

# Memory Game Project for UTM CSCI 352

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## Abstract

**This project is a Memory Game that keeps score of how many matches the player got. The target for this game is for anyone that likes memory games or that likes to test their memory. The look of this program is based on a hand-drawn aesthetic.**

## 1. Introduction

We made a fun and good looking game for entertainment purposes only. If people play this game, we hope they just have fun and not compare it to one of those bad ad infested games on the app store. This was a good experience in how creating games for a living would be and we have a better understanding on how 2D video games are made.

### 1.1. Background

We decided to do a fun game for our project because we both play video games all the time and wanted to see how complex it would be to make. We chose a memory game because we both like puzzles and mystery solving, and also memory games are a great and engaging way to keep your brain and memory active.

### 1.2. Impacts

The only impact that this project would really have is on health. Computer eye strain is a real concerning problem when looking at a computer screen for long periods of time or any screen for that matter. We highly recommend, if you feel your eyes getting tired or worse start getting blurry even when you look away from the screen, take a break from your work, game, or whatever you are doing. On another lighter note, memory games can have an impact on improving your memory and can help you later on in life when your memory would start deteriorating. Any game that challenges your brain are good mental exercises in general.

### 1.3. Challenges

The challenges in this project were not too demanding, but they were still very complicated to overcome. Figuring out how to program buttons to hide themselves and show a picture was fairly simple. The real challenge came when we tried to check if another picture was showing and if that picture was a match or not. We ended up using a bunch of if/else statements, as well as bool values to check when pictures had been clicked. This was by far the most challenging and most complex things in this project to do, but it was good learning experience and taught us how it must be when real game developers make a game. There were a few more challenges, like figuring out how background music works, and where the sound needed to be called from so it played through the whole game without being recalled. Another challenge was how to navigate through the pages, and how to make a timer not global so when the game ends, it wont still be going in the background and call a null exception. Overall I am happy that we were able to overcome these challenges and have something we can both be proud of

## 2. Scope

The goals we set for this project were to have a good looking game that is fun and pleasing to look at, to be able to play the game several times and not have it break down or stop. We want it to be fun, but challenging. Another goal is to have music, and to have the pictures disappear when a match is made. All these goals give us ideas on how this project would look and how we want it to work.

Stretch goals:

- taking away the matched pictures from the board in a fade out animation
- to have background music and let the user mute/unmute the background music

We think the project will be done when we are able to play an entire game and have no major hiccups, with maybe minor, non game breaking bugs. We want all the functionality that we have stated to be in this game, and we feel confident that we have the capabilities to do them.

Use Case ID	Use Case Name	Primary Actor	Complexity	Priority
1	A game is started	Player	Med	1
2	Pause	Player	Med	1
3	Continue playing	Player	Med	1
4	Restart	Player	Med	1
5	Mute	Player	Med	1
6	Wins	Player	Med	1

TABLE 1. MEMORY GAME USE CASE TABLE

## 2.1. Requirements

These requirements are just basic computer game standards that we felt needed to be in the game. We also looked at other memory games and they all seem to have these general requirements.

### 2.1.1. Functional.

- Game lets user click on all the buttons to reveal the pictures so they can make a match
- Game has ability to let the user restart from the pause menu in the game
- Game has 3 levels of difficulty
- Game has background music
- Game lets user turn off background music if wanted

### 2.1.2. Non-Functional.

- Game has nice menu layouts (the font looks good and the colors are readable against the background), and nice backgrounds that make the game look modern
- Game should load within a few seconds
- Each screen transition should be smooth

## 2.2. Use Cases

These use cases are brief examples of how our game is expected to run and be used.

Use Case Number: 1

Use Case Name: Player starts a new game

Description: A player wants to start a game on normal difficulty. They will click on the “Normal” button. This will start the process of loading up the normal game screen.

- 1) Player loads the game and the start menu is loaded into the window.
- 2) Player left-clicks on the “Normal” button.
- 3) The normal game screen is loaded up, the timer starts and the pictures are shown for 5 seconds so the user can memorize them.
- 4) When the timer hits 60, the buttons cover the pictures.
- 5) The player can now play the normal difficult game.

Use Case Number: 2

Use Case Name: Pause

Description: A player wants to pause the game. They will click the “Pause” Button. This will stop the timer and show a pause menu.

- 1) Player is playing game.
- 2) Player clicks the “Pause” button.
- 3) The timer stops, and the player is taken to another screen.
- 4) The player can either resume playing the game, restart the game, or quit the game.

Use Case Number: 3

Use Case Name: Resume

Description: A player wants to resume the game. They will click the “Resume” Button. This will start the timer again and show the last screen with all matches still counted.

- 1) Player has paused the game.
- 2) Player clicks the “Resume” button.
- 3) The timer starts again, and the player is taken back to the screen they were just at with the score and matches still saved.

- 4) The player continues to play the game.

Use Case Number: 4

Use Case Name: Restart

Description: A player wants to restart their game. They will click on the “Restart” button in pause menu. This will restart the game with the same difficulty, erasing the previous game.

- 1) Player pauses the game.
- 2) Player hits restart from pause screen.
- 3) The game mode will be restarted.
- 4) The timer will restart and the score will be reset back to 0 and the matches will all be deleted and be shown to the player again for about 5 seconds.

Use Case Number: 5

Use Case Name: Mute

Description: A player wants to mute their game’s music. They will click on the “mute” button (picture of a speaker) while the game is playing. This will stop the music from playing.

- 1) Player is playing game.
- 2) Player hits mute button.
- 3) The music stops until the user hits the unmute button.

Use Case Number: 6

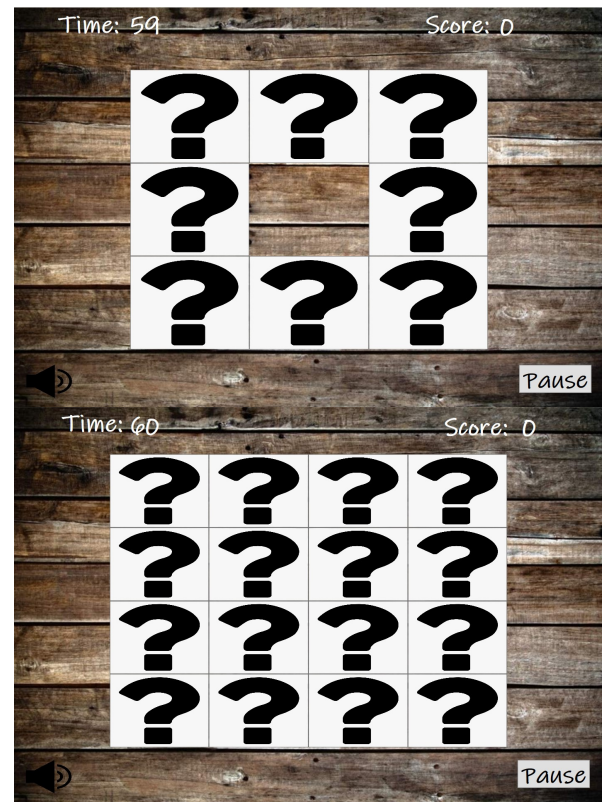
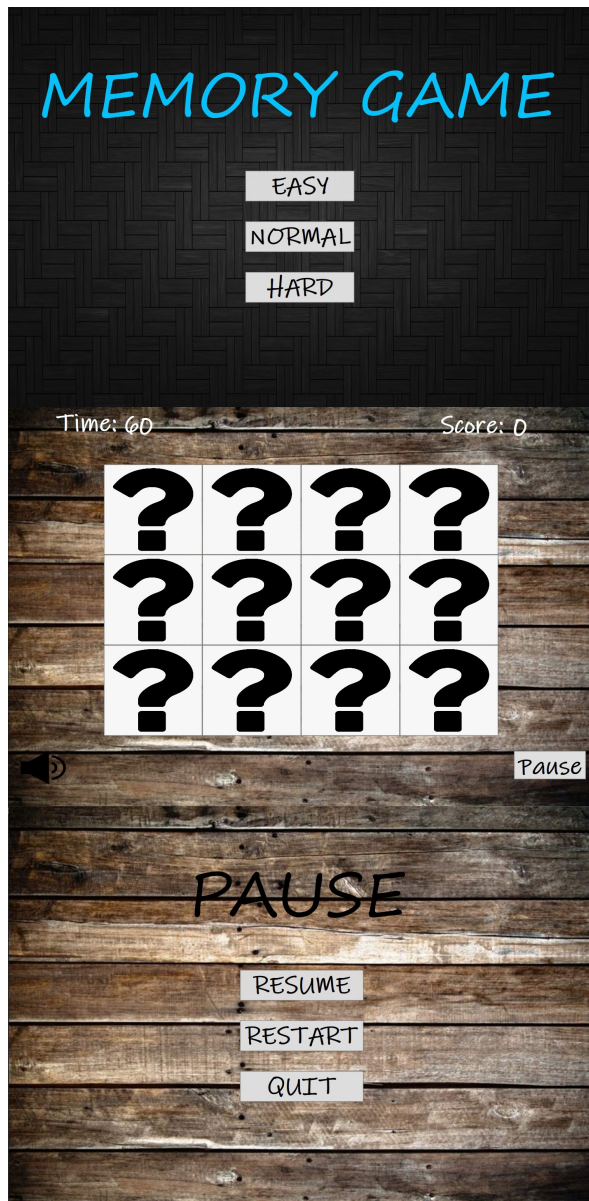
Use Case Name: Player wins

Description: A player gets all the matches and wins the game.

- 1) Player gets all matches.
- 2) The game ends and the timer stops.
- 3) The player is taken to a winner screen for that difficulty.
- 4) The player can read the score, how many matches were made, and then hit the quit button, which will unmute the music if the music was muted and take the player back to the start menu.

## 2.3. Interface Mockups

These pictures are screen shots of the windows of the game. The first picture, (top left), is the start menu and it just lets you pick which difficulty you want. The next picture, (top right), is the easy difficulty, it is what you see when you hit the easy button on the start menu and it has 4 pictures to match. Below the start menu is the normal difficulty, and it has 6 pictures that are a little more complex than the easy difficulty. Next to normal, and under easy is the hard difficulty, and it has 8 pictures that are very difficult compared to the other difficulties. And finally, under the normal difficulty is the pause page and it allows you to resume, restart, or quit the current game.



### 3. Project Timeline

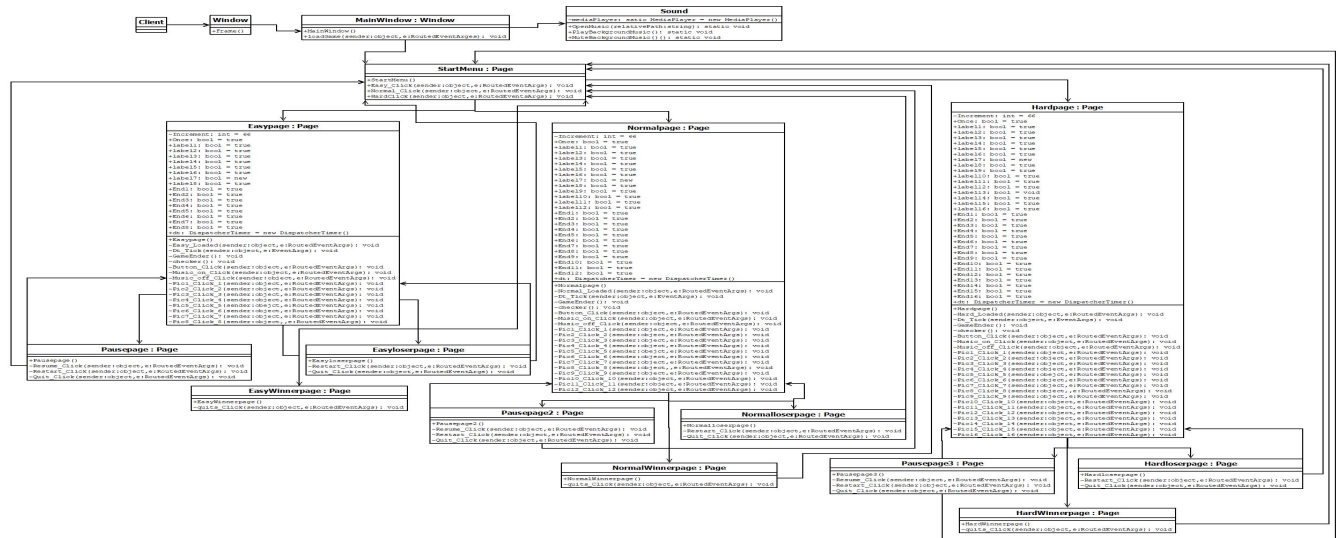
- Project Proposal, 09/09/2020 - This Document was created and we decided on what type of project to do, gave a brief introduction, an abstract of the project, and some impacts and challenges that the project would have.
- Project Update 1, 09/29/2020 - We made the requirements for the project and started thinking about the functional and non functional aspects of the project. We made 3 use cases for how the project would function, and mocked up some interface ideas and layout.
- Project Presentation, 10/06/2020 - Showed off the interface mockups to Dr. Guerin and got some feedback and some ideas of where the game could go.
- Project Update 2, 10/30/2020 - Made a timeline of the entire project and made future deadlines to hopefully fulfill.
- All pages and elements are done, 11/01/2020 to 11/8/2020 - We got all the pages made, but did not have all the elements done or almost nothing working yet.
- Project is working, possibly 11/15/2020 - This project was not working at this point, we wanted it to, but about half was and about half wasn't.
- Project was about 85 percent done, 11/19/20 - The project was working and you could actually play an entire game.
- Project was done, 11/22/20 - The game logic and all pages were working together and all comments and header comments were added.
- Presentation done 11/24/20 - Made the presentation video and showed a demo of our project working.
- This document is done, 11/24/20 - This document was finished on this date.

### 4. Project Structure

We chose to keep this game simple in its building, but we do have ideas to keep adding complexity to it. At the beginning of this project, we had to draw mockups for the window layouts. We then decided to try use those mockups in the game, but when we imported the pictures to the program, it didn't look good or it stood out as this was added in, so after looking through the fonts that visual studio has, we found one that closely looks like hand drawn words. After that, we focused on the background music. We tried to choose a relaxing and jazzy kinda of music and found exactly what we were looking for. We even found a picture of a speaker to use for the mute/unmute button. Then came the pictures, we made sure that the pictures we used were family friendly, and not NSFW images or anything like that. The pictures were chosen for each difficulty so that easy was easy, normal was a bit of a challenge and hard would be extremely complex to remember. Overall these choices we made stayed throughout the rest of the project and we are very happy with how everything turned out.

#### 4.1. UML Outline

Below is our UML for the memory game, as you can see it is very complex and goes everywhere, but we will walk you through it. The client starts the programs and is shown a window, then the window loads in the main window class, which loads in a new instance of the start menu class. While that is happening, in the background, the main window class is also loading the sound class and starts playing music. Now that the user is seeing the start menu, they choose a difficulty. When they have chosen, the start menu class will load the difficulty screen, that difficulty class, and the timer in the class. Then while the user is playing the game, if they hit the pause button, the pause class is accessed and either goes back to the difficulty class or it can load in the start menu class if the user decides to quit. Finally the winner and loser classes/pages can restart the game and quit if you lose, which resets the difficulty class or loads the start menu class. If you win, your only option is to go back to the start menu. This is a very complex code and UML and I hope this little walk through helps you understand it better.



## 4.2. Design Patterns Used

There were no design patterns used for this project. We understand this is not what was wanted, but we did not understand how to implement them. We do however feel that this game is good without them and it is an example of what you can do without design patterns.

## 5. Results

We have a game. We are very proud of what we have made and are excited for people to try it, even though it does have some minor bugs. Overall this was really fun to make, and we are happy with how everything turned out. The pictures we used are not too challenging (except maybe hard), and the hand-drawn aesthetic really makes this game stand out on its own. All the challenges that were in this, the logic of the game, the buttons hiding the pictures, everything was very satisfying to overcome and make the game work the way we wanted it to. All the pages and programming work together seamlessly to make an enjoyable experience for the player. We hope you like it.

### 5.1. Future Work

We have come up with a few ideas on what to do next with this game. First, make the pictures randomize so they are not always in the same spot. Second, make a high score so that someone can try to beat the previous player. Of course solve the small bugs in the system, and make sure to not introduce new bugs. Finally, we had the idea to add sound effects to the buttons when they are clicked.