Semester Project 3 WiFi2BLE REST API Intro

Semester project: Distributed Software Systems with Embedded Elements

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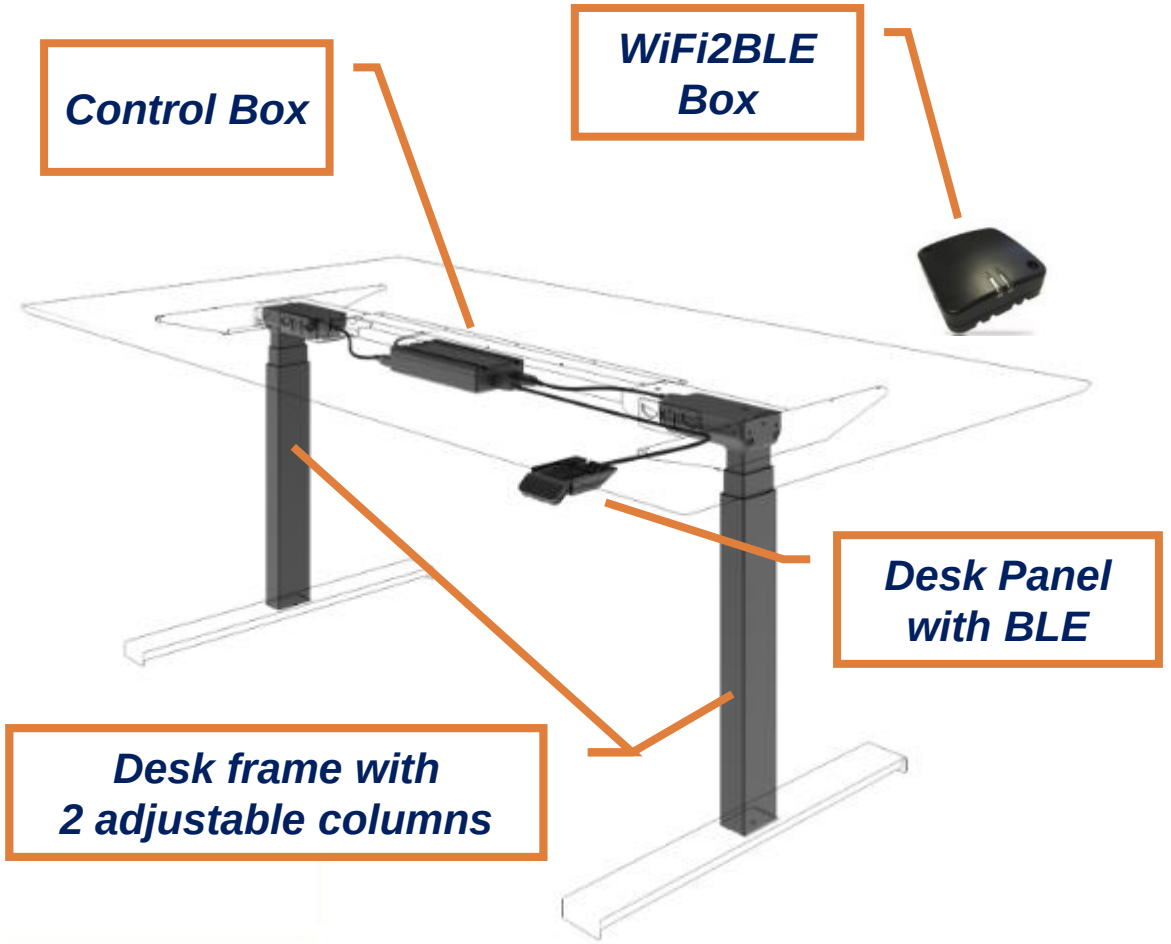
Project Case Study: Desk Usage Supervision

Generated by AI

- → Obtain, visualize and analyze desk usage data for health, occupancy and maintenance
- → Motorized desks are commonly used in office spaces as they can improve user working comfort
- → Greater gains could be achieved by learning from the desk data, for example about the desk moving distance and frequency

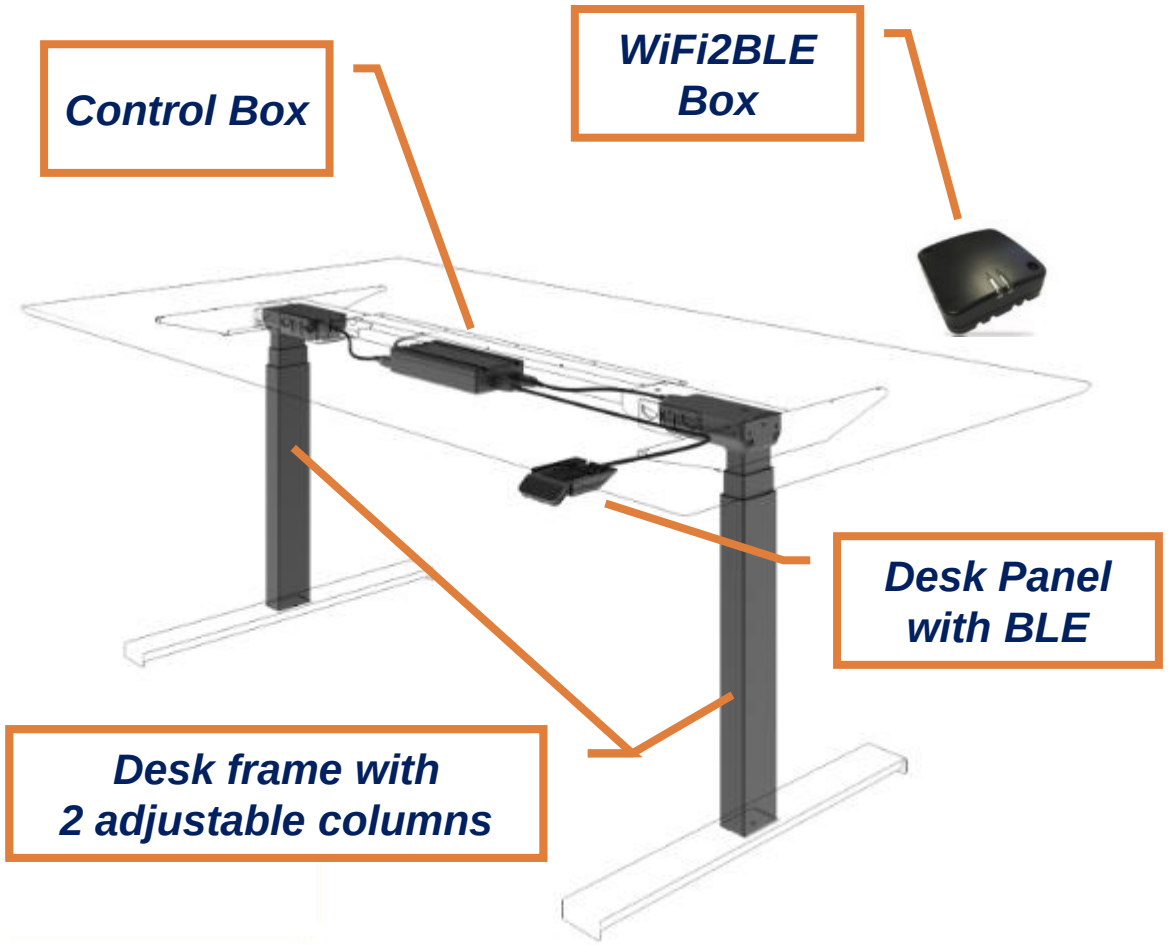
Desk System Operation

- → Desks columns are controlled by the intelligent Control Box that is connected to the Desk Panel
- → The desk panel accepts user commands to adjust desk height up and down
- → The WiFi2BLE box exposes desk information over a Wi-Fi by translating the desk Bluetooth Low Energy (BLE) protocol to a Web API
- → This allows for monitoring and controlling desks remotely
- → Desk Panel has as built-in anti-collision sensor, display, and storage of favorite positions 😮



Web API Data

- → Number of desks connected to WiFi2BLE box
- → Desk ID, Name, Manufacturer
- → Position
  - → Get and Set
- → Speed
- → Status
- → Last errors with timestamps
- → Activation counter
- → Sit/stand counter



Python WiFi2BLE Simulator

→ Simulation of the WiFi2BLE box Web API

→ To speed up project development and testing
→ Get independent of the hardware and NDAs
→ Mitigate the Project Coordinator temporary “disabilities”

→ Requirements: Python 3

→ Very basic, for now
  → Not complete, yet
  → Desk dynamics missing

Creative use of AI 😉

REST API Basics

→ Understanding REST API: https://www.freecodecamp.org/news/how-to-use-rest-api/
  → Course material? Web Technologies? Operating Systems?

→ Base URL: `http://127.0.0.1:8000`
  → Assuming local execution
  → For testing only

→ Expecting path format: `/api/<version>/<api_key>/<endpoint>`
  → Versioned API, `<version>`: v1
  → “Secured”, `<api_key>`: 32 characters, for example: `E9Y2LxT4g1hQZ7aD8nR3mWx5P0qK6pV7`

→ Object type: JSON
  → Content type: application/json

Endpoints: Get all desks

→ Get all desks: retrieve list of unique IDs of all desks connected
  → URL: `/desks`
  → Method: `GET`
  → Response
    → Status: `200 OK`, Body: JSON array of desk IDs
    → Status: `404 Not Found`, if the endpoint does not exist

→ Example:
  → `GET http://127.0.0.1:8000/api/v1/E9Y2LxT4g1hQZ7aD8nR3mWx5P0qK6pV7/desks/`
  → `200 ["cd:fb:1a:53:fb:e6", "ee:62:5b:b8:73:1d"]`

Endpoints: Get desks by ID

→ Get desks by ID: retrieves details of a specific desk by its ID
  → URL: `/desks/{desk_id}`
  → Method: `GET`
  → Parameters:
    → `{desk_id}` (string): ID of the desk to retrieve
  → Response
    → Status: `200 OK`, Body: JSON object of the desk if found
    → Status: `404 Not Found`, if the desk with the specified ID does not exist

→ Example:
  → `GET http://127.0.0.1:8000/api/v1/E9Y2LxT4g1hQZ7aD8nR3mWx5P0qK6pV7/desks/cd:fb:1a:53:fb:e6`
  → `200 {"id": "cd:fb:1a:53:fb:e6", "name": "DESK 4486", "manufacturer": "Linak A/S", "position": 990, "speed": 0, "status": "Normal"}`

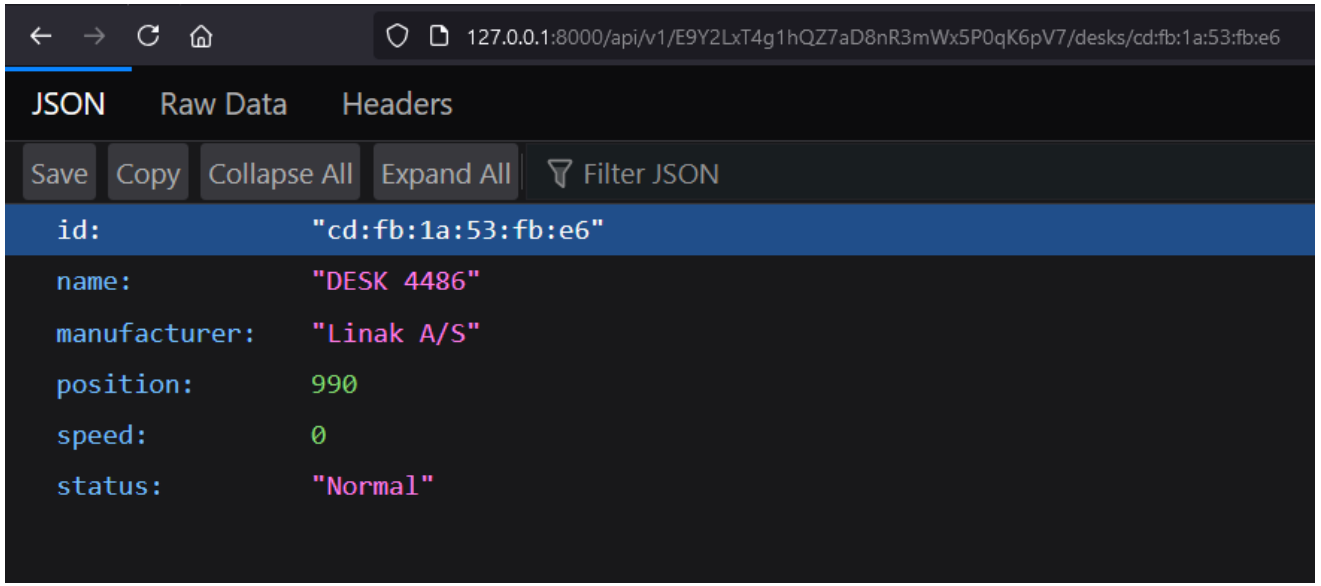
Endpoints: Update desks by ID

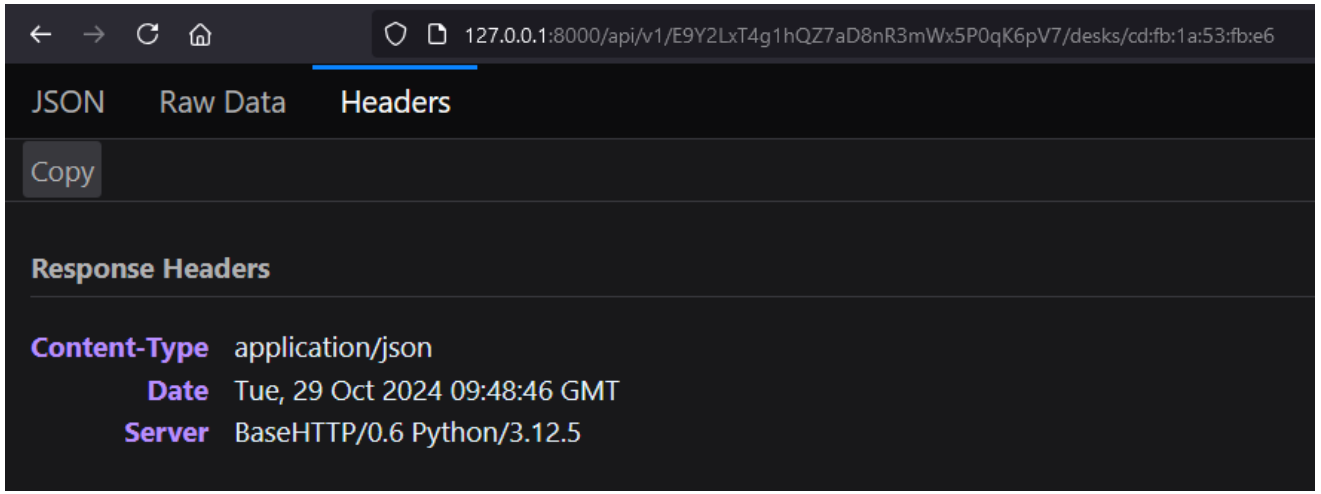
- → Update desks by ID: updates position
  - → URL: `/desks/{desk_id}`
  - → Method: `PUT`
  - → Parameters:
    - → `{desk_id}` (string): ID of the desk to retrieve
  - → Request Body
    - → JSON object with update position field
  - → Response
    - → Status: `200 OK`, Body: JSON with updated position, if new desk position accepted
    - → Status: `404 Not Found`, if the desk with the specified ID does not exist
    - → Status: `400 Bad Request`, if the request body is malformed
- → Example:
  - → `PUT http://127.0.0.1:8000/api/v1/E9Y2LxT4g1hQZ7aD8nR3mWx5P0qK6pV7/desks/cd:fb:1a:53:fb:e6 {"position": 990}`
  - → `200 {"position": 990}`

Testing REST API

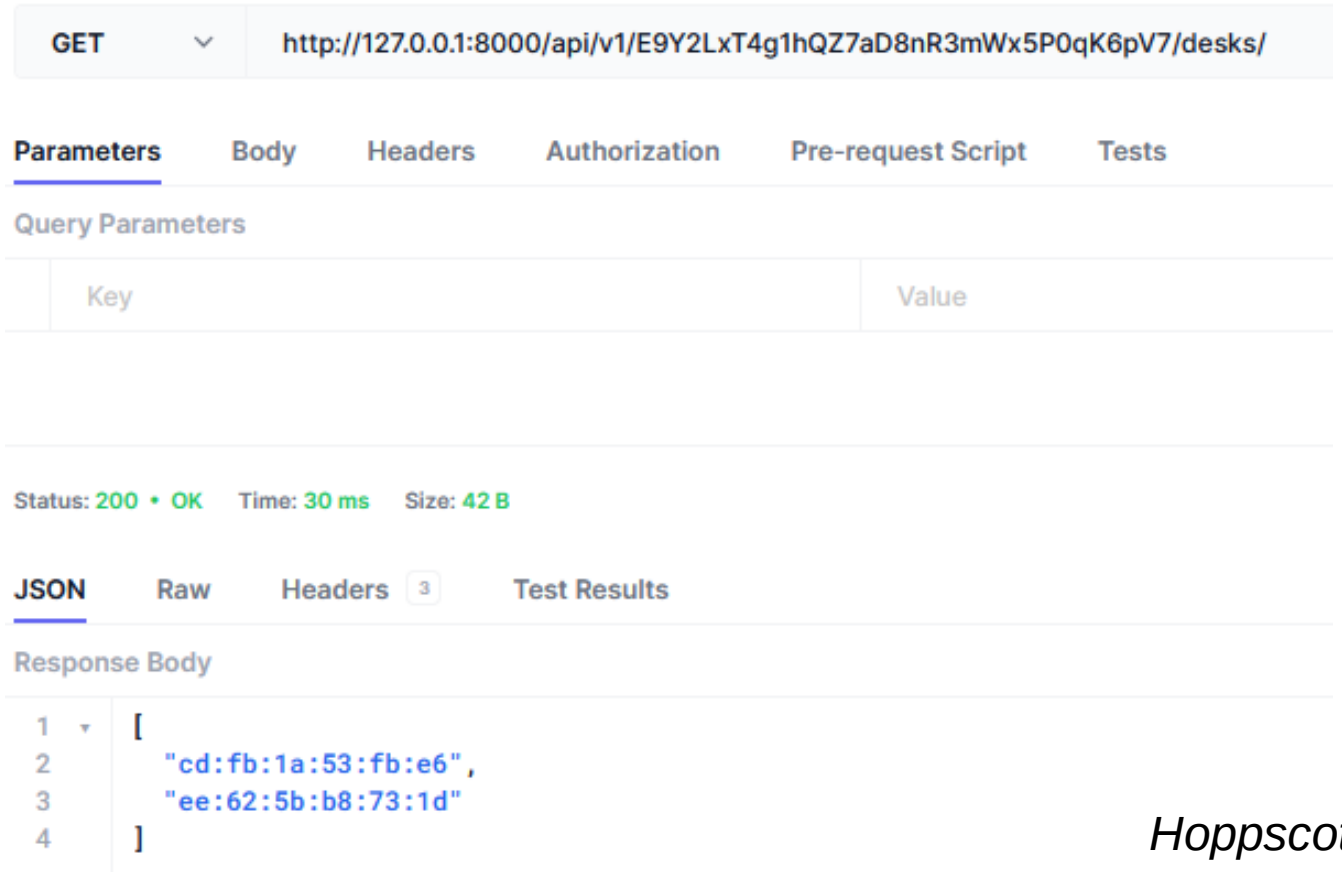
→ Browser, Firefox

→ Hoppscotch
  → Open-source alternative to Postman
  → https://docs.hoppscotch.io/



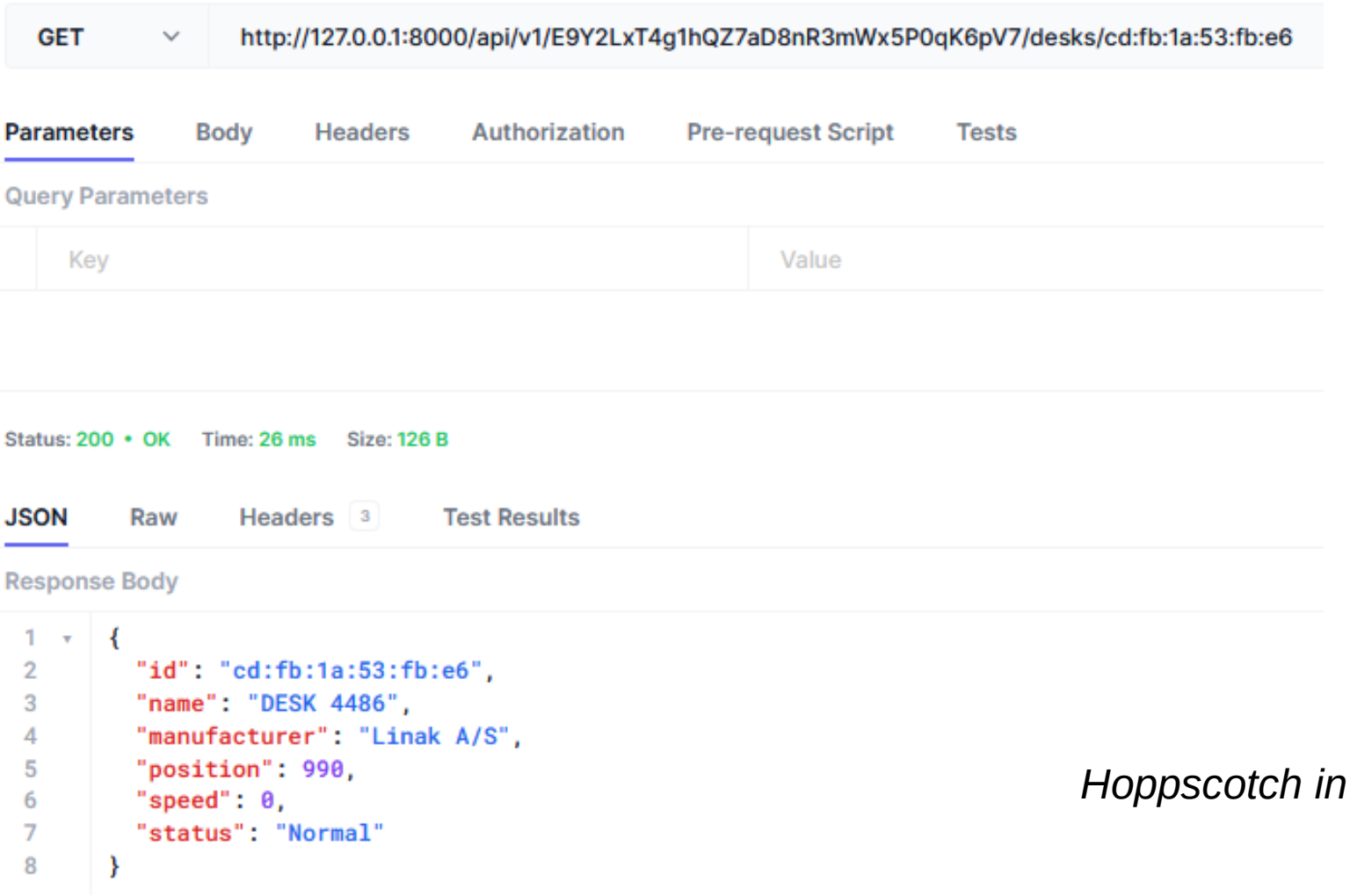


Testing: Get all desks



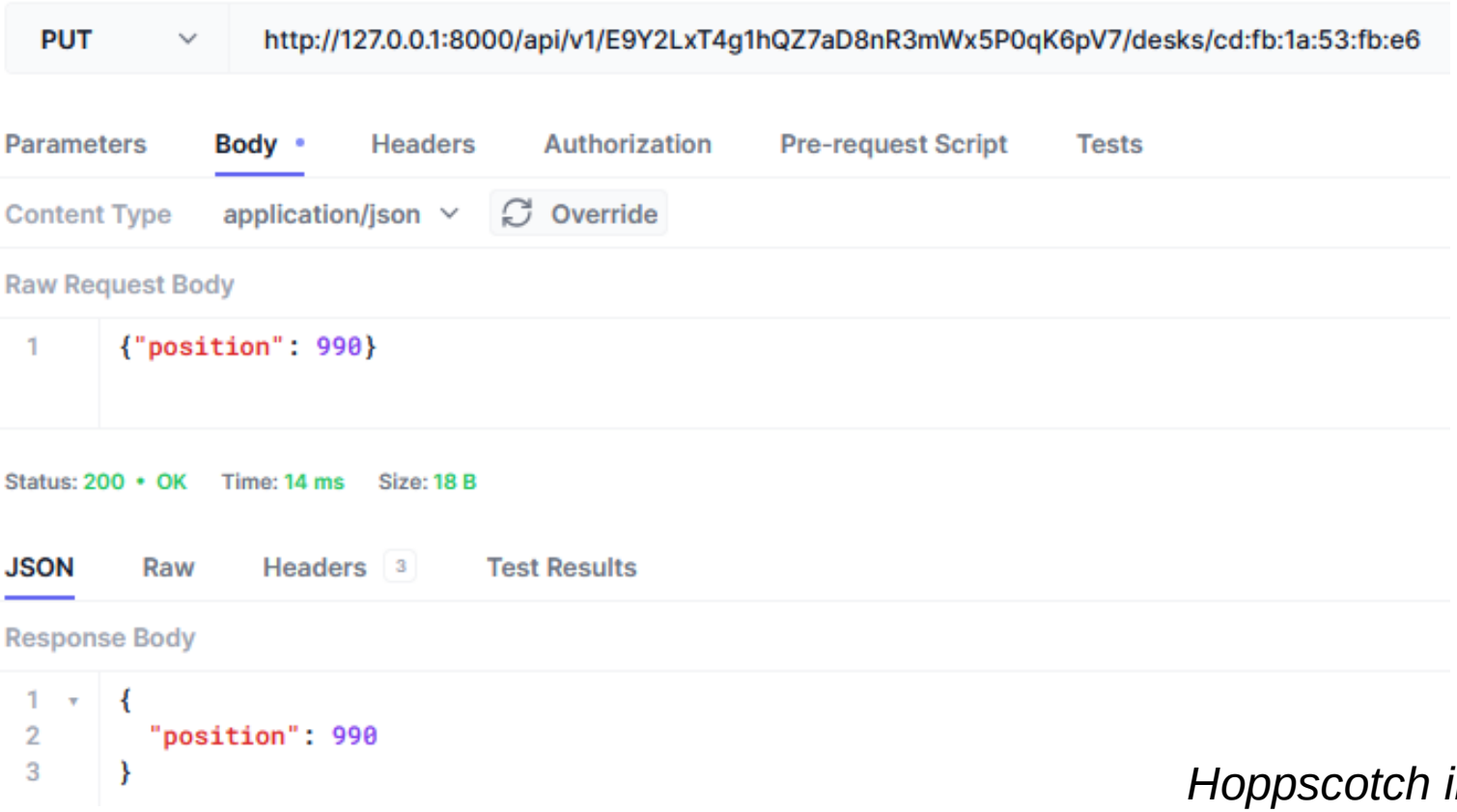
Hoppscotch in action

Testing: Get desks by ID



Hoppscotch in action

Testing: Update desks position



Hoppscotch in action

Thank you