

Groundstation: Design

Team #25

High-Altitude Rocketry Challenge

Natasha Anisimova

Terrance Lee

Albert Morgan

Abstract

The *Groundstation* software will collect telemetry from a rocket while is in flight and graphically display the telemetry in real-time. Groundstation is made up several different components: collection of data, storage of data, interpolation of data, and display of data. This document will examine nine different components of the system. For each of these components, three different technologies will be described and evaluated for use in this component. Finally, a recommendation will be made about which technology should be used.

I. INTRODUCTION

- 1) Identification of the SSD
- 2) stakeholders
- 3) concerns
- 4) selected viewpoints
- 5) design views
- 6) design overlays
- 7) rationale

Maybe we don't need all of this stuff in the intro? I think some of it is covered below.

II. STRUCTURE VIEW

PC

Entity

Author: Your name here

Type: Component

Purpose: Why does it exist?

Contents: Stuff here.

Package Manager

Entity

Author: Albert Morgan

Type: Subprogram

Purpose: The package manager will install, track, and update software dependencies on the server.

Contents: Because Groundstation will be using Node and JavaScript for both the frontend and backend, Node Package Manager (NPM) will be used [1]. NPM has a large repository of both server-side and client-side JavaScript packages.

Frontend

Entity

Author: Natasha Anisimova

Type: Component

Purpose: User interface

Contents: Stuff here.

Backend

Entity

Author: Albert Morgan

Type: Component

Purpose: The purpose of the backend is to facilitate communication between the rocket and the user. The backend takes care of all data collection, transformation, logging, and serving that data to the user.

Contents: Stuff here.

Node

Entity

Author: Albert Morgan

Type: Subprogram

Purpose: Node is the software that runs the backend.

Contents: The backend will run on Node. Several choices were considered to run the backend, particularly Node, PHP, and Ruby. The backend was chosen two criteria:

- Speed. The backend will run on a Raspberry Pi, so speed is important to minimize the system resources used.
- Interoperability. The backend needs to work with multiple components, including the logging software, the data coming in from the serial port, serving the frontend to the user.

Node uses an event driven architecture, which is ideal for reading data from the serial port. PHP and Ruby on Rails are both HTML preprocessors, so they don't get activated until the web site is requested. Node, on the other hand, runs continuously in the background and uses an event driven architecture. The event driven architecture is ideal for reading the data from the serial port. Additionally, Node much faster than either ruby or PHP.

Serialport

Entity

Author: Your name here

Type: Library

Purpose: Node serialport library

Contents: Stuff here.

Log

Entity

Author: Albert Morgan

Type: Data store

Purpose: Store the data in non-volatile storage for later retrieval and update new connecting clients

Contents: Groundstation will store telemetry in JSON format. The log should limit the possibility of the corruption of the data due to a programming error and make the data easily accessible for newly connecting clients. Several choices were considered for the logging, including relational databases, JSON documents, and logging the telemetry. A relational database would be unnecessary because the data does not have any relations that need to be tracked; each telemetry packet is an independent piece of information. Logging the telemetry as it comes in from the rocket would limit the possibility of corruption. A programming error in the JSON parsing routines could cause all of the data to be unusable. However, storing the data in JSON format would make it very easy for new clients that connect to the server in the middle of the rocket flight to be updated with all of the past data. For this reason, the telemetry will be stored in a JSON format.

jQuery

Entity

Author: Your name here

Type: Library

Purpose: UI stuff

Contents: Queries the J

3.js

Entity

Author: Natasha Anisimova

Type: Library

Purpose: UI stuff

Contents: All of your 3 needs

Rocket

Entity

Author: Your name here

Type: Component

Purpose: Gets high

Contents: ZOOM

Web server

Entity

Author: Albert Morgan

Type: Process

Purpose: The web server will serve three primary functions:

- Server web pages to the clients.
- Receive telemetry from the serial port and convert it into json.
- Make the JSON data available to the clients.

Contents: The web server will run on the Raspberry Pi. The web server has three primary functions: Groundstation will use the Apache [2] web server.

Web browser

Entity

Author: Albert Morgan

Type: Process

Purpose: The web server

Contents: The client will use a web browser to connect to the Groundstation web server and access the content. The web browser may be any of:

- Chrome version 54 or higher
- Edge version 14 or higher
- Firefox version 49 or higher
- Safari version 10 or higher

Web browser composition

Relationship

Author: Your name here

Type: Composition

Contents: The web browser runs on the PC

Frontend composition

Relationship

Author: Natasha Anisimova

Type: Composition

Contents: Stuff

Backend composition

Relationship

Author: Your name here

Type: Composition

Contents: Stuff

jQuery composition

Relationship

Author: Your name here

Type: Composition

Contents: Stuff

3.js composition

Relationship

Author: Natasha Anisimova

Type: Composition

Contents: Stuff

Node composition

Relationship

Author: Your name here

Type: Composition

Contents: Stuff

Serialport use

Relationship

Author: Your name here

Type: Use

Contents: Stuff

Log composition

Relationship

Author: Your name here

Type: Composition

Contents: Stuff

Web browser use

Relationship

Author: Your name here

Type: Use

Contents: Uses the web server

Frontend / Backend relationship

Relationship

Author: Your name here

Type: Composition

Contents: Backend servers frontend

Backend / Rocket

Relationship

Author: Your name here

Type: Use

Contents: Gets data from the rocket

NPM / Frontend

Relationship

Author: Your name here

Type: Use

Contents: Frontend uses NPM

NPM / Backend

Relationship

Author: Your name here

Type: Use

Contents: Backend uses NPM

III. INTERACTION

Talk about how the system will get data from the serial port and how it will get sent to the web browser.

IV. ALGORITHM

Stuff about the event-driven architecture maybe.

REFERENCES

- [1] Node package manager. [Online]. Available: <https://www.npmjs.com>
- [2] Apache. [Online]. Available: <https://www.apache.org>

Nancy Squires

Date

Natasha Anisimova

Date

Terrance Lee

Date

Albert Morgan

Date