|  |  |  |  |
| --- | --- | --- | --- |
| Objective | Met ? | Comment | Test Reference |
| Login system that only accepts the correct username and password combination from the user. | Yes | The login system will allow a user to log into the system as long as their username and password are correct and have previously been registered. If the user enters a username that hasn’t been registered into the system, then an error message informing them that the username doesn’t exist pops up on the other hand if their password is incorrect then they’re brought an error screen saying incorrect password.  Objective met as the user is able to sign into the game as long as their details are correct. | **1.01**  **1.02**  **1.03**  **1.09** |
| Sign Up/ Register Option for users who do not have an account and would like to play the game. | Yes | If users attempt to register an account with a username that’s already been registered, then they are told so in a error message box the same happens if their username is too short or long or if their password is too short. Otherwise, their account will be registered.  This objective has been met as users are able to create a new account. | **1.04**  **1.05**  **1.06**  **1.07** |
| Music in the background of the game as well as special sounds for events such as picking up “Pac-Dots”. | Yes | Once the level starts the music starts playing and every time he dies, restarts or un pauses the level the music will restart.  Objective met as players have in game music in the singleplayer mode. | **2.03** |
| Graphics that will be loaded into the game and used for the Pacman, the four different ghosts and the “Pac Dots”. | Yes | N/A | **Figure 1.1** |
| Objective | Met ? | Comment | Test Reference |
| Leader board which will be accessible from the menu page and will show the top ten high scores as well as their gamertag. | Yes | The leader board is constantly updating and will display the top 10 users if available.  Objective met as players are able to view the top high scores in the game. | **1.12** |
| Multiplayer Network Option which allows friends to simultaneously play with their friends on the same map. | Yes | The players are able to play across a network. Once one player joins, they have a waiting for player two screen and the game won’t begin until another player joins then when they join the game runs the same as a singleplayer game but with two players.  Objective has been met as two players are able to play an entire pacman game together across a network. | **3.0 – 3.12** |
| Maze Solving this will be used in the AI for the ghosts and will enable to try and eat Pacman throughout the game. | Yes | The A\* shortest path algorithm provides the shortest path between positions in the maze.  Objective met as the ghost is able to traverse the shortest path between two positions. | **4.0** |
| Various AI ghosts each using the same algorithm but having different destination cells. | Yes | Each ghost is different as the red ghost chases your exact location, the blue ghost the closest large pac dot, the black ghost has intervals of peace and chasing you and the orange ghost attempts to cut you off and aims for the cell two spaces ahead of you.  Objective met as the ghosts all have different behaviour patterns. | **4.00 – 4.04** |
| Objective | Met ? | Comment | Test Reference |
| Point System | Yes | As the player collects pac dots their score increases.    This objective has been met as there is a clear point system in the game. | **2.02**  **3.04** |
| Game Pause | Yes | If the player clicks the esc button the game will pause both in multiplayer and singleplayer.  Objective met as users can pause. | **2.12**  **2.13**  **3.11** |
| Easy to use GUI with interactive buttons | Yes | The buttons are large and colourful and also change colour as you hover over them.  Objective has been met as buttons are easy to use and change colour. | **1.10**  **1.11**  **1.13**  **2.00**  **3.00** |
| Display points and lives at the top of the screen. | Yes | Objective met as points and score are shown constantly during the game. | **2.02**  **3.04** |
| Users score saved to the database and leader board updated. | Yes | Leader board updates once the singleplayer game is over.  Objective met as the users score is saved to database. | **2.19** |
| Graphics that will change for the ghosts once the “Pac Fruit” has been eaten and flickers when there’s 3 seconds left of being frightened. | Yes | Ghosts become frightened and run to their corners.  Objective met as their image also updates when they are frightened in singleplayer and multiplayer games. | **2.07**  **2.09**  **3.07**  **3.08** |
| Frightened ghosts use shortest path algorithm to run away |  | Ghosts run to their corners using the shortest path algorithm.  Objective met as ghosts take the shortest path to their corners | **2.08**  **3.1**  **4.00**  **4.01**  **4.02** |
| If the ghost Is eaten after their graphics will change to just eyes and run to the ghost cage using shortest path algorithm. | Yes | Ghost dies if the player eats the ghost once it is frightened.  Objective met as ghost image will change to eyes in both single and multiplayer games. | **2.11**  **3.09**  **3.13** |
| Objective | Met ? | Comment | Test Reference |
| Then once the player gains a certain number of points or a set amount of time passes the blue ghost will exit the chamber and attempt to chase Pacman. | Yes | Once the player gains 200 points or 20 seconds passes the blue ghost is released.  Objective achieved as the ghost leaves once a specific condition has been met. | **2.04** |
| The black ghost leaves the chamber at level 3. | Yes | Once the player reaches level 3 the black ghost is released.  Objective achieved as the ghost leaves once a specific condition has been met. | **2.15** |
| Then finally the orange ghost leaves last and he does not do so until at least level 4. | Yes | Once the player reaches level 4 the black ghost is released.  Objective achieved as the ghost leaves once a specific condition has been met. | **2.17** |
| Randomly generated Pacman maze, this will be dependent on if I have enough time. | No | N/A | **N/A** |
| Multiple Levels to make game more difficult. | Yes | Once the player collects all the dots in a level the next level automatically begins.  Objective met as the game has multiple levels in which more ghosts exit in order to make it more difficult. | **2.14** |

**Users Feedback**

**How easy is the system to use ?**

**“**The system is so easy to use I love it. Right from the login screen I saw a lot or clear and straightforward text and buttons like the register and log in. When I got to the menu page I loved how all the buttons just stood out to me like it was all so easy to read and clear. Then when I clicked each button, they took me to the correct place.”

**What do you enjoy about the game ?**

“The singleplayer game was very fun to play I loved how it got more challenging later on once more ghosts left the chamber.” - 19-year-old

“I really like how colourful all the buttons are on the screen. My favourite feature was the multiplayer section, I loved being able to play with my friends” – 10-year-old.

**Does it meet the objectives ?**

“For me 100% . Nearly everything that I would want in a pacman game is here. Looking at the objective table above I can agree that all the objectives they said they met have met.”

**Any areas to improve ?**

“Overall, I think the game is wonderful and I know I would really enjoy playing a game like this, however, random mazes are a feature that I would have loved to see. I feel like even though the game is really enjoyable I think that adding random mazes would prevent the game from even becoming repetitive another suggestion I have is more customisation of the game of example I would love to have choices on the look of pacman and maybe there was a way you could make the game easier for younger players by making the ghosts easier possibly. The final feature I would really enjoy in the game would be a friends list or a way to play with specific friends rather than random players.

**Feedback analysis:**

Overall, the feedback that I have received from two potential end users has been mainly positive this has filled me with a lot of confidence that I have achieved my objectives and produced a good game. I was happy hear that the buttons made the system easy to use for all ages as that was a feature I really wanted to get right in the system. I agree with the areas to improve these were features that were initially meant to be in the game however due to time constraints they weren’t able to be implemented.

**Possible Extensions**

If I were given the chance to develop my game again there are some features/objectives that I would certainly love to add. The first feature would be random maze generation. Initially I set out to add this feature however I didn’t have time to complete it. Initially I set out to have the maze represented and pygame drawn rectangles however this didn’t look good and I felt as though with these graphics wouldn’t have met the needs of the end users. Next time I would create a maze then randomly place Tetris like shapes such as L, T I and rectangles and squares like there are in the original pacman maze. Then for each wall in the maze I would represent it with wall image and see if that would be better visually. This would make my game more unpredictable and less repetitive which could make users play for longer periods of time.

Another feature I would add to my game next time would be a setting/customisation file and button on the screen. Right now, my game doesn’t have any form of customisation I would like to implement a way for the player to be able to change the image of the ghosts and the image of the player, I would also add a way for the player to be able to change the game music.

Also, if I had more time, I would’ve provided a way for players to play with their friends and a friends list. I initially set out to do this and if I had more time It was a feature that I certainly would’ve included this feature would’ve made my game more enjoyable for the end users as they can play specifically with who they want to and also see if their friends are online at any time.

Finally, the last objective I would do differently is my shortest path algorithm. Currently I am using the A\* shortest path algorithm which is very efficient at finding the shortest path. It is better than Breadth first search in that is doesn’t search the entire maze it only searches the paths that are the closest distance to the end. However, the algorithm relies on a heuristic value that is reliable and accurate however in the pacman maze this can be difficult to achieve as some distances are further away however they lead to the shortest path which is something that should be impossible in the A\* method. In my algorithm I took this into account in order to make the ghosts take the shortest path however next time I would prefer to use a different algorithm like BFS despite its time limitations.