Table of Conte

Contents

[1 Introduction 1](#_Toc433050772)

[2 Programming Languages and SoftwareUsed and Their Underlying Concepts 2](#_Toc433050773)

[2.1 Ruby 2](#_Toc433050774)

[2.2 Ruby on Rails 2](#_Toc433050775)

[2.3 Git and GitHub 3](#_Toc433050776)

[2.3.1 Software Framework 3](#_Toc433050777)

[2.3.2 Model-View-Controller (MVC) 3](#_Toc433050778)

[3 Data Sources 3](#_Toc433050779)

[3.1 National Oceanic and Atmospheric Administration (NOAA) 3](#_Toc433050780)

[3.2 California Department of Transportation (Caltrans) 4](#_Toc433050781)

# Introduction

There is no doubt that the United States is a car culture. The automobile is daily relied on for transportation to and from work, soccer practice, the doctor, etc. There is one element of this culture that is special and unique; that most all of us go through and usually at a younger age. This is the road trip. You pile into a car with one or more people, one of which is a friend, and head out onto the highway to go camping, see another friend, go to some ones birthday party, or some other event requiring a long drive typically four or more hours. During this journey unexpected events occur friction in the car, a flat tire, closed freeways. Use your imagination or personal experience lots of things can happen on a road trip.

In the days before the internet and massive amounts of real time data you had an address a paper map, and maybe some directions from the place you are trying to find. The person in the passenger seat was your defacto navigator; hopefully they could read the map. In inevitably you got lost and had to stop for directions, ended up in a bad part of town, or missed your destination an hour ago. The culture in the car during a road trip is usually quite distracting with playing music, sharing stories, and other things.

Today the road trip is a different thing. With very high quality mapping software like Google Maps, In Dash Navigation Systems, Streets & Trips by Microsoft, Street Atlas, and other software the road trip has become less of a navigational challenge. Smart phones have excellent mapping applications with turn by turn directions and many other features. Some of these applications use crowd sourced data, Maze is one of these applications. Other driving apps like Along The Way point out the places to eat and sights to see for a day trip. Others include Hotel Tonight, Priceline, Songza, Animoto, Glympse, Gas Buddy, SitOrSquat, and many more. However most of these offer services not related to the actual road travel to get from point A to point B. Waze is a program that provides information on travel from point A to Point B but is based on crowed sourcing. This method has problems especially in rural areas where there are not enough participants and where cell phone service is not available. In addition, there are better and well established apps to address the issues of finding food, gas, lodging, or any other need during your trip. Like Yelp, Priceline, GasBuddy, Musement, and others. What is missing is a program that will tap weather conditions along your route, access the current road conditions and the road conditions ahead as well as and provide images of the route ahead.

When travelling long distances weather may significantly change necessitating a layover, delay of your trip, bumping up your departure time, or all out cancelling of the trip. For example a trip from Bakersfield, CA to Incline Village, NV goes over two mountain passes. In the winter and, though less common, even in the summer months blizzards, car damaging hail, and flash floods can occur. The usual route to Incline Village is to take Highway 99 to Sacramento, to Interstate 80 (I-80) to Highway 267 to Incline Village. This trip takes approximately 6 ½ hours. Many different climate zones are traversed necessitating up to date and accurate weather forecasts days in advance as well as on the travel day. There is a joke in the Sierra Mountains that there are two seasons winter and road work season. Knowing of road work, lane closures, and especially night time road closers is vital for many a road trip goes long into the night. It is so often the case that 11:00 PM is when the closure begins. So up to date road conditions are key. It could be raining in Sacramento and dry in the mountains and if you time your drive right you can miss the snow or rain in the mountains.

# Programming Languages and Software Used and Their Underlying Concepts

## Ruby

Ruby was developed in the mid 1990’s by Yukihiro “Matz” Matsumoto. It is an object oriented language that was designed for productivity and implementing a quality user interface. Ruby is a dynamic language. One of the philosophies of Ruby is to focus on the human coding and not obsess on how fast or efficient the machines run. Mats followed the principle of least astonishment (POLA) intending that the code should behave in a manner that experienced users could understand. Ruby is written in the C language. Background C code can be seen and, though highly not recommended, modified. The following is C code for reversing an array in Ruby and demonstrates how C is the underlying language of Ruby and how Ruby used this code to create simpler methods to call.

rb\_ary\_reverse\_m(VALUE ary){

long len = RARRY\_LEN(ary);

VALUE dup = rb\_ary\_new2(len):

If (len > 0){

Const VALUE \*P1 = RARRY\_CONST\_PTR(dup) + len – 1

VALUE \*p2 = (VALUE \*)RARRY\_CONST\_PTR(dup) + len – 1;

do \*p2-- = \*p1++; while (--len > 0);

}

ARRY\_SET\_LEN(dup, RARRY\_LEN(ary));

Return dup;

}[[1]](#footnote-1)

For this project Ruby version 2.1.5 is used.

## Ruby on Rails

Ruby on Rails also known as just Rails is an open-source web application framework. It was written by David Heinemeier Hansson. Rails is a model-view-controller (MVC) framework. It is written in Ruby and includes structures for web pages, databases, and web services. Common web formats like JSON, XML, HTML, CSS, and JavaScript are all supported. Rails favors a convention over configuration development philosophy. Convention over configuration tries to reduce the number of decisions a developer needs to make gaining simplicity but not losing flexibility in the code. Some well-known companies use Rails for example GitHub, Shopify, and initially Twitter. Twitter began on Rails but became too large to continue running on this platform. This is often a source of criticism of Rails but the reality is that Twitters extremely large member base, data repository, and huge user interaction simply outgrew Rails, which was designed for small to medium loads. For this application Ruby on Rails 4.1.8 will be used.

## Git and GitHub

To manage the files in this project the open source programs of Git and GitHub will be used. Git is a distributed version control system used widely for software development. Only the command line interface is supported by Git. Git’s core constructs include data integrity, speed, and the ability to have a distributed non-linear workflow. Repositories are central to Git’s functionality it is a collection of files, directory structure, and metadata that is stored on the disk. Copies of these repositories can be disseminated to others working on the same project. Git is useful in that it tracks changes to the repository. This is accomplished by the following command line input *git commit –m “put a message here”*. This command creates a unique point that is maintained with a hash. The use of a hash makes it very unlikely that there will be any errors in the downloaded files. The user is able to “revert” to one of these “commit” positions if future versions are lost, corrupted, or any other reason. These actions are stored locally. Another benefit of Git is its ability to create branches. This is good for having multiple people work on the same project at the same time or to experiment with some code.

Git can be a challenging program to set up and work with. There are many steps along the way that require previous actions to have been performed. Plus trying to execute a command on the wrong item or in the wrong place can cause problems. To start for the first time with a repository one “git clone” it to the desired location. From then on out to get the latest version the command “git pull” is used while in the correct repository. I cloned a repository into an already existing repository. Though this can be done it causes confusion and update issues with each repository. To repair the problem I one luckily knew I created a problem, had not made many changes, and stopped making changes to the files. I was able to remove the second repository and then revert back to an earlier version that was stable.

GitHub hosts Git repositories on the web via a GUI. There are private and public repositories on GitHub. The Git command line also works on GitHub. The public repositories can be accessed by anyone and are frequently used for communal projects. GitHub also offers some social functions like feeds, followers, a social network graph, and other elements. Repositories can be pulled to anywhere from GitHub making it a valuable tool for working from many different locations. The worker only needs to install Git and have the proper access to download the repository

### Software Framework

Frameworks are a beginning skeletal structure of a program that can then be modified for customization. They consist of the code most often needed for the specific need. There are many frameworks covering many different applications such as webpages, Computer Aided Design, Scientific computing, general UI applications and others. The classes and methods most often used in the specific framework area are already in place. In this case a web framework such as Ruby on Rails. Frameworks are beneficial to the coding process because they speed up application development, use reliable code, they are more secure, and they are modular. The architecture of these frame works consist of “frozen spots” and “hot spots”. The “frozen spots” manage the overall architecture the software. And in the “hot spots” the user customization occurs.

### Model-View-Controller (MVC)

The format of MVC is quintessential to Rails. The software is divided into three interconnected elements: the model, the view, and the controller. Initially the MVC methodology was used for GUIs and currently it is a key format for the design of web pages. Models are the stored data like a database, csv file, or other formats of data storage. The view is how the data is presented to the user; frequently in HTML. The controller is the connection between the Model and the View. It says how to get the model or data and turn it into a view the user can read. The controller can also update the model.

# Data Sources

# 3.1 National Oceanic and Atmospheric Administration (NOAA)

NOAA is a very large organizations running under the U.S. Department of Commerce. They manage satellites, buoys in the ocean and weather stations on land, set up tornado warning as well as tsunami warnings. They forecast the weather on land and in the ocean. NOAA has collected a very large of data over a wide range of subjects. NOAA has many APIs and work hard to share their data. This program will connect with the National Oceanic and Atmospheric Administration API for the National Digital Weather Forecast Database. NOAA uses a Simple Object Access Protocol (SOAP) to generate XML files that can be parsed for the desired information.

# 3.2 California Department of Transportation (Caltrans)

Caltrans has a variety of tools to help the driver navigate from point A to point B. Some of these include road maps, highway conditions, construction alerts, road closer alerts, chain restrictions, and other useful data relating to roads in California. Currently Caltras has “Caltrans Earth” which uses Google Earth API but it will be retiring on 12.12.2012 because of security flaws. Caltrans does not have an API but does have very stable web pages that contain plain text regarding the road conditions throughout the state. Below is an example of the text reporting style for Caltrans and its importance when travelling; note the closure of I-80.

<pre style="word-wrap: break-word; white-space: pre-wrap;">

“

I 80

[IN THE SAN FRANCISCO BAY AREA - SOLANO CO]

NO TRAFFIC RESTRICTIONS ARE REPORTED FOR THIS AREA.

**[IN THE NORTHERN CALIFORNIA AREA &amp; SIERRA NEVADA]**

**IS CLOSED TO WESTBOUND TRAFFIC 0.5 MI WEST OF DONNER SUMMIT (NEVADA CO) -**

**DUE TO AN ACCIDENT - MOTORISTS ARE ADVISED TO USE AN ALTERNATE ROUTE**

MOTORISTS ARE SUBJECT TO LANE REDUCTIONS IN BOTH DIRECTIONS FROM

SIERRA COLLEGE BLVD /IN ROCKLIN/ TO NEWCASTLE RD /IN NEWCASTLE/ (PLACER CO)

FROM 2000 HRS EACH NIGHT TO 0900 HRS EACH MORNING SUNDAY THRU FRIDAY THRU

10/16/15 - DUE TO CONSTRUCTION

“

</pre>[[2]](#footnote-2)

Caltrans has a Commercial Wholesale Web Portal to disseminate some of their data. These include Vehicle Speed and Volume Traffic Data, Closed Circuit Television images, Changeable Message Sign, Lane Closure System, and Roadside weather Information Systems (RWIS). Barring the (RWIS), this data is not much use for this project. The RWIS data at this time is beyond the scope of this project but may be an important addition especially to mountain travel and for fog alerts in the San Juaquin Valley. Each highway and Interstate in California has a link to a “Current Highway Information – Table Format” page <http://www.dot.ca.gov/hq/roadinfo/hwytables.htm>. Here each route has a link to its own page displaying the current highway conditions. This is updated no more than once an hour. There is a file that has all the updates for each highway and the date/time of the update.

1. Accessed from <http://ruby-doc.org/core-2.2.0/Array.html#method-i-reverse> on 10/15/2015 [↑](#footnote-ref-1)
2. Downloaded from [http://www.dot.ca.gov/hq/roadinfo/i80 on 10.15.2015](http://www.dot.ca.gov/hq/roadinfo/i80%20on%2010.15.2015) at 14.26 [↑](#footnote-ref-2)