The quick and easy way to record your attendance

University of BRISTOL

- Download the University of Bristol app
- Enable location services
- Select ‘Record Attendance’
- Select ‘Check-in’

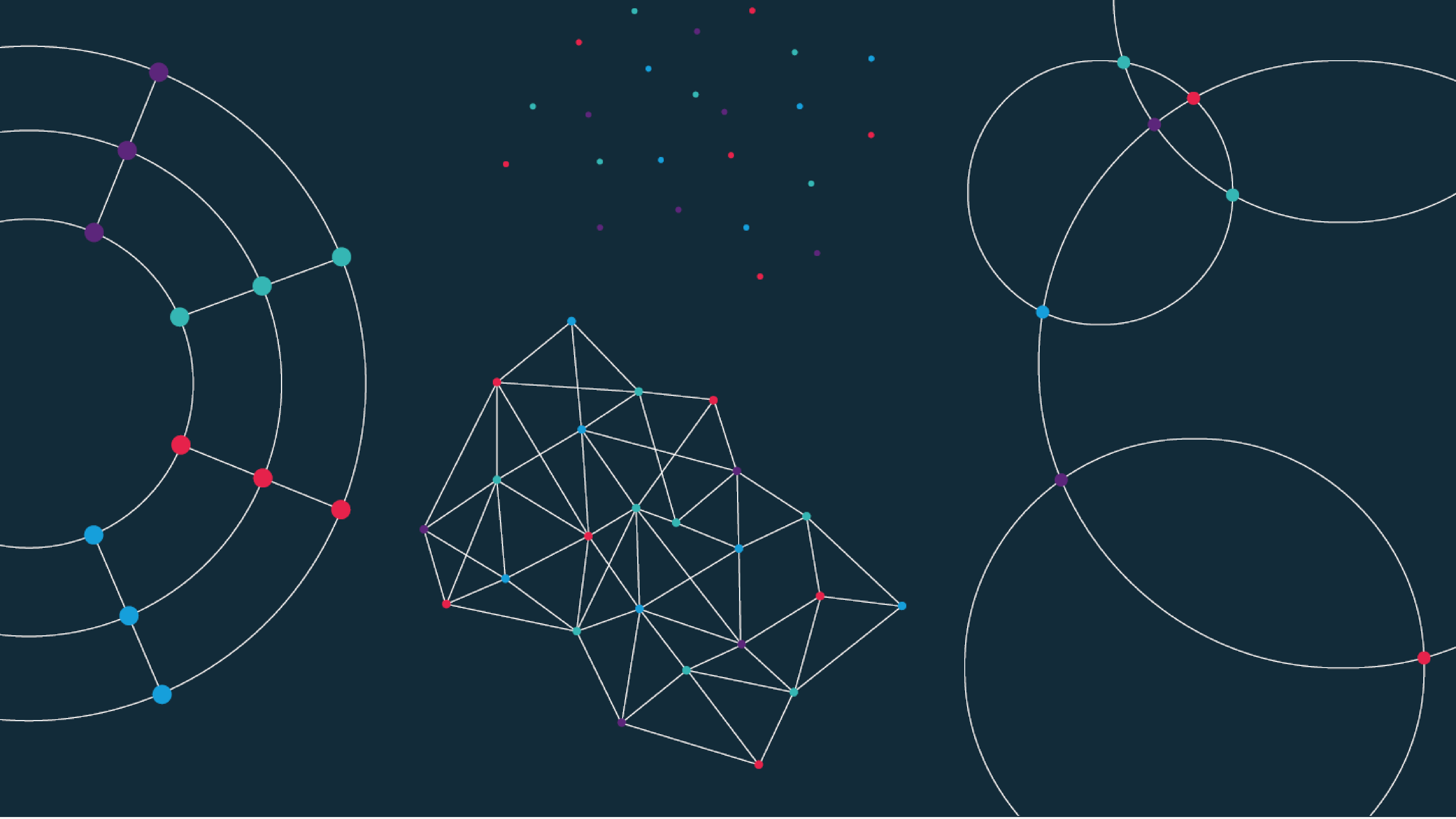
Apple App Store

Google Play Store

Make sure your attendance is recorded for all your on-campus classes

Key academic dates 2024/25

9 Sep 2024	16 Sep to 14 Oct 2024	21 Oct 2024	28 Oct to 25 Nov 2024	2 Dec 2024	9 Dec 2024	16 Dec 2024 to 5 Jan 2025
Welcome week	Teaching Block 1	Consolidation Week	Teaching Block 1	TB-1 Assessment Preparation Week	Mid-year/ TB-1 Assessment period	Winter Vacation
6 Jan 2025	13 Jan to 16 Feb 2025	17 Feb 2025	24 Feb to 30 Mar 2025	31 Mar 2025	7 Apr to 27 Apr 2025	
TB-2 Preparation week	Teaching Block 2	Consolidation Week	Teaching Block 2	TB-2 Assessment Preparation week	Spring vacation	
28 Apr to 16 May 2025	19 to 23 May 2025	26 May 2025	21 Jul to 1 Aug 2025	29 Aug 2025		
Summer/TB-2 Assessment period	Last week of term	Summer vacation starts (undergraduates)	Reassessment period	PGT Dissertation submission deadline		



Data Science.

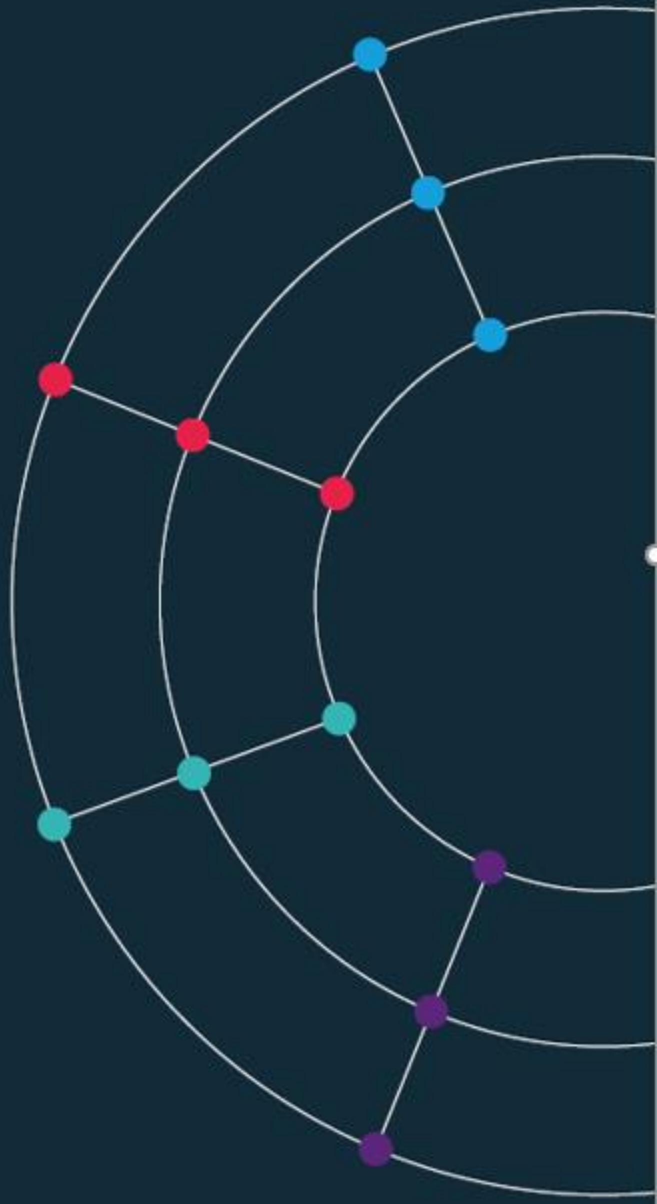
Autumn 2024

Week 1.

- **Intro and plan.** Team, learning objectives, resources, assessment.
- **What is Data Science?** Data, insights and responsibilities.
- **Building blocks.** HTML, CSS and JavaScript
- **Practical 1.** Setting up your portfolio site.

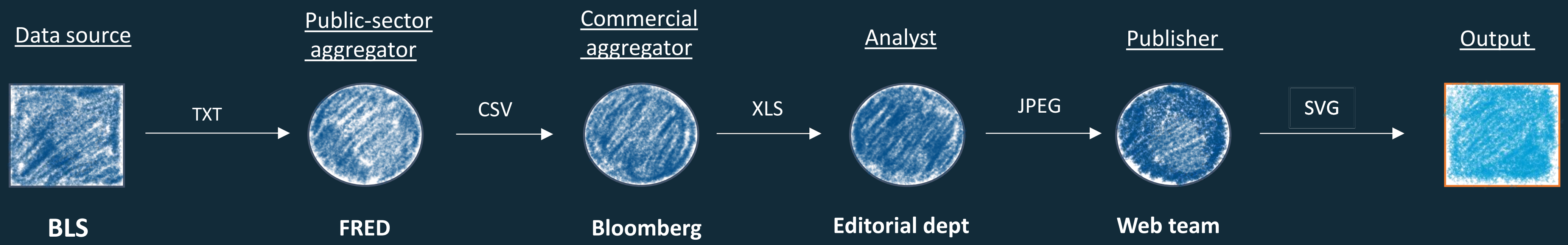
Motivation.

The way we use data evolves



Where we are.

- Currently analysts will tend to have five steps or more between their raw data and their output.
- Example: a journalist or consultant making a chart of US GDP



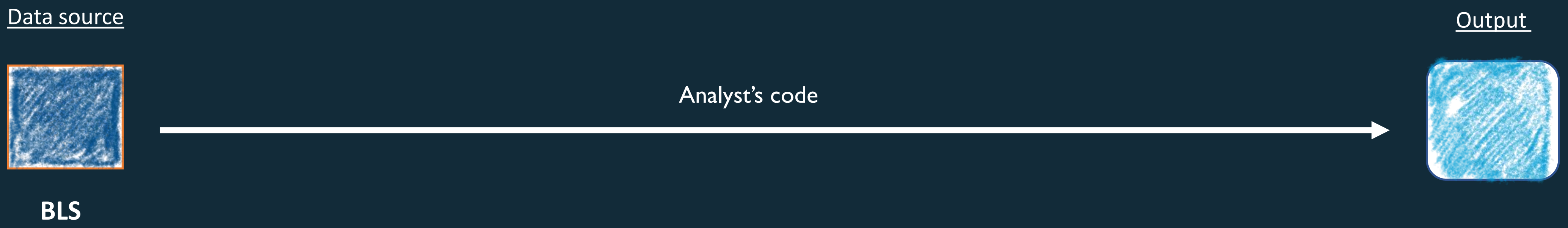
Note how this system works:

1. **Many players**. Some add delay, others add commercial cost. It is slow and expensive.
2. **Error prone**. Each link can, and does, break. Each one adds to the chance of a human error.
3. **Compatibility problems.** Many different file types. Delay and compatibility problems
4. **Data storage costs.** Huge data storage requirement, with data stored in each silo along the way.

The result is a data system that is slow, costly and inaccurate.

Where we are going.

- The modern approach used in this course is different. We will aim to build single secure channels linking an analyst's output right back to the raw data.



Data source

Output

Analyst's code

BLS

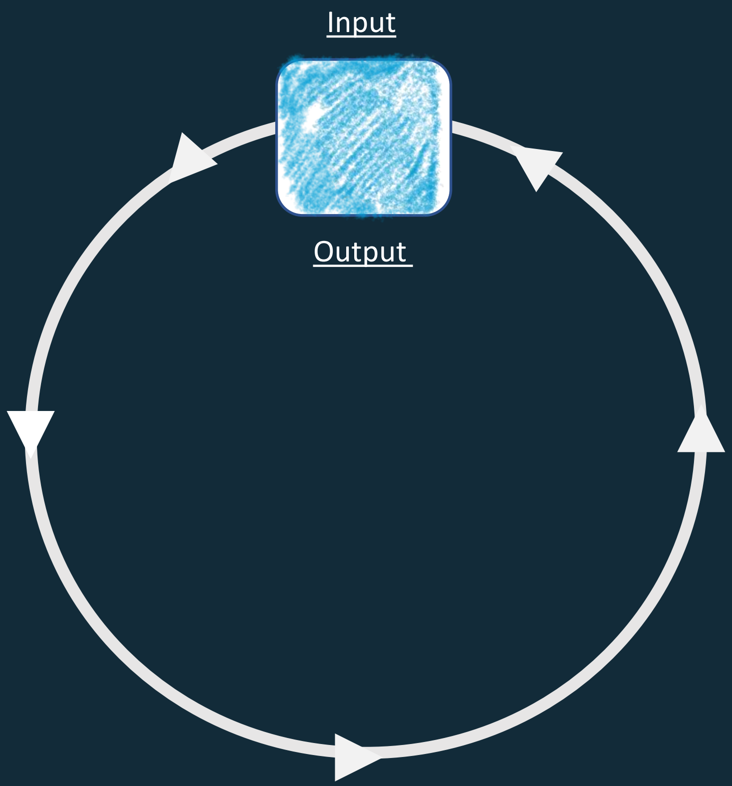
Note the differences with the new system:

1. **Auto-refresh**. Your presentation is always up to date. When the raw data updates, it flows through the channel instantly and automatically.
2. **Cost eradication.** The number of players (and associated costs) collapses. There are no data silos – the data shown on the web site are the raw data, not a copy of them.
3. **Auto-verification**. The one-to-one link back to the original data provider means fact checks can be swift.

The result is analysis that is faster, cheaper and more accurate.

What's possible.

- Today we carry supercomputers in our pockets in the form of smartphones. This means the combination of this hardware, along with JavaScript, and web-browsers can even create a data analysis loop with no links in the chain, where the phone is both the input and output.



Why it matters.

The problems and opportunities set out above matter in many fields that use data. But they are particularly acute in economics, for the following reasons:

Regular data updates. Economic data is high-frequency. This means that the ‘repeated analysis’ problem is particularly acute.

Positive/descriptive. Often we are aiming to clarify or get the bottom of some new finding. We need our work to be replicable (someone else can run your code and get the same result) and verifiable.

Normative/policy. Economic data is hard-wired into policy decisions. Getting it right affects people’s lives.

Team.

Prof Richard Davies

www.richarddavies.io

www.RDeconomist.github.io

www.extremeeconomies.com

Dr Denes Csala

www.csaladen.es

Finn McEvoy

github.com/FM-ds

Josh Hellings

jhellingsdata.github.io

Learning objectives.

What you can expect from this course

Knowledge. You will gain an understanding of the principles and theory of data and of visualisation.

Skills. This is a hands on, practical course. Starting from no programming knowledge we will guide you as you learn how to access, manipulate and display data using HTML, CSS, JavaScript, Python, and Vega.

Portfolio. You will be build a live web site that hosts both your DS portfolio and your project. These can be used professionally and/or in further study.

Resources.

- Key resource 1: **demonstrations of** code, chart examples, course plan:

https://rdeconomist.github.io/datascience

The repository behind this site:

https://github.com/RDeconomist/RDeconomist.github.io

- In particular familiarise yourself with the following pages:
    - https://RDeconomist.github.io/datascience2022 | Some of the best previous projects.
    - https://RDeconomist.github.io/dashboards | Some dashboards.
    - https://RDeconomist.github.io/library | A compendium of different types of chart, with links to the code and data.
- Key resource 2: In addition, there is a course DropBox, holding PDFs of notes and examples of code:

Data Science DropBox

Weekly plan.

- **Tuesday 16:00-18:00:** Lecture and practical.
- **Thursday 10:00, 11:00:** Seminars: skill (taught) and project discussion.
- **Office Hours:**
  - Richard: Tues, 14:00-15:00 (TBC)
  - Denes: Thu, TBC (online)
  - Finn: Wed, 14:30-15:30 (TBC)
  - Josh: Thu, 10:00-11:00 (TBC)

Questions / comments / requests.

How to get help:

1. Thursdays. Please ask questions during our project seminars. If you have a question, however, basic, just ask: many people will face similar problems.
2. Office hours. There are 4h per week for Q&A.
3. Discussion board.

Important note: The team is not able to answer questions about the basic functioning of your computer (e.g. hardware problems, battery, operating system problems) : these should go the manufacturer, or IT services.

Assessment. {Deadline: Friday 6th December}

- **Coursework.** The coursework consists of two parts.
- **DS Portfolio (20%).** In each of the first 10 weeks you learn the steps to produce charts, tables or visualisations. These are worth 20% of your grade. Each week is graded equally, i.e. 2%. These should be completed during the week. Note that the portfolio is NOT the same as for previous years.
- **DS Project (80%).**
  - Between 3 and 8 charts. Embedded in your site, hosted by GitHub pages.
  - An accompanying write-up (also embedded on your page) discussing:
    1. the aims of your project;
    2. the data you used, how you accessed it, including notes on automation/replication;
    3. challenges in data cleaning and/or analysis, and the tools you used to overcome them;
    4. your conclusions.

  Each section must not exceed 200 words.

A vital diary date.

The festival of economics

- Part of your portfolio will be to comment on / analyse and argument made at the Festival of Economics.
- The dates for this are 30th September – 3rd October.
- The events are here: https://www.economicsobservatory.com/events
- You will need to attend at least one session – please book tickets ASAP.
- The event is an opportunity to meet professional economists and potential employers, and we look forward to seeing you there.

** If this is problem for anyone, please let us know, as the Observatory will have some sponsored tickets we may be able to provide free of charge.*

Steps to take immediately.

Three things to do today

Key resources. Check that you can access both the RapidCharts GitHub repository, and the course drop box. The links are here and here.

Economics Observatory. Sign up for our newsletter. We will be emphasising charts and data over coming months. https://www.economicsobservatory.com/join-us

Social Accounts. Follow our social accounts. On IG: @RapidCharts, @EconomicsObservatory. On Twitter: @EconObservatory, @RD_Economist. We will post chart ideas, along with code, during the duration of the course. These will help with both your portfolio and project.

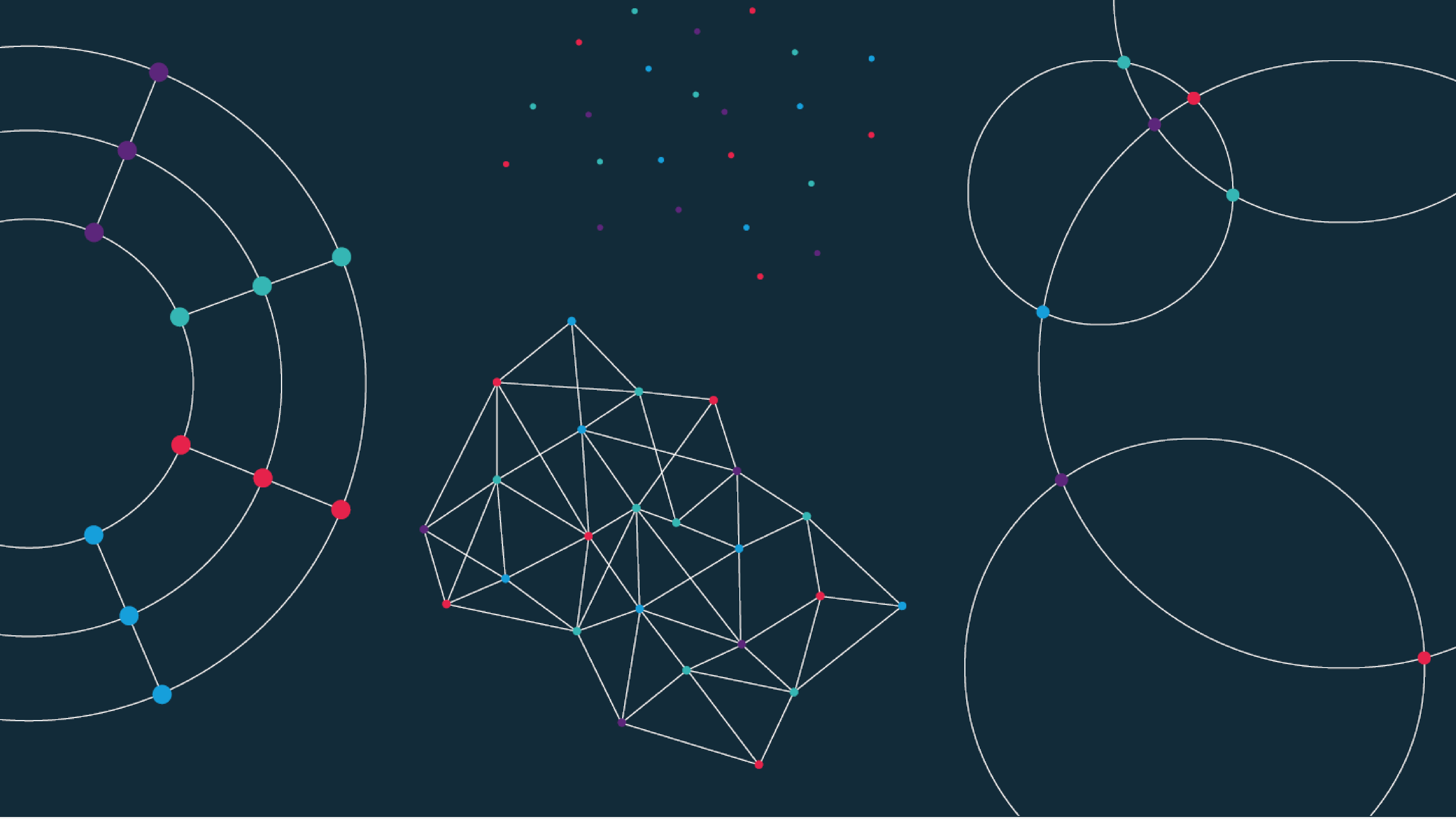
Success on the course.

Some advice from the team

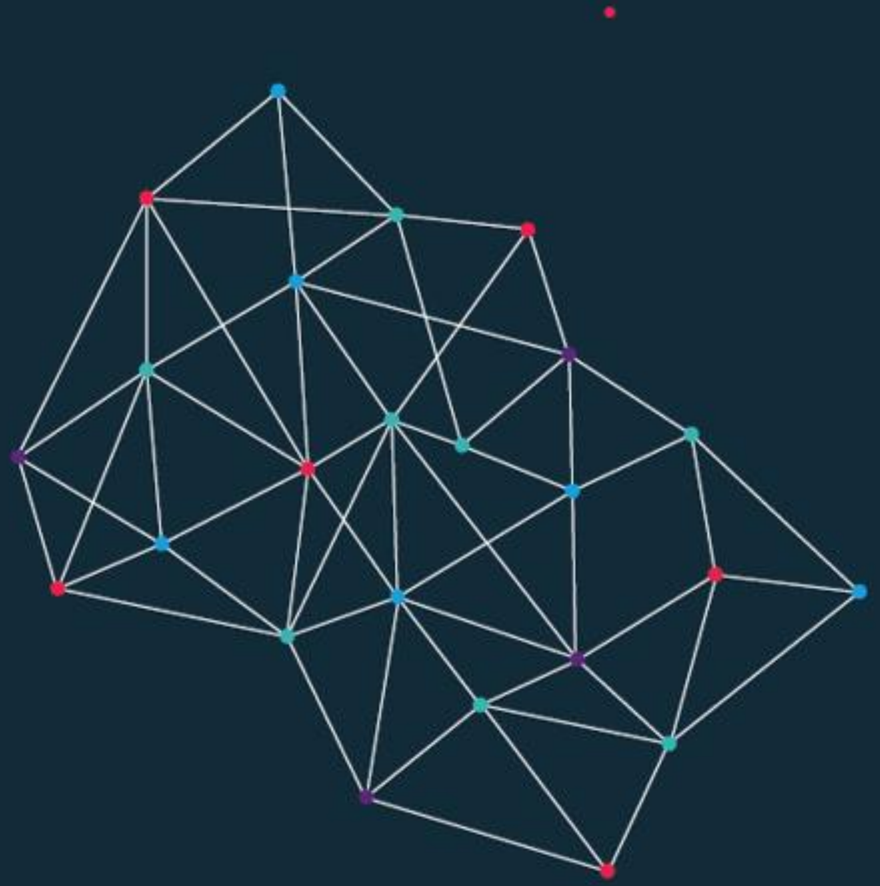
- The course is designed to take you from no coding skills to a position where you can make a professional quality web-site which collects, cleans, analyses and displays data.
- The skills we teach and code-along sessions are an essential part of this.
- The weekly homework will build the skills that you need to score well in the final coursework.

However…

- Coding and data are not like writing. They cannot be done in a short and rushed way. Our advice is to treat this course professionally. Complete each homework in the week it is set, attend and ask questions about your project.

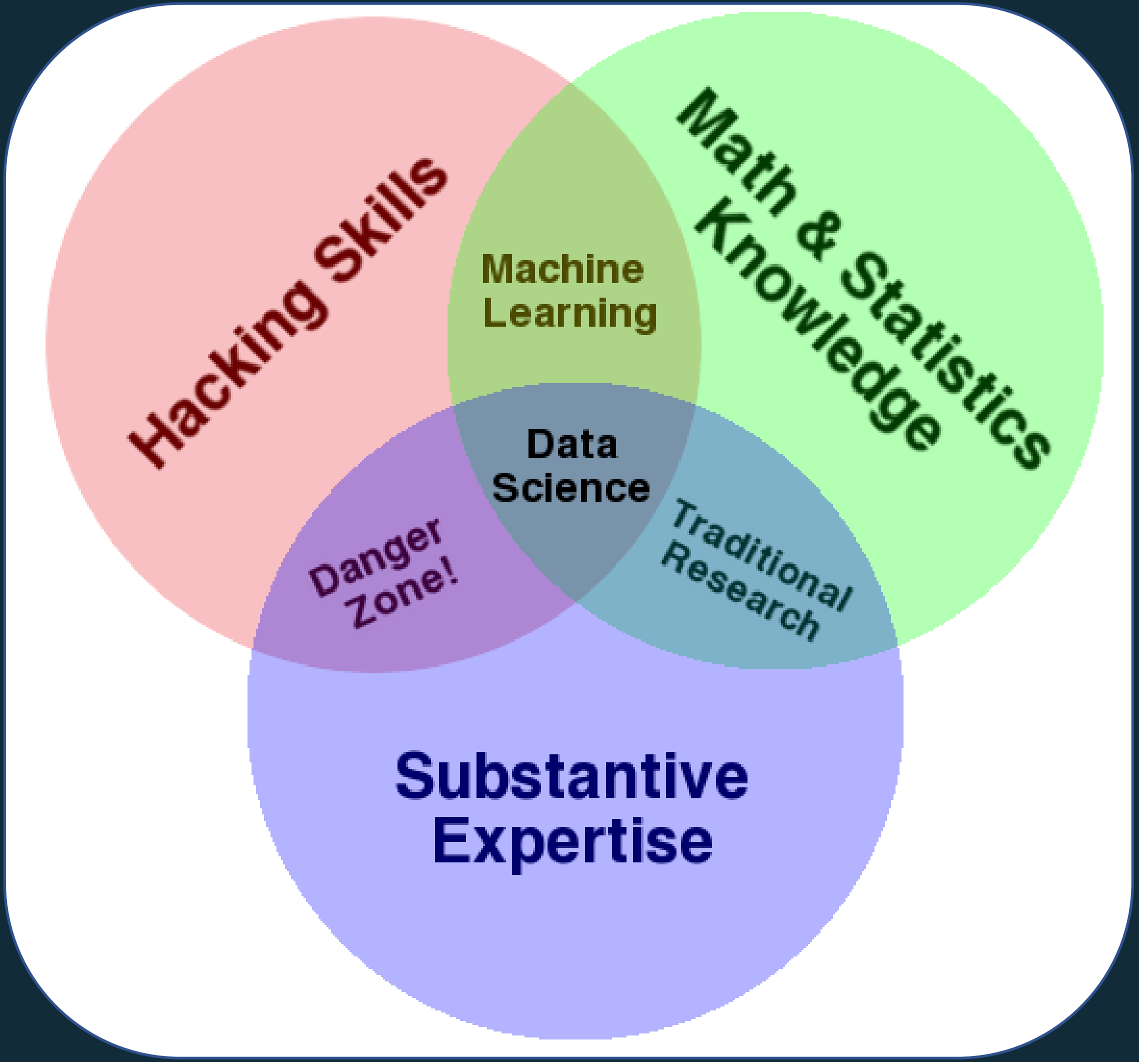


Building blocks.



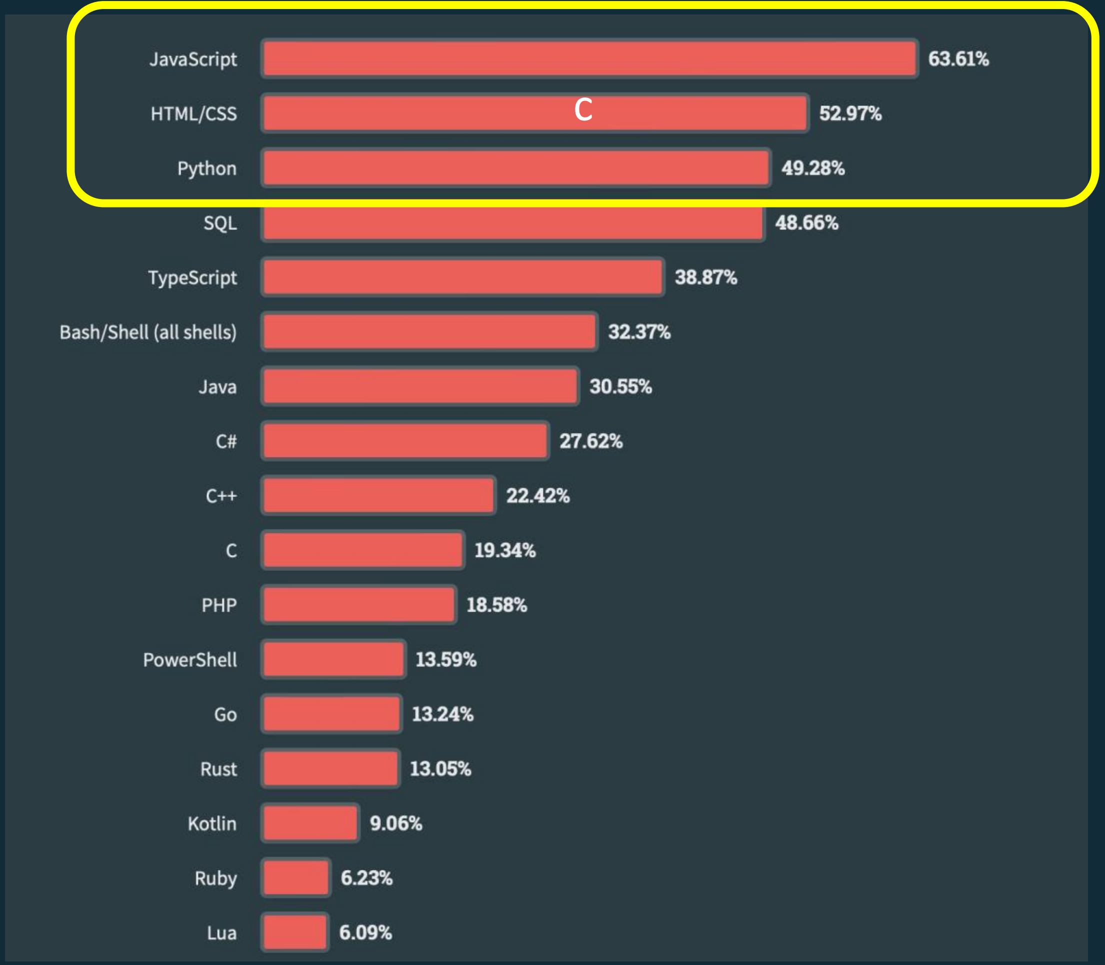
Data science.

What is it?



Learning a new language.

The most used languages, 2023



https://survey.stackoverflow.co/2023/#technology

HTML.

- HT. Hypertext.
  - As in http:// (Hypertext Transfer Protocol)
- ML. Markup language
- 1993. Invented at CERN by Tim Berners-Lee.
- 1994. Dave Raggett (Hewlett Packard, Bristol), develops HTML+ and Arena browser.
- 1995. WC3 guidelines published, to end browser wars.
- Big idea. The HT in the name is the big idea. There were lots of markup languages (SGML for example) but TBN idea was to link documents together, it added hyperlinks.

Tim Berners-Lee. Image: CERN

https://home.cern/science/computing/birth-web/short-history-web

https://www.vanityfair.com/news/2018/07/the-man-who-created-the-world-wide-web-has-some-regrets

HTML example.

```
<!DOCTYPE html>
<html>

<!-- THIS IS A COMMENT [HIGHLIGHT TEXT, THEN CONTROL+/] -->
<!-- Economics Observatory, Data Science -->

<head>
    <title>Page Title</title>
</head>

<!-- The body contains things you see -->
<!-- Most elements both open and close, with the content in the middle -->
<!-- Indenting is optional, but helps with readability -->
<body>
    <h1>My First Heading</h1>
    <p>My first paragraph.</p>
</body>
</html>
```

All code examples are in the course Dropbox

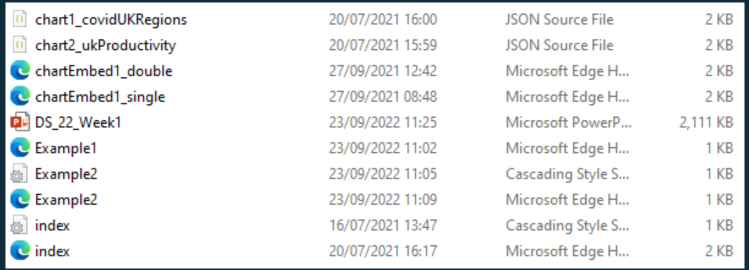


chart1_covidUKRegions	20/07/2021 16:00	JSON Source File	2 KB
chart2_ukProductivity	20/07/2021 15:59	JSON Source File	2 KB
chartEmbed1_double	27/09/2021 12:42	Microsoft Edge H...	2 KB
chartEmbed1_single	27/09/2021 08:48	Microsoft Edge H...	2 KB
DS_22_Week1	23/09/2022 11:25	Microsoft PowerP...	2,111 KB
Example1	23/09/2022 11:02	Microsoft Edge H...	1 KB
Example2	23/09/2022 11:05	Cascading Style S...	1 KB
Example2	23/09/2022 11:09	Microsoft Edge H...	1 KB
index	16/07/2021 13:47	Cascading Style S...	1 KB
index	20/07/2021 16:17	Microsoft Edge H...	2 KB

CSS.

Cascading Style Sheets

- 1994. First proposal – again at CERN.
- Applies styles to the different parts of your site.
- Challenge is to link the styles you chose, to the parts of your site where you wanted them.
- This is done using tags (also classes and ids)

Håkon Wium Lie, 12 December 1995
https://www.w3.org/Style/CSS20/history.html

Putting HTML and CSS together.

To link your HTML page to a CSS file you specify the location in the head section of your page.

```
<!-- Here is the head section -->
<head>
<title>Page Title</title>

<!-- Link to my CSS file -->
<link rel="stylesheet" href="Example2.css">
</head>
```

Your page will now have the styles set out in the CSS file.

JavaScript.

- History. JS launched by Netscape in 1995. Key developer was Brendan Eich. Brief war with Microsoft before widespread adoption. Now used in almost all (>95%) of web sites.
- In Data Science. Some uses of JS.
    - Fetching data. Grab data from another site, via an API, when you open your page.
    - Cleaning and manipulating data. Prepare and analyse the data for use in a chart or table.
    - Visualising data. Display the data in a way you wish. There are lots of charting “libraries” that do this. For example, Vega Lite and Charts.js.
    - Interactivity. Make visualisations interactive + sites fun and engaging.

JavaScript example.

```
<!DOCTYPE html>
<html>


<head>
    <!-- JS can be used to load external resources. Here we load Vega Lite library including its “embed” function-->
    <script src="https://cdn.jsdelivr.net/npm/vega@5"></script>
    <script src="https://cdn.jsdelivr.net/npm/vega-lite@5"></script>
    <script src="https://cdn.jsdelivr.net/npm/vega-embed@6"></script>
</head>


<body>
    <!-- Create a "figure" tag and give it the UNIQUE id of "Location1" -->
    <figure id="Location1"></figure>
</body>


<!-- Next we can use the tag script to tell the HTML file we are going to start writing in JavaScript -->
<script>
    // Now we are in JavaScript, so comments start with //

    // Declaring a variable, giving it the name chart1_spec, and storing the JSON that defines a chart in it.
    var chart1_spec = "s2_chart1.json";

    // The vegaEmbed function needs to know (a) what, and (b) where to embed the chart.
    vegaEmbed('#Location1', chart1_spec)
</script>

</html>
```

JavaScript example.

```
<!DOCTYPE html>
<html>


<head>
    <!-- JS can be used to load external resources. Here we load Vega Lite library including its “embed” function-->
    <script src="https://cdn.jsdelivr.net/npm/vega@5"></script>
    <script src="https://cdn.jsdelivr.net/npm/vega-lite@5"></script>
    <script src="https://cdn.jsdelivr.net/npm/vega-embed@6"></script>
</head>


<body>
    <!-- Create a "figure" tag and give it the UNIQUE id of "Location1" -->
    <figure id="Location1"></figure>
</body>


<!-- Next we can use the tag script to tell the HTML file we are going to start writing in JavaScript -->
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    // The vegaEmbed function needs to know (a) what, and (b) where to embed the chart.
    vegaEmbed('#Location1', chart1_spec)
</script>

</html>
```
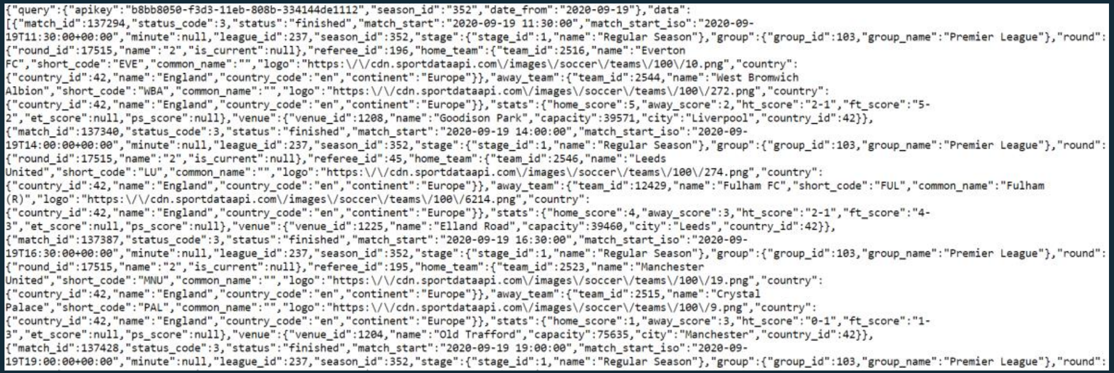

JSON data.

- JavaScript Object Notation. An important data type. Why use it?
  - It is the way computers share data.
  - Most importantly it is what many APIs will deliver – your data will arrive to you in this way.
  - It looks complicated at first, but is easy to convert into access, change and chart.
- Formatted as key : value pairs (aka name : value pairs)

```
'{"name":“Richard", “kids":2, “team":“Manchester United”, “address”:null}’
```

- Keys are strings, always in double quotes.
- Values can be many things: string, number, arrays, objects.
- Useful tools:
  - www.jsonlint.com. Test and format JSON.
  - JSON formatter. Chrome extension.

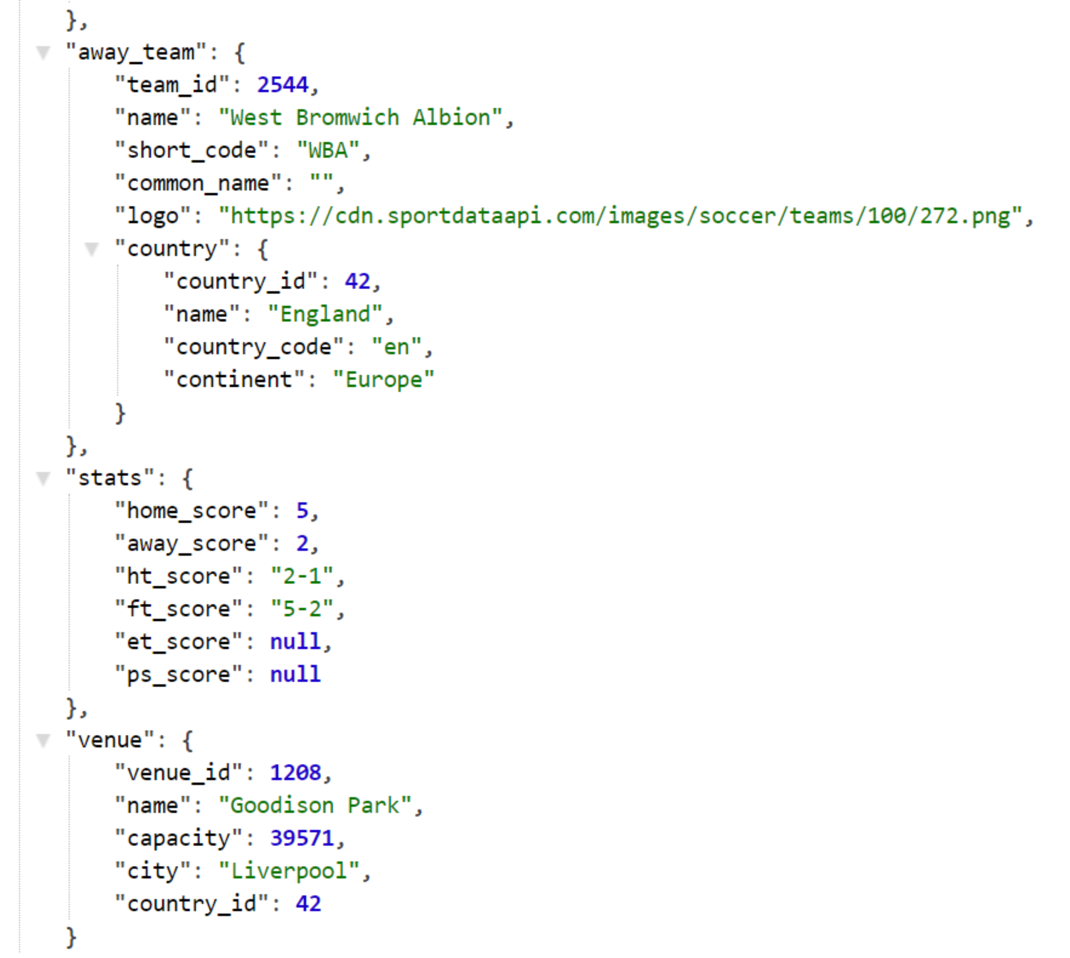
Raw.



```
{"query":{"apikey":"b8bb8050-f3d3-11eb-808b-334144de1112","season_id":"352","date_from":"2020-09-19"},"data":
[{"match_id":137294,"status_code":3,"status":"finished","match_start":"2020-09-19 11:30:00","match_start_iso":"2020-09-
19T11:30:00+00:00","minute":null,"league_id":237,"season_id":352,"stage":{"stage_id":1,"name":"Regular Season"},"group":{"group_id":103,"group_name":"Premier League"},"round":
{"round_id":17515,"name":"2","is_current":null},"referee_id":196,"home_team":{"team_id":2516,"name":"Everton
FC","short_code":"EVE","common_name":"","logo":"https:\/\/cdn.sportdataapi.com\/images\/soccer\/teams\/100\/10.png","country":
{"country_id":42,"name":"England","country_code":"en","continent":"Europe"}},"away_team":{"team_id":2544,"name":"West Bromwich
Albion","short_code":"WBA","common_name":"","logo":"https:\/\/cdn.sportdataapi.com\/images\/soccer\/teams\/100\/272.png","country":
{"country_id":42,"name":"England","country_code":"en","continent":"Europe"}},"stats":{"home_score":5,"away_score":2,"ht_score":"2-1","ft_score":"5-
2","et_score":null,"ps_score":null},"venue":{"venue_id":1208,"name":"Goodison Park","capacity":39571,"city":"Liverpool","country_id":42}},
{"match_id":137340,"status_code":3,"status":"finished","match_start":"2020-09-19 14:00:00","match_start_iso":"2020-09-
19T14:00:00+00:00","minute":null,"league_id":237,"season_id":352,"stage":{"stage_id":1,"name":"Regular Season"},"group":{"group_id":103,"group_name":"Premier League"},"round":
{"round_id":17515,"name":"2","is_current":null},"referee_id":45,"home_team":{"team_id":2546,"name":"Leeds
United","short_code":"LU","common_name":"","logo":"https:\/\/cdn.sportdataapi.com\/images\/soccer\/teams\/100\/274.png","country":
{"country_id":42,"name":"England","country_code":"en","continent":"Europe"}},"away_team":{"team_id":12429,"name":"Fulham FC","short_code":"FUL","common_name":"Fulham
(R)","logo":"https:\/\/cdn.sportdataapi.com\/images\/soccer\/teams\/100\/6214.png","country":
{"country_id":42,"name":"England","country_code":"en","continent":"Europe"}},"stats":{"home_score":4,"away_score":3,"ht_score":"2-1","ft_score":"4-
3","et_score":null,"ps_score":null},"venue":{"venue_id":1225,"name":"Elland Road","capacity":39460,"city":"Leeds","country_id":42}},
{"match_id":137387,"status_code":3,"status":"finished","match_start":"2020-09-19 16:30:00","match_start_iso":"2020-09-
19T16:30:00+00:00","minute":null,"league_id":237,"season_id":352,"stage":{"stage_id":1,"name":"Regular Season"},"group":{"group_id":103,"group_name":"Premier League"},"round":
{"round_id":17515,"name":"2","is_current":null},"referee_id":195,"home_team":{"team_id":2523,"name":"Manchester
United","short_code":"MNU","common_name":"","logo":"https:\/\/cdn.sportdataapi.com\/images\/soccer\/teams\/100\/19.png","country":
{"country_id":42,"name":"England","country_code":"en","continent":"Europe"}},"away_team":{"team_id":2515,"name":"Crystal
Palace","short_code":"PAL","common_name":"","logo":"https:\/\/cdn.sportdataapi.com\/images\/soccer\/teams\/100\/9.png","country":
{"country_id":42,"name":"England","country_code":"en","continent":"Europe"}},"stats":{"home_score":1,"away_score":3,"ht_score":"0-1","ft_score":"1-
3","et_score":null,"ps_score":null},"venue":{"venue_id":1204,"name":"Old Trafford","capacity":75635,"city":"Manchester","country_id":42}},
{"match_id":137428,"status_code":3,"status":"finished","match_start":"2020-09-19 19:00:00","match_start_iso":"2020-09-
19T19:00:00+00:00","minute":null,"league_id":237,"season_id":352,"stage":{"stage_id":1,"name":"Regular Season"},"group":{"group_id":103,"group_name":"Premier League"},"round":
```

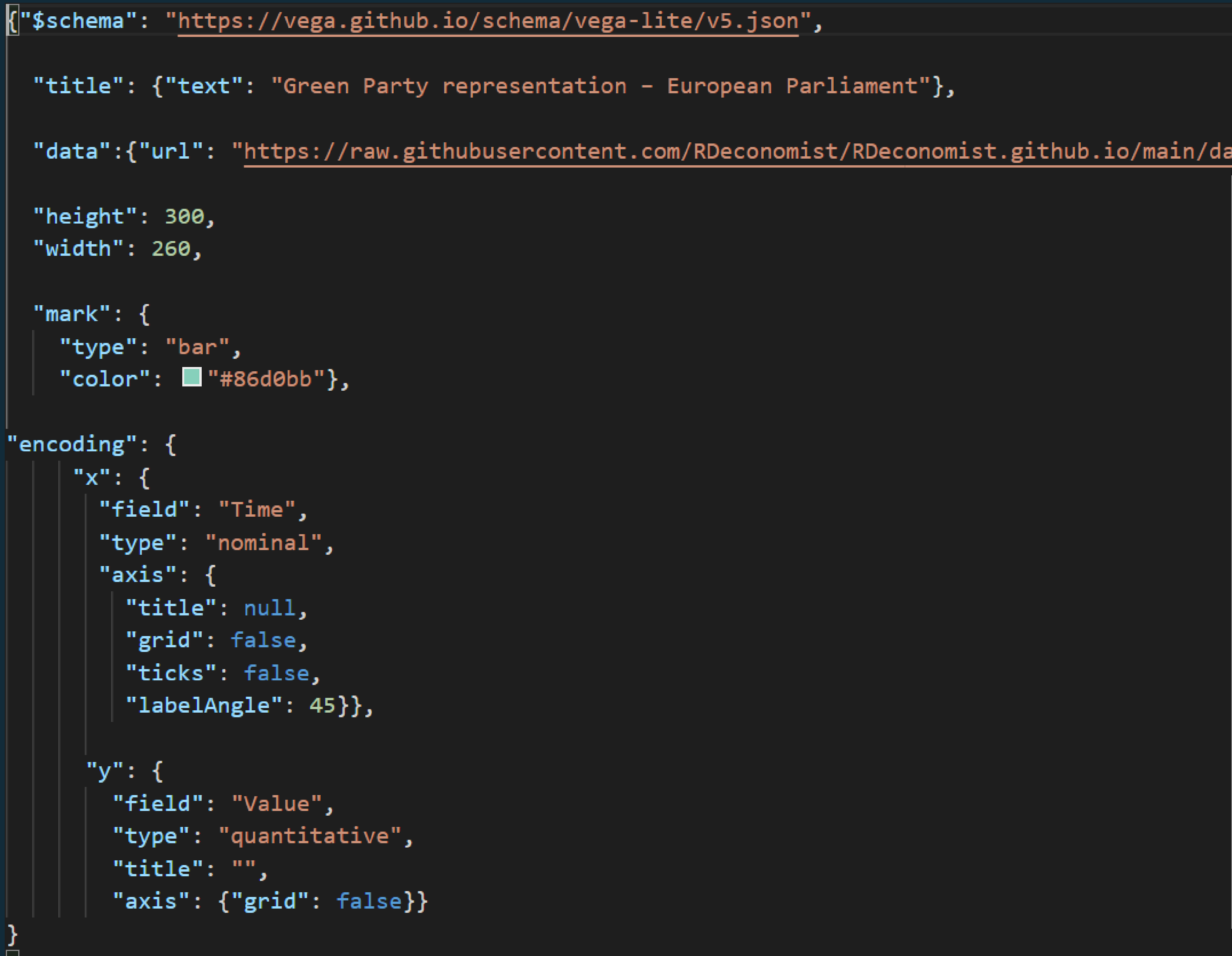
API returns. The results of request to Sport Data API.

Parsed.

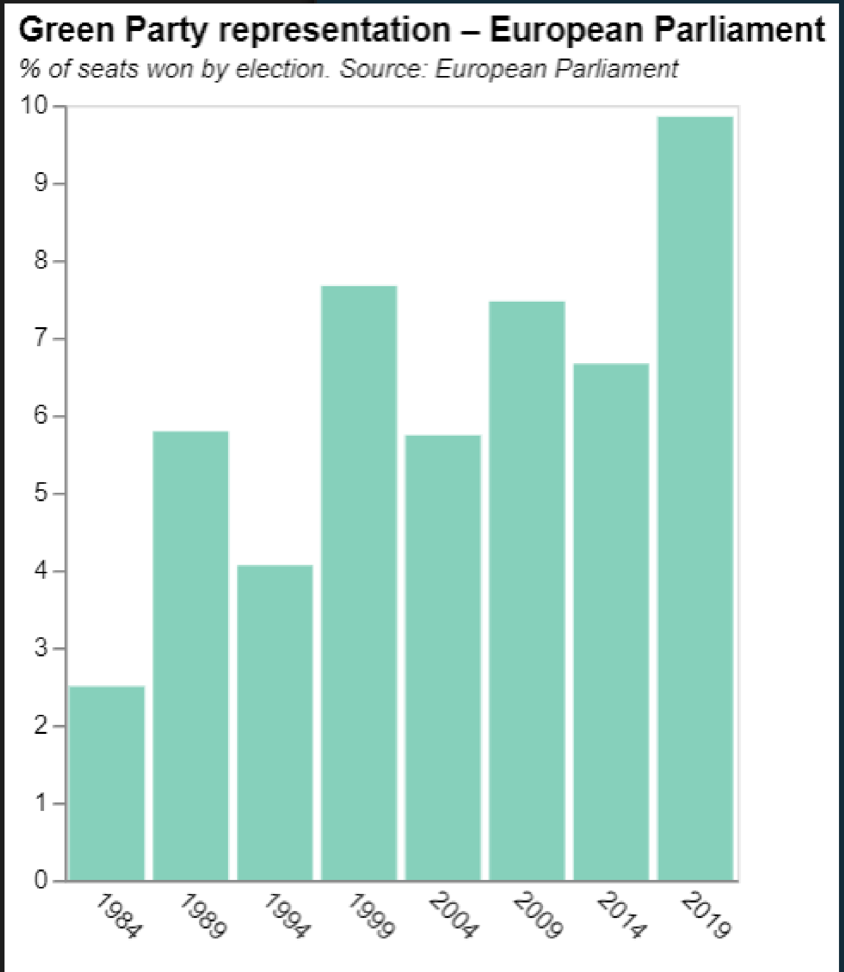


```
},
"away_team": {
    "team_id": 2544,
    "name": "West Bromwich Albion",
    "short_code": "WBA",
    "common_name": "",
    "logo": "https://cdn.sportdataapi.com/images/soccer/teams/100/272.png",
    "country": {
        "country_id": 42,
        "name": "England",
        "country_code": "en",
        "continent": "Europe"
    }
},
"stats": {
    "home_score": 5,
    "away_score": 2,
    "ht_score": "2-1",
    "ft_score": "5-2",
    "et_score": null,
    "ps_score": null
},
"venue": {
    "venue_id": 1208,
    "name": "Goodison Park",
    "capacity": 39571,
    "city": "Liverpool",
    "country_id": 42
}
```

Charts as JSON.

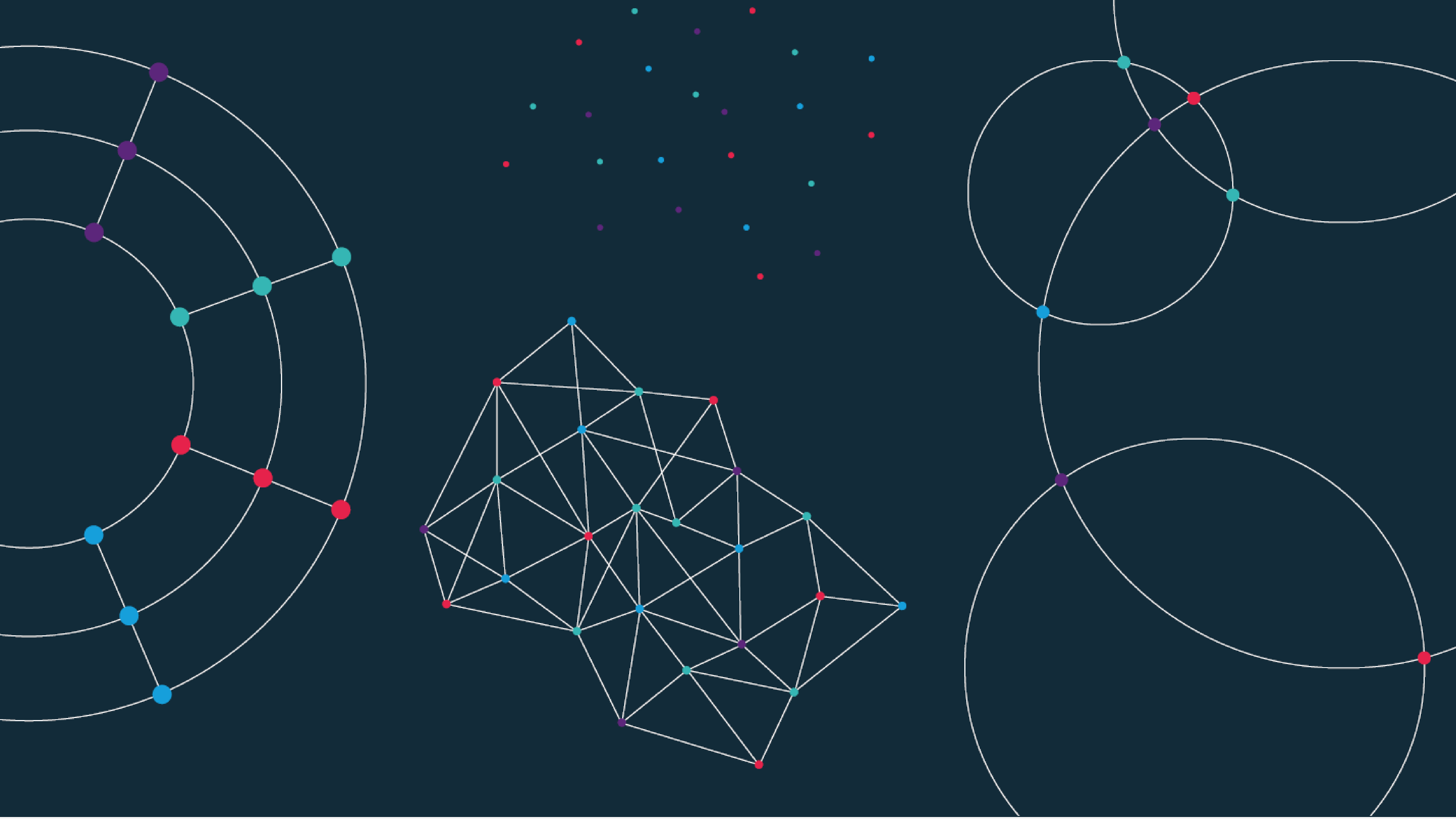


```
{"$schema": "https://vega.github.io/schema/vega-lite/v5.json",

  "title": {"text": "Green Party representation – European Parliament"},

  "data":{"url": "https://raw.githubusercontent.com/RDeconomist/RDeconomist.github.io/main/data/chartENV19.csv"

  "height": 300,
  "width": 260,

  "mark": {
    "type": "bar",
    "color": 🟩"#86d0bb"},

"encoding": {
     "x": {
       "field": "Time",
       "type": "nominal",
       "axis": {
         "title": null,
         "grid": false,
         "ticks": false,
         "labelAngle": 45}},

      "y": {
        "field": "Value",
        "type": "quantitative",
        "title": "",
        "axis": {"grid": false}}
}
```



Green Party representation – European Parliament

% of seats won by election. Source: European Parliament

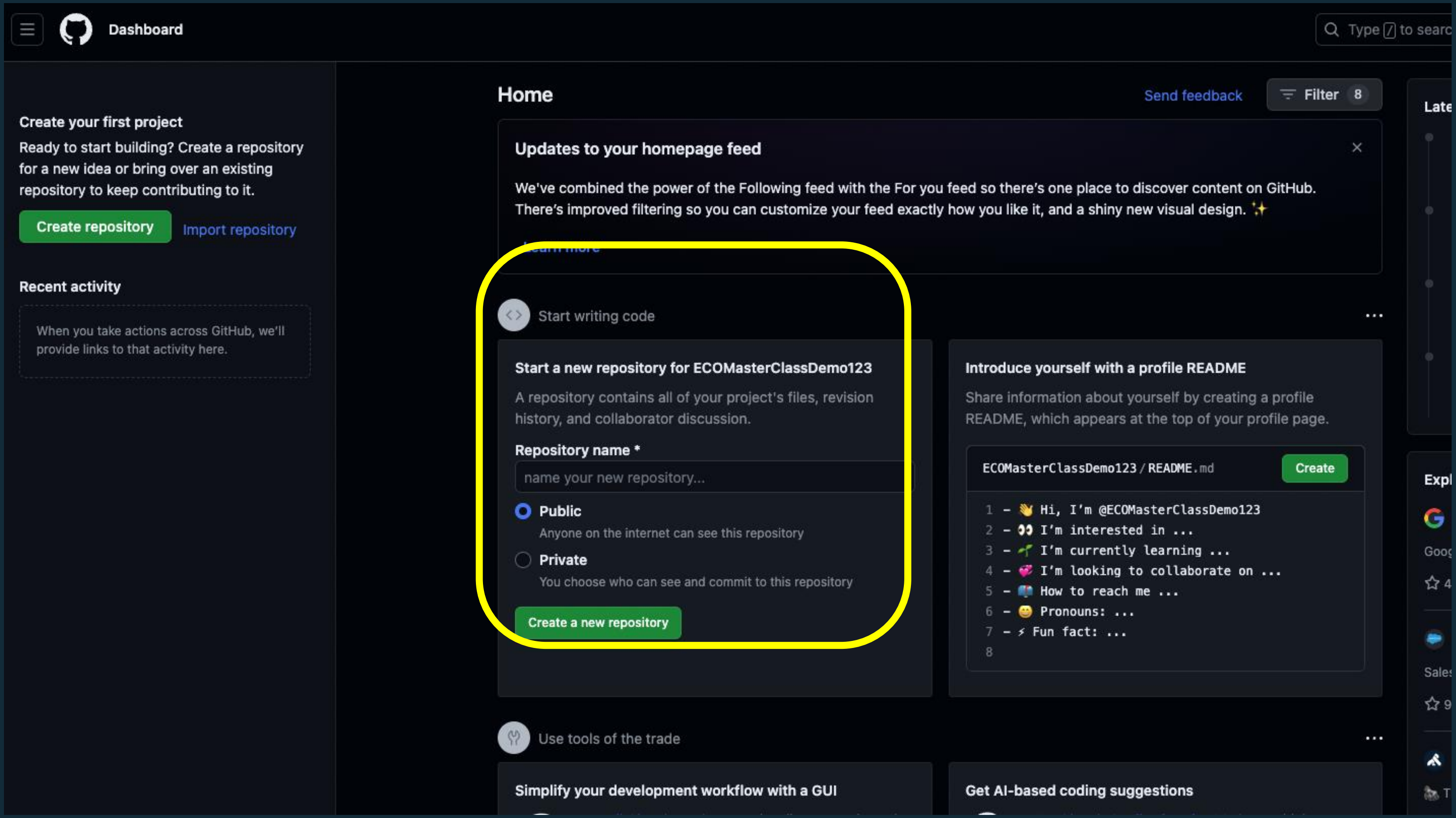


Practical 1.

- Set up your GitHub pages site.
- Enter your details HERE.
- Embed first two charts in your page.

GitHub Pages.

Make ‘special’ repository: click here



Dashboard

Type / to searc

Create your first project

Ready to start building? Create a repository for a new idea or bring over an existing repository to keep contributing to it.

Create repository Import repository

Recent activity

When you take actions across GitHub, we'll provide links to that activity here.

Home

Send feedback Filter 8

Updates to your homepage feed

We've combined the power of the Following feed with the For you feed so there's one place to discover content on GitHub. There's improved filtering so you can customize your feed exactly how you like it, and a shiny new visual design. ✨

Learn more

Start writing code

Start a new repository for ECOMasterClassDemo123

A repository contains all of your project's files, revision history, and collaborator discussion.

Repository name *

name your new repository...

● Public

Anyone on the internet can see this repository

○ Private

You choose who can see and commit to this repository

Create a new repository

Introduce yourself with a profile README

Share information about yourself by creating a profile README, which appears at the top of your profile page.

ECOMasterClassDemo123 / README.md Create

```
- 👋 Hi, I’m @ECOMasterClassDemo123
- 👀 I’m interested in ...
- 🌱 I’m currently learning ...
- 💞️ I’m looking to collaborate on ...
- 📫 How to reach me ...
- 😄 Pronouns: ...
- ⚡ Fun fact: ...

```

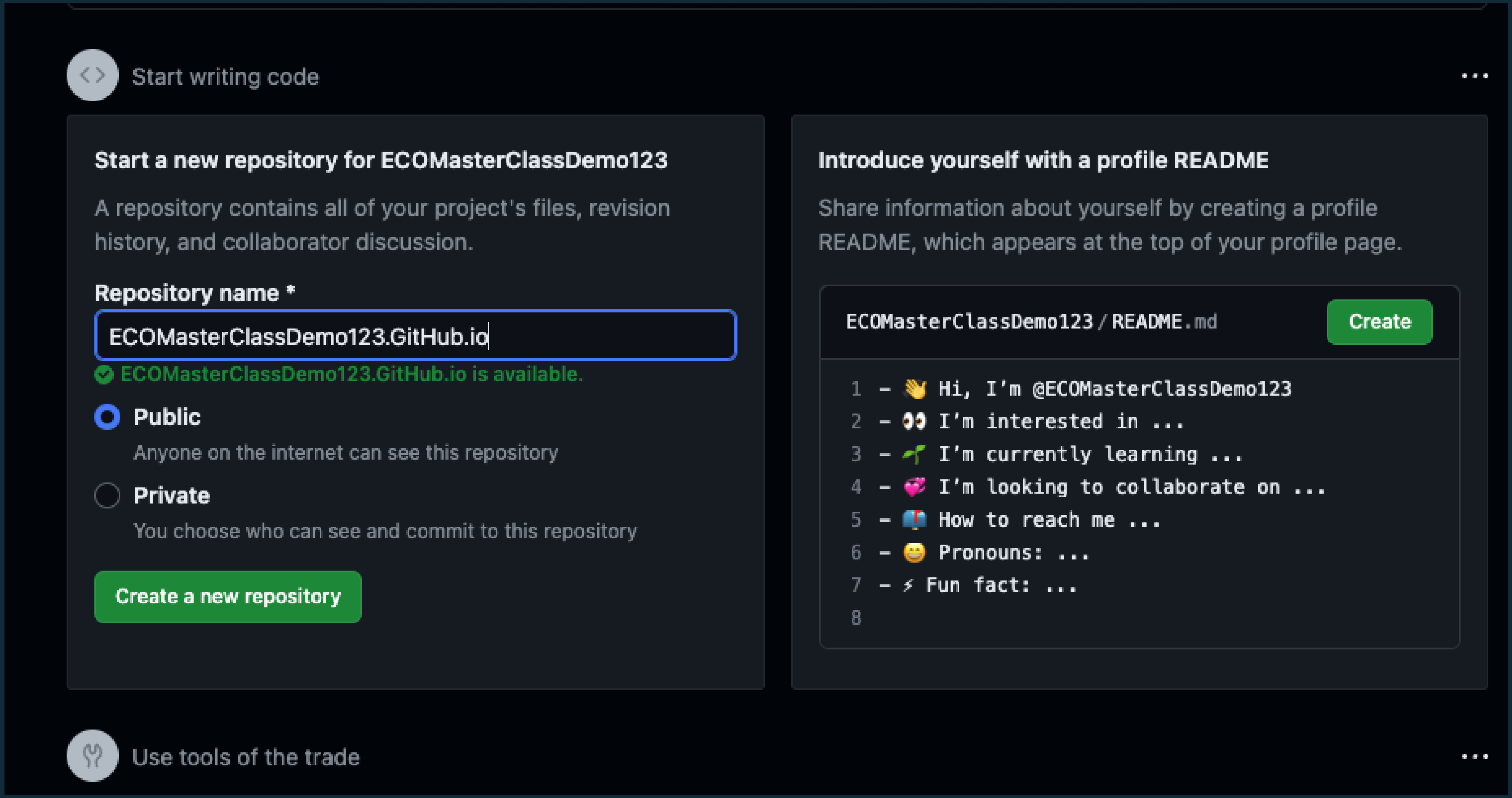
Use tools of the trade

Simplify your development workflow with a GUI

Get AI-based coding suggestions

GitHub Pages.

Follow this format – username/username.github.io



Start a new repository for ECOMasterClassDemo123

A repository contains all of your project's files, revision history, and collaborator discussion.

Repository name *: ECOMasterClassDemo123.GitHub.io

ECOMasterClassDemo123.GitHub.io is available.

● Public
Anyone on the internet can see this repository

○ Private
You choose who can see and commit to this repository

Introduce yourself with a profile README

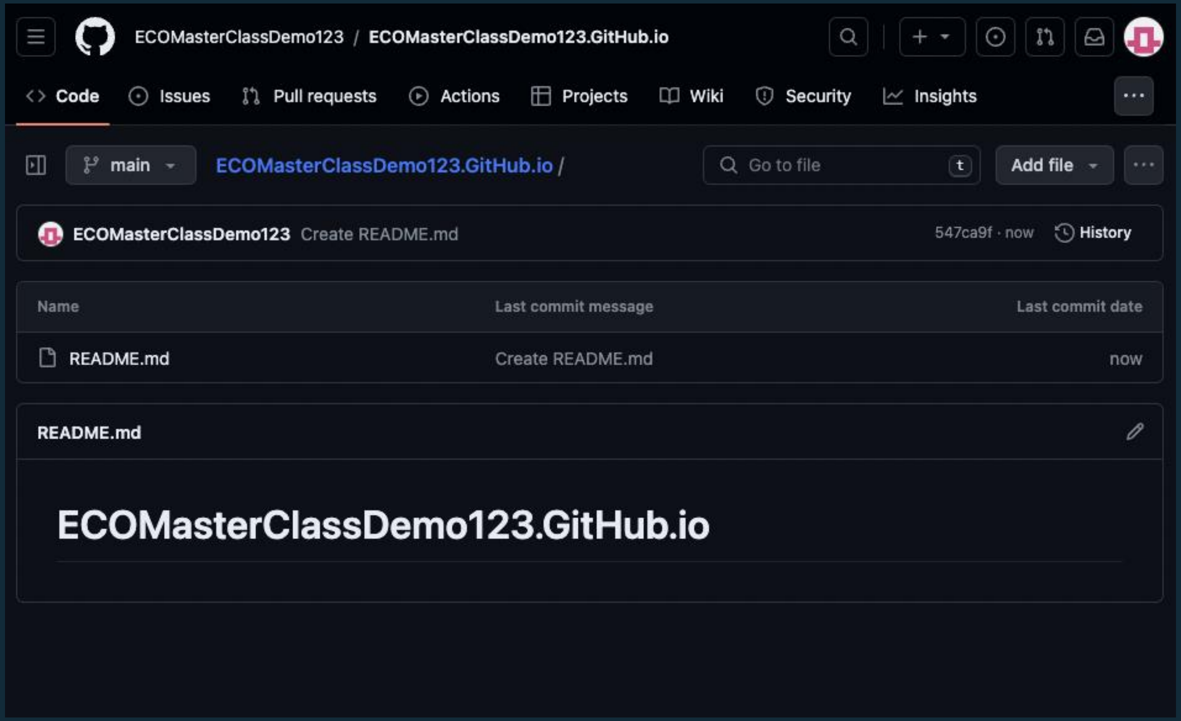
Share information about yourself by creating a profile README, which appears at the top of your profile page.

ECOMasterClassDemo123 / README.md

```
- 👋 Hi, I’m @ECOMasterClassDemo123
- 👀 I’m interested in ...
- 🌱 I’m currently learning ...
- 💞️ I’m looking to collaborate on ...
- 📫 How to reach me ...
- 😄 Pronouns: ...
- ⚡ Fun fact: ...
```

GitHub Pages.

Make special personal repository: you should get to this point

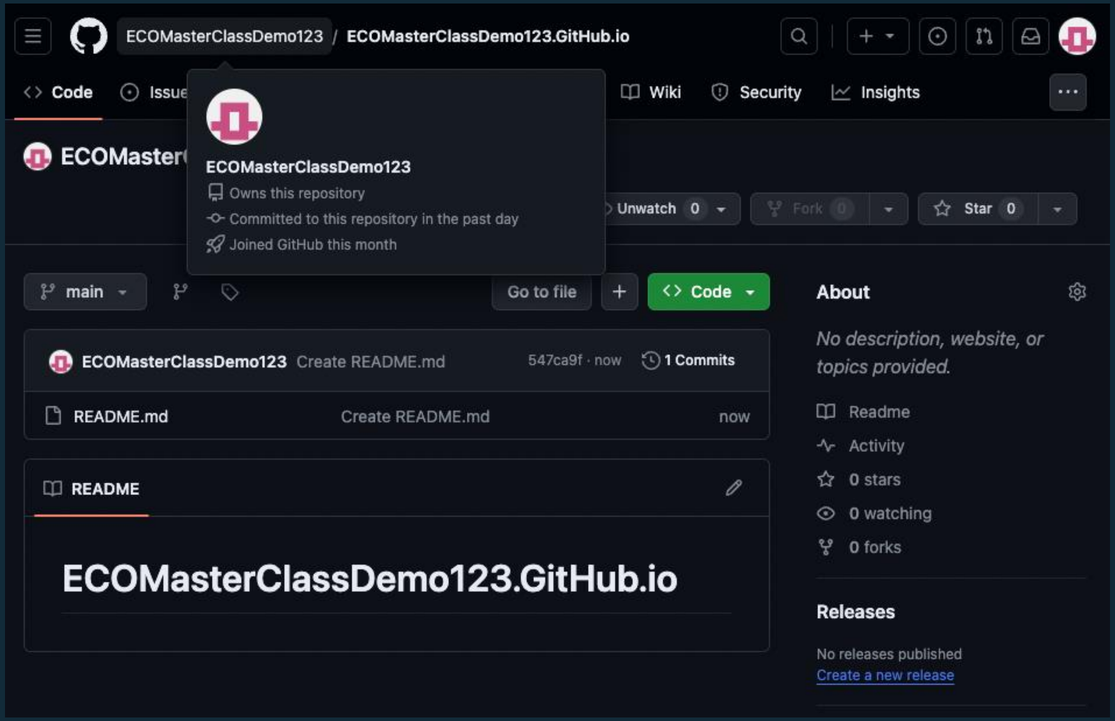

ECOMasterClassDemo123 / ECOMasterClassDemo123.GitHub.io
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
main
ECOMasterClassDemo123.GitHub.io /
Go to file
t
Add file
History

ECOMasterClassDemo123 Create README.md 547ca9f · now

Name	Last commit message	Last commit date
README.md	Create README.md	now

README.md

ECOMasterClassDemo123.GitHub.io



ECOMasterClassDemo123
Owns this repository
Committed to this repository in the past day
Joined GitHub this month

ECOMasterClassDemo123 Create README.md 547ca9f · now 1 Commits

README.md Create README.md now

README

ECOMasterClassDemo123.GitHub.io

No description, website, or topics provided.

No releases published

HTML.

Create and edit your “index.html” file.

Use “example.html” from Dropbox as your starting point.

JSON.

Edit your “index.html” file, and add JSON files to your file structure

There is already a chart embedded in the example HTML. Try replacing this with a chart from Dropbox, or adding a new chart altogether