API

Extract

Retrieves and verifies data from various sources

Transform

Processes and organizes extracted data so it is usable

Load

Moves transformed data to a data repository

Read data from a file

```
import pandas as pd

df = pd.read_csv("data/grades.csv")

print(df)
```

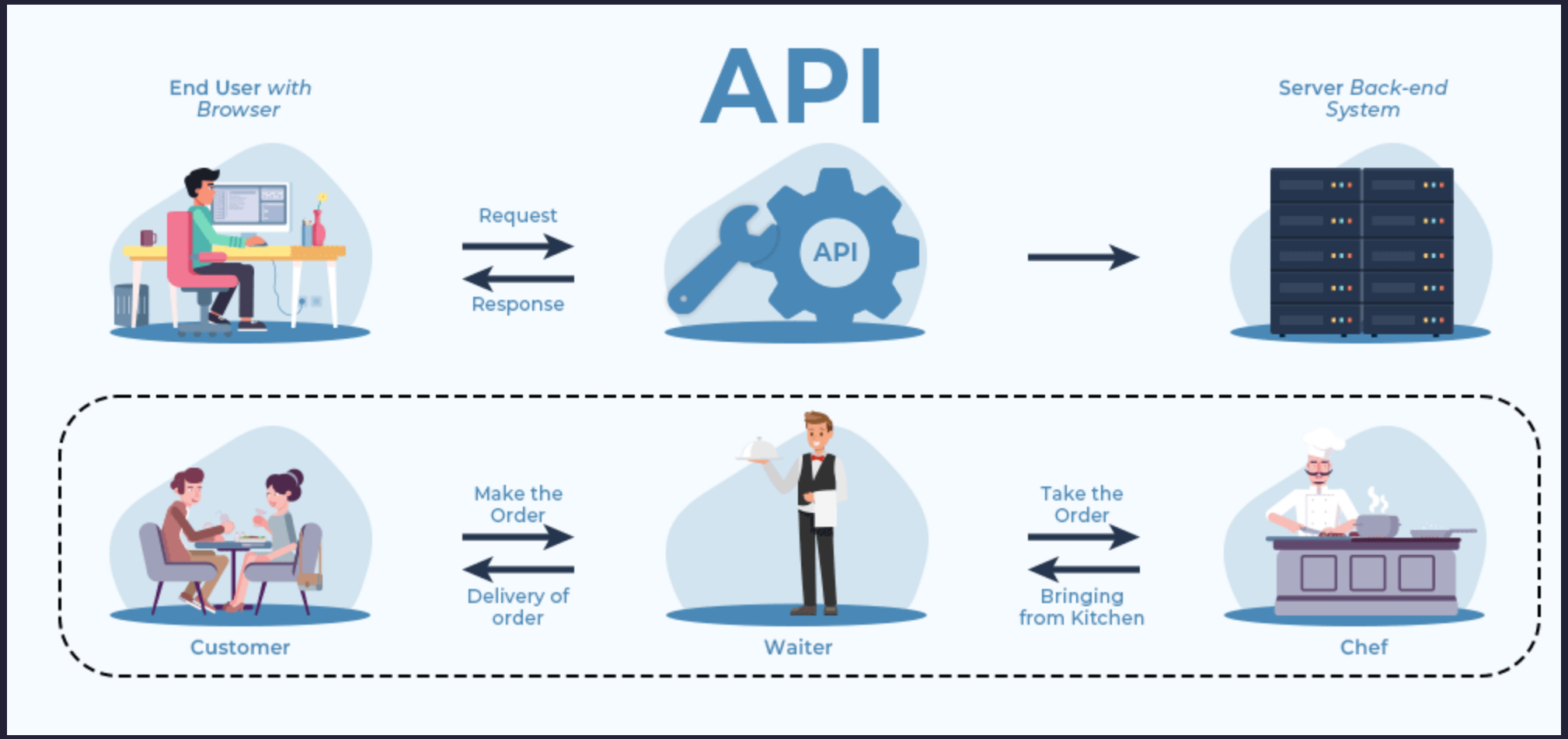
Extract data from a source

- Manually download a file
- Extract data using SQL
- **Extract data using an API**

What is an API?

https://youtu.be/s7wmiS2mSXY?si=Qb3zgVmPj2jB9DPP

Application Programming Interface



iTunes API

Web API that allows you to search for movies, music, apps, etc on iTunes.

https://developer.apple.com/library/archive/documentation/AudioVideo/Conceptual/iTuneSearchAPI/index.html#//apple_ref/doc/uid/TP40017632-CH3-SW1

`https://itunes.apple.com/search?entity=movie&term=avengers&limit=1`

API response in JSON (JavaScript Object Notation)


```
{
  "resultCount": 1,
  "results": [
    {
      "wrapperType": "track",
      "kind": "feature-movie",
      "collectionId": 1470195095,
      "trackId": 533654020,
      "artistName": "Joss Whedon",
      "collectionName": "Avengers 4-Movie Collection",
      "trackName": "The Avengers",
      ...
    }
  ]
}
```

REST API syntax

`https://itunes.apple.com/search?entity=movie&term=avengers&limit=1`

- endpoint: `itunes.apple.com/`
- path (or database): `search`
- query parameters: `entity=movie&term=avengers&limit=1`

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https://www.ibm.com/docs/en/informix-servers/12.10?topic=api-rest-syntax

More on query parameters

`https://itunes.apple.com/search?entity=movie&term=avengers&limit=1`

- Start after the question mark `?`
- Key-value pairs separated by `&`
  - `entity=movie`
  - `term=avengers`
  - `limit=1`

Understanding API documentation

- Endpoint
- Path
- Query parameters

COVID-19 Canada Open Data Working Group

https://opencovid.ca/api/

- Endpoint: ?
- Path: ?
- Query parameters: ?

COVID-19 Canada Open Data Working Group

- Endpoint: `https://api.opencovid.ca`
- Path & Query parameters
  - `timeseries`
    - `loc`
    - `after`
    - ...
  - `summary`
    - `loc`
    - `date`
    - ...

COVID-19 Canada Open Data Working Group

- `https://api.opencovid.ca/timeseries?loc=qc`
- `https://api.opencovid.ca/timeseries?loc=qc&after=2023-09-01`
- `https://api.opencovid.ca/summary?loc=qc`

💻 Open Brewery DB

https://www.openbrewerydb.org

- Endpoint: ?
- Path: ?
- Query parameters: ?

💻 Open Brewery DB

- Endpoint: `https://api.openbrewerydb.org/v1`
- Path & Query parameters
  - `breweries`
    - `by_city`
    - `by_state`
    - `by_type`

      ...

💻 Open Brewery DB

- `https://api.openbrewerydb.org/v1/breweries?by_city=detroit`
- `https://api.openbrewerydb.org/v1/breweries?by_state=michigan`
- `https://api.openbrewerydb.org/v1/breweries?by_state=michigan&by_type=micro`

Make `requests` programmatically

- `requests.get()` : **get data from a URL**
- `requests.post()` : post data to a URL
- `requests.put()` : update data on a URL
- `requests.delete()` : delete data from a URL

requests.get()

```
import requests

url = "itunes.apple.com/search?entity=movie&term=avengers&limit=1"

response = requests.get(url)
```

response

```
print(response)          # <Response [200]>
print(response.text)     # raw text
print(response.json())   # convert to python dictionary
```

`requests.get()` dynamically

```
import requests

entity = "movie"
term = "avengers"
limit = 1

url = f"itunes.apple.com/search?entity={entity}&term={term}&limit={limit}"

response = requests.get(url)
```

`requests.get()` dynamically with `params`

```
import requests

url = "https://itunes.apple.com/search"

params = {
    "entity": "movie",
    "term": "avengers",
    "limit": 10
}

response = requests.get(url, params=params)

print(response.json())
```

Accessing items in a list/tuple/dict

- list/tuple: `[index]`
- dict: `[key]`

How to access the following items?

```
cities = [
    {"name": "Montreal", "state": "QC", "country": "CA"},
    {"name": "Toronto", "state": "ON", "country": "CA"},
    {"name": "Vancouver", "state": "BC", "country": "CA"},
    {"name": "Detroit", "state": "MI", "country": "US"}
]
```

- `{"name": "Vancouver", "state": "BC", "country": "CA"}`
- `"Vancouver"`
- `"Montreal"`

```
cities = {
    "name": ["Montreal", "Toronto", "Vancouver", "Detroit"],
    "state": ["QC", "ON", "BC", "MI"],
    "country": ["CA", "CA", "CA", "US"]
}
```

- `["Montreal", "Toronto", "Vancouver", "Detroit"]`
- `"Montreal"`

```
cities = {
    "Montreal": {"state": "QC", "country": "CA"},
    "Toronto": {"state": "ON", "country": "CA"},
    "Vancouver": {"state": "BC", "country": "CA"},
    "Detroit": {"state": "MI", "country": "US"}
}
```

- `{"state": "QC", "country": "CA"}`
- `"QC"`

```
cities = {
    "location": {
        "Montreal": {"state": "QC", "country": "CA"},
        "Toronto": {"state": "ON", "country": "CA"},
        ...
    },
    "stats": {
        "Montreal": [
            {"year": 2013, "population": 2000000, "area": 431.5},
            {"year": 2014, "population": 1980000, "area": 431.5}
            ],
        "Toronto": [
            {"year": 2013, "population": 2800000, "area": 630.2},
            ],
        ...
    }
}
```

- `{"year": 2013, "population": 2000000, "area": 431.5}`
- `"QC"`
- `2000000`

```
{
  "resultCount": 1,
  "results": [
    {
      "wrapperType": "track",
      "kind": "feature-movie",
      "collectionId": 1470195095,
      "trackId": 533654020,
      "artistName": "Joss Whedon",
      "collectionName": "Avengers 4-Movie Collection",
      "trackName": "The Avengers",
      ...
    }
  ]
}
```


- `"Joss Wheldon"`
- `"The Avengers"`

```
[
  {
    "id":"8aadd633-ee8b-4550-9b3a-ffdf6fee2b44",
    "name":"Brew Detroit",
    "brewery_type":"micro",
    "address_1":"1401 Abbott St",
    ...
  },
  {
    "id":"9ef70c89-a7e9-4759-a71e-4adca64c543a",
    "name":"Eastern Market Brewing Company",
    "brewery_type":"micro",
    "address_1":"2515 Riopelle St",
    ...
  },
]
```


- `"Brew Detroit"`

💻 `requests.get()` dynamically with `params` - Open Brewery DB

https://www.openbrewerydb.org

1. Make a request to the Open Brewery DB API to get a list of breweries in California that are micro breweries.
2. Print the name and address (`address_1`) of each brewery.

```python
import requests

url = "https://api.openbrewerydb.org/v1/breweries"

params = {
    "by_state": "california",
    "by_type": "micro"
}

response = requests.get(url, params=params)
data = response.json()

for brewery in data:
    print(brewery["name"] + " - " + brewery["address_1"])
```