

Unit 14

Computer Games Development



Dallam School

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# **Introduction**

I will create a computer game that will allow the user to move around a timed level collecting items to earn points. There will be three difficulties, easy medium and hard and each level will contain hazards that cause the player will lose a life on interaction. If the timer runs out or the player loses all of their lives then they will fail the level.

# **Planning**

## Initial Ideas:

### 1) Maze

The player navigates a human player around a maze and has to collect items while avoiding the rats; if they run into a rat then they lose a life. They must exit the maze before the timer runs out or fail the level. The difficulty levels could be set by having more rats and increasing the number of points required to get the star rankings. The problem with this is that each level would require a different maze to be designed and there are already games with a similar structure.

### 2) Escape room – Chosen option

A room that the player moves around, collecting items and to move on to the next level they have to collect all the items in that room while avoiding the dangers, hit three dangers and the player dies. There is a timer that counts down how long they have to do each level and for the different difficulties the time is less/more items to collect. When they finish they are given a score based on how long it took them to collect all of the objects and they lose points for each life they lost and then they are awarded a star rating based on the number of points they get. When they leave the room, they move onto the next room and have to find the items in there. This is unique because while there are other escape room puzzle games, each game still manages to be different with different level layouts, and puzzles to be completed.

### 3) Follow path

The player moves along a path dodging objects and collect items using arrow keys. Running into objects slows the player down, when they run into five objects they die, and they speed up the longer it’s been since they hit an object, the quicker they finish the level the greater the multiplier. The downside of this is that there are already a lot of games that follow a similar structure and there is no clear end to the levels; the player just keeps running until their character dies. There also aren’t a lot of ways to increase the difficulty because as the game progresses the character naturally starts to move faster, and more objects appear.

## Steps

1. Plan the character
2. Plan the levels
3. User Feedback
4. Final designs & justification
5. Create a flow chart to plan how it will run
6. Asset table
7. Data dictionary
8. Code the character movements
9. Test character movements
10. Code timer
11. Test timer
12. Add GUI displaying the timer, items in level and the lives
13. Test GUI
14. Code the item collection
15. Test item collection
16. Code the Level Exit
17. Test Level Exit
18. Code dangers
19. Test dangers
20. Design & code start menus
21. Design & code score menu and game over menu
22. Test menus
23. Create furniture that will be used in levels
24. Design the level layout
25. Create the levels
26. Test the whole game
27. Feedback
28. Enhancements
29. Review criteria
30. Evaluation

## Software

I will be creating my game using unity because it will allow me to create the 3D backgrounds that I will need for my players to interact with their surroundings and collect the items. Unity is also widely used so I will be able to find video support to help me if I am struggling at any point.

## Success Criteria

1. A menu allowing the user to choose the level difficulty
2. The higher the difficulty the shorter the time a player has to complete the level
3. If the player fails to find all the items and exit the room in the given time, they will fail the level
4. A menu with multiple levels that the player can choose to complete
5. The higher the level number, the more items a player needs in order to escape
6. A UI that shows the player how much time is left, the items they need to collect and the number of lives left
7. A player will have to explore the room looking for the items to get out
8. The player will complete puzzles in order to collect items
9. There are dangers that they need to avoid interacting with
10. Interacting with a hazard will result in the player losing a life
11. If the player loses three lives, they will die
12. When all items have been collected the player will need to use the items to solve the puzzle for how to leave the room
13. When the puzzle for the exit is solved the level ends
14. The player will receive a score at the end based on how long it has taken them to complete the level
15. The score will be calculated by multiplying the number of items collected by 500, adding the remaining lives times 100 and multiplying it all by the time remaining in seconds
16. Players will then be awarded a star rating based on how many points they scored compared to the number of points available for the level
17. If the player has failed the level they will still receive a score for what they did but their overall score will be zero and their stars will be zero

## Character Designs:

### Version 1

Feedback - User 1

* Design character to meet the room’s theme
* Could have two players who compete to find the items

Feedback - User 2

* The simple design will allow the user to focus on the actual level rather than being concerned about how their character looks

### Version 2

Themed character examples

|  |  |
| --- | --- |
| C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\50FA421D.tmp | C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\BAB76AB9.tmp |
| C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\AFA69941.tmp | C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\B3E1FE7B.tmp |

Feedback – User 1

* The different additions look a different quality so if you do include them then make sure that they look the same quality inside the game.
* Having the decoration adds extra colour to the characters and makes them more interesting

Feedback – User 2

* Having the two characters different colours is a good way to tell between the two players

### Final Design

|  |  |
| --- | --- |
| Normal | |
|  |  |
| Christmas | |
| C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\50FA421D.tmp | C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\BAB76AB9.tmp |
| Halloween | |
| C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\AFA69941.tmp | C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\B3E1FE7B.tmp |

Justification:

Keeping the characters simple means that I don’t need to spend as much time on creating them in game and I can focus on creating the furniture and the code for the actual game. It also means that the player isn’t going to be concerned with how they look so there won’t be any need to offer different character options and they’ll focus on the actual level like I want them to. Having the character match the theme of the room, as suggested by user 1, will add more colours to the character and make them more interesting. The idea of creating a two player game where the players compete against each other and both receive a score would allow more people to enjoy the game, however it could be difficult to code so I am only going to do this if I have time.

## Level Designs:

### Version 1

Feedback – User 1

* Have some themed rooms to make levels easier to design (e.g. Christmas, storage room)
* Add timer to display

Feedback – User 2

* Show how many items are left to find
* Player Lives to display

### Version 2

Time

Items: X/X



Time

Items: X/X

|  |  |  |
| --- | --- | --- |
|  |  |  |

Feedback – User 1

* Multiple levels for the themes (Multiple Christmas levels, multiple Halloween levels)

Feedback – User 2

* Don’t put the text in a box, just have it float
* Need more clutter in some designs (Halloween)
* Need more places to find items (Halloween)

### Final Design

House Levels

Time

Items: X/X

Lives



Christmas levels

Time

Items: X/X

Lives

|  |  |  |
| --- | --- | --- |
|  |  |  |

Halloween Levels



Time

Items: X/X

Lives



|  |  |  |
| --- | --- | --- |
|  |  |  |

Justification:

Each one of my levels needs to be different with different ways to leave them otherwise they could become repetitive as the player is carrying out similar actions each time. My levels also have to be highly detailed and need to be 3D for the player character to explore them. Having a display in the corner that shows how much time players have left, items are in the level and lives remaining will make it so that the player is aware of what is happening in the level and when they need to speed up or need to be more cautious. It also means they know when they have all the items and can leave the level.

## Storyboard:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level Selection  Easy  Medium  Hard  Level Selection  2  3  4  5  6  Main Menu  1 |  | | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\44F881AE.tmp  Inventory |
| Start menu | Players look around rooms and solve puzzles to find the items | | The Players collect items around the level | | When all items are collected, they can access the exit |
| C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\D6D189EC.tmp C:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\349DFF8.tmpC:\Users\13k.hurst\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\7D9E42DA.tmp | | Level Failed  Total: 0  Player 1 Items collected: XX  Player 2 Items collected: XX  Player 1 Lives: X/3  Player 2 Lives: X/3  Player 1 Score: XXXXXX  Player 2 Score: XXXXXX  Touch to continue | | Score  Total: XXXXXX  Player 1 Items collected: XX  Player 2 Items collected: XX  Player 1 Lives: X/3  Player 2 Lives: X/3  Player 1 Score: XXXXXX  Player 2 Score: XXXXXX  Touch to continue | |
| If players interact with dangers, then they lose a life. | | If they lose three lives the players die, if both players die, they fail the level.  If they run out of time they fail. | | The players are awarded points for how many items they collected, and the time taken to complete the level. | |

## Asset table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Graphic | Model Creator | Texture Creator | Audio |
| Level Audio | N/a | N/a | N/a | Loop & Music Free |
| Player | Player | Kevin Iglesias | Kathryn Hurst | N/a |
| Hazard | Spider | Kathryn Hurst | Kathryn Hurst | N/a |
| Wall | Wall | Kathryn Hurst | Kathryn Hurst | N/a |
| Floor | Floor | Kathryn Hurst | Kathryn Hurst | N/a |
| Exit | Door  Vent | Kathryn Hurst  Kathryn Hurst | Wood & Gold  Kathryn Hurst | N/a |
| Search Locations | Cupboard  Shelf  Vent  Draw | Kathryn Hurst  Kathryn Hurst  Kathryn Hurst  Kathryn Hurst | Wood  Wood  Kathryn Hurst  Wood | N/a |
| Clutter | Book  Paper | Kathryn Hurst  Kathryn Hurst | Kathryn Hurst  Kathryn Hurst | N/a |
| Items | Key  Screwdriver  Ladder | Kathryn Hurst  Kathryn Hurst  Kathryn Hurst | Kathryn Hurst  Kathryn Hurst  Kathryn Hurst | N/a |

## Data dictionary:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | Data Value | Data length | Scope | Purpose |
| Easy | Boolean | True/ False | 4/5 | Global | Player presses a button that sets how long players have to complete the level |
| Medium | Boolean | True/ False | 4/5 | Global | Player presses a button that sets how long players have to complete the level |
| Hard | Boolean | True/ False | 4/5 | Global | Player presses a button that sets how long players have to complete the level |
| speedH | Float | 2.0 | 2 | Global | The speed at which the camera will move on the horizontal |
| speedV | Float | 2.0 | 2 | Global | The speed at which the camera will move on the vertical |
| yaw | Float | Any num | Any | Local | How far the camera moves on the horizontal |
| pitch | Float | Any num | Any | Local | How far the camera moves on the vertical |
| Speed | Float | 6.0 | 2 | Global | The speed at which the character will move around the level |
| jumpSpeed | Float | 8.0 | 2 | Global | The speed at which the character moves upwards when the space bar is pressed |
| gravity | Float | 20.0 | 2 | Global | The speed at which vertical acceleration decreases so that the player will fall back to the ground. |
| moveDirection | Vector3 | Any num | Any | Local | The direction in which the player sprite will move using coordinates. |
| Items | Integer | 1 - 9 | 1 | Global | Store the number of items in a level |
| Collected | Integer | 1 - 9 | 1 | Global | Store the number of items the player collects |
| textBox | String | 1 – 9 | 1 | Local | Used to display the Items variable on the UI |
| textBox2 | String | 1 – 9 | 1 | Local | Used to display the Collected variable on the UI |
| Exit | Boolean | True/ False | 4/5 | Global | Set to true when the level is completed |
| FinishTime | Float | e.g. 300 | 1 - 3 | Global | Store the time the finish the level for ‘Total’ calculation |
| Lives | Integer | 1 – 3 | 1 | Global | Stores the number of lives the player has |
| textBox | String | 1 – 3 | 1 | Local | Used to display the Lives variable on the UI |
| timeStart (in seconds) | Float | e.g. 300 | 2 - 3 | Global | The time that users have at the beginning of the level based on whether they choose easy medium or hard. |
| Count | Float | e.g. 300 | 1 - 3 | Local | To count down how long until they run out of time and the players fail the level. |
| textBox | String | 0 – 300 | 0 – 3 | Local | Used to display the Count variable on the UI |
| textBox1 | String | 1 – 9 | 1 | Local | Used to display the Collected variable on the menu |
| textBox2 | String | 1 – 3 | 1 | Local | Used to display the Lives variable on the menu |
| textBox3 | String | 0 – 4800 | 0 – 4 | Local | Used to display the score variable on the menu |
| score | Integer | 0 – 4800 | 0 – 4 | Global | Store The player score |
| bonus | Integer | 60 – 300 | 2 / 3 | Local | Used in calculating the total according to the difficulty level selected. |
| textBox | String | 0 – 24000 | 0 – 5 | Local | Used to display the total variable on the menu |
| total | Integer | 0 – 24000 | 0 – 5 | Local | Displays the final score |

## Flowchart:

Load **Level** from storage

Input **Difficulty**

Player1\_Collected = 0

Player2\_Collected = 0

Difficulty == “E”

Player1\_Lives = 3

Player2\_Lives = 3

Time = 15 mins

Difficulty == “M”

Time = 10 mins

Difficulty == “H”

Time = 5 mins

Start

Input **Level**

N

N

N

Y

Y

Y

Exit

Stop

Y

N

Items = X

Exit = False

Start **Time**

Time == 0

Display Level

Display Level Failed screen

Player1\_Lives == 0

Player2\_Lives == 0

Player1\_Move = False

Player1\_Move = True

Player2\_Move = True

Player2\_Lives == 0

Player2\_Move = False

N

N

N

N

Y

Y

Y

Y

Items == 0

Display Score screen

PlayerX\_Score = (Items \* 500) + (PlayerX\_Lives \* 100)

Total = (Player1\_Score + Player2\_Score) \* Time in seconds

Stars = X

W, A, S, D or arrow key pressed

Move corresponding player

Player touching item

Collect item

Items = Items - 1

PlayerX\_Collected = PlayerX\_Collected + 1

Player touching Danger

PlayerX\_Lives = PlayerX\_Lives - 1

N

N

N

N

Y

Y

Y

Y

Touching LevelExit

Y

N

## Technical specification:

| **Minimum requirements** | **Windows** | **macOS** | **Linux (Support in Preview)** |
| --- | --- | --- | --- |
| **Operating system version** | Windows 7 and Windows 10, 64-bit versions only. | Sierra 10.12.6+ | Ubuntu 16.04, Ubuntu 18.04, and CentOS 7 |
| **CPU** | X64 architecture with SSE2 instruction set support | X64 architecture with SSE2 instruction set support | X64 architecture with SSE2 instruction set support |
| **Graphics API** | DX10, DX11, and DX12-capable GPUs | Metal-capable Intel and AMD GPUs | OpenGL 3.2+/ Vulkan-capable, Nvidia and AMD GPUs. |
| **Additional requirements** | Hardware vendor officially supported drivers | Apple officially supported drivers | Gnome desktop environment running on top of X11 windowing system, Nvidia official proprietary graphics driver or AMD Mesa graphics driver. Other configuration and user environment as provided stock with the supported distribution (Kernel, Compositor, etc.) |
| For all operating systems, the Unity Editor is supported on workstations or laptop form factors, running without emulation or compatibility layer. | | | |

## Test Plan:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Test** | **Test Data** | **Test Type** | **Purpose** | **Expected outcome** | **Actual outcome** | **Comment** |
| Main Menu | Easy button | Normal | See if the easy button on the main menu works | The timer will be set to 15 minutes |  | The user clicks a button and selects a difficulty which corresponds to how long players have to complete a level |
| Medium Button | Normal | See if the Medium button on the main menu works | The timer will be set to 10 minutes |  |
| Hard Button | Normal | See if the Hard button on the main menu works | The timer will be set to 5 minutes |  |
| Level menu | Level 1 Button | Normal | See if level 1 loads | Level 1 will load |  | The user clicks the button to select the level and the level opens |
| Level 2 Button | Normal | See if level 2 loads | Level 2 will load |  |
| Level 3 Button | Normal | See if level 3 loads | Level 3 will load |  |
| Level 4 Button | Normal | See if level 4 loads | Level 4 will load |  |
| Level 5 Button | Normal | See if level 5 loads | Level 5 will load |  |
| ‘Game Over’ screen | Level fail | Normal | To ensure that the menu displays the correct information | Display Items collected by the player |  | When the players fail a level the correct ‘Game Over’ screen is displayed |
| Display The player lives remaining |  |
| Correctly calculate the player score |  |
| Total displayed as zero |  |
| ‘Score’ screen | Level success | Normal | To ensure that the menu displays the correct information | Display Items collected by the player |  | The score is correctly calculated and the screen displays what it should |
| Display The player lives remaining |  |
| Correctly calculate the player score |  |
| Total calculated and displayed |  |
| Level Play | Collect items | Normal | To see if the level is interactive | Items variable will reduce by 1 and the item will be hidden |  | To check that the levels are playable |
| Touch danger | Normal | To see if the level is interactive | The player will lose a life |  |
| Lose three lives | Normal | To see if the lives system works | The player will die |  |
| Both players lose three lives | Normal | To ensure that when both players have died the game ends | ‘Game Over’ screen displayed |  |
| Time runs out | Normal | When the player takes too long to complete the level it’s gameplay stops | ‘Game Over’ screen displayed |  |
| Collect all items & interact with exit | Normal | The level can be completed | The ‘Score’ screen will be displayed |  |

# **Testing**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Test** | **Test Data** | **Purpose** | **Expected outcome** | **Actual outcome** | **Comment** | **Evidence** |
| Main Menu | Easy button | See if the easy button on the main menu works | The timer will be set to 15 minutes | The timer is set to 900 seconds, which is 15 minutes. (This could be too long)  **(Fixed)** | The user clicks a button and selects a difficulty which corresponds to how long players have to complete a level | Menu |
| Medium Button | See if the Medium button on the main menu works | The timer will be set to 10 minutes | The timer is set to 600 seconds, which is 10 minutes. (This could be too long)  **(Fixed)** |
| Hard Button | See if the Hard button on the main menu works | The timer will be set to 5 minutes | The timer is set to 300 seconds, which is 5 minutes. (This could be too long)  **(Fixed)** |
| Level menu | Level 1 Button | See if level 1 loads | Level 1 will load | Level 1 loads | The user clicks the button to select the level and the level opens | N/a |
| Level 2 Button | See if level 2 loads | Level 2 will load | Level 2 loads |
| Level 3 Button | See if level 3 loads | Level 3 will load | Level 3 loads |
| Level 4 Button | See if level 4 loads | Level 4 will load | Level 4 loads |
| Level 5 Button | See if level 5 loads | Level 5 will load | Level 5 loads |
| Level 6 Button | See if level 6 loads | Level 6 will load | Level 6 loads |
| ‘Game Over’ screen | Level fail | To ensure that the menu displays the correct information | Display Items collected by the player | Display Items collected by Player | When the players fail a level the correct ‘Game Over’ screen is displayed | Hazards |
| Display The player lives remaining | Display Player lives remaining |
| Correctly calculate the player score | Correctly calculate Player score |
| Total displayed | Total calculated and displayed, however it is easier to get a high score on easy because the player starts off with more time.  **(Fixed)** |
| ‘Score’ screen | Level success | To ensure that the menu displays the correct information | Display Items collected by the player | Display Items collected by Player | The score is correctly calculated and the screen displays what it should | Item Collect & Timer |
| Display The player lives remaining | Display Player lives remaining |
| Correctly calculate the player score | Correctly calculate Player score |
| Total calculated and displayed | Total calculated and displayed, however it is easier to get a high score on easy because the player starts off with more time.  **(Fixed)** |
| Level Play | Arrow key | To see if the player moves | The player will move forward, back, left and right based on which arrow key is pressed | The player moves around the room depending on which arrow key is pressed | To check that the levels are playable | Player Movements |
| Collect items | To see if the level is interactive | Items variable will reduce by 1 and the item will be hidden | The items can be collected and the Items variable decreases by one; however, they are collected no matter where you click.  **(Fixed)** | To check that the levels are playable | Item Collect & Timer |
| Touch danger | To see if the level is interactive | The player will lose a life | The player loses a life and the hazard is hidden | Hazards |
| Lose three lives | To see if the lives system works | The player will die & ‘Game Over’ screen displayed | The player dies and ‘Game Over’ screen is displayed |
| Time runs out | When the player takes too long to complete the level it’s gameplay stops | ‘Game Over’ screen displayed | The ‘Game Over’ screen is displayed | N/a |
| Collect all items & interact with exit | The level can be completed | The ‘Score’ screen will be displayed | The ‘Score’ screen is displayed, however just like with the item collection it doesn’t matter where you click in the level  **(Fixed)** | Level Finish  Level Finish 2 |
| Whole game | All previous inputs | To check that the entire game works | The entire game will run properly and the player will be able to go between all of the levels | The entire game works as it is supposed to and the user can move through the levels I have created. | To check that my entire game runs when all of the sections are put together. | Computing Unit 14 Finished Game |

## User Feedback

# **Implementation**

## Code

### Menu

|  |  |
| --- | --- |
| Code | Comments |
|  | Attached to a piece of text with a collider and when clicked will load the Difficulty menu. |
|  | Attached to a piece of text with a collider and when clicked will load the Level menu |
|  | Attached to a piece of text with a collider and when clicked will close the game |

### Difficulty Menu

|  |  |
| --- | --- |
| Code | Comments |
|  | Attached to a piece of text with a collider and when clicked will set the ‘easy’ variable to true so that the time and bonus can be applied accordingly |
|  | Attached to a piece of text with a collider and when clicked will set the ‘medium’ variable to true so that the time and bonus can be applied accordingly |
|  | Attached to a piece of text with a collider and when clicked will set the ‘hard’ variable to true so that the time and bonus can be applied accordingly |

### Level Menu

|  |  |
| --- | --- |
| Code | Comments |
|  | Attached to a piece of text with a collider and when clicked will load level 1 |
|  | Attached to a piece of text with a collider and when clicked will load level 2 |
|  | Attached to a piece of text with a collider and when clicked will load level 3 |
|  | Attached to a piece of text with a collider and when clicked will load level 4 |
|  | Attached to a piece of text with a collider and when clicked will load level 5 |
|  | Attached to a piece of text with a collider and when clicked will load level 6 |

### Level

|  |  |
| --- | --- |
| Code | Comments |
|  | The ‘speedH’ is the horizontal movement speed of the camera while the ‘speedV’ is the vertical speed of the camera.  ‘yaw’ is how much the camera moves when the mouse pointer is moved left or right and ‘pitch’ does the same but for the mouse being moved up and down. The final live then moves the camera |
|  | ‘speed’ is the walk speed of the player, ‘jumpSpeed’ is how quickly the player moves upwards and ‘gravity’ is how quickly they return to the floor again.  The character controller is the arrow keys and when pressed the player moves in that direction, however it also checks that the player sprite is facing the way they are moving. |
|  | The script sets items to zero at the start of the level and sets items collected to the same as it is in the ItemCollect code. It then displays them in the textbox.  Every frame it changes Items to be the same as it is in the ItemCollect code so that I can have as many items as I want in one code without needing to have different code for each level. It then sets the two textboxes to the current number of Items remaining and items collected to display it on the UI. |
|  | At the start of the level ‘Items’ is incremented by one for every item that has this code attached.  Then when an item with this code attached is clicked on the item is hidden, the ‘Items’ variable decreased by one while the ‘Collected’ variable increased by one. |
|  | ‘Items’ is set to equal the ‘Items’ variable in the ‘Item’ code and every scene the Items variable is then reset.  If the model that I have attached the code to is then clicked and the items variable is equal to zero then Exit is set to true, the time remaining is stored and the ‘Score’ menu is loaded. |
|  | Lives is set to three at the start of the level and then put into the text box so that it is displayed on the UI.  Every time the mouse button is clicked, no matter where on the screen it is it will set lives equal to the number of lives in the hazard code so that is a hazard is clicked Lives will be decreased.  If the ‘Lives variable goes down to zero then the ‘Game Over’ menu is run |
|  | At the start of the level ‘Lives’ is set equal to the number of lives from the Life code.  Then when an item with this code attached is clicked on the item is hidden, the ‘Lives’ variable decreases by one. |
|  | This code is set to some objects so that when you click on them they disappear, this is because some of the items or hazards are hidden under or behind other objects to make them harder to find. |
|  | Timer takes the Boolean variables ‘easy’, ‘medium’ and ‘hard’ from the Easy, Medium and hard script to decide how then the player has at the start of the level.  The ‘Count’ variable is then set to time start and displayer in the textbox on the UI. The ‘Count’ variable then decreases and the textbox is set to that value.  When the time runs out the level ends and the ‘Game Over’ menu is displayed. |

### Score Menu

|  |  |
| --- | --- |
| Code | Comments |
|  | Calculates the player ‘score’ when the level is complete using the number of items the player collects and the number of lives they have remaining. It is then output on the Score menu by setting the textbox to display the ‘score’ value. |
|  | Calculates the player ‘total’ when the level is complete using the player ‘score’, the time remaining at the end of the level and the bonus based on whether they played on easy medium or hard. It is then output on the Score menu by setting the textbox to display the ‘total value’ value. |

### Game Over Menu

|  |  |
| --- | --- |
| Code | Comments |
| ScoreCalc | The code used is the same as the code used on the Score menu. |
|  | Calculates the player ‘total’ when the level is complete using the player ‘score’ and the bonus based on whether they played on easy medium or hard. It is then output on the Score menu by setting the textbox to display the ‘total value’ value. |

# **Enhancements**

1. At the moment when the player completes a level, they will automatically return to the difficulty screen, my end user suggested adding buttons so that the player can select whether they want to return to the difficulty menu to reselect the difficulty or to the level menu to play the next level on the same difficulty.
2. I felt that the players had an excessive amount of time to complete each level and when I asked my end users they agreed with me, so I’m going to reduce easy to five minutes, medium three minutes and hard to one minute.
3. Currently the total is calculated by multiplying the score by the time remaining but on easy the player automatically has more time so has a chance to get a higher score my end users felt that this was unfair because if they had completed a level on hard then their score should reflect this.

Evidence of improvements:

|  |  |  |
| --- | --- | --- |
| **Number** | **Evidence** | |
| 1 |  |  |
| Two buttons were used so that the player can choose to either return to the difficulty menu or to the level menu | |
| 2 |  |  |
| The timings have been reduced so that they are more reasonable and there is a higher chance of failing because a player runs out of time. | |
| 3 |  |  |
| The total is now multiplied by a bonus corresponding to the time it took them to complete the level and divided by 3600 so that it isn’t too large because there are two time based values  The FTotal ignores the finish time, because the user technically didn’t finish the level, and multiplies the score by a bonus before dividing by 60 to reduce the score because there is only one time based value | |

# **Review**

|  |  |  |
| --- | --- | --- |
| No. | Requirement | Analysis |
|  | A menu allowing the user to choose the level difficulty. | I have a menu at the start of my game that allows players to select the difficulty and it works exactly as I intended it to when planning, and I used the original colour scheme. It doesn’t look the same as my original idea though I prefer the way it looks to my original plan, especially now that it has an exit button to leave the game. |
|  | The higher the difficulty the shorter the time a player has to complete the level. | The harder the difficulty the less time the player has to complete the level, I was originally going to have this at 15 minutes for easy, 10 minutes for medium and 5 minutes for hard, but decided this was too long. As such I changed the timings to 5 minutes for easy, 3 minutes for medium and 1 minute for hard. |
|  | If the player fails to find all the items and exit the room in the given time, they will fail the level. | When the timer runs out if the player hasn’t found all the items in the level and interacted with the exit then the ‘Game Over’ menu is displayed and a score is calculated, though this score is less that the score they would have received had they completed the level. |
|  | A menu with multiple levels that the player can choose to complete. | I have a level menu that allows players to select the level they want to play and just as with the difficulty menu it works as I intended it to when planning and uses the same colour scheme. Also like the difficulty menu it doesn’t look identical to the original idea, as the buttons for the levels are smaller and I added a back button and an exit button. |
|  | The higher the level number, the more items a player needs in order to escape. | I only had time to make level 1 and level 2 however I did make it so that the player needed to collect more items in level one than they did in level 2. |
|  | A UI that shows the player how much time is left, the items they need to collect and the number of lives left | In the top left corner of the screen the player can see how long they have left, the number of items that still need collecting and the lives remaining. This interface changes with time ticking down, Lives decreasing on interacting with a hazard and the items in the level decreasing when collected. However I added another piece of information, showing how many items they had managed to find in the level so far. |
|  | A player will have to explore the room looking for the items to get out. | The player can move around the room and look at their surroundings to try and find the items. |
|  | The player will complete puzzles in order to collect items. | I didn’t do this as with the time I had I wouldn’t have been able to complete the code and design the levels to a decent standard. |
|  | There are dangers that they need to avoid interacting with. | If the player clicks on a hazard then they lose a life, the difference is that during planning I was going to use spiders, scorpions and snakes but given how long it took to create the model for the spider I decided to only make one of them. |
|  | Interacting with a hazard will result in the player losing a life. | The code for the hazards works as I intended; the hazards are placed around the level and when the player clicks on the player loses a live and the spider is hidden. |
|  | If the player loses three lives, they will die. | The lives tick down and when the player has clicked on three different hazards around the room they lose all of their lives sending them to the ‘Game Over’ menu. |
|  | When all items have been collected the player will need to use the items to solve the puzzle for how to leave the room. | Once the player has collected all of the Items and the Items variable is equal to zero, when they click on the exit the level ends. This is slightly different to how I originally planned the levels to work but it does the same thing. |
|  | When the puzzle for the exit is solved the level ends. | Once all the items are collected and the exit is clicked the level ends, however there isn’t really a puzzle that the players have to solve. |
|  | The player will receive a score at the end based on how long it has taken them to complete the level. | I ended up splitting the score up into two parts, the first part is calculated and stored in the score variable and the second part is calculated and stored in the total variable. I also have a different method for calculating the score when the player passed or fails a level as the calculation method for a level success would result in an answer of zero for the ‘Game Over’ total. |
|  | The score will be calculated by multiplying the number of items collected by 500, adding the remaining lives times 100 and multiplying it all by the time remaining in seconds. | The score was calculated by multiplying the lives remaining by 500 and the lives remaining by 100.  The success total was then calculated by multiplying the score by the time remaining and multiplying that by a bonus based on whether the user chose easy medium or hard before it was divided by 3600.  The fail total was calculated by multiplying the score by the same bonus before dividing by 60.  This differs from my original plan but works better than what I was originally going to do as it takes into account whether the player chose easy, medium or hard and means that the player gets a score is they fail but it will be less that any score they could achieve if they were successful |
|  | Players will then be awarded a star rating based on how many points they scored compared to the number of points available for the level. | In the end I decided not to do this as I felt since there are a different number of items every level the points needed to achieve them would have to differ and I decided that having to decide the number of points required to earn stars for each level and code it would take up a lot of time I could be using to make the main game better. |
|  | If the player has failed the level they will still receive a score for what they did but their overall score will be zero and their stars will be zero. | As previously stated I decided that I would have a different calculation for when the player failed or completed a level and I scrapped the idea of a star system. This means that while it is still possible to get a score of zero if the player doesn’t collect any items and loses all of their lives, they still get a score and can see how well they did even though they failed the level and can figure out how to improve. |

# **Evaluation**

My game met the majority of my success criteria, although I would have liked if I could have met all of them, unfortunately it would have been difficult in the time given to complete the project however with more time I believe I would have been able to do this. I am actually quite happy with how the actual design of my game turned out, I didn’t create my own player sprite but instead found one that someone else had made that was similar to how I wanted mine to appear as I felt like creating my own would take quite a while since I was already going to create all of my own models for the furniture and hazards as that is the main focus of my levels. My menus didn’t turn out exactly as I originally planned them to but I prefer how they ended up over my original plan because I think they look better; however I do agree with my end users that on the difficulty menu and the title menu that the writing was pixilated and I could have put a title screen with images to make it more interesting. The menus worked as intended, the difficulty buttons led to the level menu and the level buttons led to the levels. I used the difficulty to determine the amount of time the users had to complete the levels and also the bonus that was applied to ensure that the players received a score appropriate for how long they took in comparison to the difficulty they selected however I altered the timing so that it was shorter than my original plan because I thought it could be too long and the players agreed that the new timings were more reasonable.

As for actual playability the player is able to move around the level and I added camera rotation so the view moved with the mouse, making it easier to look for the items when I was hiding them in boxes on the ground or on top of shelves; when asked, my players believed that the items were well hidden, though user one did note that as they were always in the same location so when you had played it once it was easy to complete the level again. The players had to find all items in the level in order for interaction with the exit to have any effect and the player can see when they have collected all of the items by looking at the display in the top left corner. The display showed everything I planned it to though I added another textbox that showed the player how many items they had collected and the value of collected was used to calculate the score and total; one of my users thought that the display was the right size and one thought it was too small, as this is more about the users personal opinion with extra time I could attempt to add a feature that would allow the user to adjust the size of the display. While I only had time to create two levels, but in those levels I did increase the number of items that needed collecting and it was my intension to carry on doing so. Both players agreed that the room size was alright and that there was enough clutter to make the necessary items difficult enough to find, however user one did note that the idea of having themed rooms wasn’t clearly displayed with the two levels that I did have time to create as it was a study and a storage room and to really show I theme I would have needed more rooms to put it across. My users did think that there were enough hazards in the levels as there were five in the first one increasing to eight in the second but they were in agreement that they needed to be harder to avoid. I personally like the suggestion made by user one who said that they could become more difficult to avoid as the levels increase with them starting to move around to level. Again both users were in agreement that having multiple models for the hazards as I originally intended would have made things more fun to play and if I had more time I would have added these in and if I had more models I would likely have had certain models in certain rooms but I also liked player one’s suggestion of different hazards having different penalties. Something that player one suggested for the overall game is that there were no instructions so without me being there they wouldn’t have known the controls, I could have had a tutorial section that would teach the user what to do or had a button that told the user the controls, what their goal in each level was etc.

Failing the level didn’t change throughout the production of the game, the user had three lives which both users deemed reasonable and if they lost them all then the player died, they also failed if they ran out of time before collecting all of the items and leaving the level. Exiting the game was altered as I was originally planning to make the player solve puzzles to find the items and they would also have to work out how to leave the room, but I decided the code for this was too complex with the given time so just ended up making it so that when all the items were collected and the door was clicked on the player won. Score and total calculation went through some minor changes over the course of the game’s development as I decided to only make a single player game which meant I needed a different way to calculate the score, the player’s score also needed to take into account if the user was playing on easy medium or hard which I didn’t consider at first. I was also going to create a star rating system which is something else I disregarded while making the game and while, it might have been nice to have I personally like the way the score system is currently set up. Neither player were concerned with the lack of a star rating and said that they would only be interested in having one if there was a way to compare how they did with others who played the game. Player two believed that score calculation was reasonable though player one felt that the calculation was complex and not clearly explained at any point throughout the game. Player one once again commented on the act the fact that there could be pictures or something to make the screen appear more interesting while player two felt that something should be done to make the buttons taking the player back to the menus more obvious and that if a player failed a level advise could be offered on how to complete it.

I think I could have planned the project out in more detail when making the steps because I was being very ambitious to complete it all in the time period and if I had then I might have realised that I wasn’t going to complete everything I wanted to in the time period. However, despite this my initial idea was rather detailed along with my level designs and that meant I didn’t need to waste time thinking about it once I began, so was still able to create a working game even if it wasn’t exactly what I had in mind at the beginning. I could have looked into other game development software rather than just choosing a well-known one and seen if there was something that better suited my needs, but Unity is widely used and did have a significant amount of support that I could use. I think my level designs could have been more detailed because I only planned out one side of the room meaning that when creating the levels I still needed to decide how to decorate the other side at the same time as building it which may have added extra time to the process. For the actual programming of my game I think I did quite well as, despite not doing everything in the order that I originally planned, I eventually got everything working and this allowed me to focus on the design of the game which is probably the only reason that I even had time to create the second level. Overall, excluding the fact that I misjudged my timings at the start, I think I was actually fairly organised and did well to get as much done as I did. I also feel I worked fairly independently and was resilient, taking a break if I found a problem with my code and working on something else before coming back to it with fresh eyes. I would find my solutions using sources that I found online and as I developed my game I was able to build on my knowledge which could then be applied elsewhere in my scripts.

If I had more time, I would have added in a second player so that two people could explore the room and compete in finding the items, I would also have attempted to include a star rating on the score menu. Another thing I could have done was adding more levels and increased the complexity of the levels so that the players had to do more than just find items, for example I might have added in a safe that the players had to find the code for and enter in the correct values themselves rather than it being done automatically. Related to increasing the complexity of the levels, I would have liked it if I could have made it so that the draws in dressers would open and close along with cupboards and maybe had a false book that I could place objects inside; I would also have taken into account the suggestion made by end user one and had the hazards start moving around as the player moved onto harder levels and had different models for hazards that have different penalties. On top of this I would have looked into why the text was blurry on the Difficulty menu and Level menu so that I could fix this. Another thing I would have investigated was having the items move around the level so that they are in different places when a player repeated a level as well as having images or something on the menus to add more interest. In addition, the final thing I would have done was had a sound effect play when the player collects and item or loses a life.

# **Appendix**

## Project Log

25/11/19

* Layout word document
* Initial Ideas

02/12/19

* Add details to design ideas and choose which I will be doing

16/12/19

* Character design 1
* Level design 1

17/12/19

* Level design 1

18/12/19

* Level design 1

19/12/19

* Meeting with end user to provide feedback on design

23/01/20

* Character design 2
* Level design 2

27/01/20

* Level design 2

28/01/20

* Meeting with end user to provide feedback on design
* Final character design
* Final level design
* Storyboard
* Asset table

30/01/20

* Final level design
* Asset table
* Storyboard

03/02/20

* Storyboard

04/02/20

* Asset table
* Data dictionary

06/02/20

* Flowchart

10/02/20

* Flowchart

11/02/20

* Gantt Chart
* Test plan

12/02/20

* Test plan
* Success criteria
* Justification of chosen software

17/02/20

* Program character movement

18/02/20

* Program menu

19/02/20

* Code Item collection

20/02/20

* Technical Specification
* Level 1 – Create Shelves & door
* Level 1 – Place Shelves & door

21/02/20

* Code Timer
* Code Items
* In game GUI
* Level 1 – Create draws, desk, chair & lights
* Level 1 – Place draws, desk, chair & lights

22/02/20

* Level End code
* Player Camera code

24/02/20

* Fix ItemCollect
* Fix LevelExit

25/02/20

* Fix Menus
* Timer different for Easy, Medium and Hard
* Create Hazards

26/02/20

* Create Hazards

28/02/20

* Lives
* Code Hazards
* ‘Score’ screen

29/02/20

* ‘Score’ screen
* ‘Game Over’ Screen
* Change easy, medium, hard timing

01/03/20

* Give player options at end of level
* Make score calculation related to the amount of time the player starts off with.

02/03/20

* Level 1 - Create book

03/03/20

* Gantt Chart
* Data Dictionary
* Review – 1, 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17
* Level 1 – Place books
* Level 1 - Create papers
* Level 1 - Place papers

05/03/20

* Level 1 - Place papers

06/03/20

* Add code to document
* Comment Code
* Data dictionary
* Asset table

08/03/20

* Audio
* Level 2
* Criteria Review
* Evaluation

09/03/20

* Finalise Document
* Film final game

10/03/20

* Make questionnaire
* Add to justification
* Add to steps
* Introduction

23/03/20

* Improvised end users fill out Questionnaire
* Include questionnaire findings in evaluation

## Questionnaire

|  |
| --- |
| **Criteria – End User 1** |
| **Difficulty Menu** |
| 1. Does the menu allow you to choose a difficulty? |
| * **Yes** * No |
| 1. Does the exit button work? |
| * **Yes** * No |
| 1. What do you think of the appearance of the menu? |
| **Boring – needs more colour, some pictures, something ‘dynamic’ like movement.**  **Maybe a title showing the name of the game?** |
| **Level Menu** |
| 1. Can you select which level you want to complete? |
| * **Yes** * No |
| 1. Does the back button work? |
| * **Yes** * No |
| 1. Does the exit button work? |
| * **Yes** * No |
| 1. What do you think of the appearance of the menu? |
| **As previous comments.** |
| **Game Play** |
| 1. Do you have less time to complete the levels on medium difficulty and less time on hard than medium? |
| * **Yes** * No |
| 1. Is the time for easy medium and hard reasonable? If not should it be longer or shorter? |
| * **Yes** * No, Why? |
| 1. Is the number of items you need to collect reasonable? If no, why? |
| * **Yes** * No, Why? |
| 1. What do you think of the display showing how much time is left, the items left and the lives left? Are there any improvements that could be made to it? |
| **Would be more obvious if bigger & bolder** |
| 1. Are the items hidden well? Are they too difficult to find or not difficult enough? |
| **Items hidden well, for first play through not too difficult to find.** |
| 1. What do you think of the size of the rooms and their design? Are they too small or too big? Is there enough furniture and clutter? |
| **Room size ok – clutter ok – maybe could be improved with more colour or a theme.**  **In my opinion having say a haunted house escape room or a stately home with a library, kitchen, etc. or a castle** |
| 1. Are there enough dangers in the level? Should there be more or less? |
| **Yes – there are enough hazards** |
| 1. Should the dangers be harder to avoid or easier to avoid? |
| **Should be harder to avoid as level increases in difficulty. Maybe hazards should move around could increase speed they move dependant on difficulty level.** |
| 1. Do you like the design of the hazards? If no, why? |
| * **Yes** * No, Why? |
| 1. Should there be multiple models for the dangers? (e.g. scorpions) |
| **Yes would add to the interest of the game. Perhaps different hazards could have a different penalty. Lower for a spider, higher for a scorpion, higher again for a rat. Select appropriate hazard for each room…rats in kitchen, spiders in bathroom, etc.** |
| 1. What do you think of the number of lives the player has? Should they have more or less? |
| **Three lives seems good standard across games so seems appropriate** |
| **Score Menu** |
| 1. What do you think of the appearance of the score screen? Are there any changes that should be made? |
| **Score screen nice and clear. Only improvement would be pictures to add interest.** |
| 1. Is the score calculation reasonable? Should it be altered? |
| **Need an on screen explanation as to how score is arrived at.** |
| 1. Is the total calculation reasonable? Should it be altered? |
| **Seems complicated, could it be simplified?** |
| 1. Would you want to receive a star rating at the end of the level? |
| **No, unless there was the possibility of competing against other players.** |
| **Game Over Menu** |
| 1. What do you think of the appearance of the game over screen? Are there any changes that should be made? |
| **All screens appear to be a bit too formal like an office presentation – need more fun and drama – scary fonts, exclamation marks, joking comments like “Bad Luck…Loser!”** |
| 1. Is the score calculation reasonable? Should it be altered so that it differs from the level success score? |
| **Need an on screen explanation as to how score is arrived at, especially if different to calculation on success.** |
| 1. Is the total calculation reasonable on level failed? Should it be altered? |
| **Seems complicated, could it be simplified?** |
| 1. Would you want to receive a star rating at the end of the level? |
| **No, unless there was the possibility of competing against other players.** |
| **Entire Game** |
| 1. Did you enjoy the overall game? |
| **No, I don’t really play that many games, and in my opinion a handset to play would improve manoeuvrability**. |

|  |
| --- |
| **Criteria – End User 2** |
| **Difficulty Menu** |
| 1. Does the menu allow you to choose a difficulty? |
| * **Yes** * No |
| 1. Does the exit button work? |
| * **Yes** * No |
| 1. What do you think of the appearance of the menu? |
| **The layout is logical and concise, but the display font shows some pixelation.** |
| **Level Menu** |
| 1. Can you select which level you want to complete? |
| * **Yes** * No |
| 1. Does the back button work? |
| * **Yes** * No |
| 1. Does the exit button work? |
| * **Yes** * No |
| 1. What do you think of the appearance of the menu? |
| **The layout is logical and concise, but the display font shows some pixelation.** |
| **Game Play** |
| 1. Do you have less time to complete the levels on medium difficulty and less time on hard than medium? |
| * **Yes** * No |
| 1. Is the time for easy medium and hard reasonable? If not should it be longer or shorter? |
| * **Yes** * No, Why? |
| 1. Is the number of items you need to collect reasonable? If no, why? |
| * **Yes** * No, Why? |
| 1. What do you think of the display showing how much time is left, the items left and the lives left? Are there any improvements that could be made to it? |
| **Big enough to be read easily whilst not too intrusive to detract from gameplay** |
| 1. Are the items hidden well? Are they too difficult to find or not difficult enough? |
| **Seem to be about right** |
| 1. What do you think of the size of the rooms and their design? Are they too small or too big? Is there enough furniture and clutter? |
| **OK** |
| 1. Are there enough dangers in the level? Should there be more or less? |
| **OK** |
| 1. Should the dangers be harder to avoid or easier to avoid? |
| **Probably harder to avoid** |
| 1. Do you like the design of the hazards? If no, why? |
| * Yes * No, Why? |
| 1. Should there be multiple models for the dangers? (e.g. scorpions) |
| **Other items in addition to spiders would be better** |
| 1. What do you think of the number of lives the player has? Should they have more or less? |
| **OK** |
| **Score Menu** |
| 1. What do you think of the appearance of the score screen? Are there any changes that should be made? |
| **Different colour font or different appearance for the clickable text would be better.** |
| 1. Is the score calculation reasonable? Should it be altered? |
| **OK** |
| 1. Is the total calculation reasonable? Should it be altered? |
| **OK** |
| 1. Would you want to receive a star rating at the end of the level? |
| **A ranking against other players would be good** |
| **Game Over Menu** |
| 1. What do you think of the appearance of the game over screen? Are there any changes that should be made? |
| **Different colour font or different appearance for the clickable text would be better.** |
| 1. Is the score calculation reasonable? Should it be altered so that it differs from the level success score? |
| **OK** |
| 1. Is the total calculation reasonable on level failed? Should it be altered? |
| **OK** |
| 1. Would you want to receive a star rating at the end of the level? |
| **NO, but some advice to improve performance might help the player** |
| **Entire Game** |
| 1. Did you enjoy the overall game? |
| **Yes** |

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