



**HKUST**  
VISLAB

# **COMP 4462**

## **Data Visualization Tutorial**

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<https://bit.ly/vis-t06>

# Javascript and Observable

- Javascript

- Nothing to do with Java
- The native programming language of web browsers
  - Compile to JS, e.g. coffeescript, typescript, scala.js, elm
  - Compile to binary for performance, see [WebAssembly](#)
  - Runs with HTML, CSS and web technologies (SVG, WebGL, HTML5 Canvas)
  - The programming language for data visualization
- The most widely used programming language
  - Both web and server (node.js)
- Big community and a lot of libraries on GitHub / npm
  - Data visualization: D3.js, Vega-Lite, p5.js and many more

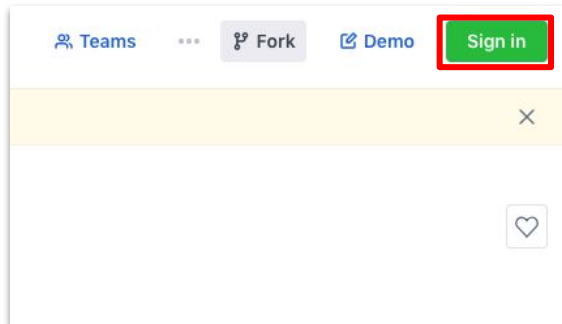
- Observable

- A Jupyter notebook like environment for Javascript
- It runs on your browser entirely! No remote runtime (server) is needed.
- Built by Mike Bostock (the author of D3.js), Jeremy Ashkenas (the author of Coffeescript) and Tom MacWright

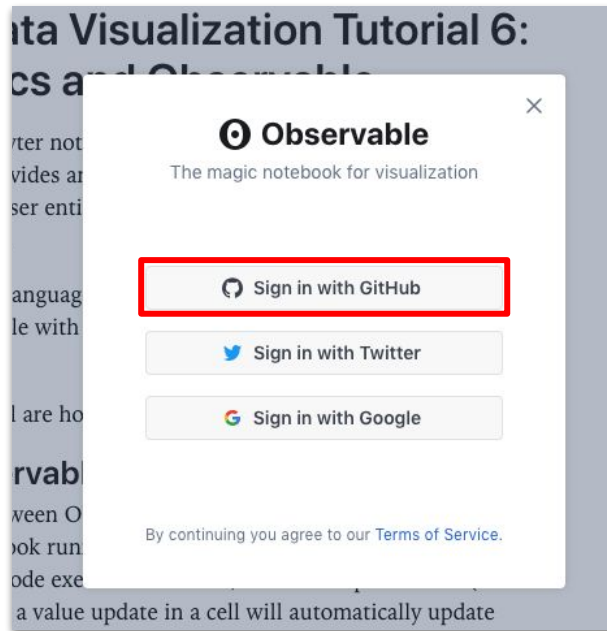
# Sign in Observable

1. Go to the [notebook of this tutorial](#)

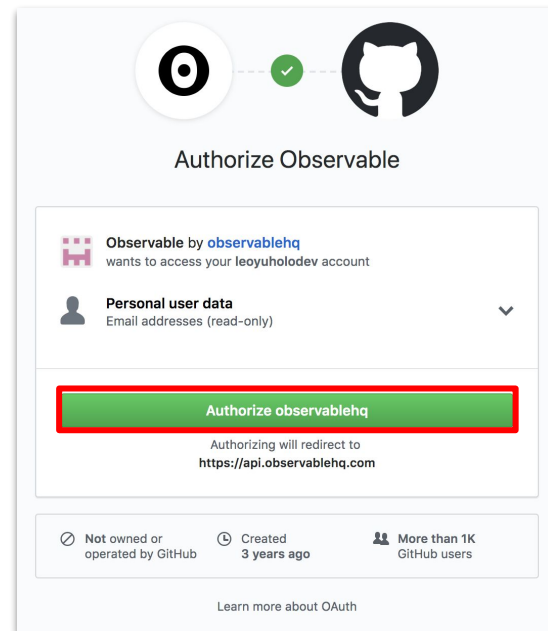
2. Click Sign in



3. Sign in with GitHub (recommended)



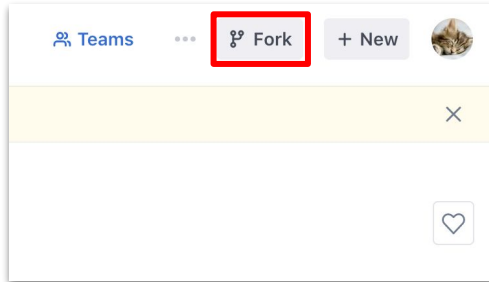
4. Authorize observablehq



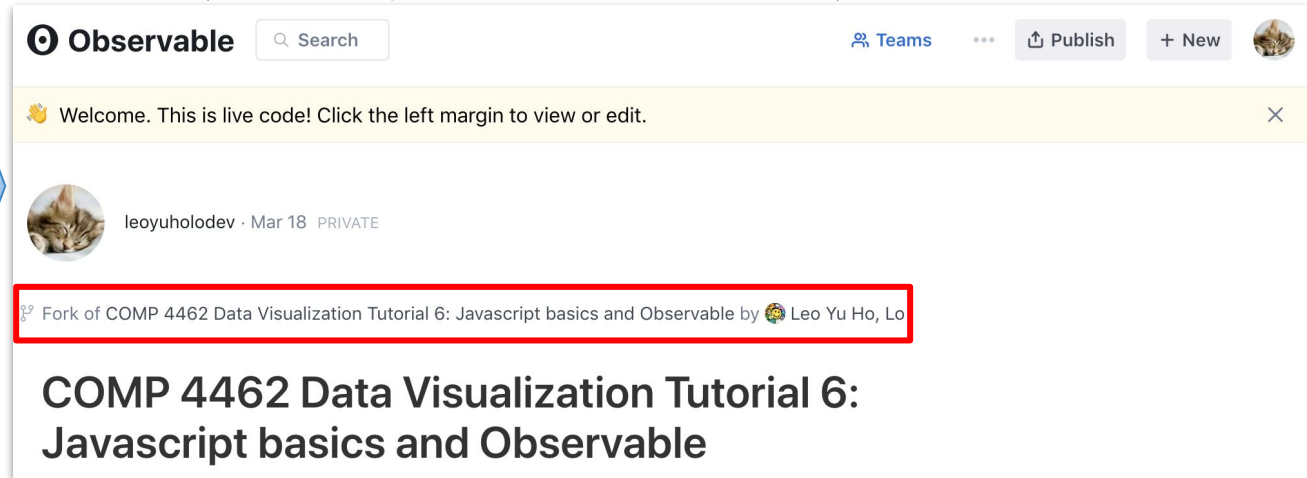
# Fork Observable notebook

1. Go to the [notebook of this tutorial](#)

2. Click Fork



3. Check if you're working on your copy of the notebook (otherwise, your work will not be saved)



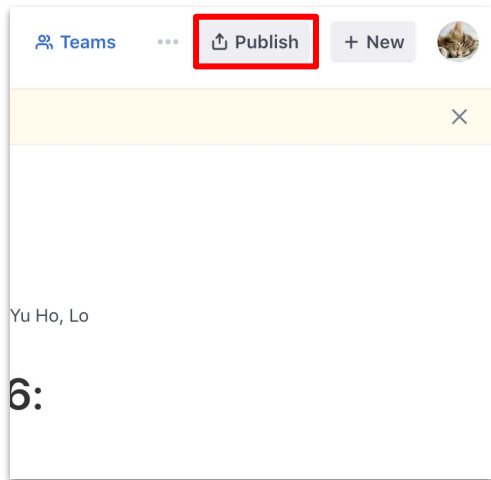
# Javascript and Observable Basics

- See the [Observable notebook of this tutorial](#)
- Topics:
  - Javascript
    - Data types: number, string, array, object, date
    - Logic flow/loop
    - Function/arrow function
    - Callback/asynchronous
    - Datetime
  - Observable:
    - Expressions/blocks
    - Import libraries
    - Import data
    - Basic plot with Vega-Lite

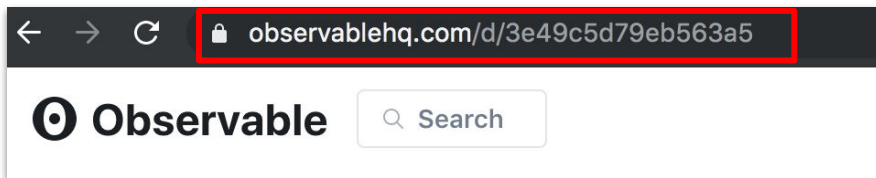
# Publish your Observable notebook

1. In your working copy of the notebook

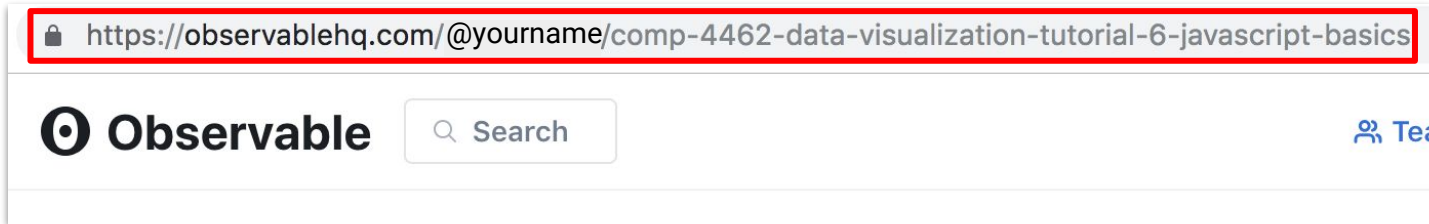
2. Click Publish



3. The URL changes from a hash...



4. To a meaningful URL, this URL is publicly accessible



# Lab exercise

- Tasks

- Sign in [Observable](#)
- Open [this Observable notebook](#) and fork it
- Read through “Javascript and Observable Basics” and fill in the “TODO” cells
- Learn about how to load data from GitHub
- Plot the Pokemon dataset with vizsla
- Plot the Pokemon dataset with Vega-Lite
- Publish your notebook when finished
- Copy the URL of your Observable notebook and submit to Canvas
  - The URL should be something like:
    - <https://observablehq.com/@yourname/comp-4462-data-visualization-tutorial-6-javascript-basics>

- Optional

- Like [our Observable notebook](#) ❤️❤️❤️ and star [our GitHub repository](#) ☆☆☆Thank you! ❤️
- Learn about asynchronous in Javascript: [A blog post by Sebastian Lindström](#)
- Learn about event loop of Javascript: [A visualized explanation by Philip Roberts](#)

# More topics on Javascript and Observable

- **A lot** more about Javascript

- Promise / async / await / generator / iterator / delegation / asynchronous generator / variable scope / immutability / prototypal inheritance / event loop / “this” keyword / class / object destructuring / web worker
- Compile to JS languages
  - Babel / Typescript / Coffeescript / Elm / Scala.js
- Frontend development
  - Frameworks like React / Vue.js / AngularJS
  - Webpack module bundler
- Backend development: Node.js and npm
- Use Javascript to build desktop/mobile apps: Electron / React Native

- More on Observable features

- See the ["Observable: The User Manual"](#) notebook
- Streaming data / latex / files / viewof / mutable / different kinds of input / tables / saving SVG / presentation slides / streaming shapefiles / create animated gif



# Next tutorial

Vega-lite and data  
processing libraries

- We will use [Observable](#) again
- Learn more about Javascript
- [Vega-Lite](#)
  - The library behind Altair
- [Lodash](#)
  - Utility library of Javascript
- [Moment.js](#)
  - Datetime manipulation library