

Introduction to APIs

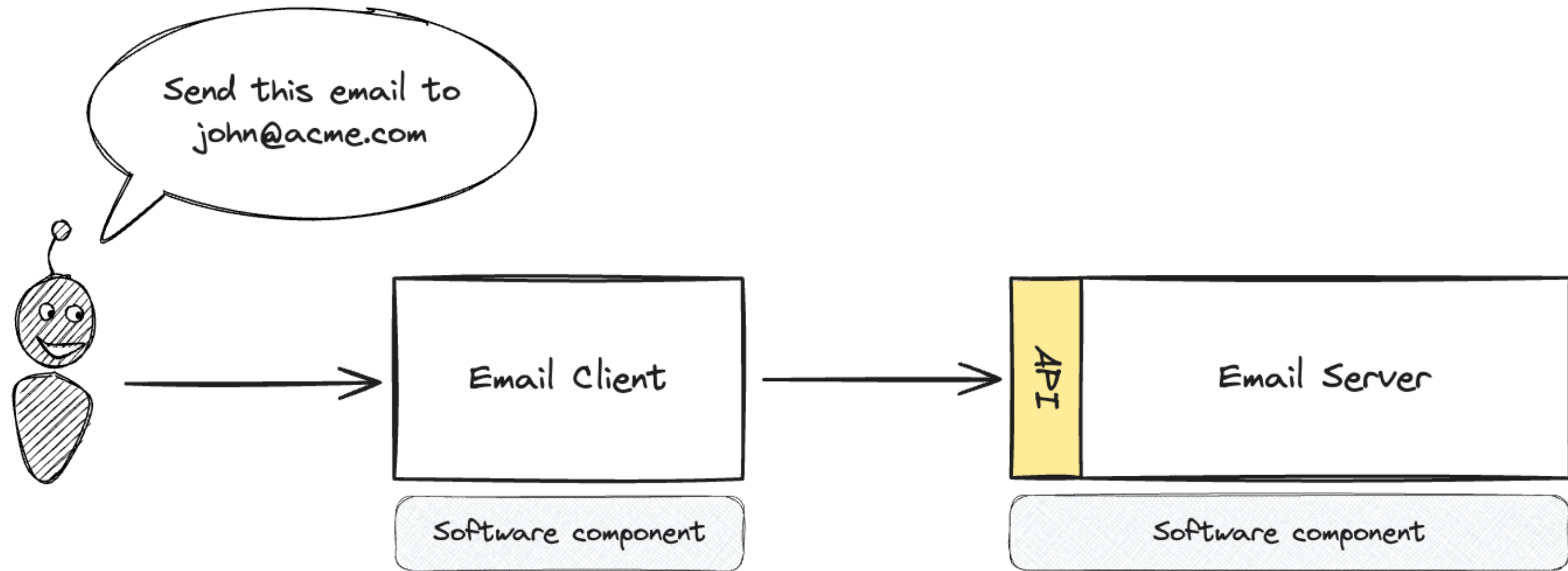
INTRODUCTION TO APIS IN PYTHON



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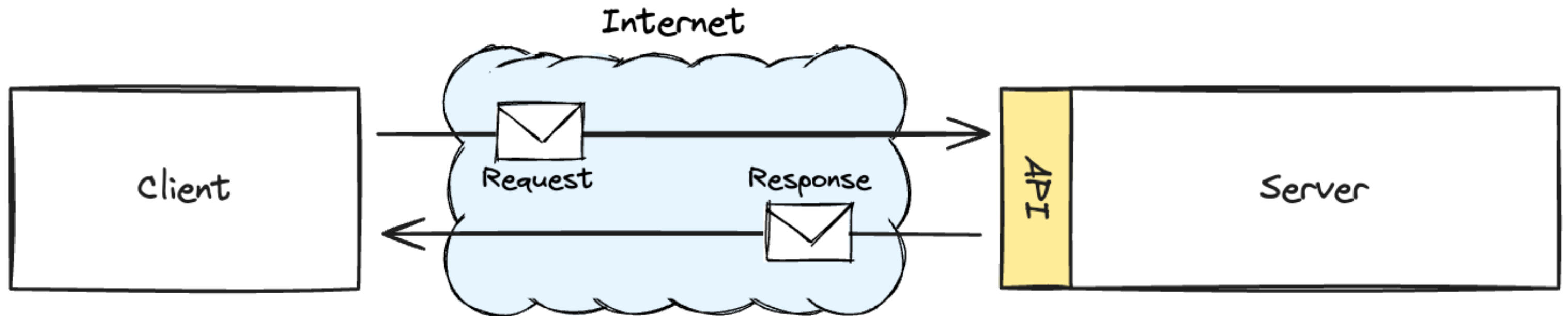
What is an API?

- 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

¹ <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

¹ 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')
```

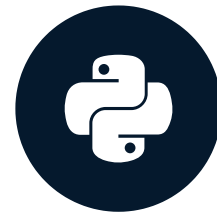
- Each verb has its own method in the `requests` package
- Use the `data` argument to pass data to a POST or PUT request.

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

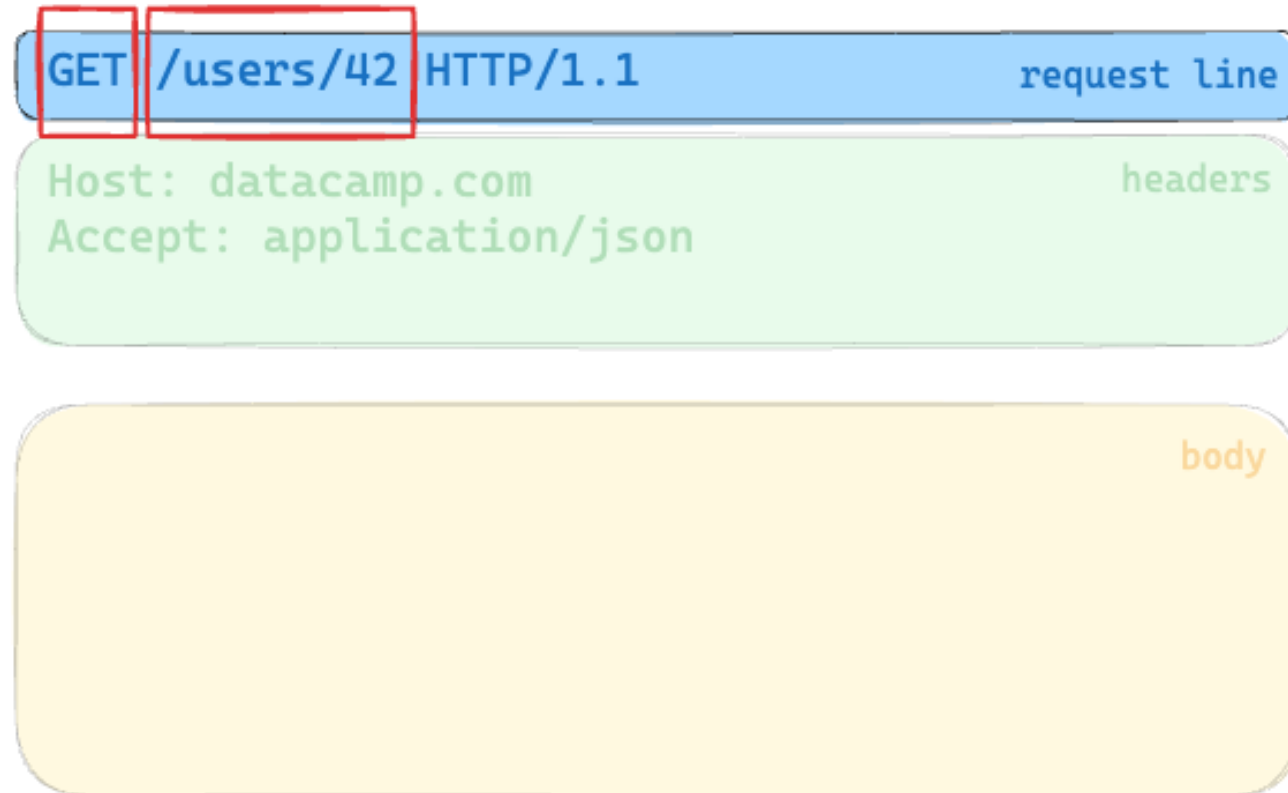
HTTP/1.1 200 OK response line

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

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

The start-line

Request message



Response message



- 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

¹ 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

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Response message

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Content-Type: application/json headers
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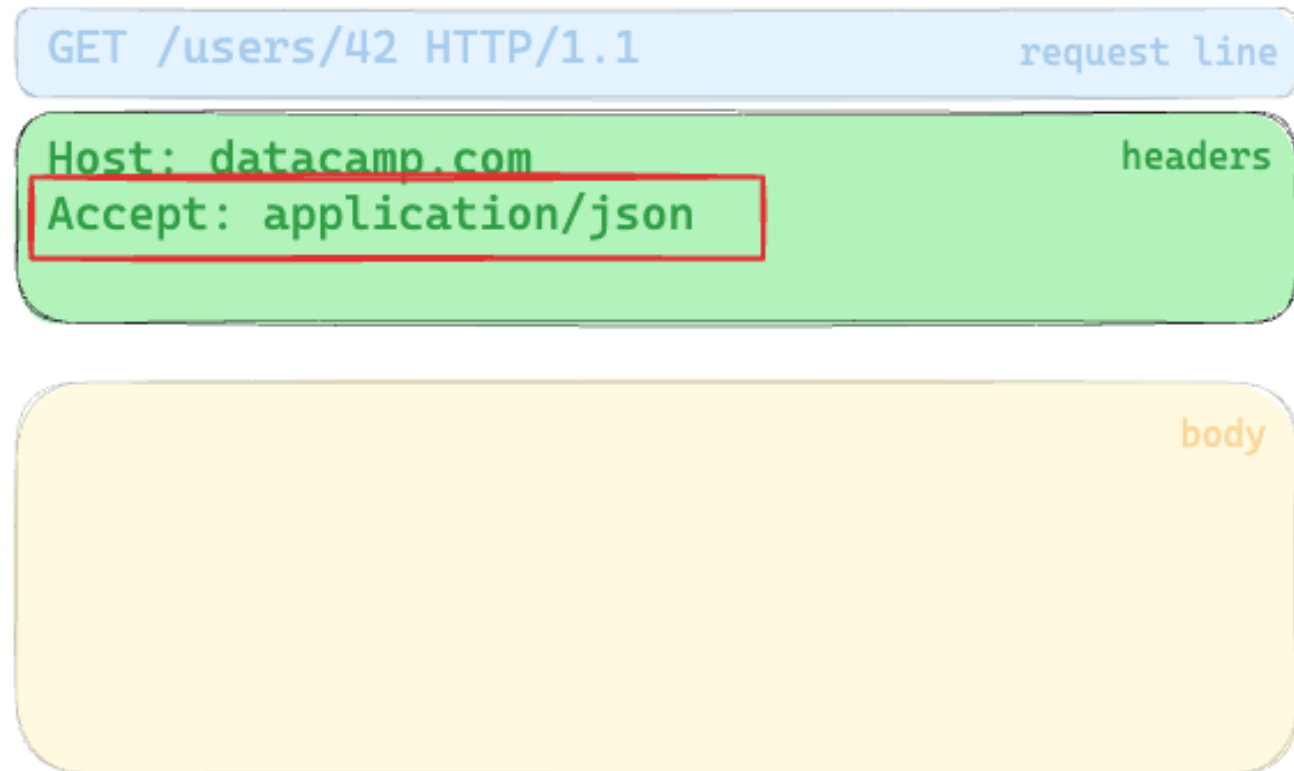
```
{  
  "id": 42,  
  "name": "John Doe",  
  "age": 30,  
  "email": "john@datacamp.com"  
}
```

key1: Value 1

key2: Value 2

Example: Content negotiation with headers

Request message



Response message



- 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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