#### Introduction to APIs

INTRODUCTION TO APIS IN PYTHON

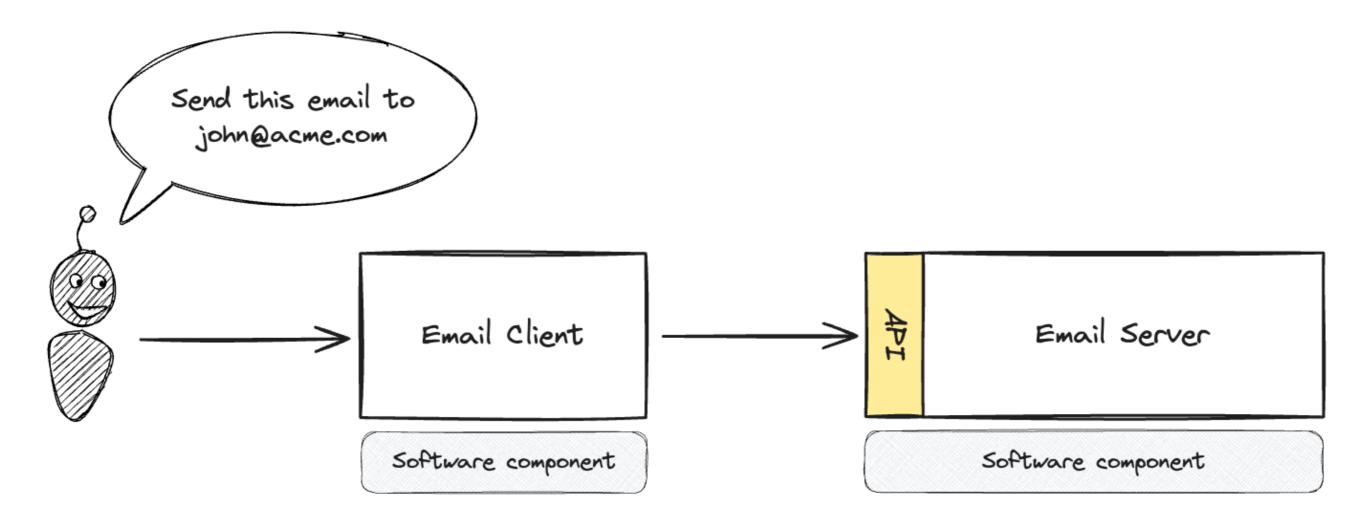


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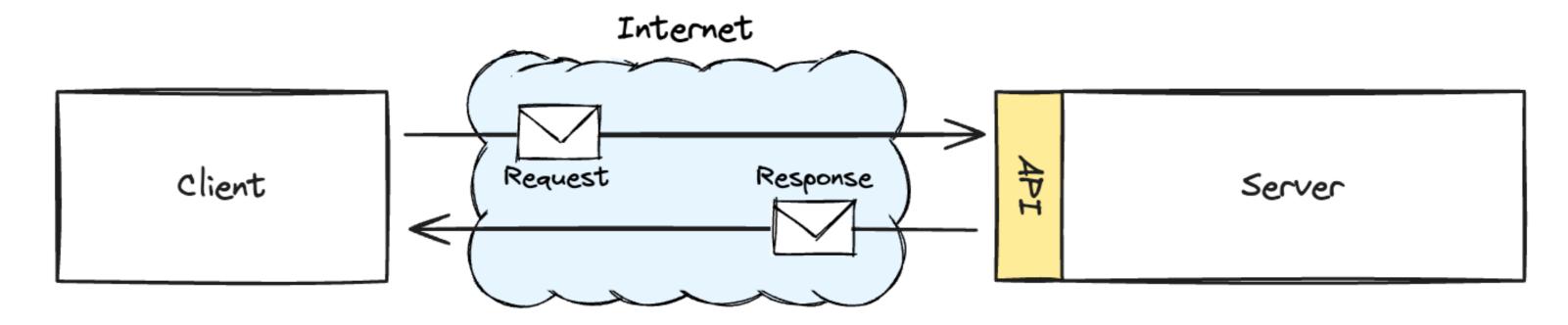
#### What is an API?

- Application Programming Interface
- Set of communication rules and abilities
- Enables interactions between software applications



#### Web APIs, clients and servers

- Web APIs communicate over the internet using HTTP
- Client sends a request message to a Server
- Server returns a response message to the Client



Request/Response cycle

#### Types of Web APIs

- SOAP
  - Focus on strict and formal API design
  - Enterprise applications
- REST
  - Focus on simplicity & scalability
  - Most common API architecture
- GraphQL
  - Focus on flexibility
  - Optimized for performance

<sup>&</sup>lt;sup>1</sup> https://www.postman.com/state-of-api/api-technologies/#api-technologies



## Working with APIs in Python urllib

- Bundled with Python
- Powerful but not very developer-friendly

```
from urllib.request import urlopen
api = "http://api.music-catalog.com/"

with urlopen(api) as response:
   data = response.read()
   string = data.decode()
   print(string)
```

#### requests

- Many powerful built-in features
- Easier to use

```
import requests
api = "http://api.music-catalog.com/"

response = requests.get(api)
print(response.text)
```

### Let's code!

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## The basic anatomy of an API request

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#### What are URLs?

- URL = Uniform Resource Locator
- The structured address to an API Resource
- Customize the URL to interact with specific API Resources

http://350.5th-ave.com/unit/243

#### Dissecting the URL



- **Protocol** = the means of transportation
- **Domain** = the street address of the office building
- Port = the gate or door to use when entering the building
- Path = the specific office unit inside the building
- Query = any additional instructions

#### Adding query parameters with requests

```
# Append the query parameter to the URL string
response = requests.get('http://350.5th-ave.com/unit/243?floor=77&elevator=True')
print(response.url)
```

```
http://350.5th-ave.com/unit/243?floor=77&elevator=True
```

Use the params argument to add query parameters

```
# Create dictionary
query_params = {'floor': 77, 'elevator': True}
# Pass the dictionary using the `params` argument
response = requests.get('http://350.5th-ave.com/unit/243', params=query_params)
print(response.url)
```

```
http://350.5th-ave.com/unit/243?floor=77&elevator=True
```



#### **HTTP Verbs**

- Destination: Unit 243 of the 350 5th Ave office building
- URL: http://350.5th-ave.com/unit/243

#### **Actions**

Verb	Action	Description
GET	Read	Check the mailbox contents
POST	Create	Drop a new package in the mailbox
PUT	Update	Replace all packages with a new one
DELETE	Delete	Remove all packages from the mailbox

<sup>&</sup>lt;sup>1</sup> There are 9 HTTP verbs in total, but for simple REST APIs only these 4 are relevant



#### Sending data via POST and PUT

```
# GET = Retrieve a resource
response = requests.get('http://350.5th-ave.com/unit/243')
# POST = Create a resource
response = requests.post('http://350.5th-ave.com/unit/243', data={"key": "value"})
# PUT = Update an existing resource
response = requests.put('http://350.5th-ave.com/unit/243', data={"key": "value"})
# DELETE = Remove a resource
response = requests.delete('http://350.5th-ave.com/unit/243')
```

- Each verb has it's own method in the requests package
- Use the data argument to pass data to a POST or PUT request.

### Let's practice!

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## Headers and status codes

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#### Request and response message anatomy

#### Request message

# GET /users/42 HTTP/1.1 request line Host: datacamp.com headers Accept: application/json body

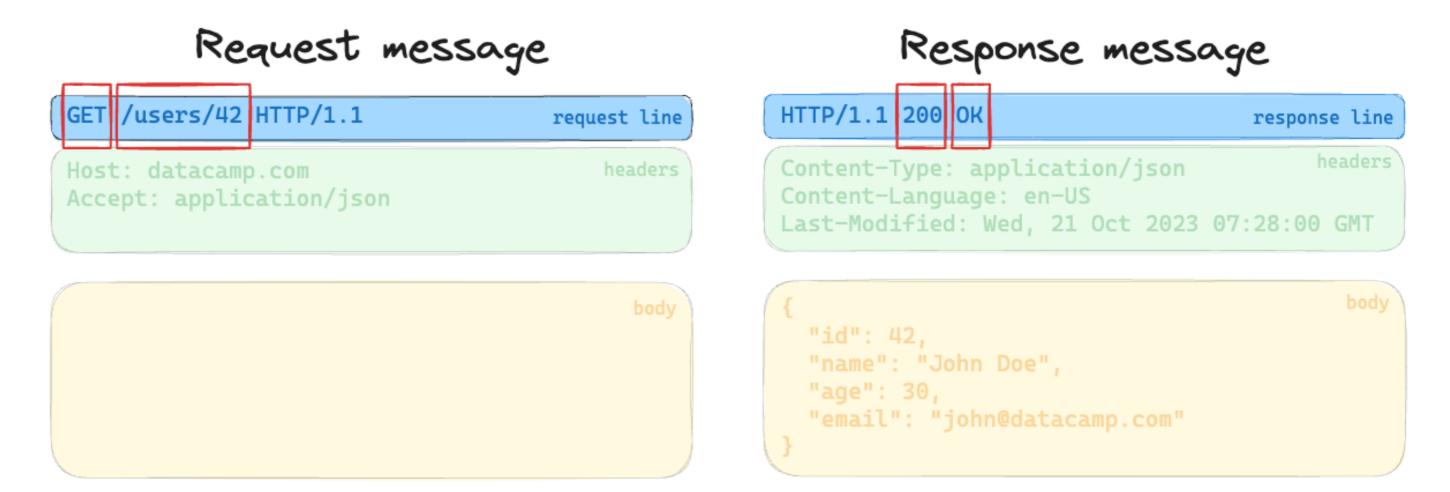
#### Response message

```
HTTP/1.1 200 OK response line

Content-Type: application/json
Content-Language: en-US
Last-Modified: Wed, 21 Oct 2023 07:28:00 GMT

{
    "id": 42,
    "name": "John Doe",
    "age": 30,
    "email": "john@datacamp.com"
}
```

#### The start-line



A server will always include a numeric status code in the response message

#### Status codes

#### Status code categories

- 1XX: Informational responses
- 2XX : Successful responses
- 3XX : Redirection messages
- 4XX : Client error responses
- 5XX : Server error responses

#### Frequently used status codes

- 200 : OK
- 404 : Not Found
- 500 : Internal Server Error

<sup>&</sup>lt;sup>1</sup> For a full list of all response codes you can refer to the MDN page on status-codes via https://developer.mozilla.org/en-US/docs/Web/HTTP/Status



#### Headers

#### Request message

# GET /users/42 HTTP/1.1 request line Host: datacamp.com headers Accept: application/json body

#### Response message

key1: Value 1

key2: Value 2

#### **Example: Content negotiation with headers**

#### Request message

# GET /users/42 HTTP/1.1 request line Host: datacamp.com headers Accept: application/json body

#### Response message

```
Content-Type: application/json
Content-Language: en-US
Last-Modified: Wed, 21 Oct 2023 07:28:00 GMT

{
    "id": 42,
    "name": "John Doe",
    "age": 30,
    "email": "john@datacamp.com"
}
```

- Client adds an accept: application/json header to the request
- Server responds with a content-type: application/json header

#### Headers with requests

```
# Adding headers to a request
response = requests.get(
  'https://api.datacamp.com',
  headers={'accept':'application/json'}
# Reading response headers
response.headers['content-type']
'application/json'
response.headers.get('content-type')
'application/json'
```



#### Status codes with requests

```
# Accessing the status code
response = requests.get('https://api.datacamp.com/users/12')
response.status_code == 200
```

#### True

```
# Looking up status codes using requests.codes
response = requests.get('https://api.datacamp.com/this/is/the/wrong/path')
response.status_code == requests.codes.not_found
```

#### True



### Let's practice!

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