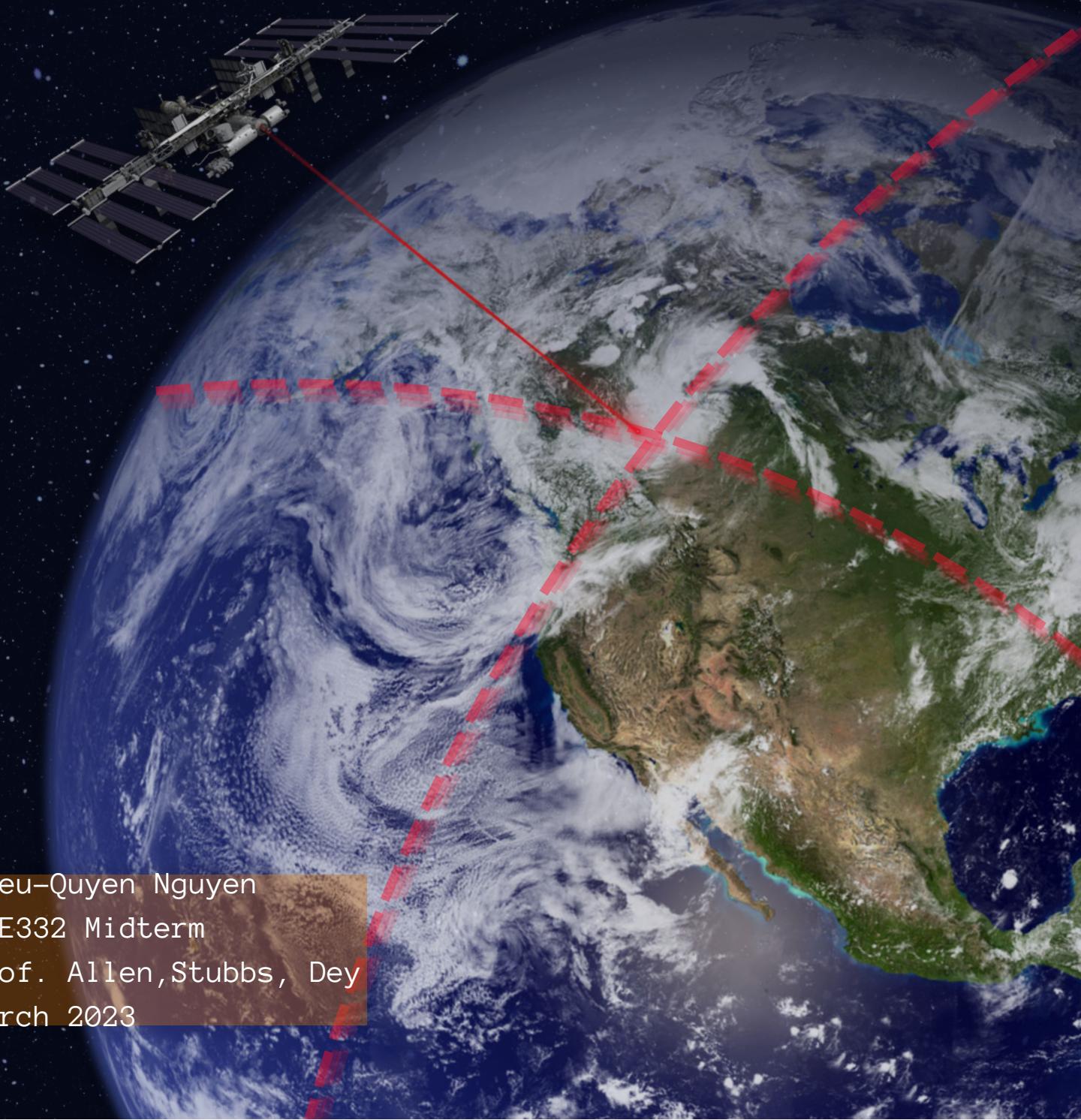


# THE INTERNATIONAL SPACE STATION TRACKER



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COE332 Midterm

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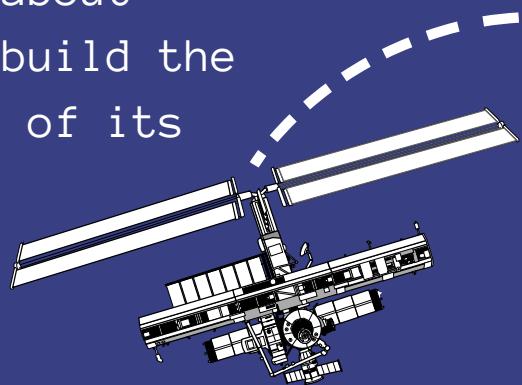
# INTRODUCTION

What is the International Space Station Tracker?

## What exactly is the International Space Station?

The International Space Station is a large spacecraft that orbits around the Earth!

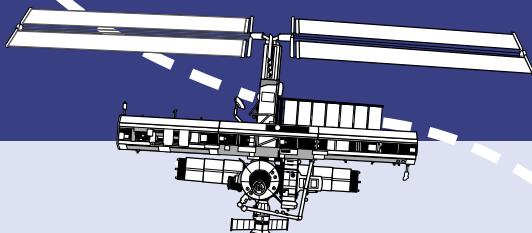
The ISS serves as a home for astronauts and a science lab to learn more about space. Many countries helped to build the ISS and the different components of its many functions.



## What is the Tracker?

The ISS Tracker was created for users to interface with the ISS Trajectory Data.

The tracker is essentially a program that dissects and manipulates the ISS data set in a way that a user can understand. The tracker helps to achieve this through various files within a repository!



# DESCRIPTION

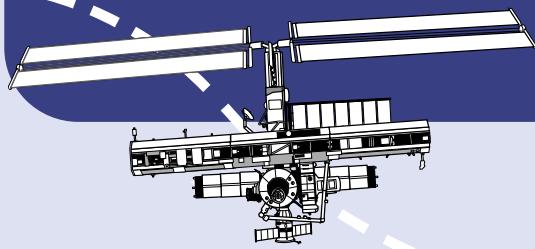
What is this project about? Data, Files, and Routes

## Project Description

As prefaced above, the ISS Tracker Project helps users interface with the ISS data set through different program files that manipulates the data for users to better understand.

## What is the ISS Data Set?

Before the files and applications are assessed, the comprehension of the ISS Trajectory Data must be emphasized. The data set, provided by NASA, became public and updates regularly when the ISS moves within Earth's orbit! The data set is broken up into different sections to help describe the ISS and its trajectory. The data set is measured in kilometers and seconds, which can be referenced in the header and comments. A user can access the ISS Trajectory Data through [NASA's Spot the Station Website](#). The website breaks down what to expect within the data and provides two different file formats that can be used for the application, TXT, and XML. For this project, the XML data was used for manipulation and analysis.

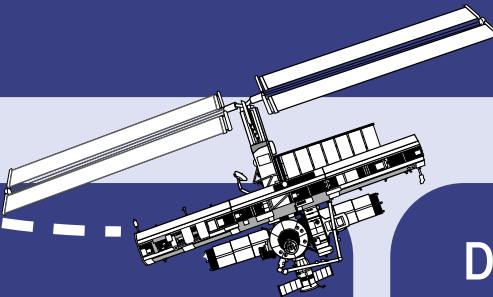


# DESCRIPTION

What is this project about? Data, Files, and Routes

## What to Expect from the Repository?

Within the repository (GitHub link provided in bibliography), an user can expect three separate files along with a ReadMe that provide instruction on how to use the files. The first file is a python script that runs a Flask application, the second file is a Dockerfile, the third is a Docker Compose File.



### Flask

Flask is a Python library that can be used to build framework for web servers! A Flask application is composed of "app routes" that users can use to interface with data or with a server through a process called curling!

### Docker

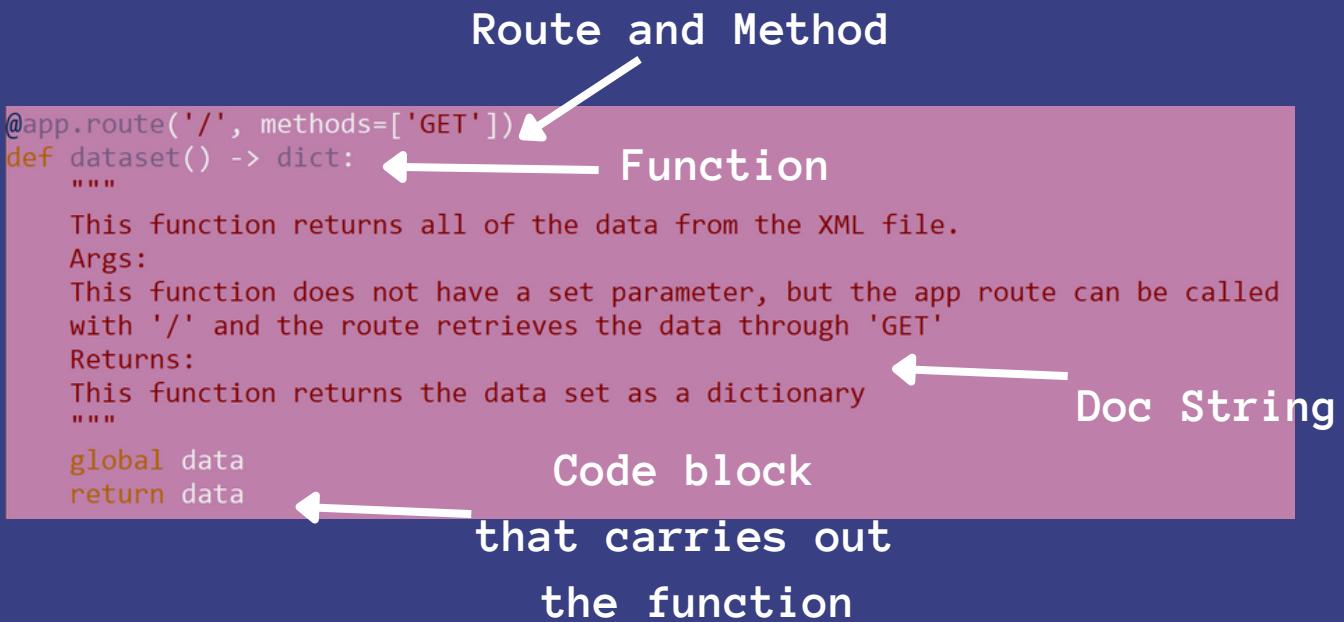
Docker is a containerization platform that can package software called containers for others like developers to use! The Docker file provides instructions on how to build the "image", container. Whereas the Docker Compose helps to manage the container.

# DESCRIPTION

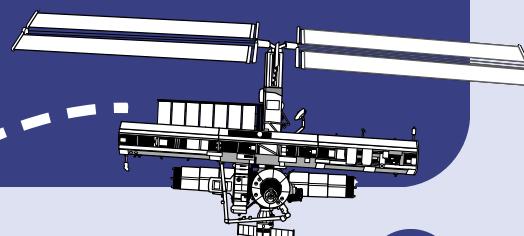
What is this project about? Data, Files, and Routes

## What are the Routes?

Within the Flask application, there are a number of routes that can help the user to navigate the data set. It is important to know the different parts of an application route!



The app route is first defined by its route and the method that the route follows. The app route then has a function with a descriptive docstring that describes what the route does. Then after the docstring, the app route carries out its main function. In this case, the app route returns the whole data set.



# DESCRIPTION

What is this project about? Data, Files, and Routes

## What is a good example of using the Routes?

A possible flow that a user may go through with this application could look like this:

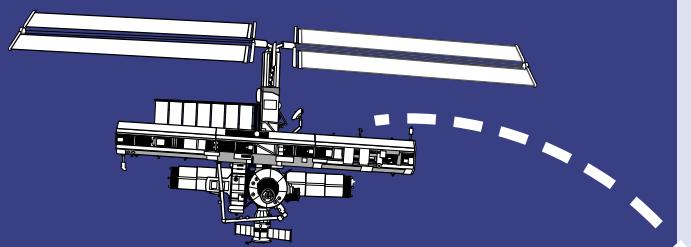
```
ubuntu@dcn558-vm:~/ISS-Tracker-Project$ curl localhost:5000/
```

The first route called will return the whole entire ISS data

```
ubuntu@dcn558-vm:~/ISS-Tracker-Project$ curl localhost:5000/epochs/2023-087T12:00:00.000Z
```

```
{
  "EPOCH": "2023-087T12:00:00.000Z",
  "X": {
    "#text": "-5912.2068734547001",
    "@units": "km"
  },
  "X_DOT": {
    "#text": "3.67395240750254",
    "@units": "km/s"
  },
  "Y": {
    "#text": "-2564.92886496029",
    "@units": "km"
  },
  "Y_DOT": {
    "#text": "-3.8670666623291998",
    "@units": "km/s"
  },
  "Z": {
    "#text": "-2156.8950889583102",
    "@units": "km"
  },
  "Z_DOT": {
    "#text": "-5.4980007201569396",
    "@units": "km/s"
  }
}
```

The second route called will return the "StateVectors," the position and velocity of the ISS, of a specific Epoch, a time stamp, provided by the user.

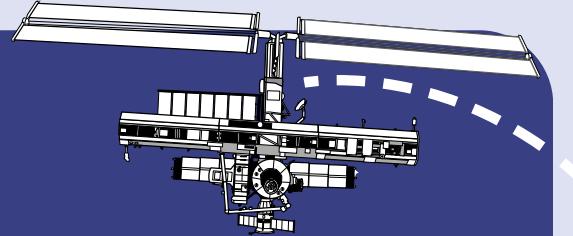


```
ubuntu@dcn558-vm:~/ISS-Tracker-Project$ curl localhost:5000/epochs/2023-087T12:00:00.000Z/speed
```

7.66 The third route called will return the speed (km/s) of the ISS at the specific Epoch provided by the user.

# DESCRIPTION

What is this project about? Data, Files, and Routes



## What are the All Routes?

`/`: returns the whole data set

`/epochs?limit=int&offset=int`: returns a modified list of Epochs with the parameters

`/epochs/<str:epoch>`: returns state vectors for a specific Epoch

`/epochs/<str:epoch>/speed`: returns the speed for a specific Epoch

`/comment`: returns comment list object

`/header`: returns the header dictionary object

`/metadata`: returns the metadata dictionary object

`/epochs/<epoch>/location`: returns latitude, longitude, altitude, and geoposition for given Epoch

`/now`: returns latitude, longitude, altitude, and geoposition for Epoch that is nearest in time

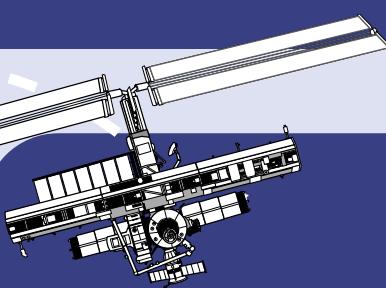
`/help`: returns text that explains each app route

`/delete-data`: deletes all the data from the dictionary object

`/post-data`: reloads the dictionary object with data from the web

# ETHICS

## The Ethical and Professional Responsibilities of the Project



When using data sets from other sources and coding an application for users to use, there are several ethical and professional responsibilities to consider. Some of these responsibilities include:

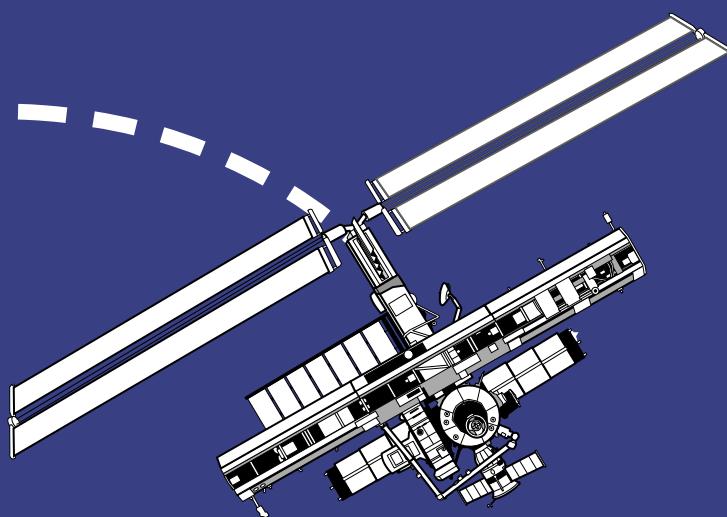
1. Respect for data privacy: It is important to ensure that the data used in the application is obtained legally and with proper consent from individuals or entities that own or provide the data. Additionally, sensitive data must be kept confidential and secured to prevent unauthorized access or misuse.
2. Transparency: It is essential to be transparent about the data sources used and how the data is being used in the application. Users should be informed about the types of data that are being collected, how they are being analyzed, and what the application intends to do with the data.
3. Accuracy and reliability: The application must ensure that the data used is accurate, reliable, and up-to-date. The algorithms and models used in the application should be designed to minimize biases, errors, or inaccuracies that may affect the results.

# ETHICS

## The Ethical and Professional Responsibilities of the Project

4. Compliance with laws and regulations: The application must comply with relevant laws and regulations governing data protection, privacy, and ethical use of data.

Using data sets from other sources and coding an application for users to use comes with a significant ethical and professional responsibility. Developers must ensure that the data is obtained legally and ethically, and that the application is designed to be accurate, reliable, fair, and respectful of user privacy and data protection laws.



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