



## Senior Software Engineer (Python)

Location: Barcelona

Full time

Remote working (with office access in Barcelona)

## Purpose

*The Data Intelligence team develops and deploys data-driven and AI-powered solutions to optimize operations in the aviation industry, with a specific focus on reducing the sector's CO2 emissions. For example, SITA's OptiClimb helps to save fuel for each climb by computing optimal climb speeds considering several factors like air density, weight ...*

We are seeking a Senior Software Engineer to develop the next version of our OptiDirect product in Python to make it more reliable and robust following the best coding principles. The successful candidate should have a strong understanding of software development concepts and algorithms, as well as experience with data processing and storage technologies such as SQL and noSQL databases. Additionally, this role will also include other side tasks related to other products since it will be part of an existing team of talented people with a dedicated PO and a TL.

## Responsibilities

- Take technical leadership, and co-design the new OptiDirect product version on top of the current internal ecosystem
- Implement, document and test the design following Agile principles

- Perform code reviews within the team
- Propose improvements to the existing code
- Assist the team and share knowledge
- Maintain the product: bug fixing and deployment

## **Qualifications**

### **Required**

- Bachelor's or master's degree in Computer Science or Engineering, or a related field
- +5 years of experience in software development in Python following software design principles and patterns
- Proficient with tabular data operations and SQL databases
- Experience with API development
- Experience with DevOps practices and tools such as CI/CD pipelines and containerization
- Excellent problem-solving and analytical skills
- Excellent communication and teamwork skills

### **Nice to have**

- Experience with version control Git
- Experience with machine learning and model training
- Familiarity with distributed computing systems like Spark for data processing and K8s for application deployment in clusters
- Proficient in batch scripting for Unix
- Interest in being up to date with new technologies
- Interest in the Aviation Industry
- Interest in Artificial Intelligence and Machine Learning

## **Why should you join us**

Join our team and embark on an exciting journey to revolutionize the aviation industry with our cutting-edge AI-driven solutions. As a member of our dynamic and passionate team, you will have the opportunity to develop and deploy our own product, ensuring full control end to end. Our commitment to sustainability is at the heart of our mission as we strive to reduce the ecological impact of the aviation sector.

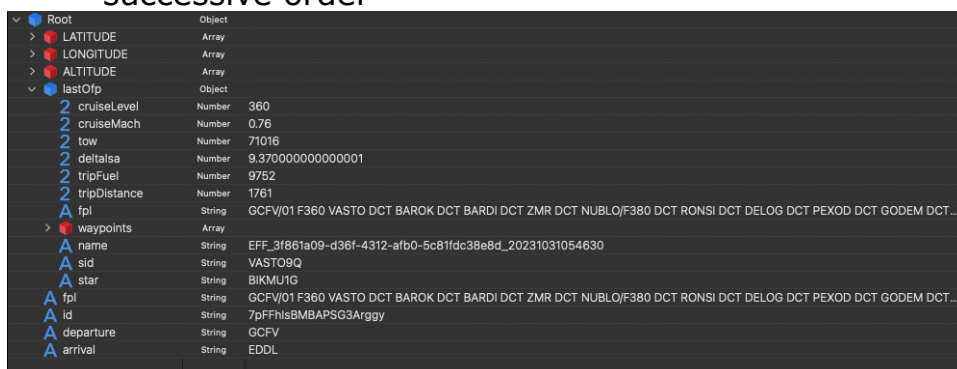
By joining our team, you will be part of a young and vibrant community of like-minded individuals who are passionate about shaping the future of the aviation industry. You will become part of a highly efficient team that thrives on continuous learning, evolving together, and enhancing skills through shared knowledge and inspiration. In our workplace, we embrace a culture of collaboration and innovation, where your ideas and contributions are not only valued but actively encouraged. Together, we will make a meaningful impact on the aviation industry while enjoying a fulfilling and rewarding career journey.

## Technical Exercise (2.5h)

The following exercises will help us to understand your way of thinking from the architecture level as well as your Python coding skills. The exercise will be reviewed live, so we expect you to have the environment ready to show it working and answering any questions that may arise, even making changes to the code! The live review will simulate a common scenario where you interact with team members solving and commenting on any issues that may arise. This will give the opportunity to see how it would be to be working together, this is the time when your soft skills will be evaluated.

To help you understand better, here are some important concepts that are illustrated in the sample payload that is accompanying the test:

- Extracted flight sensor data: timeseries of the sensor values extracted during a complete flight (climb, cruise, descend). Those are stored in LATITUDE, LONGITUDE and ALTITUDE keys of the json
- Flight route: list of given waypoints from one airport to another. Those are stored in the key lastOfp. Fpl represent the flight plan (succession of waypoints), and every waypoint is stored in the waypoints key by successive order



The screenshot shows a JSON payload structure in a code editor. The structure is as follows:

Key	Value Type	Value
Root	Object	
LATITUDE	Array	
LONGITUDE	Array	
ALTITUDE	Array	
lastOfp	Object	
cruiseLevel	Number	360
cruiseMach	Number	0.76
tow	Number	71016
deltasa	Number	9.370000000000001
tripFuel	Number	9752
tripDistance	Number	1761
fpl	String	GCFVJ01 F360 VASTO DCT BAROK DCT BARDI DCT ZMR DCT NUBLO/F380 DCT RONSI DCT DELOG DCT PEXOD DCT GODEM DCT...
waypoints	Array	
name	String	EFF_3f861a09-d36f-4312-afb0-5c81fdc38e8d_20231031054630
sid	String	VASTO9Q
star	String	BIKMU1G
fpl	String	GCFVJ01 F360 VASTO DCT BAROK DCT BARDI DCT ZMR DCT NUBLO/F380 DCT RONSI DCT DELOG DCT PEXOD DCT GODEM DCT...
id	String	7pFFHlsBMBAPSG3Arggy
departure	String	GCFV
arrival	String	EDDL

## 0. Reading and understanding the Exercise (0.5h)

### 1. Architecture (descriptive) (1h)

- Design an API that enables to...
  - store existing flight routes (with direction, time, fuel consumption) given an airline and aircraft a date

- ii. return most used flight routes given two airports for (optionally) a given an airline, aircraft or a data range
  - iii. Return the most efficient route given two airports given the best time or best fuel consumption or a combination of both given time constraints
  - iv. return a proposed route given an existing flight route returning the proposed savings of the new route.
  - v. Will the API design change if the computation of the proposed route exceeds 10 seconds of computation?
- b. Design the database
  - i. which pattern to use to efficiently store and compute the proposed route including airports information, waypoints positions and their recurrency usage
  - ii. take into consideration to later support efficient queries like finding for an airline and an aircraft the...
    - 1. shortest route
    - 2. fuel efficiency route
    - 3. most used route
- c. Scalability / maintainability
  - i. How to make it scalable so that the system can scale to more than 10.000 queries every minute? What would you propose to do to scale taking into consideration the algorithm takes approximately 10 seconds using a single CPU to compute a result?
  - ii. How to make it maintainable enough so that new routes and new waypoints can be added and removed in the system so that it becomes an evolving system and improves over time rather than a static one?
  - iii. Design the key aspects for the product development CI and CD, what will they include?

## **2. Coding Skills (working code) (1h)**

- a. Implement proposed database and show a working code
- b. Implement proposed API
- c. Implement the integration with the database
- d. Tabular Data: Given an extracted flight sensor data in CSV
  - i. Load it
  - ii. Explore it (give relevant insights)
  - iii. Clean it

## **3. Bonus**

This serves as an additional opportunity to show your value, either by showing a working code or by explaining in enough detail any of the following topics.

- a. Setup in as a git repository
- b. Design the algorithm for computing the best scenario
- c. Design the algorithm to detect shortcuts
- d. Scale and automate data cleaning
- e. Include tests

- f. Include documentation
- g. Containerization of the API solution
- h. Helm to deploy to K8s
- i. How to scale a cluster wise the application (vertical, horizontal)?
- j. Improvements or enhancements to current code