# Data Products & Flask Web Apps

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# Objectives

At the end of the day, you'll be able to:

- Describe example data product workflows
- Implement simple webpages using HTML and Flask
- Describe the HTTP methods GET and POST & list the differences
- Build a cross-platform, modern website using the Bootstrap framework
- Embed plots in your website using the bokeh package

# Agenda

We'll be covering:

- AM:
  - HTML web pages
  - Flask web apps

- PM:
  - Bootstrap to develop flask web pages
  - Bokeh to display charts on websites

# Reference

Your main reference today is W3 Schools. They cover:

- HTML
- CSS
- JavaScript
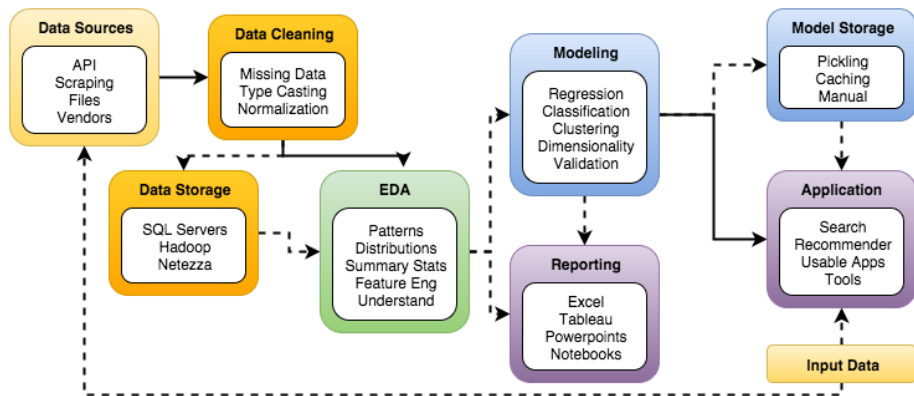- Bootstrap

# Data Products & Workflow



Figure 1:Data Products Flowchart

Image by Ming Huang

# Why Learn Basic Web Development?

**Show off your project!**

- Past Student Project Example: Stone Soup

# Review: HTML & CSS

Need basic HTML to build websites

- HTML
  - ▶ HyperText Markup Language
  - ▶ Based on tags
- CSS
  - ▶ Cascading Style Sheets
  - ▶ Assigns style properties to (sections of) your site.

# Example: Working with HTML

Example files:

- `example.html`: a very basic website we'll build on in lecture
- `extended_example.html` for 'final' example.

# HTTP methods: GET and POST

The two most common HTTP methods are:

- **GET**: Request data from a server. (Default method in http & flask)
- **POST**: Submits data to server.
- Important differences: see table at this w3 link

# Flask: Introduction

A python web development microframework.

- Lightweight, easy to use
- The more common/complex python web dev framework is Django

# Why Learn Flask?

Modern web development has a lot of parts:

- HTML
- CSS
- JavaScript
- fonts
- etc

Flask is an easy way to avoid dealing with these elements directly.

Can include other python functionality (functions, modeling, etc).

# Flask: Folder Structure & Running

Organize your files for flask (Reference):

- python file(s) containing web app
- a 'static' folder
  - ▶ contains css, js, font, images
- a 'templates' folder
  - ▶ contains html templates
- requirements.txt (optional)
- config.py (optional)

Run from command line using:

- ```
  python flask_app.py
  ```

# Flask Examples

We'll run through these together:

- example.py
- example_with_pages.py
- example_with_form.py
- example_with_matplotlib.py
- example_with_template.py

# AM exercise

# Bootstrap: Introduction

Bootstrap is a popular front-end web framework combining HTML, CSS, & JavaScript.

Why Bootstrap:

- Easy way to develop modern web pages
- cross-platform, including mobile
- downloadable templates available at startbootstrap.com
- high quality results
- free & open source

# Bootstrap to Flask: get started

For your reference:

- Download a theme from startbootstrap.com & unzip.
- Match the file structure Flask needs:
  - Create a "static" folder
  - move the js, css, and fonts folders to it.
  - Create a "templates" folder
  - move the index.html file into it.

- Edit index.html to reflect new file structure
  - add "static" in path name for css, js

- Create flask app file.
- Edit content as needed
  - Probably in `<--! Page content -->` in .html

# Bootstrap to Flask: add new pages

For your reference:

- Copy the existing html template to use as new page template
- Edit content
- Add new route block (page) to Flask app
- Add links to connect all the pages

# Example: bootstrap to flask

Working through example in class.

- Start from "bare" template from http://startbootstrap.com/
- Final result in `flask-bootstrap`

# Bokeh

Bokeh is a python library to create interactive plots.

Why use bokeh?

- Display your data in a more pleasing way than a static image
- Update charts easily
- Users can interact with your charts

# Bokeh: version & installation

As of Apr 2016: Version 0.11.1

- Check version using `conda list bokeh`
- Install using `conda install bokeh`
  - or, upgrade with `conda update bokeh`

# Use Bokeh in bootstrap/flask sites (1/2)

Need to add the following two lines to the *.html template(s):

```
<link rel="stylesheet" href="http://cdn.pydata.org
/bokeh/release/bokeh-0.11.1.min.css" type="text/css" />
```

```
<script type="text/javascript" src="http://cdn.pydata.org
/bokeh/release/bokeh-0.11.1.min.js"></script>
```

(Lines got wrapped for space here; unwrap with no spaces for the template.)

# Use Bokeh in bootstrap/flask sites (2/2)

To add a bokeh page to your site:

- Build figure in python app
- Add a page for the figure
    - ▸ Add route block in flask
    - ▸ Copy/create a new template .html file for the page
- Add relevant content & variables to html template

# Example time!

Let's add a bokeh plot to our bootstrap page

- final result in `flask-bootstrap-bokeh`

# Content is King

Don't steal content:

- Plenty of free-to-use images are available.
    - Google search options: filter images by usage rights
    - Flickr: license options in search
- Give your sources credit!

# PM Assignment Extra Credit:

Post your website for the world to see! Free options include:

- Python Anywhere
- Heroku

Pay options (free with credits) include:

- AWS

# PM Assignment