Intro to Data Collection

APIs

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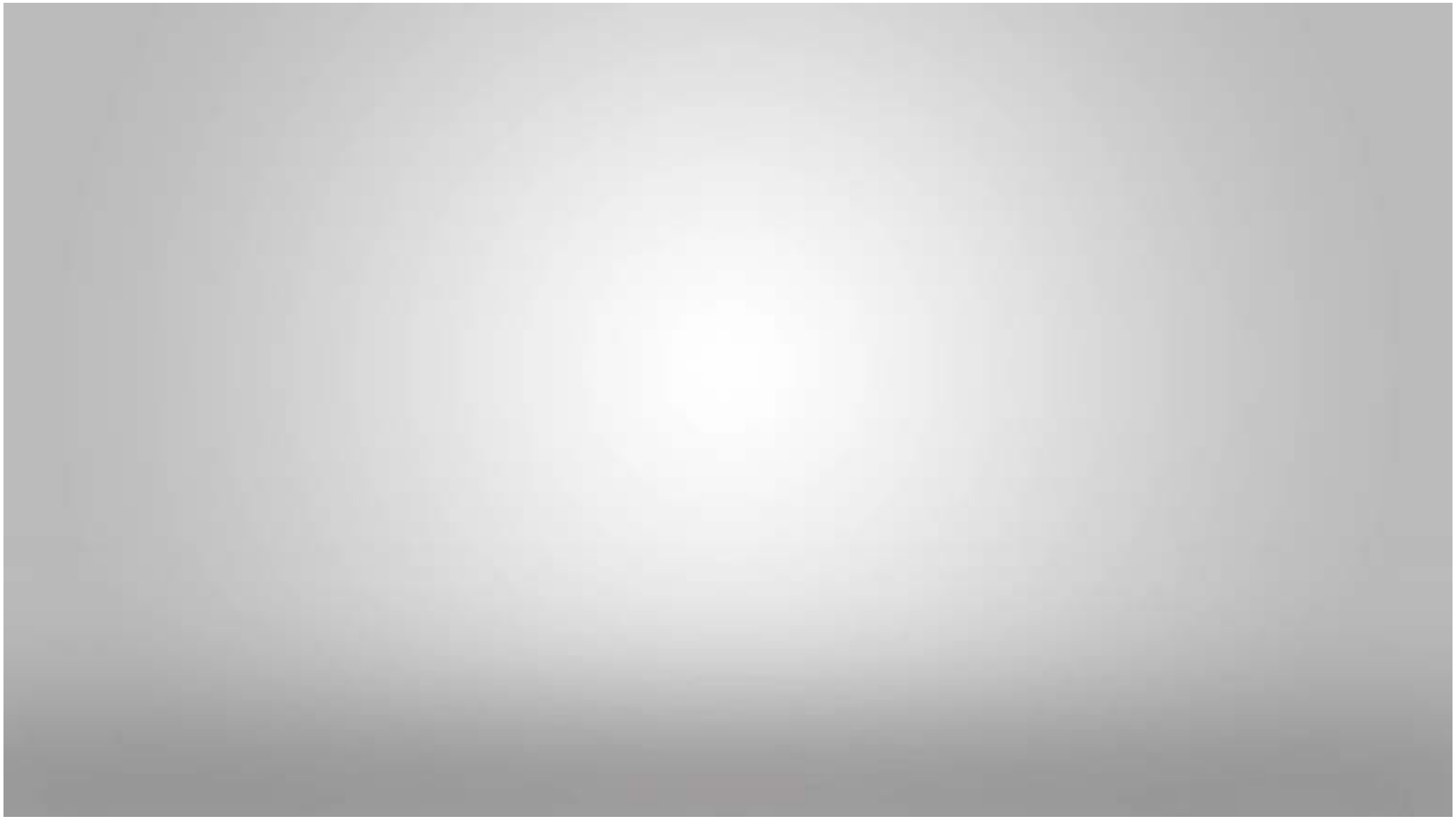

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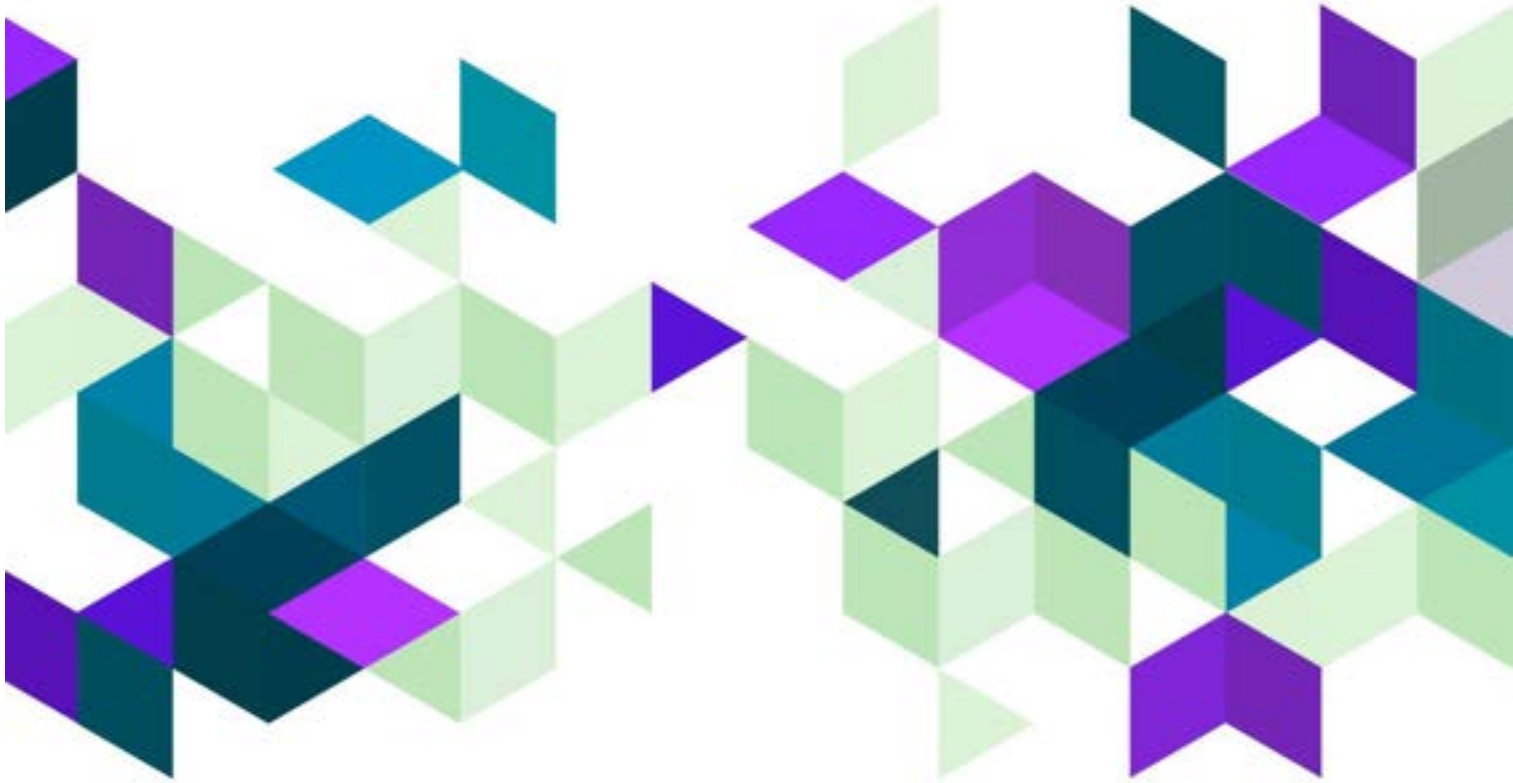
“Look after **truth** and **goodness**, and **beauty** will look after herself”



The data is the 1st priority of effective data visualizations

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Data: facts and statistics **collected**

Oxford

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Examples of Data Sources

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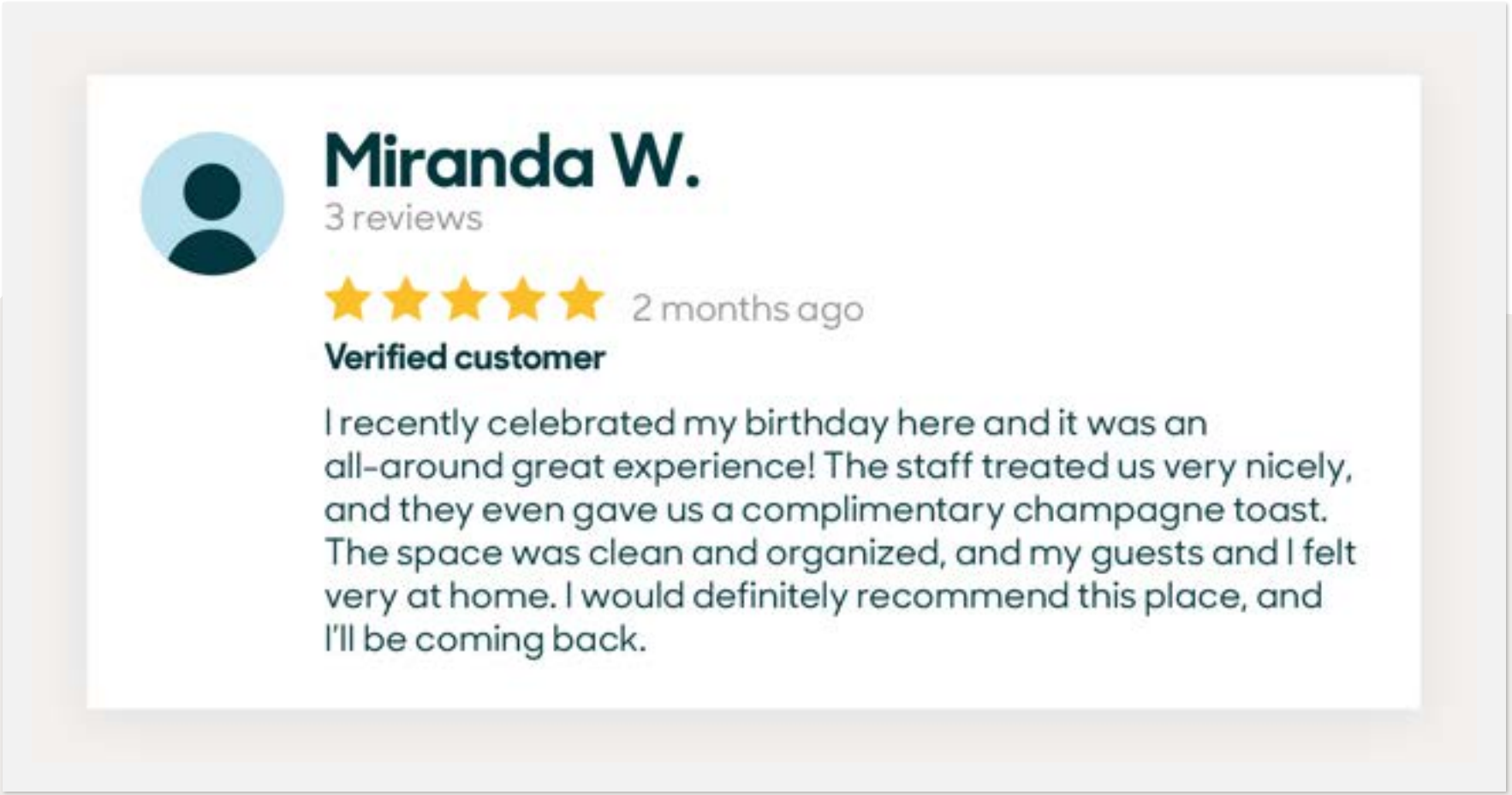

Reviews

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Behavior

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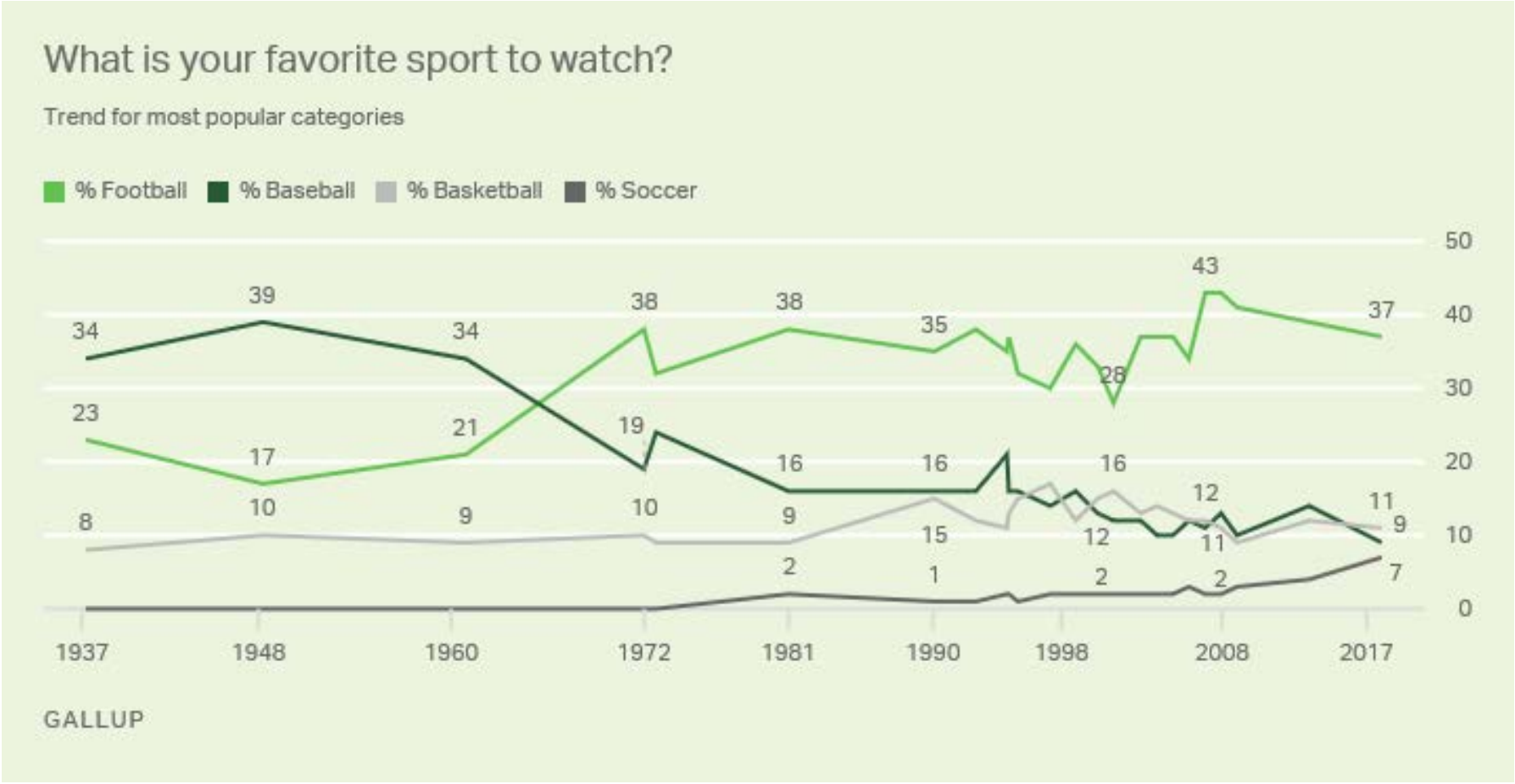
Polls



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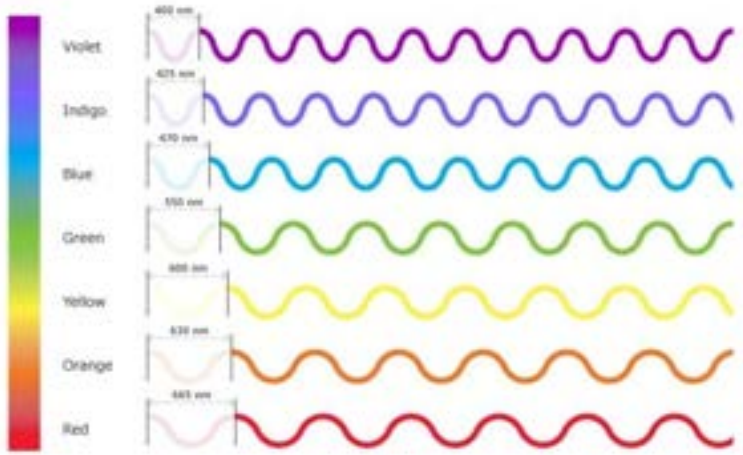
Measures



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Geodata

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Market Data

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Transactional Data

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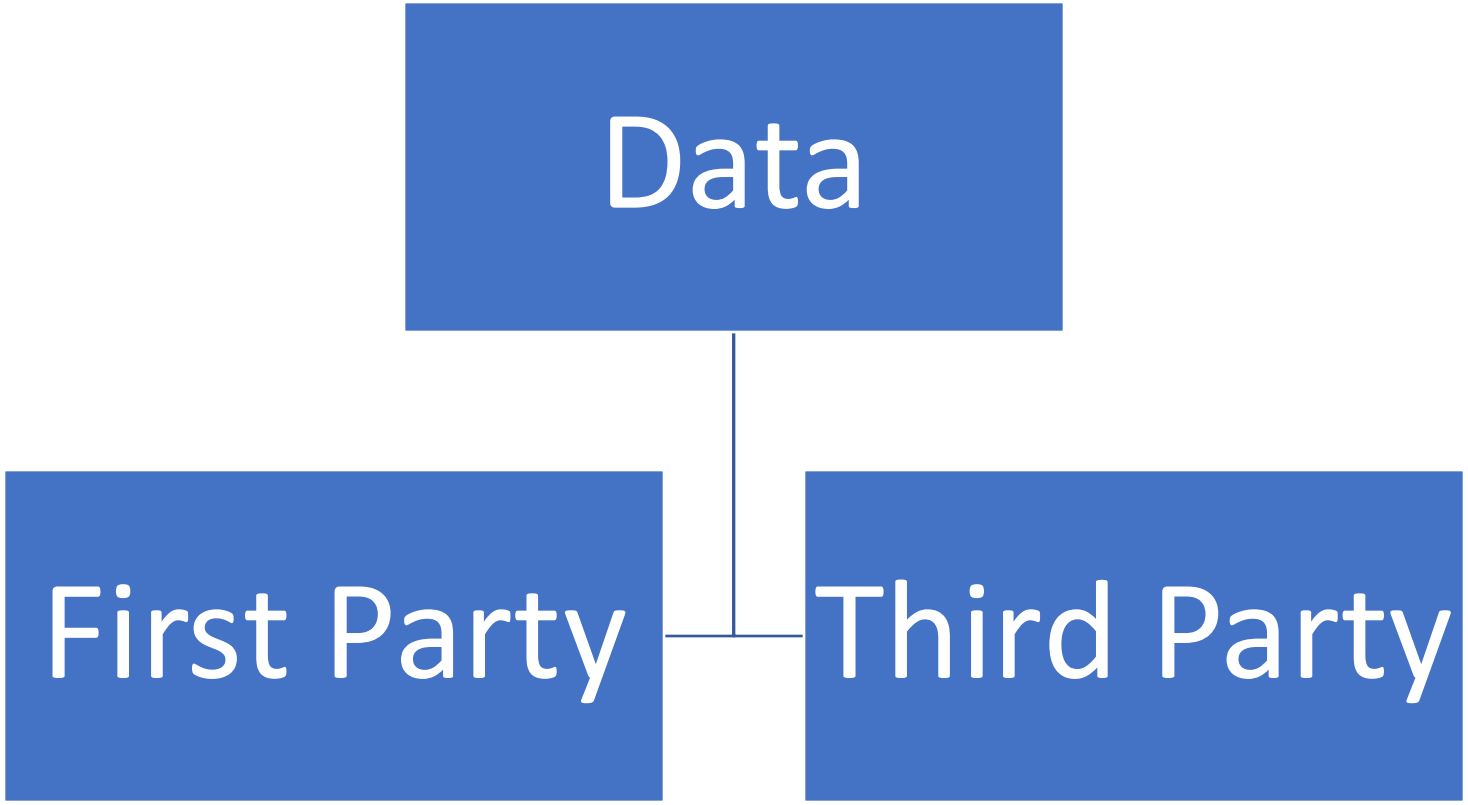
Primary Ways to Get Data



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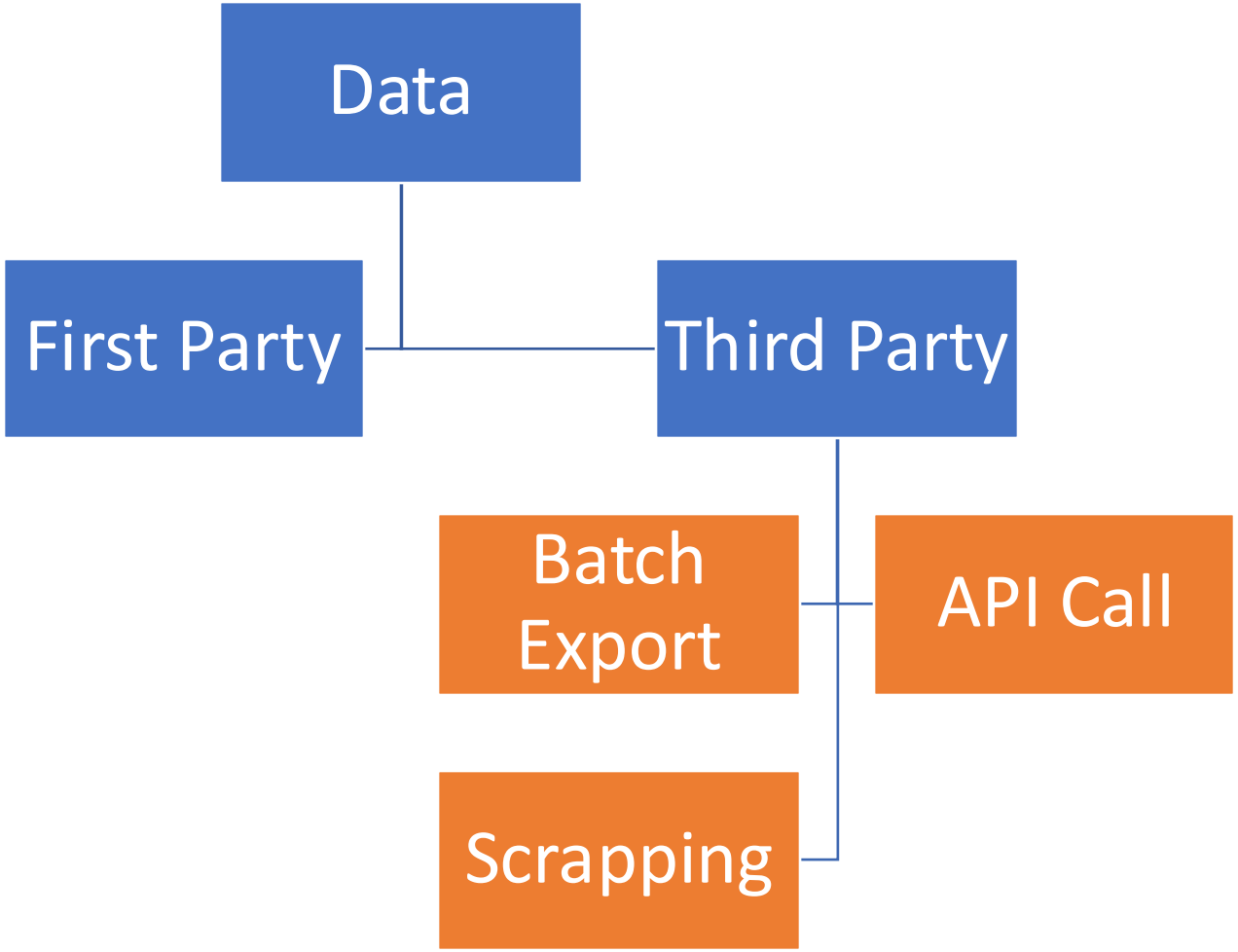
Primary Ways to Get Data



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Batch: Some free services

- https://www.kaggle.com/datasets
- https://datasetsearch.research.google.com/
- https://data.gov/
- https://datahub.io/collections
- https://www.earthdata.nasa.gov/
- https://opendata.cern.ch/
- https://apps.who.int/gho/data/node.home

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Web scrapping

Next time

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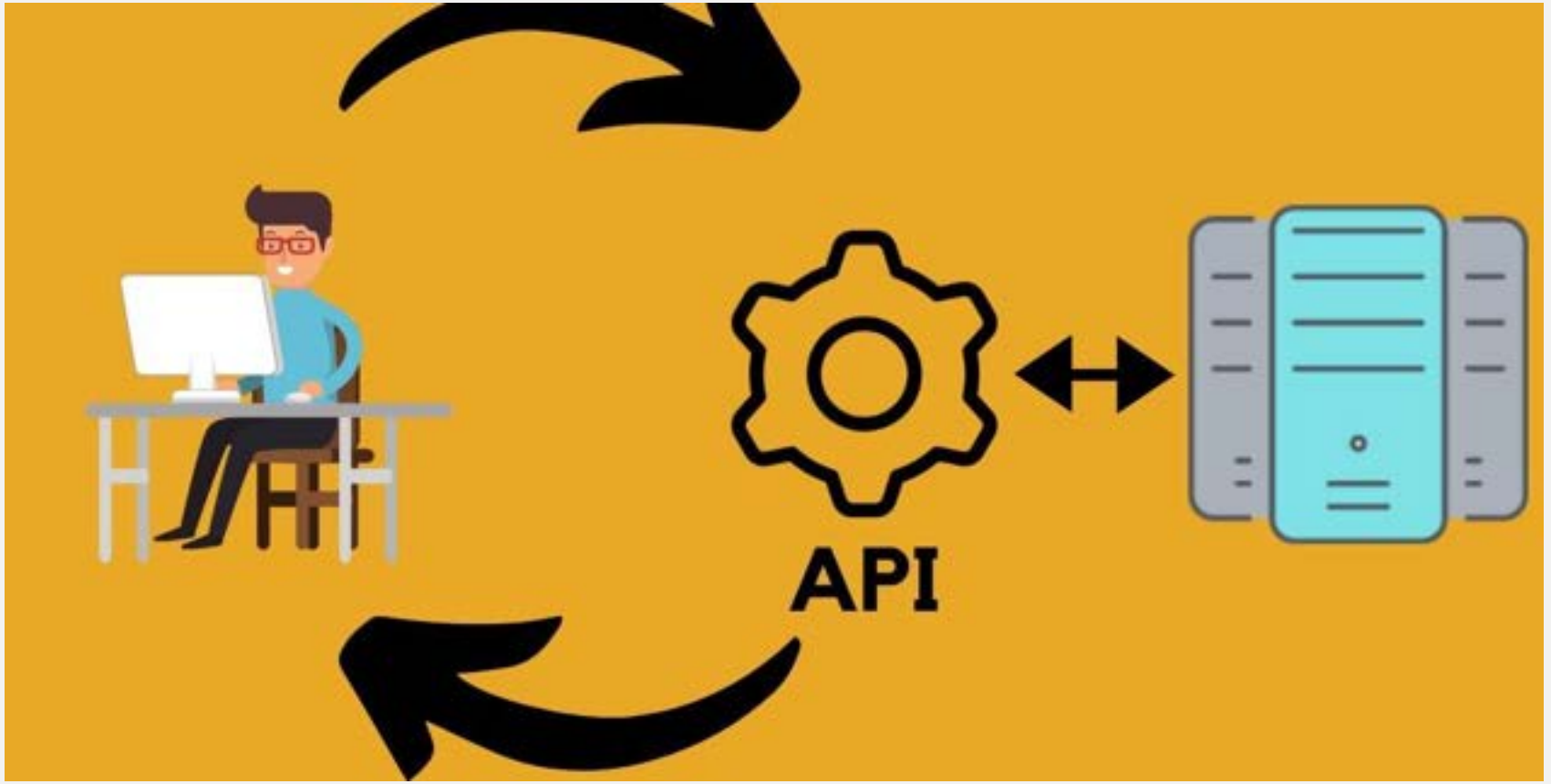

API Calls

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What is an API?

- An application programming interface for the web
  - Application programming: software
  - Interface: way to communicate
  - Web: online

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Take 5 Minutes: Google Public APIs

- https://github.com/public-apis/public-apis
- https://rapidapi.com/collection/list-of-free-apis
- https://publicapis.dev/
- https://free-apis.github.io/#/
- https://medium.com/codex/15-fun-and-interesting-apis-to-use-for-your-next-coding-project-in-2022-86a4ff3a2742

Most popular websites have an API (Facebook, Twitter, Instagram, LinkedIn, etc.)

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Example: Public Holidays

- Call in Web browser
  - https://date.nager.at/api/v3/publicholidays/2025/US (you can change the year, or the country. Try DE)
  - https://api.agify.io/?name=stefan
- Call in terminal on Mac:
  - curl https://date.nager.at/api/v3/publicholidays/2025/AT
  - curl https://api.agify.io/?name=stefan
- Call in R (coming soon)

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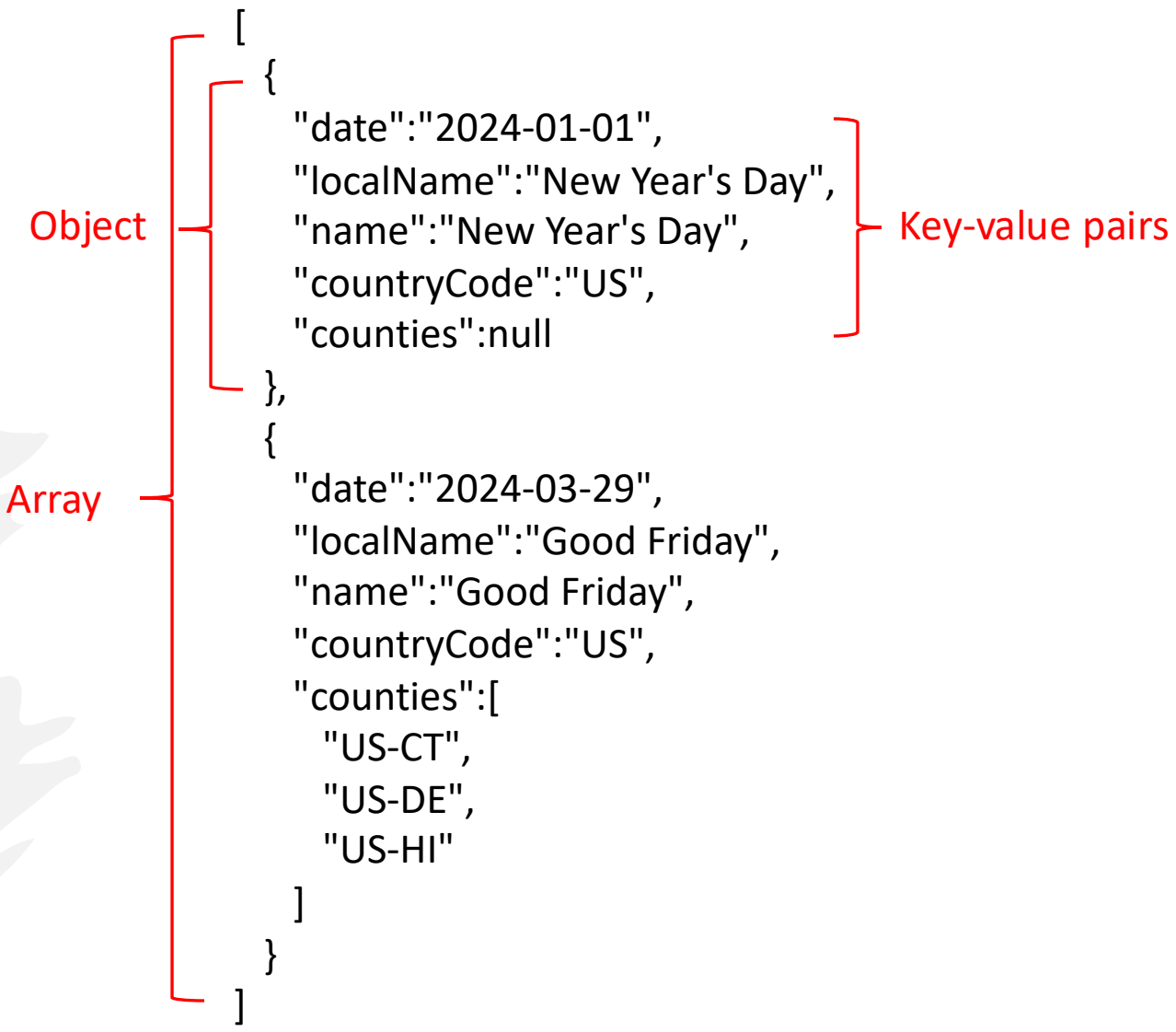
Wait, what is coming back from the API calls?

- Can be a variety of formats:
  - Most often: JSON
  - Others: XML, plain text



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API Protocols

- REST API (representational state transfer): a flexible architecture that allows applications to exchange data in multiple formats. This is the most popular web API architecture
- SOAP API (simple object access protocol): a highly structured architecture that uses XML data format
- RPC (remote procedural call): invoke executable actions or processes remotely

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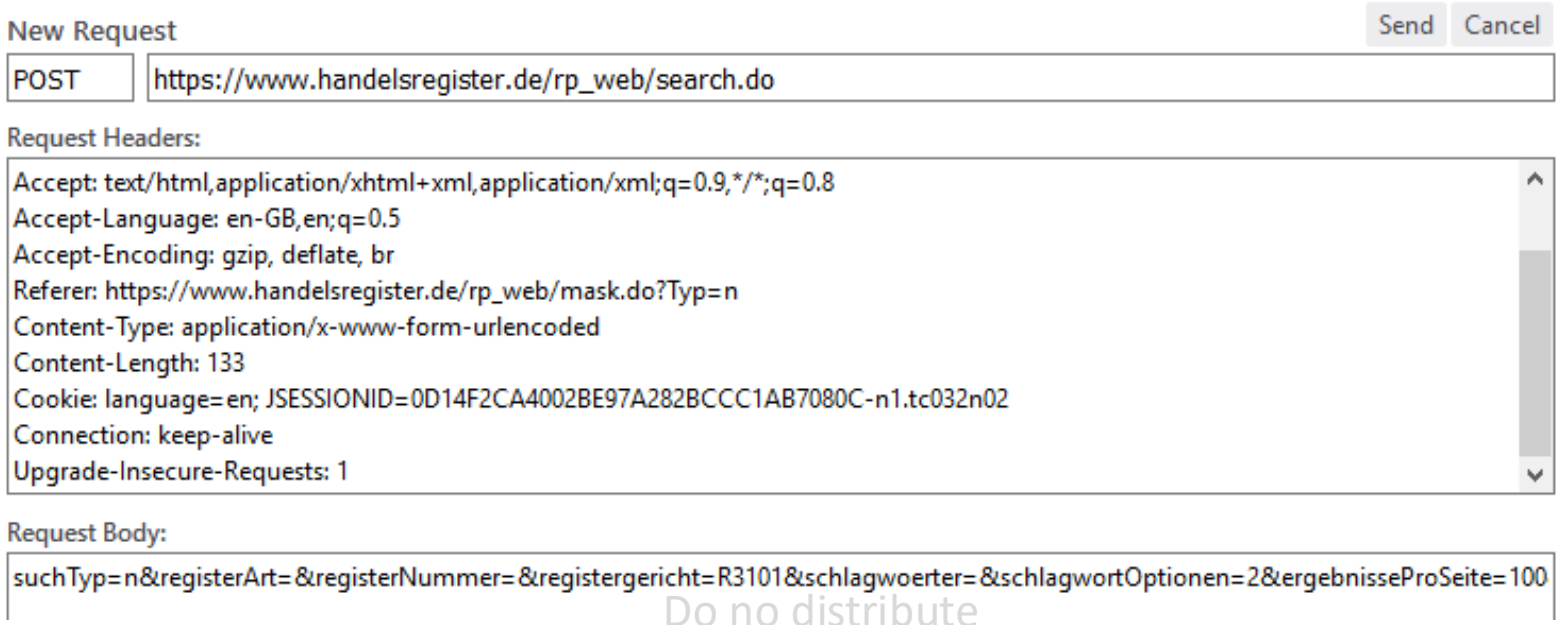
Get versus Post API Calls

- GET: Pass needed information in the URL:

  https://date.nager.at/api/v2/publicholidays/2024/DE

  https://api.agify.io/?name=stefan

- POST: Pass needed information in the body of the request.



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What do you need to make an API call?

- Endpoint: the URL of what you are going to call)
- Key:
  - A String that says you are authorized to make the call
  - Can be used for billing
  - Can be used to restrict the number of calls you make
  - Key might be sent in the URL (get), header, or the body depending on the API

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Let’s get a key and make a call

- https://rapidapi.com/apidojo/api/yahoo-finance1/
- Create a free account, and subscribe to API (Free Basic Account, 500 calls per month)
- Let’s take a few minutes to look around at the options

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Goal: Pull Data Into R to Analyze and Visualize

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Library Httr2

https://httr2.r-lib.org/

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In Class Demo

https://www.dropbox.com/scl/fi/b7d4mk2efngz63zc37hlf/InClassAPISample.R?rlkey=9pigsgwhv5w2dpdan4hq1hxyq&dl=0

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Let's Practice

- Football Stats
  - https://www.api-football.com/documentation-v3#section/Introduction
  - A solution for the leagues endpoint: https://www.dropbox.com/scl/fi/8eydqx9vrmrwh1tosbr0d/InClassAPISample_Sports.R?rlkey=1wfaykdhlqvq56uarxfizmnf2&dl=0
- Currency exchange (a bit harder):
  - Create a tibble that lists the conversion rate between EUR and each supported currency
  - https://rapidapi.com/fyhao/api/currency-exchange
  - A solution: https://www.dropbox.com/scl/fi/b0lk8f04tc3hm18whvvh9/InClassAPISample_Countries.R?rlkey=jhhucvkx9zql8szr7difq8s7l&dl=0

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Look at Assignment

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Potential Final Exam Questions

- Which of the following are examples of data sources?
- What are the two primary ways to get data?
- Third party data typically comes in which of the following formats?
- What is an API call?
- What is the difference between GET and POST API calls?
- List what information you typically need to make an API call?
- What R library can you use to make API calls?
- Some high-level questions about R syntax to make API calls (what certain lines of code do)

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