Grey Group

CM50109 Coursework 2

A Ghost Catching Dungeon Game

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Contents

Project Kick-off (23/10/2019 to 30/10/2019)

1.1 Overview

The project kick-off consisted of meeting the group and preparing necessary tools and roles. After meeting the group, we scheduled a meeting for a skills assessment, as well as set up communications, version control and project management using Microsoft Teams, Github and Trello respectively. In addition, we took the time to prepare questions to ask the customer for the first interview.

1.2 Meeting Minutes

1.2.1 Meeting 1 (23/10/2019)

Attendance: All (Robert, David, Khaled, Wan, Sa, Feng); Duration: 1.5 hours

1. **Introductions**: During the lab session we were assigned our groups for coursework 2. Each of us exchanged names, phone numbers and brief introductions so we could get an idea of each member's background.

2. **Tool set up**: We decided to set up the necessary team tools while everyone was already present. We set up a Microsoft Teams for communications as this was already provided by the University. In addition, we also created a group chat on Whatsapp. The next tool we set up was Github for version control and keeping the code all in one place. Lastly, we set up a Trello board to keep track of our sprints. This was also integrated with our Microsoft Teams.

3. **Next Steps**: With the forming of the group complete and the next class being two days later, we opted to brainstorm during the next class. We set up a Sunday afternoon call to discuss possible roles and creating a skills matrix.

1.2.2 Meeting 2 (25/10/2019)

Attendance: Robert, David, Khaled, Wan; Duration: 1.5 hours

1. **Brainstorming** This meeting was primarily brainstorming based requirements listed in the course assignment.

   (a) **Story**: We went back and forth on the story and ultimately could not decide. We pitched ideas such as being in a time loop (based on the film *Groundhog Day* 1993), as well as a prison break scenario, in which both would involve building a story through gameplay.

   (b) **Mechanics**: In order to fulfil the initial user story specified in the coursework specification (a dungeon game, playing against a bot and varying level of game difficulty), having a 2D game would be easily achievable for us and would fit best with what we wanted to do. We thought having a top down, randomly generated, decision-based dungeon crawler could keep the game non-repetitive. It would have basic movements using arrow keys and involve interactions with NPCs to work toward the goal.

(c) **Backlog**: We created a Backlog which contains a list of tasks to be completed for preparation of Sprint 1 [see section 1.3]

2. **Next Steps**: The next steps would be to attend the call on Sunday (27/10/2019) to do the skills matrix. After this we can assign the roles. We will also explain the brainstormed ideas to absentees.

1.2.3 Meeting 3 (27/10/2019)

Attendance: David, Robert, Wan, Khaled, Sa; Duration: 1.5 hours

1. **Skills matrix**: Upon each of the members attending the call, we used the Microsoft Teams whiteboard to draw up a Skills Matrix in order to identify the capabilities and strength of each team member. Our criteria ranged from 0 to 4, 4 being proficient in the area. Together, we listed down each skill and filled in what we thought our experience was in that area. Please see our Skills Matrix in section 1.5.1. From this we were able to assign roles according to the individual capabilities and strengths.

2. **Roles**: As each of us had different backgrounds, we assigned roles based on the skills matrix results. David was our scrum master and UX lead as he had experience working in this area. Robert had experience with building games so he led the development as well as took on the product owner role given he had a clear game idea. The rest of the team took part as developers that would take on tasks that would apply their principles of programming techniques.

3. **Next Steps**: The next step here would be to write up questions for the first customer interview and pitch our first brainstormed ideas.

1.2.4 Meeting 4 (29/10/2019)

Attendance: Robert, Khaled, Sa, Wan, Feng

1. **Customer interview questions**: The main objective of the day is to create the customer interview questions. The aim of these questions would be to uncover user stories that will help to guide the course of the game design. These questions revolved around genre, graphics, target audience and other user preferences. [Refer to section 1.5.3]

2. **Next Steps**: The next steps would be to carry out this interview and plan the first sprint together as a team.

1.2.5 Meeting 5 (30/10/2019)

Attendance: All; Duration: 1.5 hours

1. **Customer interview analysis**: After having the customer interview on 30/10/2019, we were able to see that the main points are to form a non-repetitive game, perhaps even with a generative narrative. Additionally, we learned that the bots included can just be Non-Player Characters (NPCs) that the player interacts with. Given that the story seemed to be a driving point for the customer, we wanted to try and focus our efforts into producing an enticing story. From this interview, we extracted 5 User Stories [see section 1.5.4]. User Stories describe the desired game features, which we will aim to include in our game.

2. **Sprint 1 planning**: After the first week complete, we can discuss the upcoming tasks for the next sprint. The next sprint should be targeted on narrowing down our focus and trying pitch the game to the customer on the following week. Based on the interview, these tasks will require us to get

a genre, setting and story, as well as settle on game mechanics. These will be added into the Sprint Backlog of Sprint 1 and assigned [please see section 2.2].

3. **Current Progress**: We completed all tasks in the Backlog [see section 1.3]
4. **Next steps**: With a clearer idea of what we want, we will officially start our next sprint and prepare for our next meeting. Each of us are to install Unity and watch some tutorials. Additionally, to prepare for the next meeting, have a think on the genre, setting, story and game mechanics to expand on the current randomly generated game. In the next meeting, we will work to form up a pitch to see what the customer likes or does not like. Robert, who has had experience with Unity game development will go ahead and create the basic movement and interactions with a room.

1.3 Product Backlog

Kick-off Backlog						
PB ID	SP ID	Task	Linked User Story	Date created or Sprint no.	Assignee	Completed in
PB-1	KO-1	Set up team tools	-	15-10-19	Everyone	-
PB-2	KO-2	Skills Matrix	-	15-10-19	Everyone	-
PB-3	KO-3	Assign roles according to Skills Matrix	-	15-10-19	Everyone	-
PB-4	KO-4	Brainstorming on game ideas	-	15-10-19	Everyone	-
PB-5	KO-5	Customer Interview Preparation	-	15-10-19	Everyone	-
PB-6	KO-6	Customer Interview	-	15-10-19	Everyone	-
PB-7	KO-7	Sprint planning for Sprint 1	-	15-10-19	Everyone	-

Table 1. Product Backlog of Kick-off phase

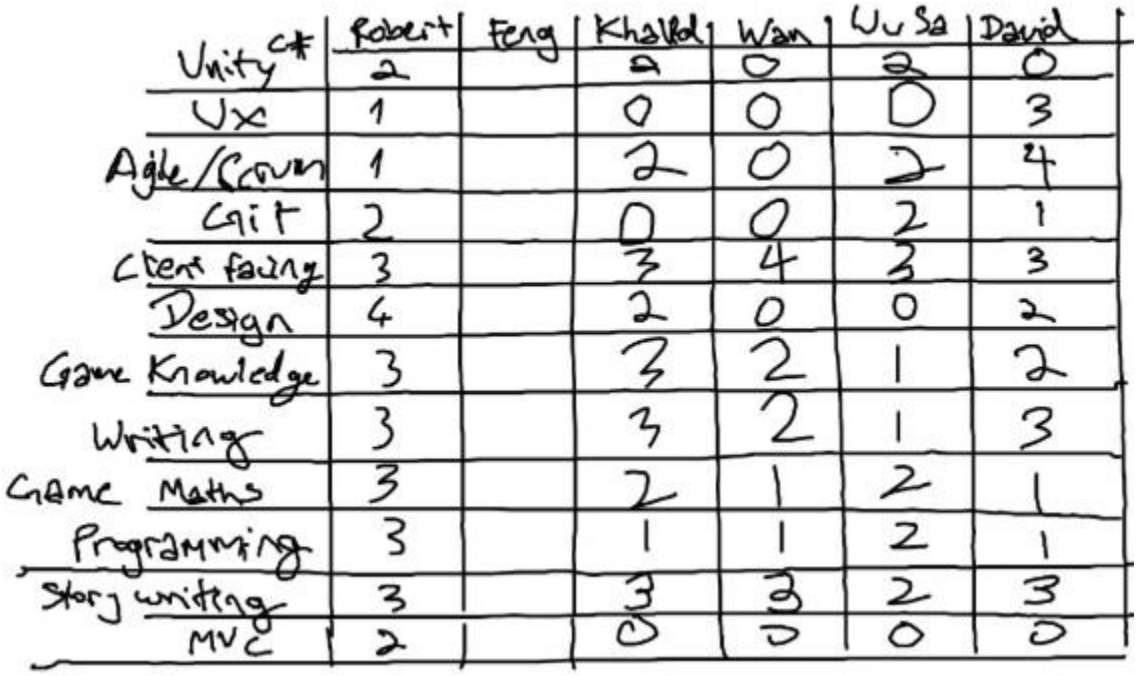
7 tasks were created in Meeting 2 and were assigned to all team members. All tasks were done by Meeting 4.

1.4 Review

This first project kick-off was semi-successful. We had some missing members on some of the days as we were not used to using Microsoft Teams just yet and sometimes members were busy. The brainstorming set us on the right path however there was still much to be done. From the customer interview, we were able to extract some user stories to breakdown into tasks we can add to first sprint. As we will be having to submit coursework 1 soon, as well as other course assignments, we will need to figure out how to manage our time appropriately.

1.5 Product contents

1.5.1 Skills Matrix



	Robert	Feng	Khalid	Wan	Wu Sa	David
Unity C#	2		2	0	2	0
Ux	1		0	0	0	3
Agile/Scrum	1		2	0	2	4
Git	2		0	0	2	1
Client facing	3		3	4	3	3
Design	4		2	0	0	2
Game Knowledge	3		3	2	1	2
Writing	3		3	2	1	3
Game Maths	3		2	1	2	1
Programming	3		1	1	2	1
Story writing	3		3	3	2	3
MVC	2		0	0	0	0

Figure 1. Skills Matrix

The Skills Matrix was created in Meeting 3. It showed the all team members' expertise level of various skills.

1.5.2 Roles

- David Ho - Scrum Master UX
- Robert Marincu - Architect Product Owner
- Wan To - Development Team
- Khaled Khalil - Development Team
- Sa Wu - Development Team
- Feng Xia - Development Team

1.5.3 Customer Interview

These customer interview questions were created in Meeting 4 to be asked in Customer Meeting on 30/10/2019.

1. Preference on game genre, FPS? RPG? OK with element of close-range fighting, shooting, trading (money, cig, to buy knife), decision-based with dialogues? 2D moving mechanics? Can we do more story driven game instead of action game?
2. Graphical requirement: OK with 2D, Top-Down Perspective and retro style (8-bit game)?
3. Preference on Story line and theme? OK with Prison break story line, with elements of violence, gore and illicit drug? Any constraints?
4. Target gamer group? Age over 18? Single player or Couch Co-Op
5. Expected timing of playing this game? Easy chill gaming during commuting or hardcore gaming. What is the expected time to spend to finish the game?
6. Define BOT. can NPC be the only BOT? Do we have to make a BOT to play the game on its own? A bit hard as we are making decision-based game... If need to watch the BOT to play the game, can we just script the BOT play?
7. Do you want to save game progress? or make it like arcade game?
8. Preference on gaming platform? PC and/or mobile?
9. Do we need score counting? e.g. Days taken to prison break?
10. Should we accommodate colorblind player? set subtitle for players during dialogue?
11. Can we contact client outside of client meeting?
12. Can we contact you via email?

After having the customer interview on 30/10/2019, we were able to see that the main points are to form a non-repetitive game, perhaps even with a generative narrative. Additionally, we learned that the bots included can just be Non-Player Characters (NPCs) that the player interacts with. Given that the story seemed to be a driving point for the customer, we wanted to try and focus our efforts into producing an enticing story. From this interview, we extracted 5 User Stories [see section 1.5.3]. User Stories describe the desired game features, which we will aim to include in our game.

1.5.4 User Stories

4 User stories were extracted from summary of Customer Meeting (30/10/2019) and was created in Meeting 5.

User Stories Version 1		
ID	Created on	User Stories
US-1	10/30/2019	As a player, I want to interact with bots so that I can play against something.
US-2	10/30/2019	As a player, I want an enticing story so I can stay interested in the game.
US-3	10/30/2019	As a player, I want a top view game so that I can see the layout of the dungeon.
US-3.5	10/30/2019	As a player, I want a game with retro aesthetic style, so it reminds me of my childhood memory. Also, it is easier to make, and we can focus on other aspects
US-4	10/30/2019	As a player, I want every playthrough to be different so that I do not get bored playing a repetitive game.

Table 2. User Stories Version 1

Sprint 1 (31/10/2019 to 6/11/2019)

2.1 Overview

This is the first Sprint after the project kick-off in which we explored the user stories and pitched the initial brainstormed ideas. At the end of the Kick-off phase, Sprint 1 Sprint Backlog was created. At this stage, the Product Backlog and Sprint 1 Backlog were the same as we did not have too many tasks.

2.2 Sprint 1 Backlog

This sprint we identified 7 tasks to be completed.

By the end of Sprint 1, we were able complete all assigned

Sprint 1 Sprint Backlog					
PB ID	SP ID	Task	Linked User Story	Date created or Sprint no.	Assignee
PB-8	SP1-1	Create character movement in Unity	US-3 & US-3.5	30/10/19	Robert
PB-9	SP1-2	Brainstorm game story setting	US-2	30/10/19	Everyone
PB-10	SP1-3	Brainstorm game mechanics for no-repetitive gameplay	US-4	30/10/19	Everyone
PB-11	SP1-4	Card prototype	US-4	30/10/19	David
PB-12	SP1-5	Prepare customer interview 2	-	30/10/19	Everyone
PB-13	SP1-6	Customer Interview 2	-	30/10/19	Everyone
PB-14	SP1-7	Planning for Sprint 2	-	30/10/19	Everyone

Table 3. Sprint 1 Sprint Backlog

This Backlog was created in Sprint 1 Planning in meeting 5 on 30/10/2019. All previous tasks in Kick-Off backlog was completed. 7 new tasks were created and assigned to various team members.

2.3 Meeting Minutes

2.3.1 Meeting 6 (05/11/2019)

Attendance: All

1. **Character movement demo**: Robert was able to show us the basic movement around and between rooms of the dungeon. So far it looks good however we will need to decide on an asset pack so we can add in graphics that fit with our theme.

2. **Game story setting**: Back on the story topic, we've brainstormed a bit more. Juggling the idea of a prison break, a post-apocalyptic world, a fantasy world etc. We thought the game could also include some comedy, drawing some inspiration from the game *The Stanley Parable*. Ultimately, the game setting will not change the mechanics of the game, so we have a little more time to think about this.

3. **Game mechanics**: From the last customer interview, we knew we wanted a Generative Narrative. In Generative Narrative game, player's moves will affect the upcoming narratives. The interactions, rooms and NPCs would be randomly generated, and the player would have to guess the correct interaction to receive a point. If they do not get enough points by the end of the play though, the day will end, and the player will loop through again. The aim will be to try and acquire the points in as few days as possible. We can assign binary values to the interactions as well as randomly generate the combinations at the start of each game so that every play through is different. It is still up to debate whether or not we want to include fighting mechanics, however we have decided this will not be a fighting game.

4. **Next Steps**: The next steps involve preparing a card/board game prototype to articulate the game to the team and the customer. The game mechanics were confusing enough to understand within our team so a card prototype can clear up the confusing. The assumption is that if we can recreate this game using cards, it should be feasible for us to program with the little experience we have.

2.3.2 Meeting 7 (06/11/2019)

Attendance: All

1. **Customer meeting analysis**: We had a Customer Meeting on 06/11/2019 [see 2.7.1 for analysis on the Customer Meeting]. Clearly the idea did not seem to sit nicely with the customer. They wanted a more direct goal that wouldn't be so cryptic. Additionally, they wanted more complex interactions instead of simply choosing between a list of 4. The mechanics of the game were fine, but it really needs to be tied into a story, so the player knows why they are doing what they are doing. By next meeting, it was suggested we work on completing a full feature (room or interaction) to present. We decided to be more resourceful and use what we had. We had found a graveyard asset pack and thought we could wrap a story around that.

2. **New game idea**: The new game idea revolved around ghosts. Essentially, the interactions will now include dialogue, death and capturing of a ghost. The player will have to sneak around ghosts while listening to their story of how they died. If the player is caught, they will have to restart. The player can however catch ghosts from behind outside of their field of vision. The ghost's fate will then be decided by the

player based on the ghost's story at the end of the dungeon. The aim would be to sort good and bad ghosts correctly in order to send them to the correct afterlife location.

3. **Sprint 1 progress**: All tasks Sprint 1 Sprint Backlog were completed.

4. **Sprint 2 planning**: This sprint was during a busy period for everyone so there were not that many tasks. There will be a few more tasks for this sprint. Ultimately, we decided we would complete a feature using the new story. To do this, we think that by end of next sprint, we should be able to show the field of vision for the ghosts and include their movement. With this, we can re-pitch the game next week and demonstrate how a player will interact with a ghost. Additionally, we will include some more info on the back story and include ghost stories for the dialogues. With these new ideas and tasks, Sprint 2 Sprint Backlog was created [section 3.2]. Robert will carry on adding more features to the game. Khaled will be leading the story writing part. Sa and Feng will research into test cases and how to design test cases according to User Stories and Use Cases. David and Wan will focus on documentation. Indeed, the usual Sprint activities (e.g. customer meeting and Sprint 3 Planning) will carry on.

5. **Next Steps**: The next steps would be to prepare coding the next features, as well as tying them to the new user stories and documenting what is necessary.

2.4 Sprint Review

This sprint was used to get the necessary tools needed to fulfill the requirements gathered from the customer meeting and analysis. Overall it went quite smoothly as Robert knew exactly the tools we needed. In addition, the team brainstormed on ideas on how to design the game so that it fulfills customer user stories. Due the coursework 1 being due this week, this sprint was a little less busy. We decided to assign less tasks so that we would be able to manage our time with other duties.

2.5 Exception Handling

The first coursework was due the on the November 1 which was during our sprint. Because there was much work and unforeseen editing needed for the coursework, not all members were able to attend the meetings. To get around this, we made sure at least one person from each pair could attend the group meeting to discuss the customer meeting. The other could work on editing the paper. We were able to divide up the work effectively and carry on smoothly.

2.6 Product contents

2.6.1 Customer Meeting on 06/11/19 and Analysis

This customer meeting, we presented a card prototype to the customer to articulate the game mechanics. The customer was okay with the game mechanics however would have liked to see more interactions that would make the game more challenging.

Additionally, the customer mentioned that the story was important and needed to be clear. The customer would not know why the character is doing what is required in the game. We needed a clear idea of what the game setting was to focus our game. It was also recommended that for next week we work on fully finishing one room, or feature that we could show during the next customer interview.

From this meeting, we extracted 3 new User Stories (US-5 to US-7) [see section 2.7.2].

2.6.2 User Stories Version 2

User Stories Version 2		
ID	Created on	User Stories
US-1	10/30/2019	As a player, I want to interact with bots so that I can play against something.
US-2	10/30/2019	As a player, I want an enticing story so I can stay interested in the game.
US-3	10/30/2019	As a player, I want a top view game so that I can see the layout of the dungeon.
US-3.5	10/30/2019	As a player, I want a game with retro aesthetic style, so it reminds me of my childhood memory. Also, it is easier to make, and we can focus on other aspects
US-4	10/30/2019	As a player, I want every playthrough to be different so that I do not get bored playing a repetitive game.
US-5	11/6/2019	As a player, I want to know the character's motive so that I know the goal of the game.
US-6	11/6/2019	As a player, I want to have more challenging interactions, so the game is not too easy and all guesswork.

US-7	11/6/2019	As a player, I want to have varying difficulty levels in the game, so that I can adjust the game difficulty.

Table 4. User Stories Version 2

This is the updated version of User Stories was created in meeting 7 on 06/11/2019. New User Stories US-5 to US-7 extracted from Customer meeting (06/11/2019) were added.

2.6.3 Use Cases

Use Case Name: Start game	ID: UC-1	Importance Level: High
Primary Actor: Player	User Stories: US-13	
Stakeholders and Interest: Player – Wants to start the game.		
Brief Description: This use case describes the process of a player wanting to start the game.		
Trigger: User starts game.		
Normal Flow of Events: 1. User opens main menu. 2. User clicks start game		

Table 5. Use Case 1

Use Case Name: Move character	ID: UC -2	Importance Level: High
Primary Actor: Player	User Stories: US-3	
Stakeholders and Interest: Player – wants to control his/her character in the game to navigate the map, as well as avoid enemies.		
Brief Description: This use case describes how the player moves his/her character		
Trigger: Player uses arrow keys or WASD in game		
Normal Flow of Events: 1. Player press directional input keys (arrow keys or WASD) 2. Character movies in direction of input		

Table 6. Use Case 2

Use Case Name: Generate room	ID: UC-3	Importance Level: High
Primary Actor: -	User Stories: US-3, US-4	
Stakeholders and Interest: Player wants non repetitive gameplay therefore each start game we generate a random room with a random dialogue.		
Brief Description: This use case describes how the room/map generates each game.		
Trigger: Start game		
Normal Flow of Events: 1. Player starts game 2. Rooms generate with random ghost, dialogues and objects.		

Table 7. Use Case 3

Sprint 2 (07/11/2019 to 13/11/2019)

3.1 Overview

This is the second sprint in the project. Here we are working to focus our game requirements and re-pitch the game based on the previous weeks feedback. We completed most of the tasks in the Sprint 2 Sprint Backlog which was created at the end of the previous Sprint. Additionally, it was time for a backlog prioritization session.

3.2 Sprint 2 Backlog

This sprint we identified 11 tasks to be completed.

By the end of Sprint 3, we were able complete all assigned tasks

Sprint 2 Sprint Backlog					
PB ID	SP ID	Task	Linked User Story	Date created or Sprint no.	Assignee
PB-15	SP2-1	Game feature - ghost movement	US-1 & US-6	06/11/19	Robert
PB-16	SP2-2	Game feature - player collecting ghosts	US-1 & US-6	06/11/19	Robert
PB-17	SP2-3	Game feature - sorting ghost order	US-1 & US-6	06/11/19	Robert
PB-18	SP2-4	Game feature - ghost vision cone	US-1 & US-6	06/11/19	Robert
PB-19	SP2-5	Writing ghost stories with dialogues	US-2 & US-4 & US-5	06/11/19	Khaled
PB-20	SP2-6	Test cases	-	06/11/19	Sa, Feng
PB-21	SP2-7	Catch up on Documentation	-	06/11/19	David, Wan
-	SP2-8	Customer meeting preparation	-	06/11/19	Everyone

-	SP2-9	Customer meeting analysis	-	06/11/19	Everyone
-	SP2-10	Sprint 3 Planning	-	06/11/19	Everyone
-	SP2-11	User Story and Backlog Prioritization	-	06/11/19	Everyone

Table 8. Sprint 2 Sprint Backlog

This Backlog was created during Sprint 2 Planning in Meeting 7 on 06/11/2019. All tasks from Sprint 1 Backlog was completed. This backlog consists of 11 tasks which were assigned to team members. Some of the tasks were created to fulfil the corresponding User Stories.

3.3 Meeting Minutes

3.3.1 Meeting 9 (8/11/19)

Attendance: All; Duration: 1 hours

1. **Documentation requirements**: This meeting took part remotely after the Friday's tutorial session. Some members were not able to attend so we decided to ask questions on the UML required for documentation. We were told that we don't have to, but it would help to include certain flow diagrams and perhaps even sequence diagrams.
2. **MVC**: We also asked about the MVC requirement. We were able to get an understanding of this and how it plays into Unity.
3. **Next Steps**: As we were able to see some previous examples of games, we had some sort of benchmark. The next steps included to simply continuing with our sprint tasks.

3.3.2 Meeting 10 (11/11/19)

Attendance: All

1. **Standup forms**: We concluded that we were having some trouble with the stand ups and availability of all team members. To get around this, we set up an automated message that would allow us to fill in our standup forms for reference.
2. **Next Steps**: The next steps were to just fill out the questions of what we did yesterday, what we are doing today, and if there are any blockers. As usual, continue with sprint tasks.

3.3.3 Meeting 11 (13/11/19)

Attendance: All; Duration: 2.5 hours

1. **Customer Meeting Summary**: In the Customer meeting on 13/11/19, we presented some new ideas and our current game version to the customer. The new idea was that the game theme would be based on player catching ghost in a graveyard setting. Player would enter a series of randomly generated room which contains a ghost. Player then needed to go near the ghosts and read the dialogues from the ghosts and determine if the ghost was a good or bad person before becoming a ghost. Then, player would need

to capture the ghost and sort them as good and bad ghosts in the last room. The player would win if he/she could sort the ghosts out correctly, otherwise, the game restarts.

We also presented our current game version with new features. We had a player that was able to capture a ghost and store it into an inventory in a graveyard setting (using an online Unity asset).

We explained that our next step was to write more ghost stories and dialogues, adding new features e.g. vision cone of ghosts, ghost attacking on player, start and pause menus, etc.

Customer once again emphasized the importance of making the game challenging and the importance of attracting player to play the game again. We explained the idea of sorting the ghost could be challenging as we could change the ghost moving speed and more ambiguous dialogues (which makes it hard to decide which ghosts are good or bad).

2. **Customer Meeting Summary Customer Meeting Analysis**: This customer meeting ensured we were on a better direction. We knew that the customer was enjoying the basic features and graphics of the game. We were however told that we needed to catch up on documentation which was true. This will be taken into account for the upcoming sprints. At this point, we are less so trying to discover more user stories and work on completing the game.

3. **Backlog prioritization**: Collectively we decided to prioritize our backlog using post its and a board. We created two axis representing impact and cost/effort. We found the top priority tasks to be working on for the upcoming sprints. Subsequently, we created Sprint 3 Product Backlog [section 4.2] Tasks PB-1 to PB-16 were completed, hence they were in the Completed section at the bottom of the Sprint 3 Product Backlog. Unfinished tasks PB-17 to PB-21 remains alongside with new tasks PB-22 to PB-29. New tasks TB-22 and TB-24 are new game features. PB-23 was for version control. Some of the unfinished and new tasks would be included in the Sprint 3 Sprint Backlog and assigned to team members [see below Sprint 3 Planning].

4. **Sprint 3 planning**: After prioritizing the Product Backlog, we started planning for the next Sprint. We included some Product Backlog tasks into the Sprint 3 Sprint Backlog according to their importance [section 4.2] and assigned them to team members. Robert would continue adding more features to the game (SP3-1, SP3-2, SP3-6 to SP3-8), e.g. sorting ghost order and ghost vision. Khaled would continue writing more ghost stories. Sa and Feng would continue working on Test cases. David and Wan would focus on catching up on documentation, to prevent disorganization and missing details.

5. **Next Steps**: The next steps just involve working on the next sprint and finishing tasks in Sprint 3 Sprint Backlog.

3.4 Sprint Review

In Sprint 2, we completed all the Sprint activities (SP2-8 to SP-11) in Sprint 2 Sprint Backlog [section 2.1])Robert successfully added new game features SP2-1 and SP2-2. The unfinished tasks were SP2-3 to SP2-7. Khaled had produced 4 sets of ghosts' stories and dialogues and would continue to produce more. Sa and Feng would continue researching into test cases. David and Wan would carry on filling the missing pieces in the documentation as well as finishing off the documentation for Sprint 2. Besides, customer was satisfied by our presented ideas and current game version. Therefore, we are progressing on the right track.

3.5 Product contents

3.5.1 Backlog Prioritization

The backlog we currently had kept growing. We needed to focus in and decide which were the most important to face. The figure below shows how we placed our user stories (post its) on a board according to impact/desirability and cost (in this case, time and effort). Using a colored tag, we picked out our tasks, which mainly consisted of high impact items.

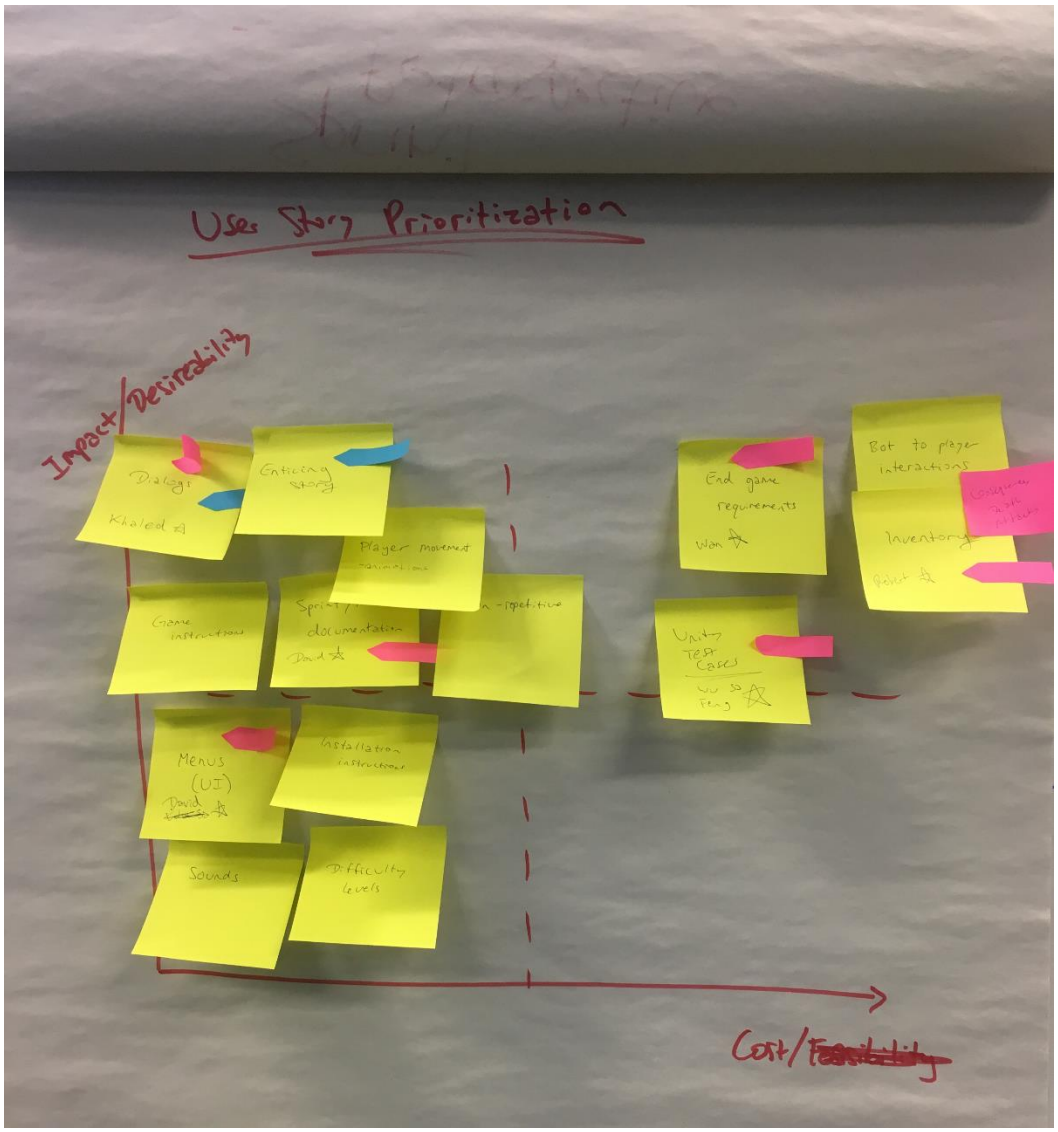


Figure 2. Image of backlog prioritisation process.

3.5.2 Use cases

Use Case Name: Catch ghosts	ID: UC-4	Importance Level: High
Primary Actor: Player	User Stories: US-6	
Stakeholders and Interest: Player – Needs to catch ghosts to eventually sort as this is the goal of the game		
Brief Description: This use case describes how the player captures ghosts		
Trigger: Player gets in range of the ghost and presses space bar to capture.		
Normal Flow of Events: 1. Player gets in range of the ghost outside of its line of sight 2. Player presses spacebar to capture ghost 3. Ghost is put into the player's inventory.		

Table.9 Use Case 4

Use Case Name: Sort ghosts	ID: UC-5	Importance Level: High
Primary Actor: NPCs	User Stories: US-6	
Stakeholders and Interest: Player – needs to sort ghosts into good or bad based on the dialogue.		
Brief Description: This use case describes how the player at the end of the map can sort ghosts into the right box (either good or bad based on what the ghost had said in its dialogue)		
Trigger: Player reaches end room and presses E on the good or bad box.		
Normal Flow of Events: 1. Player reaches end room after collecting ghosts. 2. Player remembers the dialogue and fate (good or bad) of the ghost 3. Based on what was said in the dialogue, the player will place good ghosts into the good box by pressing E next to the box 4. If the ghost was bad, then the same is repeated by the bad box.		
Alternate Flow: 1. If the incorrect box was selected, the player will lose the game and be sent to the game over screen.		

Table 10. Use Case 5

Use Case Name: Produce ghost dialogues	ID: 6	Importance Level: High
Primary Actor: NPCs	User Stories: US-6	
Stakeholders and Interest: Player – needs to read ghost dialogues to determine good or bad		
Brief Description: This use case describes how ghosts produce their dialogues		
Trigger: Ghost is in view of the player's screen		
Normal Flow of Events: 1. Player sees ghost in screen 2. Ghost will patrol and read out one of three sentences. This will take 3 seconds and be readat certain checkpoints in the room 3. Dialogue is placed into dialogue box for player to read. 4. Ghost dialogues will determine if the ghost is good or bad.		
Alternate Flow: 1. If the incorrect box was selected, the player will lose the game and be sent to the game over screen.		

Table.11 Use Case 6

Use Case Name: Character death	ID: UC-7	Importance Level: High
Primary Actor: Player	User Stories: US-6, US-14	
Stakeholders and Interest: Player – needs a condition to lose, in this case the player will die in certain events which will cause the player to lose.		
Brief Description: This use case describes how the players character can die.		
Trigger: Player is caught by a ghost or incorrectly sorts ghosts		
Normal Flow of Events: 1. Player moves character in the field of vision of the ghost 2. The player will die and the game over screen will pop up. 3. Player can restart or quit to main menu.		
Alternate Flow: 1. Player puts a good ghost into the bad box, or bad ghost into good box. 2. The player will die and the game over screen will pop up. 3. Player can restart or quit to main menu.		

Table.12 Use Case 7

Sprint 3 (14/11/2019 to 20/11/2019)

4.1 Overview

In Sprint 3, we aimed to add more features to the game and catch up on documentation. We made some good progress in the end. More new features were added to the game and documentation was gradually getting up to date. Besides, we produced four product contents [4.6] including Customer meeting summary and analysis [4.6.1], User Stories version 3 [4.6.2], and Software Test Plan [4.6.3].

4.2 Sprint 3 Backlog

This sprint we identified 14 tasks to be completed. The following tasks were unfinished from prior sprints and assigned for Sprint 3:

- PB-17 – Game feature – Ghost vision cone
- PB-21 – Catch up on documentation.

The following tasks were new tasks added to the product backlog:

- PB-22 – Game feature – Random ghost spawner
- PB-29 – Use cases

By the end of Sprint 3, we were able complete all tasks except the following:

- PB-19 – Writing ghost stories with dialogues

Sprint 3 Sprint Backlog					
PB ID	SP ID	Task	Linked User Story	Date created or Sprint no.	Assignee
PB-17	SP3-1	Game feature - sorting ghost order	US-1 & US-6	06/11/19	Robert
PB-18	SP3-2	Game feature - ghost vision cone	US-1 & US-6	06/11/19	Robert
PB-19	SP3-3	Writing ghost stories with dialogues	US-2 & US-4 & US-5	06/11/19	Khaled

PB-20	SP3-4	Test Cases	-	06/11/19	Sa, Feng
PB-21	SP3-5	Catch up on Documentation	-	06/11/19	David, Wan
PB-22	SP3-6	Game feature - Random ghost Spawner	US-1 & US-6	13/11/19	Robert
PB-23	SP3-7	Add project to Github	-	13/11/19	Robert
PB-24	SP3-8	Implement diaglogues into game	US-1, US-2, US-4, US-5, US-6	13/11/19	Robert
-	SP3-9	Customer meeting	-	13/11/19	Everyone
-	SP3-10	Customer meeting analysis	-	13/11/19	Everyone
-	SP3-11	Sprint 3 Review	-	13/11/19	Everyone
-	SP3-12	Sprint 4 Planning	-	13/11/19	Everyone

Table 13 Sprint 3 Sprint Backlog

4.3 Meeting Minutes

4.3.1 Meeting 9 (19/11/2019)

Attendance: All; Duration: 1.5 hours

1. **More game features**: Robert presented more new game features. The enemy ghost is equipped with a triangular vision range. This is designed to kill the character if the character falls into the range. Robert explored the feature - ghost sorting, which would be used in the winning game condition. He also managed to create Random Ghost Spawner and successfully added some dialogues into the game. Lastly, he added the game project to Github for easier version control as advised by lab tutors.

2. **Ghost stories**: Khaled presented 4 more ghost stories with dialogues. The team was happy about the stories.

3. **Customer Meeting 20/11 planning**: We made a list of things to go through with customer in the Customer Meeting on 20/11. We would present the current version of the game and get some feedback from customer and to see if the customer would like us to add more features. In addition, we would ask about the requirement for designing Game Installation procedure and writing Installation Guide and writing User Manual, which were mentioned in the coursework 2 specification.

4. **Next Steps**: In the next meeting, we will be summarising and analysing the customer meeting. Besides, we will carry out Sprint 3 review and planning for the next Sprint.

4.3.2 Meeting 10 (20/11/2019)

Attendance: all; Duration: 2 hours In this meeting, we summarised and analysed the customer meeting on 20/11/2019. We also updated our User Stories table. We ended Sprint 3 with Sprint 3 Reivew and Sprint 4 Planning. Post customer meeting meeting and Sprint 4 planning After having customer meeting with customer Dr Julian Padget on 20/11/2019 (please see section 4.5.2 for more information), we had Meeting 10 to discuss the following things.

1. **Customer meeting analysis**: After having a Customer meeting on 20/11/2019, we carried out summary and analysis on that meeting [4.6.1]. After getting feedback from the customer, we decided to update our User Stories in order to target the customer's desired game features and other requirements.

2. **Updating User Stories**: We created User Stories version 3 [4.6.2]. Discussion on new User stories is also included in that section.

3. **Sprint 4 Planning**: To prepare for the next Sprint (Sprint 4), we reprioritised the Product Backlog and created Sprint 4 Product Backlog [5.2]. All completed tasks were placed at the bottom of Sprint 4 Product Backlog while unfinished task (PB-19) remained on the top. New tasks include PB-25 to PB-35 which include adding new game features (PB-25 to PB-27, PB-30 to PB032), writing User Cases (PB-29), implementing Test Cases (PB-33) and producing guide and manual of installation and playing the game (PB-34 and PB-35). We prioritised the tasks and decided to commit tasks PB19 and PB-25 to PB-33 in Sprint 4, hence these tasks formed the Sprint 4 Sprint Backlog [4.2]. Besides, usual Sprint activities (Sprint 5 Planning and Sprint 4 Review) and documentation for Sprint 3 and 4 were added to Sprint 4 Sprint Backlog.

4. **Sprint 3 Review and Retrospective**: We reviewed our progress on tasks in the Sprint 3 Sprint Backlog and carried out a Retrospective on Sprint 3. [4.6.6] Completed tasks: game programming, more ghost stories written, completed test planning (reference the 2017 template).

5. **Next Step**: Sprint 3 ended and we aimed to finish all tasks in Sprint 4 Sprint Backlog in Sprint 4.

4.4 Sprint 3 Review and Retrospective

Progress of Sprint 3 was reviewed and good progress was made. Robert completed all tasks SP3-1 and SP3-2 and SP3-6 to SP3-8 which involved adding new game features and adding the game project to Github. Khaled made 4 more sets of ghost stories, so he made progress towards completion of task SP3-3, we planned to have 4 more stories for completion. Sa and Feng finished their research into test cases (SP3-4) and created a Software Test Plan [4.6.3]. Hence SP3-3 would be marked as completed, and a new Product Backlog task would be created. David and Wan made progress on documentation (SP3-5), documentations before Sprint 3 were completed. The usual Sprint activities were also completed (SP3-9 to SP3-12). The only unfinished task was SP3-3 (ghost story writing) which would be added to Sprint 4 Sprint Backlog to be completed.

For retrospective, we analysed our performance in Sprint 3. There are 4 boxes, smile face means what we did well, sad face means what we did not do well, graduation hat face means what we learnt, and question mark face means what we need to learn. Overall, we thought we worked more efficiently as a team and individually, but we still need to work quicker on documentation, and uses Github properly for version control. We learnt a few things including MVC and the correct way for documentation and test cases. We identified that we still needed to learn more about Github and Activity (UML) diagrams.

4.5 Exception Handling

Concerns about slow Documentation progress

The customer emphasised that our documentation needs to be up to date. The fact that most of us had at least 2 deadlines between 11/11/2019 to 13/11/2019 (in Sprint 2), was a factor causing the slowing down in documentation process. Wan and David will be spending more time collaborating and work on the documentations in order to catch up on the progress.

4.6 Product Content

4.6.1 Customer Meeting (20/11/2019) Summary and Analysis

Here we summarise and analyse the discussion we had with customer Dr Julian Padget on 20/11/2019.

1. **What is the customer's requirement on game manual? How detailed description is needed?**
   The customer expressed that Game Manual and Installation instruction have to be detailed and easy to understand, so that user can follow them without problems. Customer also mentioned that the installation of the game should not require addition installation of another software. Therefore, we should not assume that user has an prerequisite technical understanding and the instructions that we produce should be crystal clear so that user could follow them step by step. Besides, our game would only require one software installation. These requirement on Game Manual and Game Installation would become 2 new User Stories.

2. **Customer asks about our progress on documentation** We informed customer that we had been catching up the documentation. We were in Sprint 3 and we were working on documentations for Sprint 2 and Sprint 3 which would be completed by next week meeting (26/11/2019). In addition, we will be up to date and completing Sprint 4 by the end of Sprint 4. We hadn't been writing CRC cards and wanted to clarify how the MVC framework would work. We wrote up a few cards and asked if this was correct (it was).

3. **Presentation of current status of our game**

   Robert presented the current status of our game with new features. The new feature was that ghosts were acquired with vision range. Another feature was that the main character could get behind the and capture the ghost, then keep the ghost in the inventory. Customer was impressed by the new feature and also Robert's effort to refactor the code continuously during the game programming process.

4. **Suggested new features from customer**

   After seeing our newest version of the game, customer suggested us to add more bonus objects / features into game if we have spare time, for example creating an underground tunnels at a graveyard that player can enter and exit in another place. This suggested new game feature would become a new User Stories.

5. **Next Features to add in next sprint**

   Customer was asking what we would be adding to the game in the next sprint (Sprint 4). We informed him that we would be adding an ”end game situation” and ”randomisation of rooms”. Again customer was satisfied on our progress towards completion of the game.

   Overall, customer seems happy with our game making progress. In addition, he suggested some addition features that we can add when we have spare time. He showed concerns on our progress of documentations. We assured him that we will be able to catch up the progress by next meeting (27/11/2019).

4.6.2 User Stories Version 3

As customer suggested new desired features and requirements in Customer meeting on 20/11/2019, hence we updated our User Stories. User Stories US-1 to US-7 remained the same from User Stories version 2 [2.6.2]. New User Stories US-8 to to US-14 were created. US-8 and US-9 are compulsory requirement regarding to Game Installation and Game Manual from the customer. US-11 is an optional game feature to be added if we have spare time. We created US-10 as we think interesting background music could make the game playing experience more exciting. We also created US-11 to US-13 which involves adding Start game menu, Pause game menu and End game menu, which allow player to decide what to do outside gameplay (e.g. pause game).

User Stories Version 3		
ID	Created on	User Stories
US-1	10/30/2019	As a player, I want to interact with bots so that I can play against something.
US-2	10/30/2019	As a player, I want an enticing story so I can stay interested in the game.
US-3	10/30/2019	As a player, I want a top view game so that I can see the layout of the dungeon.
US-3.5	10/30/2019	As a player, I want a game with retro aesthetic style, so it reminds me of my childhood memory. Also, it is easier to

		make, and we can focus on other aspects
US-4	10/30/2019	As a player, I want every playthrough to be different so that I do not get bored playing a repetitive game.
US-5	11/6/2019	As a player, I want to know the character's motive so that I know the goal of the game.
US-6	11/6/2019	As a player, I want to have more challenging interactions, so the game is not too easy and all guesswork.
US-7	11/6/2019	As a player, I want to have varying difficulty levels in the game, so that I can adjust the game difficulty.
US-8	11/20/2019	As a player, I want clear step by step instructions on how to play the game
US-9	11/20/2019	As a player, I want to have an installation manual, so I know how to install the game, and I want to install one software only in order to play the game.
US-10	11/20/2019	As a player, I want to have some music to enrich gaming experience.
US-11	11/27/2019	As a player, I want to have tunnels that bring the player from graveyard to another place, like a teleport portal (only if time allows), to make the gameplay more fun.
US-12	11/27/2019	As a player, I want to pause and exit the game during gameplay.
US-13	11/27/2019	As a player, I want to have a Start Menu so I can decide to play or exit the game.

US-14	11/27/2019	As a player, I want to have a Death Menu so I can decide to restart or exit the game.

Table 14: User stories version 3

4.6.3 Software Test Plan

At this point we had not done too much testing. We did the research on how to carry out testing and came up with this plan. Ideally it would've have been good to be testing from day 1 however we learned and improved through sprints.

1. Plan

   (a) Test period: 11/25 - 12/12

   (b) Test purpose: Because this Coursework needs to develop dungeon game, our group has carried out a lot of discussion and design, and finally determined the version. The basic functions of players, robots, and NPCs are implemented in the game, and some special skills are given to different characters.

   (c) Test environment: PC —— Windows/Mac

   (d) Test documentation: Follow the test record table. Strictly follow the test case number and priority, and submit the BUG

   (e) Test document storage: upload Team or Google DOC

   (f) BUG management method: After the tester submits the test report, the developer and other personnel should promptly repair the problems or bugs in the test. After the completion, the BUG repair should be promptly reported.

2. Design

   (a) The game test is mainly divided into three parts: one is the test plan of the game program itself, such as the task system, chat, map, etc. The function test plan realized by the program, and the second is the game playability test plan, such as the economic balance standard. Whether it meets the requirements, each martial art skill balance test parameters and methods, game style testing, and the third is about performance testing plans, such as client requirements, network version of the server performance requirements.

      i. Game test

         A. Player character
         B. NPC role
         C. Ghost character
         D. menu
         E. User role F. Game loop
         G. Game over
         H. Game exit

      ii. Game playability test

         A. Game style test
         B. In-game character skills test

C. Is the whole logic of the game reasonable? Game loop / game end / re-enter the game scene

D. Test under network status iii. Game performance test

A. Game hardware consumption

B. When the game is played on the PC side, is there a stuck phenomenon?

C. Consider the different reactions of the game and the various problems that arise under different network conditions.

(b) The parts related to the game test are mainly divided into: unit test, integration test, system test, acceptance test.

i. Unit test

A. Test object: the smallest code module after encoding or encoding

B. Test method: white box test

C. Main test content: module interface test, local data structure test, path test, boundary test, etc. ii. Integration Testing

A. Test phase: after the unit test is over B. Test object: interface between

modules

C. Test method: mainly based on white box test, sometimes it may also use black box test

D. Test content: data transmission between modules, whether there is a function conflict between modules, whether the module is correct after assembly, whether the module has defects for the system

(c) System test (regression test + smoke test)

i. Test object: the entire system (software + hardware)

ii. Test method: black box test

iii. Test content: interface, functionality, reliability, availability, performance, compatibility, and security

(d) Acceptance Test

i. Test object: the entire system (including hardware)

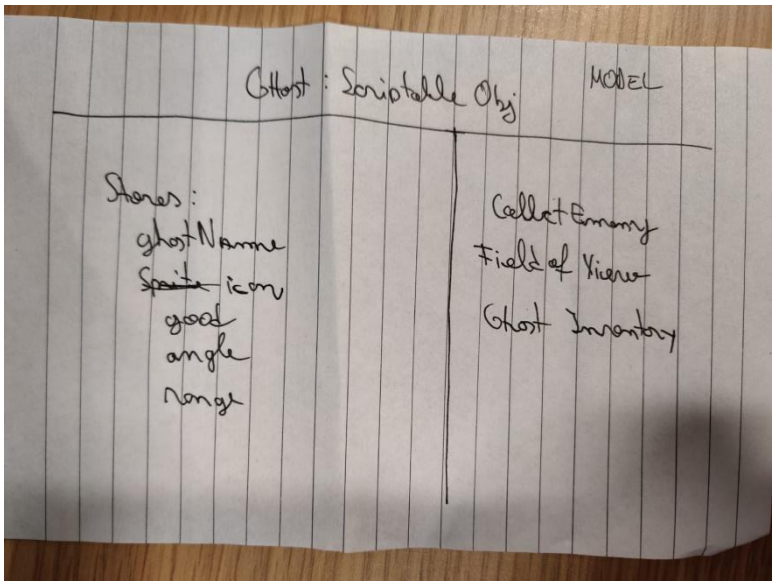
ii. Test method: black box test

iii. Test content: interface, functionality, reliability, availability, performance, compatibility, and security

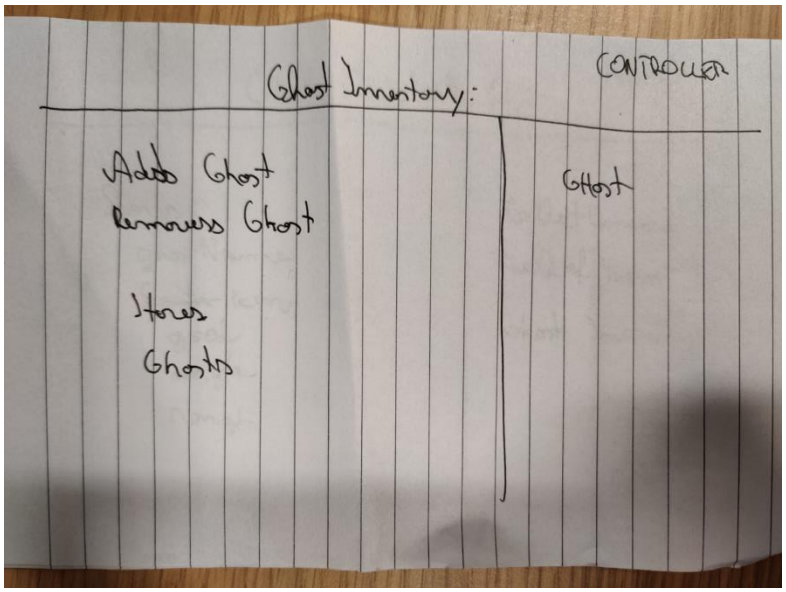
4.6.4 CRC Cards

We hadn't been up to date with the CRC cards with Model Viewer Controller so this sprint we presented one to the professor and got the approval.

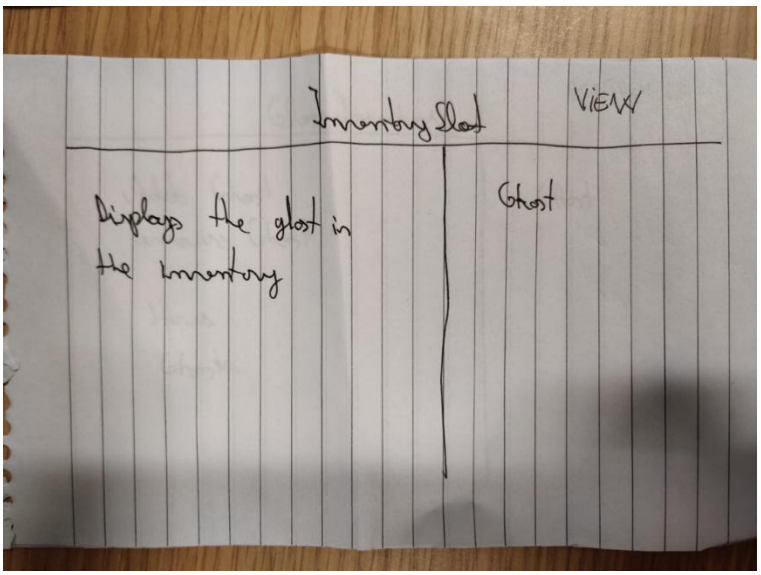
CRC Card 1: Ghost – Scriptable Object [UC-4, UC-5, UC-6]



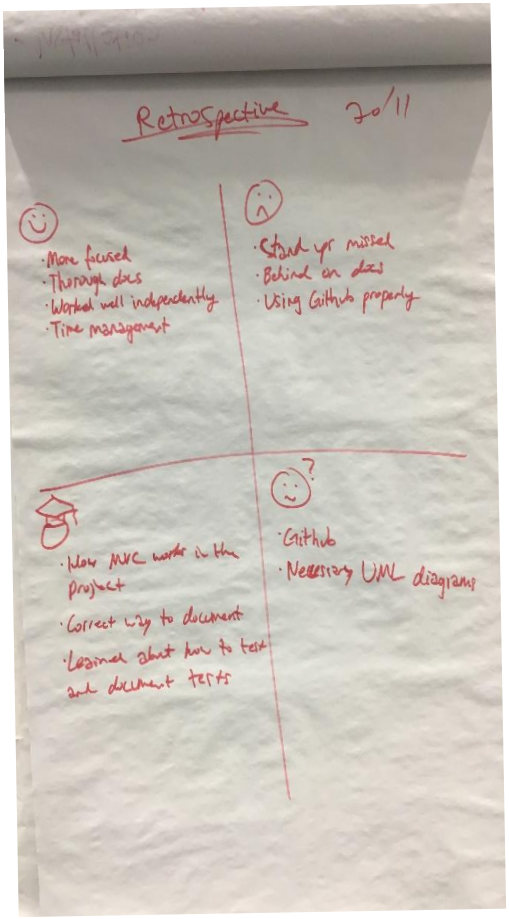
CRC Card 2: Ghost Inventory [UC-4]



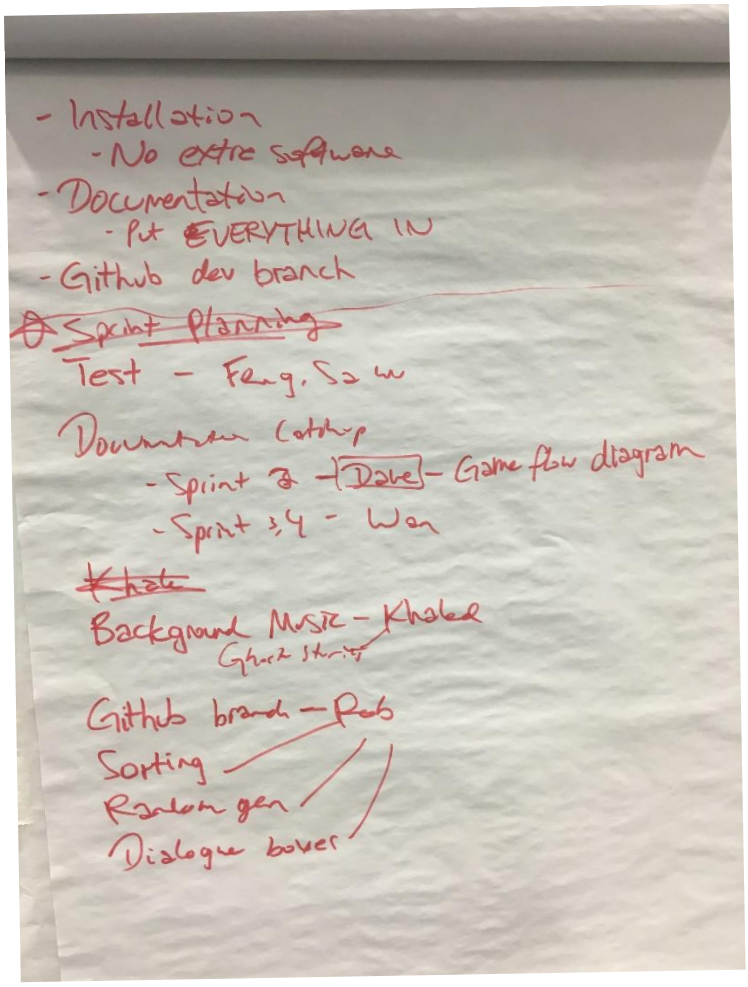
CRC Card 3: Inventory [UC-4]



4.6.5 Sprint Retrospective



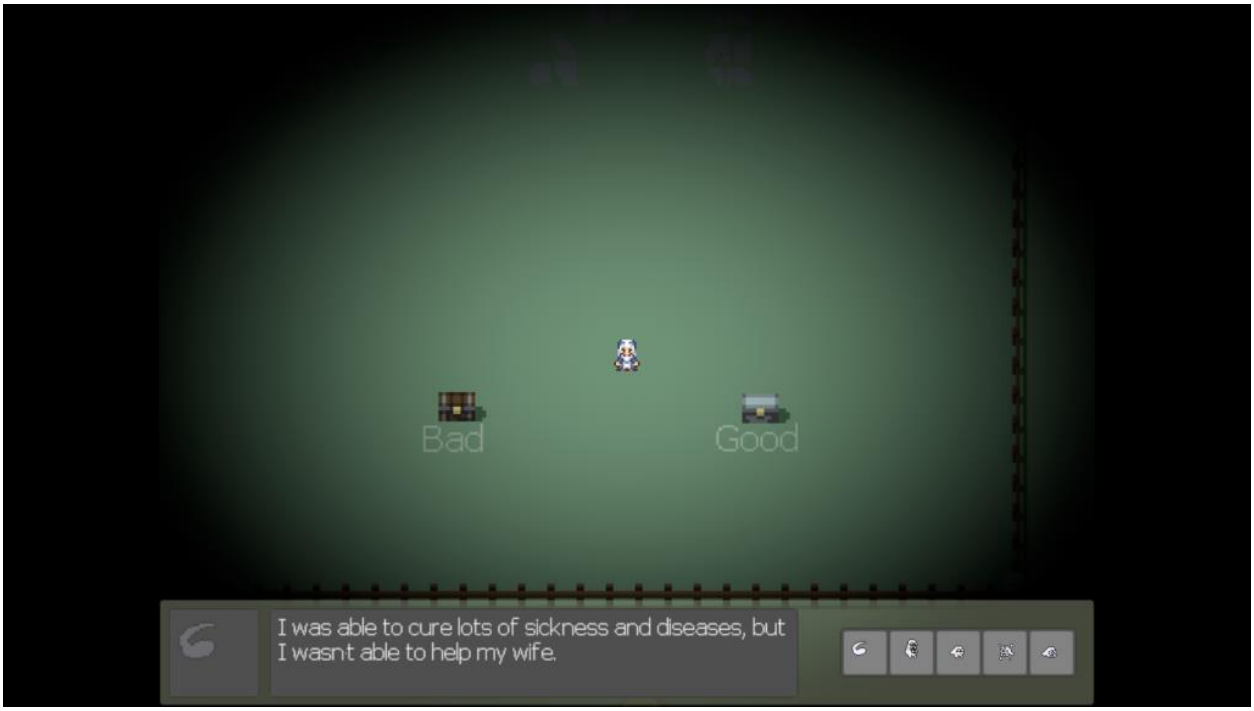
4.6.6 Sprint Planning Board



4.6.7 User Interface

Screenshot showing ghost field of vision, dialogue, inventory and map [UC-2 UC-3, UC-4, UC-6]

Screenshot showing the boxes for sorting ghosts [UC-5]



Sprint 4 (21/11/2019 to 27/11/2019)

5.1 Overview

In Sprint 4, apart from adding more game features, we aimed to implement the first Test case and produce more product content. We produced a new version of User Stories, Test Cases version 1 (see section 5.5.3) and activity diagram (see section). We made good progress as all tasks in Sprint 4 Sprint backlog (see section below) were completed. Unfortunately, we were not able to present our game and ask for feedback from customer, as the customer was unavailable.

5.2 Sprint Backlog

Changes made from last Sprint Product Backlog was discussed sprint 4 planning [section 4.4]. Task SP4-1 was unfinished task from Sprint 3 and SP42 to SP4-10 were new tasks. Robert would tackle tasks PB4-2 to SP4-2, SP4-7 to SP4-8, continue adding more game features. In addition, Khaled would find background music (SP4-9) and Robert would add that music into the game. Khaled would also write 4 more ghost stories to complete SP4-1. Khaled and David would work on Activity Diagrams (SP4-5). After producing Software Test Plan, Sa and Feng would add acceptance tests to our current version of User Stories (SP4-10). In addition, they would create and implement Test Cases version 1 to our current game version. Wan would finish Sprint 3 and Sprint 4 documentation (SP4-11 and SP4-12), bringing the documentation up to date. Lastly, the whole team would carry out the usual Sprint Activities (SP4-13 and SP4-14).

Sprint 4 Sprint Backlog					
PB ID	SP ID	Task	Linked User Story	Date created or Sprint no.	Assignee
PB-19	SP4-1	Writing ghost stories with dialogues	US-2 & US-4 & US-5	06/11/19	Khaled
PB-25	SP4-2	Complete Minimum viable product	-	13/11/19	Robert
PB-26	SP4-3	Game feature – End game(death)	US-6	13/11/19	Robert
PB-27	SP4-4	Game feature – Start and Pause menu	US-12, US-13	13/11/19	Robert

PB-28	SP4-5	Activity Diagram	-	13/11/19	David, Khaled
PB-29	SP4-6	Finalize Use Cases	-	13/11/19	David
PB-30	SP4-7	Add randomized obstacles	US-4	20/11/19	Robert
PB-31	SP4-8	Implement more dialogues into game	US-1, US-2, US-4, US-5, US-6	20/11/19	Robert
PB-32	SP4-9	Find and add background music	US-10	20/11/19	Khaled, Robert
PB-33	SP4-10	Write and implement Test Cases version 1 and add acceptance tests to User Stories	All US	20/11/19	Sa, Feng
-	SP4-11	Sprint 3 documentation	-	20/11/19	Wan
-	SP4-12	Sprint 4 documentation	-	20/11/19	Wan
-	SP4-13	Sprint 4 review and retrospective	-	20/11/19	Everyone
-	SP4-14	Sprint 5 Planning	-	20/11/19	Everyone

Table 14: Sprint 4 Sprint Backlog

5.3 Meeting Minutes

5.3.1 Meeting 11 (26/11/2019)

Attendance: All; Duration: 1.5 hours

1. **Documentation formatting:** Wan and David were working on different part of the documentations. We discussed an agreed uniform formatting style to follow for the entire documentation. The whole team also discussed on the final format of the Product Backlog and Sprint Backlog.
2. **Game difficulty:** Robert has presented the newest version of the game which was excellent. The team has played on it and gave some suggestions. As the ghost dialogue disappeared too quickly before we can finish reading it while playing the game, we suggested that the ghost dialogues should be displayed for longer e.g. 3-5 seconds.
3. **Ghost stories**: Khaled presented the last 4 ghost stories and the team was happy about the interesting stories.

4. **Next Steps:** After the discussion, Robert will be adding and changing the game features according to the team's suggestion. Also Robert would be adding the new sets of ghost stories to the game. Sa and Feng will be finishing the testing design by tomorrow before the customer meeting. David and Wan would carry on catching up on the documentation. Khaled will carry on finding background music and refining his ghost stories.

5.3.2 Meeting 12 (27/11/2019)

Attendance: All; Duration: 1 hours

1. **New game features:** Robert presented the newest game version which had new features including randomised obstacle, more dialogues, end game condition. Everyone was happy with the music that Khaled found, and the music was added into the game. Now we had a minimum viable product ready to be shown to customer.
2. **Activity Diagram**: Activities diagram were presented by David and Khaled. The whole team discussed on this and finalized the diagrams [see section 5.5.4]
3. **Test Cases and User Stories**: Sa and Feng presented Test Cases version 1 [5.5.3]. and the results after implementation on the newest game version. Robert would be fixing the bug in the next Sprint. Besides, Sa and Feng added acceptance criteria to our User Stories, we now have the final version [5.5.1].
4. **CRC cards**: Robert made more CRC cards. This enabled us to meet the coursework requirement and also helped us to think about new game features.

5. **Sprint 4 review and retrospective:** Sprint review and retrospective were done in Sprint 4, please see section 5.4

6. S**print 5 planning:** In Sprint 5, we aimed to write more Test Cases and implement these tests to the game. Besides, we aimed to finish all the major documentation and product content including game manual, installation guide and maintenance guide. As all tasks in Sprint 4 Sprint backlog was completed, new tasks PB-36 to PB-41 were added the Sprint 5 Product Backlog see [section 5.2]. PB-36 to PB-41 alongside with the usual Sprint activities formed the Sprint 5 Product Backlog [section 6.2].

5.4 Sprint Review and Retrospective

We reviewed and reflected on the completed and uncompleted tasks in Sprint 4.

1. **What we achieved:**
    a. This was a productive Sprint as we have completed all tasks in Sprint 4 Sprint Backlog.
    b. We were making progress in Test Cases. It was good that our tester was discovering bugs in the current game version, so that the game code can be improved at an early stage. In addition, it ensured that the game features were fulfilling requirements specified in User Stories and Use Cases.
    c. Robert continuously adding more features to the game and minimum viable product was formed.
    d. More product content was produced including activity diagram, CRC cards and User Stories.
    e. We had reorganized some product contents including Use Cases and User Stories, ensuring they had correct enumeration in different versions. Besides, we started having a standard style to product content our documentation.

2. **What are the tasks yet to be completed**
    a. More work was needed to be done for Documentation; minor corrections were needed to be done in the documentation of previous Sprints. Some of the team member had been missing daily Stand-ups (online), which we needed to try harder and do daily Stand-ups and record our own progress.

3. **What we learnt**
    a. We learnt how to do Activity diagrams and create Unity user interfaces (e.g. game menus).

4. **What we need to find out**
    a. We needed to think about if the current Acceptance Criteria in User Stories were suitable for User Stories for designing Test Cases. In addition, we needed to refine the Use Cases descriptions.

5.5 Product Content

5.5.1 User Stories Final Version

Compared to the last version, this final version was added with acceptance criteria to each User Cases.

User Stories Final Version			
ID	Created on	User Stories	Acceptance Criteria
US-1	10/30/2019	As a player, I want to interact with bots so that I can play against something.	1. Players will die if they are detected by robots 2. If the player is not detected by the robot, the player can eavesdrop on the robot and catch it 3. Player can listen to bots' dialogue to know which one is good or bad.
US-2	10/30/2019	As a player, I want an enticing story so I can stay interested in the game.	Players can discover that each robot has its own story
US-3	10/30/2019	As a player, I want a top view game so that I can see the layout of the dungeon.	The perspective of the game is a bird 's-eye view, so players will know the layout of the map
US-3.5	10/30/2019	As a player, I want a game with retro aesthetic style, so it reminds me of my childhood memory. Also, it is easier to make and we can focus on other aspects	The game's art style is retro pixel style
US-4	10/30/2019	As a player, I want every playthrough to be different so that I do not get bored	Each game, map layout, the robot Settings will be random

		playing a repetitive game.	
US-5	11/6/2019	As a player, I want to know the character's motive so that I know the goal of the game.	At the beginning of the game there will be a background so that players understand the story
US-6	11/6/2019	As a player, I want to have more challenging interactions, so the game is not too easy and all guesswork.	Players will die if they are detected by robots2. Players will die if they can't distinguish robot between good or bad based on its dialogue"
US-7	11/6/2019	As a player, I want to have varying difficulty levels in the game, so that I can adjust the game difficulty.	The difficulty of the game can be adjusted in the menu, and the robot's vision, movement speed and reaction speed will be different according to the difficulty
US-8	11/20/2019	As a player, I want clear step by step instructions on how to play the game	In the game's start menu, there are tutorial levels that teach the player everything about the game
US-9	11/20/2019	As a player, I want to have an installation manual, so I know how to install the game, and I want to install one software only in order to play the game.	The game will have an installer. Just run the installer and the game will be installed
US-10	11/20/2019	As a player, I want to have some music to enrich gaming experience.	During play, the game will have background music

US-11	11/27/2019	As a player, I want to have tunnels that bring the player from graveyard to another place, like a teleport portal (only if time allows), to make the gameplay more fun.	Unfinished
US-12	11/27/2019	As a player, I want to pause and exit the game during gameplay.	Pressing “ESC” in the game will bring up the pause menu, in which the game will be paused and the player can go back to the main menu at any time”
US-13	11/27/2019	As a player, I want to have a Start Menu so I can decide to play or exit the game.	After running the game, it will enter the main menu of the game, in which the player can start the game and exit the game”
US-14	11/27/2019	As a player, I want to have a Death Menu so I can decide to restart or exit the game.	When the player dies, the game will pop up the death menu, allowing the player to restart the game or go back to the main menu”

Table 15. User Stories Version

5.5.2 Use cases

The following use cases are ones written this sprint. View all the use cases in the appendix.

Use Case Name: Pause game	ID: UC-8	Importance Level: High
Primary Actor: Player	User Stories: US-12	
Stakeholders and Interest: Player – Wants to pause the game during gameplay. Also provide option to quit.		
Brief Description: This use case describes a player can pause the game during game play.		
Trigger: Player presses pause button		
Normal Flow of Events: 1. Player presses P 2. Game pauses showing pause menu with resume and quit to main menu.		

Table 16: Use case 8

Use Case Name: Quit game	ID: UC-9	Importance Level: High
Primary Actor: Player	User Stories: US-13	
Stakeholders and Interest: Player – Player wants to stop playing the game.		
Brief Description: This use case describes how the player goes about quitting the game.		
Trigger: Player closes application or exits the game via game menus.		
Normal Flow of Events: 1. Player pauses game 2. Player quits to main menu		
Alternate Flow: 1. Player clicks exit game from main menu.		
Alternate/Exceptional Flows: 1. Player uses closes the game application using commands or from desktop.		

Table 17: Use case 9

Use Case Name: Play game music	ID: UC- 10	Importance Level: Medium
Primary Actor: Player	User Stories: US-10	
Stakeholders and Interest: Player – Player wants to background music.		
Brief Description: This use case describes how the player will enjoy background music		
Trigger: Player starts game		
Normal Flow of Events: 1. Player starts game 2. Music plays 3. If player dies, stop music		

Table 18: Use case 10

5.5.3 Tests

Test 1.1 24/11

Test Priority	High
Test Title	Player movement
Description	Test the player navigation using the keyboard arrow keys.
Use Case	UC-2
User Story	US-1

Executable 1.1.1 24/11Corresponding Test: 1.1(above)

	Test Steps	Test Data	Excepted Result	P(Pass)/F(Fail)
1	Press UP to move character north.	Input UP using arrow keys.	Character moves north.	P
2	Press DOWN to move character south.	Input DOWN using arrow keys.	Character moves south.	P
3	Press LIFT to move character west.	Input LIFT using arrow keys.	Character moves west.	P
4	Press RIGHT to move character east.	Input RIGHT using arrow keys.	Character moves east.	P

Test 1.2 24/11

Test Priority	High
Test Title	Ghost movement
Description	Test the ghost navigation.
Use Case	UC-4
User Story	US-1

Executable 1.2.1 24/11Corresponding Test: 1.2(above)

	Test Steps	Test Data	Excepted Result	P(Pass)/F(Fail)
1	Begin the game.	Load up the source code.	Ghost is visible in the room.	P

2	See ghost move around	Ghost hits obstacles or walls.	If ghost hit obstacles or walls, it can change its direction.	P

Test 1.3 24/11

Test Priority	High
Test Title	Ghost scanning
Description	Test the ghost scan player or obstacles.
Use Case	UC-4
User Story	US-1

Executable 1.3 24/11Corresponding Test: 1.3(above)

	Test Steps	Test Data	Excepted Result	P(Pass)/F(Fail)
1	Ghost scanning	Player enters the view of the ghost	Player dies and starts the game again	P
2	Obstacle blocks ghost view	Player stands behind an obstacle	Player will not be found by ghosts	P
3	Change of view	Observe the change of view of the ghost	When a ghost changes its route, its view changes with the route	P

Test 1.4 24/11

Test Priority	High
Test Title	Procedural generation test
Description	Verify that a new dungeon is created every time the game is run.
Use Case	UC-3
User Story	US-4 and US-6

Executable 1.4 24/11Corresponding Test: 1.4(above)

	Test Steps	Test Data	Excepted Result	P(Pass)/F(Fail)
1	Random room layout	Restart the game 20 times	Each time the game restarts, the layout of obstacles in the ghost room will be randomly distributed	P
2	Random ghosts	Restart the game 20 times	Ghosts in the room are randomly assigned each time a new game is played	P

Test 1.5 24/11

Test Priority	High
Test Title	Room generation test
Description	Verify that a room include with walls, some obstacles.
Use Case	UC-3
User Story	US-4 and US-6

Executable 1.5 24/11Corresponding Test: 1.5(above)

1	Begin the test.	Run the source code.	A collection of rooms is generated.	P
2	Begin the test.	Run the source code.	Rooms have 4 walls.	P
3	Begin the test.	Run the source code.	Rooms have at least one exit.	P
4	Begin the test.	Run the source code.	Rooms are interconnect ed.	P
5	Begin the test.	Run the source code.	A collection of obstacles is generated.	P
6	Begin the test.	Run the source code.	A ghost is generated.	P

Test 1.6 24/11

Test Priority	High
Test Title	Ghost capture test
Description	Verify that the player can catch the ghost
Use Case	UC-4

User Story	US-1

Executable 1.6 24/11Corresponding Test: 1.6(above)

	Test Steps	Test Data	Excepted Result	P(Pass)/F(Fail)
1	Catch ghosts beside the body and out of sight	Press space when approaching ghosts outside of their view	Ghosts disappear and captured ghosts appear in inventory	P
2	Catch a ghost in contact with the body of a ghost	Presses space when the player contacts the ghost's body outside of the ghost's view	Player dies and starts the game again	P

Test 1.7 24/11

Test Priority	High
Test Title	Ghost Box test
Description	Verify that the captured ghost can properly place in the corresponding box
Use Case	UC-5
User Story	US-1

Executable 1.7 24/11Corresponding Test: 1.7 (above)

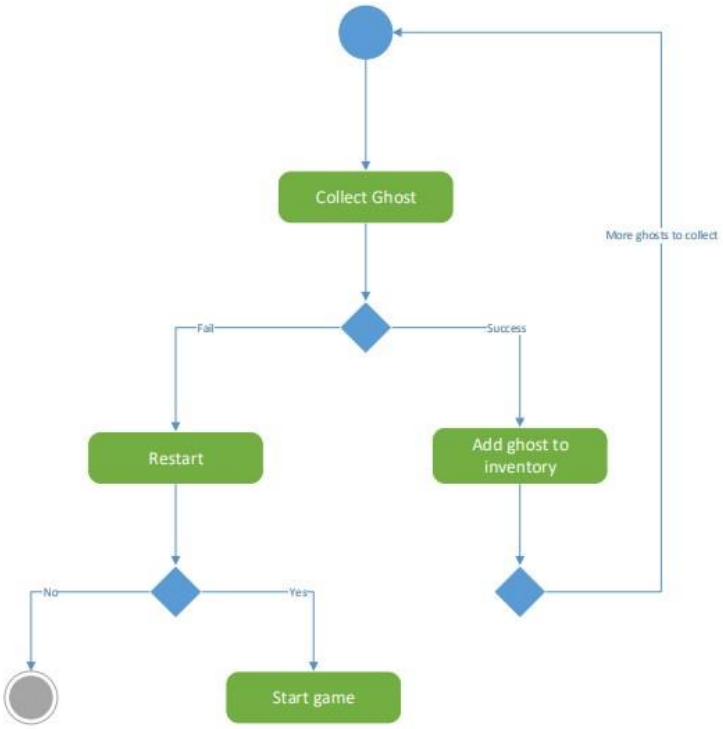
1	Put the good ghost in the good box	When carrying only good ghosts, press "e" in front of good box	The ghost in the inventory disappears and the game continues	P

2	Put the good ghost in the bad box	When carrying only good ghosts, press "e" in front of bad box	Player dies and starts the game again	p
3	Put the bad ghost in the good box	When carrying only bad ghosts, press "e" in front of good box	Player dies and starts the game again	F
4	Put the bad ghost in the bad box	When carrying only bad ghosts, press "e" in front of bad box	The ghost in the inventory disappears and the game continues	F

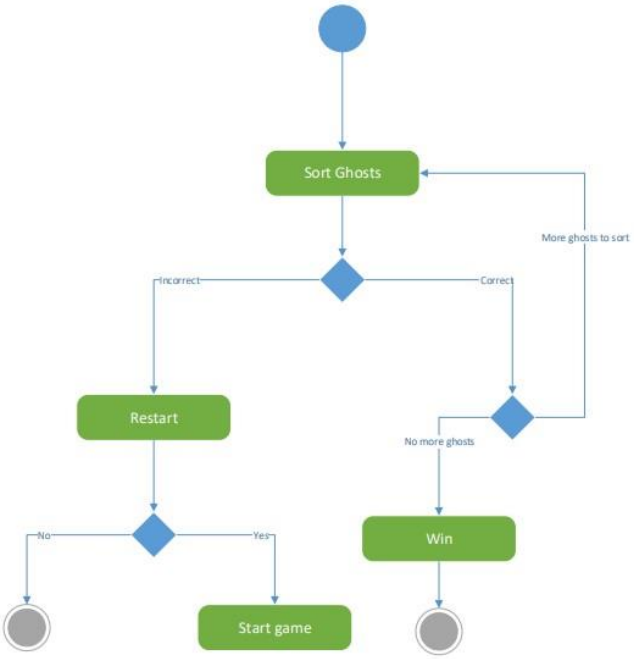
5.5.4 Gameflow Diagram

Activity Diagram 1: Overall Game Flow Diagram

Activity Diagram 2: Collect Ghosts

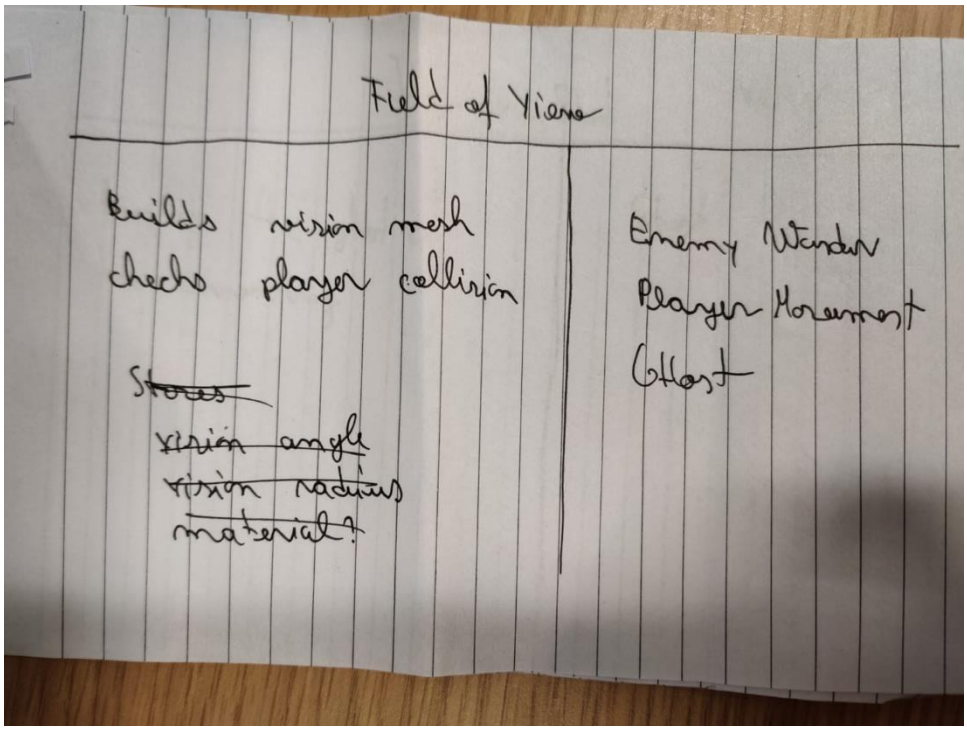


Activity Diagram 3: Sort Ghosts

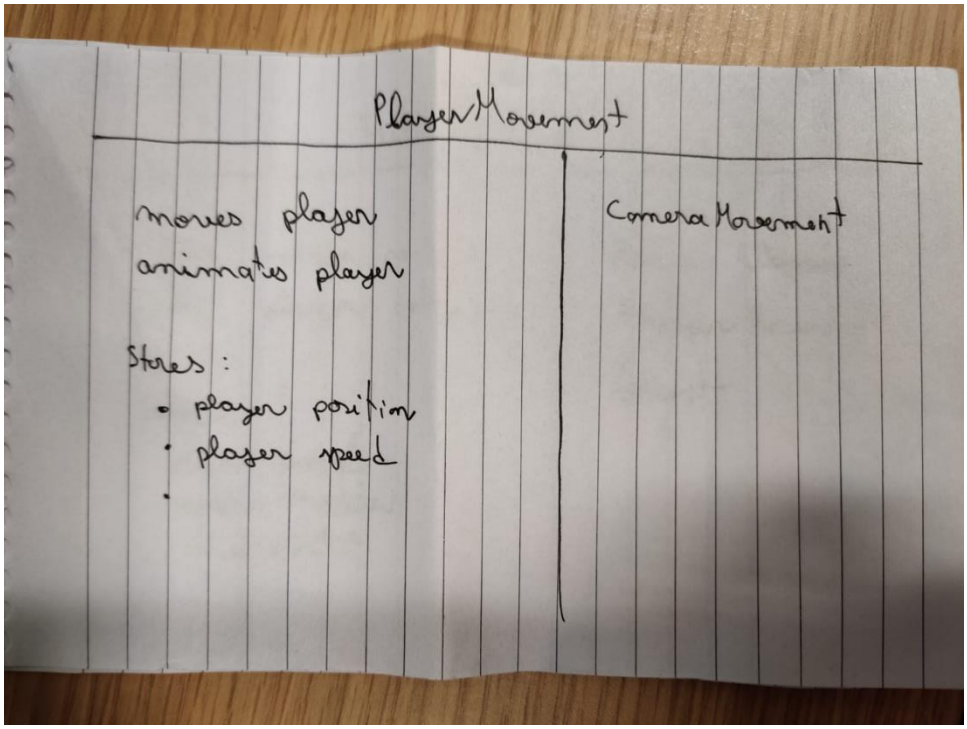


5.5.5 CRC Cards

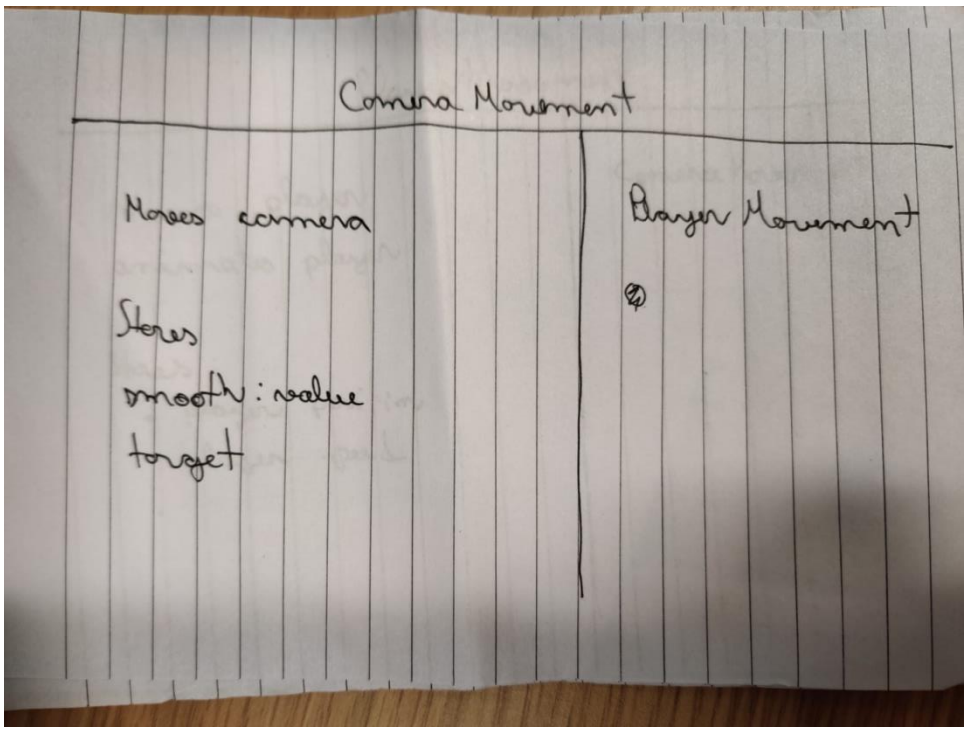
CRC Card 4: Field of Vision [UC-7]



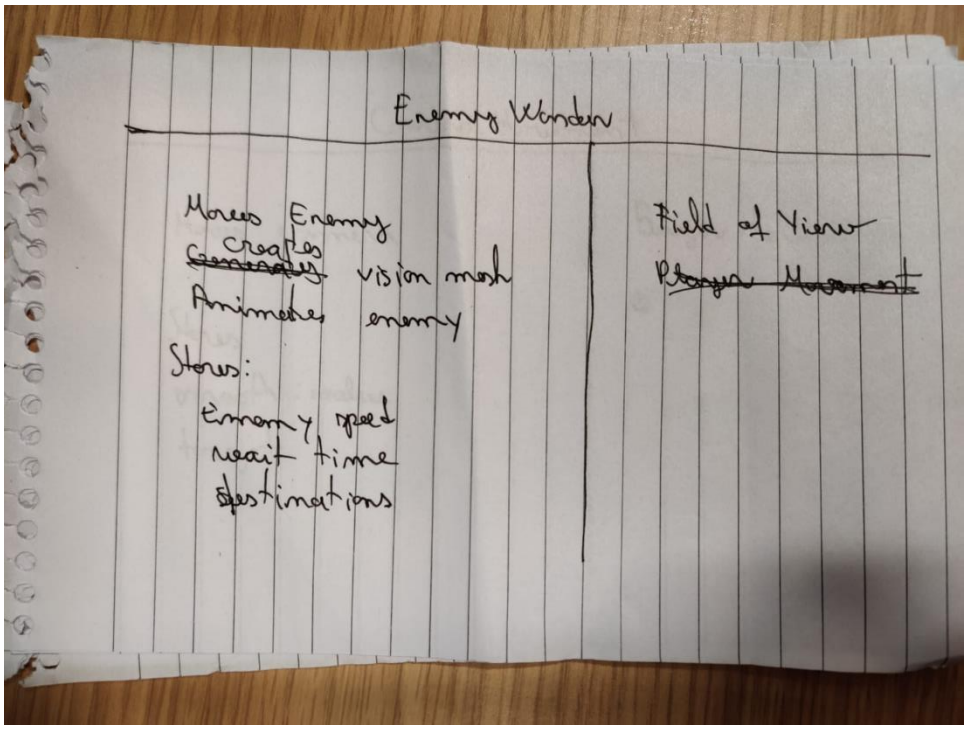
CRC Card 5: Player Movement [UC-2]



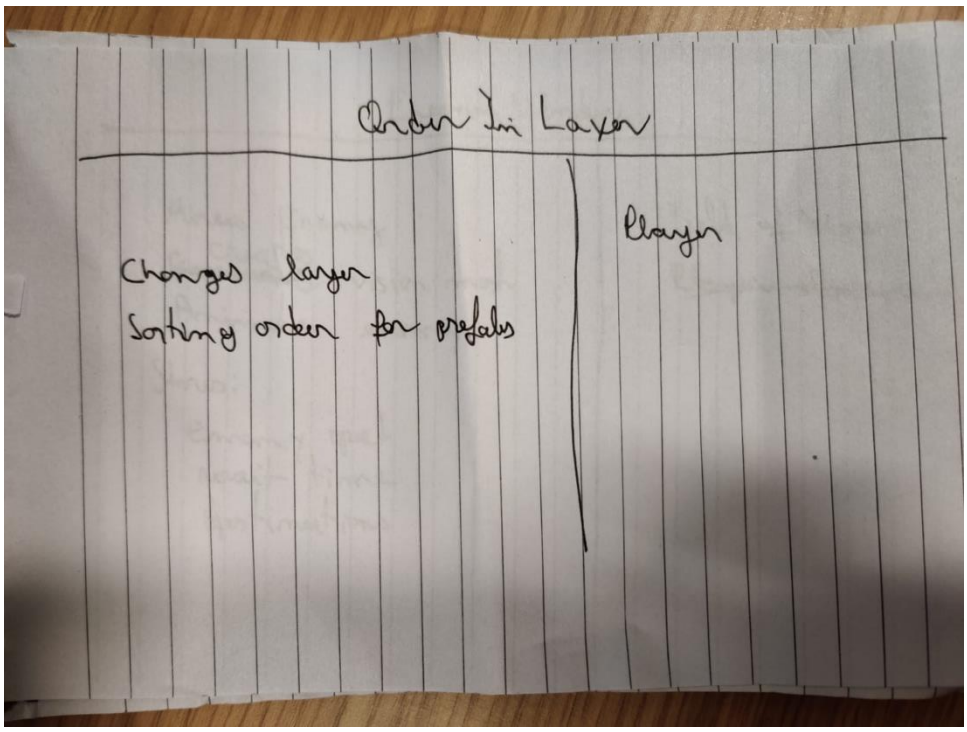
CRC Card 6: Camera Movement [US-3]



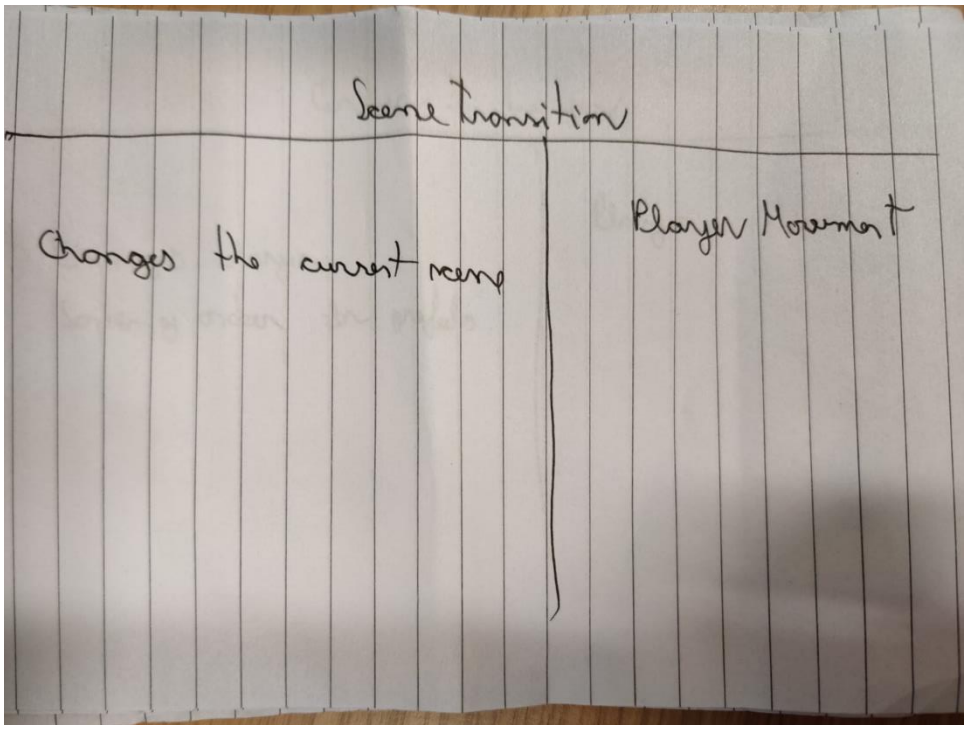
CRC Card 7: Enemy Wander [UC-3, UC-7]



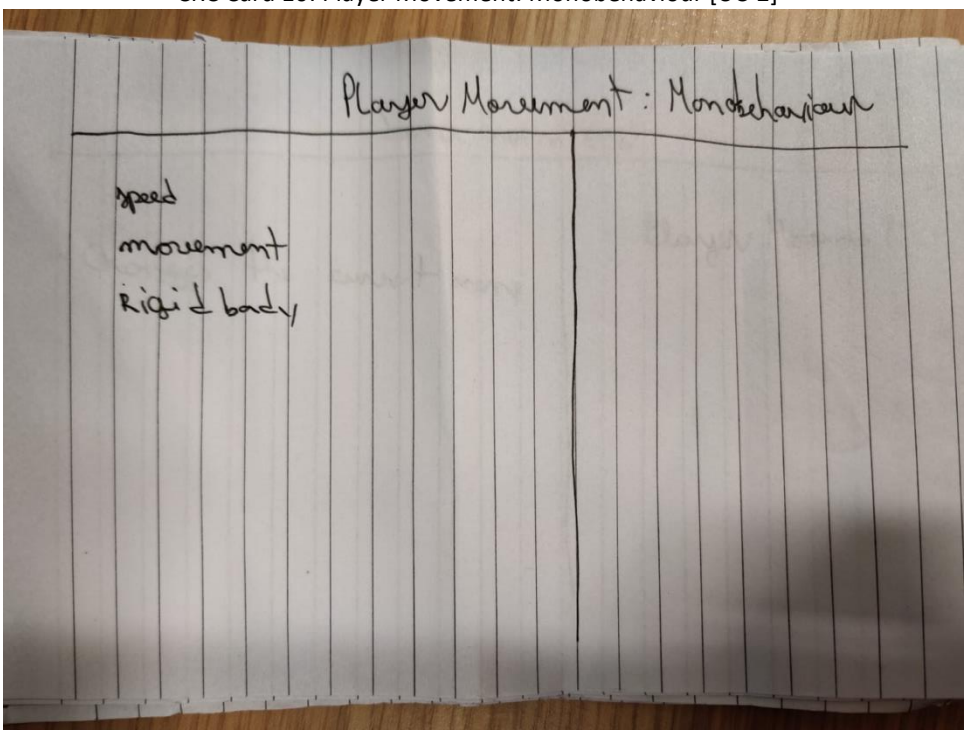
CRC Card 8: Order in layer [UC-2]



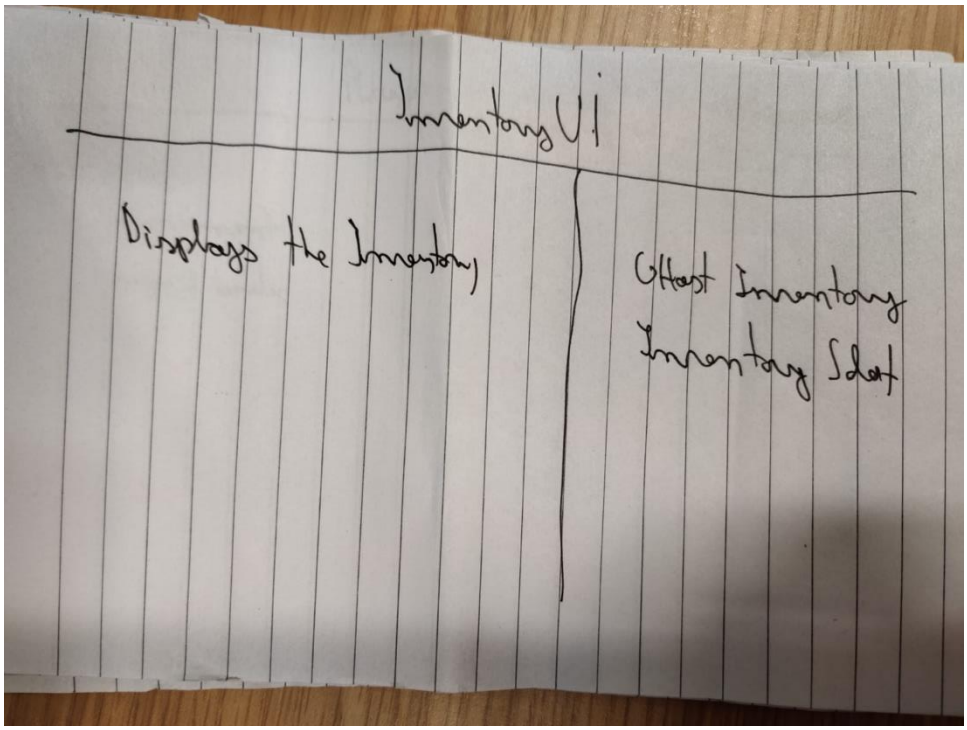
CRC Card 9: Scene Transition [UC-2]



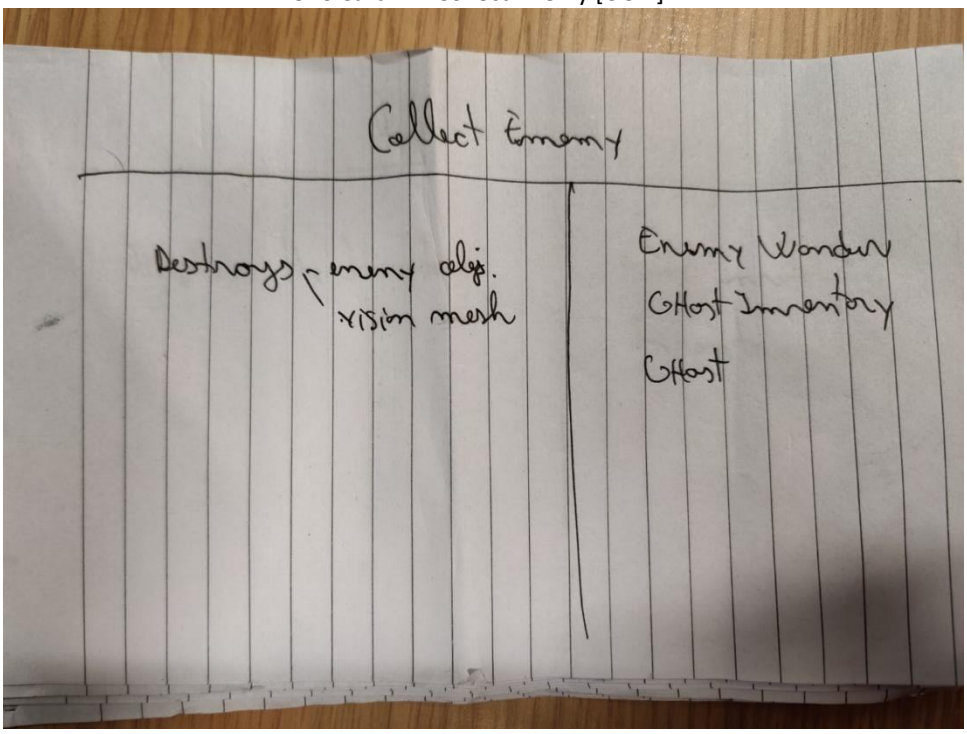
CRC Card 10: Player Movement: Monobehaviour [UC-2]



CRC Card 11: Inventory UI [UC-4, UC-5]

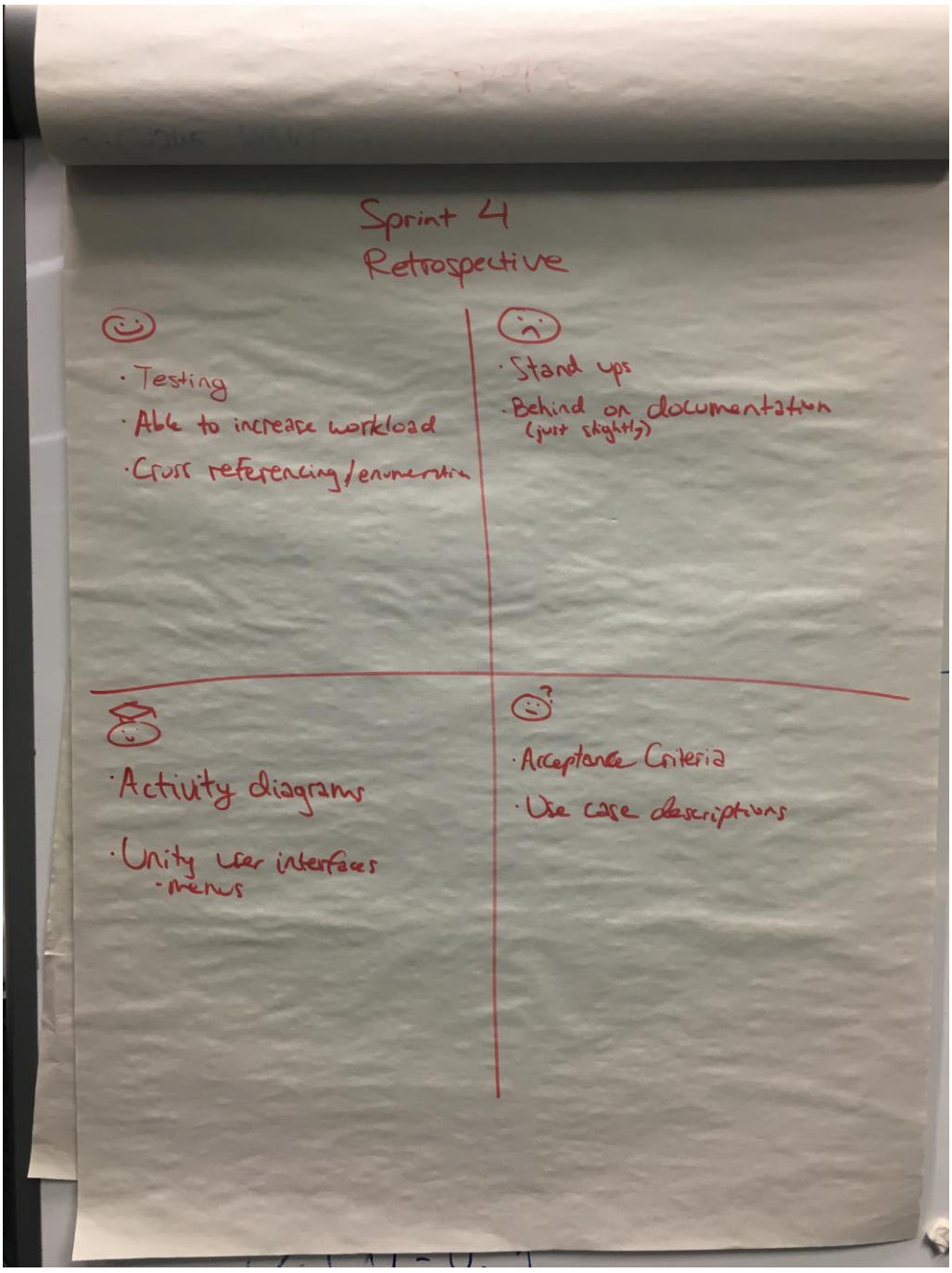


CRC Card 12: Collect Enemy [UC-4]



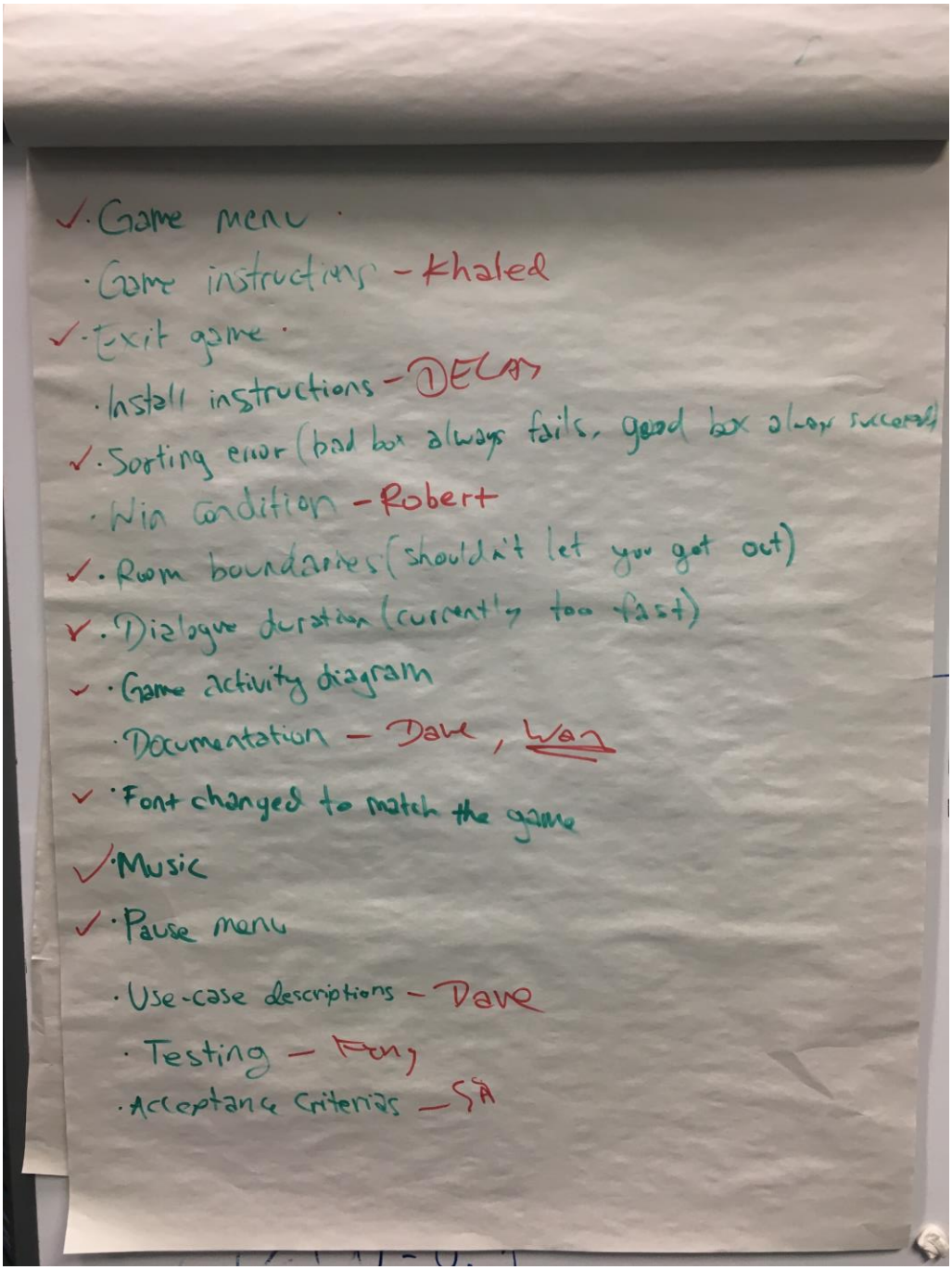
5.5.6 Sprint Retrospective

Sprint 4 Retrospective



5.5.7 Sprint Planning Board

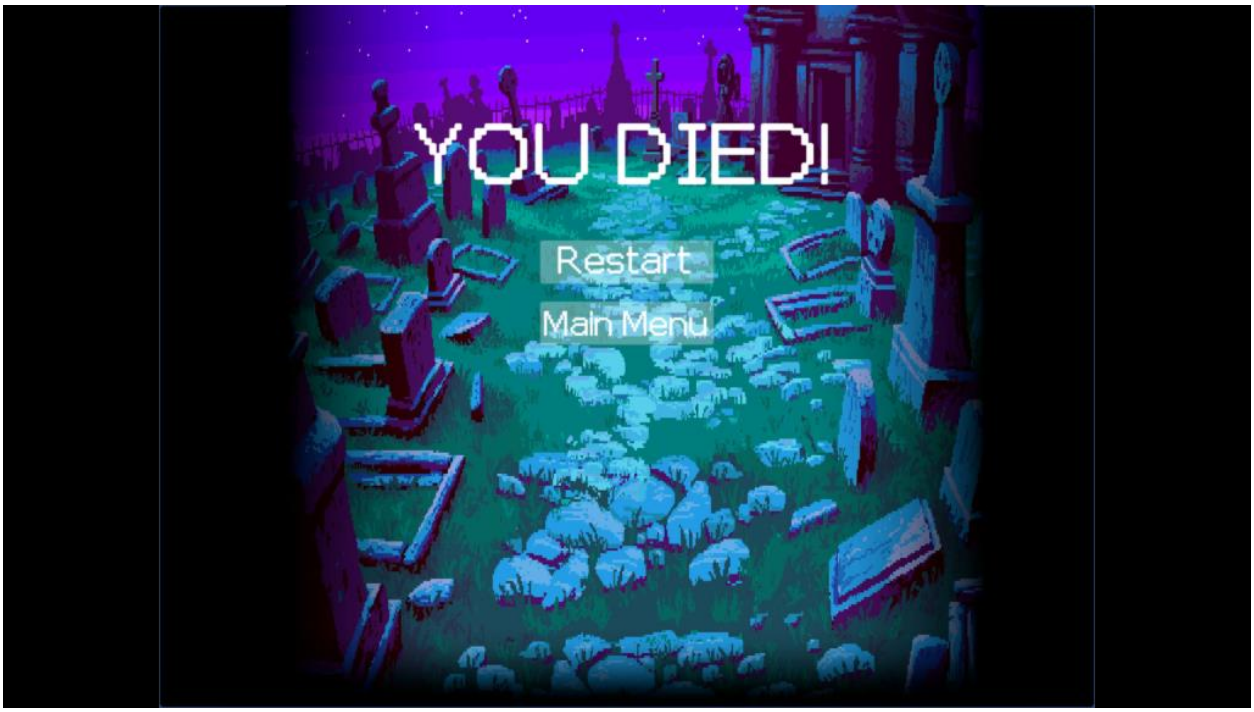
Sprint 5 Planning



5.5.8 User Interface

Start menu [UC-1]

Death menu [UC-7]



Pause menu [UC-8]

Sprint 5 (28/11/2019 to 06/12/2019)

6.1 Overview

In Sprint 5, we made good progress. Several product documents were produced including Installation Guide, Game Manual, Maintenance Guide, Test cases version 2 and 3 documentation. All basic game features were added and finalized. Attempts had been made to fix most of the bugs, however minor bugs were still to be fixed. We presented our current game version to customer and he was happy with it.

6.2 Sprint 5 Sprint Backlog

Sprint 5 Sprint Backlog					
PB ID	SP ID	Task	Linked User Story	Date created or Sprint no.	Assignee
PB-34	SP 5-1	Design Game Installation and write Installation Guide	US-9	20-11-19	Khaled
PB-35	SP 5-2	Game Manual	US-8	20-11-19	Robert
PB-36	SP 5-3	Writing Maintenance Guide	-	27-11-19	Robert
PB-37	SP 5-4	game feature - game tutorial	US-8	27-11-19	Robert
PB-38	SP 5-5	Win condition - sorting ghost	US-6	27-11-19	Robert
PB-39	SP 5-6	Fixing bugs	-	27-11-19	Robert

		identified in all Test Cases			
PB-40	SP 5-7	Test Cases version 2	-	27-11-19	Sa, Feng
PB-41	SP 5-8	Test Cases version 3	-	27-11-19	Sa, Feng
-	SP 5-9	Documentation	-	27-11-19	David, Wan
-	SP 5-10	Sprint 5 Review	-	27-11-19	Everyone
-	SP 5-11	Team Questionnaire	-	27-11-19	Everyone
-	SP 5-12	Personal Questionnaire	-	27-11-19	Everyone

6.3 Meeting Minutes

6.3.1 Meeting 13 (3/12/2019)

Attendance: All; Duration: 2 hours

1. **Test Cases version 2**: We discussed on Test Cases version 2 design (see section 6.5.3) and what should be included in Test Cases version 3. The bugs identified in Test Cases version 2 ware also identified and discussed.
2. **Customer Meeting (**06/12/19) **Preparation**: We planned to present the current version of the game to customer, to see if he wanted to us to change anything. We also wanted to ask him about requirement on product documents including game manual, installation guide and maintenance guide.
3. Game feature: The final game feature – winning condition was added. Now all basic game feature was completed and ready to be presented to Customer.
4. Use Cases: A new Use Case was created to specify the requirement for game tutorial design (see section 6.5.2)
5. Next step: We would carry on with the unfinished task in Sprint 5 Sprint Backlog and see what the customer would comment in the customer meeting.

6.3.2 Meeting 14 (06/12/2019)

1. Test Cases version 3: Test Cases version 3 (see section) was created and implemented. At this stage, all the test in all Test Cases were passed except one test (3.2.1 no.8). This would be solved before the deadline.
2. Customer meeting summary and analysis: We had a customer meeting on 06/12/2019 (see section 6.5.1). Customer was happy with our current game version and gave us some advice on product documentations and coursework submission. He also suggested an modification on one game feature which we decided not to commit due to time restraint.
3. Team questionnaire and Individual Questionnaire: The team questionnaire was completed with no dispute. All team members were reminded to submit their individual questionnaire.
4. Product documents: All product documents were drafted. After discussion and minor corrections, all documents were finalized.
5. Sprint 5 Review and Retrospective (see section 6.4)
6. Next step: As all the tasks were completed in any Backlog were completed, we would start wrapping up the whole project by tidying the documentations, and revisit and fulfilling the submission requirement.

6.4 Sprint Review and Retrospective

1. What we achieved
    a. All tasks were completed in the Sprint 5 Sprint Backlog (and all backlog). Our game was fully functional with all planned features. All product documents were produced and finalized. We presented the game to customer, and he was satisfied with the current game version, therefore we would not be adding any more features.
2. What are the Tasks yet to be completed?
    a. One minor bug (in the game tutorial) was yet to be completed. However, it did not affect the functionality of the whole game.
3. What we learnt
    a. We learnt how to write all the product documents.
4. What we need to find out
    a. We need to find out the submission requirement.

6.5 Product Content

6.5.1 Customer Meeting Summary and Analysis (06/12/2019)

1. **Presenting newest game version**: We presented the newest game features which were winning condition, Start Game Menu, End Game Menu and Tutorial. Customer was happy with these features.

2. **Suggested modification**: Customer suggested that we could change the rotation speed of the ghosts. At the moment, ghosts turn their head very suddenly. If we make modification by making ghosts to turn their head gradually, then player can better anticipate their change of direction. This makes the game slightly easier and more enjoyable. However, we decided not to add this feature due to time constraint from other coursework commitment.

3. **Presenting Test Cases**: We presented our current versions of Test Cases and Customer was happy with the format.

6.5.2 Use cases

Use Case Name: Tutorial	ID: UC-11	Importance Level: Medium
Primary Actor: Player	User Stories: US-10	
Stakeholders and Interest: Player – Player wants a tutorial on how to play to game so they know how to play.		
Brief Description: This use case describes how the player will play through the tutorial		
Trigger: Player starts game		
Normal Flow of Events: 1. Player boots up game 2. Player clicks tutorial 3. Player is taught to move 4. Player is taught how to capture ghosts 5. Player is taught how to sort ghosts		

6.5.3 Tests

These tests derive from the analysis and specification performed in meeting. They detailed features including menu, dialogue and music tests for the game. Test-2.1 were failed in the last Test Case (version 2), and now these were passed in the current Test Case. The failed test would be implemented again in the next Test Case after bug fixing and modification on the game product by our developer.

Test 2.1 30/11

Test Priority	Medium
Test Title	Start menu test
Description	Verify that a menu is shown to the user on start-up. Check that its features ("start game", "exit game" and "tutorial" buttons) function correctly.
Use Case	UC-1
User Story	US-13

Executable 2.1.1 30/11Corresponding Test: 2.1 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Try to start a new game.	Select "start game" on the menu.	A new game is started.	P

2	Try to exit the program.	Select "exit game" on menu.	The application shuts down.	P
3	Try to watch how to play this game.	Select "tutorial" on the menu.	The new screen of tutorial is shown.	F

Test 2.2 30/11

Test Priority	Medium
Test Title	In-game menu test
Description	Verify that a menu is shown to the user. Check that its features ("Pause" and "main menu" button) function correctly.
Use Case	UC-8
User Story	US-12

Executable 2.2.1 30/11Corresponding Test: 2.2 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Try to press "Esc"	Pause the game	A game is paused.	P
2	Try to go to home	Select "Main menu"	I will go to the home.	P

Test 2.3 30/11

Test Priority	Medium
Test Title	"You Died" screen and re-enter button test
Description	Tests the death screen is present upon getting scan by a ghost and that the player can restart game using the enter key.
Use Case	UC-7

User Story	US-14

Executable 2.3.1 30/11Corresponding Test: 2.3 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Start a new game.	Run and start game.	The game loads up.	P
2	Purposely interact with the ghost	Move player sprite using the arrow keys until death.	The ghost interacts with the player and the game is finished.	P
3	A "You died" screen is shown.	Move player sprite using the arrow keys until death.	Upon death, the new screen informing the player.	P
4	The player can restart game.	On death, the player can press enter to restart the game.	Pressing "restart game "	P

Test 2.4 30/11

Test Priority	High
Test Title	Dialogue test
Description	Verify the ghost dialogue function works correctly
Use Case	UC-6
User Story	US-1

Executable 2.4.1 30/11Corresponding Test: 2.4 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	When players enter the room, they can hear the ghost dialogue	Players enter ghost rooms without being detected	Ghost dialogue appears in the dialog box in the bottom left corner of the screen	P
2	Each ghost has its own three dialogues	The player is in the same room as the ghost without being detected	Ghosts talk to themselves over and over again in the order of dialogue	P
3	When the player leaves the room, the ghost dialogue disappears	The player leaves the room but does not enter the next room	The dialog box in the bottom left corner of the screen goes blank	P
3	When the player catches the ghost, the ghost dialogue disappears	The player leaves the room but does not enter the next room	The dialog box in the bottom left corner of the screen goes blank	P

Test 1.7 30/11

Test Priority	High
Test Title	Ghost Box test
Description	Verify that the captured ghost can properly place in the corresponding box
Use Case	UC-5

User Story	US-1

Executable 1.7.2 30/11Corresponding Test: 1.7 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Put the ghost in the box.	When carrying only good ghosts, press "e" in front of good box	The ghost in the inventory disappears or Player dies	P
2	Put the good ghost in the good box	When carrying only good ghosts, press "e" in front of good box	The ghost in the inventory disappears and the game continues	P
3	Put the good ghost in the bad box	When carrying only good ghosts, press "e" in front of bad box	Player dies and starts the game again	p
4	Put the bad ghost in the good box	When carrying only bad ghosts, press "e" in front of good box	Player dies and starts the game again	p
5	Put the bad ghost in the bad box	When carrying only bad ghosts, press "e" in front of bad box	The ghost in the inventory disappears and the game continues	p
6	Put all 5 ghosts in the right box	Catch all 5 ghosts, go to the box and press "e". Put	Game clearance, clearance	F

		the good ghost in the good box and the bad ghost in the bad box	screen appears	

Test 2.5 30/11

Test Priority	Medium
Test Title	Music test
Description	Verify that the background music of the game plays correctly
Use Case	UC-10
User Story	US-10

Executable 2.5.1 30/11Corresponding Test: 2.5 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	The game starts with background music	In the main menu, press the "start game" button	Enter the game, background music began to play	P
2	During the game, background music is always playing	Stand still for 10 minutes after starting the game	Background music played on a loop	P
3	When the player dies or exits the game	The player is killed by a ghost or exits to the main menu through the pause menu	Background music stop	P

Testing Records 3 05/12

These testing records correspond with some User stories. They detail some advanced features which the team were committed to incorporating into their game. This test is the last test case version. In the last test case version, there are 3 test cases in total, only one (test 3.2) case was failed.

Test 3.1 05/12

Test Priority	High
Test Title	Winning conditions test
Description	Player can put ghost in correct boxes.
Use Case	UC-5
User Story	US-1

Executable 3.1.1 05/12Corresponding Test: 3.1 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Player can catch ghost in every room.	Player can catch ghost in every room.	Player can put every ghost to correct boxes.	P

Test 2.1 05/12

Test Priority	Medium
Test Title	Start menu test
Description	Verify that a menu is shown to the user on start-up. Check that its features ("start game" , "exit game" and "tutorial" buttons) function correctly.
Use Case	UC-1
User Story	US-13

Executable 2.1.2 05/12Corresponding Test: 2.1 (above)

	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Try to start a new game.	Select "start game" on the menu.	A new game is started.	P
2	Try to exit the program.	Select "exit game" on menu.	The application shuts down.	P
3	Try to watch how to play this game.	Select "tutorial" on the menu.	The new screen of tutorial is shown.	P

Test 3.2 05/12

Test Priority	High
Test Title	Tutorial test
Description	Test tutorial
Use Case	UC-12
User Story	US-8

Executable 3.2.1 05/12Corresponding Test: 3.2 (above)

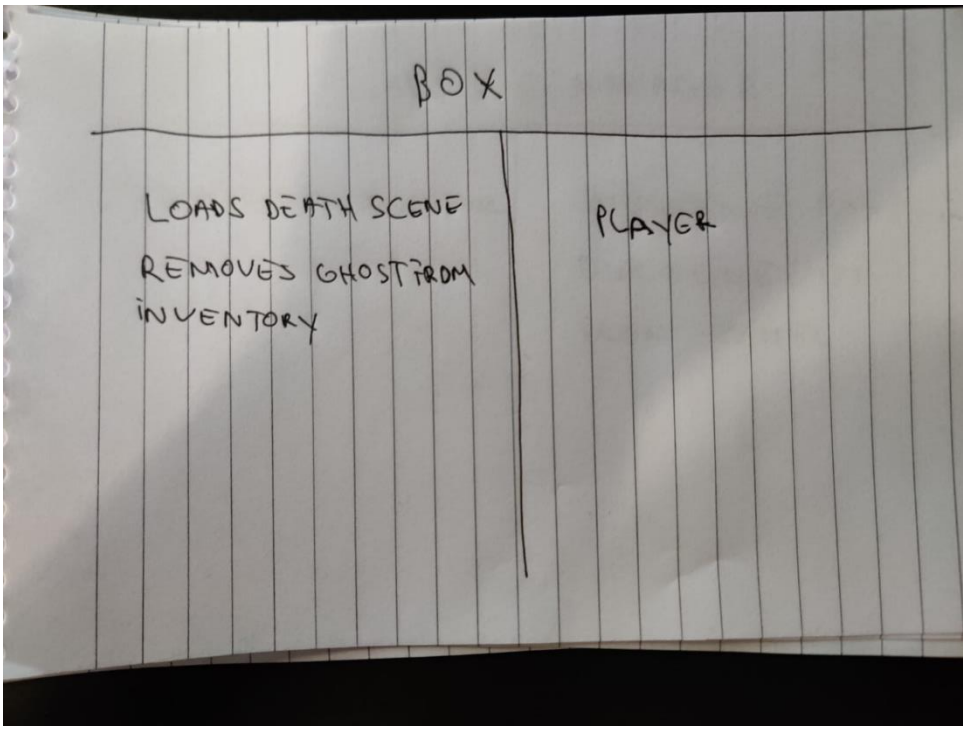
	Test Steps	Test Data	Excepted Result	Pass(P)/Fail(F)
1	Start new tutorial	Click "tutorial" button	Room、ghost、texts and ghost boxes are built.	P
2	Catch ghosts beside the body and out of sight	Press space when approaching ghosts	Ghosts disappear and captured ghosts	P

		outside of their view	appear in inventory	
3	Put the bad ghost in the good box	When carrying only bad ghosts, press "e" in front of good box	Player dies and starts the game again	P
4	Put the bad ghost in the bad box	When carrying only bad ghosts, press "e" in front of bad box	The screen shows "You won" and "main menu" button.	P
5	Ghost catch player.	Ghost scan player.	Player died and screen shows "You died", "Restart" and "main menu" button.	P
6	The player can restart tutorial.	On death, the player can press enter to restart the tutorial.	Pressing "restart tutorial "	P
7	Try to press "Esc"	Pause the game	A game is paused.	P
8	Try to go to home	Select "Main menu"	I will go to the home.	F
9	Walls and obstacles	Player can try to go through the walls and obstacles.	Walls and obstacle can prevent movement of player.	P

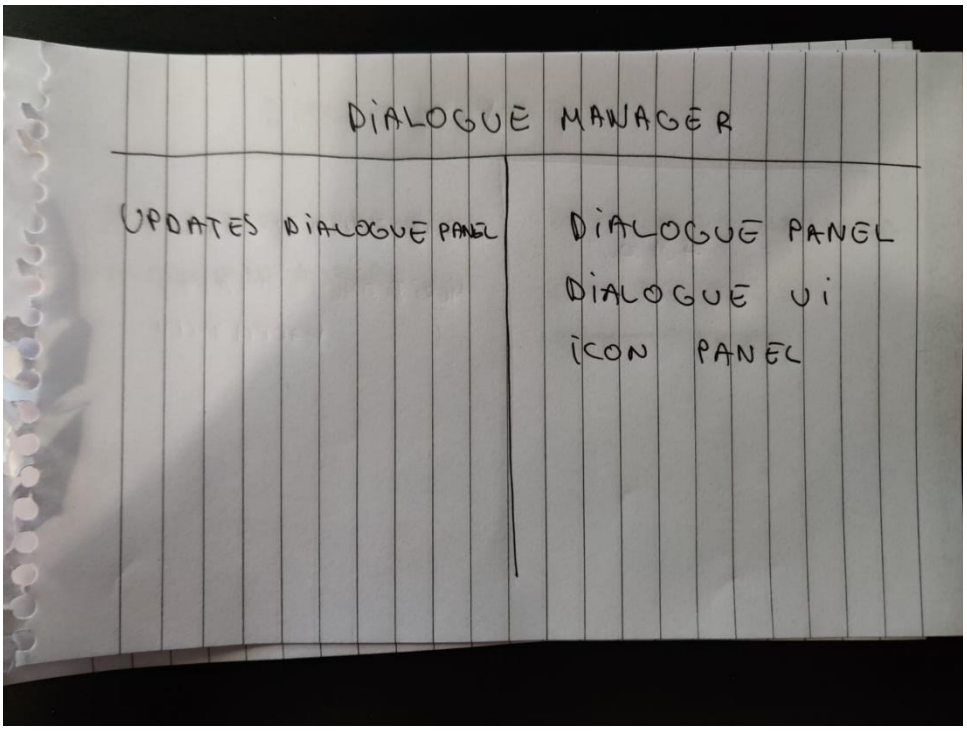
OBJ

6.5.4 CRC Cards

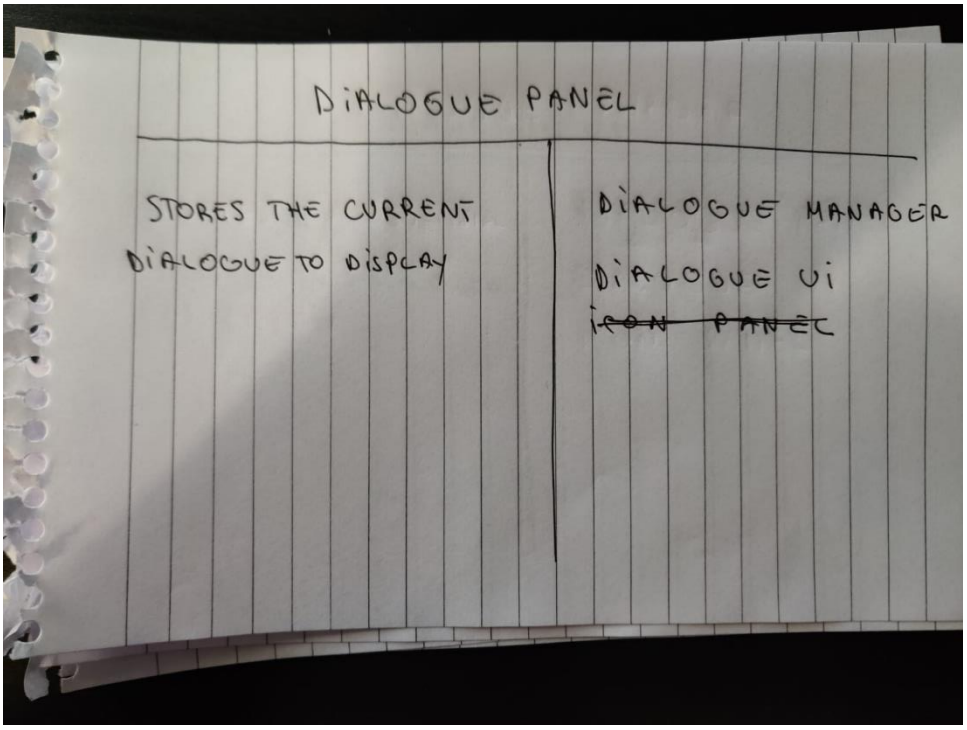
CRC Card 13: Box [UC-5]



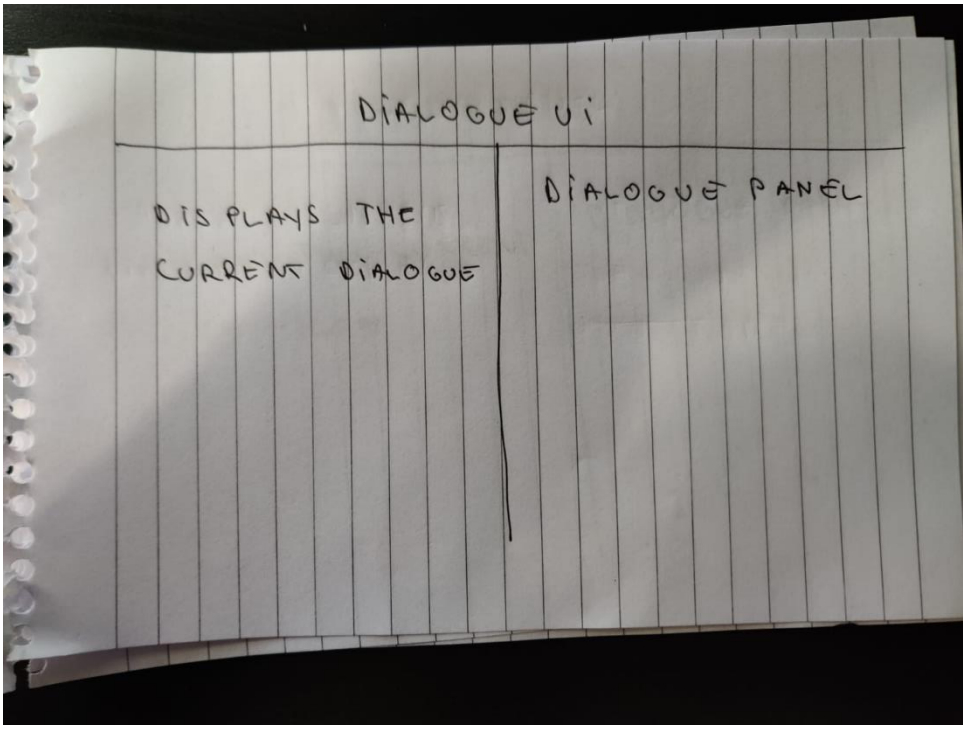
CRC Card 14: Dialogue Manager [UC-6]



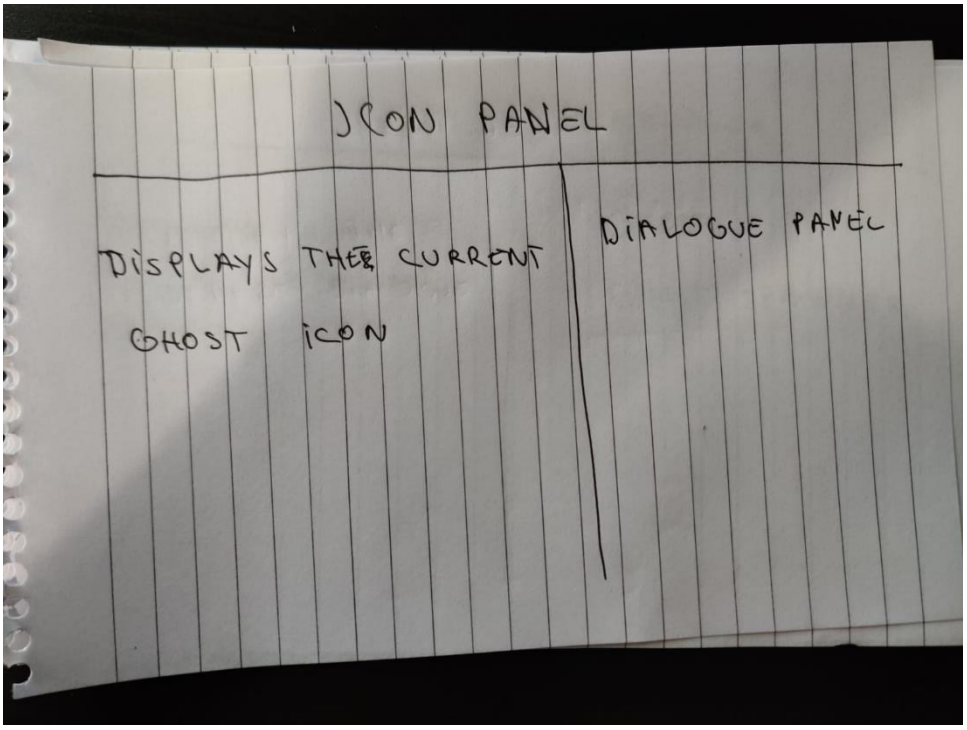
CRC Card 15: Dialogue Panel [UC-6}



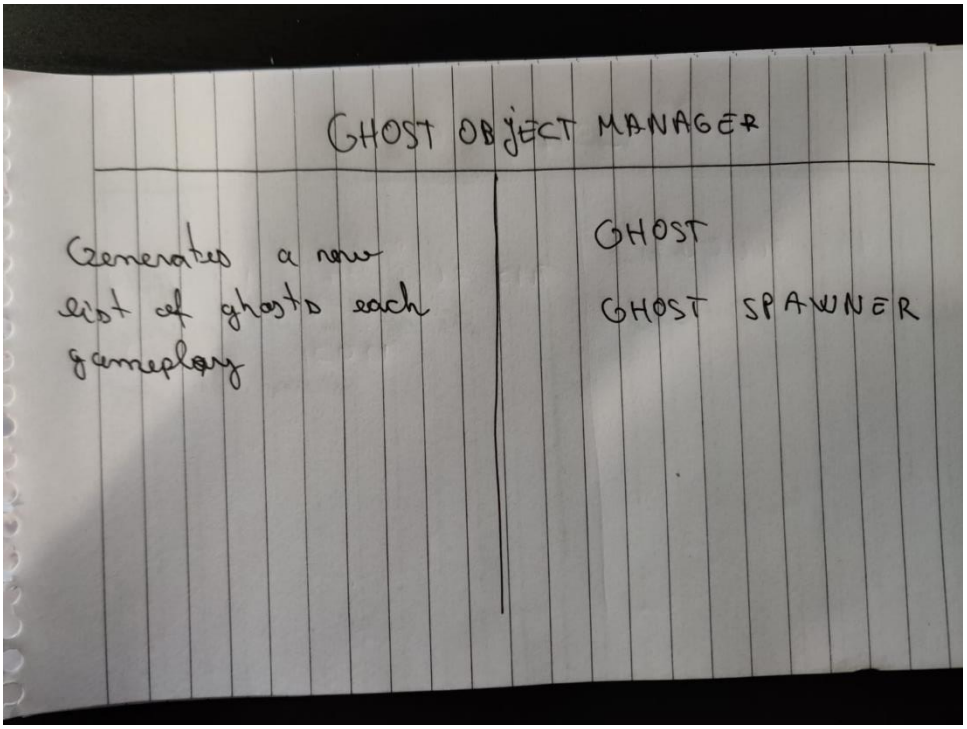
CRC Card 16: Dialogue Panel [UC-6]



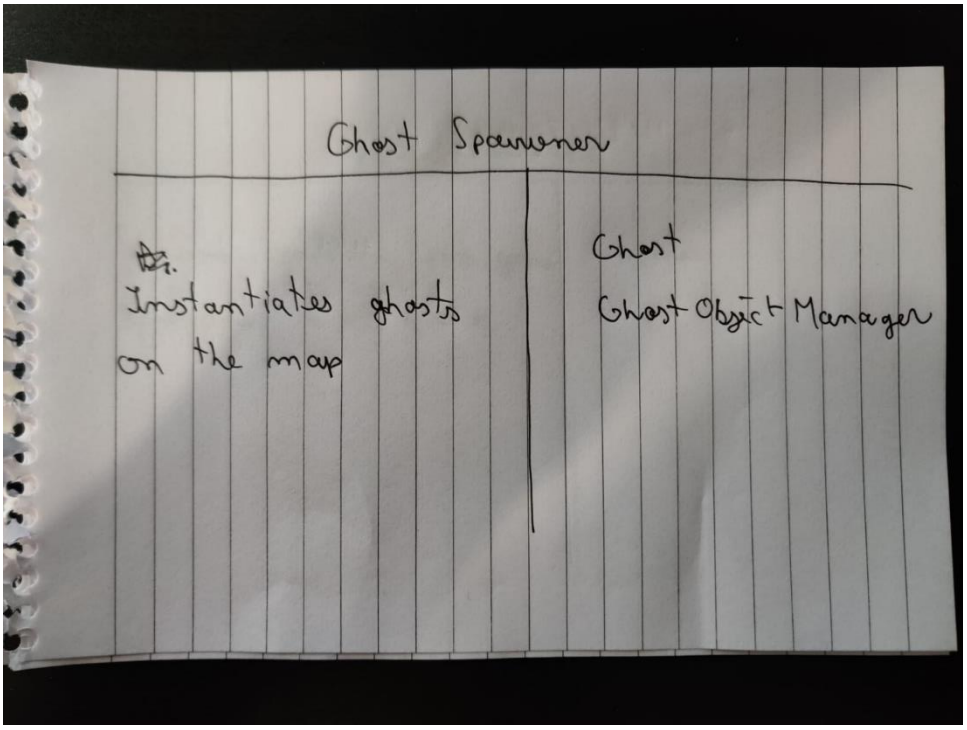
CRC Card 17: Icon Panel [UC-4, UC-5, UC-6]



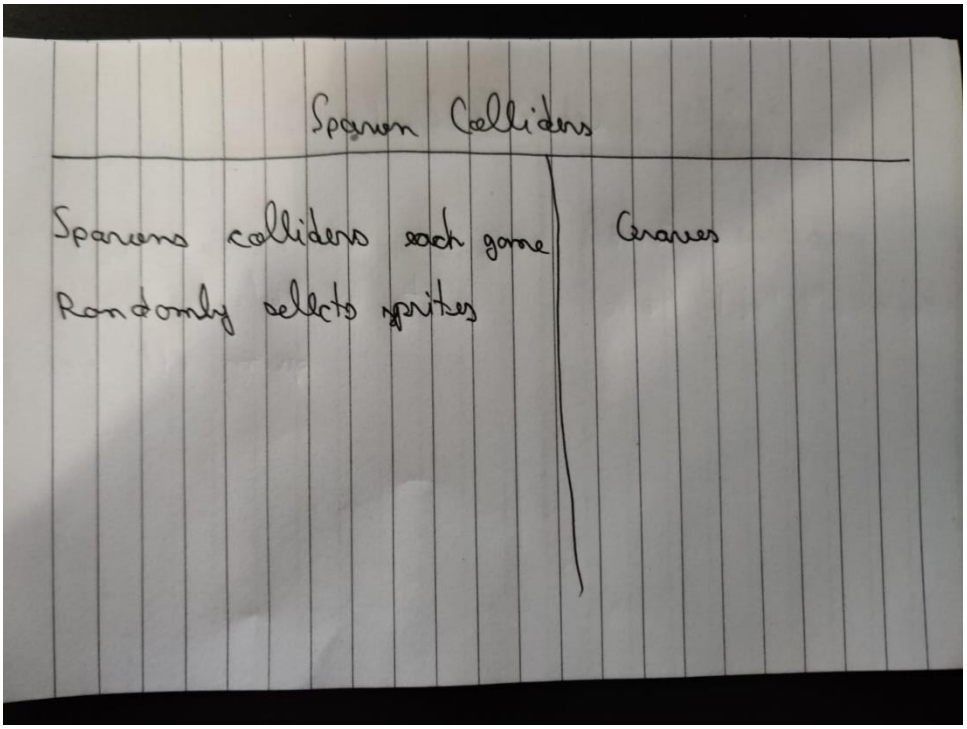
CRC Card 18: Ghost Object Manager [UC-3]



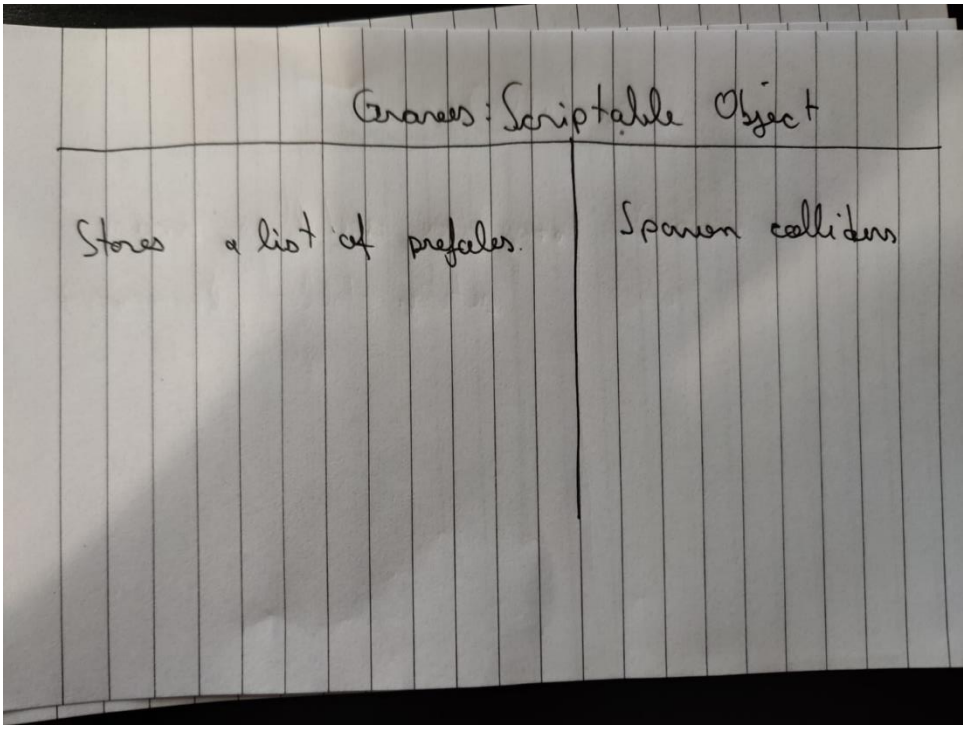
CRC Card 19: Ghost Spawner [UC-3]



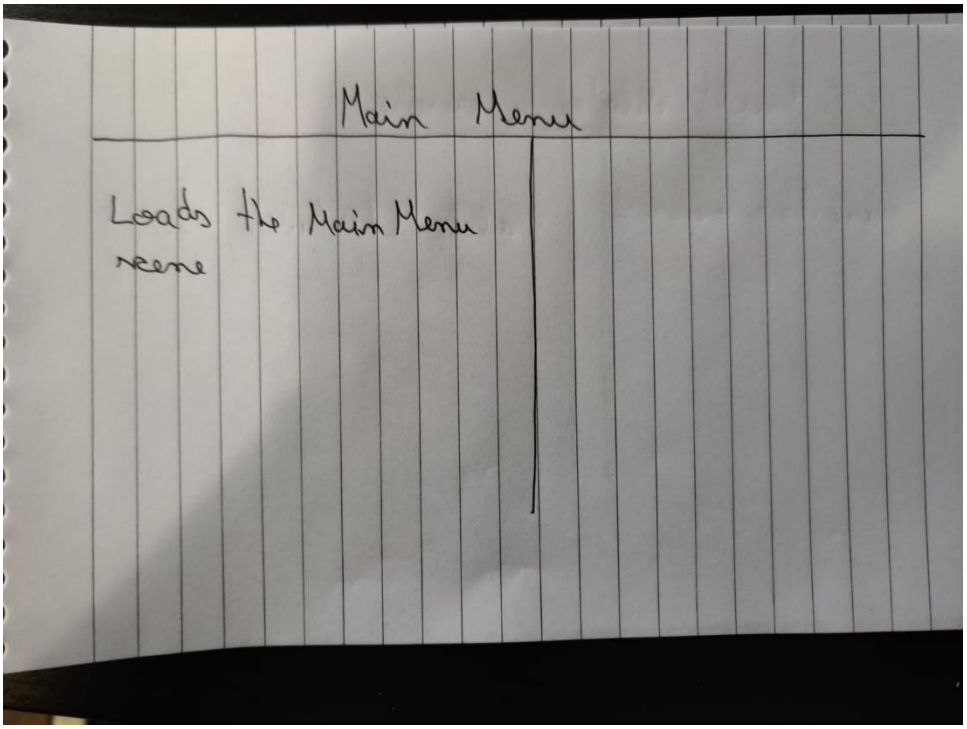
CRC Card 20: Spawn Colliders [UC-3]



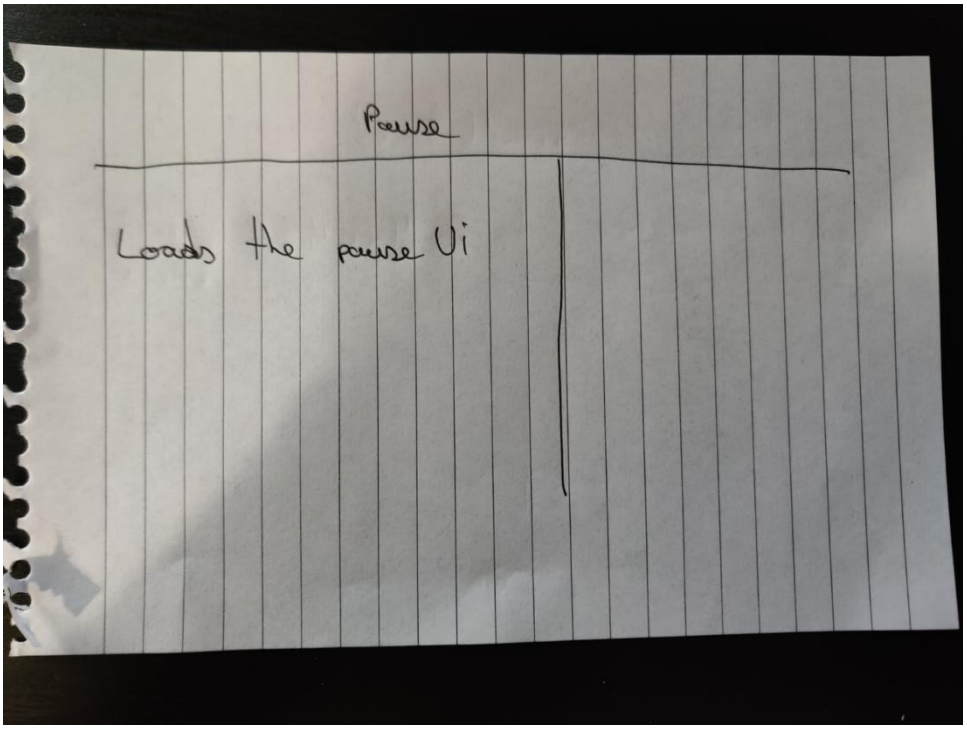
CRC Card 21: Graves – Scriptable Object [UC-3]



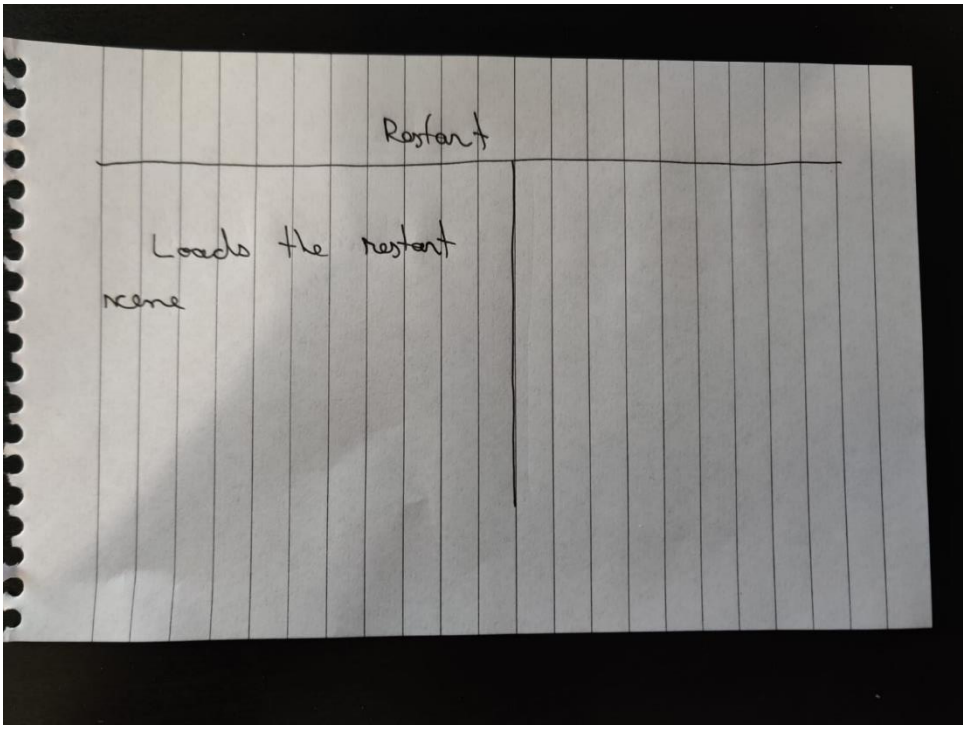
CRC Card 22: Main Menu [UC-1]



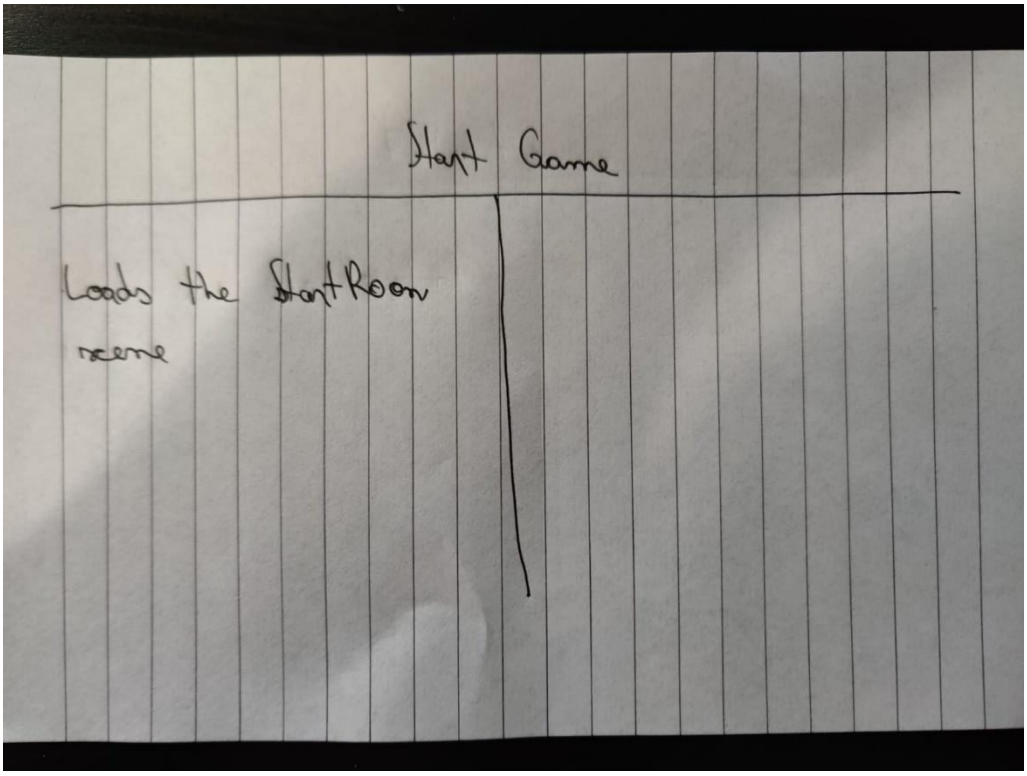
CRC Card 23: Pause [UC-8]



CRC Card 24: Restart [UC-7]

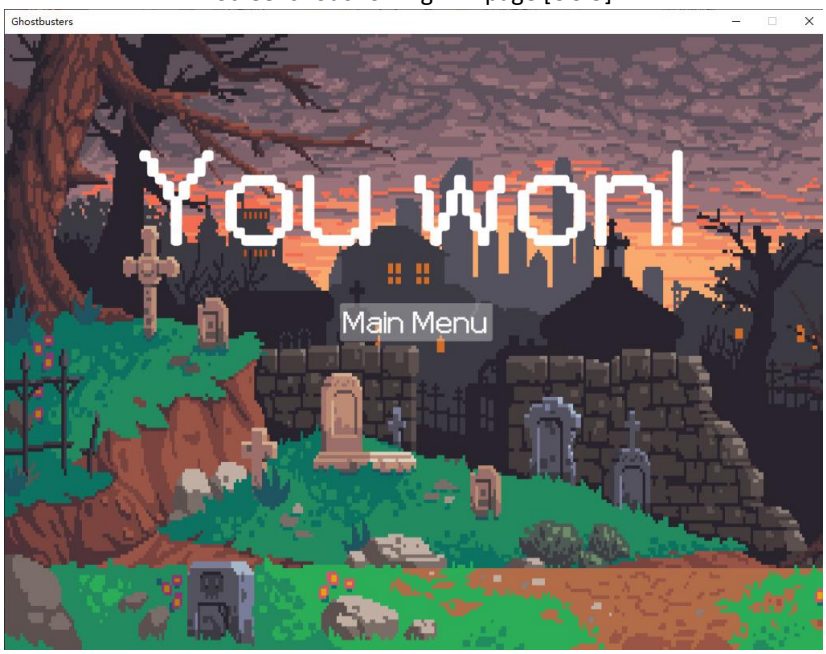


CRC Card 25: Start game [UC-1}



6.5.5 User Interface

Screenshot showing win page [UC-5]



Project Wrap-up (7/12/2019 to 13/12/2019)

7.1 Overview

The final week before submission was used to wrap up the project. We did not add any tasks to the backlog and instead focused on putting the documentation together. The team met twice, the first meeting being used to identify what documentation or bug fixes still needed to be added and to review the team questionnaire, and the second being used to review the submission documents and submit.

7.2 Meeting Minutes

7.2.1 Meeting 15 (10/12/2019)

Attendance: All; Duration: 1 hour

3. **Testing:** Together we all did final bug tests for the game, making sure that all of us were happy with the game itself. The minor bug with the game tutorial was still not fixed as we had run out of time. However, this bug wont affect the functionality of the whole game. This bug prevented user to go back to the main menu from the tutorial page. Therefore, user would need to reboot the game program in order to enter the main menu again.
4. **Documentation**: The documentation was slightly behind however we discussed as a group what was left to be written up. We would have to take the time to put together all the content files into one document, as well as cross reference them. Once all the content is in, we will come together and edit.
5. **Github delivery branch:** We quickly set up the delivery branch with all the necessary files. Prior to submission, we'll just have to put in the documentation and give the link.

Overall the wrap up was successful. Although a stressful time as many of us had other deadlines, each team member was able to help edit and review. By the end, we were all very happy with the project submission.