



Sean Kang / python-cmu-class

# final

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This is the class work for my Carnegie Mellon University Python class

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## python-cmu-class / final

Name	Size	Last commit	Message
..			
GTFS-files		2019-10-03	first part of final
images		4 minutes ago	details
templates		2 days ago	more read me content
README.md	3.99 KB	28 seconds ago	images
realtimevehicle.py	2.37 KB	21 minutes ago	lint clean up
requirements.txt	4.65 KB	2 days ago	requirements
routes.py	4.72 KB	1 hour ago	lint clean up
run-flask-web.sh	39 B	2019-10-05	first web
tripdata.py	1.12 KB	21 minutes ago	lint clean up
tripdropdownitem.py	593 B	18 minutes ago	lint clean up
webmain.py	2.55 KB	12 minutes ago	base dir

## README.md

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# Transit Tracker with GTFS

# Introduction



This Python final project uses the primary Request and Flask external libraries to interpret the transit bus and subway data for the Boston Metropolitan area managed by MBTA (Massachusetts Bay Transit Agency).

Transit agencies such as MBTA uses a combination of static and real-time data to tell external users where their bus or subway vehicles are. The format and data structure of the data is made available through one standard called GTFS, primarily led by Google.

## Goals

The overall goal was to learn to use the flask and request libraries to learn and use the GTFS datasets which is described below.

Including Flask and the Request, this also builds on the other concepts learned in the class such as object-oriented classes, reading CSV files, list comprehensions, sets, and dictionaries.

Also to build a web tool to determine the position and time of the current vehicles and to determine the path way that the vehicle was traveling along based on a schedule.

## What is GTFS

GTFS is the General Transit Feed Specification. This the data format and data transmission specification used by many transit agencies such as MBTA to let external transit application developers such as Google to let them know the bus or train routes, trip and their travel patterns.

The MBTA GTFS data comes from their web site. <https://www.mbta.com/developers/gtfs-realtime>

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GTFS has a reference web site  
<https://developers.google.com/transit/gtfs/reference>

One of the clearest technical explanation of the GTFS specification.

<https://multigtfs.readthedocs.io/en/latest/gtfs.html>



## Requirements

Requirement #1 to use a web interface for the user interface.

Requirement #2 to display the vehicles on a visual map of the Boston area.

Requirement #3 to interpret the GTFS data using the CSV file format.

Requirement #4 to display some real-time vehicle data.

## Design

The main program is built around using FLASK as the web framework.

From the webmain.py which is the main FLASK entry point, there are these helper class files:

routes.py - a class to read the static data files.

readtimevehicles.py - a class to fetch the real time vehicle data from the MBTA web services and to do some data management for easier use.

There are many other py files as helper files to make the web pages easier to manage such as the tripdata.py and tripdropdownitem.py.

The web template files are located in the subdirectory templates.

And the static data files are located in GTFS-files.

## Limitations

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This project goes into JavaScript, CSS, HTML, and the internal GTFS data formats that were more complicated than I had predicted. Some of the easier complication such as CSS or JavaScript events were easier to resolve and implement into the solution. But when there was some inconsistencies or un-understood data



values in the real time data sets or the static files, then there was a lack of time to fully understand those concepts.

The future work is to better understand all the GTFS datasets and be able to predict or show accurate real time vehicle positions.

## Usage - How to Run

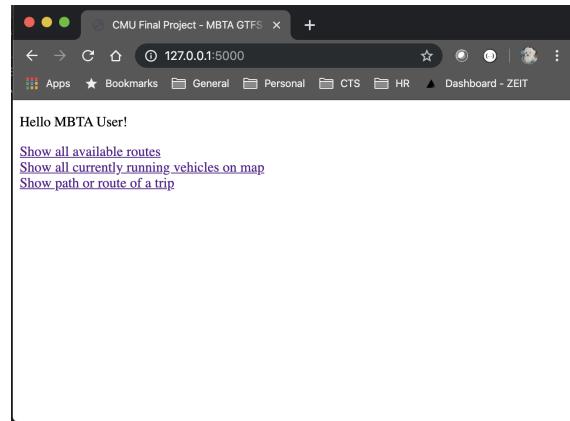
```
./run-flask-web.sh
```

This script will execute the command line below to launch the python script to run its flask web server on port 5000 on <http://127.0.0.1:5000/>

```
FLASK_APP=webmain.py flask run --reload
```

## Demo

When the main web site page opens



When the first link on the main page is clicked to show all known route, this is shown.

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All Routes

Click on any row to show the details of the route

All Routes Defined in MBTA

Red Line
Mattapan Trolley
[Mattapan, 'I', '', 'Mattapan Trolley', 'Rapid Transit', '0', 'https://www.mbta.com/schedules/Mattapan', 'DA291C', 'FFFFFF', '10011', 'Rapid Transit', 'line-Mattapan, "']
Orange Line
Green Line B
Green Line C
Green Line D
Green Line E
Blue Line
Logan Airport - South Station
Design Center - South Station

Map of All Running Vehicles

Topic: Final Project

127.0.0.1:5000/map

All Vehicles Running Defined in MBTA

When one of the vehicles icon on the map is clicked a infobox is shown to present more details of the running vehicle.

127.0.0.1:5000/map

All Vehicles Running Defined in MBTA

Click on any running vehicle to see more details.

## i Repository details

### Last updated

21 seconds ago

Open pull requests Branches  
0 1

Watchers Forks  
1 0

Version control system Language  
Git Python

Access level  
Admin

0 builds

Give feedback

There is a link inside the info box. When that link is clicked, then that trip is shown on the map with some additional data about the trip.



< > ⌛ ⌂ 127.0.0.1:5000/gettrip?tripid=41894404

Apps Bookmarks General Personal CTS HR Dashboard - ZEIT

Find results

Stop Name: Dudley Square

latitude, longitude: 42.329789 , -71.083887

Head Sign: Harvard

route id: 1

Position of current vehicle and its trip

The map displays the city of Boston and its suburbs. Key locations labeled include Dudley Square, Somerville, Cambridge, Everett, Chelsea, and Boston Logan International Airport. Major roads like I-93, I-90, and I-95 are visible. A purple dot marks the current vehicle's position near Dudley Square. A legend in the bottom right corner shows icons for Road, Bus, and Train, with 'Road' selected. A scale bar indicates 1 Mile (1.6 km). The map is sourced from Bing.

