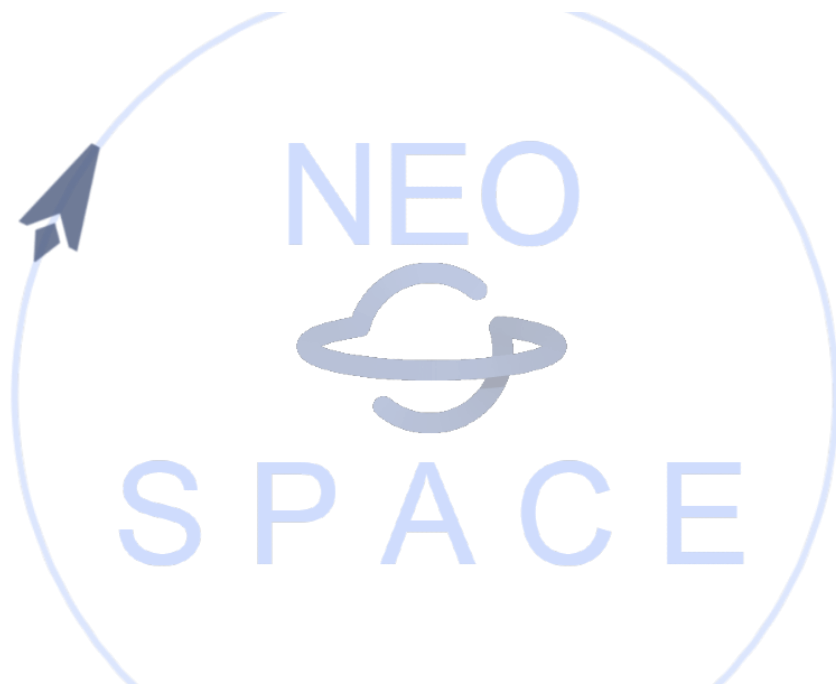

NEOSPACE

creative_original_name



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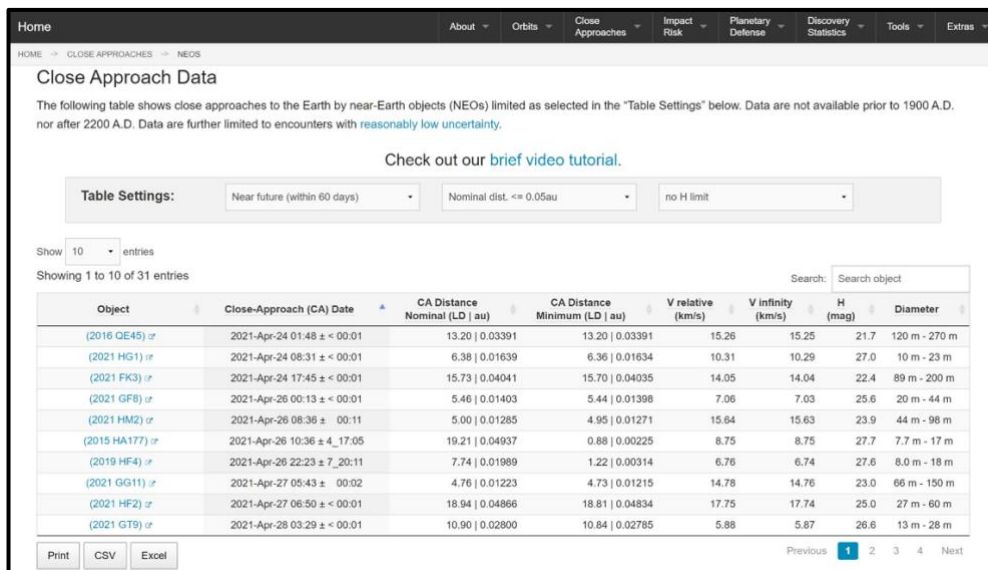
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Business Part

Purpose of the system

Space has long been a fascination for humanity for decades, a recent resurgence in popularity has seen a growing interest from the public to understand complex topics. This has underlined the space industry with a mass influx of content being produced to satisfy this growing consumer demand. However, these existing systems lack simplifying such multifaceted and complex topics for novice users as they remain daunting for users to navigate. Current systems such as the Centre for Near Earth Object Studies, focus on displaying information in a “tabular” format as show below:



Home About Orbits Close Approaches Impact Risk Planetary Defense Discovery Statistics Tools Extras

HOME → CLOSE APPROACHES → NEOS

Close Approach Data

The following table shows close approaches to the Earth by near-Earth objects (NEOs) limited as selected in the "Table Settings" below. Data are not available prior to 1900 A.D. nor after 2200 A.D. Data are further limited to encounters with [reasonably low uncertainty](#).

Check out our [brief video tutorial](#).

Table Settings: Near future (within 60 days) Nominal dist. <= 0.05au no H limit

Show 10 entries
Showing 1 to 10 of 31 entries

Search: Search object

Object	Close-Approach (CA) Date	CA Distance Nominal (LD) au	CA Distance Minimum (LD) au	V relative (km/s)	V infinity (km/s)	H (mag)	Diameter
(2016 QE45) or	2021-Apr-24 01:48 ± < 00:01	13.20 0.03391	13.20 0.03391	15.26	15.25	21.7	120 m - 270 m
(2021 HG1) or	2021-Apr-24 08:31 ± < 00:01	6.38 0.01639	6.36 0.01634	10.31	10.29	27.0	10 m - 23 m
(2021 FK3) or	2021-Apr-24 17:45 ± < 00:01	15.73 0.04041	15.70 0.04035	14.05	14.04	22.4	89 m - 200 m
(2021 GF8) or	2021-Apr-26 00:13 ± < 00:01	5.46 0.01403	5.44 0.01398	7.06	7.03	25.6	20 m - 44 m
(2021 HM2) or	2021-Apr-26 08:36 ± 00:11	5.00 0.01285	4.95 0.01271	15.64	15.63	23.9	44 m - 98 m
(2015 HA177) or	2021-Apr-26 10:36 ± 4_17:05	19.21 0.04937	0.88 0.00225	8.75	8.75	27.7	7.7 m - 17 m
(2019 HF4) or	2021-Apr-26 22:23 ± 7_20:11	7.74 0.01989	1.22 0.00314	6.76	6.74	27.6	8.0 m - 18 m
(2021 GG11) or	2021-Apr-27 05:43 ± 00:02	4.76 0.01223	4.73 0.01215	14.78	14.76	23.0	66 m - 150 m
(2021 HF2) or	2021-Apr-27 06:50 ± < 00:01	18.94 0.04866	18.81 0.04834	17.75	17.74	25.0	27 m - 60 m
(2021 GT9) or	2021-Apr-28 03:29 ± < 00:01	10.90 0.02800	10.84 0.02785	5.88	5.87	26.6	13 m - 28 m

Print CSV Excel

Previous 1 2 3 4 Next

This above system lacks visualisation and interactivity for users as they cannot approximate the true size of such object in space. Additionally, in combination with the poor design choices and the overload of quantitative data, means that the page further solidifies disengagement for a user.

Other sites lacking in engaging users are the SkyLive, which provides disorganised content with no interactive features, the provided orbit diagram is extremely cluttered with no filters to remove some data, as shown below:



Further critiquing the flaws of existing systems, we have summarised our findings in the below table:

<u>Characteristics</u>	NEOSpace	<u>CNEOS</u> <u>(NASA)</u>	<u>The Sky Live</u>	<u>Wikipedia</u>
Engaging Pages				
Layman Friendly				
Simple Navigation				
Visual Representations				
Pleasant Displayed Data				
Data on Past NEOs				
NEO search				
Data Filters				
Data on Present NEOs				
Mars Rover Photo Data				
Mars Images from Multiple Rovers				
Filters for Easier Photo Navigation				
Photo Descriptions				
Astronomy Picture of the Day				

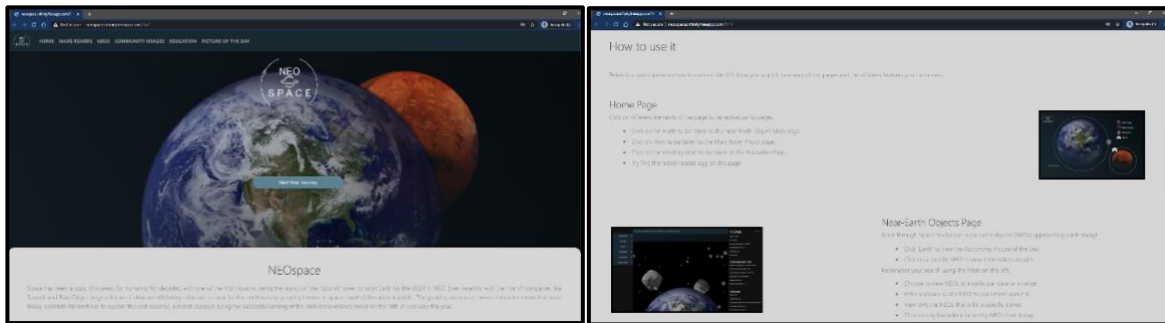
Thus, the faults present in existing systems provide a challenge for novice users to navigate intricate topics. Using NASA's vast collection of API's, we aspire to create a site that is both interactive and informative, presenting data specifically about near-Earth objects (NEOs). By focusing on a specific topic, we aim to present detailed, well presented data for those who have a general interest in NEOs without cluttering their page with unrelated data. This will make the information more interesting, especially for younger users who are intrigued on learning more about space exploration.

Furthermore, through specific design choices, we will create an interface that is fully interactive, responsive to user's commands. This will allow the user to feel a sense of control over the information that they're receiving, further capturing their attention. The site will also be quite dynamic, changing constantly based on the input provided by the users. This will capture the engagement of younger users, who typically have a shorter attention span, allowing them to not feel 'bored' or 'unmotivated'.

Summarising the above, our purpose is to displaying information on near Earth Objects (NEOs), which leads to a harmonious balance between educating and engaging users.

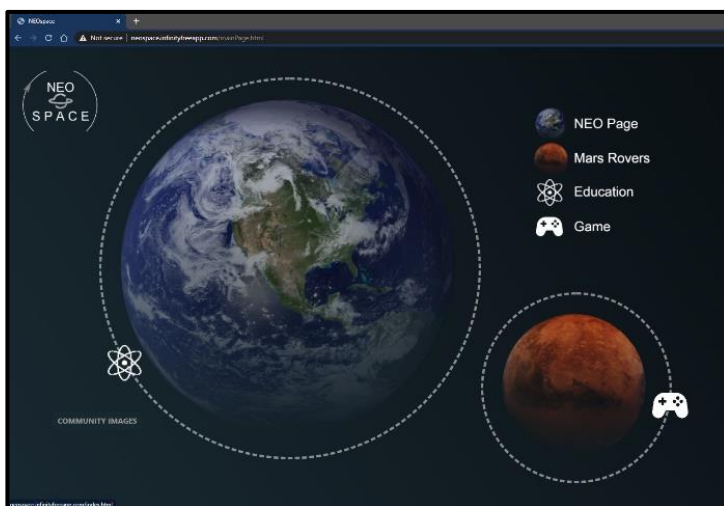
Final interface screenshots

Landing Page



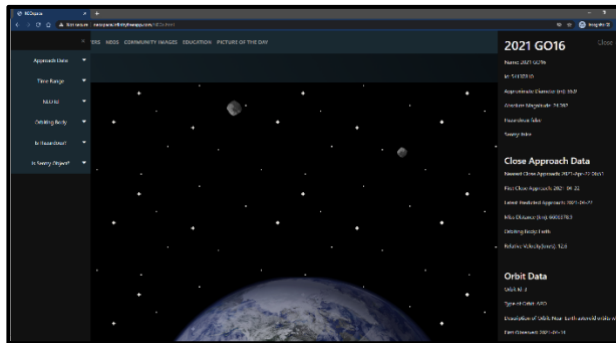
This is the page that users will be greeted with as they enter the website. This page provides a description of the functionality and purpose of the site as well as a tutorial on how to use each page and feature. This screen is intentionally kept simple, not cluttered with too many buttons or text. This will make users more interested in exploring the site and increases their curiosity. It will also cause the site to not be too overwhelming or confusing for new users.

Intermediary Page



The intermediary page is an interactive page where users have the choice to click on Earth, Mars or a few other options and learn more about each topic. Some clickable options are icons that can orbit around both planets, providing a more engaging aspect for the user. This page's simplicity will help the site to not be too overwhelming or confusing for new users.

NEO Page



Clicking on the Earth will result in the users entering the NEOs page. In this screen, users will be presented with an interface that showcases part of the Earth along with NEOs at a particular distance from it. Users will be able to click on the NEOs to display more information about them, such as their size, relative velocity, distance from earth, etc. This information will appear in a

sidebar that will appear on the right of their screen.

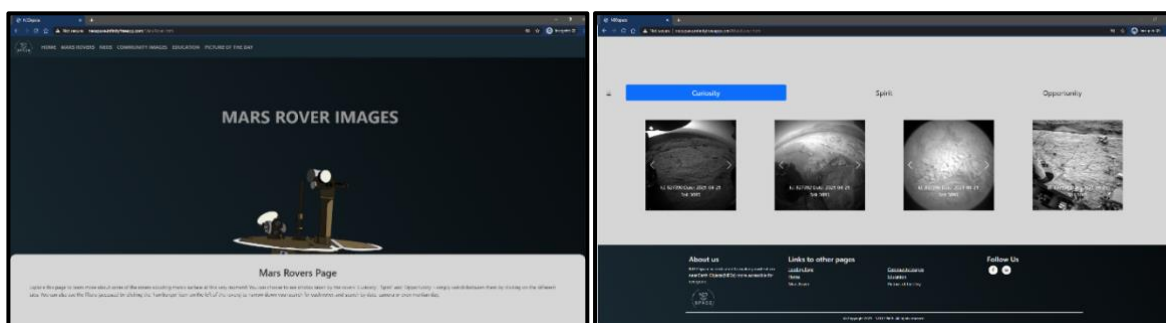
There will be a menu option on the left side of their screen, that can be expanded to reveal a side panel on the left where users can apply filters to the NEOs such as approach date, orbiting body, time range etc.

Picture of the Day



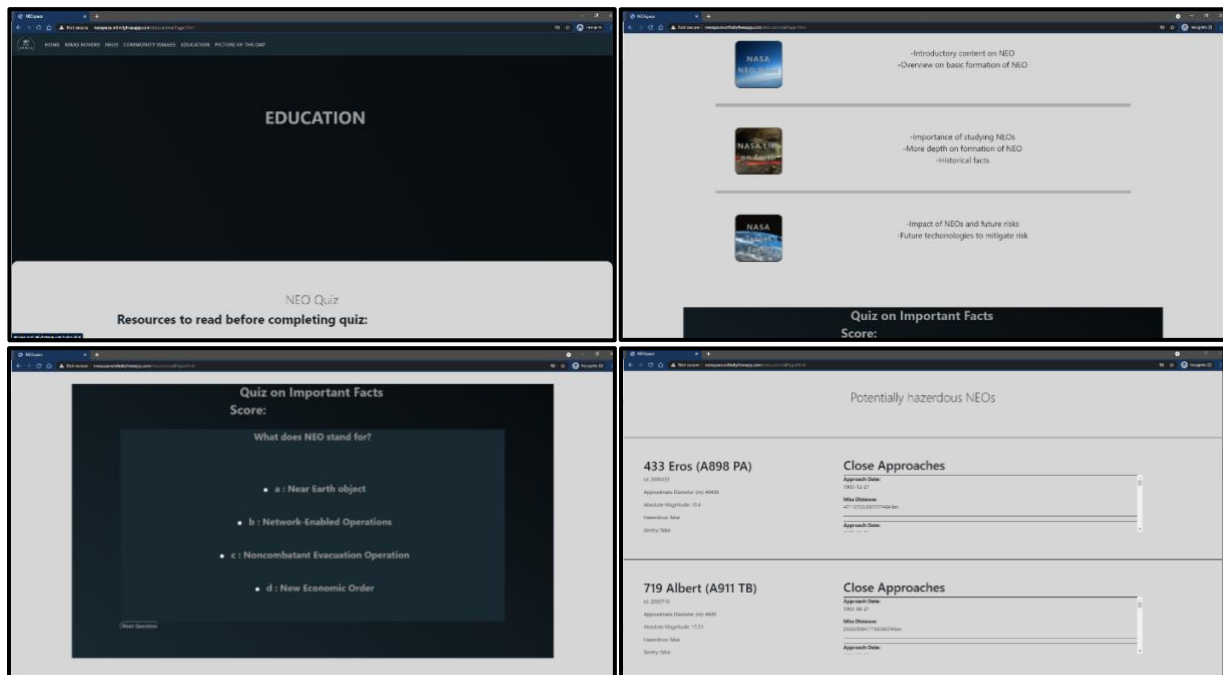
The Earth on the NEOs page will also be clickable. It will open up a webpage with the astronomy picture of the day from the APOD API. Below the image there exists some text describing the image and its significance.

Mars Rover Page



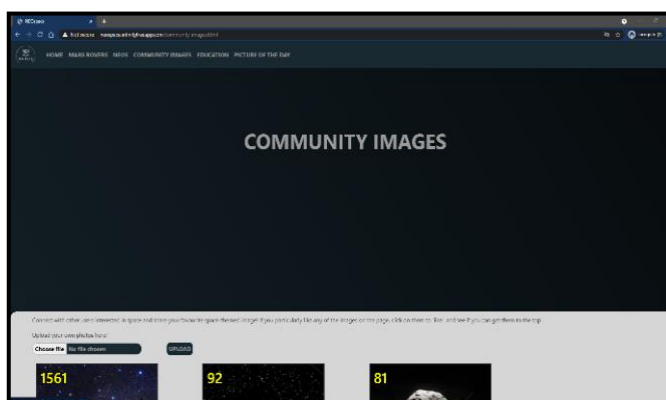
When users click on the Mars planet, a new page will open, displaying photos from the Mars Rovers with a description of the photo. At the top of the page, there will be tabs with different rovers listed on them, allowing users to specify which rover they would like to see photos from. The formatting of the page for all the rovers will remain consistent, with similar images and a description of the image in carousels.

Education Page



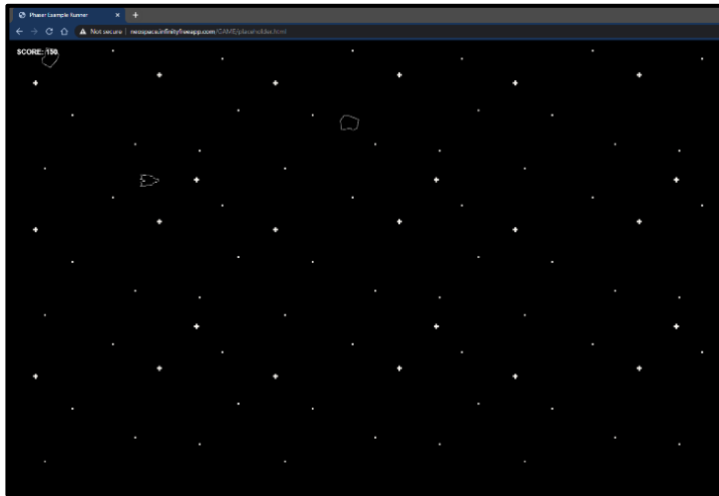
When users click on the symbol orbiting earth, they will be redirected to the education page. This page includes educational resources on the topic of NEOs followed by a quiz on the same topic. At the bottom of the page there is a list of past and future hazardous NEOs, the list shows the past miss dates and distances and any possible future miss dates and distances.

Community Images



When users click the community images button, they will be sent to this page. The idea of this page is a socialised version of a place where users can share their own interesting images to do with astronomy. Users can click on any image on this page that they like, and its clicks counter will go up and the images are displayed in order of how many clicks they have, therefore the most popular images will rise to the top.

Interactive Game



When the user clicks the icon orbiting mars, they are taken to an easter-egg type feature in our website. This page is a mini asteroid dodging game where users have to try and dodge incoming asteroids. This simply adds a fun gamified component to our website to enhance the user experience.

User Stories and Features

The 'Filter' feature

Description: On the “Near Earth Objects Page” there will be an optional menu bar to the left which when selected reveals a side panel. This side panel allows users to search near-Earth Objects (NEOs) for a particular criterion (e.g., time, name, size, type).

Feature: Apply a filter that allows users to search a particular NEO by time.

As someone who is interested in space,

I want to be able to see a list of NEOs when entering a specific range of time,

So that I can view past NEO objects.

Scenario: View a list of NEOs when inputting a date/time range

Given I am on the “Near Earth Objects” page

When I press on the left panel in the NEO page

Then a search bar should pop up which allows you to select the hour, day, month, year in a minimum and maximum range.

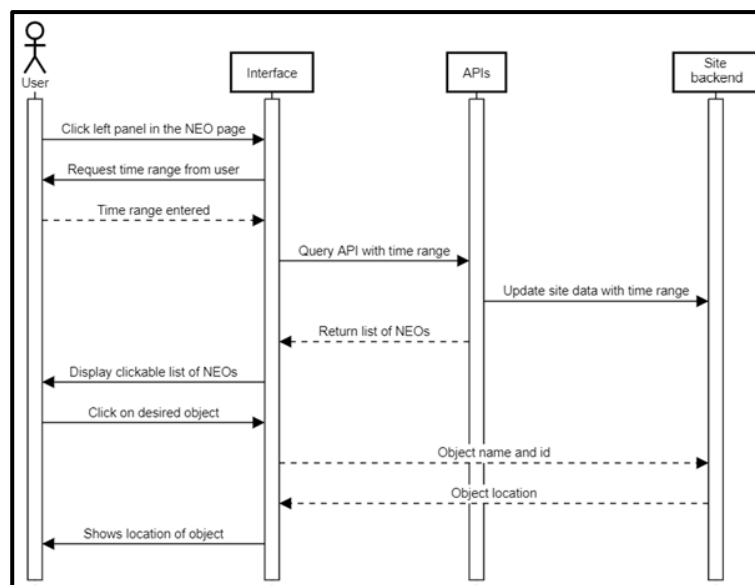
When I specify the input range for time

And I enter the input range

Then a list of clickable NEOs within those times/dates should appear.

When I click on one of the search results,

Then I should see the desired object’s location relative to earth.



Feature: Search for a particular near-Earth object (NEO) by name.

As someone who is interested in physics and space,

I want to search for a particular near-earth object by name,

So that I can see a visual representation of this object.

Scenario: Search for a particular near-earth object by name

Given I am on the “Near Earth Objects” page,

When I press on the left panel,

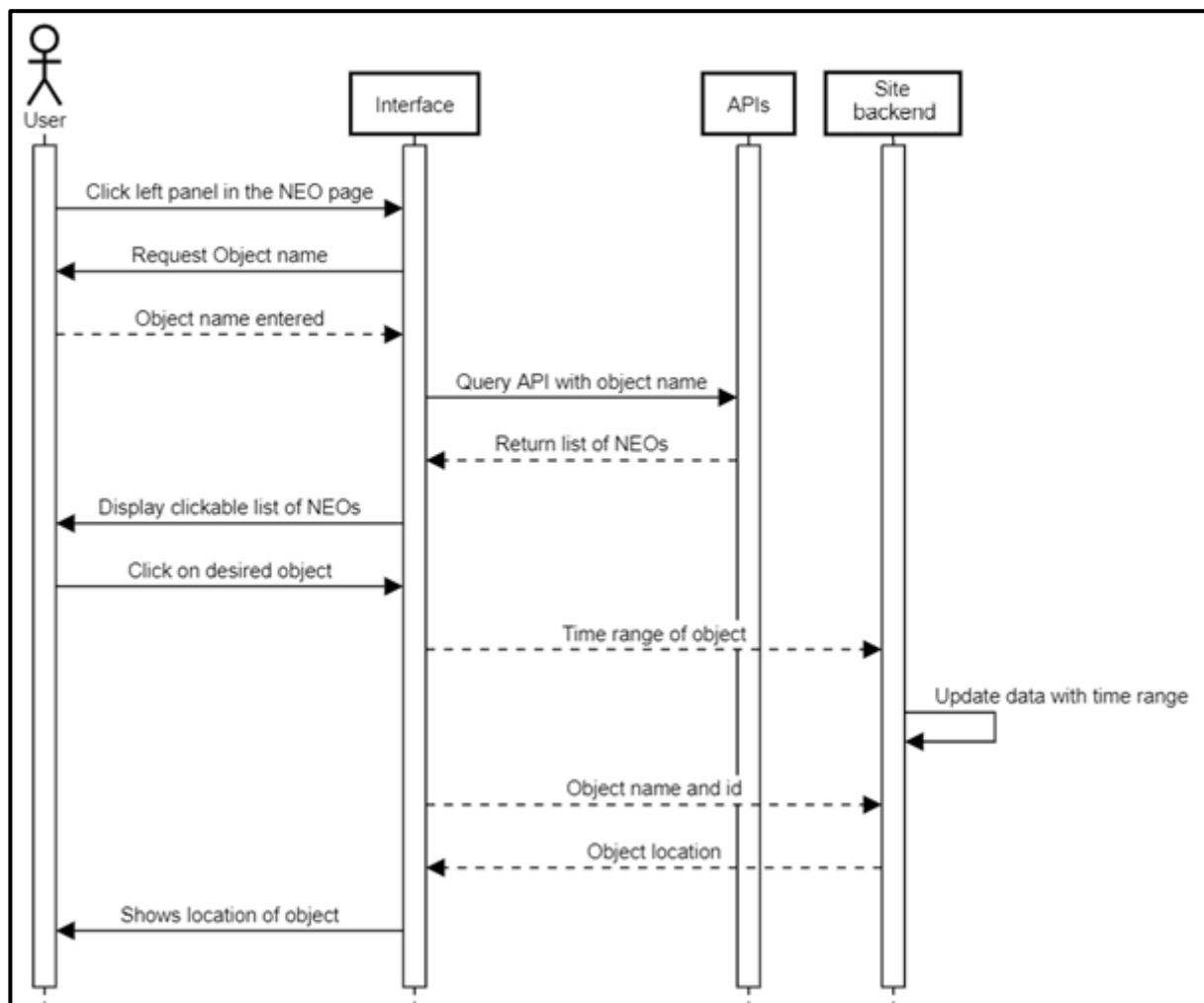
Then a search bar should pop up.

When I type in the name of a particular object in the search bar,

Then a drop-down list of search results will appear.

When I click on one of the search results,

Then I should see the desired object’s location relative to earth.



Information on Near-Earth Objects

Description: Provided users are on the “Near Earth Objects” page, selecting a near-earth object (NEO), will result in a panel appearing on the right side. This panel will contain a list of information on that NEO such as size, velocity, and distance. Users will also have the option at the top of the page to select a timeline slider where they can view recent NEOs up to a selected date.

Feature: View NEOs within a given range from current date to recent date.

As someone who is interested in space

I want to view the most recent NEOs by an interactive slider,

So that I can view NEOs within a given time range.

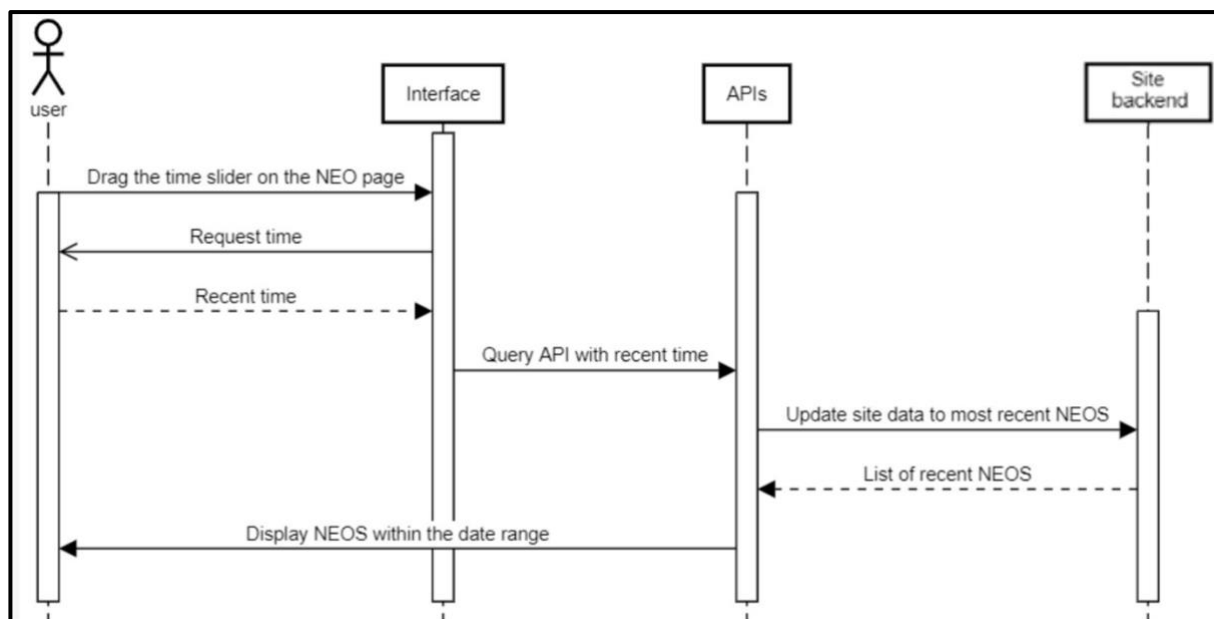
Scenario: View NEOs within a certain time range.

Given I am on the “Near Earth Objects” page,

When I drag the time slider bar which is to the top right,

And I specify the time,

Then all NEOs within that date will be displayed.



Feature: View information on a particular object such as its velocity, distance, speed orbit from Earth.

As someone who is interested in physics and space,

I want to view information on a particular near-Earth object (NEO),

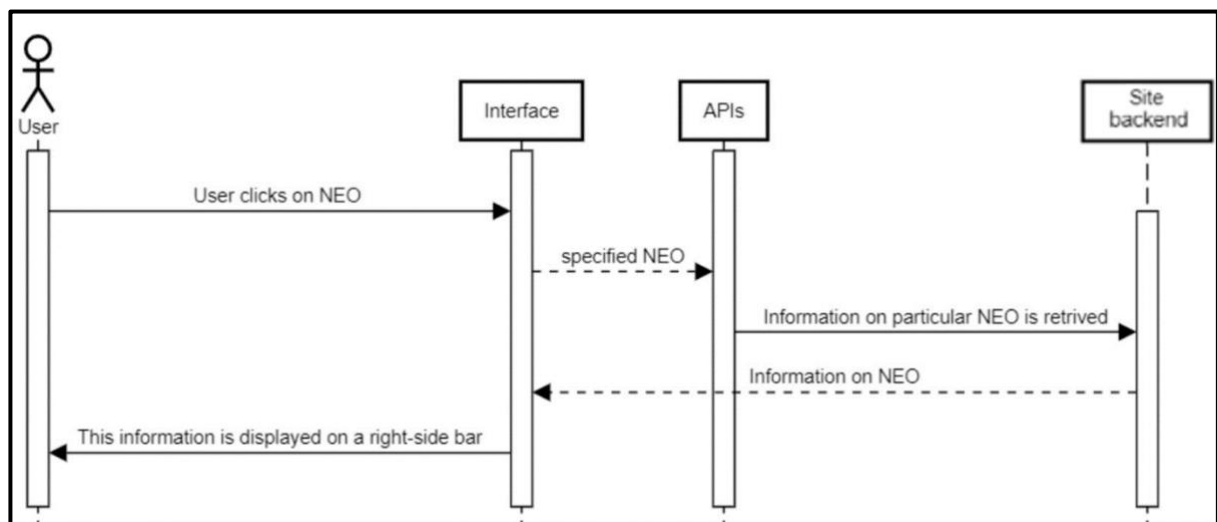
So that I can be given quantitative data on the NEO.

Scenario: View information on a particular near-earth object

Given I am on the “Near Earth Objects” page,

When I click on an object that I am interested in,

Then a right-side bar should appear that displays information on a particular object such as its velocity, size and distance from earth.



Picture of the Day

Description: A webpage which allows users to view the “Astronomy Picture of The Day”

Feature: View NASA’s astronomy picture of the day

As someone who is interested in the beauty of space and astronomy,

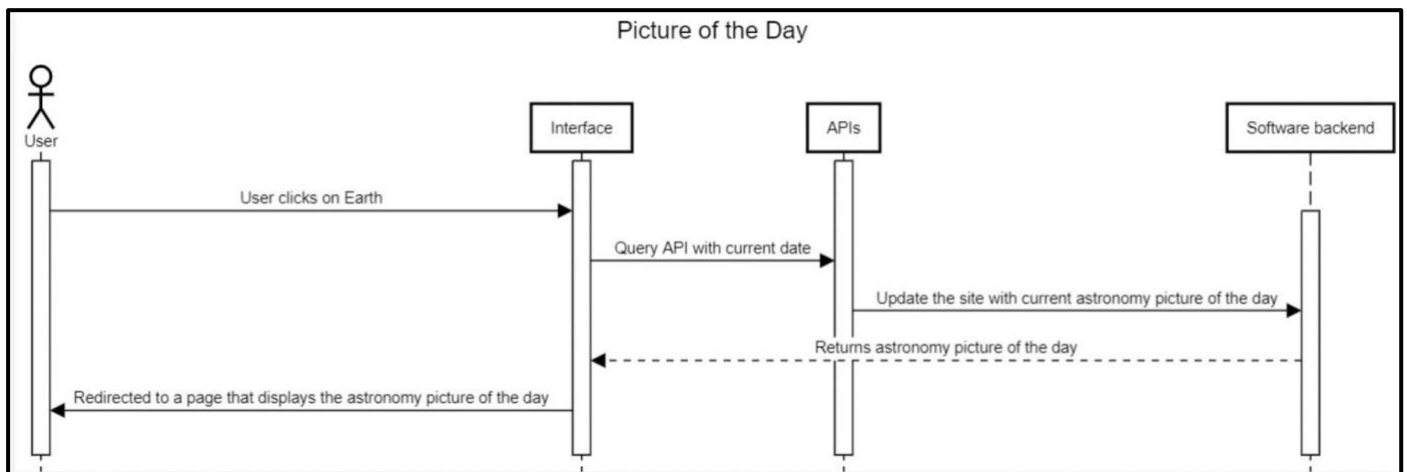
I want to easily be able to find the astronomy picture of the day.

Scenario: View the astronomy picture of the day

Given I am on the “Main” page,

When I click on the Earth,

Then I am redirected to the “Picture of the Day” page which showcases the astronomy picture of the day with a description of the image.



Mars Rover Features

Description: A page that allow users to view images and information/data related to those images.

Feature: View photos of Mars from a chosen Rover.

As someone who is interested in recent explorations of Mars,

I want to view a specific Rover,

So that I can view photos of Mars.

Scenario: View Mars Rover Photos

Given I am on the “Main” page,

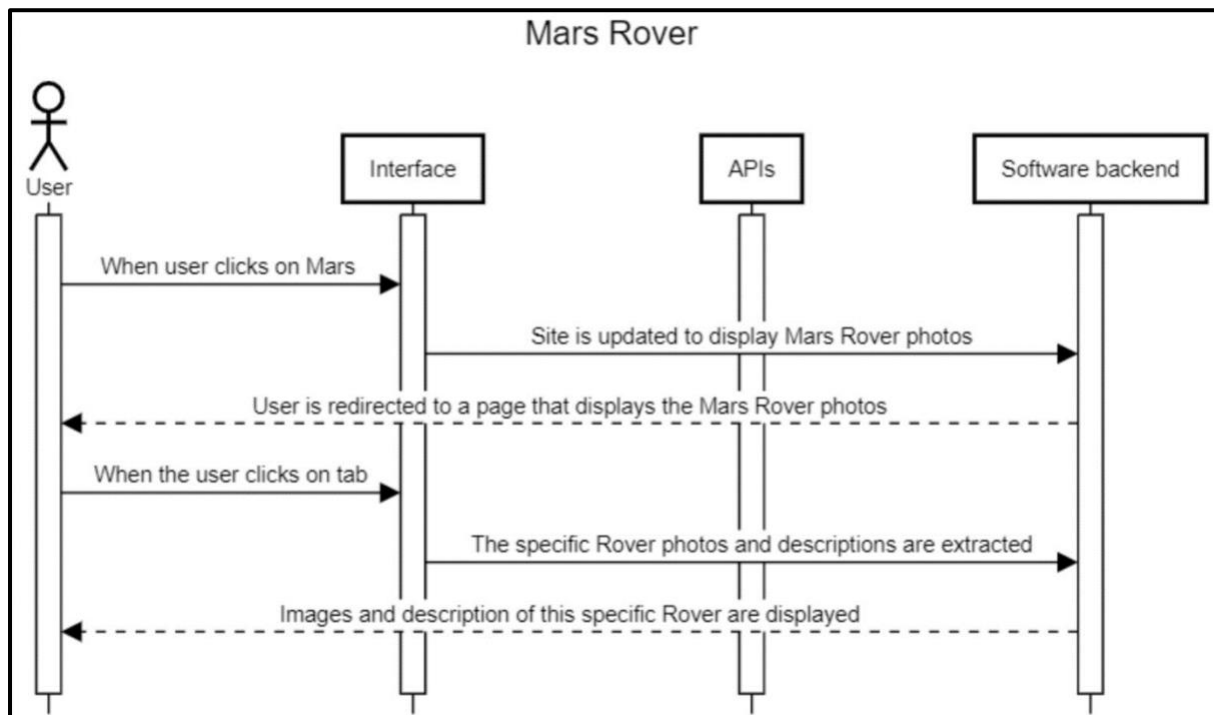
When I click on Mars,

Then the “Mars Rover photos” page will be displayed,

And different tabs on top left with different Rover missions are showcased,

When I click on one of the tabs,

Then images and description of this Rover exploration will be displayed.



Feature: Use the carousels to see similar images that are grouped

As someone who is interested in the explorations of Mars,

I want to view a specific Rover,

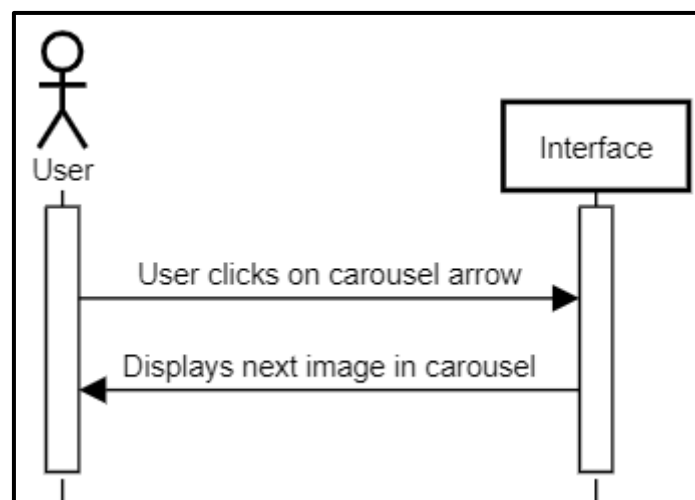
So that I can view similar photos of Mars taken together from different angles.

Scenario: Use the Carousel to view similar images taken from slightly different angles.

Given I am on the 'Mars' page,

When I click on the arrows on one of the images,

Then the “carousel” slides to show other similar images



Feature: View photos of Mars from a chosen Rover based on a specific query.

As someone who is interested in the history of explorations of Mars,

I want to view a specific Rover,

So that I can view photos of Mars at a time in the past.

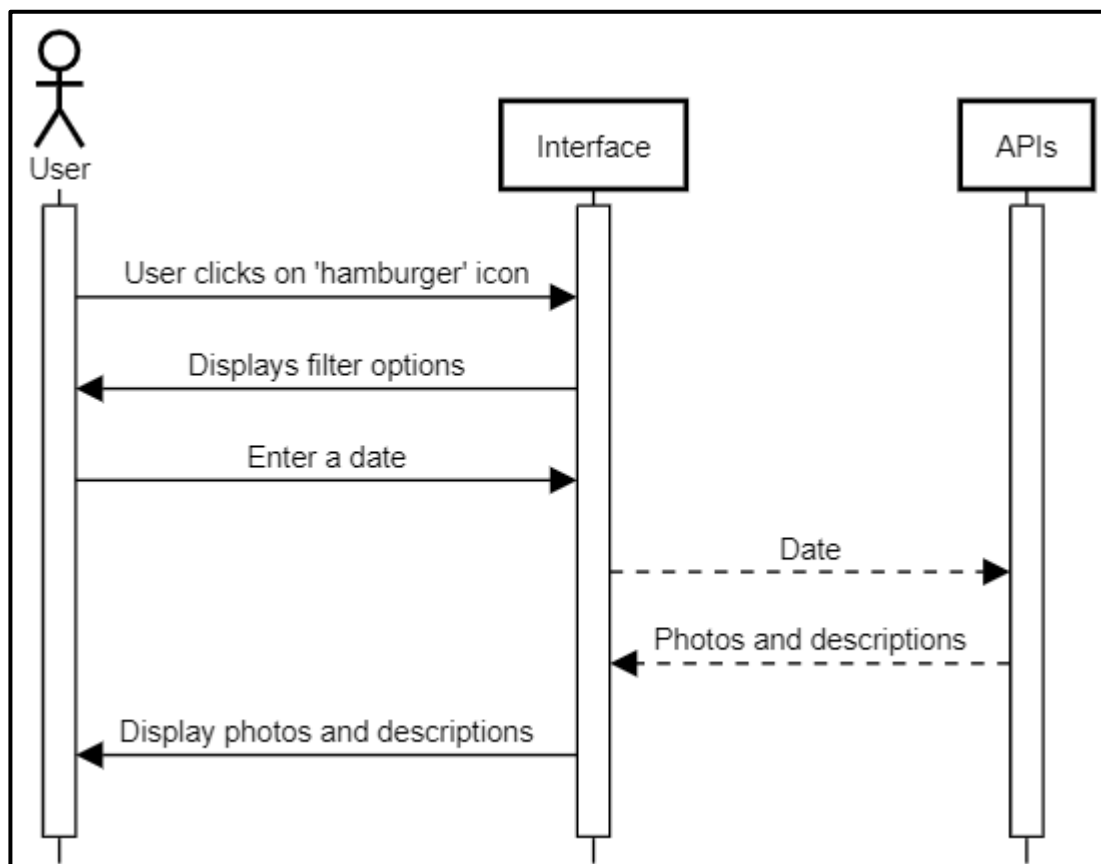
Scenario: View Mars Rover Photos at a particular date

Given I am on the 'Mars' page,

When I click on the 'hamburger' icon,

And I enter a date into the 'date' section,

Then the "Mars Rover photos" page will load with images from that date



Global Chat

Description: A chat for the NEO page that allows all users currently on the page to talk to each other about anything to do with NEOs.

Feature: Read messages that have been sent by other users in the chat.

As someone who is interested in discussing space and time,

I want to be able to read messages that other users have typed,

So that I can talk amongst others who are also interested in space and time.

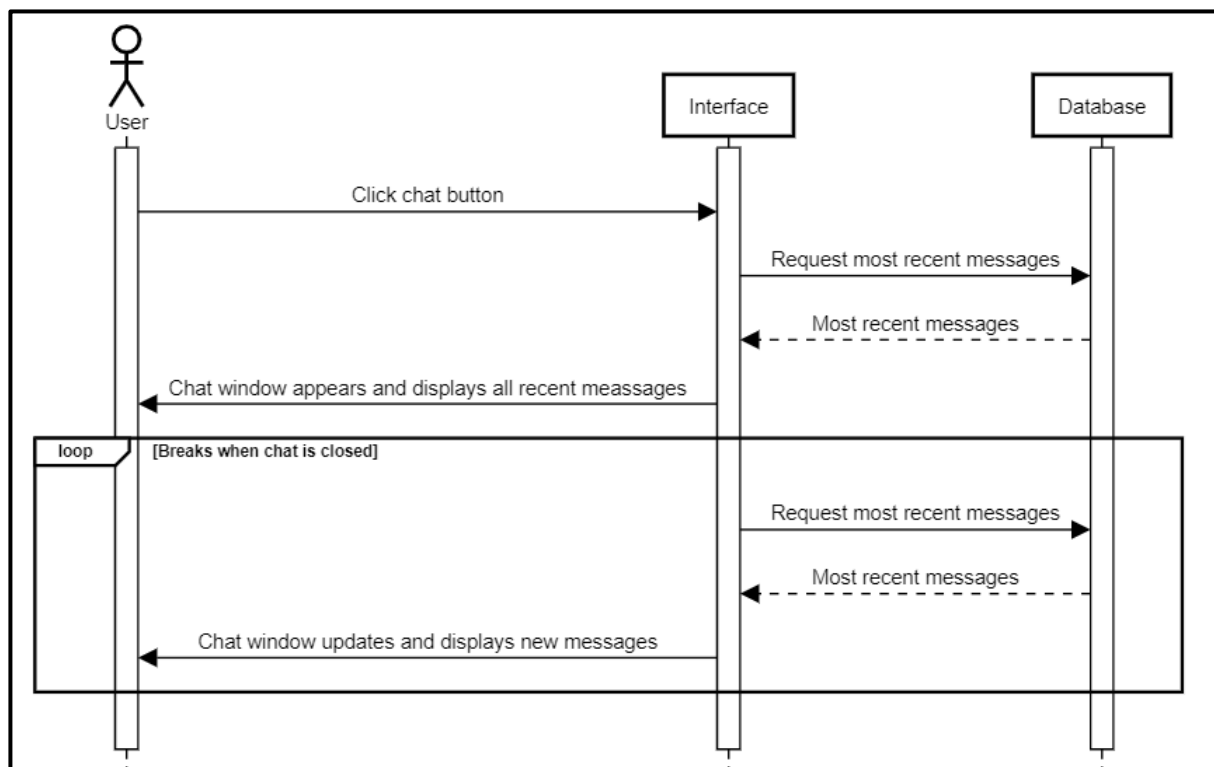
Scenario: Read messages that users have sent in the global chat.

Given I am on the “Near Earth Objects” page,

When I click on the chat button at the bottom of the page,

Then a small chat window should appear at the bottom of the screen,

And I should see all recently sent messages from users of the site.



Community Images Page

Description: A collection of visually appealing photos related to space, ranked by how many likes each photo has. Most liked photos will appear at the top

Feature: Upload a photo.

As someone who is interested in photos related to space,

I want to be able to upload photos I really like,

So that I can share space related photos amongst others who are also interested in space.

Scenario: Uploading a photo from desktop.

Given I am on the “Community Images” page,

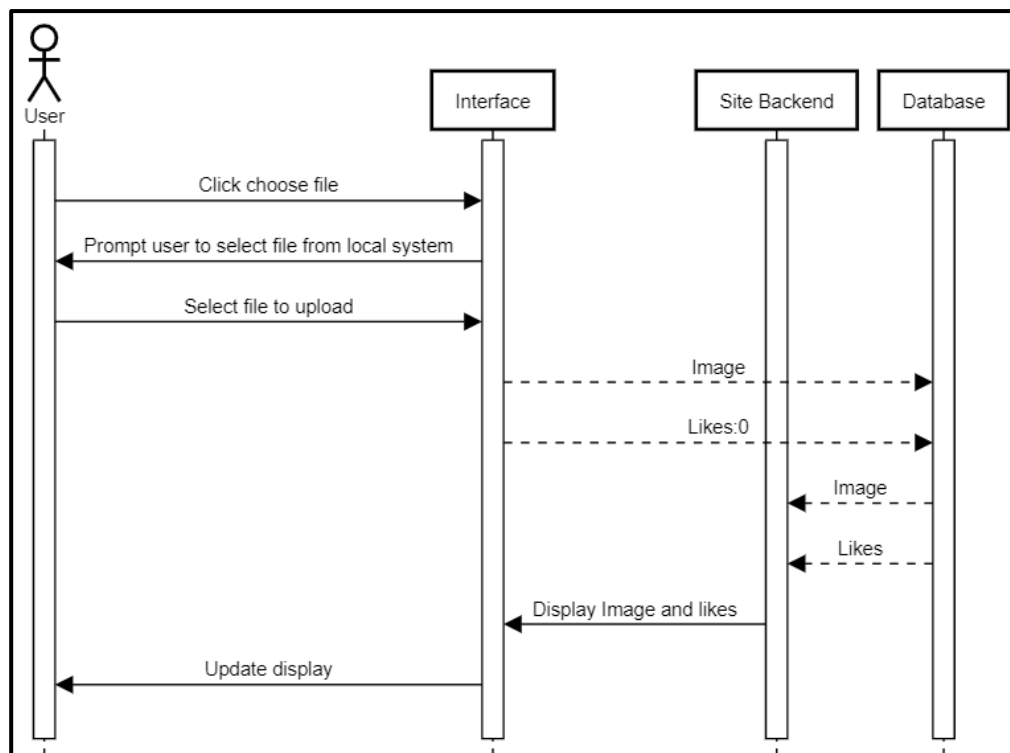
When I click on the “Choose File” button at the top of the page,

Then a small window should appear of my local system files.

When I select a photo for uploading,

Then I am able to click the “Upload” button to upload my photo,

And my photo is then visible on the site.



Feature: Leave a like on a photo.

As someone who is interested in photos related to space,

I want to be able to press ‘like’ on photos I really like,

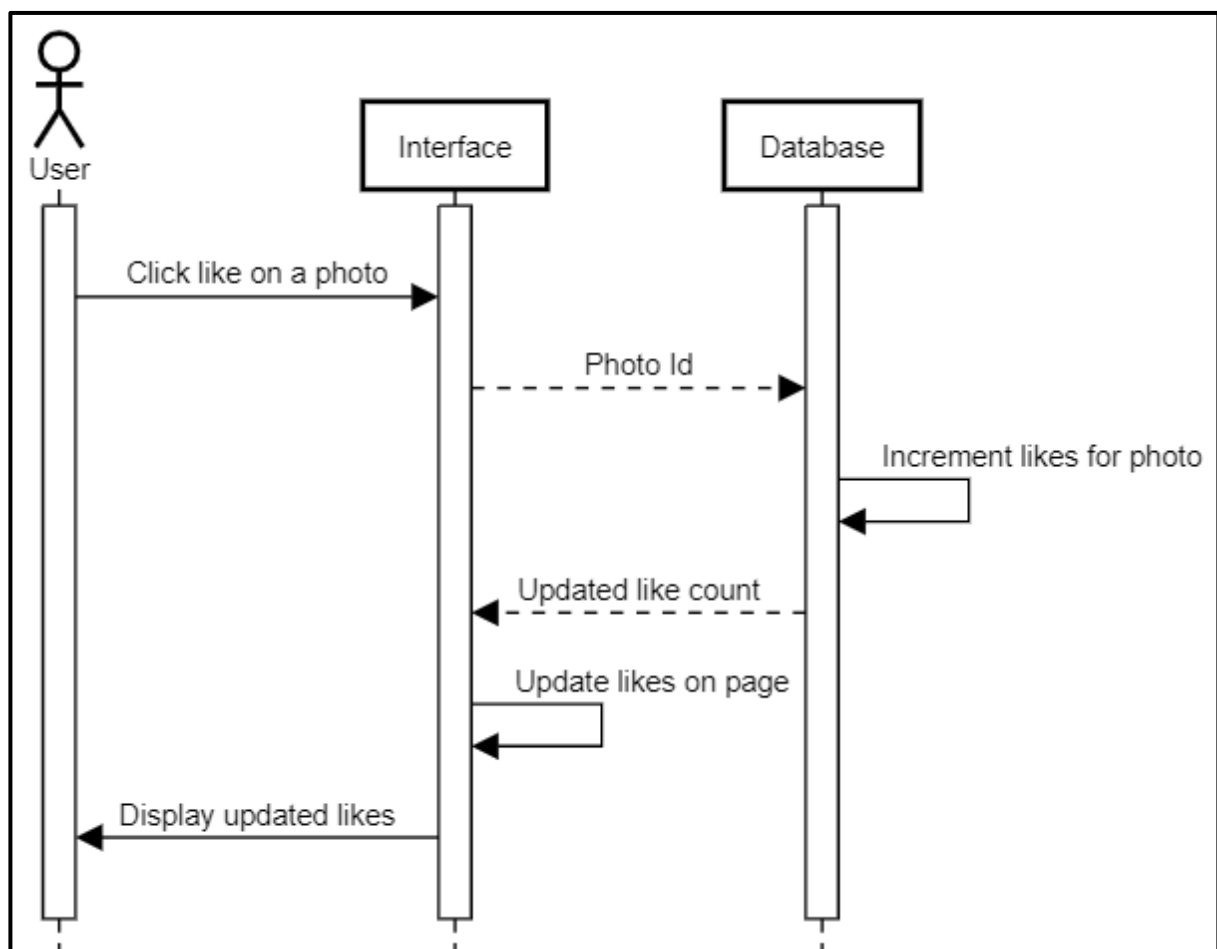
So that I can express which photo’s I like the most.

Scenario: Liking a photo from on the “Community Images” Page.

Given I am on the “Community Images” page,

When I click on a photo anywhere on the page,

Then the number of likes of that photo will increase.



Feature: Send messages on the global chat for users on the NEO page

As someone who is interested in discussing space and time,

I want to be able to send messages to other users of the site,

So that I can talk amongst others who are also interested in space and time.

Scenario: Send a message in the global chat.

Given I am on the “Near Earth Objects” page,

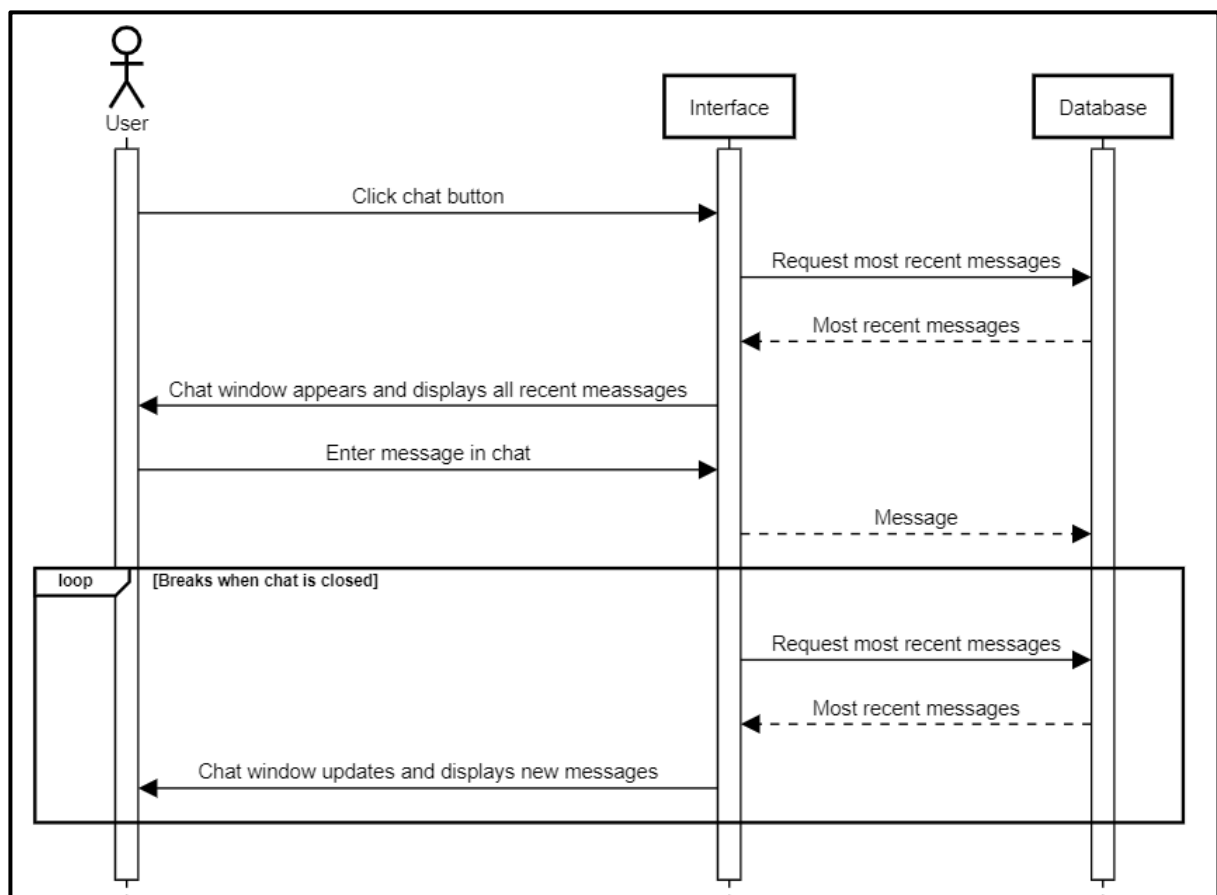
When I click on the chat button at the bottom of the page,

Then a small chat window should appear at the bottom of the screen,

When I enter a message in the chat,

And I press the send button.

Then my message should appear in the global chat and be visible to other users.



Educational Page

Description: A page for users who are interested in learning more about NEOs. This page will include an educational quiz and a few educational resources on the topic.

Feature: Play an educational quiz where you answer a certain subset of questions

As someone who is interested in learning about NEOs,

I want to be able to play a fun quiz that teaches me a variety of things,

So that I can learn more about NEOs.

Scenario: Play an educational quiz where you answer a series of questions to do with NEOs.

Given I am on the “Learning” page,

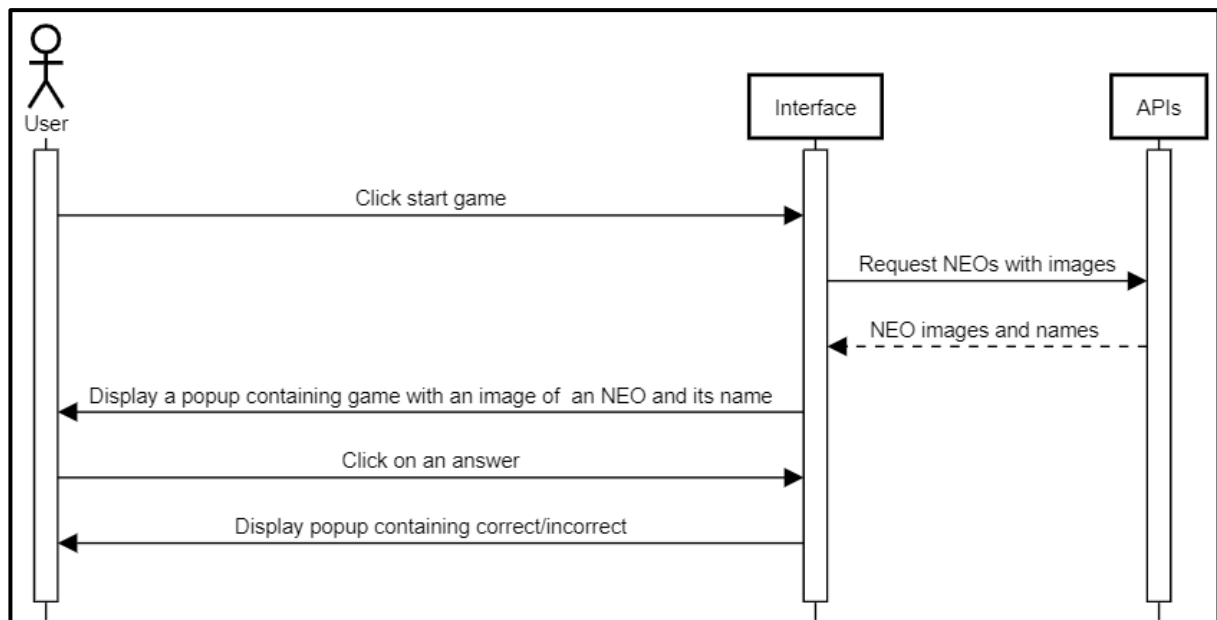
When I click on the start game button,

Then a popup containing the quiz should appear,

And I will see a question with four possible answers.

When I click on one of the four answers,

Then I should see a message that tells me whether my choice was correct or not.



Feature: View the impact of high risk past NEOs

As someone who is interested on the impact of NEOs,

I want to be able to view the historical past NEOs,

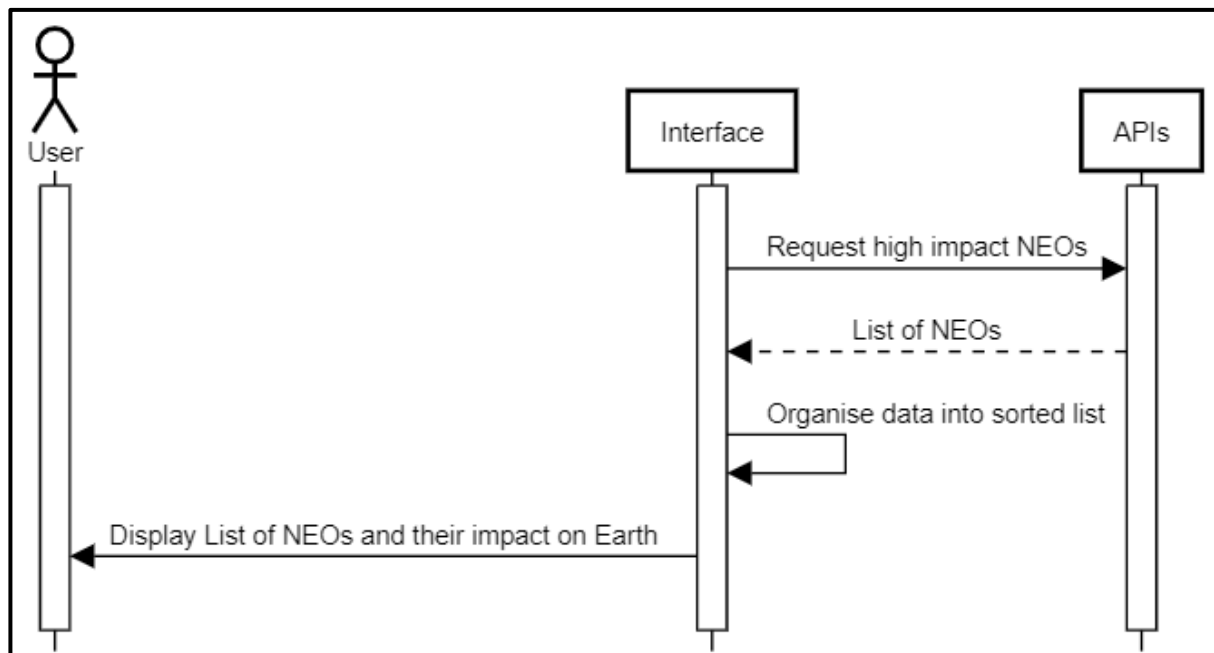
So that I can see the scale of impact they had on Earth.

Scenario: View a list of hazardous NEOs and their impact

Given I am on the “Education page”,

When I scroll down to the “past NEOs section” ,

Then I should see a list of hazardous NEOs and their miss distance from Earth ordered from the oldest miss to future misses.



Interactive Game

Description: A fun interactive game that users can play on the site. Starting from Earth users will navigate to a series of planets attempting to avoid orbiting near Earth Objects. It is based on an award system where points are awarded for distance (in kilometres) away from the Earth.

Feature: Play an interactive NEO game where users avoid NEO.

As someone who is interested in Near Earth Objects,

I want to be able to have an interactive game,

So that I can remain engaged in learning the content.

Scenario: Play an interactive NEO game where users avoid NEO.

Given I am on the “landing page”,

When I click on “Game”,

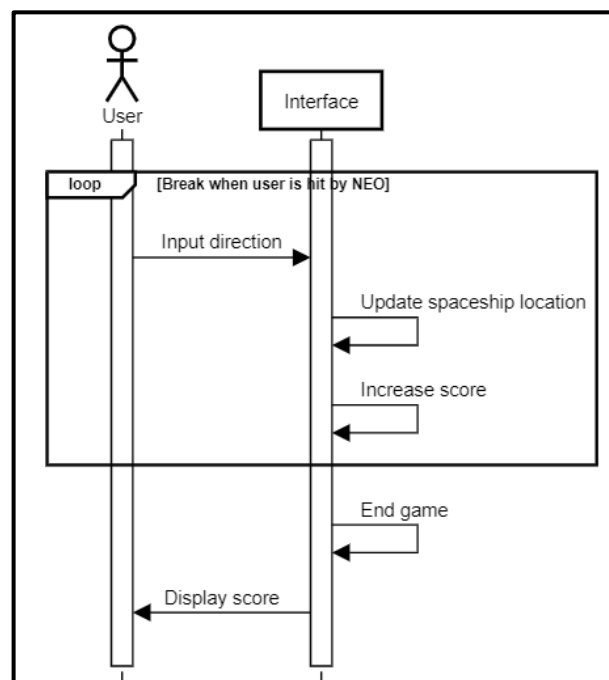
Then I should be redirected to “Game page”, which displays Earth with a spaceship and a “Start button”,

When the user presses on one of the arrow keys or the “Start button”,

Then the game should start, where movement of the spacecraft will begin, incrementing the score of the user each second that passes,

When the user is struck by a NEO,

Then the game should stop.



Feature: Pop-up questions users can answer.

As someone who is interested in Near Earth Objects,

I want to be able to answer quiz like questions,

So that I can remain engaged and test my knowledge.

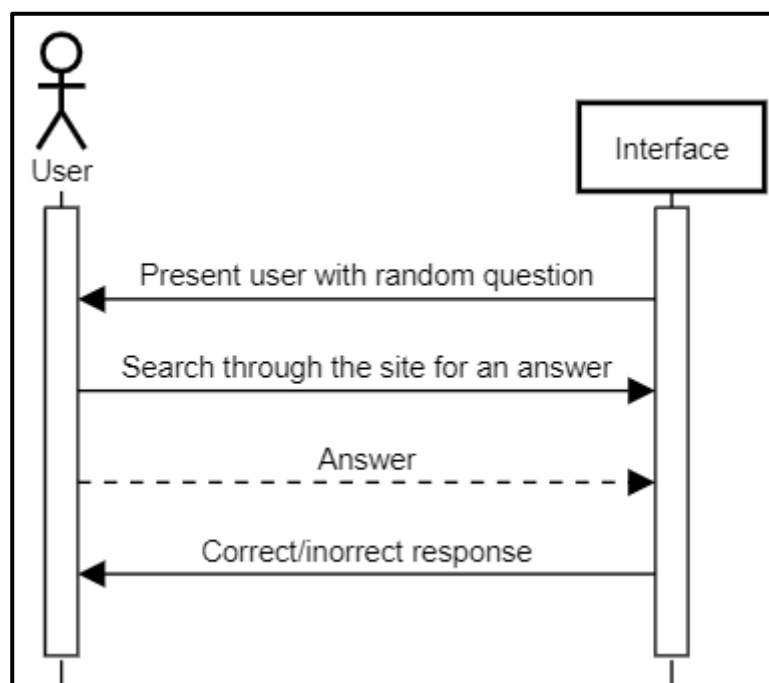
Scenario: Question pops up for user to answer.

Given that I am on any page other than the “main” page,

When I’m looking through the page, a question will pop-up at random,

Then I will provide the prompt with an answer,

And I will get a response stating that I was either correct or incorrect.



Design Part

Prototype Implementation

When implementing the NEOSpace prototype it was found that the majority of the site could be hosted on infinityfree servers due to most of the API queries being made from the frontend. All pages were hosted on infinityfree servers, with some embedded pages that would be hosted on a flask server, for example the global chat. This flask server was hosted locally for the prototype, and it should be noted that this was the only part of the site that was locally hosted. The database for storing community images was a firebase, meaning we were able to host it for free for the prototype.

Software Architecture

The architecture of a software system serves as a blueprint for the system. It is critical that a team models their software architecture before developing the system itself, as it will outline the different components that need to be developed as well as how they are connected. Designing the software architecture also allows the team to evaluate their skills and abilities, hence enabling them to select a web stack best suited towards them. The vital decisions that are made during this phase pave the way for the scalability of the development process.

Software architecture can be modelled in a variety of ways. Our team based the software architecture diagram off the 'layered approach', illustrating the major layers/components in the system (for example backend, frontend, etc) and how they pass data between one another.

Data sources

An important part of the NEOSpace app is the raw data that is used to create a refined presentation of information that is presented to users. This raw data comes from several data sources, the information from these data sources is obtained by querying the sources (either through JavaScript or the flask server) with specific queries determined by user inputs.

Asteroids NeoWs

The NeoWs API provides access to NASA's database of near-Earth objects (NEOs). This database will be queried with a start and end date. All NEOs that were present within the given time range are returned with information on their size, speed and luminosity. This information will be used to create a visual representation of the NEOs, for example the size data will be used to scale each object within the site.

Astronomy Picture of the Day (APOD)

The APOD API takes in a query containing the current date, which will return the astronomy picture of the day and a description of this picture. This data is used to showcase the astronomy picture of the day in a secret part of our site.

SbDb Close Approach data

This API provides access to a database that contains detailed information on close approach data for NEOs. This API will be queried with the name and id of a near-Earth object and will return data such as object class and orbit id. This information will be displayed to the user if they click an object and want to find out more about it.

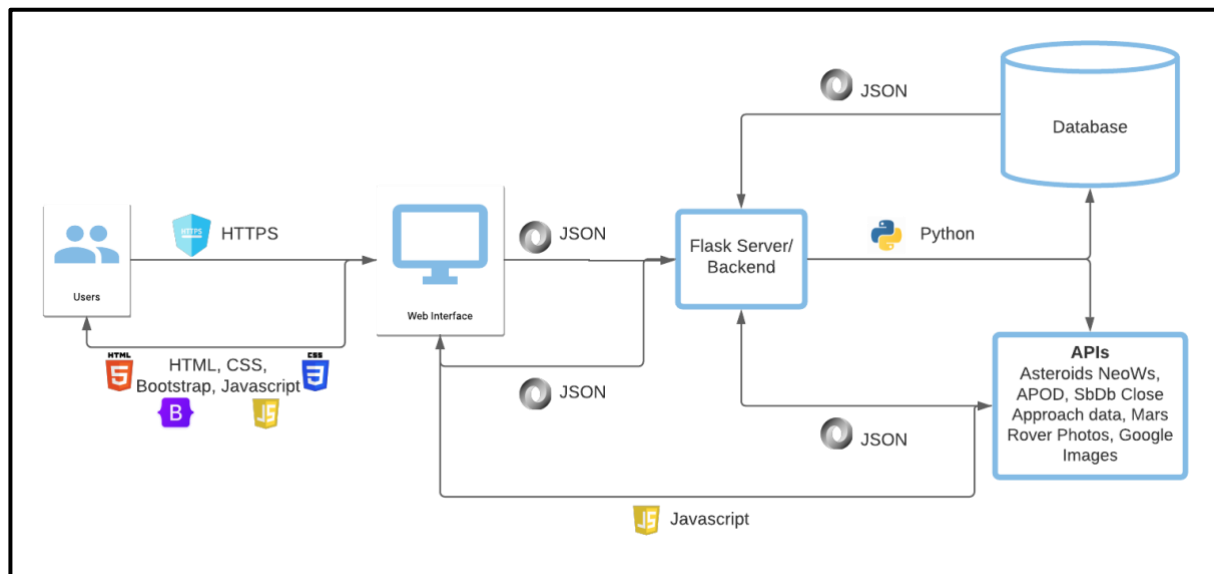
Mars rover photos

This API can be queried by Mars or Earth date and will return images from some of the Mars rovers (Curiosity, Opportunity and Spirit), and mission manifests for each rover. This information will be used to display images from each of the Mars rovers to users.

Google images

Google images will be used to obtain images of famous NEOs. These images will be used to show users what the most interesting NEOs look like along with info on them.

Overview of the System



The above diagram describes the architecture of our software system. Our application will be in the form of a website, which users will access using HTTPS. In response, the site will display the home page which will be created using a combination of HTML, CSS, Bootstrap and JavaScript. As the user interacts with the site, JSON data with their queries will be sent to the flask server. This server will communicate to the APIs (described in detail above) using python and return relevant information as JSON. This JSON data is passed back to the website for the users and displayed in a more readable format using HTML. The interface will also be communicating directly with the APIs for some queries, using JavaScript. Specific interactions of the user and the interface will also lead to relevant data being passed to the flask to be stored in the database, so it is saved for each time the user visits the site.

Interface Layer: The interface layer comprises of the web interface, which users will interact with to navigate the site. The interface will display data and elements in a user-friendly way using a combination of HTML, CSS, and Bootstrap. Some pages are also very interactive, for example the NEOs page, hence JavaScript will also be used. The interface will also directly interact with the APIs by passing user's queries through JavaScript.

Server Layer: The system will use a flask server, which will be implemented in python. The server will communicate between the backend and frontend, passing the user's queries on to the APIs, as well as storing their data in the database. Within the backend, the flask will use python to interact with APIs and database, and pass data as JSON.

Backend Layer: The backend will be implemented in Python. This makes implementing the flask server much simpler and is a language the team is familiar with.

API Layer: The APIs being used and the justifications for why they are used is explained above (the data sources section). The APIs will answer users' queries and pass the required JSON data to the server or in some cases the interface.

Database Layer: The database will store the users' information (such as high score from game), as well as their messages from the chatbot. Such data will be stored along with the user's IP address, thus if users use the site again on the same device, progress will be saved.

Relating Choices/Justifications to components

Python: Python will be used to implement the backend. It was chosen because all group members have had experience with flask servers in python. Python's simple syntax also allows for fast and easy maintenance on the server if needed. Python also has a plethora of built-in scientific data libraries for handling the exact type of data used in this project.

Bootstrap: Bootstrap was chosen to assist the team with the creation of the interface as our team hasn't had much experience with HTML and CSS.

JavaScript: The use of JavaScript is necessary for some elements of our site, for example the interactive game and the NEO page. These are highly interactive and dynamic pages, hence the use of JavaScript will make coding these sections of the project much simpler.

JSON: The main data type used will be JSON, due to API providing data in this format. JSON is also easy to understand and works very well with Python. This makes it ideal for this project.

Platforms

With the rapid influx of development in web services, platform synchronisation is becoming the increasing standard. Meaning multiple platforms can coexist to create the final system, as both Microsoft and Linux environments can be utilised.

Our server will be a flask server, which we would deploy on Linux (for simplicity), however the server could be deployed on windows or mac as well.

The webapp will be designed for specifically google chrome, however the site will also be useable on other browsers. Though, some features may not be supported such as the game which might not function on older browsers.

Summary of key achievements of the design

The initial specification that was created by the team for this project is as follows:

Using NASA's vast collection of API's, we aspire to create a site that is both interactive and informative, presenting data about near-Earth Objects (NEOs). This will make the information interesting, especially for younger users keen on learning more about space exploration.

We successfully created a site that is both interactive and informative, while presenting data about NEOs. Furthermore, the information was made interesting and engaging. While we did meet these initial requirements, there were some specific features that we either changed or could not implement. These are listed below, along with extra features we decided to add.

Key things changed:

- Eliminated the absolute magnitude filter search as felt it was useless to system and did not have a high value.
- Eliminated the filter search on basis of classification (asteroids, comets, meteoroids) due to its complexity and time constraints.
- Eliminated the filter option to calculate the size of near-Earth objects in relation to football fields due to time constraints and complexity of comparing sizes. It also, reduced the visual aesthetic as it cluttered page with additional content, and thus we did not implement.
- Eliminated the ability to search through the global chat for users send by a particular user as felt it was a pointless feature and did not fit in with overall theme of the website.
- Eliminated chat bot on the website due to the fact the landing page was a guide on how to use the website and felt it was pointless.

Key things added-

- Community images as we want a socialisation and extra gamification element to website.
- Changed the educational page from a game to quiz to suit the theme of the page and inform users. Also added high risk NEO in more of a static scroll feature, to again suit with the theme of the page.
- Added carousels to Mars Rover photos feature, since the same camera angle from the same day would display similar photos that would clutter the page, so it was less convoluted and easier to navigate with the carousels as we grouped together similar images.

Survey Questions and Answers

As we worked through the project, we've received a lot of professional feedback from our mentors which we used as a guide and framework every step of the way. But we wanted to know what the public thought about our website. Following the completion of our site, we hosted it so that other people may be able to visit our site with a link provided by us. Thus, we asked some people for their opinion on our website in its entirety. Here are the questions we asked:

- How likely are you to recommend our site to your friends?
- Are you having trouble finding anything?
- Is there anything missing?
- How did your experience compare to your expectations?
- Please leave us some feedback.
- And here are some responses we received:

User 1:

1. How did your experience compare to your expectations?
 - a. Exceeded expectations.
2. Are you having trouble finding anything?
 - a. Unique but intuitive interface
3. Is there anything missing?
 - a. Not particularly
4. How likely are you to recommend our site to your friends?
 - a. 10/10
5. Please leave us some feedback.
 - a. This would be really cool if it was built upon further... especially the game.

User 2:

1. How did your experience compare to your expectations?
 - a. My expectations were met.
2. Are you having trouble finding anything?
 - a. No, I did not have any trouble finding anything.
3. Is there anything missing?
 - a. No there weren't anything that I felt was missing from the site.
4. How likely are you to recommend our site to your friends?
 - a. I am very likely to recommend this site.
5. Please leave us some feedback
 - a. This site has been well developed and easy to navigate through. The NEO page was very creative with its interactive features and great design.

User 3:

1. How did your experience compare to your expectations?
 - a. There was a lot more interesting information and interactive activities on the website than what I anticipated. It also looked really professional and cool, really organised as well.
2. Are you having trouble finding anything?
 - a. Not really, if I needed to find something I went back to the home page.
3. Is there anything missing?
 - a. It would be great if the website utilised videos in addition to pictures. Also, would be helpful if the instructions on the neo page were more concise and clear.
4. How likely are you to recommend our site to your friends?
 - a. Very likely, it had great resources.
5. Please leave us some feedback.
 - a. Add some videos and try to condense the information you have into dot points instead of paragraphs to make it easier for readers to understand. It could also be helpful to have a summary for the information sections which states the most important facts.

With all this feedback, we have come to notice that there are some areas we could improve upon to further enhance our users' experiences. As the purpose of our site was to provide the community with educational content that could enrich their knowledge on space, we will take these responses to heart and take strides into improving our site to improve engagement, interactivity and the user experience as a whole.

Team organisation and Conclusion

Responsibilities/Organisation of the Team

Our group had a fluid and dynamic structure with group members focusing on tasks which would utilise their strengths. Throughout the project duration we had stand-ups every 1-2 days where we would outline the goals and objectives of the next few days. Our team had created a doc shared between all of the members and every stand-up we would assign people to tasks. We were all mutually understanding of each other's commitments and helped cover if someone was struggling with their respective tasks. Despite being a fluid and dynamic team, we had an overall structure when completing the project. The team structure was as follows:

Project Manager/Organiser ~ Neeraj Mirashi

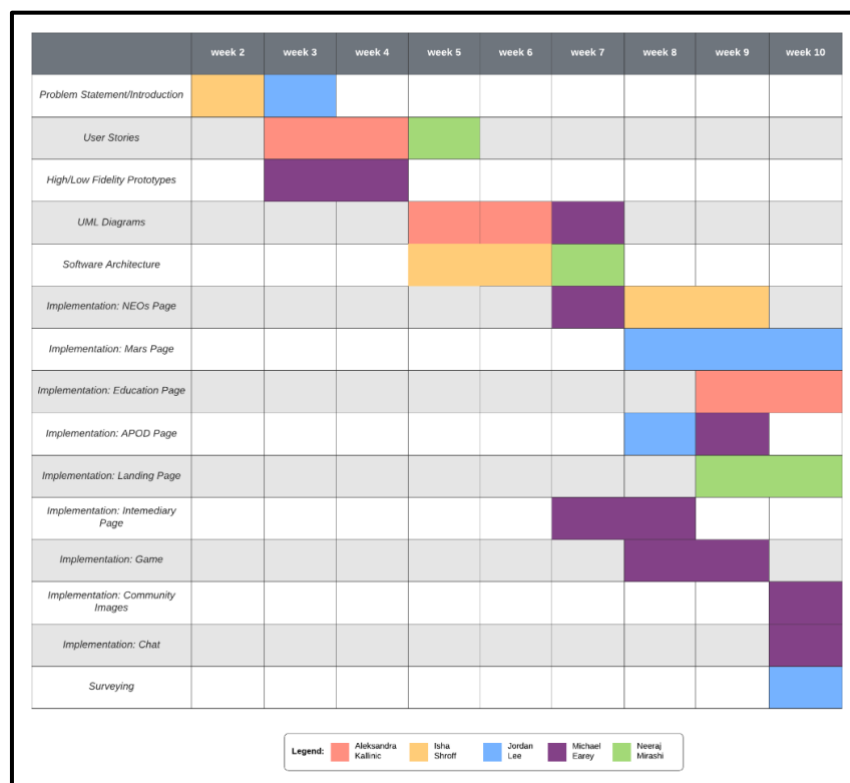
Lead Backend Programmer ~ Isha Shroff

Lead UI/UX Designer ~ Aleksandra Kalinic

Lead Frontend Programmer ~ Michael Earey

Lead Market Researcher/Quality Assurance ~ Jordan Lee

Organisation



Time Management

In order to stay on track with the project deadlines, we used a Gantt chart to keep track of our progress throughout the project. This also allowed us to clearly what each person in the team was working on, making communication much easier.

Issues encountered

Clarifications/Understanding the Specification

We often had difficulty understanding certain aspects of the design specification and required further assistance to clarify them. It was sometimes a little difficult to have done effectively in the short weekly session, so it would have been useful to have more time. Despite this, our mentor Ali always answered any questions we were able to ask and clarified as many of our concerns as he could.

Familiarity with Programming Languages

No members of the team had any experience with developing websites and designing interfaces, thus we found this aspect of the project particularly challenging. It took a long time for the team to adapt to learning HTML and CSS while creating an engaging and professional interface for users. Several pages on our site also required JavaScript, another new language for the team to learn. Given more time, we would have been able to become more familiar with these languages and further enhance our design.

Limited API Calls

Our team was using NASA's open APIs to get information for our website. These API keys had limits of 1000 queries per hour on them, after which they would 'time out' and be unusable for an hour. This proved to be a problem as most pages on our website called the API multiple times. We resolved this by using different API keys for each page, preventing the individual keys from reaching their quota.

What would we do differently?

If we were to do this project again, there are several changes that we would make to the development process to make the implementation process and overall process a lot smoother and allow us to produce a much better product.

Time Management

One major thing that we would have done differently is time management, as a team we underestimated the amount of time that a lot of parts of this project would take. This led to a lot of last-minute rushing and working as well as a lot of last-minute changes. To resolve this issue, we would break tasks into smaller tasks and create deadlines for each small task. This would allow for team members to check their progress on tasks frequently and identify time required for each task much earlier, thus leading to less last-minute changes and rushing.

User Interface Design

While working on this project, we made the decision to redesign the user interface and the aesthetics of the site multiple times. This wasted quite a bit of time as we could have simply designed it well from the beginning. Therefore, when designing the prototype for the site, we would have been able to design one that was functional and aesthetically pleasing, as well as achievable considering our circumstances.

GitHub management

When approaching the end of this project we realised that our GitHub structure was not very consistent, thus making it a lot harder to work with for the final implementation when merging everything together. To rectify this, we would create the GitHub before starting work on the coding and make all the branches consistent with each other.

Coding practices

Throughout this project we observed some bad coding practices due to a lack of experience with making webservises. For example, we used one CSS file for the entire project, which proved to be problematic towards the end as all of our style code was in one 800-line file, which was very hard to navigate and work with. Therefore, we would create one CSS file for each page in the site, and furthermore create a generally neater and less confusing file structure for the project.

Overall, we were happy that we made these mistakes as it provided us with a very clear understanding of what went wrong and how we can prevent this in the future, thus allowing us to learn a lot about good practices from our mistakes.

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