PMPro - Cal Poly Senior Project

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1 INTRODUCTION

In software engineering, platforms such as GitHub are used by developers to store projects and network with like-minded people. From small class projects to large projects that reach millions of users, GitHub is a notably used platform to publicize projects by using repositories, as well as version control to collaborate with other users. One of the features GitHub provides is pull requests. Pull requests are basically a gateway to creating a revision on the original repository and reviewers can see if they would like to accept or decline the changes to the master branch. This is an essential feature, especially in software teams who are constantly implementing code for an application and need to add it to the project. Reviewers can see if the code looks good depending on requirements and can either accept or request changes to the pull request. Other times, they can even reject a pull request. That's what we wanted to achieve in this project.

On this work, we propose PMPro – a tool to analyze pull requests by simply inputting a GitHub repository and analyzing data through graph visualizations. The ultimate goal we want this tool is to provide data analysis features by pulling data from GitHub repositories and visualizing them on a dashboard. Companies rely on this to do informal code reviews and ensure that their developers are writing clean, quality code. By utilizing this tool, we can see a project's trend on pull requests and determine what these numbers associate to. Is the repository owned by a company that has requirements set in terms of code quality? Would this be due to the size of each pull request that needs to get reviewed? These are some of the many questions we want to solve for software teams so that they can bring the analysis back to their team.

2 OUR SOLUTION

Our solution's target outcome is to be able to provide a pull request dashboard that would allow software engineers to be able to track their team's health based on pull request content, such as code and conversations via comments. In order to create the dashboard, we decided to develop a web application using a React-Node.js-GraphQL tech stack. The backend of the app uses Node.js and Axios to send HTTP requests to the GitHub GraphQL API server

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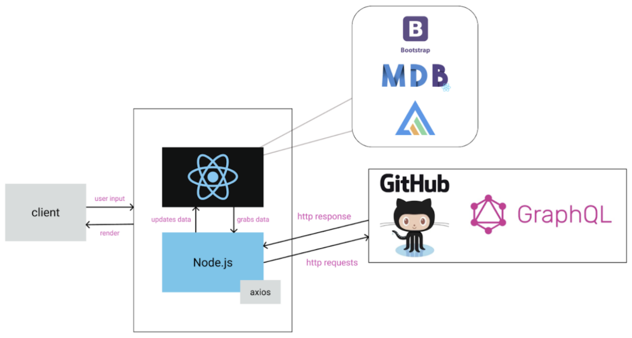
in the form of a GraphQL query, which then responds with the query-specified data. This data is then stored in the graph component's state, which is then rendered on the front end using React. We use Bootstrap, MDB React, and ApexCharts.js for the front end to render the data into the pie and bar charts.

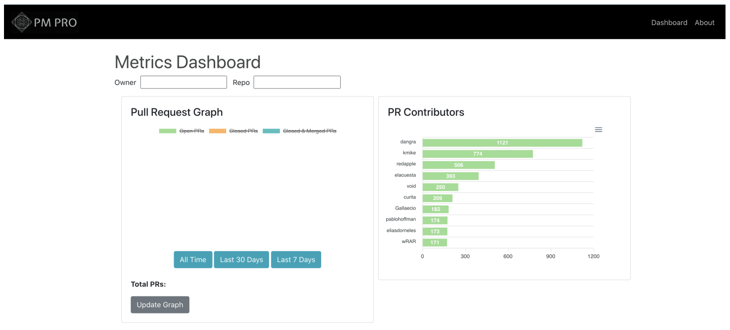
We chose to use GraphQL over REST API because we can filter out data that wasn't necessary. That way, the user can see data they need. GraphQL v3 has a rate limit of 5,000 notes per hour, which is a smaller rate limit than REST API v4's 5,000 per hour. Once the user hits this rate limit, then an error would be triggered.

Fig. 1. Overview of PM Pro tech stack



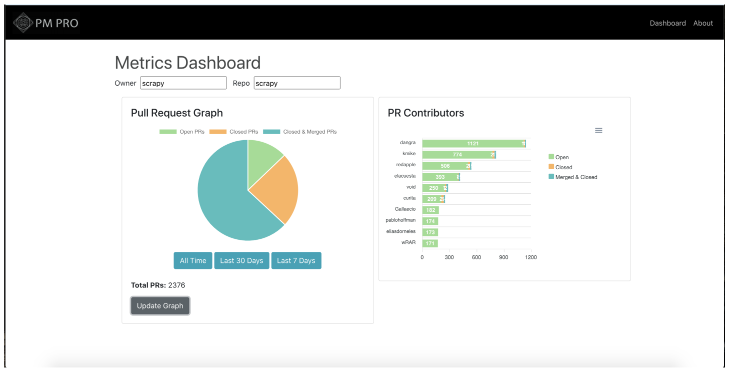
When the user opens the application, they are directed to the homepage that contains a dashboard. This is where the user can input data about a GitHub repository's pull request and analyze it through graph visualizations. In addition, there is an About page where the user can learn about the developers behind this project.

Fig. 2. PM Pro Dashboard



To interact with PM Pro, a user would provide information about the GitHub repository's owner in the "Owner" search bar and the repository they would like to see data into the "Repo" search bar. Once the user provides this information, the user would click on "Update Graph" and the dashboard will load a pie chart containing data on merged pull requests, accepted, and rejected pull requests. In addition, PR contributors will populate the contributors committing code to the repository so the user can see the amount of open, closed and merged pull requests. The user can also filter the graph by displaying PR data from the last seven days, 30 days, or all time.

Fig. 3. Graph Visualization on Dashboard



During development, we ran into issues that prevented us from finishing features in our application. When we started the project, we had a lot of design ideas to have a fully functional web application. However, we ran into styling issues in our first quarter of development, which caused us to change the UI of our application during the second quarter of development. In addition, we switched to bootstrap to implement our front-end to make implementation easier. We also ran into issues on how to render graphs onto our application, which took a while to figure out how to connect the components together so we can display data based on user input. Finally, we also ran into an issue with setting up the environment for the application. We used a personalized token from GitHub containing our credentials so we can pull data from our account. By using a token, however, we had to change it to our respected token because one person's token wouldn't work for the other. To troubleshoot this, the user must create their own token on GitHub, create a .env file and paste it to the file. Then build and run the project again.

3 CONCLUSION

Our project's goal was to analyze pull request trend's in GitHub repositories using an application. We can do this by inputting information about the repository and outputting data through a graph visualization. For the past two quarters, we were able to create a dashboard for the user to look at the data and search for a repository using a search bar. We also connected the front end and the back end so the application can search for the repositories. This is triggered by utilizing HTTPs requests with GraphQL and would return results the user wants. This is a good start to the overall goal of our application. In the future, there are some features that would like to be added to the application. Some of these features include checking for the user who reviewed the pull request, using different types of graphs, and check pull requests with request changes. We also want to host this on a cloud platform so users can interact with this on a live website than through the package manager. We hope that once these features are added, it would be in production and used by many software teams to create high quality pull requests.