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**Spring Individual Assessment**

Our senior design project consists of an Angular-powered web app capable of searching NASA’s Exoplanet Archive with user input and displaying the results in an interactive table. Our project includes several advanced features, such as streamlined data retrieval, responsive styling for mobile devices, Aladin Lite API integration, table column configuration, and more. Overall we feel our project was a success, and we both learnt a lot about software development and collaboration.

**Individual Contribution**

My individual contribution includes a wide variety of features and functionality. To start, I created the GitHub repo and started a new Angular project early in November. I also began testing API calls to the Exoplanet Archive using Postman to check the syntax of the returned data. After ensuring the data is usable and compatible, I spent a lot of time learning the ins and outs of both Angular and HTML/CSS. Even though I had experience with web development before this project, I had little experience starting from scratch (especially CSS styling and layout). I then began adding the elements to the input bar, such as the dropdown boxes and buttons. I spent a lot of time adding functionality to the search button, making sure a valid API URL is built using values from the drop-down boxes and calling the API to return the data.

After successfully returning the data, I spent a lot of time creating the Material table to display the results. One of the biggest features of our project is the ability to expand an exoplanet’s row to learn more about that exoplanet. Adding that functionality was certainly difficult, since I was required to learn how to use Angular animations, directives, and change detection. One of the hardest challenges in early development was detecting the model change and updating the table view to include the data. After getting the data to appear on the table, I spent a lot of time implementing a variety of features, such as exporting as .csv and a help button to learn more about the project. Another major obstacle we overcame was dealing with CORS. After publishing our project to GitHub pages, we noticed CORS blocks the exoplanet data from being returned. To fix this, we implemented a simple Express.js proxy acting as a middleman between our project and the Exoplanet Archive.

Next, I spent a lot of time streamlining data retrieval using caching and pagination. Whenever a user first visits the site, it starts to cache ALL exoplanet data in the background on a separate thread. When the search button is clicked, it builds the API URL but checks to see if the cache is present before calling the Exoplanet Archive. If cache is present, it just filters and returns the cache. If not, it uses the API URL to call the archive and return the data. To ensure data is as accurate as possible, exoplanet cache expires every other day and users have the option to manually clear cache using a button in the help section. Once the data is returned, instead of rendering every row in the table, it uses pagination to only display the rows currently on the screen. By implementing both features, **data retrieval is almost instantaneous** after data is cached.

At this point, the project’s core functionality was completely operational. Next, I continued to add additional features, such as table column configuration, additional input options, a previous search button, URL parameters based on the current search, an integrated Twitter feed from the Exoplanet Archive, and a fun loading spinner. I also spent a lot of time making sure the web app was at least somewhat compatible with mobile devices by using CSS media queries.

**Conclusion**

Overall, we feel our project was a success and we are very happy with the final result. Not only were we able to implement every feature from our planning, but we were able to implement several advanced features that make our project stand out and helps us achieve our goals in a more efficient and effective way. We also received positive feedback from users at the CEAS Expo, which is a testament to the quality of our work. Moving forward, we plan to continue refining and improving our project to ensure it remains a valuable tool for novice astronomers and enthusiasts alike.