

REST APIs and Machine Learning with Python

02807 Computational Tools for Data Science
Week 3

Dates for project hand-in

- Project 1: 2019-10-13
- Project 2: 2019-11-10
- Project 3: 2019-12-05

Today

- REST web APIs
- Machine learning with Python
- Python libraries: requests, sklearn

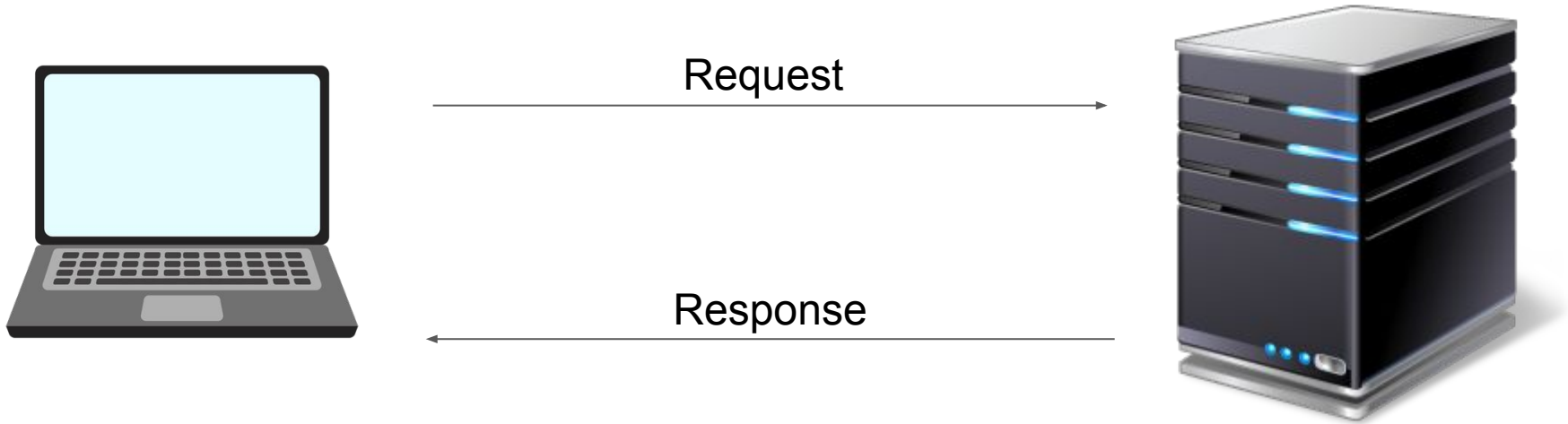
API

- Application Programming Interface
- Definition of methods for interacting with a software component such as a Python library or a remote service

Examples:

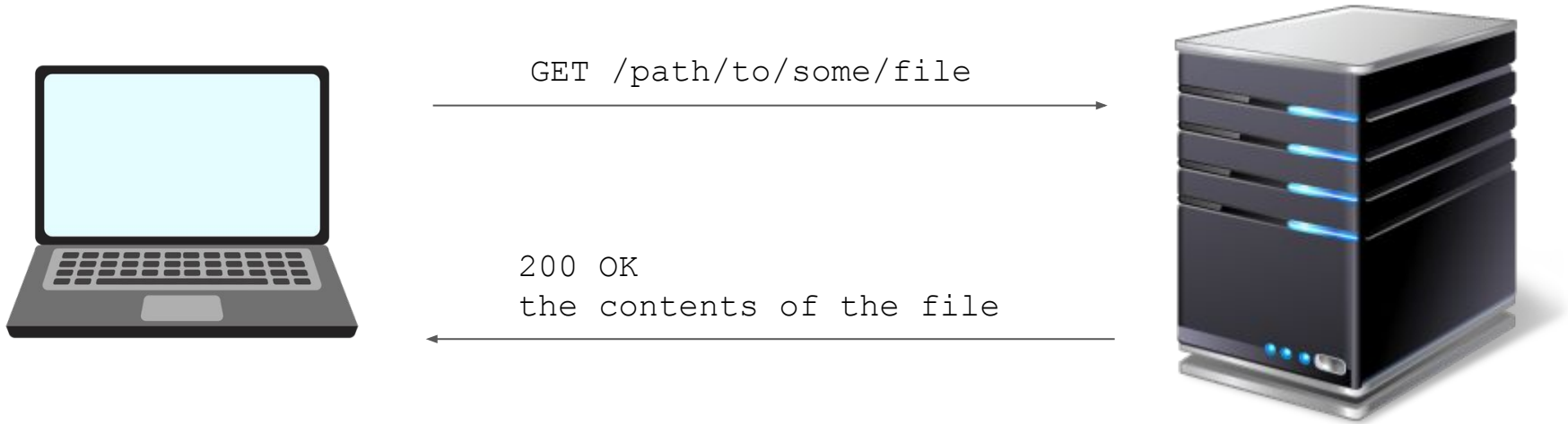
- Getting data
- Invoking services
- Retrieving statistics
- Interacting with a database

Web API



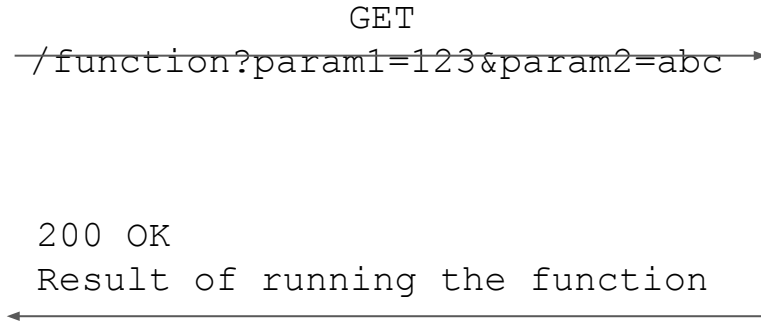
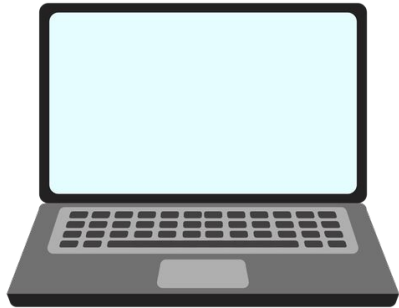
Protocol: The rules for communicating

Web API (HTTP protocol)



Protocol: Hypertext Transfer Protocol (HTTP)

Web API (HTTP protocol)



Protocol: Hypertext Transfer Protocol (HTTP)

The HTTP protocol

Common methods:

GET	Read
POST	Create
PUT	Update/replace
DELETE	Delete

Example response:

```
HTTP/1.1 200 OK
Date: Mon, 27 Jul 2009 12:28:53 GMT
Server: Apache/2.2.14 (Win32)
Last-Modified: Wed, 22 Jul 2009 19:15:56 GMT
Content-Length: 88
Content-Type: text/html
Connection: Closed
Response data
```

Response codes: too many to list here

Response data formats

- Text
- HTML
- XML
- YAML
- **JSON**

```
{
  "firstName": "John",
  "lastName": "Smith",
  "isAlive": true,
  "age": 27,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "spouse": null
}
```

HTTP-based RESTful APIs

- Using the HTTP protocol
- Representational State Transfer
 - Server does not store client state
 - Uniform messages
 - Idempotent

Example of a RESTful service

Url: <https://api.chucknorris.io>

GET /jokes/random

```
{  
  "categories": [],  
  "created_at": "2016-05-01 10:51:41.584544",  
  "icon_url": "https://assets.chucknorris.host/img/avatar/chuck-norris.png",  
  "id": "Xnt8KedKQ4uUFhVdsZBcvA",  
  "updated_at": "2019-06-10 23:29:39.258319",  
  "url": "https://api.chucknorris.io/jokes/Xnt8KedKQ4uUFhVdsZBcvA",  
  "value": "Chuck Norris doesn't do push-ups ~ Chuck Norris pushes the earth down!"  
}
```



Example of a RESTful service

GET /jokes/search?query=van damme

```
{
  "total":9,
  "result":[
    {
      "categories":[],
      "created_at":"2016-05-01 10:51:41.584544",
      "icon_url":"https://assets.chucknorris.host/img/avatar/chuck-norris.png",
      "Id":"foynoigqtu2ytxzrya096g",
      "updated_at":"2016-05-01 10:51:41.584544",
      "url":"https://api.chucknorris.io/jokes/foynoigqtu2ytxzrya096g",
      "value":"Diamonds are not, despite popular belief, carbon. They are, in fact, Chuck Norris fecal matter. This was proven a recently, when scientific analysis revealed what appeared to be Jean-Claude Van Damme bone fragments inside the Hope Diamond."
    }, ...
  ]
}
```

REST APIs and Python

- Use the `requests` library
- Look for a dedicated Python client

Machine learning with Python

Scikit-learn: regression, classification, clustering, text data

NLTK, Spacy: natural language processing

Keras and TensorFlow: neural networks

PyTorch: computer vision