

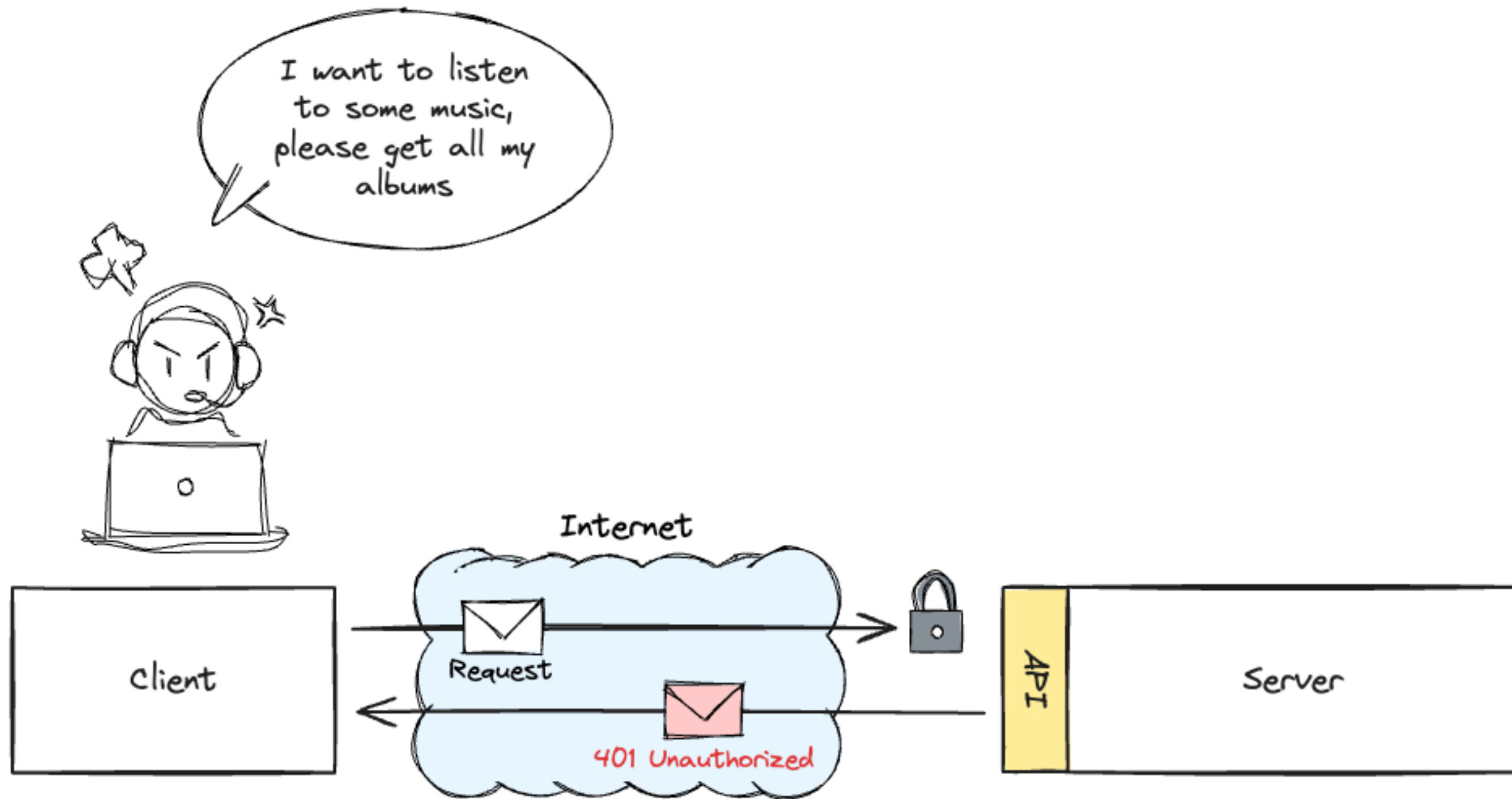
API Authentication

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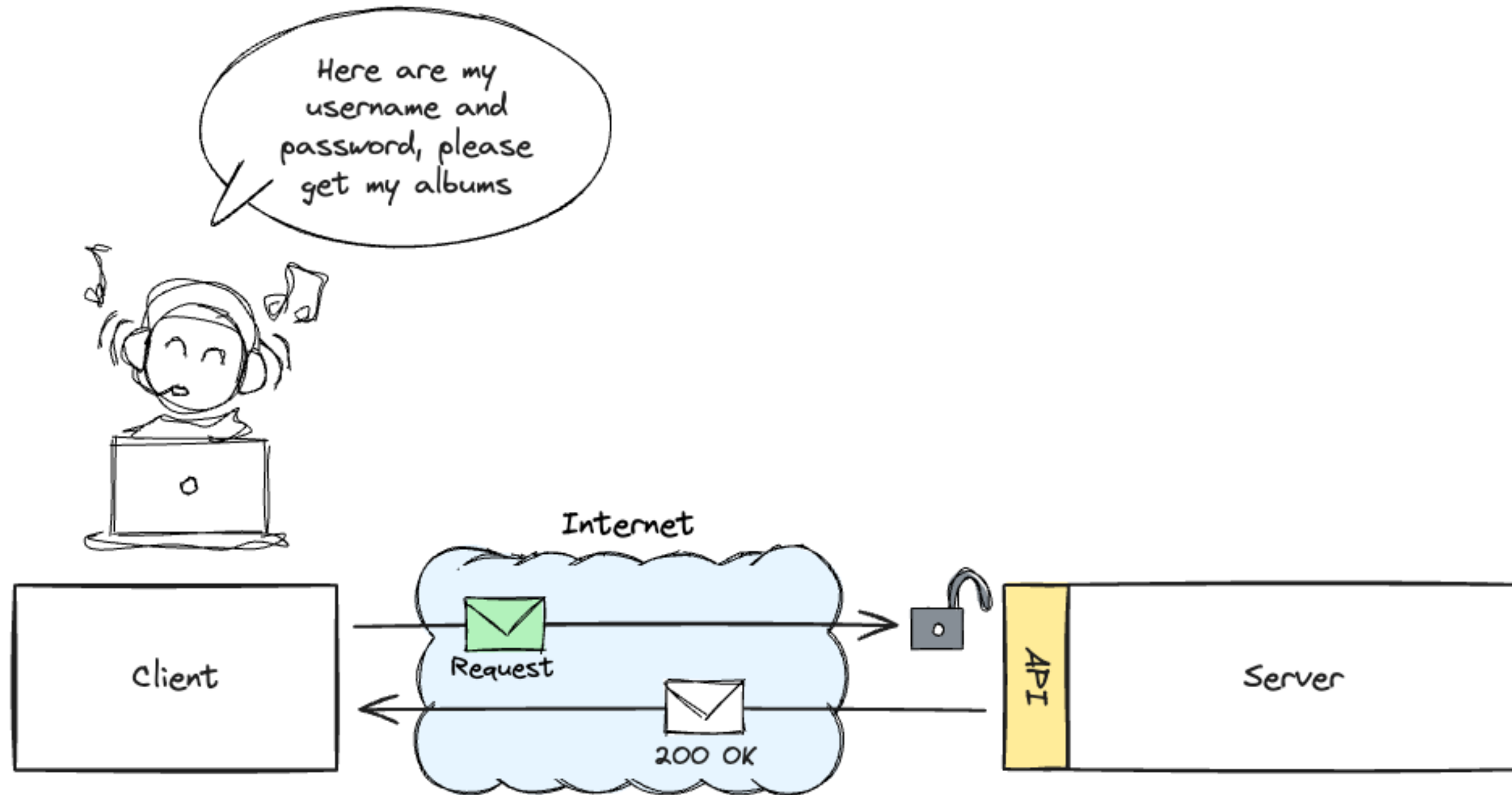


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Accessing sensitive data



Accessing sensitive data



Authentication methods

Method	Ease of Implementation	Security Rating
Basic Authentication		☆ ☆ ☆ ☆
API key/token Authentication	☆	☆ ☆ ☆
JWT Authentication	☆ ☆	☆
OAuth 2.0	☆ ☆ ☆	

Tip: Check the documentation of the API you are using to learn which method to use for authentication!

Basic authentication

GET /users/42 HTTP/1.1

request line

Host: datacamp.com

headers

Accept: application/json

Authorization: Basic dXNlcjpwYXNzd29yZA==



Basic authentication with the requests package

```
# This will automatically add a Basic Authentication header before sending the request
requests.get('http://api.music-catalog.com', auth=('username', 'password'))
```

API key/token authentication

Using a query parameter

```
http://api.music-catalog.com/albums?access_token=faaa1c97bd3f4bd9b024c708c979feca
```

```
params = {'access_token': 'faaa1c97bd3f4bd9b024c708c979feca'}  
requests.get('http://api.music-catalog.com/albums', params=params)
```

Using the "Bearer" authorization header

```
GET /users/42 HTTP/1.1  
Host: datacamp.com  
Accept: application/json  
Authorization: Bearer faaa1c97bd3f4bd9b024c708c979feca
```

```
headers = {'Authorization': 'Bearer faaa1c97bd3f4bd9b024c708c979feca'}  
requests.get('http://api.music-catalog.com/albums', headers=headers)
```

Let's practice!

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Working with structured data

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Complex data structures

Lyric API response

HTTP/1.1 200 OK response line

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

N' I never miss Cause I'm a problem
child - AC/DC, Problem Child body

Album API response

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,
  "title": "Back in Black",
  "artist": "AC/DC",
  "tracks": [
    { "id": 1, "title": "Hells bells" },
    { "id": 2, "title": "Shoot to Thrill" },
    { "id": 3, "title": "What Do You ... " },
    { "id": 4, "title": "Givin the Dog ... " },
    { "id": 5, "title": "Let Me Put my ... " }
  ]
}
```

Complex data structures: JSON

- JSON
 - *JavaScript Object Notation*
 - Widely supported
 - Human readable & machine usable
- Content-type, mime-type or media-type
- Other formats
 - XML
 - CSV
 - YAML

Album API response

HTTP/1.1 200 OK

response line

Content-Type: application/json

headers

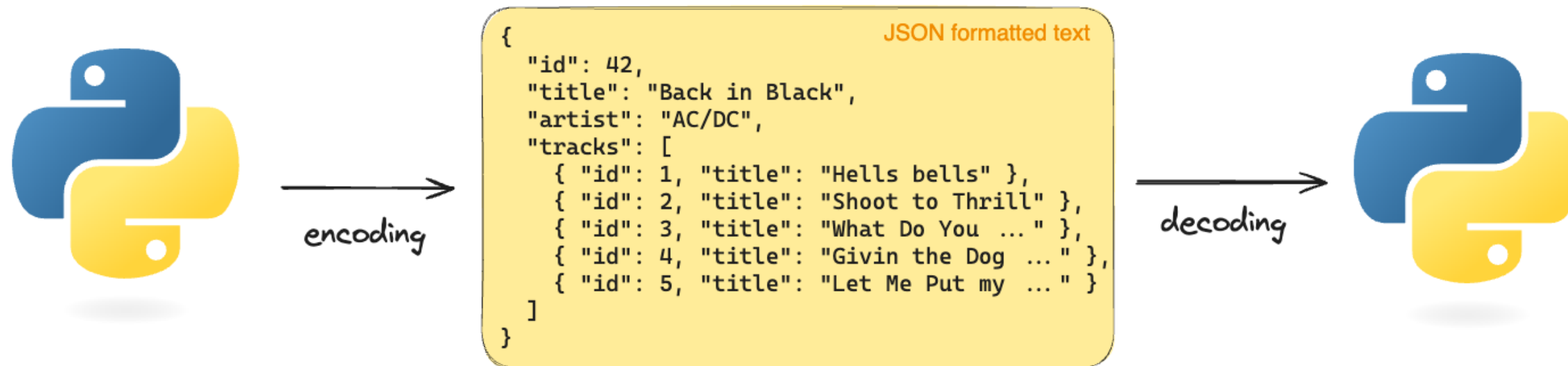
Content-Language: en-US

Last-Modified: Wed, 21 Oct 2023 07:28:00 GMT

body

```
{
  "id": 42,
  "title": "Back in Black",
  "artist": "AC/DC",
  "tracks": [
    { "id": 1, "title": "Hells bells" },
    { "id": 2, "title": "Shoot to Thrill" },
    { "id": 3, "title": "What Do You ... " },
    { "id": 4, "title": "Givin the Dog ... " },
    { "id": 5, "title": "Let Me Put my ... " }
  ]
}
```

From Python to JSON and back



```
import json  
album = {'id': 42, 'title': "Back in Black"}  
string = json.dumps(album) # Encodes a python object to a JSON string  
album = json.loads(string) # Decodes a JSON string to a Python object
```

Requesting JSON data

```
# GET request without headers
response = requests.get('http://api.music-catalog.com/lyrics')
print(response.text)
```

```
N' I never miss Cause I'm a problem child - AC/DC, Problem Child
```

```
# GET request with an accept header
response = requests.get('http://api.music-catalog.com/lyrics', headers={'accept': 'application/json'})

# Print the JSON text
print(response.text)

# Decode into a Python object
data = response.json()
print(data['artist'])
```

```
{'artist': 'AC/DC', 'lyric': "N' I never miss Cause I'm a problem child", 'track': 'Problem Child'}
AC/DC
```

Sending JSON data

```
import requests
playlist = {"name": "Road trip", "genre": "rock", "private": "true"}

# Add the playlist using via the `json` argument
response = requests.post("http://api.music-catalog.com/playlists", json=playlist)
```

```
# Get the request object
request = response.request

# Print the request content-type header
print(request.headers['content-type'])
```

```
application/json
```

Let's practice!

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Error handling

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Error status codes

4xx Client Errors

- Indicate issues on the client's end
- Common causes: Bad requests, authentication failures, etc ...

Resolution: Fix the request

5xx Server Errors

- Arises from problems on the server
- Common causes: Server overloaded, server configuration errors, internal errors

Resolution: Should be fixed by the API administrator

Error status codes: examples

4xx Client Errors

- **401 Unauthorized** - The request lacks valid authentication credentials for the requested resource
- **404 Not Found** - Indicates that the server cannot find the resource that was requested
- **429 Too Many Requests** - The client has sent too many requests in a given amount of time

5xx Server Errors

- **500 Internal Server Error** - The server experienced an unexpected issue which prevents it from responding
- **502 Bad Gateway** - The API server could not successfully reach another server it needed to complete the response
- **504 Gateway Timeout** - The server (which acts as a gateway) did not get a response from the upstream server in time

Handling errors

API errors

```
import requests

url = 'http://api.music-catalog.com/albums'

r = requests.get(url)
if r.status_code >= 400:
    # Oops, something went wrong
else:
    # All fine, let's do something
    # with the response
```

Connection errors

```
import requests
from requests.exceptions import ConnectionError
url = ''

try:
    r = requests.get(url)
    print(r.status_code)
except ConnectionError as conn_err:
    print(f'Connection Error! {conn_err}.')
    print(error)
```

raise_for_status()

```
import requests

# 1: Import the requests library exceptions
from requests.exceptions import ConnectionError, HTTPError

try:
    r = requests.get("http://api.music-catalog.com/albums")

    # 2: Enable raising exceptions for returned error statuscodes
    r.raise_for_status()

    print(r.status_code)

# 3: Catch any connection errors
except ConnectionError as conn_err:
    print(f'Connection Error! {conn_err}.')

# 4: Catch error responses from the API server
except HTTPError as http_err:
    print(f'HTTP error occurred: {http_err}')
```

Let's practice!

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Final thoughts

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API basics

- The role of APIs
- Different types of APIs
- URL components
- Anatomy of request & response messages
- HTTP Verbs



APIs with Python

Requests package

```
import requests
```

HTTP methods

```
# Read a resource
requests.get('https://api.my-music.com')
# Create a resource
requests.post('https://api.my-music.com', data={...})
# Update a resource
requests.put('https://api.my-music.com', data={...})
# Delete a resource
requests.delete('https://api.my-music.com')
```

URL Parameters

```
query_params = {'artist': 'Deep Purple'}
requests.get('http://api.my-music.com', params=query_params)
```

Headers

```
headers = {'accept': 'application/json'}
response = requests.get('http://api.my-music.com', headers=headers)
print(response.headers.get('content-type'))
```

Status codes

```
response = requests.get('http://api.my-music.com')
print(response.status_code)
```

Advanced topics

- Authentication

- Basic Authentication

```
headers = {'Authorization': 'Basic am9obkBleGF...'}
```

- API key/token authentication

```
headers = {'Authorization': 'Bearer faaa1c9f4...'}
```

- Structured data

- Requesting JSON formatted data

```
requests.get('https://api.my-music.com', headers={'accept': 'application/json'})
```

- Sending JSON formatted data

```
playlists = [{"Name": "My favorite songs"}, {"Name": "Road Trip"}]  
requests.post('https://api.my-music.com/playlists/', json=playlists)
```


Error handling

- Types of errors
 - Connection errors
 - HTTP errors
 - 4XX Client errors
 - 5XX Server errors
- Handling errors with status codes
 - `response.status_code`
- Handling errors with exceptions
 - `raise_for_error()`

```
import requests
from requests.exceptions import ConnectionError, HTTPError

try:
    response = requests.get("http://api.music-catalog.com/albums")
    response.raise_for_status()

except ConnectionError as conn_err:
    print(f'Connection Error! {conn_err}.')

except HTTPError as http_err:
    print(f'HTTP error occurred: {http_err}')
```

Congratulations!

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