University of Essex

Software Engineering Project Management (Computer Science)

Development Team Project:

Project Report

Team 1

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1. Introduction

Our team is requested to support the development of the software that can be used in a child's toy. As James Zhhn, Deputy Editor of The Toy Book, states that the key to taking the toy market share is innovation (Richard, 2021), the goal of the project is to develop an innovative software-based toy which meet the expectations of the customers.

'Successful project management depends on accepting that in any social environment, such as a software development team, sensible decisions can result in counter-intuitive, and possibly counter-productive, outcomes' (Craig et al., 2011). In this report, the end-to-end life cycle of development will be specified, and the list and analysis of collected requirements will be included to ensure the best result of the project.

2. SDLC methodology

Agile methodology is chosen as it better suits the project situation where time and cost are fixed(Figure 1). Agile methodology is a combination of an incremental and iterative approach which can adapt to changes quickly. Using agile, problems can be spotted in an earlier time than waterfall approach and it is easier for the team to create a quality product under short period of time (Figure 2) (Koi-Akrofi et. al., 2019).

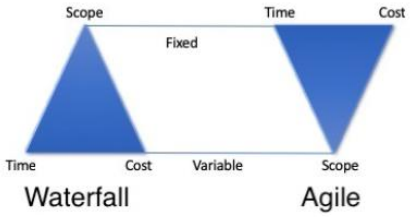


Figure 1: Agile Inverted Triangle (Nair, 2019)

Figure 2: Agile Model (Lovy, N.D.)

SDLC Model	Prototype Model	Scrum Model	Agile model	Waterfall Model
Specification of All the Requirements in the beginning	Not all and Frequently Changed	Not all and Frequently Changed	Not all and Frequently Changed	Yes
Guarantee of Success	Moderate	High	High	Low
Framework type	Iterative	iterative and incremental	Combination of Linear and Iterative	Linear
Customized product	Possible	Possible	Much Possible	Least Possible
Suitable Project Size	Low to Medium Scale	Large Scale	Low to Medium Scale	Large Scale
Risk Involvement	Low	Not High	Low	High
Flexibility	Much Flexible	Flexible	Much Flexible	Rigid
Maintenance	Maintainable	Maintainable	Maintainable	Least Maintainable
Time Frame	Long	Moderate	Long	Very Long
Team size	Small Team	Large Team	Not Large Team	Large Team
Primary Objective	Rapid Development	Rapid Development	Rapid Development	High Assurance

Figure 3: Comparison of SDLC Models (Radhika, 2013)

3. Plan of sprints

The project is divided into 3 phases. The first phase is the project planning phase, which includes the requirements collection, project estimation and risks identification etc. The deliverables of the first phase include the project charter, risk register, communications plan, confirmed requirements list and a scope baseline. The second phase is the implementation stage where the code is developed. The deliverable of this stage will be a code demonstration of features to the customers. The third phase is to work the product towards UAT. A Gantt chart (Appendix 8.11) was produced to show the activities against the project timeline.

The development of features in phase two will also be done in sprints. After each requirement has been converted to user stories, the team will vote for the story points for each story. Based on the capacity of the team and priority of the stories, they will be arranged into different sprints with high priority stories generally in an earlier time.

Furthermore, testing and quality control are applied throughout the sprint including the use of linters and functional test as soon as the feature has been developed. This is to ensure problems can be spotted as soon as possible and get fixed to deliver a quality product to customers on time.

4. Requirements and analysis

4.1. List of Requirements Gathered

The list (Appendix 8.1) contains three categories, system, operations and design and total 33 requirements gathered. The requirements come with 3 low, 21 medium, and 12 high priorities.

4.2. List of requirements included in the demo/simulation

The list (Appendix 8.2) contains 9 requirements which we voted and selected from gathered requirements. The selected requirements come with 5 medium and 4 high priorities.

4.3. Reason for prioritization

After receiving the first document of requirements from the customers, the project team raised questions about the requirements and communicated with the customers to better understand each requirement. The prioritization considers the preferences from the customers as well as the team's judgement of the requirements of a child toy.

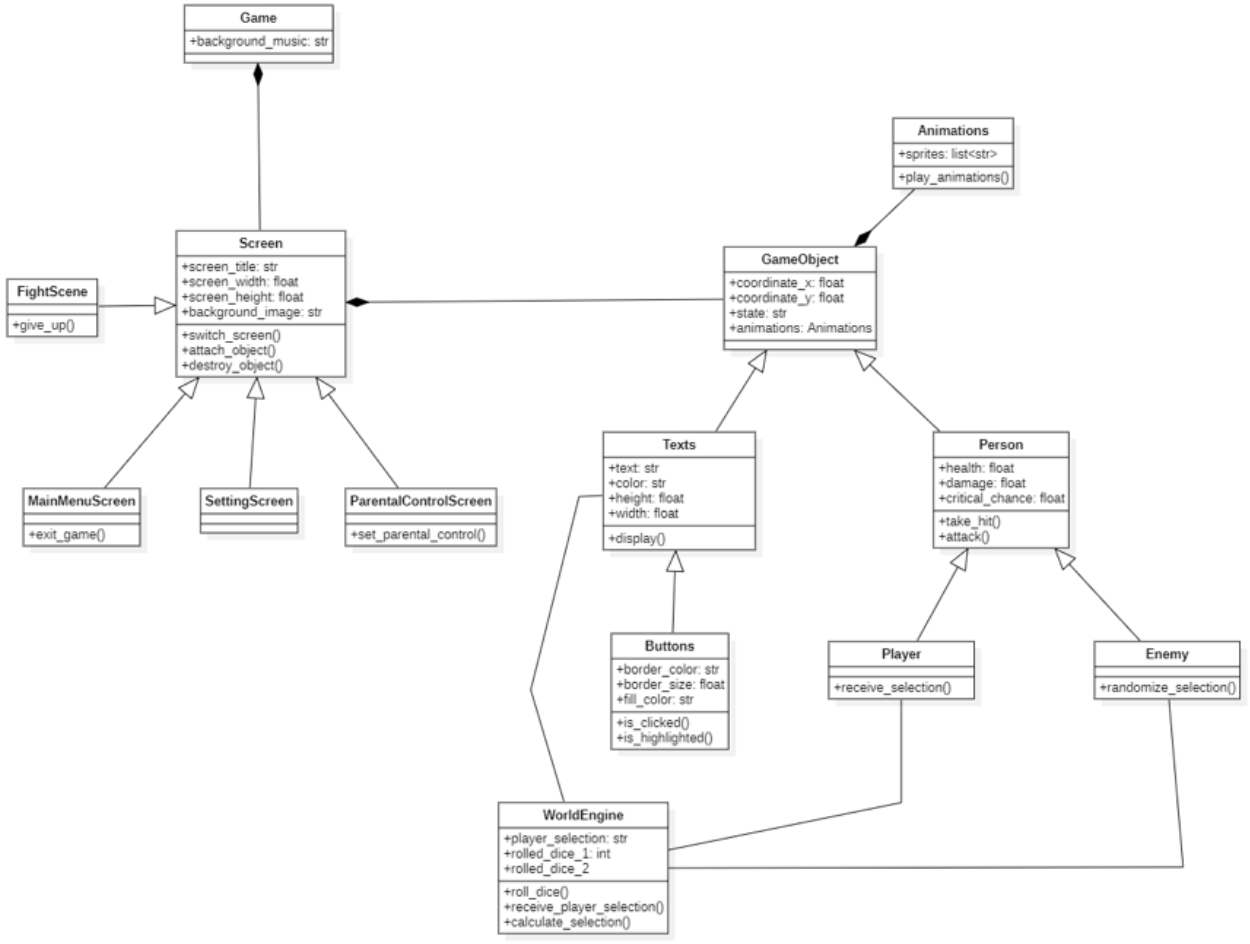
The game will be focused on designing a game for preschool children. So, the top priority is to help them to advance their independence skills and make them ready to live without parents (Apryl D. 2021). In addition, when a game comes with the indicator sound, it can attract children's attention because they easily get distracted (Funday Factory. N.D.), and the game must be responsive swiftly as preschool children have inadequate patience to wait. Consequently, we considered the FR-SYS-001, FR-DSN-001, TR-SYS-001 and TR-SYS-022 high priorities when designing the game. By including these requirements, our team aims to create a minimum viable product for the code demonstration.

5. Design of toy

5.1 Game Design

The game interface of prototype screenshots can be found in appendix 8.6.

5.2 Class Diagram



6. Estimates of Implementation

After confirming the deliverables and scope of the project, the work packages and work breakdown structure (Appendix 8.10) were created using a top-down approach. After that, the activities needed to be carried out in the project were defined. For each activity, we make use of our team members' professional experiences and judgement, or analogues comparison with similar projects team members may have worked on before to estimate the manpower, time and cost needed. Program Evaluation and Review Technique (PERT) (Project Management Academy, N.D.) was applied to take into consideration of both pessimistic and optimistic situations.

$$PERT = \frac{O + 4M + P}{6}$$

From our team's judgement, the most likely schedule (M) takes 45 days, optimistic schedule (O) takes 40 days and pessimistic schedule takes 56 days. Therefore, the weighted schedule is:

$$Weighted\ schedule = \frac{40 + 4 \times 45 + 56}{6} = 46\ (days)$$

As this project does not have any sponsor, it is assumed that there will be no funding for the project. Free resources will be utilized as much as possible in order to stay within the zero budget.

The assumptions and risks of the project should also be considered as they may have an impact on the schedule and cost. For example, one of the known risk is the communication problem with the customers as we are located in different time zones. Longer response time is expected and this will have potential impact on the project schedule (See Appendix 8.8 & 8.9 for Risk Register and Communication Plan).

In order to better visualize the dependencies of the activities, a project schedule network diagram (Appendix 8.12) was produced. Float of each activity and the whole project can be identified. Activities on the critical path that cannot be delayed can also be identified easily.

7. References

[1] Apryl Duncan. (2021) Why Playing Alone Is Important for Children. Available from: https://www.verywellfamily.com/why-playing-alone-is-important-3129415. [Accessed on 20 Jul 2022].

[2] Craig, C., David, V., & Stanislaw, M. (2011). Teaching software engineering project management-A novel Teaching software engineering project management-A novel approach for software engineering programs approach for software engineering programs. Available from: https://doi.org/10.5539/mas.v5n5p87 [Accessed on 22 Jul 2022].

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[9] Richard Kestenbaum. (2021). How The Pandemic Has Changed The Toy Business And The Latest Trends In Toys. Available from: https://www.forbes.com/sites/richardkestenbaum/2021/04/20/how-the-pandemic-has-changed-the-toy-business-and-the-latest-trends-in-toys/?sh=37f9e2c9441e [Accessed on 22 Jul 2022].

8. Appendix

8.1. List of Requirements Gathered

Category	Title	Priority
System	System bootup time	Medium
	Common protocols support	Low
	72 hours continuous runtime	Low
	System security	High
	Multi-platform support	High
	Open SDK	Low
	Unlimited & cheap data storage	Medium
	Efficient data storage	High
	Efficient data utilization	High
	Multi-players game mode	Low
	Single player game mode	High
	Meet the GDPR compliance	High
	SSL/TLS encryption	Medium
	Using licensed libraries	Medium
	Meet the cloud first strategy	Medium
	Microservices architecture	Medium
Operation	Single-handed game mode	High
	Either-handed game mode	Medium
	OTA software update support	High
	Download in the background	Medium
	Quick response time	Medium
	Multilingual support	Medium
	Multilingual languages Support	High
	Multi-input source support	Medium
	Persona creation	High
	Including educational content	High
Design	System bootup time	Medium
	Indication sound	Medium
	Mute key press sound	Medium
	Meet WCAG guidance	Medium
	Random game content generation	Medium
	Parent control	Medium
	Record gaming progress	Medium

8.2. List of requirements included in the demo/simulation

ID	Category	Title	Specifications	Priority
FR-SYS-001	System	Single player game mode	Appendix 8.3.1	High
FR-SYS-002	System	Single-handed game mode	Appendix 8.3.2	Medium
FR-OP-001	Operation	Multilingual support	Appendix 8.3.3	Medium
FR-OP-002	Operation	Multi-input source support	Appendix 8.3.4	Medium
FR-DSN-001	Design	Indicator sound	Appendix 8.3.5	High
FR-DSN-002	Design	Parent control	Appendix 8.3.6	Medium
NFR-SYS-001	System	System bootup time	Appendix 8.4.1	Medium
TR-SYS-001	System	Efficient data storage	Appendix 8.5.1	High
TR-SYS-002	System	Efficient data utilization	Appendix 8.5.2	High

8.3. Functional Requirements Specifications

8.3.1 Single Player Game Mode

Item	Description
ID	FR-SYS-001
Title	Single player game mode
Priority	High
Description	A player should be able to play against the computer.
Acceptance Criteria	The Game should allow the user to play against the computer.

8.3.2 Single-Handed Game Mode

Item	Description
ID	FR-SYS-002
Title	Single-handed game mode
Priority	Medium
Description	The UI should be usable with 1 hand.
Acceptance Criteria	To support users including those with a physical disability the user interface should be able to be used by one handed user.

8.3.3 Multilingual Support

Item	Description
ID	FR-OP-001
Title	Multilingual Support
Priority	Medium
Description	The game should provide multilingual UI support and additional languages are free and available.
Acceptance Criteria	The game should provide additional language packs and enable users to use it in their region.

8.3.4 Multi-input Source Support

Item	Description
ID	FR-OP-002
Title	Multi-input source support
Priority	Medium
Description	The device should be controllable via touch, voice or text/ keyboard input.
Acceptance Criteria	To allow all users to use the game on desktop or mobile control should match the device the game is being played on.

8.3.5 Indicator Sound

Item	Description
ID	FR-DSN-001
Title	Indicator sound
Priority	High
Description	The system should indicate a response with a sound (user selectable).
Acceptance Criteria	Game should have audio to help identify when functions have been selected. As this is a quality-of-life feature that will help users use the game.

8.3.6 Parent Control

Item	Description
ID	FR-DSN-002
Title	Parent Control
Priority	Medium
Description	Give parents the ability to limit when the toy / game is used and how long play sessions should be.
Acceptance Criteria	Giving parents the ability to limit play time is an important quality of life feature to provide parents the tools they need to manage children's screentime.

8.4. Non-Functional Requirements Specifications

8.4.1 System Boot Up Time

Item	Description
ID	NFR-SYS-001
Title	System Boot Up Time
Priority	Medium
Description	The system should boot up in under one second.
Acceptance Criteria	The system should boot up within one second.

8.5. Technical Requirements Specifications

8.5.1 Efficient Data Storage

Item	Description
ID	TR-SYS-001
Title	Efficient Data Storage
Priority	High
Description	Data must be stored in the most efficient way.
Acceptance Criteria	Data should be stored in an efficient way when using backend DBMS systems these should be reliable and fault tolerant.

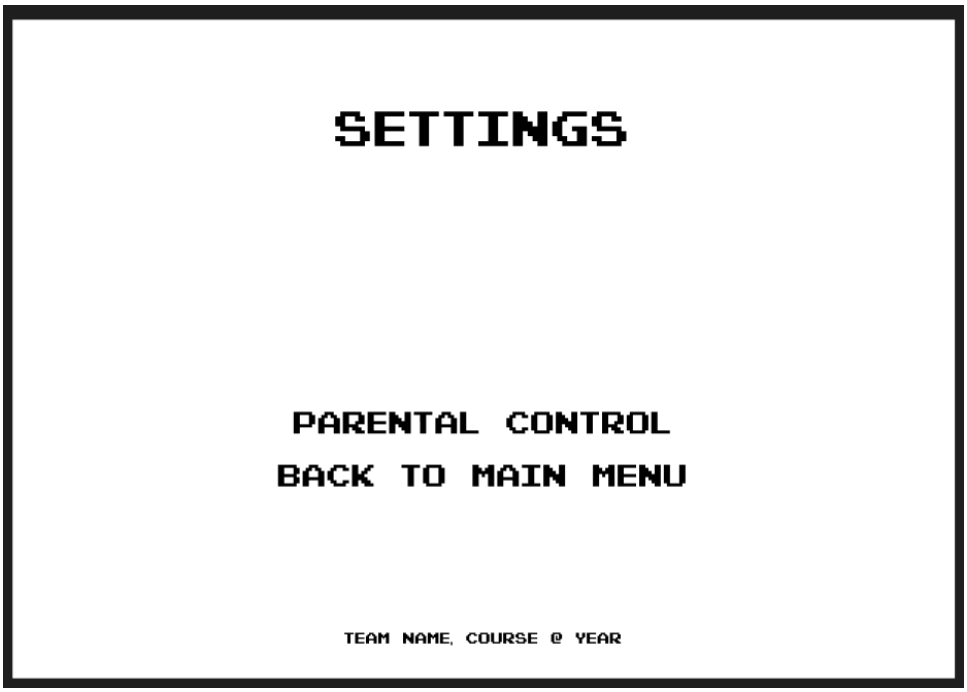
8.5.2 Efficient Data Utilization

Item	Description
ID	TR-SYS-002
Title	Efficient Data Utilization
Priority	High
Description	Data must be able to be searched and managed as efficiently as possible.
Acceptance Criteria	Any Stored data must be able to be searched and used while also being secured protected from misuse.

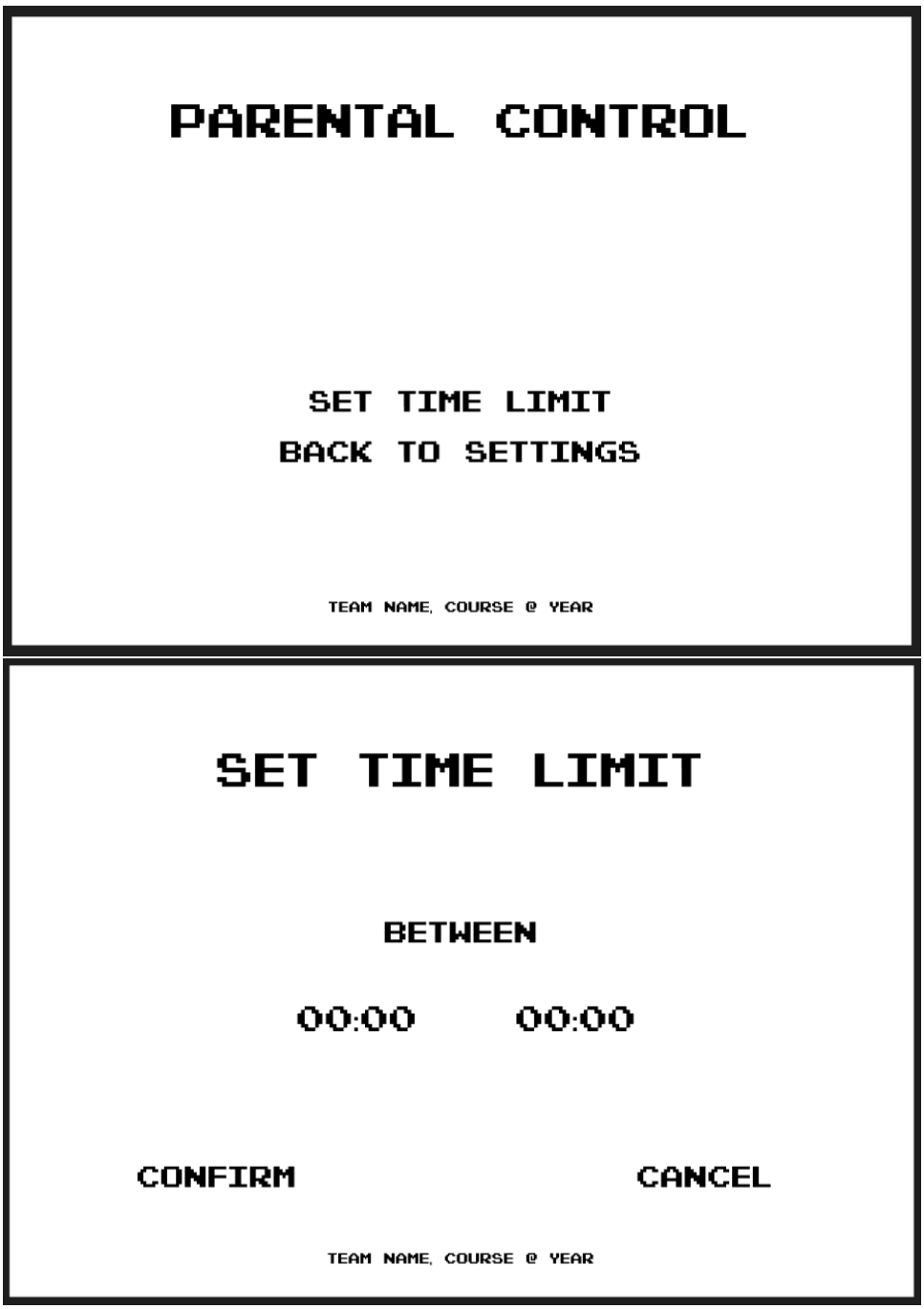
8.6. Prototype Screenshots

8.6.1 Main Screen

8.6.2 Settings

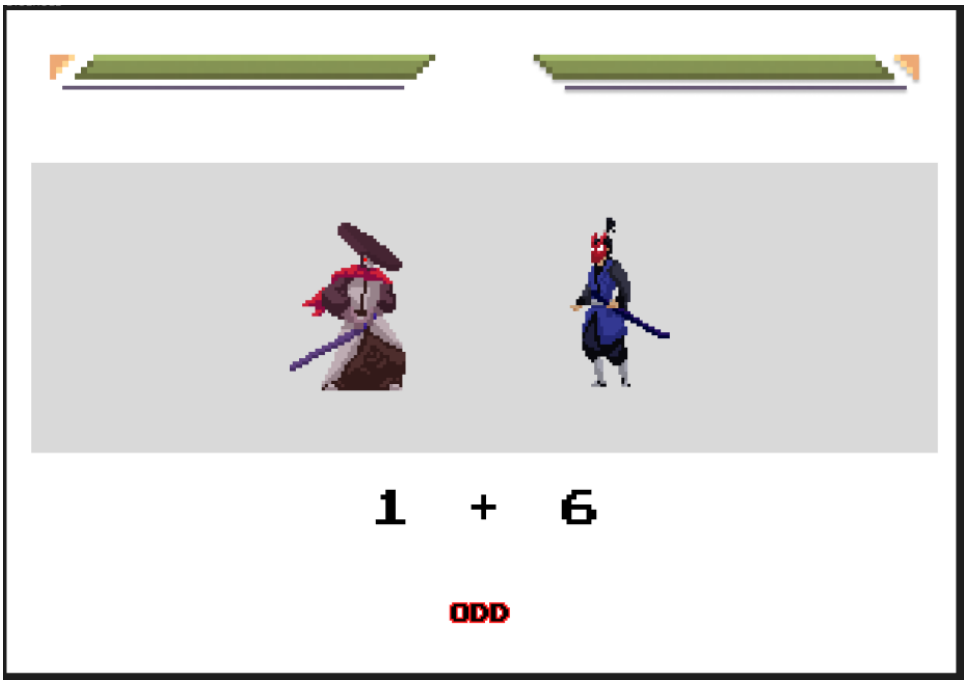


8.6.3 Parental Control Settings



8.6.4 Gameplay – Selecting a Number (Roulette mode)

8.6.5 Dice Roll – Dice Roll



8.6.5 Player/Enemy Attack

8.7. Project Charter

1. General Project Information	
Project Name:	**Child's Toy Development Team Project**
Executive Sponsors:	**None**
Impact of project:	To develop a possible child's toy which can fulfil the market demand

2. Project Team		
	Name	E-mail
Team Members:	Hung Wei Lin	hl21922@essex.ac.uk
	Kei Yiu Yvone Chan	chankeiyiu@gmail.com
	Yin Ping Lai	kris.lai.0730@gmail.com
	Yusuf Fahry	yusuf.fahry@hotmail.com

4. Project Scope Statement
Project Purpose
To develop a child's toy with software component meeting the most latest customer trends in the market
Deliverables
Project report Code demonstration Follow-up plan to UAT

Scope

A code demonstration of 10 requirements by customers
Actual development of the toy product is not included in this phase

Project Milestones *Propose start and end dates for Project Phases (e.g., Inception, Planning, Construction, Delivery) and other major milestones*

1 Jul – Requirements collection
25 Jul – Requirements Finalization
26 Jul – 28 Aug – Code development
29 Aug – Demonstration of the model

Major Known Risks (including significant Assumptions)

Risk	Risk Rating (Hi, Med, Lo)
Time zone differences delay communication between customers and development team	High

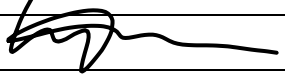
Constraints

Lack of budget may impair the choice of the most appropriate technology stack.

5. Communication Strategy

Development team will communicate with stakeholders regularly through Slack and/or email. When necessary, online meetings will be arranged to communicate bewteen two teams.

6. Sign-off

	Name	Signature	Date (MM/DD/YYYY)
Stakeholders – Team 2	Ian Wolloff		07/14/2022
Development team – Team 1	Chan Kei Yiu Yvone		07/13/2022

This phase is only a subsidary part of the project of toy UAT development. The ultimate goal should be producing a UAT but the current phase only includes the code demonstration part. This phase is only a proof of concept and does not entriely represent the full functions of final product.

8.8. Risk Register

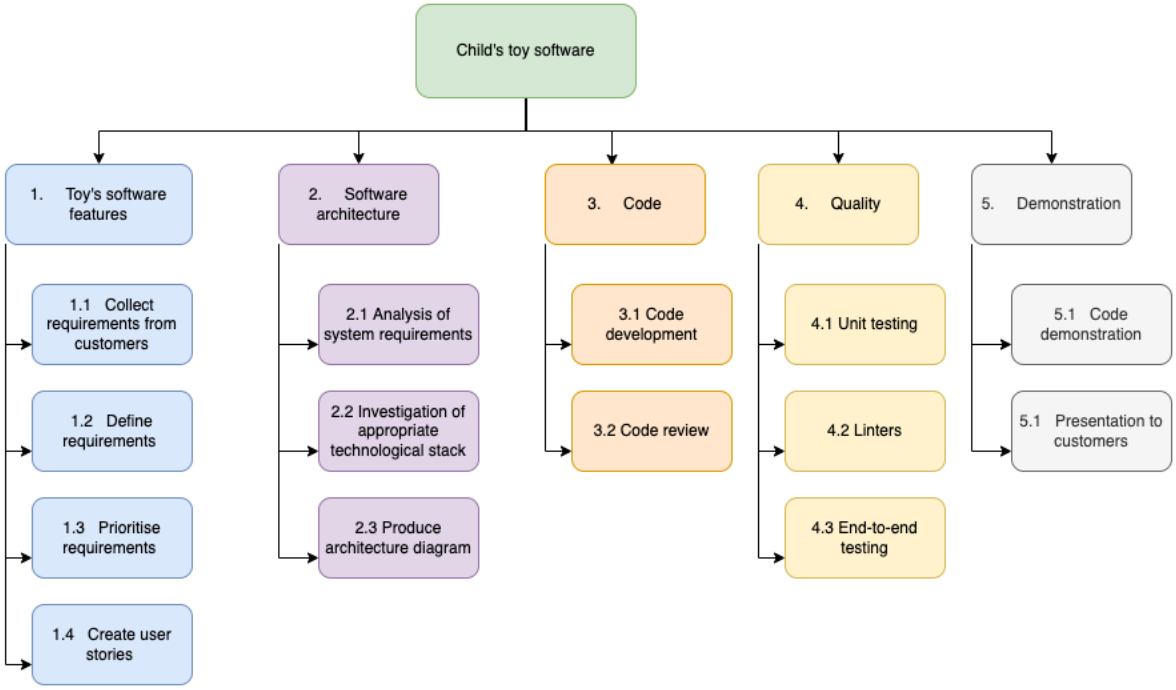
Risk description	Impact description	Impact level 1 (low) to 5 (high)	Probability level 1 (low) to 5 (high)	Priority level (Impact level * probability level)
Communication difficulties due to time zone differences	Delays in communication responses may be expected which may lead to delay in activities	3	4	12

Dispute in requirements	Disagreement may arise as the team may have chosen requirements that customers do not have the highest priority	5	2	10
Work culture may be different for team members	Work may not proceed efficiently as expected or misunderstandings may arise	2	2	4

8.9. Communications Plan

Situation	Target audience	Objectives	Schedule	Format
Project kick-start	Project team, stakeholders	To kick start the project	Once	Meeting
Team meeting	Project team	To decide and discuss on major matters	Weekly	Meeting
Project status update	Project team	To update team members on work progress	Daily	Online message/ Slack
Project status update	Stakeholders	To update project progress	Weekly	Email
Information gathering	Stakeholders	To gather necessary information for the project team	When necessary	Email

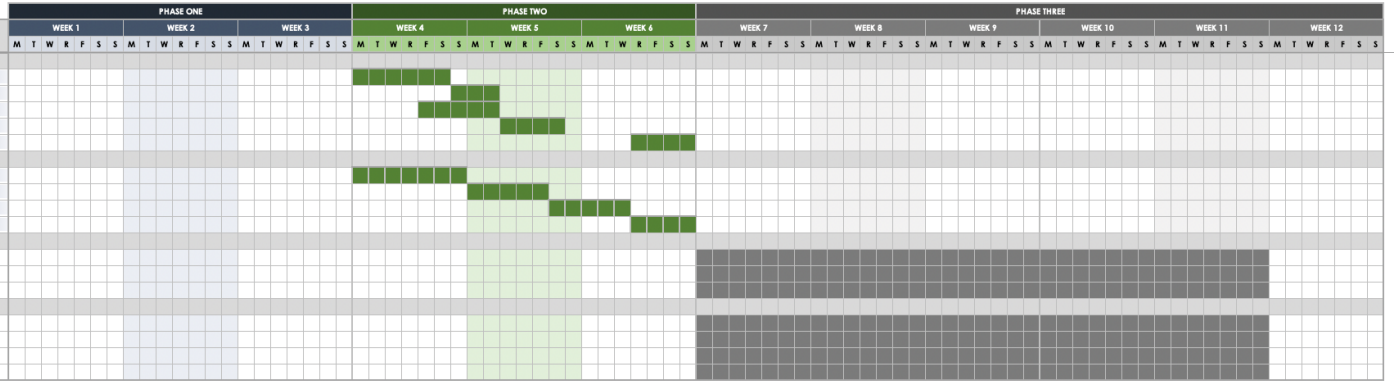
8.10. Work Breakdown Structure



8.11. Gannt Chart

PROJECT TITLE	Child's Toy Development Team Project
COMPANY NAME	Team 1
DATE	Sunday, 24 July 2022

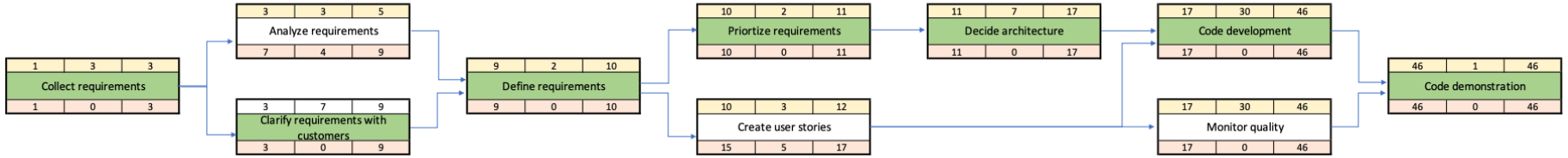
TASK ID	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION IN DAYS	PCT OF TASK COMPLETE
1	Project Conception and Initiation					
1.1	Project Charter	Yvone	07/04/22	07/09/22	5	100%
1.1.1	Project Charter Revisions	Yvone	07/10/22	07/12/22	2	100%
1.2	Research	Yvone	07/08/22	07/12/22	4	100%
1.3	Identify Stakeholders	Yvone	07/13/22	07/16/22	3	100%
1.4	Project Initiation	Yvone	07/21/22	07/24/22	3	100%
2	Project Definition and Planning					
2.1	Scope & Goal Setting	Brandon	07/04/22	07/10/22	6	100%
2.2	Budget	Brandon	07/11/22	07/15/22	4	100%
2.3	Communication Plan	Brandon	07/16/22	07/20/22	4	100%
2.4	Risk Management	Brandon	07/21/22	07/24/22	3	100%
3	Project Launch and Execution					
3.1	Status & Tracking	Yusuf	07/25/22	08/28/22	34	0%
3.3	Project Updates	Yusuf	07/25/22	08/28/22	34	0%
3.3.1	Chart Updates	Yusuf	07/25/22	08/28/22	34	0%
4	Project Performance / Monitoring					
4.1	Project Objectives	Yin Ping	07/25/22	08/28/22	34	0%
4.2	Quality Deliverables	Yin Ping	07/25/22	08/28/22	34	0%
4.3	Effort and Cost Tracking	Yin Ping	07/25/22	08/28/22	34	0%
4.4	Project Performance	Yin Ping	07/25/22	08/28/22	34	0%



Version as of 24 Jul 2022

The timeline of the chart is based on the week of the course. Only the first two phases of the project are included in the Gantt chart as of the constraint of the course duration.

8.12. Project Schedule Network Diagram



The green path indicates the critical path which activities have zero float and must start and finish on time.

Yellow part indicates the early start and early finish, and duration. Orange part indicates late start and late finish, and float.