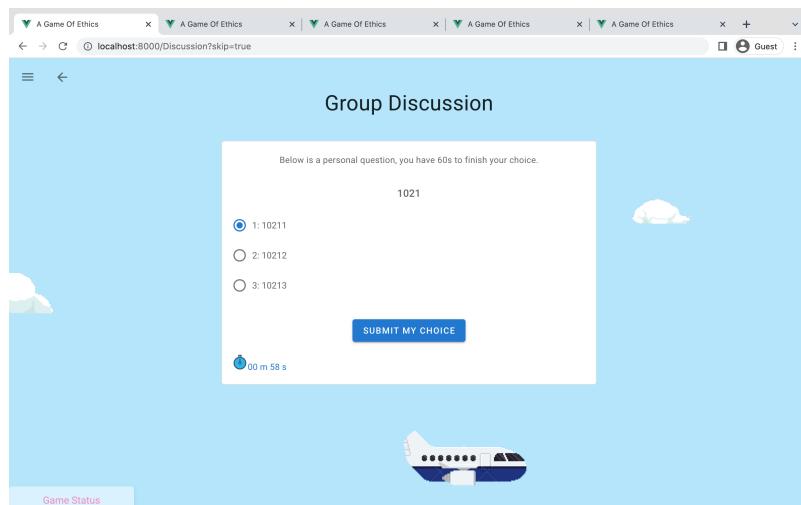
1021

1: 10211  
 2: 10212  
 3: 10213

SUBMIT MY CHOICE

00 m 58 s

Game Status



A Game Of Ethics   X A Game Of Ethics   X | + Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

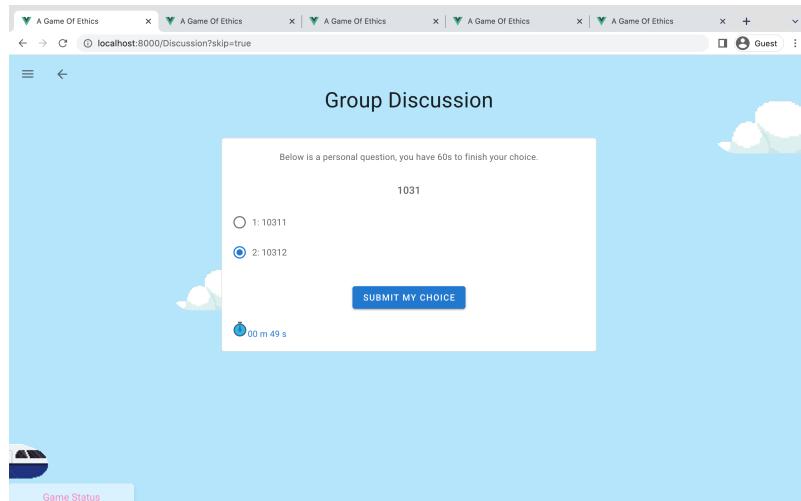
1031

1: 10311  
 2: 10312

SUBMIT MY CHOICE

00 m 49 s

Game Status



## **Role 2 (Aeronautical Engineer):**

The screenshot shows a web browser window with five tabs, all titled "A Game Of Ethics". The active tab displays a "Group Discussion" section. The content area contains the following text:  
Below is a personal question, you have 60s to finish your choice.  
2011  
 1: 20111  
 2: 20112  
 3: 20113  
  
**SUBMIT MY CHOICE**  
  
00 m 58 s

A Game Of Ethics

localhost:8000/Discussion?skip=true Guest

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

2021

1: 20211

2: 20212

3: 20213

4: 20214

**SUBMIT MY CHOICE**

00 m 50 s

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2032

1: 20321  
 2: 20322  
 3: 20323

SUBMIT MY CHOICE

00 m 59 s

Group Discussion

Below is a personal question, you have 60s to finish your choice.

2041

1: 20411  
 2: 20412  
 3: 20413

SUBMIT MY CHOICE

00 m 53 s

### Role 3 (Boeing Pilot):

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3011

1: 30111  
 2: 30112  
 3: 30113

SUBMIT MY CHOICE

00 m 59 s

A Game Of Ethics | Guest

localhost:8000/Discussion

Group Discussion

Below is a personal question, you have 60s to finish your choice.

3021

1: 30211  
 2: 30212  
 3: 30213

SUBMIT MY CHOICE

00 m 52 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

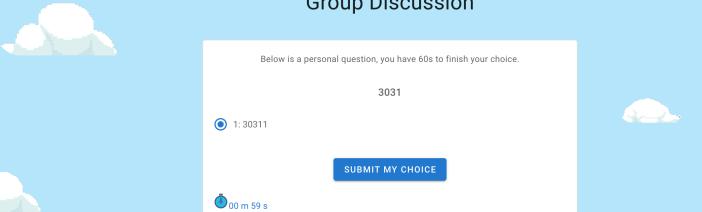
Below is a personal question, you have 60s to finish your choice.

3031

1: 30311

SUBMIT MY CHOICE

00 m 59 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

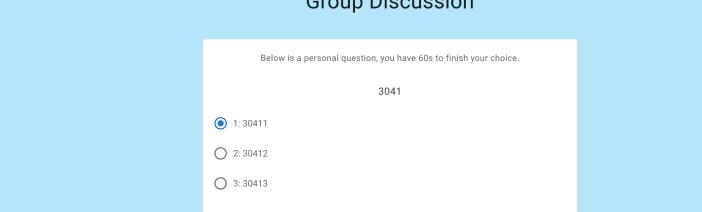
Below is a personal question, you have 60s to finish your choice.

3041

1: 30411  
 2: 30412  
 3: 30413

SUBMIT MY CHOICE

00 m 34 s



Game Status

#### Role 4 (Federal Aviation Administration (FAA) Official):

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

4011

1: 40111  
 2: 40112  
 3: 40113

SUBMIT MY CHOICE

00 m 43 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

4021

1: 40211  
 2: 40212  
 3: 40213  
 4: 40214

SUBMIT MY CHOICE

00 m 52 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

Group Discussion

Below is a personal question, you have 60s to finish your choice.

4031

1: 40311  
 2: 40312

SUBMIT MY CHOICE

00 m 49 s



Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

4041

1: 40411  
 2: 40412  
 3: 40413  
 4: 40414

SUBMIT MY CHOICE

00 m 51 s

Game Status

### Role 5 (Software Developer):

A Game Of Ethics | Guest

localhost:8000/Discussion

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

5011

1: 50111  
 2: 50112  
 3: 50113

SUBMIT MY CHOICE

00 m 59 s

Game Status

A Game Of Ethics | Guest

localhost:8000/Discussion?skip=true

## Group Discussion

Below is a personal question, you have 60s to finish your choice.

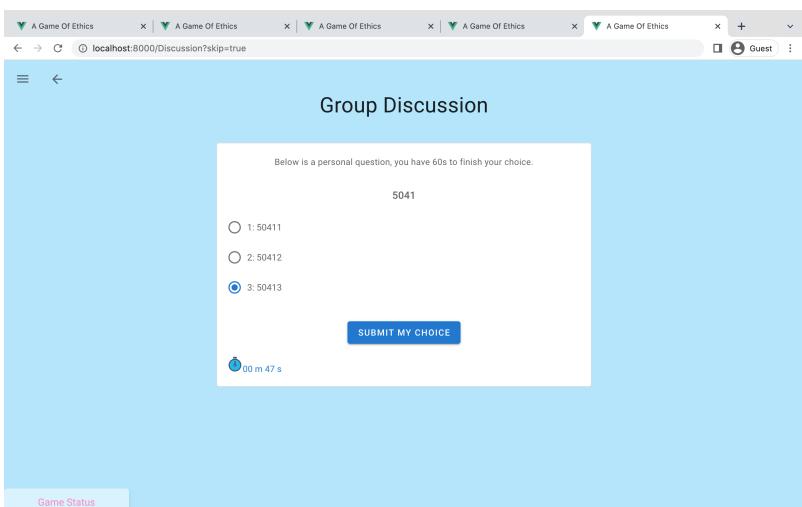
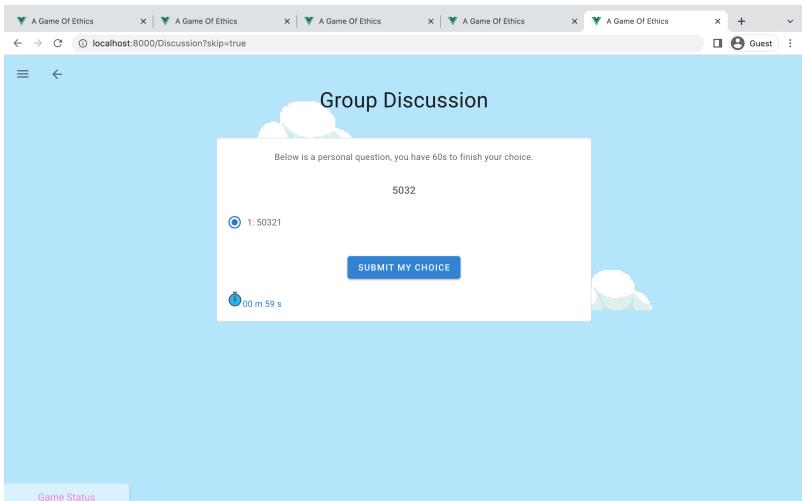
5021

1: 50211  
 2: 50212  
 3: 50213  
 4: 50214

SUBMIT MY CHOICE

00 m 58 s

Game Status



# Is05-2 Testing

**Tester: Hongwei**

## Background:

The Is05-2 issue concerns the need to implement proper name validation when players rejoin a game to maintain player count. Currently, when a player leaves a game and rejoins later, they can change their username to any name they choose, even if that name is already in use by another player. This can result in confusion and disrupt the game's overall flow, especially if multiple players have similar or identical names. To address this issue, proper name validation needs to be implemented. This would ensure that when a player rejoins a game, they are not allowed to use a name that is already in use by another player. Instead, they would be prompted to choose a different, unique name. This would help maintain player count and prevent any potential confusion or disruption during gameplay. Overall, implementing proper name validation would improve the overall experience of the game and ensure that all players are easily identifiable and accounted for.

## Purpose:

The purpose of issue testing for implementing proper name validation when players rejoin a game is to ensure that the player count remains accurate and consistent throughout the gameplay. By validating the player's name during rejoining, the system can avoid counting duplicate or fake players and prevent any potential disruptions or errors that may arise from incorrect player count data. Through issue testing, any bugs or glitches in the name validation process can be identified and addressed, ensuring a smooth and seamless gaming experience for all players.

## Procedure:

test case id	test case description	test case status
1	Enter a valid name that is not already in use by another player. Verify that the player count is incremented by one	done
2	Enter an invalid name that contains special characters or numbers. Verify that the system rejects the name and displays an error message to the player.	done
3	Enter a valid name that is already in use by another player. Verify that the system rejects the name and displays an error message to the player.	in-progress
4	Enter a name that differs only in capitalization from an existing name. Verify that the system considers the names to be the same and rejects the name, displaying an error message to the player	in-progress.

## Conclusion:

In a summary, all current test cases are established around the name validation mechanism and focus on name categories and counting.

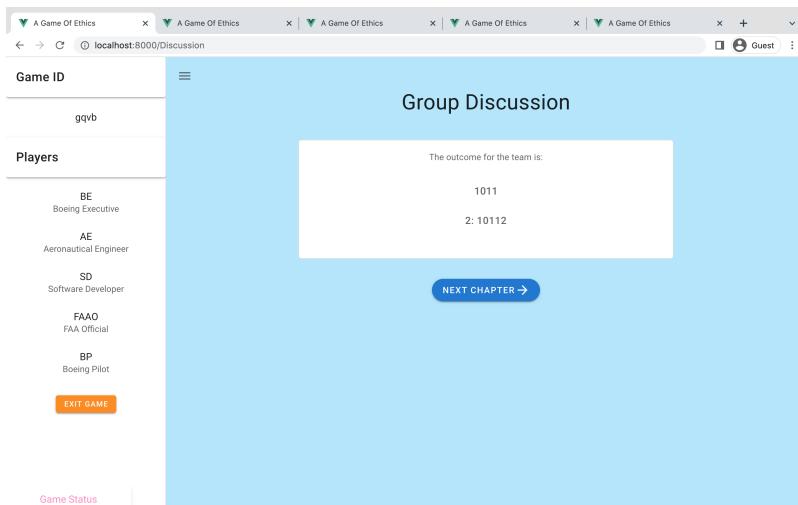
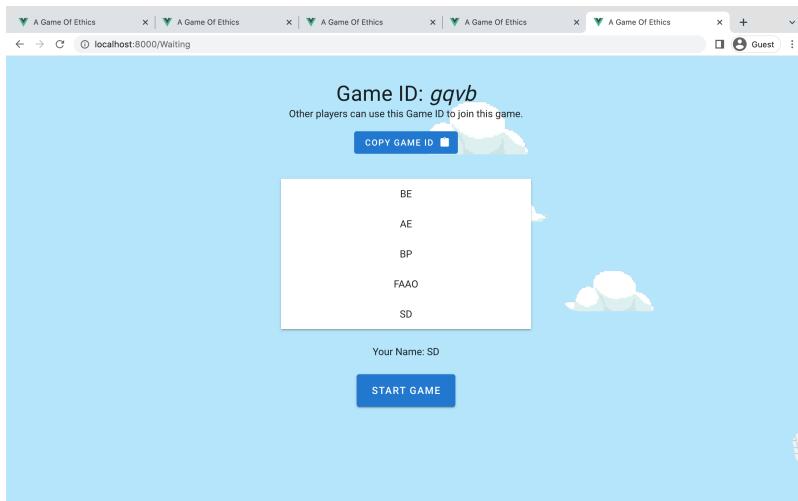
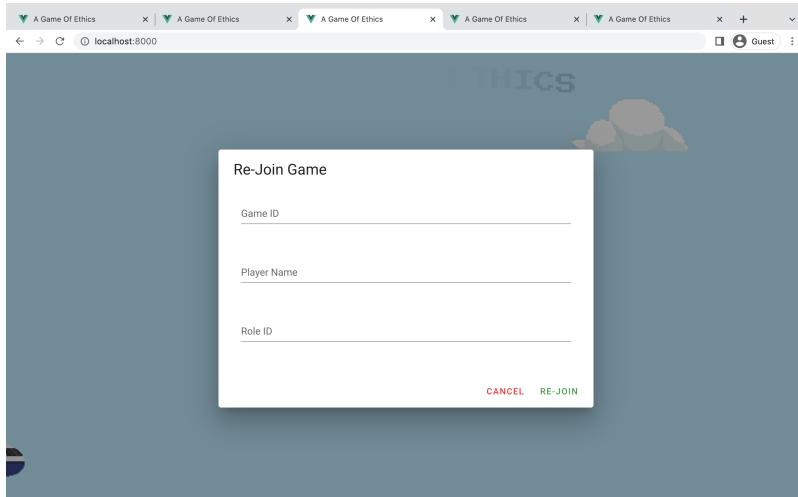
Based on the test cases table, test case 1 and 2 are operated successfully which proved that the name validation mechanism has ability to accept valid name categories and counting and reject invalid name categories

However, test cases 3 and 4 are still in progress due to the more complex situation and capitalization.

It is necessary that test these cases thoroughly that ensure the mechanism has ability to handle any possible situation and improve the quality of whole system.

Issue testing for implementing proper name validation is a critical step in improving the gaming experience and ensuring a smooth and error-free gameplay environment.

# Screenshots for test case 1 and 2



# | Automated Testing Implementation

# Test Frame

Based on the testing experience and choice of the previous project team, we also chose `jest` as the testing tool for this project.

We chose **jest** because it has the following advantages:

First, jest is easy to use and easy to configure. Jest is easy to install and configure, just use the npm command and you can basically use it.

Second, its execution is efficient. Jest executes tests in parallel and only tests against modified files, which improves testing speed.

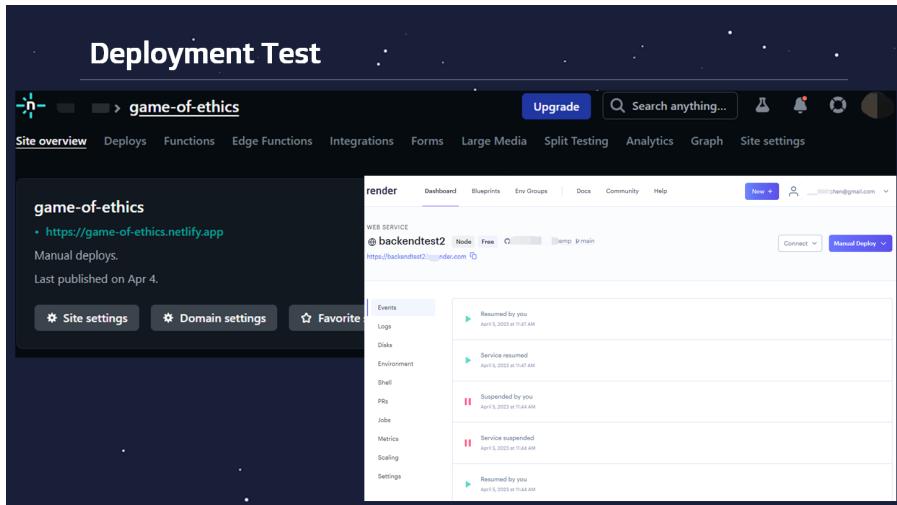
Finally, as a project developed and maintained by Facebook, Jest has extensive community support and continuous updates, ensuring that our group has ready access to help and the latest features to facilitate testing as we go through the development process.

Here is some picture for our testing using jest.

# | Deployment & Release

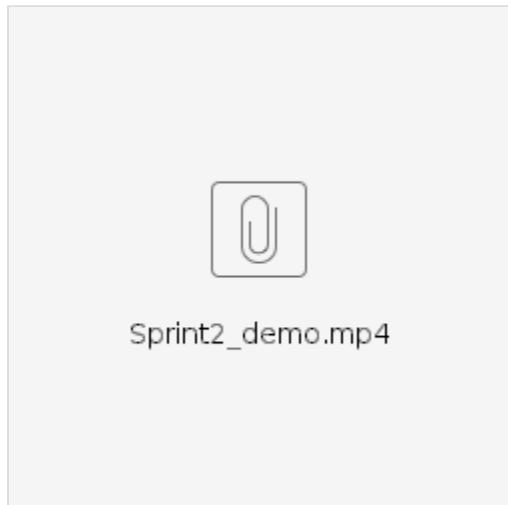
## Sprint2 Updates (1st May)

We have successfully deployed the game on both Render and Netlify platforms.



**However, due to a series of issues, including unresolved bugs and a lack of communication with the client for three weeks, we have been unable to confirm whether certain bug fixes are acceptable or reach a consensus on the hosting service. As a temporary solution, we are currently supporting local deployment instead.**

Below is the current demo of our five-player Game of Ethics:



Sprint2\_demo.mp4

# Hosting Services Research

// To graders, we have not decided to use which hosting service in Sprint 2 because of:

1. The client is unable to have meetings with us for 3 weeks;
2. We have not receive the client's decision on the hosting service for the game.

Therefore, we have come up a hosting services research for the client and wait for his confirmation.

## Summary:

		AWS	Heroku	Netlify	Render
Pricing	pros	<ul style="list-style-type: none"> <li>▪ Pay-as-you-go pricing</li> <li>▪ Cost optimization tools</li> </ul>	<ul style="list-style-type: none"> <li>▪ Free tier availability</li> <li>▪ Reduced infrastructure and maintenance costs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Generous free tier</li> <li>▪ Pay-as-you-grow pricing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Free tier for small-scale projects</li> <li>▪ Transparent pricing with no hidden costs</li> </ul>
	cons	<ul style="list-style-type: none"> <li>▪ Complex pricing structure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limited free tier</li> </ul>	<ul style="list-style-type: none"> <li>▪ Additional third-party services</li> </ul>	<ul style="list-style-type: none"> <li>▪ No built-in MongoDB support</li> </ul>
Performance	pros	<ul style="list-style-type: none"> <li>▪ Global infrastructure</li> <li>▪ Auto-scaling</li> </ul>	<ul style="list-style-type: none"> <li>▪ Automatic scaling and load balancing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Global CDN</li> <li>▪ Automatic HTTPS</li> </ul>	<ul style="list-style-type: none"> <li>▪ Global CDN for optimal latency</li> <li>▪ Efficient resource allocation</li> </ul>
	cons	<ul style="list-style-type: none"> <li>▪ Network latency</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limited control over infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>▪ No native support for WebSockets</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potential cold start issues</li> </ul>
Flexibility	pros	<ul style="list-style-type: none"> <li>▪ Integration options</li> </ul>	<ul style="list-style-type: none"> <li>▪ Multi-language and framework support</li> <li>▪ Integration with popular development tools</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wide range of integrations</li> <li>▪ Serverless functions with AWS Lambda</li> </ul>	<ul style="list-style-type: none"> <li>▪ Seamless integration with modern tech stacks</li> <li>▪ Streamlined collaboration and access control</li> </ul>
	cons	<ul style="list-style-type: none"> <li>▪ Time-consuming learning curve</li> </ul>	<ul style="list-style-type: none"> <li>▪ Vendor lock-in</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limited database support</li> </ul>	<ul style="list-style-type: none"> <li>▪ Smaller ecosystem and community</li> </ul>
Scalability	pros	<ul style="list-style-type: none"> <li>▪ On-demand resource provisioning</li> <li>▪ Load balancing and distribution</li> </ul>	<ul style="list-style-type: none"> <li>▪ Effortless scaling of dynos</li> <li>▪ Seamless database scaling</li> </ul>	<ul style="list-style-type: none"> <li>▪ Serverless functions</li> <li>▪ Load balancing and redundancy</li> </ul>	<ul style="list-style-type: none"> <li>▪ Automatic scaling for fluctuating workloads</li> <li>▪ Managed databases with scaling options</li> </ul>
	cons	<ul style="list-style-type: none"> <li>▪ Overprovisioning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Pricing impact</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dependent on third-party services</li> </ul>	<ul style="list-style-type: none"> <li>▪ No built-in MongoDB support</li> </ul>
Security	pros	<ul style="list-style-type: none"> <li>▪ Data protection</li> <li>▪ Compliance and security certifications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Platform-level security</li> <li>▪ Automatic security updates</li> </ul>	<ul style="list-style-type: none"> <li>▪ Automatic HTTPS</li> </ul>	<ul style="list-style-type: none"> <li>▪ Private networking and isolation</li> <li>▪ Regular updates and security patches</li> </ul>
	cons	<ul style="list-style-type: none"> <li>▪ Shared responsibility model</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data compliance restrictions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dependency on third-party services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limited security features</li> </ul>

# AWS

## Introduction

Amazon Web Services (AWS) is a comprehensive cloud computing platform provided by Amazon. AWS offers scalability, flexibility, and cost optimization, allowing us to build and manage the ethics-based webpage game more efficiently. With AWS, we can easily integrate services like EC2, Lambda, S3, and RDS into our Vue.js frontend and Node.js backend, creating a high-performance and secure gaming experience for the students while maintaining full control over our resources and costs.

## Pricing

- Pay-as-you-go pricing: AWS follows a pay-as-you-go pricing model, which means we only pay for the resources we consume. This eliminates the need for upfront investments and allows for better cost management as the project scales.
- Cost optimization tools: AWS provides cost optimization tools, such as AWS Cost Explorer and AWS Trusted Advisor, which help us analyze and optimize the spending by identifying underutilized resources and suggesting cost-saving measures.
- Complex pricing structure: AWS has a multitude of services, each with its own pricing model, making it challenging to estimate costs accurately, which can lead to unexpected expenses.
- Reference:
  - AWS EC2 Pricing: <https://aws.amazon.com/ec2/pricing/>
  - AWS Cost Explorer Pricing: <https://aws.amazon.com/aws-cost-management/aws-cost-explorer/pricing/>

## Performance

- Global infrastructure: AWS has an extensive global infrastructure, including data centers and edge locations, which allows us to host the project closer to the university, reducing latency and improving performance.
- Auto-scaling: AWS services like EC2 and Lambda support auto-scaling, which means they can automatically adjust the computing capacity to handle varying workloads. This ensures consistently high performance, even during peak times.
- Network latency: Although AWS has a global infrastructure, students in oversea regions with limited AWS presence may experience higher network latency, affecting their gameplay experience.
- Reference:

## us-east-1 → ap-southeast-2

Parallel Connections	VPC Peered – Avg Bandwidth (MBits/sec)	VPC Peered – Avg Standard Deviation (MBits/sec)	VPC Peered – Avg Retransmissions	Software VPN – Avg Bandwidth (MBits/sec)	Software VPN – Avg Standard Deviation (MBits/sec)	Software VPN – Avg Retransmissions
1	55.0	0.8	0	55.7	1.4	2.1
2	109.7	1.6	0	108.2	7.9	128.9
4	220.4	1.5	0	187.3	31.6	799.3
8	439.5	2.9	0.5	312.4	66.7	1612.0
16	858.9	12.1	1674.4	501.6	39.8	3123.3

## us-east-1 → eu-west-2

Parallel Connections	VPC Peered – Avg Bandwidth (MBits/sec)	VPC Peered – Avg Standard Deviation (MBits/sec)	VPC Peered – Avg Retransmissions	Software VPN – Avg Bandwidth (MBits/sec)	Software VPN – Avg Standard Deviation (MBits/sec)	Software VPN – Avg Retransmissions
1	159.9	1.6	3.5	157.2	3.4	5.4
2	318.1	2.9	26.8	307.1	10.7	105.9
4	631.1	15.9	90.7	561.0	80.6	778.3
8	1237.3	51.9	513.4	844.0	131.3	1950.5
16	1740.7	86.5	2313.1	1218.2	138.7	2984.8

- The bandwidth between us-east-1(Northern Virginia) and ap-southeast-2(Sydney) would be less than us-east-1(Northern Virginia) and eu-west-2(London) from Examining cross-region communication speeds in AWS: <https://medium.com/slalom-technology/examining-cross-region-communication-speeds-in-aws-9a0bee31984f>

## Flexibility

- Integration options: AWS provides SDKs and APIs for various programming languages, making it easy to integrate their services with our existing tech stack, including our Vue.js frontend and Node.js backend.
- Learning curve: AWS has a vast array of services, each with its own nuances, which can be overwhelming and time-consuming for developers to learn and navigate effectively.

## Scalability

- On-demand resource provisioning: With AWS, we can quickly provision resources as the project's needs change in the future, enabling us to seamlessly scale the application without worrying about infrastructure limitations.
- Load balancing and distribution: AWS provides load balancing solutions, such as the Elastic Load Balancer and Amazon CloudFront, to distribute traffic across multiple instances, ensuring consistent performance and high availability, even as the project scales.
- Overprovisioning: Inadequate auto-scaling configurations may lead to overprovisioning, causing unnecessary costs and underutilized resources.
- Reference:
  - AWS Auto Scaling: <https://aws.amazon.com/autoscaling/>

## Security

- Data protection: AWS offers data encryption both at rest and in transit, safeguarding the project's sensitive information and ensuring compliance with data protection regulations.
- Compliance and security certifications: AWS adheres to various industry standards and certifications, such as GDPR, HIPAA, etc., ensuring that our project meets the necessary security and regulatory requirements.

- Shared responsibility model: AWS operates on a shared responsibility model, meaning we are responsible for securing the application and data, while AWS secures the underlying infrastructure.

# Heroku

## Introduction

Heroku is a cloud platform as a service (PaaS) that allows developers to build, run, and operate applications entirely in the cloud. It provides an ideal solution for hosting our ethics-based multiplayer game project. With support for Node.js and MongoDB, Heroku offers a flexible, scalable, and secure infrastructure for the project. Heroku simplifies the deployment process through GitHub integration, and its free tier availability ensures cost efficiency. Additionally, Heroku's automatic scaling and load balancing provide performance enhancements to ensure the best user experience for our game.

## Price

- Free tier availability: Heroku used to offer a free tier with limited resources, allowing us to prototype and develop the project without incurring any initial cost. This enables us to experiment and validate the idea before investing in more resources.
- Reduced infrastructure and maintenance costs: By using Heroku, it eliminates the need to invest in and manage our own infrastructure. This allows us to focus on the application's development and user experience, while Heroku takes care of the underlying infrastructure management.
- Limited free tier: Heroku began to eliminate the free tiers of Heroku Dynos, Heroku Postgres and Heroku Data for Redis on 28 Nov 2022. It comes with limitations in terms of resources, like dyno sleeping, which may not be sufficient for production environments or heavy workloads.
- Reference:
  - Deprecation of Heroku free resources: <https://devcenter.heroku.com/changelog-items/2461>

## Performance

- Automatic scaling and load balancing: Heroku enables easy vertical and horizontal scaling, ensuring optimal performance as the application grows. Load balancing distributes traffic across multiple dynos, preventing bottlenecks and improving response times.
- Limited control over infrastructure: Heroku manages the underlying infrastructure, so we have less control over performance optimization compared to other cloud providers where we can fine-tune settings to match the application's requirements.
- Reference:

Memory, CPU share, and other differentiating characteristics for each Common Runtime dyno type are listed below:

Spec	Eco	Basic	Standard-1X	Standard-2X	Performance-M	Performance-L
Memory (RAM)	512 MB	512 MB	512 MB	1024 MB	2.5 GB	14 GB
CPU Share	1x	1x	1x	2x	100%	100%
Compute	1x-4x	1x-4x	1x-4x	4x-8x	12x	50x
Sleeps	✓					
Dedicated					✓	✓

These figures show expected performance based on 99 percent of historical system loads. The performance of apps running on `eco`, `basic`, and `standard` dyno types can vary based on available system resources, as well as [limits in your account](#). Your app's performance can also vary significantly based on its implementation.

- Dyno Types: <https://devcenter.heroku.com/articles/dyno-types>

## Flexibility

- Multi-language and framework support: Heroku supports a wide range of programming languages and frameworks, allowing us to choose the best technologies for the project and easily adapt to evolving requirements.
- Integration with popular development tools: Heroku works well with popular development platforms like GitHub, Git, and CI/CD tools, streamlining our development process and making it easier to adapt our workflow as the project evolves.
- Vendor lock-in: Heroku uses proprietary tools and services, which can make it difficult to migrate the application to another platform in the future.

## Scalability

- Effortless scaling of dynos: Heroku allows us to easily scale the application by adjusting the number of dynos (containers) or dyno types (resources per container), accommodating increased traffic and demand.
- Seamless database scaling: Heroku simplifies the process of scaling the database, offering options like Heroku Postgres, which provide managed database hosting and scaling capabilities to accommodate the application's growth. However the mLab MongoDB add-on was removed from all Heroku apps on November 10, 2020.
- Pricing impact: Scalability is closely tied to pricing. As we scale the application, we might find that the cost of running on Heroku becomes prohibitive compared to alternative cloud providers.

- Reference:
  - mLab MongoDB Add-on Discontinued: <https://devcenter.heroku.com/changelog-items/1823>

## Security

- Platform-level security: Heroku provides built-in platform security features such as network isolation, strict access controls, and secure default configurations, ensuring a secure environment for the application.
- Automatic security updates: Heroku regularly updates its platform with the latest security patches, protecting the application from known vulnerabilities without requiring manual intervention from our side.
- Data compliance restrictions: Heroku has data centers in specific regions, which may not align with the data compliance and localization requirements of our project, potentially affecting security and data privacy.
- Reference:
  - Heroku Security & Compliance Resources and Features: <https://devcenter.heroku.com/articles/security-and-compliance-resources-and-features>

# Netlify

## Introduction

Netlify is a platform that offers hosting and serverless backend services for web applications and static websites. It is designed to make deploying, scaling, and maintaining web projects easier, particularly for developers working with modern web technologies like JavaScript frameworks and static site generators. Netlify can be a suitable choice for our ethics-based multiplayer webpage game project due to its ease of deployment, serverless architecture, and scalability. However, we should also consider the database aspect because it does not provide built-in database support, as we may need to use a third-party service like MongoDB Atlas or another add-on to manage the MongoDB database.

## Price

- Generous free tier: Netlify's free tier offers essential features like continuous deployment, global CDN, and custom domain support. This allows us to start and test the project without incurring any costs, reducing the initial investment and financial risk.
- Pay-as-you-grow pricing: As the project scales and requires additional resources, we can upgrade to one of Netlify's paid plans. These plans offer more build minutes, serverless function execution, and bandwidth, ensuring that we only pay for the resources we need, optimizing the budget allocation.
- Additional third-party services: Netlify doesn't natively support certain features like MongoDB, which may require using additional third-party services, resulting in increased overall project costs.
- Reference:

## Netlify Pricing

Starter	Pro	Business	Enterprise
<p>Single-member plan for personal projects, prototypes, or getting started.</p> <p><a href="#">Start for free</a></p> <p><b>Free</b> to get started</p> <p>Start free, then <a href="#">pay as you go</a>:</p> <ul style="list-style-type: none"><li>✓ Deploy to global edge network</li><li>✓ Live site previews with a collaboration UI</li><li>✓ Instant rollbacks to any version</li><li>✓ Deploy static assets &amp; dynamic serverless functions</li></ul>	<p>Team collaboration for professional web projects.</p> <p><a href="#">Start free Pro trial</a></p> <p>or <a href="#">buy now</a> ➔</p> <p><b>\$ 19</b> per member /month</p> <p>Starter features, plus:</p> <ul style="list-style-type: none"><li>✓ Background Functions</li><li>✓ Password-protected sites</li><li>✓ 1TB bandwidth and 25k build minutes</li><li>✓ Audit logs with 7-day history</li><li>✓ Shared environment variables</li><li>✓ Support for organization-owned private Git repos</li><li>✓ Slack &amp; email notifications</li><li>✓ Email support</li></ul>	<p>Advanced security &amp; compliance for larger teams.</p> <p><a href="#">Buy Business</a></p> <p><b>\$ 99</b> per member /month</p> <p>Pro features, plus:</p> <ul style="list-style-type: none"><li>✓ SAML single sign-on</li><li>✓ Role-based access control</li><li>✓ 1.5TB bandwidth and 35k build minutes</li><li>✓ Audit logs with full history</li><li>✓ Unlimited Analytics for all sites</li><li>✓ Unlimited Forms and Identity</li><li>✓ Billing administrator role</li><li>✓ Support for GitHub Enterprise Server or self-managed GitLab</li><li>✓ Build Prioritization</li></ul>	<p>A custom plan with services tailored to team and performance requirements.</p> <p><a href="#">Request demo</a></p> <p><b>Custom pricing</b></p> <p>Business features, plus:</p> <ul style="list-style-type: none"><li>✓ 99.99% uptime SLA</li><li>✓ 24x7x365 premium support</li><li>✓ Unlimited teams with org-level controls</li><li>✓ Enterprise-grade global edge network</li><li>✓ High-Performance Build with SLAs</li><li>✓ Custom contracts &amp; invoicing</li><li>✓ Security &amp; compliance review</li><li>✓ Performance and load testing</li><li>✓ Log Drains</li></ul>

- Netlify Pricing: <https://www.netlify.com/pricing/>

## Performance

- Global CDN: Netlify's global Content Delivery Network (CDN) ensures the web application is served from the nearest data center to students, resulting in faster load times and improved user experience, essential for a multiplayer game.
- Automatic HTTPS: Netlify provides SSL/TLS certificates for custom domains at no extra cost, ensuring secure data transmission and improving performance by enabling modern web optimizations like HTTP/2 and brotli compression.
- No native support for WebSockets: Netlify doesn't support WebSockets natively, which can be a performance constraint for our real-time application that require low-latency communication.
- Reference:
  - Does Netlify support websocket programming?: <https://answers.netlify.com/does-netlify-support-websocket-programming/4213>

## Flexibility

- Wide range of integrations: Netlify supports integrations with popular tools and services, such as Git repositories, headless CMS, authentication providers, and analytics platforms. This allows us to easily connect and extend the project's functionality based on specific requirements.
- Serverless functions with AWS Lambda: Netlify Functions allow us to implement server-side logic using AWS Lambda, supporting multiple languages including Node.js. This enables us to develop and deploy custom backend functionality for the project without being limited to a specific server technology or infrastructure.
- Limited database support: Netlify doesn't provide built-in database support, which may require integrating with third-party services like MongoDB Atlas or using additional add-ons, increasing project complexity.

## Scalability

- Serverless functions: Netlify Functions allow us to build and deploy server-side logic without the need for dedicated servers. This enables us to easily scale our backend as the project grows, without worrying about server management or capacity planning.
- Load balancing and redundancy: Netlify's infrastructure is designed to distribute traffic across multiple servers and data centers, providing load balancing and redundancy. This ensures consistent performance and availability, even during traffic spikes or infrastructure failures, making the project resilient and reliable.
- Dependent on third-party services: For features not natively supported by Netlify, like databases, we will rely on third-party services, which may introduce additional scalability concerns and complexity.

## Security

- Automatic HTTPS: Netlify provides free SSL/TLS certificates for custom domains, ensuring secure data transmission between the web application and users. This encryption helps protect sensitive data and prevents man-in-the-middle attacks.
- Dependency on third-party services: Relying on third-party services for databases and other functionalities may introduce additional security risks and challenges in ensuring a consistently secure environment across our entire project.

# Render

## Introduction

Render is a fully managed platform for running modern applications and websites. It provides a unified platform to build, deploy, and scale our application with ease, allowing us to focus on the project rather than managing the infrastructure. Render offers various hosting services, including static sites, web services, background workers, and databases. However it does not offer a managed MongoDB service out-of-the-box which means we need to manage the MongoDB database separately or use an external MongoDB provider for your specific use case. The Render could be an excellent choice for the project at an early stage due to its simple deployment process, automatic scaling, managed services, and competitive pricing.

## Price

- Free tier for small-scale projects: Render provides a free tier that includes static site hosting, which could potentially be sufficient for our game's initial development phase, reducing our overall costs during early stages.
- Transparent pricing with no hidden costs: Render's pricing is simple and transparent, with no hidden costs or complex calculations. This makes it easier for us to predict and manage our project's hosting expenses, preventing unexpected budget overruns.
- No built-in MongoDB support: Since Render does not provide managed MongoDB, we may incur additional costs using an external MongoDB provider or managing our own custom installation.

## Performance

- Global CDN for optimal latency: Render offers a global content delivery network (CDN) to cache and serve our static assets, ensuring minimal latency for the game's players, regardless of their geographic location.
- Efficient resource allocation: Render optimizes resource allocation for our application, providing a balance between cost and performance. This ensures our project runs efficiently without sacrificing performance, offering a seamless gaming experience to students.
- Potential cold start issues: If the application is not receiving consistent traffic, Render may scale down resources, leading to potential cold start delays when new requests come in.

## Flexibility

- Seamless integration with modern tech stacks: Render easily accommodates our chosen tech stack (Vue.js, Node.js, and MongoDB), providing a flexible hosting environment that supports a wide range of languages, frameworks, and databases.
- Streamlined collaboration and access control: Render enables us to add team members, manage permissions, and collaborate on projects effortlessly. This flexibility allows for efficient teamwork and smoother project management, adapting to our team's unique workflow.
- Smaller ecosystem and community: As Render is a newer platform, it may have a smaller ecosystem and community compared to more established hosting providers, potentially limiting available resources, tools, and support.
- Reference:
  - Render secures \$20M Series A to scale its DevOps cloud platform: <https://techcrunch.com/2021/11/22/render-secures-20m-series-a-to-compete-with-the-big-three-cloud-vendors/>

## Scalability

- Automatic scaling for fluctuating workloads: Render's platform automatically scales the application to handle increased traffic, ensuring a consistent user experience as our game's player base grows without requiring manual intervention.
- Managed databases with scaling options: While Render provides managed PostgreSQL databases, integrating our MongoDB database with Render won't hinder the scalability, as most MongoDB providers offer scaling options to accommodate growing demands, ensuring seamless scaling for our entire tech stack.
- No built-in MongoDB support: Scaling our MongoDB database will need to be managed separately or through an external provider, which could create extra work and complexity as the project scales.
- Reference:
  - PostgreSQL: <https://render.com/docs/databases>

## Security

- Private networking and isolation: Render enables private networking, allowing us to create an isolated environment for the application components, reducing the attack surface and enhancing the security of our project.
- Regular updates and security patches: Render ensures that its platform is consistently updated and security patches are applied, providing a secure hosting environment for our application and reducing the risk of potential vulnerabilities.
- Limited security features: Render may not have as many built-in security features as larger providers like AWS, potentially requiring more manual configuration and setup to ensure the security of our project.