**Testing**

**Strategy**

The purpose of my tests of my program is so that I can be confident that all areas of my project function properly, areas that don’t function correctly will be fixed so they have the expected outcome. I will test my project by creating both a large test table which will help in organising the tests and ensure all are completed. Finally, to prove that I have indeed tested my code I have created a video with timestamps demonstrating the point at which each test is completed alongside my test table.

To test my login system, I will first attempt to enter valid and invalid data which is usernames which haven’t been used before and passwords which are incorrect. To test the registration section of the login system I will attempt both invalid and valid data as before. This could include usernames that have already been taken, or usernames and password that are either too long or short. I can then test my database by making sure the users account was created in order to show my database exists and is working. Finally, I will attempt to log in with the account I just created to show the system works.

I will demonstrate the GUI by clicking each of the bright buttons and hovering over them to show how they change colour to suggest you can interact with them.

To test the leader board page, I will be comparing the top ten users displayed on the page against the top 10 users I get from a SQL database query. To also test the leader board works I will be inputting data directly to the database and once I review testing the leader board to see if the leader board has updated or not.

I will use my singleplayer and multiplayer sections to test a range of objectives. To test the level increase works I will be fully completing a set number of levels of the game. I will work my way up to level five to demonstrate how the games difficulty gradually progresses as more ghosts are released at later levels. I will be testing my in-game music by selecting the singleplayer mode and waiting for any music to play. My in-game graphics will be demonstrated through my traversal of either the multiplayer or singleplayer sections. I will test the game being paused in both the singleplayer and multiplayer sections to demonstrate it working and what happens when it is paused. I will also test the keys being able to control the player. I will test my game score through the singleplayer game mode. To test this section, I will move the player around collecting the different types of Pac dots, large Pac dots and fruits and monitoring the score seeing if it will increase or not. I will also test if the lives score and levels variables are displayed on the screen and if the increase accordingly.

To test if the database saves the users data, I will be playing a game and getting a high score then checking the leader board and database to see if the data has been updated.

To test each ghost, I will show each ghost moving individually once by one in order to demonstrate the difference in their algorithms. I will be attempting to show the red ghost chasing the players direct location, the blue ghost hovering around the large Pac dots if any remain, the black ghost who has intervals between when he chases the player and roams randomly and the orange ghost who predicts where the player is going and if possible, attempts to get two spaces ahead of them. Each ghost will also demonstrate the shortest path algorithm they are using to find the path they take. I will also test to ensure the ghosts remain in the ghost cage until the requirements for them to leave have been met. I will also test player collisions with ghosts when the ghosts aren’t frightened to see if the player dies. I will also test player collision with the ghost when the ghost is frightened which will test if the ghost image changes to eyes once he has been eaten and runs away back to the ghost cage.

Finally, I will test the multiplayer section of the game by playing across two separate computers and recording them to show the games are connected and also demonstrate how multiple isolated games can be run simultaneously.

I will perform a test in order to prove that my entire program works by following a set path, the path goes as followed:

I will first attempt to sign in with invalid details, I will then register a new account to show this section is working and show the database to show the new username and password was registered.

I will then proceed to sign into this new account and check the leader board to see all the high scores once again opening the database and running a SQL command to verify these are the top accounts. I will then play a singleplayer game to demonstrate majority of the objectives.

Once I have finished with the singleplayer mode and set a high score I will check the leader board again in order to demonstrate how it updates.

I will then move onto the multiplayer section of the code opening two different games and showing how they are linked then opening another game and showing how that is independent of any other game.

Then I will have a separate video to further demonstrate the individual ghost moving mechanisms.

LOGIN SYSTEM TEST: <https://youtu.be/8M7WCXNeP6M>

SINGLEPLAYER GAME TEST: <https://youtu.be/bObs6P0TXiA>

SINGLEPLAYER PAUSE TEST: <https://youtu.be/FXtyvoLrufA>

MULTIPLAYER GAME TEST: <https://youtu.be/cQrqajnl6aA>

MULTIPLAYER GHOST DEATH: https://youtu.be/yhel9meSkwU

GHOST SHORTEST PATH TEST: <https://youtu.be/pntvLEjjYic>

CLOSEST PAC DOT TEST: <https://youtu.be/hH2E8_Sg6i8>

BLACK GHOST MOVEMENT TEST: https://youtu.be/xeIdaAL5g1o

ORANGE GHOST MOVEMENT TEST: https://youtu.be/0wCTO8-tfhM

Singleplayer Tests

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| --- | --- | --- | --- | --- | --- | --- |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **1.01** | Empty username or password box returns an error | Username: “”  Password = “” | Error prompt indicating you must enter data | Error window appears | **NONE** | **0:03**  LOGIN SYSTEM TEST |
| **1.02** | Invalid usernames and prevent user log in | Username: notausername  Password:  Password | Error prompt indicating the username doesn’t exist in the system | Error window appears | **NONE** | **0:15**  LOGIN SYSTEM TEST |
| **1.03** | Invalid password prevents user log in | Username: admin  Password: notthecorrectpassword | Error window indicating the password is incorrect | Error window appears | **NONE** | **0:24**  LOGIN SYSTEM TEST |
| **1.04** | Register new account with pre-existing username | Username: admin  Password: newuser | Error prompt indicating the account already exists | Error window appears | **NONE** | **0:39**  LOGIN SYSTEM TEST |
| **1.05** | Register new account with invalid username conditions | Username: hi  Password: pacman | Error prompt indicating username too short | Error window appears | **NONE** | **0:50**  LOGIN SYSTEM TEST |
| **1.06** | Register new account with invalid password conditions | Username: newuser  Password: pas | Error prompt indicating the password is too short | Error window appears | **NONE** | **0:59**  LOGIN SYSTEM TEST |
| **1.07** | Register a user with valid account details | Username: newuser  Password: password | Successful account creating prompt | Info window appears | **NONE** | **1:06**  LOGIN SYSTEM TEST |
| **1.08** | See if the registered data is saved to the database | SELECT \* From user WHERE username = ? | Account saved on database | Account on database | **NONE** | **1:16**  LOGIN SYSTEM TEST |
| **1.09** | Login with valid username and password details | Username: newuser  Password: pacman | Login window closed and the user is taken to the menu screen | User logged in successfully | **NONE** | **1:29**  LOGIN SYSTEM TEST |
| **1.10** | Button changes colour when hovered over | Mouse over button | Button becomes darker | Button becomes darker | **NONE** | **1:34**  LOGIN SYSTEM TEST |
| **1.11** | Button achieves the goal intended that’s written on the button | Leader board button clicked | Taken to leader board screen | Leader board screen appears. | **NONE** | **1:41**  LOGIN SYSTEM TEST |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **1.12** | Leader board displays correct top 10 players from the database | “Select username, highscore From user ORDER By highscore DESC” | Correct 10 users displayed | Correct users displayed | **NONE** | **2:25**  LOGIN SYSTEM TEST |
| **1.13** | Does the menu button work | Menu button clicked | User taken back to the menu screen | User taken to menu screen | **NONE** | 0:02  SINGLEPLAYER GAME TEST |
| **2.00** | Does the singleplayer button work | Singleplayer button clicked | User taken to the singleplayer game | Singleplayer game starts | **NONE** | 0:09  SINGLEPLAYER GAME TEST |
| **2.01** | Test that the game doesn’t start till the onscreen counter is finished. | Trying to move. | Unable to move and ghosts don’t move | All sprites remain in position | **NONE** | 0:16  SINGLEPLAYER GAME TEST |
| **2.02** | Collecting pac dots updates score and removes the from the screen | Moving into pac dots | Score increases and they removed from the screen | Score increased and they’re removed from screen | **NONE** | 0:18  SINGLEPLAYER GAME TEST |
| **2.03** | Game music and pac dots | Playing game | Music Plays | Music Plays | **NONE** | 0:25  SINGLEPLAYER GAME TEST |
| **2.04** | Blue ghost released once the player gains 200 points | Collecting 200 points | Blue ghost leaves ghost cage | Blue ghost leaves ghost cage | **NONE** | 0:30  SINGLEPLAYER GAME TEST |
| **2.05** | Collisions with ghost when they aren’t frightened results in player losing a life and the images that represents lives decrease by one | Player collides with ghost when the ghost isn’t frightened | Player restarts level and loses a life | Level restarts and the player loses a life | **NONE** | 0:26  SINGLEPLAYER GAME TEST |
| **2.06** | Collecting a large pac dots changes the ghosts state and makes the frightened | Moving into large pac dots | Ghost becomes frightened and runs and runs away | Ghost becomes frightened and runs to its corner | **NONE** | 0:41  SINGLEPLAYER GAME TEST |
| **2.07** | Frightened ghosts have a unique image | Eating large pac dot | Ghost turns a dark blue | Ghost turns dark blue | **NONE** | 0:41  SINGLEPLAYER GAME TEST |
| **2.08** | Frightened ghosts will run to their unique corner with the shortest path | Eating large pac dot | Ghosts runs away | Ghost runs | **NONE** | 0:42  SINGLEPLAYER GAME TEST |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **2.09** | Ghosts flicker in last 3 seconds of being frightened | Eating large pac dot | Ghosts flicker | Ghost flicker | **NONE** | 0:52  SINGLEPLAYER GAME TEST |
| **2.10** | Collision with ghost that is frightened results is the ghost’s death and the ghost runs to the ghost cage | Eating ghost when the ghost is frightened | Ghost dies | Ghost dies | **NONE** | **1:02**  SINGLEPLAYER GAME TEST |
| **2.11** | Dead ghosts will have an image of eyes and run to ghost cage using the shortest path to get there | Eating ghost when it is frightened | Ghost runs away as an eye image | Ghost runs away as an eye image | **NONE** | **1:02**  SINGLEPLAYER GAME TEST |
| **2.12** | Player is able to pause game | Clicking esc | Game paused | Game paused | **None** | **0: 10**  SINGLEPLAYER PAUSE TEST |
| **2.13** | Player is able to resume game | Clicking resume game buttons | Resume game | Game resumed | **None** | **0:13**  SINGLEPLAYER PAUSE TEST |
| **2.14** | Completing the level reset the maze and all entities | Eating all pac dots and large pac dots | Game reset | Game reset | **NONE** | **1:38**  SINGLEPLAYER GAME TEST |
| **2.15** | Black ghost comes out at level 3 | Reach level 3 | Black ghost begins to move randomly | Black ghost moves randomly | **NONE** | **2:51**  SINGLEPLAYER GAME TEST |
| **2.16** | When the black ghost is chasing its image changes to a white ghost | Move around maze | Image changes | Image changes | **NONE** | **3:00**  SINGLEPLAYER GAME TEST |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **2.17** | Orange ghost comes out at level 4 | Reach level 4 | Orange ghost begins to chase two spaces ahead of pacman | Orange ghost chases | **NONE** | **4:01**  SINGLEPLAYER GAME TEST |
| **2.18** | When the player loses all their lives the game freezes and the player has the option to the menu or to start again. | Die repeatedly to the ghosts | Game over heading appears alongside buttons. | Game over message appears alongside buttons. | **NONE** | **4:45**  SINGLEPLAYER GAME TEST |
| **2.19** | Players Score updates on leaderboard once they die | “Select username, highscore From user ORDER By highscore DESC” | Score updates on leaderboard | Score updates on loaderboard | **NONE** | **5:07**  SINGLEPLAYER GAME TEST |

Multiplayer Test

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| --- | --- | --- | --- | --- | --- | --- |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **3.00** | Multiplayer button takes you to the multiplayer section | Clicking multiplayer button | Multiplayer game opens | Multiplayer game opened | **NONE** | **0:02**  MULTIPLAYER GAME TEST |
| **3.01** | When player connects to multiplayer there is a waiting screen | Join multiplayer game | “Waiting For Player 2…” message on screen | Waiting message on screen | **NONE** | **0:05**  MULTIPLAYER GAME TEST |
| **3.02** | When a second player joins the game it automatically starts | Second player join game | Game countdown occurs | Game countdown starts | **NONE** | **0:17**  MULTIPLAYER GAME TEST |
| **3.03** | When one player on his screen he also moves on player twos screen | Moving around | Players position is updated on both screens | Players position updated on both screens | **NONE** | **0:23**  MULTIPLAYER GAME TEST |
| **3.04** | When a player increases their score the score updates on both screen | Eats pac dots | Score updates on both screens | Score updates on both screens | **NONE** | **0:25**  MULTIPLAYER GAME TEST |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **3.05** | When one of the players dies their total life decreases for both players. | Die | Image that represents lives decreases by one on both players screens | Image that represents lives decreases by one on both screens | **NONE** | **0:43**  MULTIPLAYER GAME TEST |
| **3.06** | All ghosts’ positions are updated on both screens and the positions and directions are identical | Move around and have ghost chase me | Ghost position is identical in both games | Ghost position is the same | **NONE** | **0:26**  MULTIPLAYER GAME TEST |
| **3.07** | When either player consumes a large pac dot the ghost becomes frightened and their image changes on both screens | Eat large pac dot | Ghost becomes frightened on both screens | Ghost is frightened on both screens | **NONE** | **0:49**  MULTIPLAYER GAME TEST |
| **3.08** | Ghosts flicker on both screens when they have 3 seconds of being frightened left | Eat large pac dot | Image flickers on both screens | Flickers on both screens | **NONE** | **1:03**  MULTIPLAYER GAME TEST |
| **3.09** | When either player collides with a ghost when its scared the ghost dies on both screens | Eat ghost when frightened | Ghost image changes on both screens | Ghost image changes on both screens | **NONE** | **0:12**  MULTIPLAYER GOHST DEATH |
| **3.1** | Frightened ghosts will run to their unique corner with the shortest path on both screens | Eating large pac dot | Ghosts runs away on both screens | Ghost runs on both screens | **NONE** | **0:49**  MULTIPLAYER GAME TEST |
| **3.11** | When one player pauses the game, it is paused for both players | Click esc to pause game | Both players have a paused screen with different messages | Both players have a paused screen with different messages. | **NONE** | **1:06**  MULTIPLAYER GAME TEST |
| **3.12** | Games are made independently of each other and other players can play a unique game simultaneously to your game | Open another game with two more players | Games are unique | Games are unique | **NONE** | **1:54**  MULTIPLAYER GAME TEST |
| **3.13** | Dead ghost run to the ghost cage using the shortest path | Eating ghost when frightened | Ghost runs to ghost cage | Ghost runs to ghost cage | **NONE** | **0:12**  MULTIPLAYER GOHST DEATH |

Ghost Shortest Path Test:

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| --- | --- | --- | --- | --- | --- | --- |
| **Test No.** | **Test Purpose** | **Test Data** | **Expected Outcome** | **Actual Outcome** | **Changes** | **Timestamp of test and appropriate video** |
| **4.00** | Ghost is able to find shortest path between two points | Two random points in the maze | Ghost traverse shortest path | Ghost traverses’ shortest path | **NONE** | **0:00 – 1:24**  GHOST SHORTEST PATH TEST |
| **4.01** | When ghost is frightened it runs to its corner using the shortest path | Red and Blue ghost as examples. | Ghost takes shortest path | Ghost takes shortest path | **NONE** | **1:26 – end**  GHOST SHORTEST PATH TEST |
| **4.02** | Blue ghost is able to find the closest pac do to pacman and travel the shortest distance there | Blue ghost and pacman | Travels shortest distance to large dot | Shortest distance travelled. | **NONE** | **ENTIRE VIDEO**  CLOSEST PAC DOT TEST |
| **4.03** | Back ghost has unique behaviour and travels shortest distance | Black ghost and pacman | Black ghost travels shortest path and changes its image when it is chasing the player | Black ghost travels shortest path and changes its image when it is chasing the player | **NONE** | **ENTIRE VIDEO**  BLACK GHOST MOVEMENT TEST |
| **4.04** | Orange ghost has unique behaviour that chases two spaces ahead of player using the shortest path algorithm. | Orange ghost and player | Travels the shortest path to cut off the player | Shortest path travelled. | **NONE** | **ENTIRE VIDEO**  ORANGE GHOST MOVEMENT TEST |

In my test I have decided to only show the frightened shortest path for two ghosts, the red and blue this is because all the ghosts use the same shortest path algorithm in order to get to the predetermined squares so essentially the outcome of one ghost is identical to the other ghosts the end result would just be arriving at a different square. Finally, this is the same for when the ghost has died and Is no longer alive as the end position is the only difference. In my videos and testing I opted to show the shortest path algorithm works as a whole at different positions in order to show it will work regardless of the end and start location.