Project Progress Report: DevOps for Github

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1. Overview:

We plan to work on a Google Chrome extension that can enhance the experience of GitHub, with a focus on DevOps evaluation metrics. The extension would allow users to view DevOps-related metrics on the repository page, possibly presented via visual charts. DevOps evaluation is a relatively new field, with no standard established at the time of writing. However, it is crucial for teams that want to improve DevOps further. The vanilla GitHub does not have many metrics that focus on the evaluation of DevOps, and we want to change that. Software engineering includes more than technical details but also many methodologies and standards. In this project, we want to build some helpful metrics which allow developers to evaluate the workflow and improve better.

The main feature that differentiates us from other tools is the ease of use. While other existing tools require software installation on the computer or additional account creation (such as Jenkins and Grafana), the Chrome extension requires minimal installation. For functionality, we focus on intuition rather than customization. Predefined metrics and 'lessons' on the metrics can let the developers be able to start using them without much knowledge of DevOps. In cases such as class projects or open source projects, the metrics not only help experienced developers become more efficient, but newcomers like students can also use the extension to learn more about DevOps. Current Computer Science education does not teach much about DevOps, so the project can help students understand DevOps from the evaluation perspective. In short, we view our project as a gentle introduction to DevOps rather than a sophisticated tool used in production. With the popularity of GitHub, our focus on the platform can benefit the most users. In the report, we will compare our extension with other products with an emphasis on intuitiveness. For example, compared to others, our extension directly provides processed DevOps metrics for our users to learn.

Our Chrome extension will be a popup window on the top right of the browser, like what an extension usually looks like. Clicking the extension icon can show and hide the popup window. In the window, users can see line charts of the metrics. For example, the x-axis of the deployment frequency is the time unit, and the y-axis is the number of deployments in a time unit. There is also a setting button beside each chart. Pressing this button will show a setting panel for users to change some parameters in the metrics. For example, users can change the time unit used to calculate deployment frequency. The default time unit is month, but users can change it to day, week, or custom development cycle, which users specify. Users will be prompted to enter the owner and repo name to obtain the information and calculate its metrics.

All the data collection and metrics calculations are executed runtime in the background. All the APIs we used can be found in the public GitHub API documentation.

2. Research Questions:

How can we evaluate the quality of a project from the DevOps perspective?
How can we let users utilize and understand DevOps metrics easily?

3. Value to User Community:

The main audience for these research questions is people who do not have much experience with DevOps experience, such as CS students. Current CS education does not put much emphasis on DevOps, yet companies usually implement the methodologies in their workflow. To practice DevOps, students are likely to utilize the functionalities on GitHub to run CI/CD, yet they do not know how well they implemented the ideas of DevOps. This is what our extension is trying to accomplish - to help programming newcomers know how well they did in terms of DevOps. Another issue regarding DevOps metrics monitoring is that they require complicated installation and customization processes, which is not great for people that are not familiar with this subject. A 'plug-and-play' experience would lower the barrier to learning DevOps metrics, where the installation process is minimal and the metrics are predefined so that users can start immediately. Furthermore, 'lessons' used to explain the metrics is also a good way to appeal to newcomers. We believe that our project can tackle these issues and create minimal friction for users to use the tools.

To evaluate our project and answer the questions, we would compare it with similar tools, such as Jenkins, Grafana, Vanilla GitHub, and more. The comparison includes installation, setup, intuitiveness, functionality, cost, and more.

4. Demo:

In the elevator pitch, we will briefly explain what our project aims to do and what benefits it can provide for our target users as we state above. In the demo, we will show a GitHub repository and demonstrate how the extension can retrieve statistics from the repository. We would also provide an explanation for each metric so that people with less experience can understand how to utilize them.

5. Delivery:

We will be using GitHub as our public repository, the code can be found here:
https://github.com/tsai00150/DevOps-for-GitHub
We would also try to get the extension published to the Chrome Web Store. In case Google does not approve our extension, users can also use our extension by cloning the repository and using the extension under developer mode.

6. External Resources:

a. [API] GitHub REST API: Used to get repository data

b. [Paper] Performance Assessment of Traditional Software Development Methodologies and DevOps Automation Culture: Metrics references
c. [Paper] Measuring Software Delivery Performance Using the Four Key Metrics of DevOps: Metrics references