OPEN ENERGY DASHBOARD ENHANCED TESTING

A Capstone Proposal

Presented to the Faculty of CST 499 at

California State University, Monterey Bay

In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science

in

Computer Science

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by

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EXECUTIVE SUMMARY OF PROPOSAL

Open Energy Dashboard Enhanced Testing
by
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Bachelor of Science in Computer Sciences
California State University, Monterey Bay, 2022

This project is an industry project brought to the college by Open Energy Dashboard, an application designed to help monitor resource usage in a web browser environment. The purpose of my involvement with the project is to assist the team with improving and expanding their unit testing suite. Some progress towards this goal has already been made by the OED team, so their work will be used as a basis for further development. Additionally, the team has requested assistance in repairing their failing automated continuous integration pipeline, a system which allows them to rapidly deploy changes to the software.

The eponymous application developed by Open Energy Dashboard is a free and open source web application for organizations to view information about their energy usage. It is designed to be free forever as a collaborative project that anybody can use. This project is a cost-effective and scalable platform to help organizations save money and reduce environmental footprint.

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PART 1 - INTRODUCTION

Introduction and Background

Project Name and Description

This proposal is for an industry project pitched by Open Energy Dashboard. Due to the fact that the application is developed and maintained solely by volunteer contributors, student involvement is common. Open Energy Dashboard has many projects set aside specifically for California State University, Monterey Bay Computer Science Capstone projects. Large applications such as Open Energy Dashboard develop unit tests, where groups of code are tested individually for functionality. To this end, the application team has requested assistance in augmenting their testing suite.

The Open Energy Dashboard team has three primary objectives in this project. In a recent update, the team added many new features. These features need to have corresponding unit tests written. Along with this, some existing tests need to be updated to be consistent with more recently implemented testing methodology. Finally, their continuous integration platform has been failing, making new code deployment difficult.

Issue

The prominent issue that arises with free, open source projects such as these is finding consistent development. There are many reasons to contribute to open source projects, but the lack of a clear extrinsic motivator means that the pace of development is slow compared to commercial projects. Thus, developers may not spend as much time on projects such as these as they do on work to generate income.

Solution

The solution that Open Energy Dashboard has found is ingrained in the history of the project. OED originally started as a project at Beloit College, and as such much of its contribution comes from students. These student contributions come from different schools, CSUMB being one of them. This capstone project will use what was learned about unit testing learned from CST 438 - Software Engineering and the work of other volunteer contributors as a guideline to add to an existing set of tests within Open Energy Dashboard.

Evidence of Need

Users of Open Energy Dashboard rely on developers to implement new features and maintain existing code. In order for development to continue, code must be tested for reliability to meet a certain quality control standard, as outlined in the OED project principles.

Project Objectives and Goals

Goals

Capstone Goals
Overhaul and improve the testing suite to allow the developers to create a better product for energy-conscious administrators.
Minimize development time for OED contributors.
Free up developers to work on core features.

Objectives

Capstone Objectives
Write unit tests for newly introduced functions
Update existing unit tests for better testing methodologies
Investigate and fix project GitHub Actions to repair Continuous integration/Continuous Deployment

Environmental Scan

There are many energy dashboards available today. However, unlike Open Energy Dashboard, these dashboards are usually proprietary and cost money. For example, MRI Software's eSight software is marketed as "Easy to use, engaging, and interactive dashboards to track and drive energy performance.". (Energy Dashboards, 2022). The software requires a

license to use, as well as contact with a sales representative to see a demo and get a pricing quote. Much like Open Energy Dashboard, eSight offers customization to tailor the needs of an organization, as well as map visualization of the facility being monitored by the dashboard.

PART 2 - Social and Legal Considerations

Stakeholders

The main stakeholder on this project is the Open Energy Dashboard team. The team stands to gain an improved testing suite, which will free up development time to add new functionality to the application. Secondary stakeholders are users of the application, who will benefit from these potential added capabilities.

Ethical Considerations

Owing to the fact that OED is designed for monitoring energy and other resource usage, it is vital that the output to the end user is precise. To this end, it is vital that the tests being written are accurate. The consequences of a faulty product could mean increased energy costs or elevated environmental impact. It is not likely that any underprivileged groups would be negatively impacted by this capstone. This project is intended to create energy conservation in a free and accessible environment, which serves to benefit everyone.

Legal Considerations

Under open source licensing, it is important to understand the licenses and their stipulations. Open Energy Dashboard is licensed under the Mozilla Public License. The MPL is a copyleft license that requires changes to code to be shared and distributed with a copy of the license (Mozilla, 2012). Any code written under this license must have a header that references this license. Code from some less restrictive licenses may be included in the project with that license's restrictions. Code from more restrictive licenses, such as the GNU Public License, may also be included. In this case, code must be distributed under both licenses (Mozilla, n.d.).

Part 3 - Project Scope

Timeline

Detailed Timeline and Milestones

- Week 1
    - Set up the work environment for development. Clone the repository, and ensure that it functions as intended and all dependencies are installed as needed.
    - Meet with the client, determine the appropriate place to begin work.
    - **Begin working on updating the existing unit tests.**
- Week 2
    - Continue working on existing unit tests.
    - Once this is completed, **begin writing new tests** using the newly updated tests as a guideline.
- Week 3
    - Finish working on writing tests for newly-implemented functions.
    - **Begin investigating GitHub Actions issue**.
- Week 4
    - Correct GitHub Actions failure
- Week 5
    - **Submit to client for approval.**
    - Make changes to code based on client feedback.

Resources Needed

A standard development environment is all that is required for this capstone. This includes an internet-connected computer with common development tools such as a text editor, Git, Node, and the project dependencies from the Node package manager (npm).

Risks and Dependencies

Risks

The primary risk of this project is related to the GitHub Actions task. This technology has been failing for the development team for some time. It is unknown whether this will be fixable in the given time span. This may expand the timeline longer than expected.

Dependencies

Due to the atomic nature of the given tasks, hypothetically they could be completed in any order. However, it will be beneficial to update the existing tests first, in order to get a sense of how these tests are meant to function. The GitHub Actions task can be approached at any point, but it is saved for last as it seems to require the most research beforehand.

Preliminary Usability Test Plan

This capstone project consists of writing tests. By nature, the tests being written will be shown to pass or fail based on their correctness. The usability of these tests will ultimately come down to approval of the client. If the client believes that the tests written for the project are sufficient, it will be considered properly implemented.

Final Deliverables

The final deliverable will be the code itself, as presented to and approved by the client.

Approach and Methodology

The project has a GitHub Project board associated with the tasks that need to be completed. This board lends itself to the Agile development process. Before development starts, familiarizing with the existing codebase and technology will take place. Once the software is well understood, work can begin on the project cards via smaller-scale sprints that will last a few days.

References

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