Lab 2: Building your own RESTful APIs

50.012 Networks

Hand-out: September 25
Hand-in: Oct 6 23:59

1 Objectives

- Your goal is to implement a set of RESTful APIs for a service of your choice
- Decide on a simple data scenario to represent (*which nouns*?)
- Define a couple of simple RESTful API calls (which verb, i.e., HTTP Method, for which noun?)
- Implement and test the API on your own server running on your laptop

2 Set up of your machine

- For this lab we will assume you use `python3`.
- We will implement our app based on Flask, which is a web framework implemented in Python. Install flask with `sudo pip install Flask`. For installing pip, see: `https://pip.pypa.io/en/stable/installing/`
- To interact with the API, we suggest to use `curl` (See: `https://curl.haxx.se/download.html`) or Python with `requests` library.

3 Notes

- REST `flask` (and `curl`) tutorial: `http://blog.luisrei.com/articles/flaskrest.html`
  - For debugging it helps to turn on flask's debugging functionality by setting: `app.run(debug=True)`
  - In your API, don't just copy the nouns/verbs from the tutorial, this will lose you points!
  - No need to implement everything in the tutorial. We will point you towards specific content in the following.
- For more information about flask visit: `https://flask.palletsprojects.com/en/1.1.x/#user-s-guide`
  - If you have problem starting the server please look at `http://flask.pocoo.org/docs/0.12/quickstart/#what-to-do-if-the-server-does-not-start` or ask for our help
  - If you are unfamiliar with the decorator in Python, you could read `https://realpython.com/primer-on-python-decorators/`

4 Basic API

- Your goal is to implement a set of RESTful HTTP APIs for a service of your choice
- Decide on a simple data scenario to represent (*which nouns*?)
  - Example: SUTD room information service
    - Which floor is the room on?
    - Is this an office, and who is using it?
    - What is the seating capacity?
    - Any other resources in this room (projector)?
    - Maybe even a reservation system for rooms (ours is kindof bad)
  - Simple message board with users and messages (or something like twitter?)
  - Maybe an API that aggregates information from other public APIs? For example, check out what is available at `https://data.gov.sg/developer`.
- Define a couple of simple RESTful API calls (which verb for which noun?)
  - You should have at least 5 different API calls/ways to interact with your API
    - At least two nouns, and different verbs (GET/PUT/DELETE)
- Send/receive data in JSON datastructures
  - No need to have something super complicated, a dictionary with a couple of keys should be enough for most things
  - Implement one of the API calls to support two different mimetypes
    - For example, provide a natural text or JSON version of the same data

5 User Authentication

- You should also implement some simple HTTP authentication with a username and a password
  - No need to implement any HTTPS/TLS yet
- Choose one or more username and passwords, then implement the authentication for at least one API resource as suggested in the tutorial.

6 What to Hand in

You will submit in the following two pieces of codes via eDimension:

- a complete API code. Please also include detailed comments at the beginning of this python file that explains the implementation details.
- Please also provide a set of example calls for `curl` (in a bash script format client.sh) or a client.py file that uses requests to test your API. Please comment in the script or the python file what features your client scripts demonstrate.

7 Further reading (optional)

- Read `https://app.swaggerhub.com/help/tutorials/openapi-3-tutorial` and `https://app.swaggerhub.com/help/tutorials/getting-started`, and try to create an OpenAPI specification for your APIs.
- Read `https://www.postman.com/use-cases/api-testing-automation/` and see how you can use tools like Postman to automate your API tests.