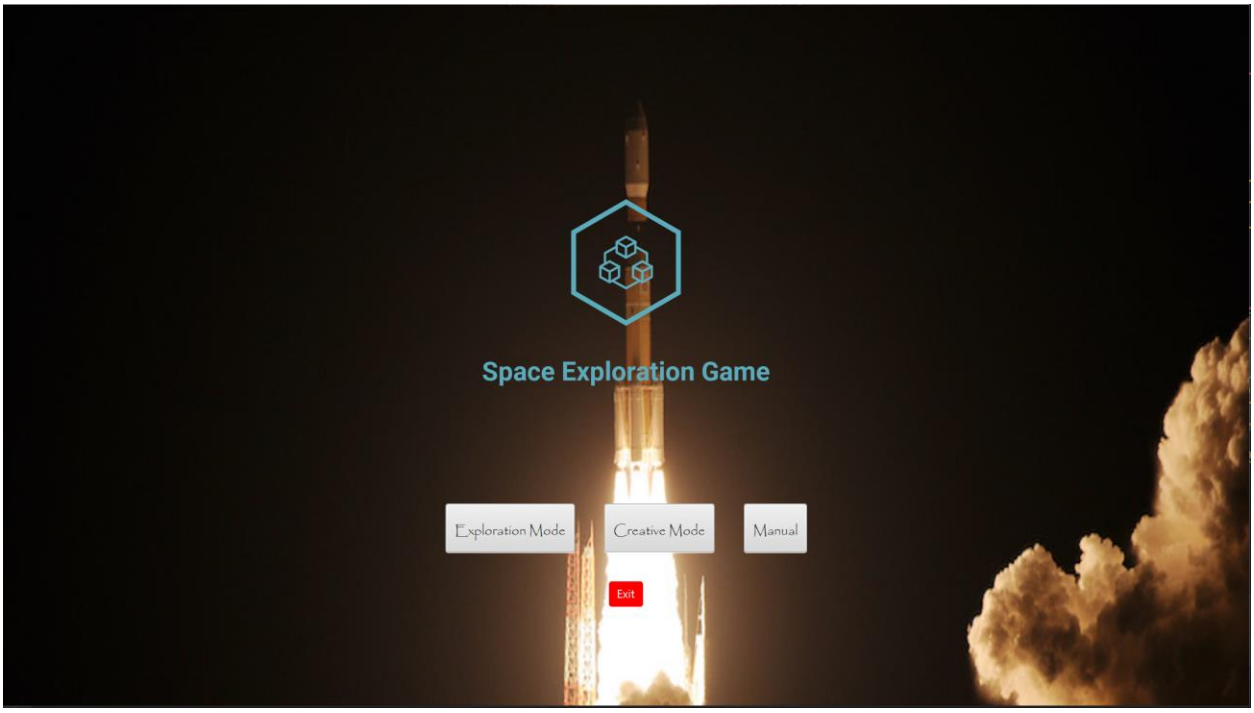
Space Exploration Game Report



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November 2023

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I Project Description

1 Project Overview

Space Exploration Game is a game created to help people learn about different planets and galaxies that exist in the currently unreachable vast expanse that surrounds Earth. Using survival aspects of fuel levels and ship durability, players can visit different galaxies, visiting and learning about different planets, eventually succumbing to the trials and tribulations that occur in deep space travel.

2 Project Domain

This project exists to give a unique way to learn about different planets and galaxies that exist in space. The data is retrieved via NASA's exoplanetary website to ensure the most accurate data is conveyed to the player. This game would be distributed to those wishing to learn more about space and the planets that exist in it, and those who want to teach others but wish for a more interactive experience.

3 Relationship to Other Documents

This project was based on Group 4's Fall of 2021 CS 440 development project of the same name.

4 Naming Conventions and Definitions

4a Definitions of Key Terms

-Fuel: Value that determines how much a player can travel before reaching a game over scenario.

-Durability: Value that determines how much more damage a player's ship can endure before reaching a game over screen.

-Player Score: The player's score gained from completing minigames and visiting planets.

-Player Ship: The player's main mode of transportation around the different galaxies, which doubles as the player's visual aid of where they are on the galaxy map.

-Kepler: One of the visitable galaxies/systems

-Milky Way: One of the visitable galaxies/systems, also the starting galaxy

-Andromeda: One of the visitable galaxies/systems

-Minigames: Small short games that either give you more resources such as fuel/durability, enable planetary data, or consume fuel/durability.

-Create-A-Planet: side mode that allows for creating and exporting planets to be used as wallpaper backgrounds

-Galaxy Map: the overworld map that allows players to visit different galaxies while seeing their player ship move along where they pick

4b UML and Other Notation Used in This Document

Any UML diagram used generally follows the Version 2.0 OMG UML standard as described by Fowler in [4].

4c Data Dictionary for Any Included Models

(damageTaken occurs in the asteroid belt minigame, initiated when traveling between galaxies)

damageTaken = (timeLapsed * 9.0)

(fuel lost in traveling occurs when traveling between galaxies)

fuelLostInTraveling=
$$\frac{\sqrt{(MAX(formerX,currentX) - MIN(formerX,currentX))^2 + (MAX(formerY,currentY) - MIN(formerY,currentY))^2}}{50}$$

(gameOverFuel is checked whenever Fuel is removed from the player, leading to a game over scene once fuel is below or equal to 0. Same check for durability)

gameOverFuel <= 0

gameOverDurability <= 0

(Fuel Progress monitored in fuel mining minigame, each space bar press is equal to 0.01 progress

fuelProgress += 0.01

fuelGain = fuelProgress * 10

(playerScore is updated throughout minigames and planet visitation)

playerScore for mining fuel = fuelProgress * 1000

playerScore for visiting Kepler planets = 10

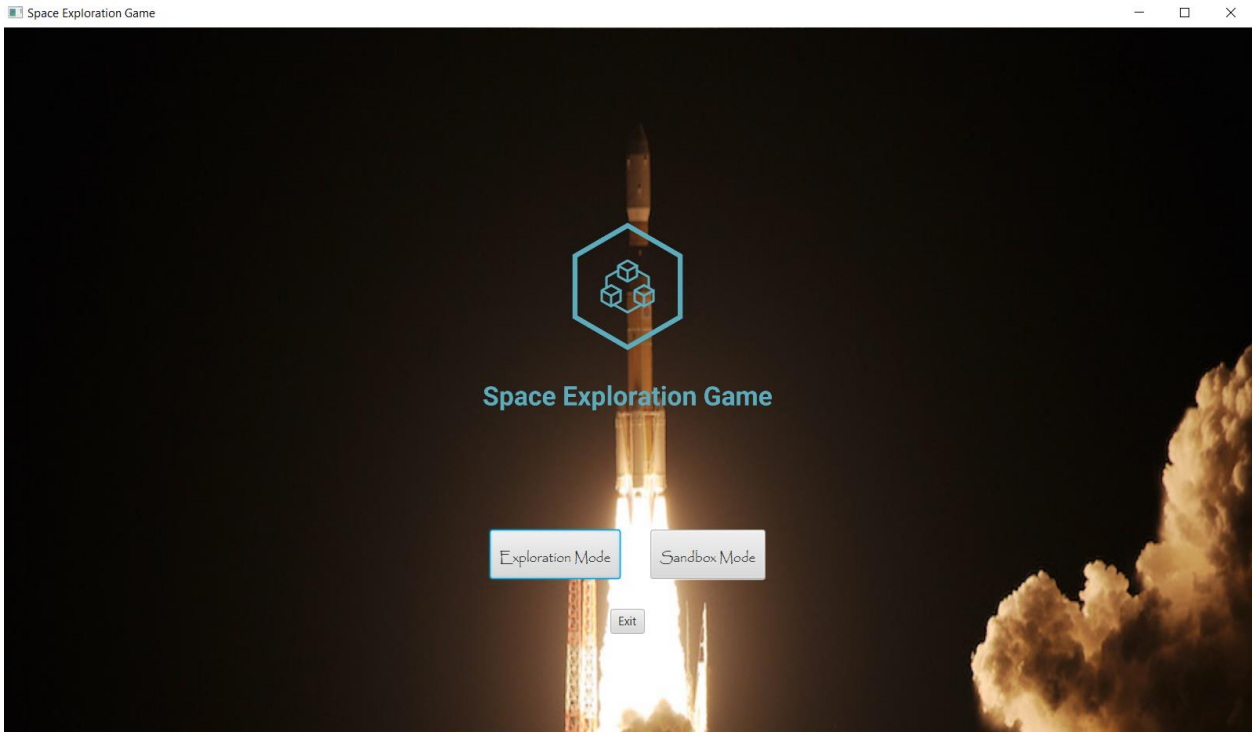
playerScore for completing Asteroid minigame = 1000

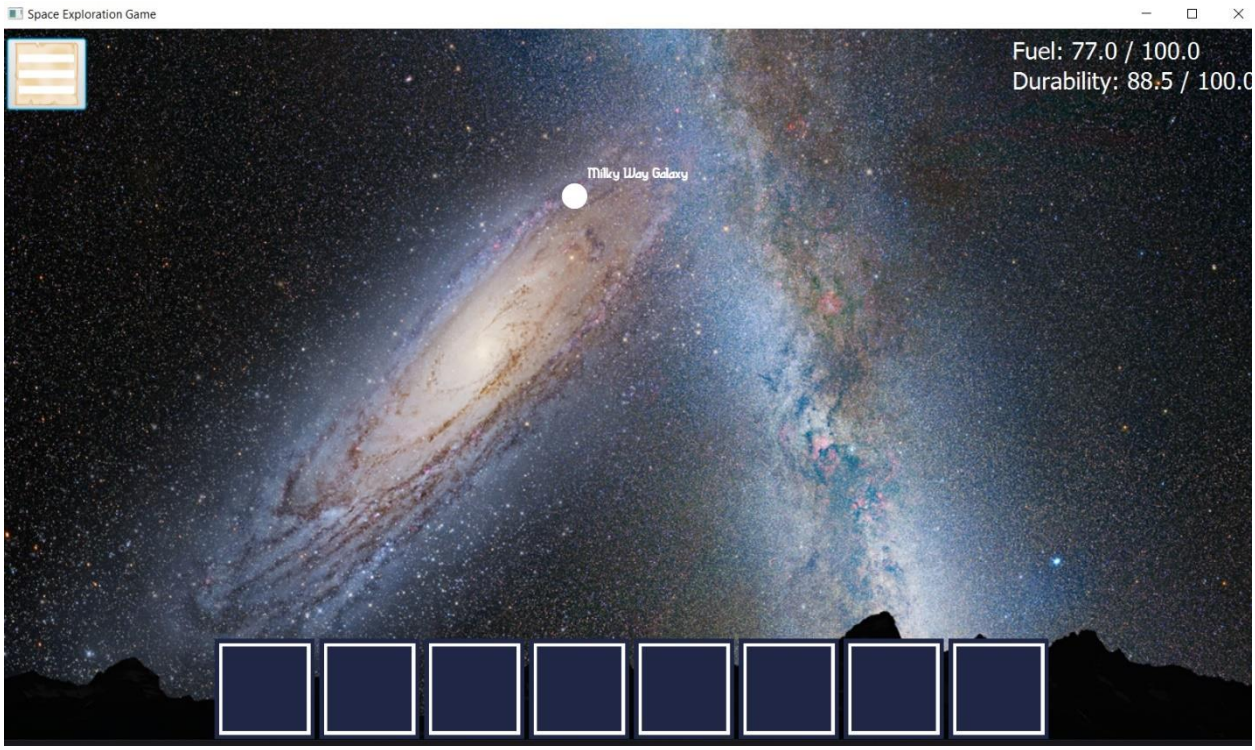
II Project Deliverables

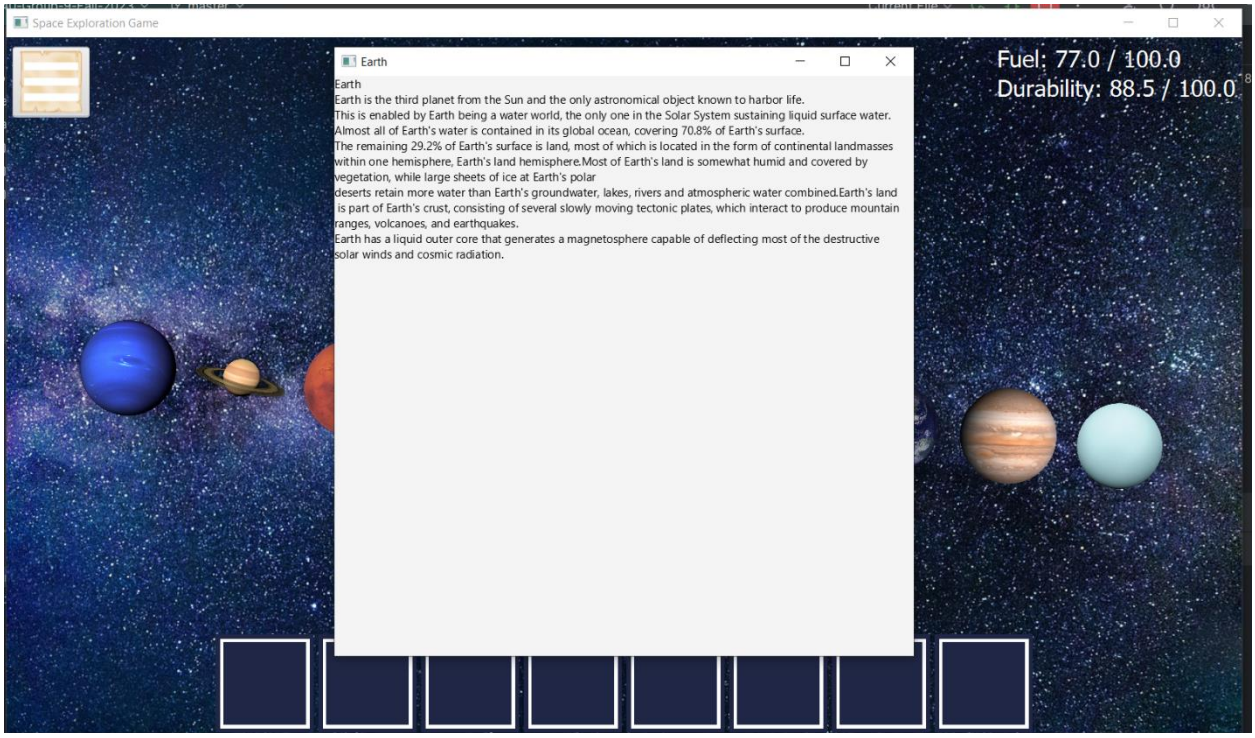
Group 9 has produced a fully playable space travel game that allows players to visit different planets from the Milky Way galaxy, Kepler System, and Andromeda Galaxy. Also included is a survival aspect that produces game overs, adding to the difficulty aspect of exploring the different systems. Player score is also tracked, giving more incentive towards replayability.

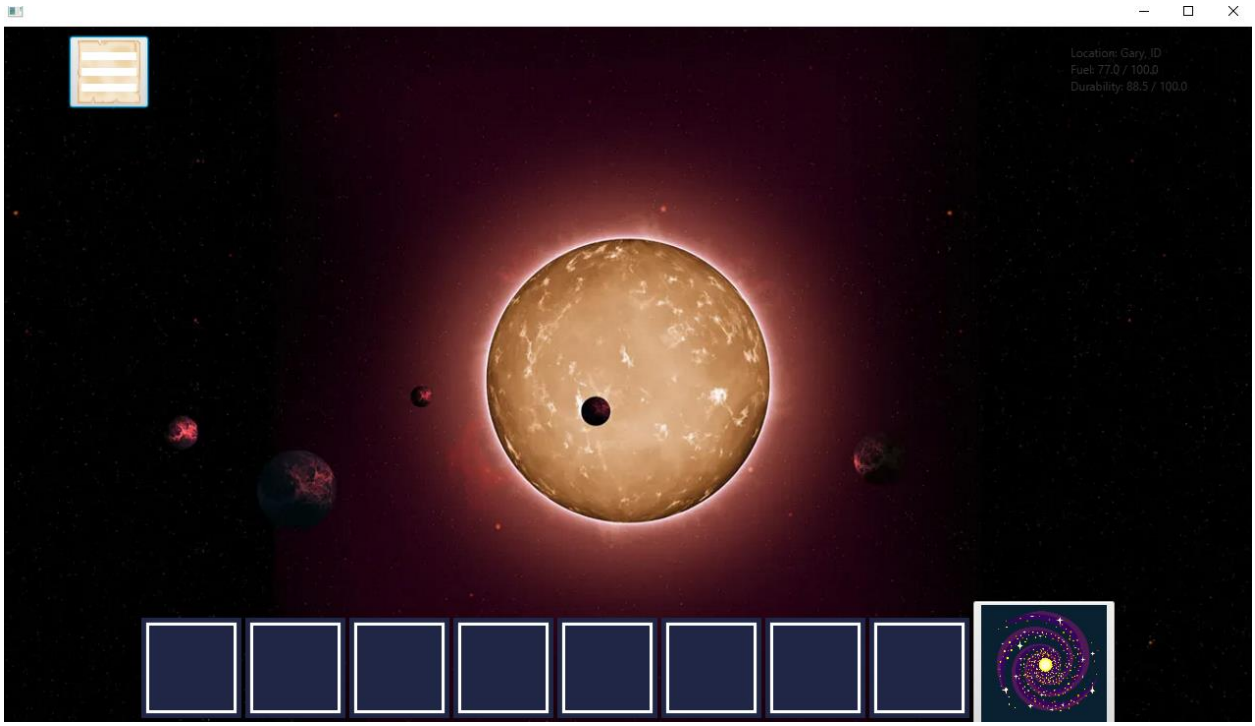
5 First Release

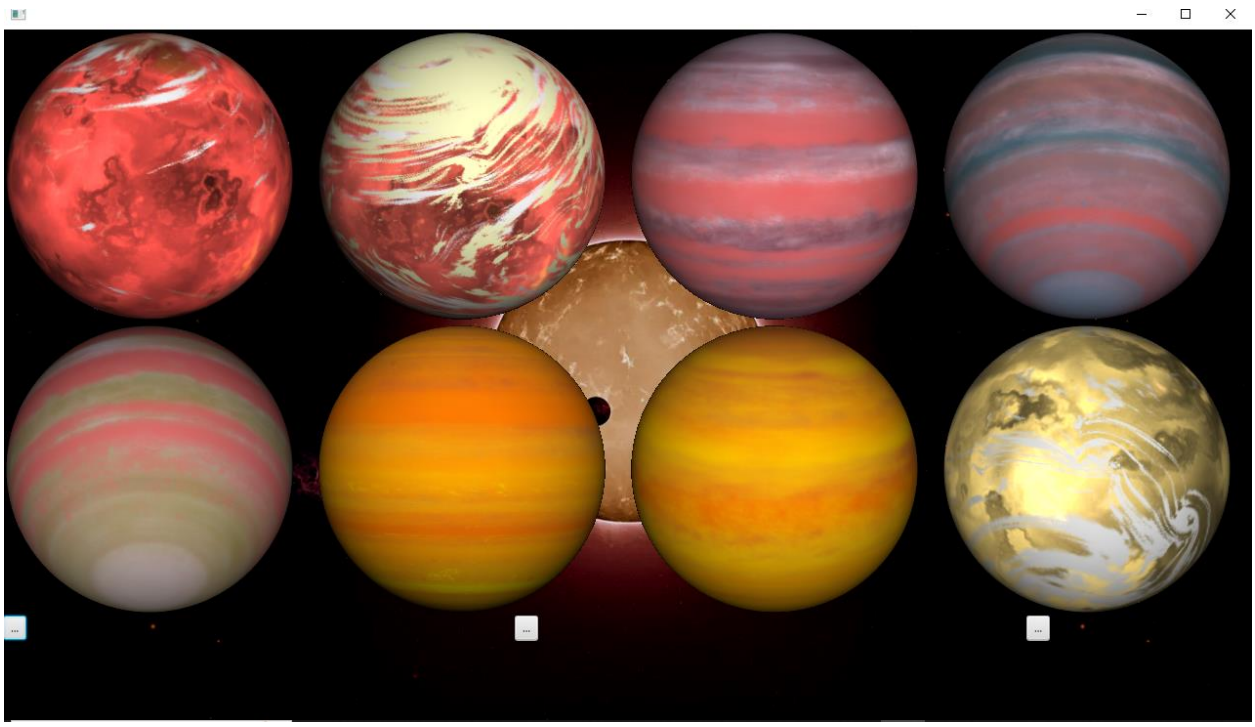
Date of First Release: October 6th, 2023

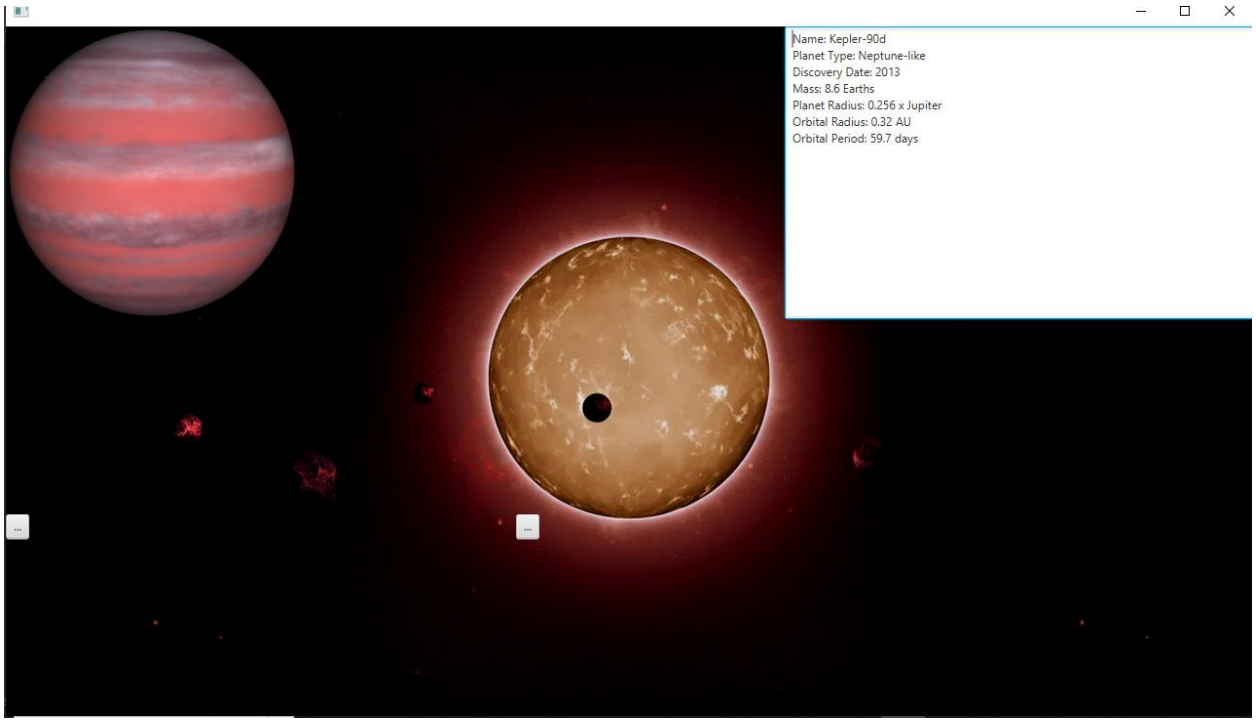



Space Exploration Game
Fuel: 77.0 / 100.0
Durability: 88.5 / 100.0
Milky Way Galaxy


Space Exploration Game
Earth
Earth
Earth is the third planet from the Sun and the only astronomical object known to harbor life.
This is enabled by Earth being a water world, the only one in the Solar System sustaining liquid surface water.
Almost all of Earth's water is contained in its global ocean, covering 70.8% of Earth's surface.
The remaining 29.2% of Earth's surface is land, most of which is located in the form of continental landmasses within one hemisphere, Earth's land hemisphere.Most of Earth's land is somewhat humid and covered by vegetation, while large sheets of ice at Earth's polar
deserts retain more water than Earth's groundwater, lakes, rivers and atmospheric water combined.Earth's land is part of Earth's crust, consisting of several slowly moving tectonic plates, which interact to produce mountain ranges, volcanoes, and earthquakes.
Earth has a liquid outer core that generates a magnetosphere capable of deflecting most of the destructive solar winds and cosmic radiation.
Fuel: 77.0 / 100.0
Durability: 88.5 / 100.0


Location: Gary, ID
Fuel: 77.0 / 100.0
Durability: 88.5 / 100.0



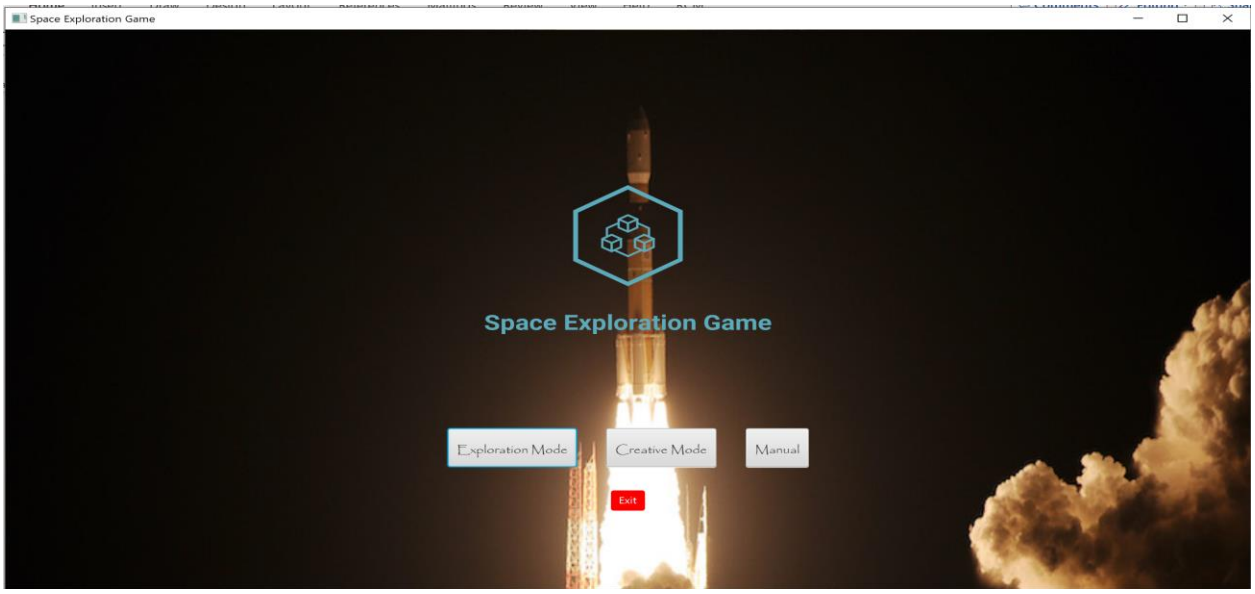


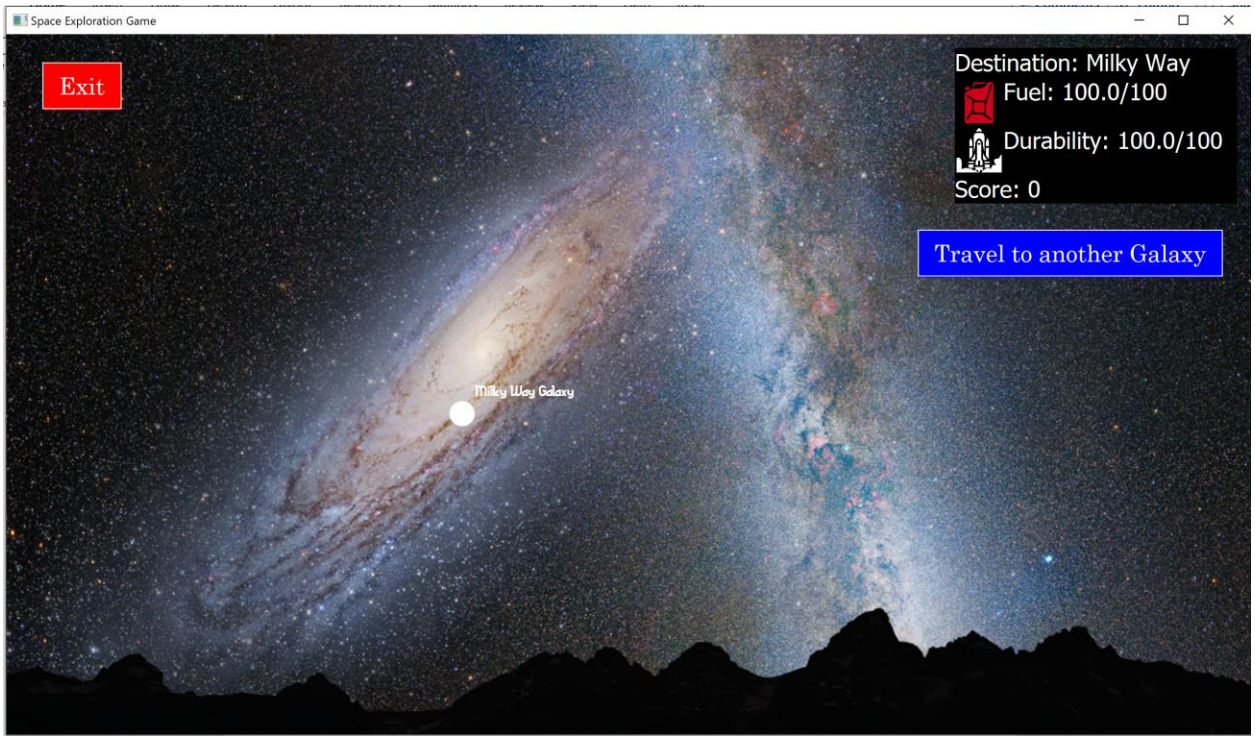
Pictured above are the first implementations of galaxy views and planet views. Galaxies could be traveled to, and planet information could be obtained. No minigames or any use of player data (fuel/durability) were functioning at this point. No media sounds/songs were implemented yet as well.

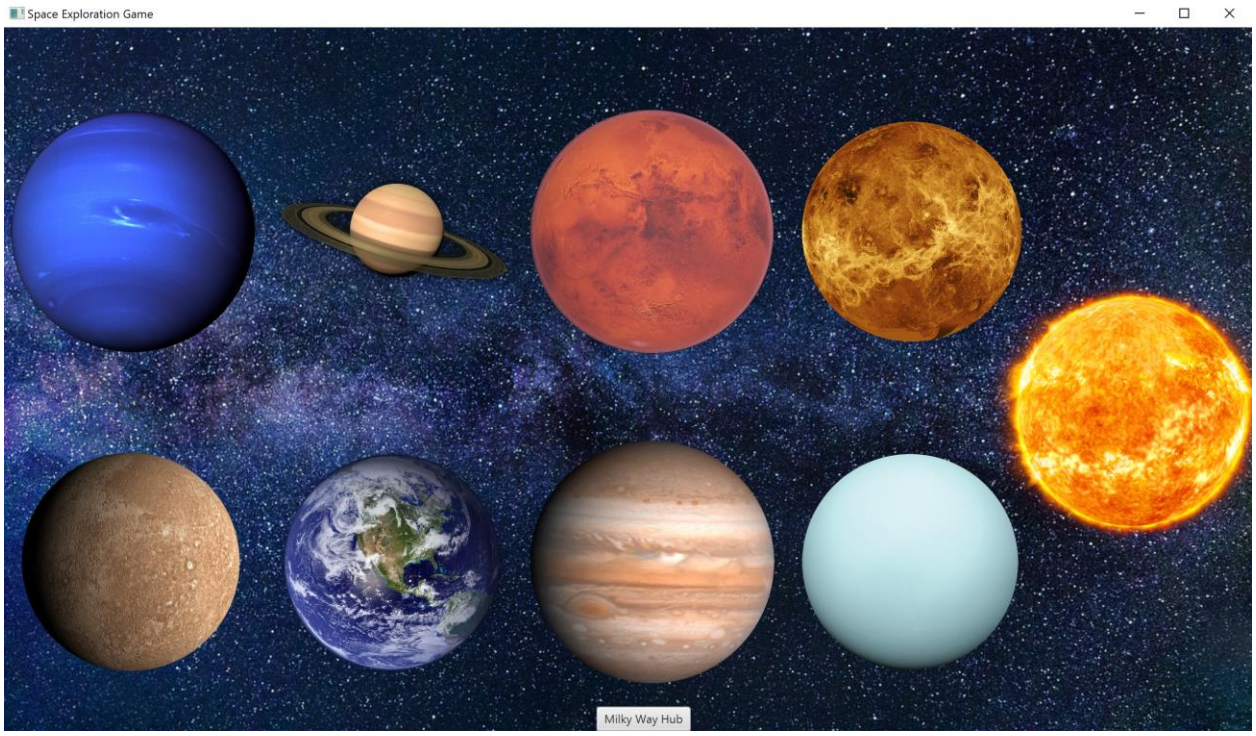
6 Second/Third Release

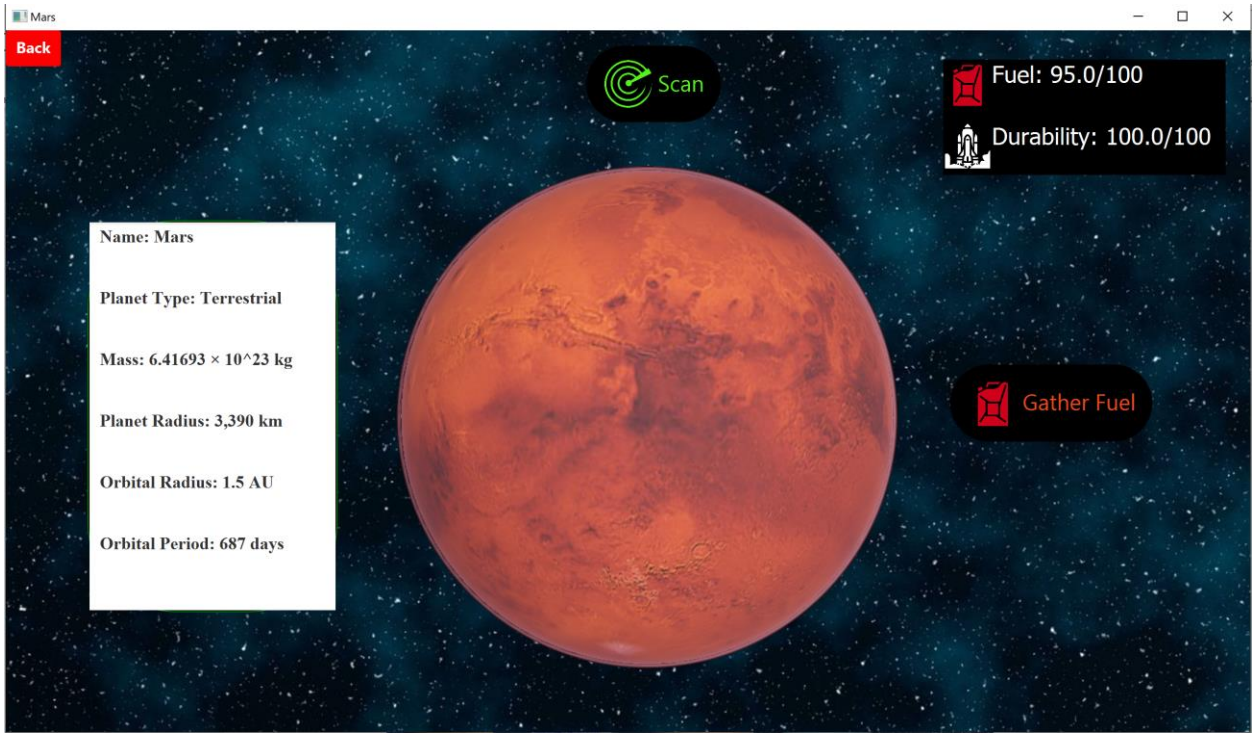
Second Release date: November 3rd, 2023

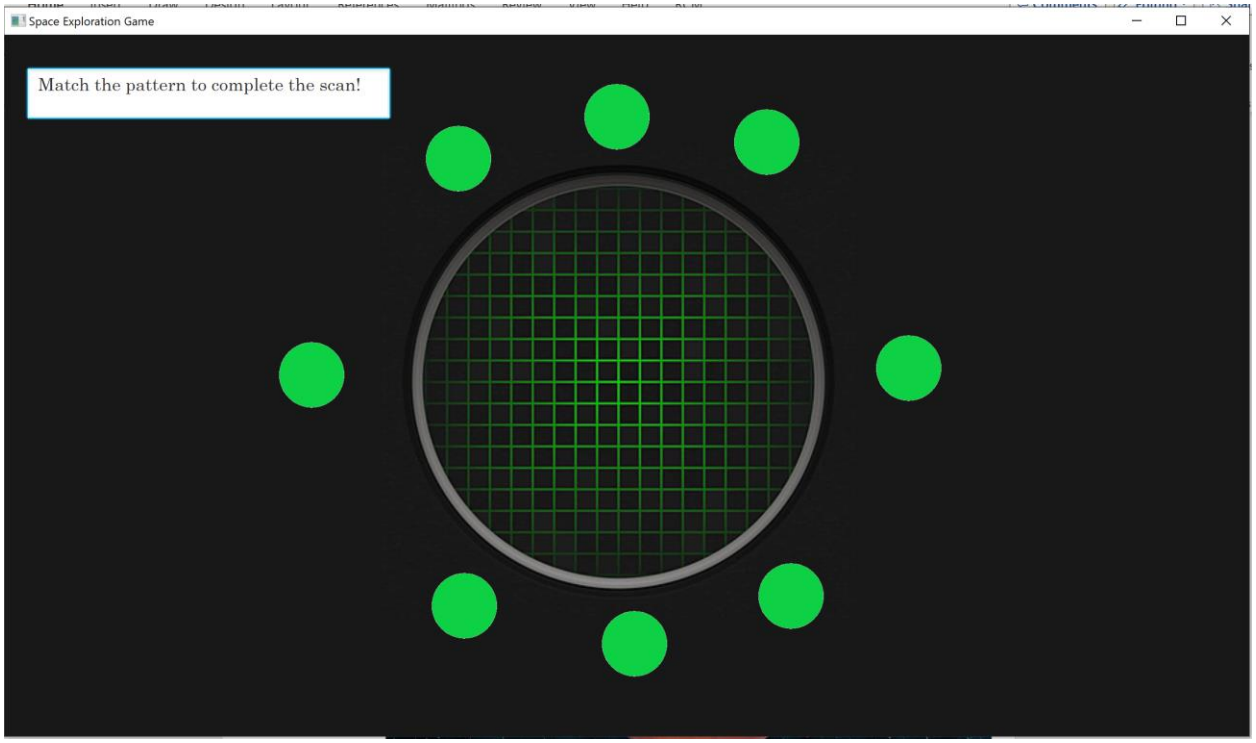
Third Release date: November 17th, 2023

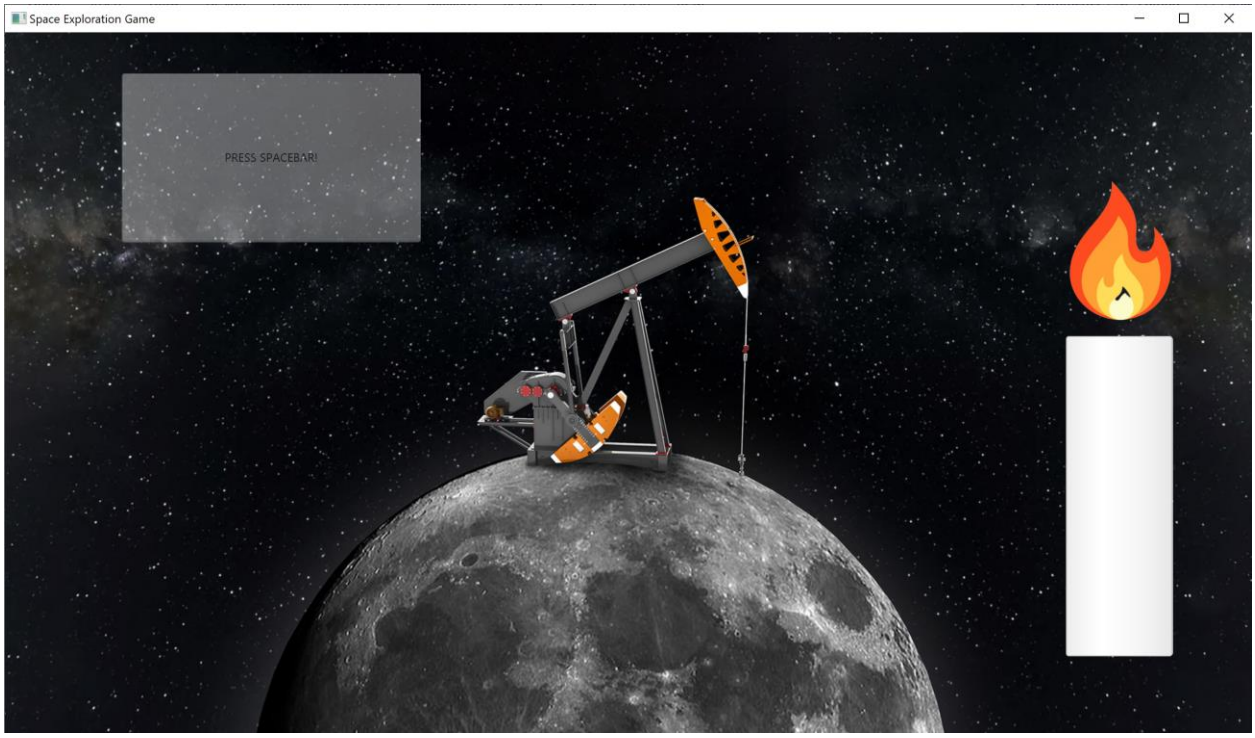


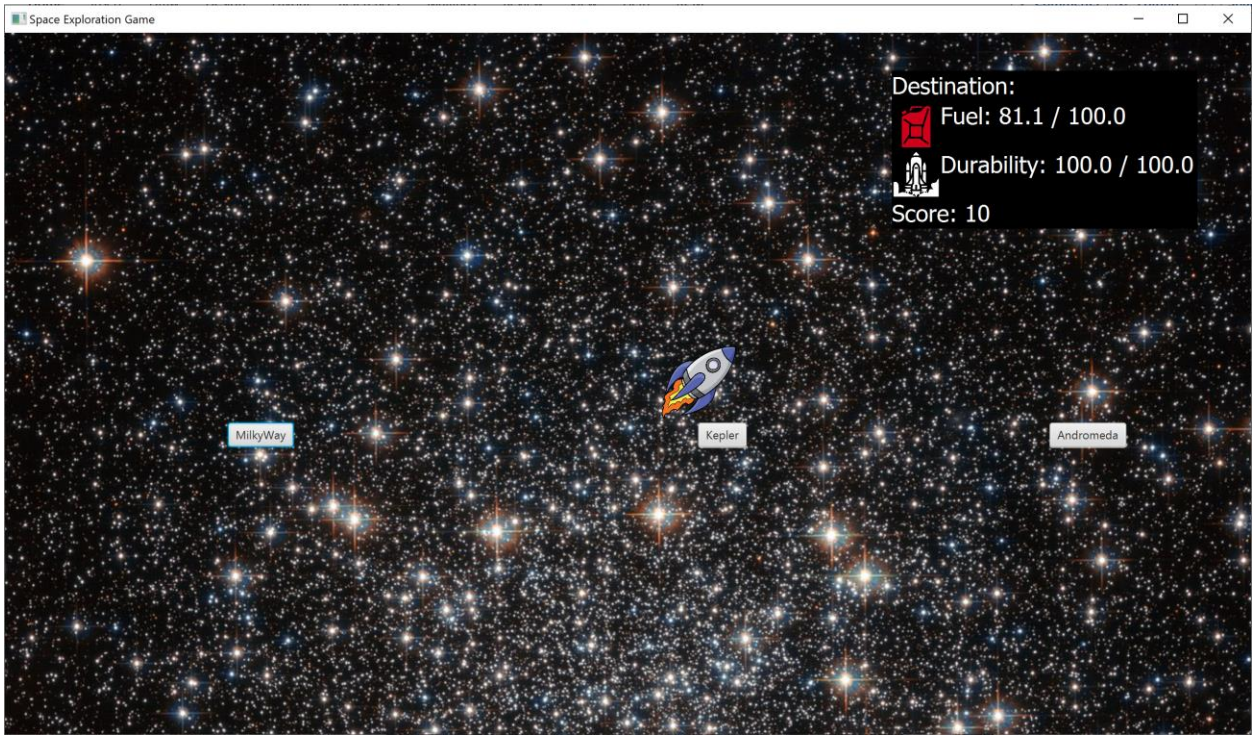

Space Exploration Game
Exit
Destination: Milky Way
Fuel: 100.0/100
Durability: 100.0/100
Score: 0
Travel to another Galaxy
Milky Way Galaxy

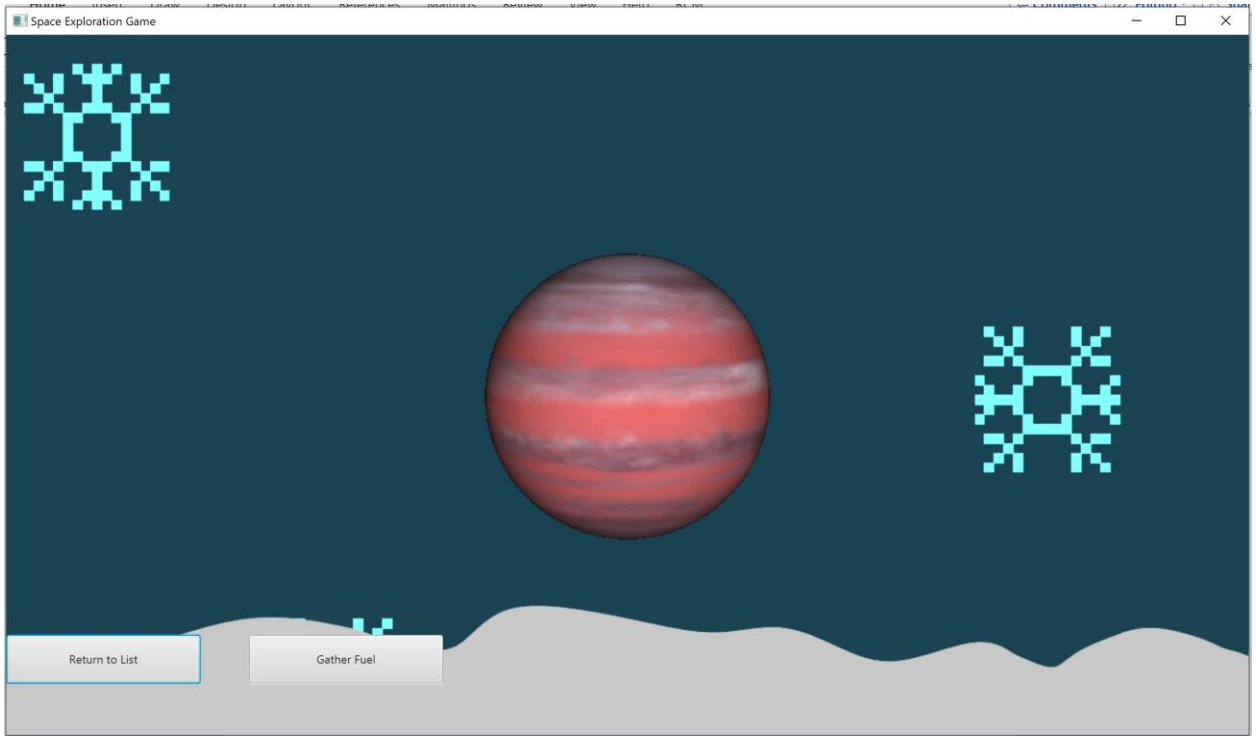

Space Exploration Game
Milky Way Hub

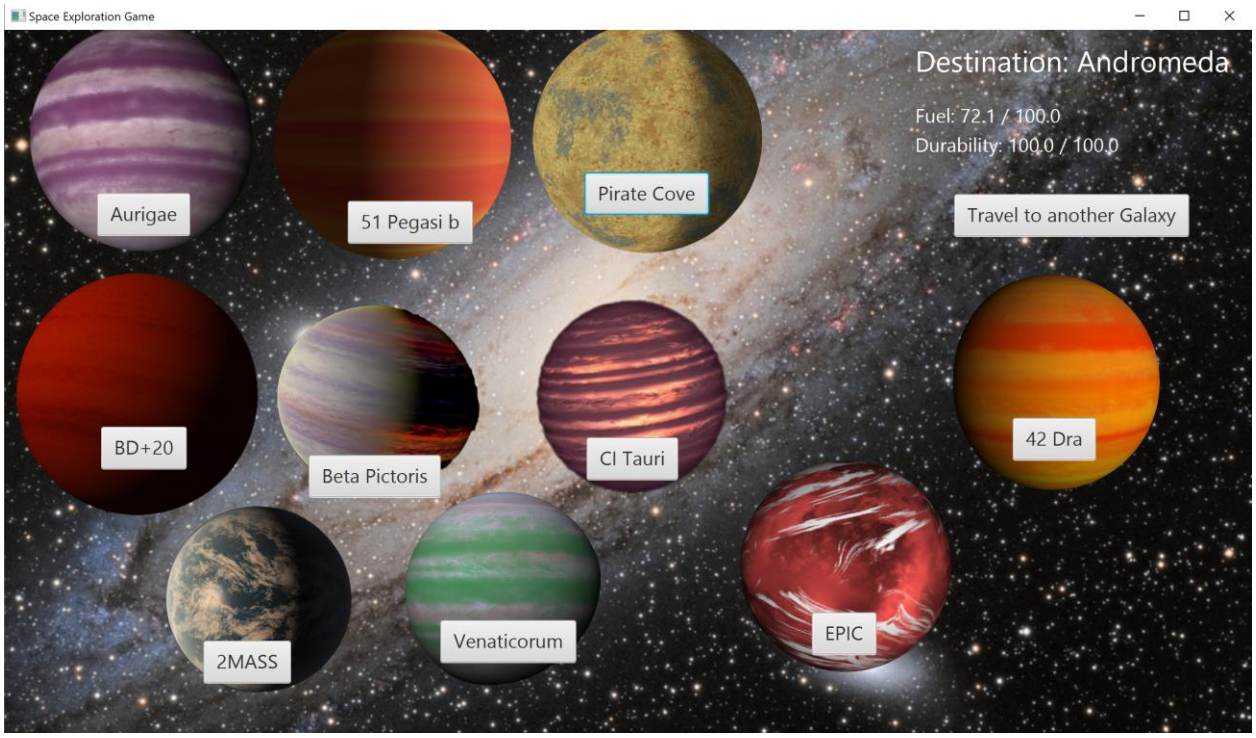

Mars
Back
Scan
Fuel: 95.0/100
Durability: 100.0/100
Name: Mars
Planet Type: Terrestrial
Mass: 6.41693 × 10^23 kg
Planet Radius: 3,390 km
Orbital Radius: 1.5 AU
Orbital Period: 687 days
Gather Fuel

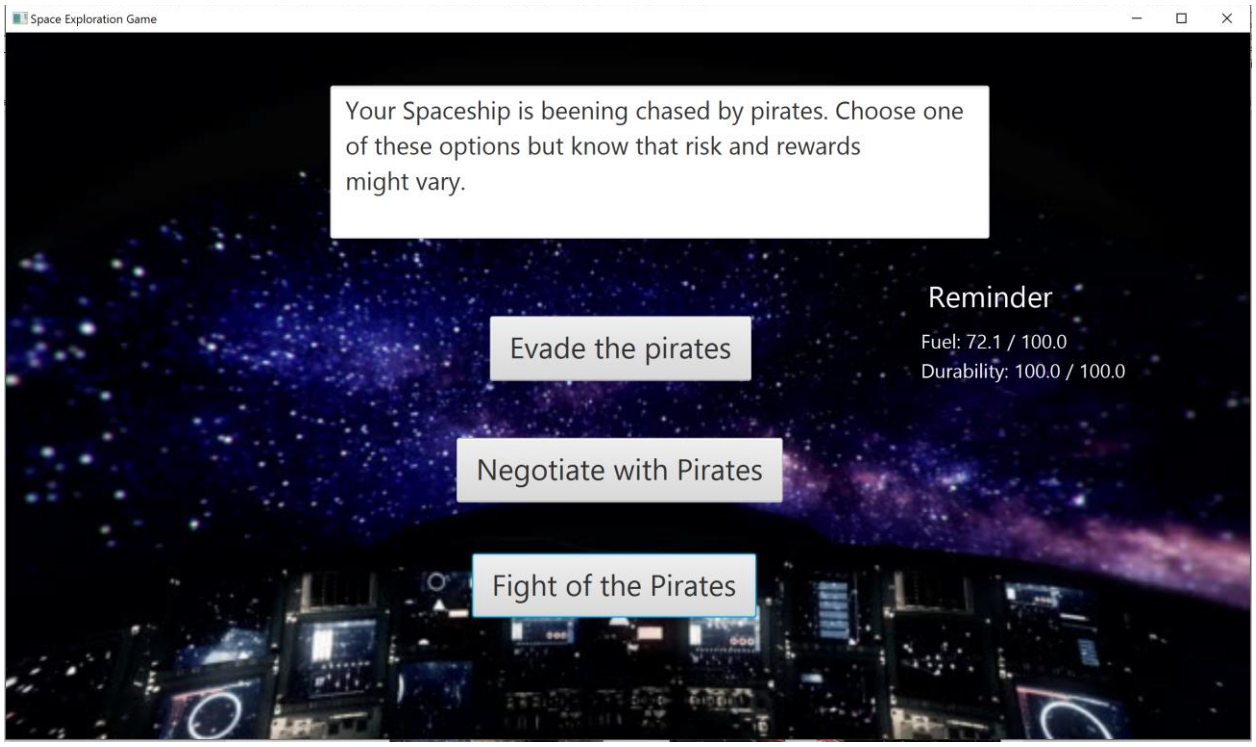

Space Exploration Game
Match the pattern to complete the scan!

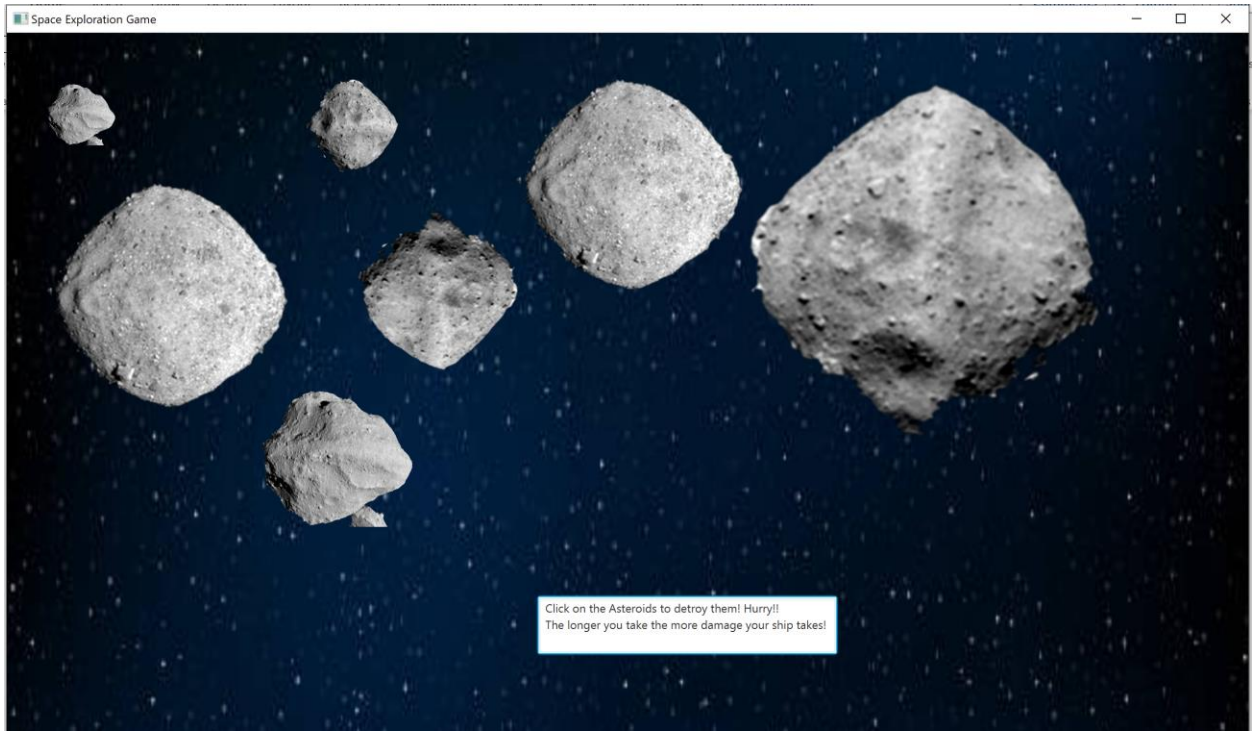

Space Exploration Game
PRESS SPACEBAR!

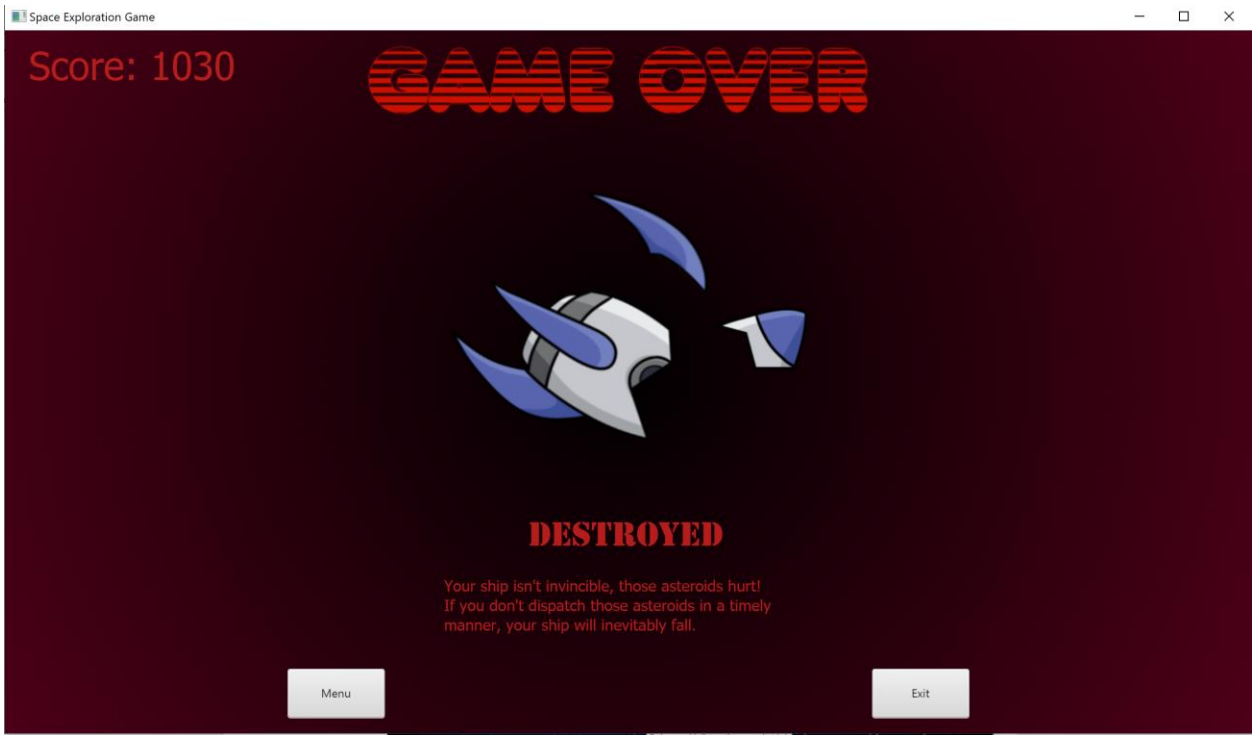

Space Exploration Game
Destination:
Fuel: 81.1 / 100.0
Durability: 100.0 / 100.0
Score: 10
MilkyWay
Kepler
Andromeda

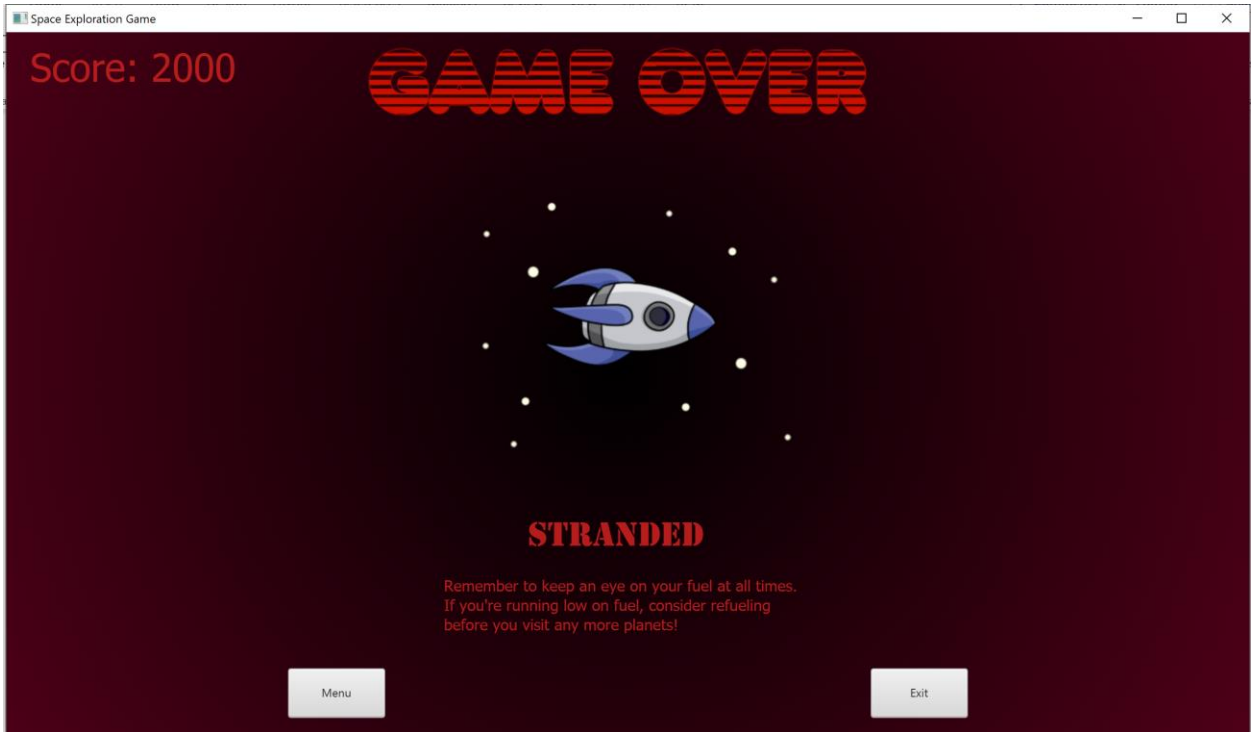

Space Exploration Game
Return to List
Gather Fuel

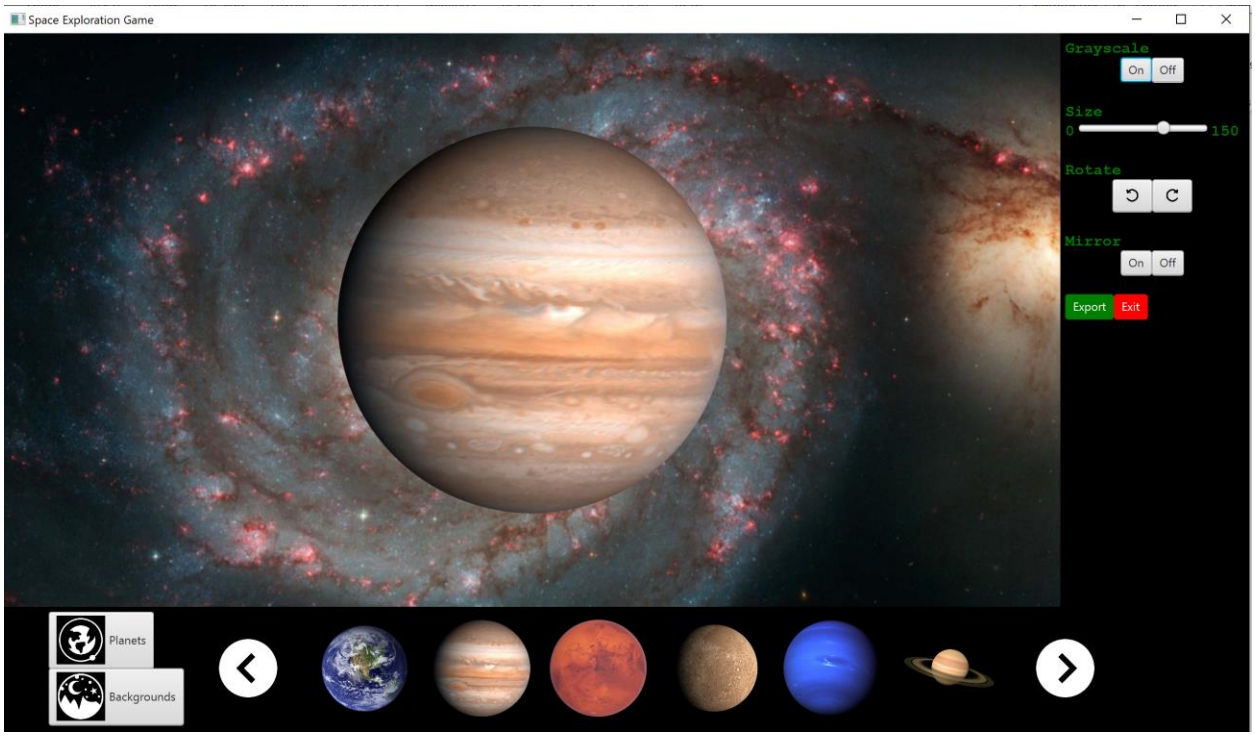

Space Exploration Game
Destination: Andromeda
Fuel: 72.1 / 100.0
Durability: 100.0 / 100.0
Aurigae
51 Pegasi b
Pirate Cove
Travel to another Galaxy
BD+20
Beta Pictoris
CI Tauri
42 Dra
2MASS
Venaticorum
EPIC

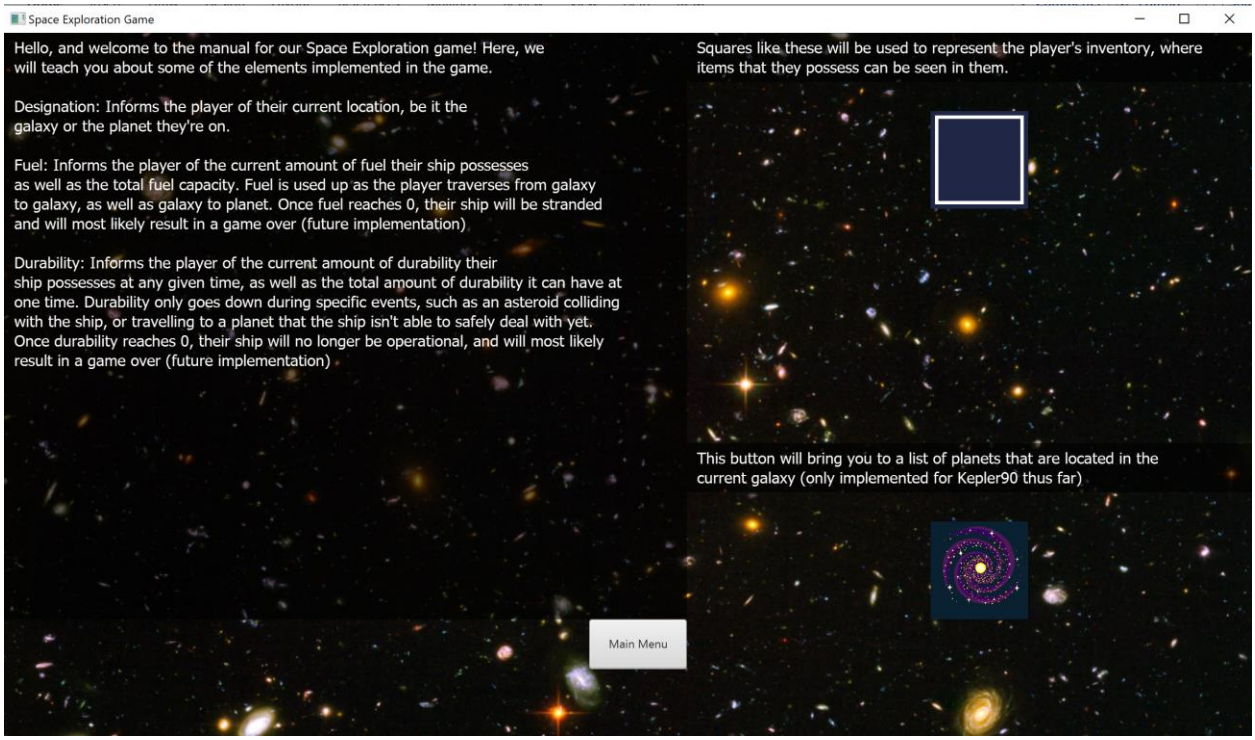

Space Exploration Game
Your Spaceship is beening chased by pirates. Choose one of these options but know that risk and rewards might vary.
Reminder
Fuel: 72.1 / 100.0
Durability: 100.0 / 100.0
Evade the pirates
Negotiate with Pirates
Fight of the Pirates


Space Exploration Game
Click on the Asteroids to detroy them! Hurry!!
The longer you take the more damage your ship takes!


Space Exploration Game
Score: 1030
GAME OVER
DESTROYED
Your ship isn't invincible, those asteroids hurt!
If you don't dispatch those asteroids in a timely
manner, your ship will inevitably fall.
Menu
Exit


Space Exploration Game
Score: 2000
GAME OVER
STRANDED
Remember to keep an eye on your fuel at all times.
If you're running low on fuel, consider refueling
before you visit any more planets!
Menu
Exit





The second release was essentially the final release, as we only had a little under 2 weeks to meet then debug and add minor additions to the game before our final demonstration. The biggest additions were minigames that gave the game much more of a game feel than the first release. A galaxy overworld was also implemented that allowed the player to visit the different galaxies and visually see their ship moving across the screen. Media sounds were also added to help immerse the players within

their environment. Game over screens were also created and linked to the different minigames, along with the addition of the Andromeda galaxy, which was finally implemented by the third and final release. Create-A-Planet was also added to the game within the second release. The Milky Way galaxy was given a new overview of the planets to be more in line with the Kepler system. Animated backgrounds were added to Kepler planet views as well.

7 Comparison with Original Project Design Document

Comparing our final game with what was presented by Fall 2021 Group 4 in their final report [5], one of the biggest things that was not implemented was the use of NASA's API, which would allow for seamless data integration for planets, as opposed to the data scraping, we performed manually to fill the planet information. Another major difference was not finishing the save system to allow for seamless continuation of a player's game. This game did follow the ideas presented in the report concerning the exploration mode and "sandbox" mode. Exploration mode's name was kept while our sandbox mode was renamed to "Creative" mode, to better reflect the mode's purpose. The focus on non-violent aspects were for the most part followed, other than the implementation of the pirate minigame in the Andromeda Galaxy. The survival aspect was kept in, and a player score was added in order to incentivize replaying.

III Testing

8 Items to be Tested

The items to be tested here are as follows: For Nicholas, their Fuel Minigame Event will be tested. For Marcos, their Scanning Minigame Event will be tested. For Jose, their Pirate Encounter Event will be tested. For Christian, their Game Over Event will be tested.

9 Test Specifications

ID# - A_01

Description: Ability to access event

Items covered by this test: ALL

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: ALL

Test Procedures: Boot up Application and perform the Inputs as stated

Input / Output Specifications:

ID #	INPUT	OUTPUT
A_01	Clicking Fuel Button on Earth	Transition to Fuel Minigame
	Clicking on Scan Button on Earth	% of Transition to Scan Minigame
	Clicking on Pirate's Cove on Andromeda	% of Transition to Pirate Encounter
	Running out of fuel in Pirate Encounter	Transition to Game Over

Pass/Fail Criteria: Meeting all the outputs

ID# - A_02

Description: Ability to access event again after it has occurred

Items covered by this test: ALL

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: ALL

Test Procedures: Boot up Application and perform the Inputs as stated

Input / Output Specifications:

ID #	INPUT	OUTPUT
A_02	Clicking Fuel Button on K90b Post-G_01	Transition to Fuel Minigame
	Clicking on Scan Button on Saturn Post-G_01	% of Transition to Scan Minigame
	Clicking on EPIC on Andromeda Post-G_01	% of Transition to Pirate Encounter
	Running out of Durability in Pirate Encounter Post-G_01	Transition to Game Over

Pass/Fail Criteria: Meeting all the outputs

ID# - F_01

Description: Changes fuel value upon exiting the Fuel Minigame

Items covered by this test: Fuel Minigame Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: N/A

Test Procedures: Boot up Application and go to Earth and press the fuel button

Input / Output Specifications:

ID #	INPUT	OUTPUT
F_01	95 Fuel, 10 space presses	1 Fuel gained, 96 Fuel
	90 Fuel, 12 space presses	1.2 Fuel gained, 91.2 Fuel
	95 Fuel, 8 space presses	0.8 Fuel gained, 95.8 Fuel
	90 Fuel, 10 space presses	1 Fuel gained, 91 Fuel

Pass/Fail Criteria: Meeting all the outputs

ID# - F_02

Description: Fuel never goes over the fuel capacity

Items covered by this test: Fuel Minigame Event

Requirements addressed by this test:

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: N/A

Test Procedures: Boot up Application and go to Earth and press the fuel button

Input / Output Specifications:

ID #	INPUT	OUTPUT
F_02	100 Fuel, 10 space presses	1 Fuel gained, 100 Fuel
	98 Fuel, 30 space presses	3 Fuel gained, 100 Fuel
	95 Fuel, 10 space presses	1 Fuel gained, 96 Fuel
	100 Fuel, 30 space presses	3 Fuel gained, 100 Fuel

Pass/Fail Criteria: Meeting all the outputs

ID# - S_01

Description: Shows planet info upon completion

Items covered by this test: Scanner Minigame Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: N/A

Test Procedures: Boot up Application and go to Earth and press the Scan button

Input / Output Specifications:

ID #	INPUT	OUTPUT
S_01	BR, BM, TM, MR, ML, TR, TL, BL	Shown planet info
S_02	BR, BM, TM, ML, BR, BM, TM, MR, ML, TR, TL, BL	Shown planet info
S_03	BM, BM, BM, BR, BM, TM, MR, ML, TR, TL, BL	Shown planet info
S_04	TL, BR, BM, TM, MR, ML, TR, TL, BL	Shown planet info

Pass/Fail Criteria: Meeting all the outputs

ID# - S_02

Description: Minigame resets upon an incorrect input

Items covered by this test: Scanning Minigame Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: N/A

Test Procedures: Boot up Application and go to Earth and press the Scan button

Input / Output Specifications:

ID #	INPUT	OUTPUT
S_05	BR, BM, TR	Minigame reset
S_06	MR, MR, MR, MR, MR, MR, MR	Minigame resets
S_07	BR, BM, TM, TR, TL, BL	Minigame resets
S_08	BR, BM, TM, TR, MR, ML, TR, BL, TL, BL	Minigame resets

Pass/Fail Criteria: Meeting all the outputs

ID# - P_01

Description: Player is provided a variety of choices along with different outcomes

Items covered by this test: Pirate Encounter Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: N/A

Test Procedures: Boot up Application and get a chance encounter in Pirate's Cove

Input / Output Specifications:

ID #	INPUT	OUTPUT
P	Evade Pirates	% Chance of Winning, -0 Fuel
_	Negotiate Pirates	Constant, -5 Fuel
0	Fight Pirates	% Chance of Losing, -10 Fuel -10 Durability
1	Fight Pirates	% Chance of Winning, +10 Fuel +15 Durability

Pass/Fail Criteria: Repeating until all outputs have been achieved

ID# - P_02

Description: The player can get a game over screen when encountering pirates

Items covered by this test: Pirate Encounter Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: Game Over Event

Test Procedures: Boot up Application and get a chance encounter in Pirate's Cove

Input / Output Specifications:

ID #	INPUT	OUTPUT
P	3 Fuel, Negotiate	Game Over
_	10 Durability, Fight	% Chance of Losing, Game Over
0	6 Fuel, Evade	% Chance of Losing, Game Over
2	6 Fuel, Fight	% Chance of Losing, Game Over

Pass/Fail Criteria: Repeating until all outputs have been achieved

ID# - G_01

Description: Game over screen can differ depending on how the game is ended

Items covered by this test: Game Over Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: Pirate Encounter Event

Test Procedures: Boot up Application and encounter pirates in specific conditions

Input / Output Specifications:

ID #	INPUT	OUTPUT
X	6 Fuel, < 0 Fuel From Negotiate	STRANDED
_	9 Durability, < 0 Durability From Fight	DESTROYED
0	7 Fuel, < 0 Fuel From Fight	STRANDED
1	5 Durability, < 0 Durability From Fight	DESTROYED

Pass/Fail Criteria: Meeting all the outputs

ID# - G_02

Description: Players given the option to replay the game or quit after game over

Items covered by this test: Game Over Event

Environmental needs: JavaFX Runtime >= 18

Intercase Dependencies: Pirate Encounter Event

Test Procedures: Boot up Application and get game over under specific conditions

Input / Output Specifications:

ID #	INPUT	OUTPUT
X	STRANDED, clicked on Menu	Main Menu
_	STRANDED, clicked on Exit	Exits Application
0	DESTROYED, clicked on Menu	Main Menu
1	DESTROYED, clicked on Exit	Exits Application

Pass/Fail Criteria: Meeting all the outputs

10 Test Results

ID# - A_01

Date(s) of Execution: 11/24/2023

Staff conducting tests: Nicholas

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - A_02

Date(s) of Execution: 11/24/2023

Staff conducting tests: Nicholas

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - F_01

Date(s) of Execution: 11/24/2023

Staff conducting tests: Jose

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - F_02

Date(s) of Execution: 11/24/2023

Staff conducting tests: Jose

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - S_01

Date(s) of Execution: 11/24/2023

Staff conducting tests: Christian

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - S_02

Date(s) of Execution: 11/24/2023

Staff conducting tests: Christian

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - P_01

Date(s) of Execution: 11/24/2023

Staff conducting tests: Nicholas

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - P_02

Date(s) of Execution: 11/24/2023

Staff conducting tests: Nicholas

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - G_01

Date(s) of Execution: 11/24/2023

Staff conducting tests: Marcos

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

ID# - G_02

Date(s) of Execution: 11/24/2023

Staff conducting tests: Marcos

Expected Results: Inputs would lead to the expected outputs

Actual Results: All Outputs Met

Test Status: PASS

11 Regression Testing

Test that has been heavily repeated (due to (un)fortunate luck) was the ones involving Pirate Encounter Event [P_01, P_02]

IV Inspection

12 Items to be Inspected

The items to be inspected are: Asteroid Minigame Event (Nicholas), Pirate Encounter Event (Jose), Creative Mode (Marcos), and Kepler90 Planet View (Christian)

13 Inspection Procedures

For every item listed, this is the list that we looked at when we were inspecting the items:

- Is the item by itself fun? In order for our game to be considered a game, it should strive to make as many elements as possible fun in one way or another

- Is the item by itself difficult? We want to find a balance in difficulty, not too easy, and not too hard. If it's too difficult, we may want to tone down on the punishment or find a way to circumvent it. If it's too easy, we should modify it to make it more difficult, or repurpose it as part of something else that carries its own difficulty, or if it's an optional side mode, there doesn't have to be difficulty to it.

- Is it possible to die in the item? For events that deal with fuel or durability, we want to make sure to implement a death event for whenever the player falls under the threshold (0). If it's not possible to die in the item, or it doesn't make sense to be able to die in the item, then we do not implement a death event

- Is there any trade-offs to the item? In short, we want to look at the risk vs reward of said item, and see if there's either too much risk for too little reward, or too much reward for too little risk. If there's an imbalance, we adjust it accordingly.

14 Inspection Results

For [Asteroid Minigame (11/25/2023) {Marcos, Jose, Christian}]:

- The gameplay itself is fun, providing some enjoyment as the player moves their cursor and clicks on the asteroids as fast as possible in order to take the least amount of damage

- In the previous stage of the development, the damage incurred by the minigame was low, not making a significant enough dent on the durability of the ship to pose a threat. This was further remedied down the line as the damage was buffed to 9 per second that the player was in the minigame, providing a moderate amount of punishment while not being too difficult

- It is possible to die during this event if the player takes too long, their durability falling 0 or below. Once this occurs, the scene switches to the game over scene, displaying that the player has perished

- If a player is feeling particularly greedy in raising their score, they are free to actively encounter this event, as each time the event is completed, they get a nice 1000 points to their score. But, if they are not confident enough in their ability, they are free to choose to reduce this probability by taking less convoluted routes

For [Pirate Encounter (11/25/2023) {Nicholas, Marcos, Christian}]:

- It provides a simple yet engaging event, as the player gets three choices to choose from, with one of them being a guaranteed albeit suboptimal outcome. It is not as fun as the Asteroid Minigame though

- The difficulty comes not from time, but in managing your resources as you decide which choice to choose, what you are willing to sacrifice in case you lose the encounter. Despite the low chances of the player winning, it seems that we have been (un)fortunate enough to survive many chance encounters with the pirates and winning about 90% of the time.

- It is theoretically possible to die, but because of the previously stated difficulty, luck a major factor in preventing our death. Even so, it has been shown to be possible to die in this event, and the scene will change to the game over screen as expected.

- There is an innate risk when encountering the pirates, but the reward of gaining durability is tempting, as this is the only way to replenish durability currently. Ideally a good risk for a good reward, but we have been far too lucky.

For [Creative Mode (11/25/2023) {Nicholas, Jose, Christian}]:

- Creative Mode is lots of fun, giving the user some control in creating their own planet / galaxy, and being able to export their creation if they desire to make it into their desktop background.

- There is no inherent difficulty to Creative Mode, as there is no objective to meet, no resource to manage, just the user indulging in what they can accomplish with the editor.

- It is not possible to die in Creative Mode, as there is no fuel or durability to manage.

- Since you cannot lose any fuel or durability in Creative Mode, there is no risk, but it is not tied to the main game. For those that aren't looking for managing resources and just want to look at or create cool planets, this is the mode for them, a nice, rewarding, alternative game mode.

For [Kepler90 Planet View (11/25/2023) {Nicholas, Marcos, Jose}]:

- The planet view isn't a minigame, but just a screen for the planet itself accompanied by a background. Not inherently bad, and as far as planet views go, it can provide a nice thing to look at, as different planet types have their own backgrounds.

- There is no difficulty, as you cannot die in the planet view, and there's no task you need to do in order to proceed. You can, however, access the fuel minigame, but it does take some fuel to get to the Kepler90 system to begin with.

- It is not possible to die in the planet view, and the only risk of dying is getting to the Kepler90 system, as it uses up fuel and there's a chance to activate the Asteroid Minigame Event.

- No risk, and there is a complimentary 5 points to your score added each time you visit a planet. It is not as much as the other sources of points, but it's a little incentive nonetheless.

V Recommendations and Conclusions

The items have overall passed inspection, but there are planned modifications in the future, such as modifying the chance of winning for the Pirate Encounter Event, as well as the addition of more planets and backgrounds to Creative Mode, and more backgrounds to be used for the Kepler90 Planet View.

VI Project Issues

15 Open Issues

Content:

Our group tried to play-test each member's code to try to eliminate any error and provide feedback in our group meetings. One of the issues that was raised was the issue of the uneven score point distribution. These score points were what we will reward the player with if they play any of the mini games. The Andromeda was one exception as it rewarded the player with score points and fuel if they successfully visit it, but it had a high chance of random encounters to keep it even.

Motivation:

Since each member independently coded their Galaxies from one another, we see multiple styles when the player visits them. Members would then push versions of their galaxies they felt were finished and later tested. Score was implemented near the end and was therefore more rushed than the other elements of the game.

Example:

The mining mini game would reward the player with around 10 to 300 points if successful mining all elements from the planet. The Andromeda Galaxy would reward the player with 30-60 points for visiting a planet and no other score related object in that Galaxy. The issue came when traversing to another Galaxy and the player would obtain thousands of points for playing the mini game. So, the most optimal way to obtain points would be to constantly get asteroid encounters and not participate in other events.

Considerations:

Given time, our group could've balanced out the values of points rewarded by each game to incentivize the player to play all mini games and visit each galaxy in a proper game run.

Content:

Our second issue was fuel, and durability point distribution similar to the score. Playing the planet mining mini game would reward the player with around 5.1 fuel back. Visiting other planets starting from Milky and going to Andromeda would cost 30-40 fuel. Visiting Andromeda planets would provide 3-5 fuel back to the player. As for durability the asteroid game would remove about 20-30 durability while Andromeda random event can cost or gain back 10 durability.

Motivation:

The motivation behind this is to create a more enjoyable game to obtain a balance between punishment and reward. So far, our games feels more punishing to the player

for exploring the game as they would quickly use up resources but wouldn't gain much in return. Adjusting values to balance rewards and punishment would greatly encourage the playing time of the game as well as making more opportunities for the player to fully explore the game in their run.

Considerations:

Provided enough time we could've adjusted the values with each other and ran tests with exterior members for feedback on the game. One thing that greatly helped move the design of our game was when we had to present it to the TA who gave out ideas for what direction our game could've moved to. If we conversed with other group, we could've finished adjusting the numbers for fuel, durability, as well as score to an enjoyable level so that everyone is satisfied.

16 Waiting Room

Content:

A couple of elements that didn't get implemented in our final project was the inclusion of a save state that would save your current progress in-game. This save state would've first been implemented in the Kepler Galaxy for testing and then later moved to all Galaxies once finished.

Motivation:

This element would've been used to load back previous custom planets the user generated as well as keeping track of the number of resources the player accumulated in their run. This way a player can load their own custom save file and can restart the run to load another round of the game.

Consideration:

Provided with enough time, we could've been able to create a save system in the game for the player to use. On a more realistic note, our issues were time constraints and the complexity of the task. We had difficulty storing values and reading them back for the game with the time constraints we had. One of our members was close to finishing it but at the end they hadn't finished. Due to that we decided to remove those elements from the game to have a more stable presentation. Had we got more time to work on it, I feel like we would've been able to implement this save system in the game.

Content:

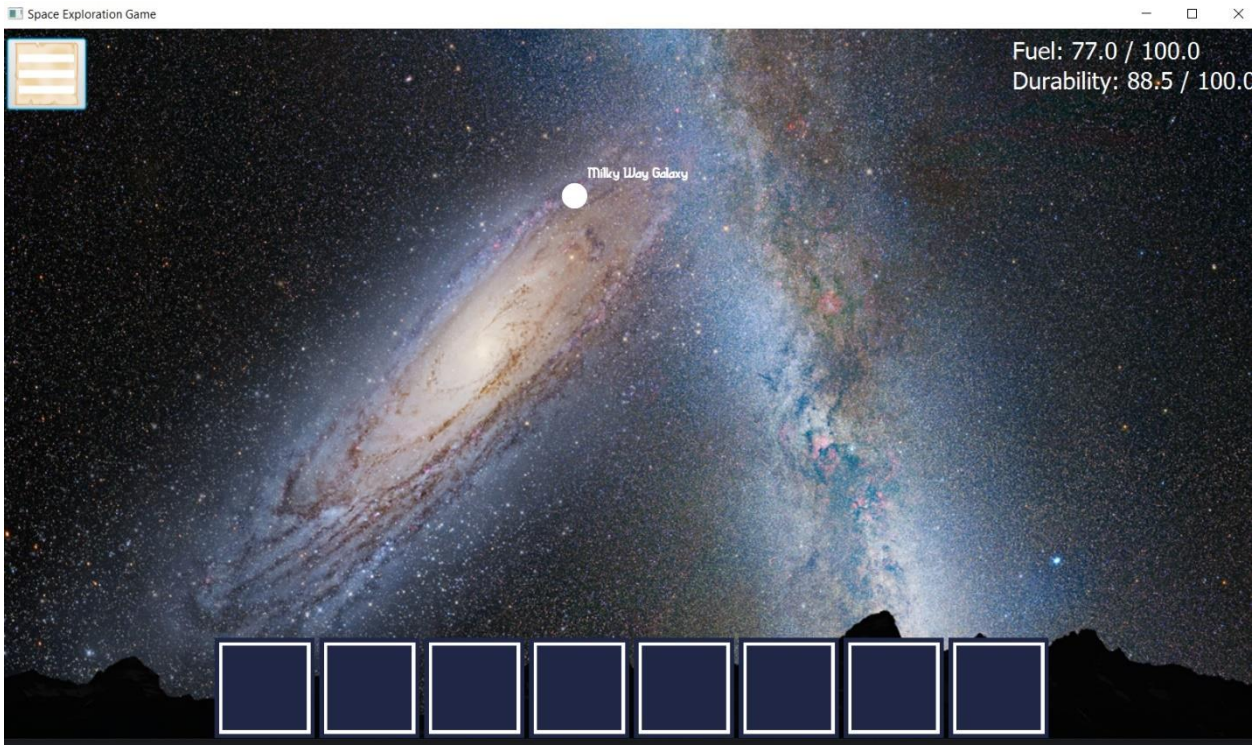
The second element that was planned to be implemented was the inventory system. This idea was first presented in Milky Way Galaxy and later Kepler and Andromeda followed by having the same system. This was later removed due to time conflicts as the game grew in complexity and we overestimated ourselves into fully utilizing this system.

Motivation:

This element would've been present in all Galaxies and used to gain items from planets to then later use in mini-games or encounters. There would've been multiple ways to obtain items and use said interactions in random hazards in-game.

Considerations

This was one of the first items later removed due to the complexity of the task, but each Galaxy still has elements of this feature in them. Provided enough time I think we would've eventually implemented this system back into our game. When presenting this idea to the TA, they mentioned that if the task was too grand, we might just have to remove the inventory system due to complexity. Our game at the time was very bare bones and that was mostly because we were trying to get the inventory system to function and create items for each situation. It was better that we removed the system and first create a solid base for the game. Overall, this was a long term goal in our group to eventually implement but with our time constraints we decided to remove this feature before presenting.



17 Ideas for Solutions

Content:

One of our conflicts we had when deciding on how to create this game was language, what IDE to use and later how to merge said items. We first agreed to use python to design our game in for simplicity's sake. Then then used GitHub to separately create a file system for each separate Galaxy that would be implemented. And lastly, we initially used vs-code to code our project in.

Motivation:

We implemented our game firstly in Python due to how simple it was to generate and place elements. Since we wanted a visual type of game, python allowed us to easily create backgrounds and link text or buttons to actions in a time efficient manner. Had we decided to create this project in C++, then we would've run more issues into pointer error or memory overflows rather than design issues and future path of our game. C++ is more machine efficient, but python is more time efficient when designing a simple game. As for GitHub, we later designated a base file for all galaxies to be placed in to simplify the merging of updates in a central file rather than trying to merge opposing separate files. As for VS-code, we changed that into IntelliJ as it was a lot simpler to locate objects and worked very well with GitHub.

Consideration:

Had we created a simpler way to merge our files it, we could've kept our Galaxy files separate as it would be easier to find elements from each galaxy and separate them if the main file ever had any error. Issues we had from this design was that my group had to repeatedly test objects to ensure that they don't break any element on the main file since that would crash our whole system. Given advice or more though put into it by asking a TA or the professor, we could have a more reliable system to push and commit new elements without worrying if we will crash or corrupt the main file system.

18 Project Retrospective

Content:

What worked well but had issues was the method we used to have a centralized file system where all galaxies and files were implemented inside. This had a simple method of working but is very hard to read for anyone else if they were given our GitHub. Elements that did work out were the use of IntelliJ as our IDE, Python for our Language, Weekly meetings for discussion and design planning of the week, and discord group notifications that help one another if we run into issues. Issues we had was inconsistencies on ideas that were to ambiguous and therefore either cut out of took longer than expected to implement.

Motivation:

Throughout the course of the semester, we tried to improve the method we used on how the project would progress and refined elements that worked and others that didn't. An example was our move from vs-code to IntelliJ for simplicity and consistency as we all moved to using it for this project. Other elements that stayed constant were implementing a galaxy and linking it to the Milky Way as a base connector. This helped test the game to ensure that we didn't crash the game and that it was safe to push and commit. As for our ambitious ideas for certain game elements, the TA helped cool down a couple of ideas we had as well as create new ideas we used to redesign our game in.

Consideration:

In the future, if we were going to design another game, we would use and recommend others to use python, GitHub, and IntelliJ for consistency as well as communicating to each other via Discord or any other method on that state of progress you've made. What we would've changed could be the overall design of a couple of elements or methods used to implement those elements in the game.

VII Glossary

Fuel: Value that determines how much a player can travel before reaching a game over scenario.

Durability: Value that determines how much more damage a player's ship can endure before reaching a game over screen.

Player Score: The player's score gained from completing minigames and visiting planets.

Player Ship: The player's main mode of transportation around the different galaxies, which doubles as the player's visual aid of where they are on the galaxy map.

Kepler: One of the visitable galaxies/systems

Milky Way: One of the visitable galaxies/systems, also the starting galaxy

Andromeda: One of the visitable galaxies/systems, also the furthest away galaxy

Minigames: Small short games that either give you more resources such as fuel/durability, enable planetary data, or consume fuel/durability.

Create-A-Planet: side mode that allows for creating and exporting planets to be used as wallpaper backgrounds.

Galaxy Map: the overworld map that allows players to visit different galaxies while seeing their player ship move along where they pick.

Pirate Cove: A planet with a very high pirate encounter rate for play testing.

Inventory: A box specifically used in Keplar to travel to their planet system. Was a previously removed feature in the game.

Kepler Planet Type: A description provided in Kepler that dictates what environment you encounter when you explore the planet. From icy, harsh desert, and lots of moon lights.

Asteroid Mini game: A mini game you get randomly when traversing to other Galaxies.

Pirate Encounter: A random encounter in which you get 3 options to choose from with a random chance of winning or losing the Encounter.

VIII References / Bibliography

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