



# Software Major Project: Check 1



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Class: Software Design Year 12  
Due date: Week 9 Term 1

## Problem statement

### The problem at hand

The everchanging world that we now live in has advanced through the means of modern technology, with a union between hardware and software that has allowed for mass adoption of newer devices such as the smartphone and electric cars. As such, the entertainment industry has advanced significantly within the distribution and development of software. This is where newer electronic games have harnessed the power of enhanced technologies that allow for immersive and complex games, coupled with the growing appreciation that society has developed for them. Consequently, this has provided a greater interconnection between individuals and their friends, creating better companionship and a deeper connection with one another as they work together or battle it out within a virtual world.



Within North Sydney Boys High School, there is significant proportion of younger students who are initially shy and unsociable as they enter a new high school environment. As such, they may lack the ability to form bonds with other students, ultimately resulting in a decreased positive view upon their journey through high school. In addition, a lack of interest is also present within the area of software development as seen by the small proportion of students in NSBHS that took the subject in the previous years who have graduated. In contrast to our modern society and its reliance on software, this is a considerable issue that should be addressed by the means of software that can promote interest within students while also allowing for better connections to be formed between them.

Thus, a new solution must be developed, providing students with a tool to form relationships with their peers through an interactive way, while also piquing their interest within the area of software development to improve the school environment.

### Proposed solution

The solution that is to be developed is a multiplayer game named project Zenith, which is designed to resolve the issue that persists throughout the cohorts of NSBHS. It will do this by allowing a group of users to compete with one another in an obstacle course in the form of a spherical ball to battle it out to reach the finish line first, promoting friendly competition that engages the users in the hopes that they will form personal connections

with one another. It will also be designed in to obtain interest from the older years, as they can view the power of software and its ability to create such complex and interactive entertainment systems that allow for people to connect with one another. This will be especially evident in its usability and reliability, to work on both Windows and Mac OS systems, which will be the two typical operating systems of the majority of students who access the software. Additionally, the application will present a friendly user interface allowing users to easily navigate through the game as it will present a host server option. This will allow students to connect easily and quickly with one another if they are connected to the same network (NSBHS network), allowing for students to begin to play and interact within a virtual world.

This ultimately will solve the pervading issue that has existed through NSBHS and as a result, increase the proportion of students who are more aware of the internet of things (IoT) and how they exist in such a technological and modern world.

## Initial design specification

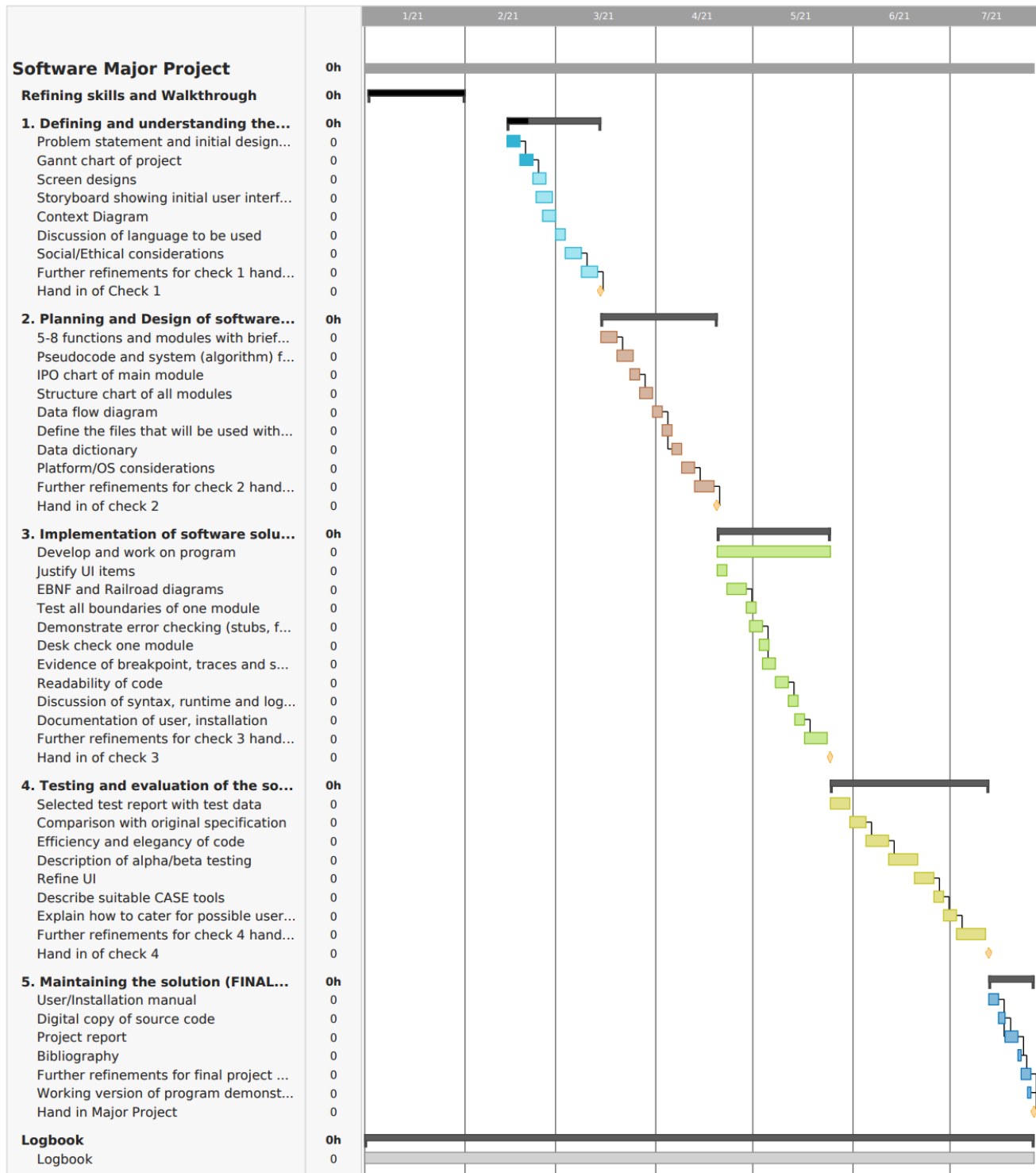
**Tailored for user perspective:**

Category	Number	Requirement
Application interface	1	Ergonomic, Intuitive and well thought out user interface (Sticking to design standards the whole way)
	2	Visual and audio outputs to engage user
	3	Legible and appropriate text/icons to direct user
	4	Consistent and judicious use of cool colours and form
	5	Keyboard shortcuts for easier and efficient navigation
Application support	6	Help and tutorial section to provide assistance
	7	Labelling of buttons and controls for controlling the player
	8	Settings menu for adjusting visual and gameplay requirements
Application usability	9	Movement and control of character to be standardised for each player
	10	Multiplayer system to have minimal lag between interactions for players
	11	Consideration for social and ethical issues such as disability, gender and inclusivity
Application fluidity	12	Satisfactory frame rates during gameplay (above 30fps and optimised for a wide range of devices)
	13	Quick response times for connecting to server and running game on devices

**Tailored for developer perspective:**

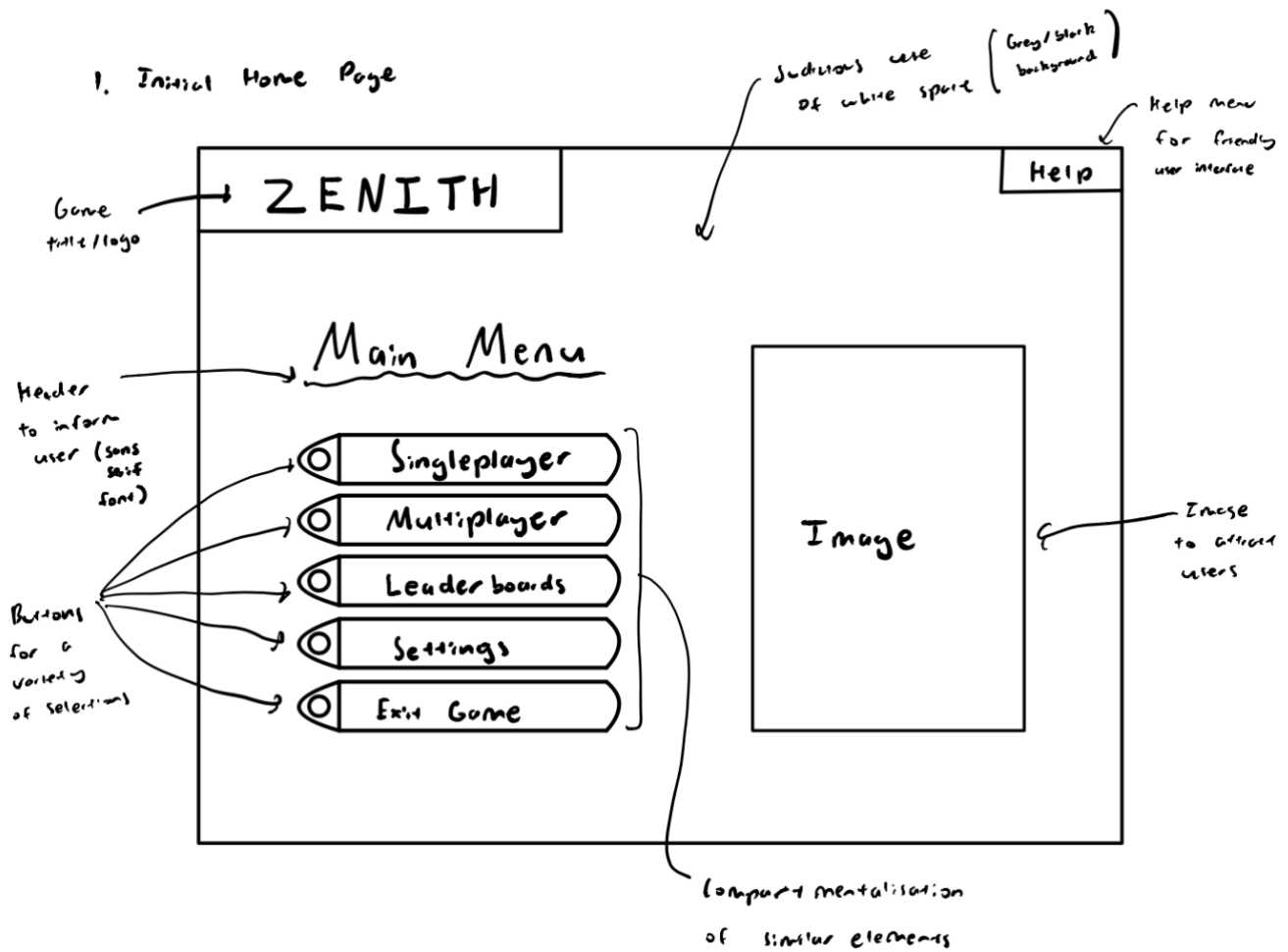
<b>Category</b>	<b>Number</b>	<b>Requirement</b>
Application development	1	Structured development approach
	2	Check back on objectives after each week to ensure quality of software
	3	Adherence to Unity trademark guidelines
	4	Use of data dictionaries, IPO chart, Data-flow diagram, EBNF/Railroad diagrams and other forms of system modelling tools
Application code	5	Well use of internal and intrinsic documentation with effective white space for increased readability
	6	Standardised C sharp coding language with use of Unity Engine
	7	Free from malware or other forms of internal system bugs
	8	Appropriate data types and use of standard control structures
	9	Clear and uncluttered mainline and reusable code for efficiency of program
Application review	10	Use of surveys and even interviews for feedback and review of system
	11	Internal and external testing
Application use (internal and background)	12	Compatibility with Mac and Windows operating systems without affecting other applications
	13	Free from logic, syntax and runtime errors

# Predicted Gantt Chart

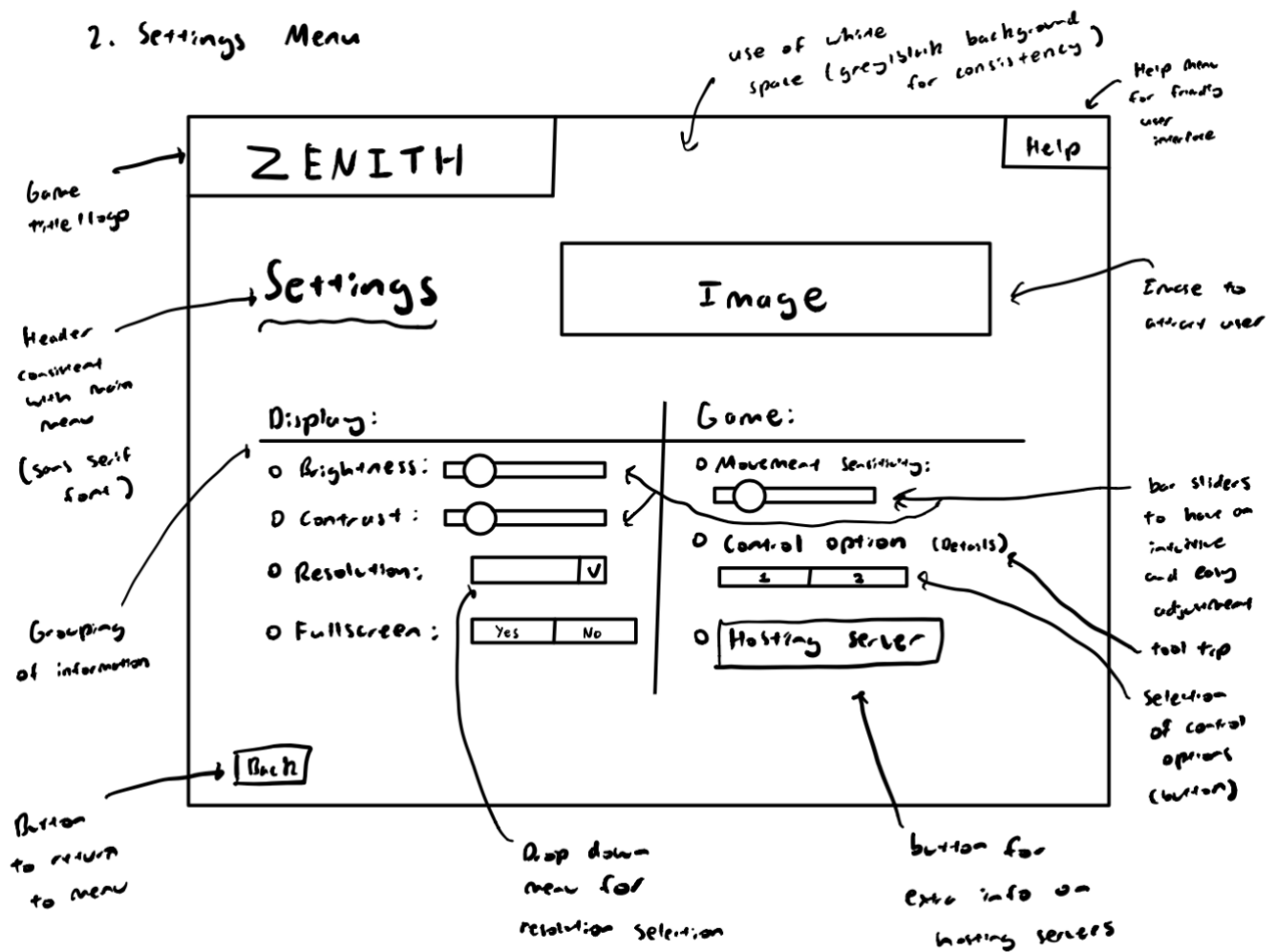


# Screen Designs

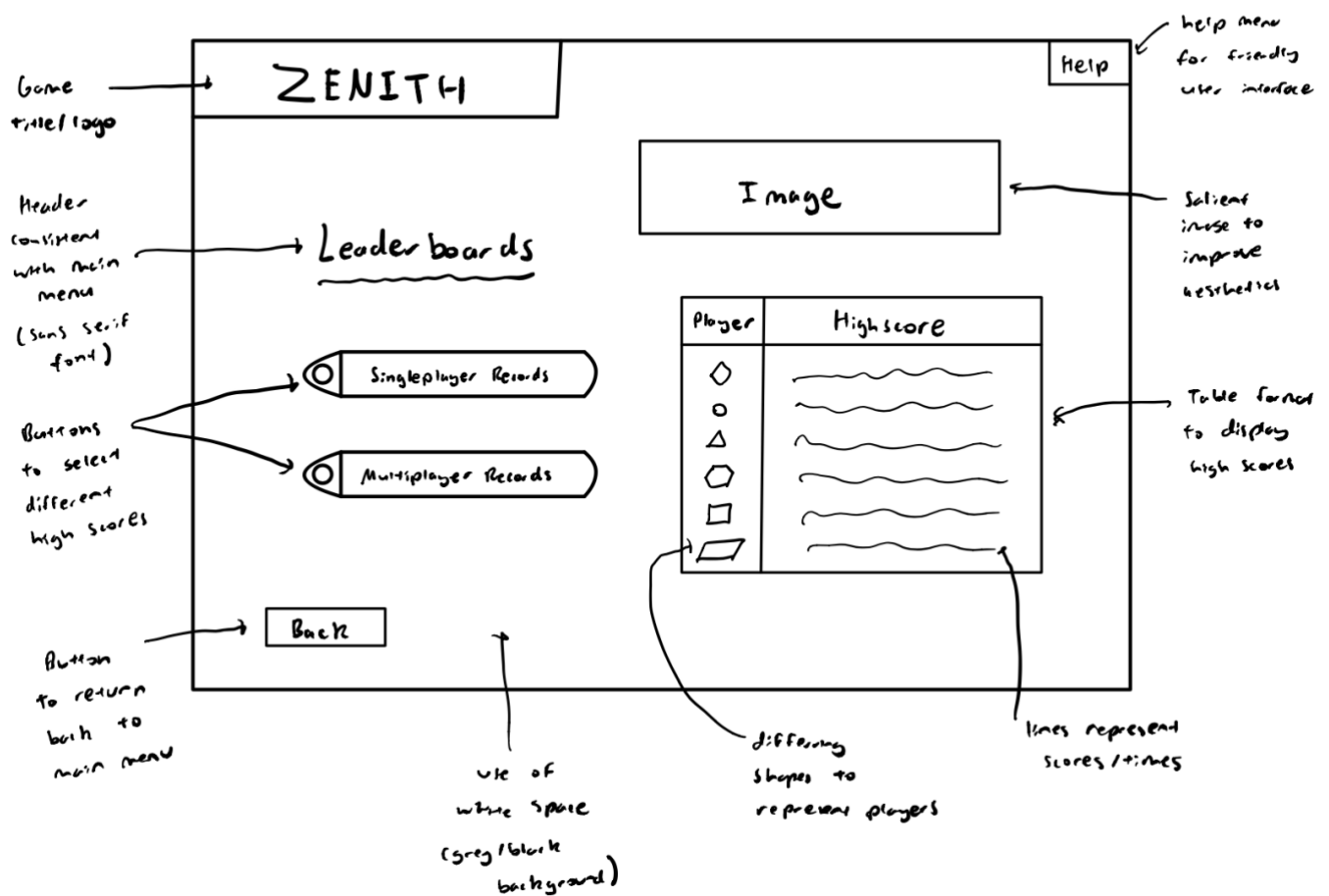
## 1. Initial Home Page



## 2. Settings Menu

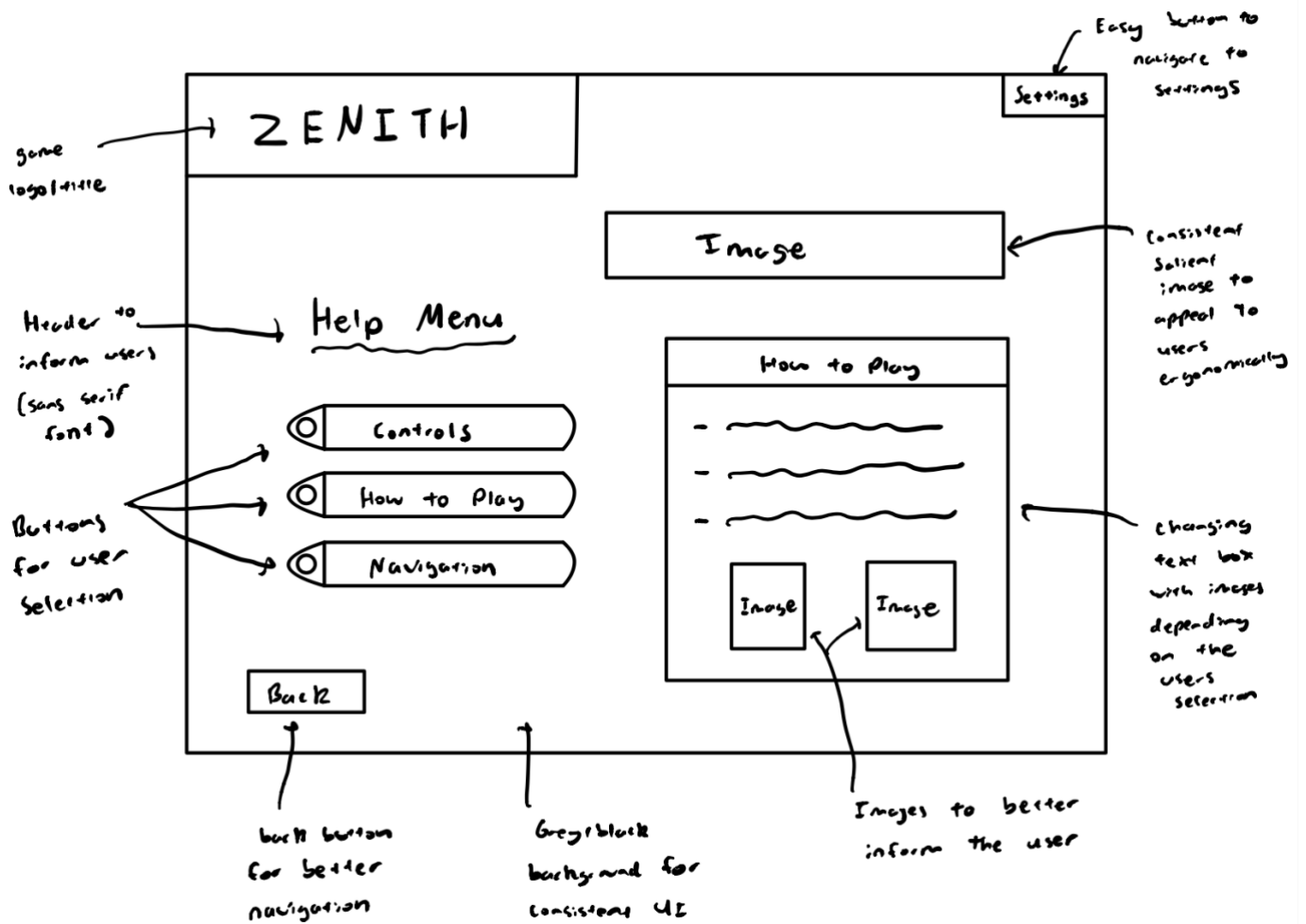


### 3. Leader boards / Records

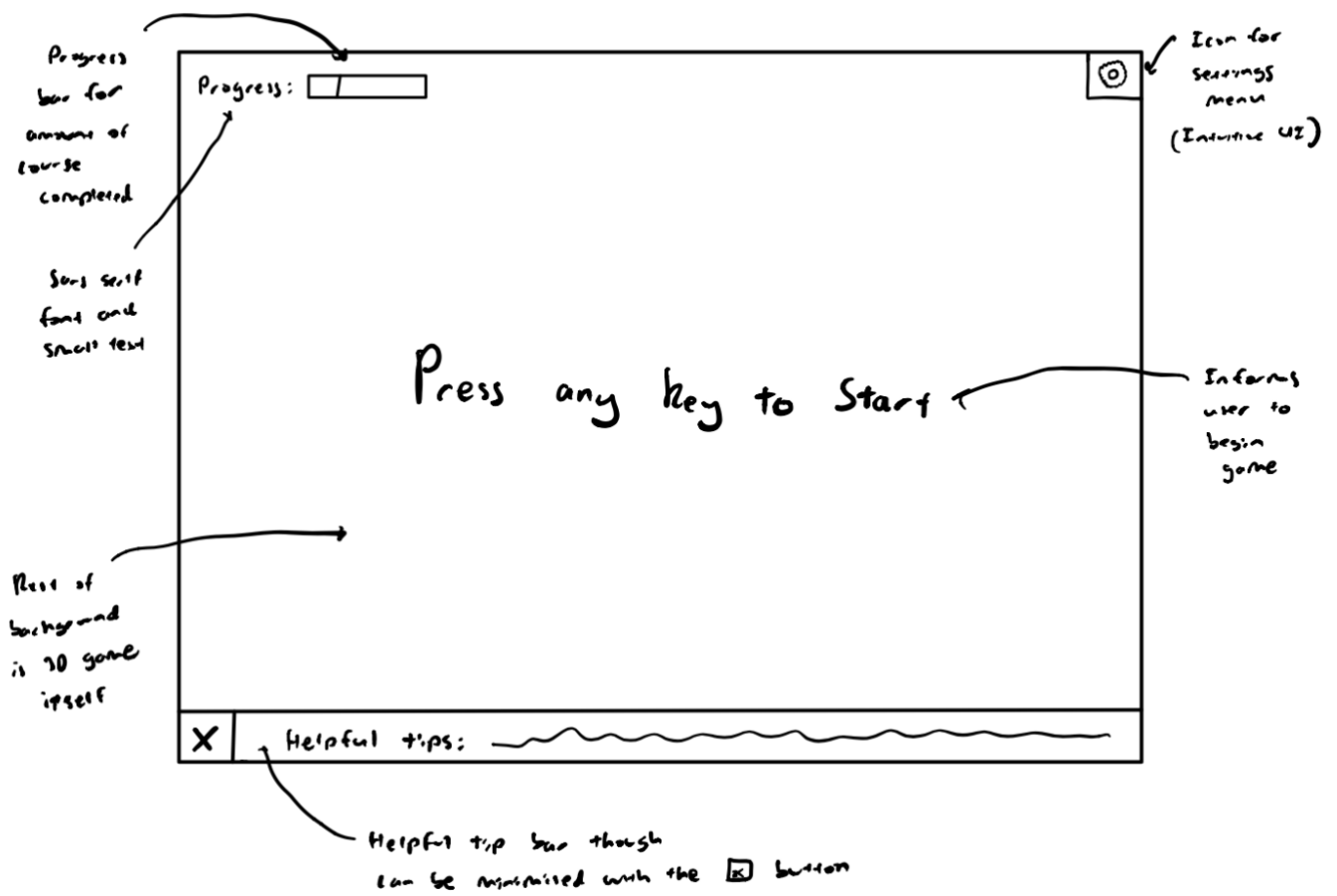




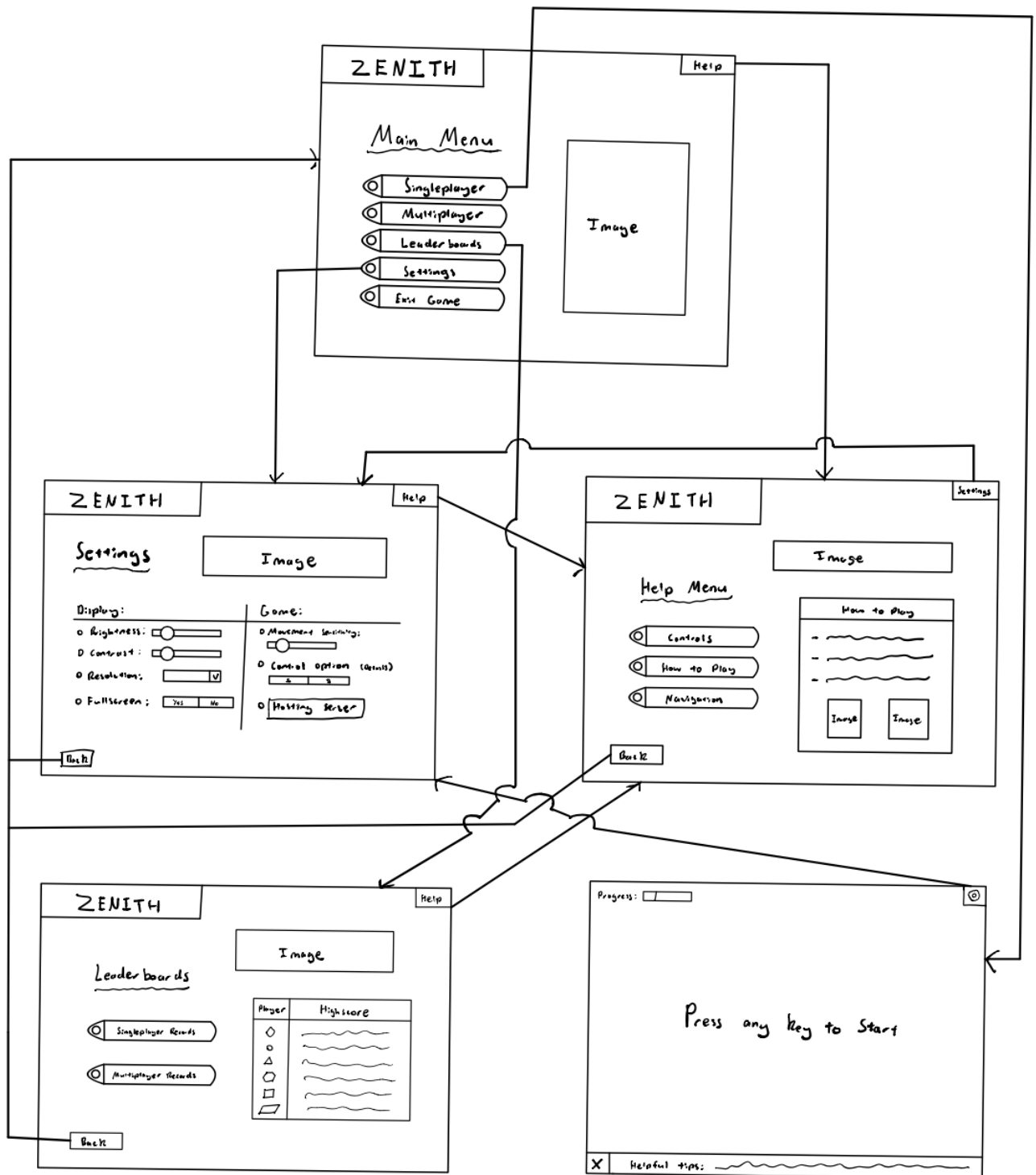
#### 4. Help menu



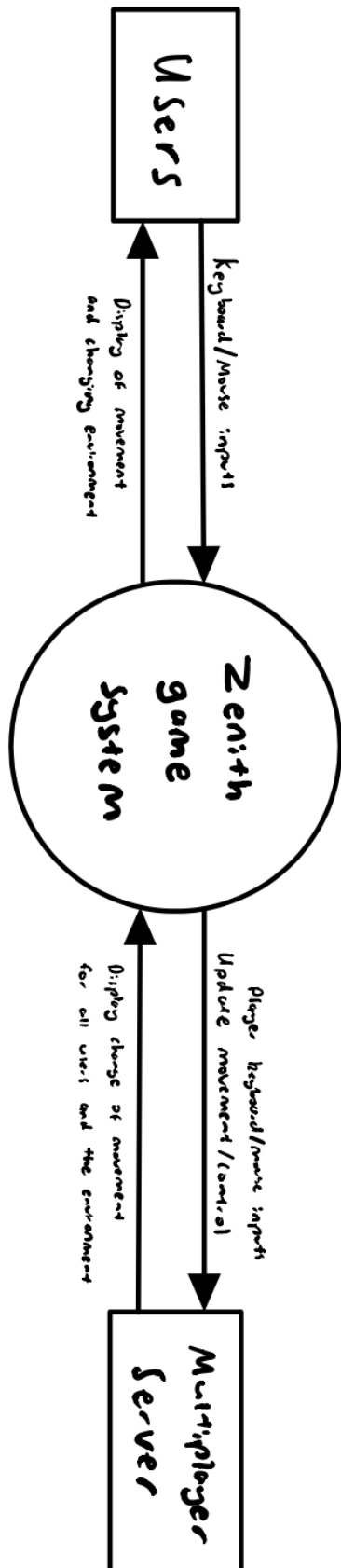
## 5. Initial Game View



# Storyboard



## Context Diagram



## Selected Programming Language

### Unity Engine and C Sharp

The multiplayer game (Zenith) that is to be developed will be done using the Unity Engine which incorporates the C-Sharp programming language.

Unity is a cross-platform game engine which was created by Unity Technologies and released in June 2005 at Apple's Worldwide Developers Conference (WWDC). It is widely used to create 3D, 2D and virtual reality games and has been adopted by many industries throughout the world. As such, it provides a great and simple engine that is free to use and also is equipped with an assets store that holds a vast number of prefabrications of objects made by the community. In addition, due to its popularity, it allows for a great deal of tech support and online help found on websites such as GitHub and Stack Exchange.



C-Sharp is an object-oriented, high level programming language that was developed by Anders Hejlsberg at Microsoft in 2000 as part of its .NET initiative. It is a simple, modern and general-purpose programming language that provides supports cross-platform development while also having great integrity and interoperability within differing environments. As it has existed for so many years, its conjunction with the Unity engine has been long-lasting and technical support found online is vast in helpful source code and tutorials.



As seen above, the engine and language complement one another within its functionality and provides a great deal of versatility for the development of my game. This is due to the Unity's own physics engine, that also allows for rendering of 3D scenes and when paired with C-sharp; allow for an object-oriented language and a higher integrity of code due to its developer being Microsoft. In addition, due to the engine being able to build the game to work on both Mac OS and Windows, it supports the multiplayer intention for students of NSBHS. Consequently, even with my low to intermediate experience with the systems, the friendliness of the system and the use of external help will allow me to create a quality multiplayer ball game.

### Resources

Additional resources include visual studio code, which will act as an IDE (integrated development environment) for the implementation and writing of the scripts in the c-sharp language. It is a freeware source code editor made by Microsoft and allows for debugging, syntax highlighting and version control. As such, it is a quintessential element within my development process as it allows for a more efficient development process.



# Social/Ethical Considerations

## 1. Intellectual property and copyright

The intellectual property of an individual is a property resulting from their individual mental labour that they own. Within Australia, the copyright act of 1968 is in place to protect individual's intellectual property, preventing others from performing acts of piracy. This means that software pirates will be placed under legal implications if they perform piracy and as a result, protects software developers so that they can share their work under software licences. These licences then stipulate how other entities can use the developer's intellectual property and allows for software developers to make profit off their work.

For the purposes of 'Zenith', it will be placed under an open-source licence agreement in order to promote its distribution and use to the outer world and also for it to be made easily accessible for students of NSBHS. Under these licence conditions, most traditional copyright is removed but reinforces the fact that it will encourage others to utilise the system. This means that the source code can be modified, reverse engineered and distributed so that it can be worked upon collaboratively, piquing the interests of the students within NSBHS to undertake software development within our technological world. In addition, the open-source licence stipulates that it must be re-released as open source, and credit is given to the original author in order to acknowledge the original developer.

As such, project Zenith will eventually become an open-source product that is loosely covered by copyright. Although this may mean a decreased ability for the product to be monetised, its ultimate aim is to promote its use with acknowledgement of the original developer. Consequently, it will heighten its accessibility, benefiting most users due to its multiplayer abilities.

## 2. Ergonomics

Within our modern world, the use of games on a personal computer or laptop has become a prevalent action. As such, ergonomic issues will arise within extended periods of use, as the repetitive motion and strain that may be placed upon certain muscles that may be in incorrect positions can cause long/short term injuries. This can include extended periods of typing on keyboards or using a mouse and can result in injuries such as carpal tunnel syndrome (CTS), where the median nerve is compressed or repetitive strain injuries (RSI) arising from repeated motions that harm individuals. Consequently, an ergonomic program should be created, to ensure that the users will not spend an exceedingly large amount of time upon the use of Zenith.

To minimise the above implications, users will be encouraged to take a break from the game after intervals of time, ensuring they can go outside to stretch and perform other activities that minimise their chance of obtaining RSI injuries as well as strain upon their eyes and cognitive function. In addition, a clock may be implemented into the game,

allowing users to acknowledge their time spent within the game itself so that they do not lose track of time when engrossed in the game. Also, a darker background will be implemented within the game to minimise the strain upon the user's eyes, as lower amounts of illumination will be less likely to cause issues such as headaches and nausea from motion sickness as a result of the 3D nature of the game. As such, the overall aesthetic will be appealing but also in accordance to minimising the effects of RSI and CTS injuries so users can enjoy the software program and not develop symptoms that may have long term effects on their health.

As well as the above, the interface should also be friendly and intuitive to use, having appropriate and clear messages to the user so that they can clearly navigate through the system itself. This is why there will be a consistency within the overall design, as the use of fonts and colour palettes will be standardised to ensure the users will be comfortable with the system as a whole. Furthermore, a help menu will be implemented so as to inform less knowledgeable users how to interact with the system and game so that they can understand the controls. The UI will also be optimised to run efficiently, minimising loading times and informing users if any errors occur to reduce stress upon the user so that they do not become frustrated with the system.

From the above considerations, it will ultimately result in a higher quality system that addresses key issues within the area of ergonomics so as to improve its overall quality and thus, user satisfaction.

### **3. Inclusivity**

Although Zenith will be targeted to a younger age bracket, it can be accessed and utilised by a wide range of individuals. As such, the program must be inclusive to accommodate all users so that it can appeal to a wider audience to encourage its multiplayer aspects. This means that all factors should be considered including disabilities, economic, cultural and gender so as to cover inclusivity concerns.

To acknowledge issues within disabilities, Zenith should use clear and easy to read language and font (e.g. sans serif) so that there are no issues within the navigation of the game itself. The Unity Engine also supports a wider variety of accessibility plugins that are available from its asset store. Using these, such as the "UI accessibility plugin", it will allow for game elements to support text to speech to help visually impaired users. Moreover, the background music will merely add an extra small layer to the experience and not be crucial to the gameplay itself, so auditorily impaired users will not lose immersion within the gameplay. Also, peripheral device support can be added if needed and supported through plugins within the asset store so that physically impaired users can interact with the program.

Economic concerns for the program are very low, as an open-source licence agreement has been placed on Zenith. This means that the game is free to distribute across the internet and will require no cost to individuals who will use the system. In addition, gender bias should be relatively low though within the modern software design workforce, there is a larger proportion of males in comparison to females. As a result,

games that are developed may have certain bias towards men though there has been a growing amount of female representation within the software market and its use. As such, Zenith will be developed while keeping this in mind to minimise any forms bias so as to produce a truly inclusive product. This means that cultural concerns will also be addressed, with clear and concise English to be used as well as minimising any forms of humour or images that may be of distaste in varying cultures. By doing this, it will increase Zenith's popularity within a wider range of audiences.

Due to the above, an inclusive and accessible system will be created to ensure that it is easily navigated by a wide range of audiences who have diverse needs within the use of software.

#### **4. Plagiarism**

Within our modern era, the plethora of software that exists across the internet means that there is a variety of ideas and creations that are the intellectual property of others. As such, when creating Zenith, careful consideration must be made to analyse and not overstep the fine line between plagiarism and simply taking inspiration from other software applications.

There are existing solutions that are similar to Zenith such as Polyball and the older arcade games such as Marble Madness. Marble Madness was an old 2D game published by Atari in 1984 and is fundamentally different to the 3D roller ball game that Zenith entails. On the other hand Polyball is a more complex version of what is to be like Zenith and also supports multiplayer though the overall aesthetics is completely different and much more complex within Polyball. As such, the issue of plagiarism will be heavily considered during the development process, with inspiration taken from the above existing solutions though major changes must occur to ensure that they do not plagiarise the existing solutions.

By considering the above factors, it will help to make a better and more ethical game that appeals to users, taking inspiration from others so to benefit the end user in its intuitive UI and gameplay mechanics. In the end, by respecting intellectual property and following copyright rules, plagiarism should not be an endearing issue but something that is looked out for and mitigated in case it arises.