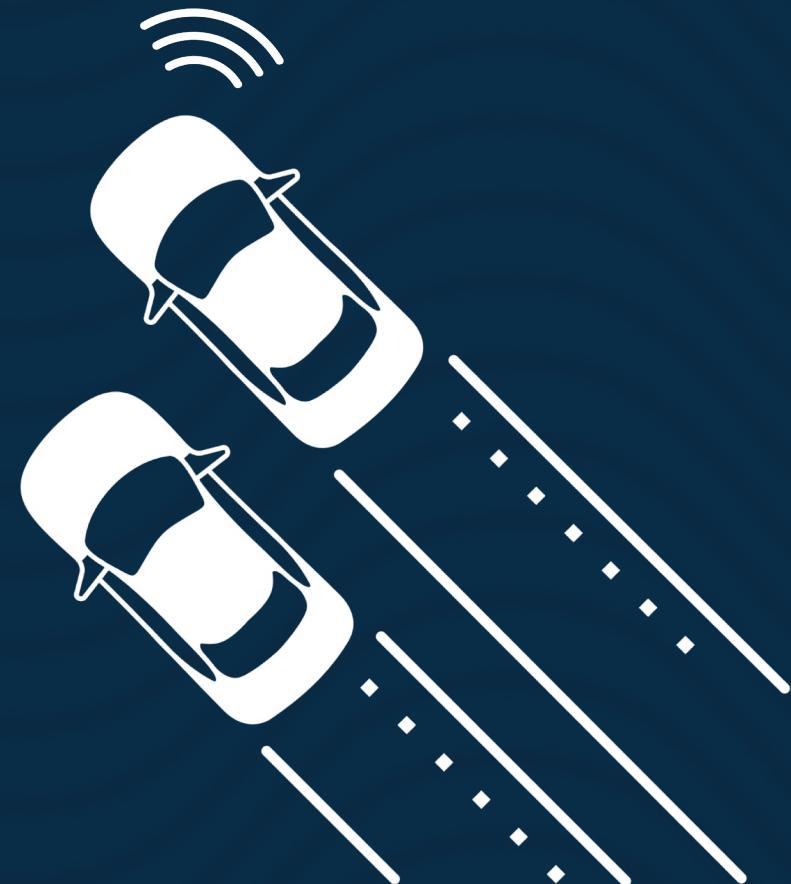


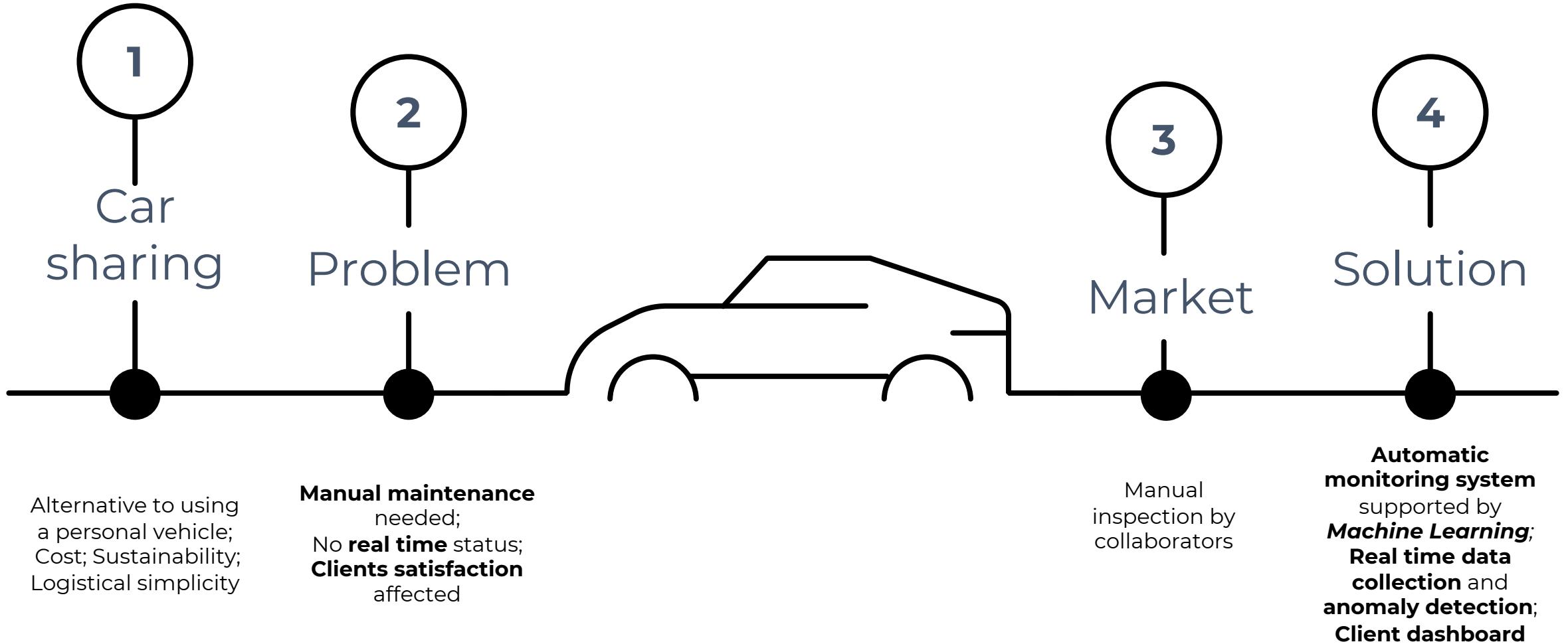
Projeto em Engenharia Informática

RideCare

Grupo PEILoad



Overview



Main functionalities



Manage your fleet



Receive real time
notifications



Locate the
anomalies

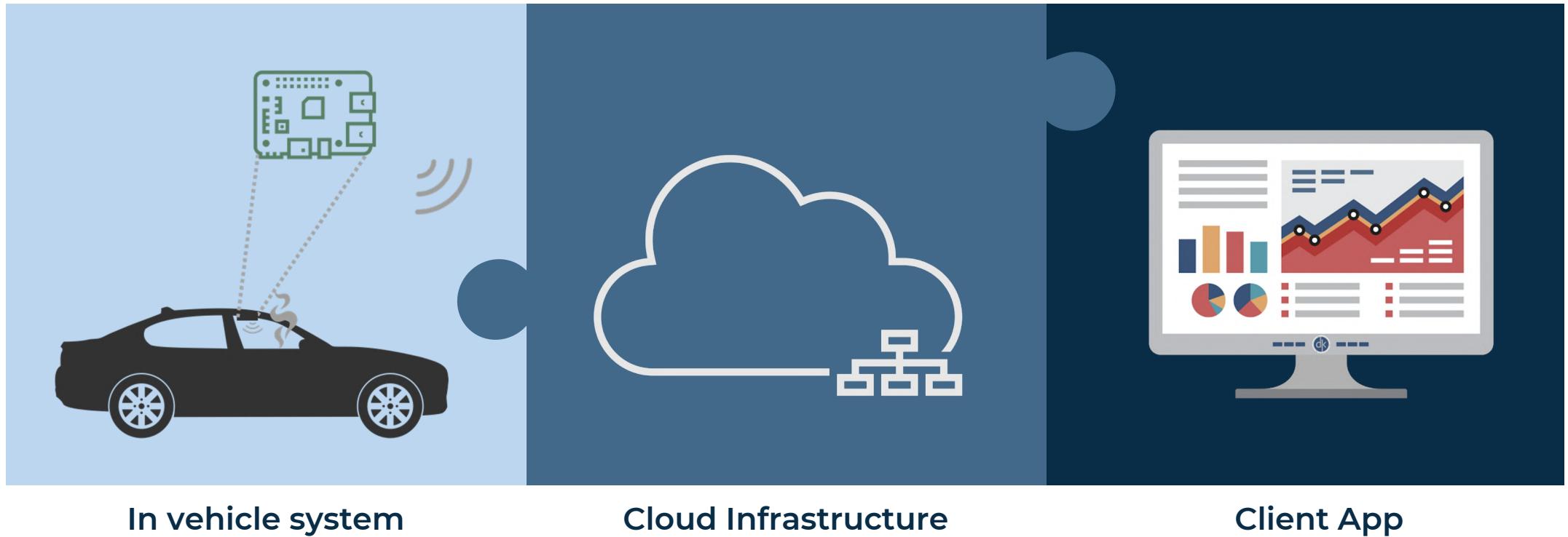


Confer past
anomalies

Anomaly Detection

| | Value | Description |
|--------|-------|---|
| Normal | 0 | Corresponds to the scenario where no anomalous event occurred |
| Smoke | 1 | Corresponds to the scenario where an anomaly is detected, namely the presence of smoke |
| Stink | 2 | Corresponds to the scenario where an anomaly is detected, namely the presence of bad smell. |

About the project



In vehicle system

Cloud Infrastructure

Client App



In vehicle system

FieldCrawler

- Sensorial data collection in real time
- Pre-labelling of the raw data
- Sends all data to a datalake and AlertAIs



BME680

SDS011



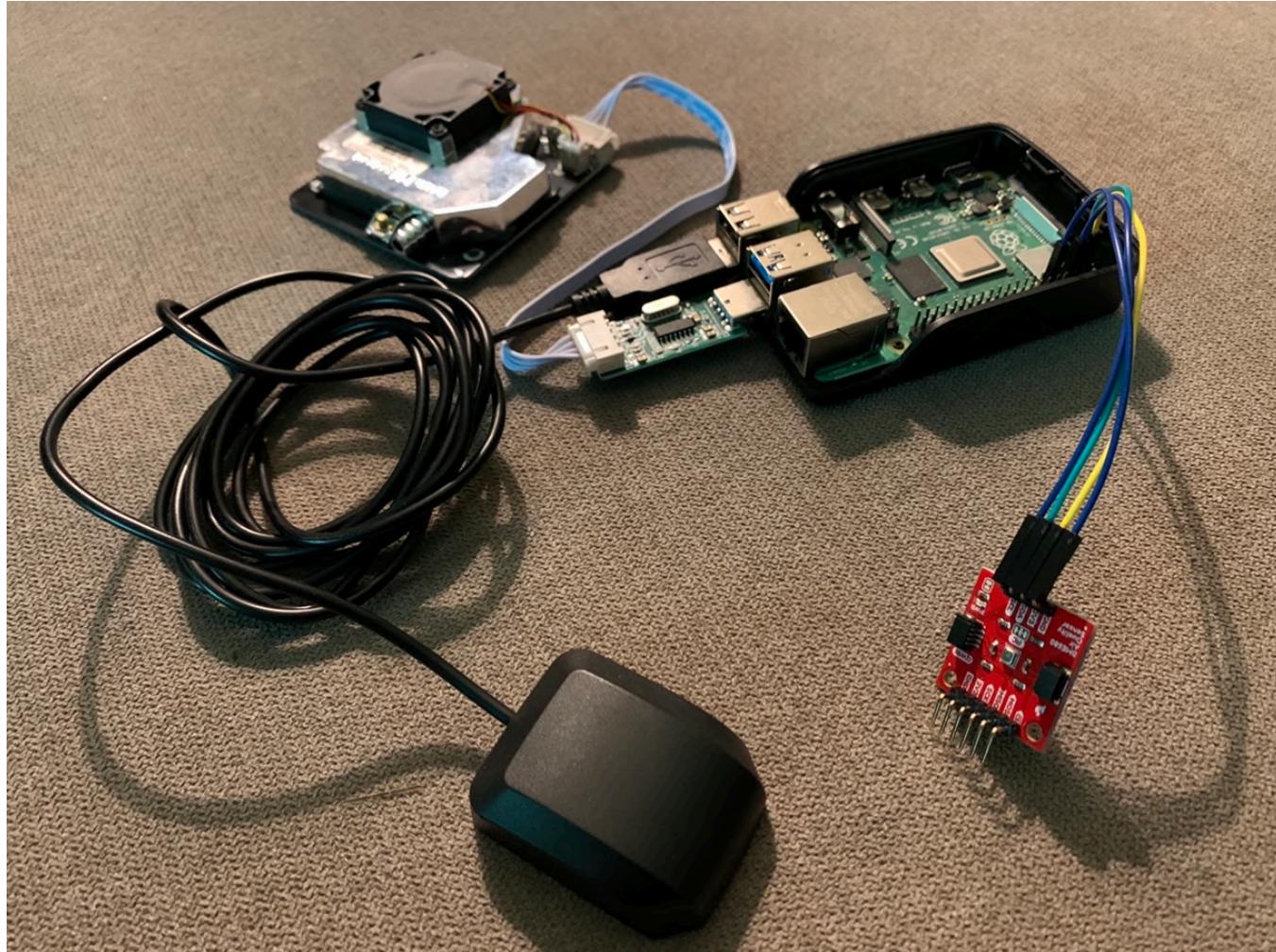
G-MOUSE VK162





In vehicle system

Final Setup

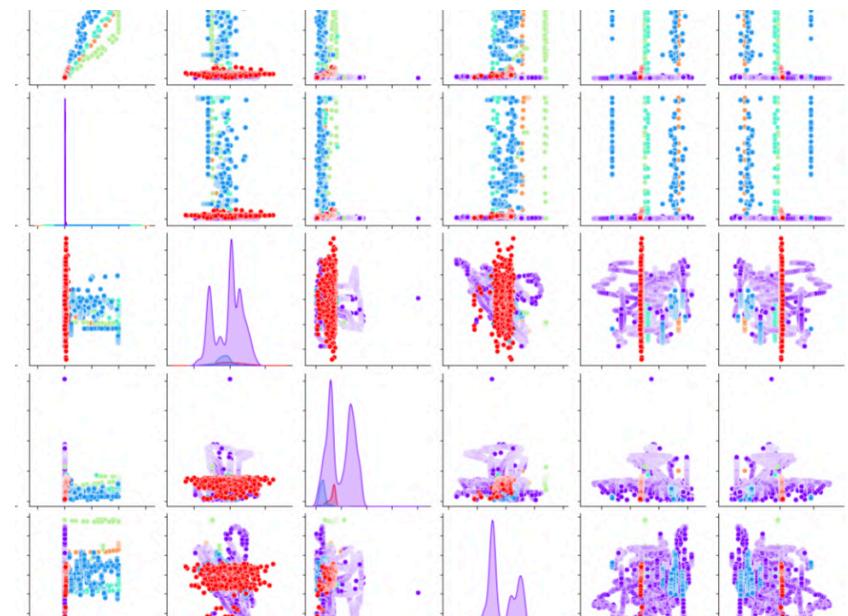




In vehicle system

AlertAI

- Real time classification of the gathered data
- Sends the anomalies to the web backend
- More details in a later presentation





In vehicle system

Job queuing system

- Present in both Fieldcrawler and AlertAI
- Assures messages are sent
- High availability is promoted
- Redis-based

```
pi@ridecare: ~
login as: pi
pi@ridecare's password:
Linux ridecare 5.4.72-v7l+ #1356 SMP Thu Oct 22 13:57:51 BST 2020 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Dec 17 23:00:29 2020
pi@ridecare:~ $ sudo service fieldcrawler stop
[sudo] password for pi:
pi@ridecare:~ $ rq info
default      | 0
connError    | [REDACTED] 156
2 queues, 156 jobs total

7829238fcacc484289fc52537f7651af (ridecare 550): busy default, connError
a8c336cf69bb4208ae079ab7e6aeb21a (ridecare 559): busy default, connError
2 workers, 2 queues

Updated: 2020-12-17 23:01:11.930211
pi@ridecare:~ $
```



More than
10.000
samples collected



Cloud-Infrastructure

Datalake

- Stores all the raw data collected
- Registers boot times
- Enables complex querying
- Provides a collection of endpoints consumed by the web backend

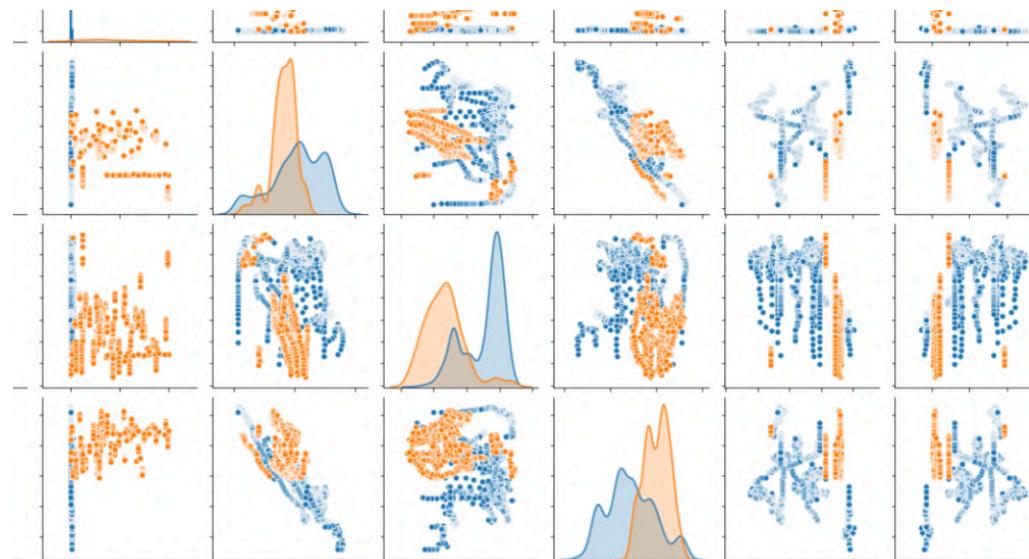
Dados - Sensores

| Dados - Sensores | | | | | | | | | | | | | | | | | | | | | |
|---------------------|----------|-------|--|-------------|----------|-----------|---------|---------------|--|-------|---------------|---------------|---------------|-----|--|----------|--|----------|--|----------|--|
| | | | | | | | | | | | | | | | | | | | | | |
| Id | | Carid | | Carlocation | | Timevalue | | Pm25 | | Pm10 | | Temperature | | Gas | | Humidity | | Pressure | | Altitude | |
| 12574 | AA-11-AA | None | | 2021-01-20 | 18:49:52 | 738.40 | 1999.90 | 19.2128125 | | 31821 | 56.4188553644 | 1000.23627311 | 108.915957578 | | | | | | | | |
| 12573 | AA-11-AA | None | | 2021-01-20 | 18:49:47 | 452.80 | 1383.90 | 19.2149609375 | | 30888 | 56.3806006412 | 1000.23461754 | 108.929886327 | | | | | | | | |
| 12572 | AA-11-AA | None | | 2021-01-20 | 18:49:41 | 166.60 | 559.10 | 19.2301953125 | | 30547 | 56.2221240636 | 1000.23023273 | 108.966777133 | | | | | | | | |
| 12571 | AA-11-AA | None | | 2021-01-20 | 18:49:35 | 3.00 | 9.00 | 19.2399609375 | | 30442 | 56.1785060909 | 1000.22208013 | 109.035367847 | | | | | | | | |
| 12570 | AA-11-AA | None | | 2021-01-20 | 18:49:30 | 3.10 | 10.00 | 19.246796875 | | 29787 | 56.1601685671 | 1000.22291482 | 109.028345288 | | | | | | | | |
| 12569 | AA-11-AA | None | | 2021-01-20 | 18:49:25 | 3.10 | 9.60 | 19.265546875 | | 29236 | 56.1113454116 | 1000.22943352 | 108.973501174 | | | | | | | | |
| 12568 | AA-11-AA | None | | 2021-01-20 | 18:49:19 | 3.30 | 10.80 | 19.28078125 | | 28724 | 56.0748911935 | 1000.22504484 | 109.010424602 | | | | | | | | |
| 12567 | AA-11-AA | None | | 2021-01-20 | 18:49:14 | 3.40 | 10.60 | 19.292109375 | | 28392 | 56.0635729339 | 1000.21255426 | 109.115512919 | | | | | | | | |
| 12874 records found | | | | | | | | | | | | | | | | | | | | | |

Cloud-Infrastructure

AlertAI Cloud

- *Flask* application, hosted on Cloud, providing REST API
- Alternative machine learning algorithms
- Experimentation with new models





Cloud-Infrastructure

Web Backend

- o Implemented with Java Spring Boot and MySQL
- o Manages user and car data
- o Stores anomalies and respective measurements for each car
- o Exposes its data to the frontend
- o Sends real time notifications when an anomaly occurs
- o Interacts with other components (AlertAI Cloud and Datalake) when the user requires more detailed information

Client Application

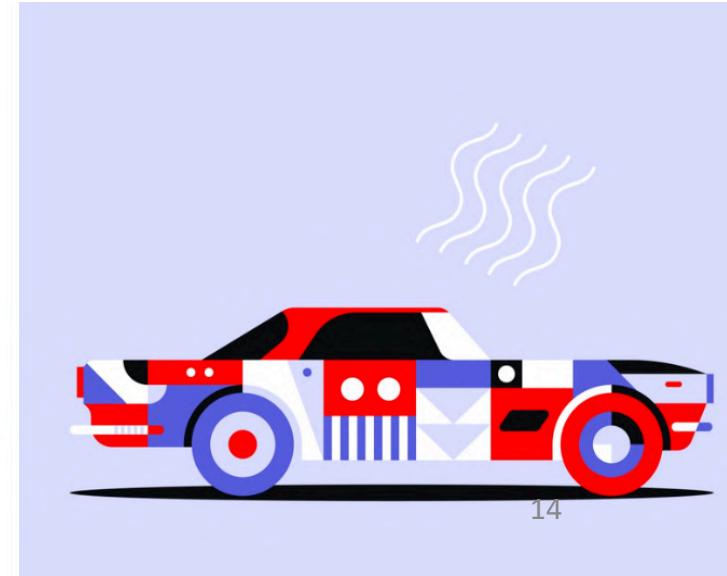
- o Direct gateway to collected and curated data
- o Comprehensive dashboard with sensor information and events' visualization
- o Detailed anomaly analysis through customizable charts
- o Fleet Management feature
- o Responsive Single Page Application



RideCare

Monitor a car sharing fleet in real time
and watch over occurred anomalies

Get Started



Cloud-Infrastructure

API-Gateway

- o Single, controlled entry point from the exterior
- o Token based authentication applied
- o Queue of jobs for Datalake writes assurance

Queues (toggle)

This list below contains all the registered queues with the number of jobs currently in the queue. Select a queue from above to view all jobs currently pending on the queue.

| Queue | Jobs |
|-----------|------|
| connError | 0 |
| default | 36 |
| failed | 23 |

Workers (toggle)

No workers registered!

| State | Worker | Queues |
|-------------|--------|--------|
| No workers. | | |

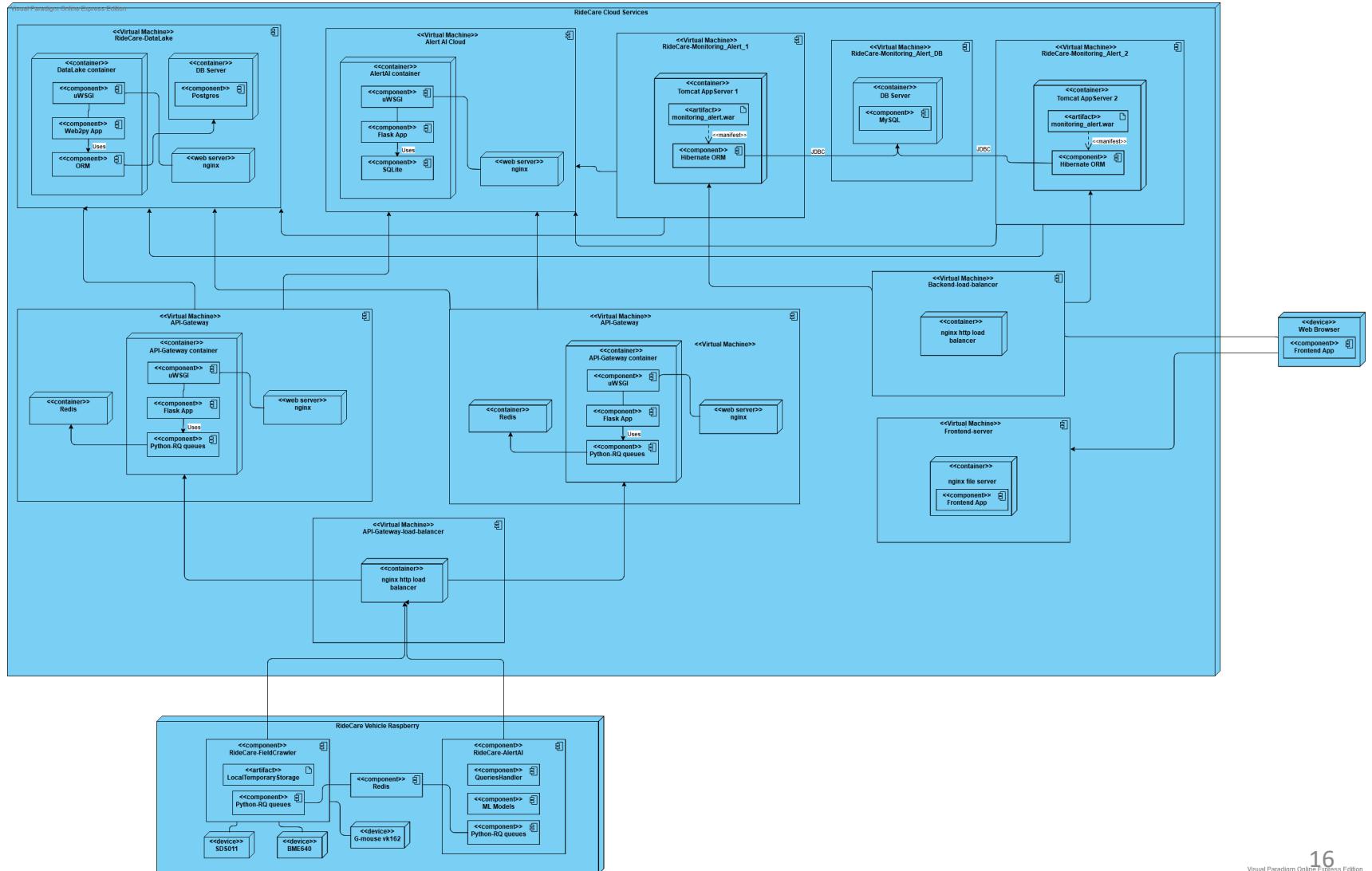
Jobs on default

| Name | Age | Actions |
|--|----------------|-------------------------|
| jobs.sensors('http://cehum.ilch.uminho.pt/datalake22/api/sensors', {'classification': '0', 'carId': '66-ZZ-66', 'temperature': 14.933515625, ...}) ze31c674-9a37-4320-a6b6-329d4935e134 | 42 seconds ago | <button>Cancel</button> |
| jobs.sensors('http://cehum.ilch.uminho.pt/datalake22/api/sensors', {'classification': '0', 'carId': '66-ZZ-66', 'temperature': 14.933515625, ...}) 5b5953ab-126e-4e3c-b504-b2d8551390e8 | 37 seconds ago | <button>Cancel</button> |
| jobs.sensors('http://cehum.ilch.uminho.pt/datalake22/api/sensors', {'classification': '0', 'carId': '66-ZZ-66', 'temperature': 14.933515625, ...}) 037cb1d8-1f91-4490-aff8-52963011ab7 | 36 seconds ago | <button>Cancel</button> |
| jobs.sensors('http://cehum.ilch.uminho.pt/datalake22/api/sensors', {'classification': '0', 'carId': '66-ZZ-66', 'temperature': 14.933515625, ...}) zaa89905-81be-4638-902c-9e6a1c1bfe0 | 36 seconds ago | <button>Cancel</button> |
| jobs.sensors('http://cehum.ilch.uminho.pt/datalake22/api/sensors', {'classification': '0', 'carId': '66-ZZ-66', 'temperature': 14.933515625, ...}) f6da19cd-d46d-4975-adec-3f6eb915e21 | 35 seconds ago | <button>Cancel</button> |

« ‹ 1 2 3 4 5 6 7 8 › »

◀ Home

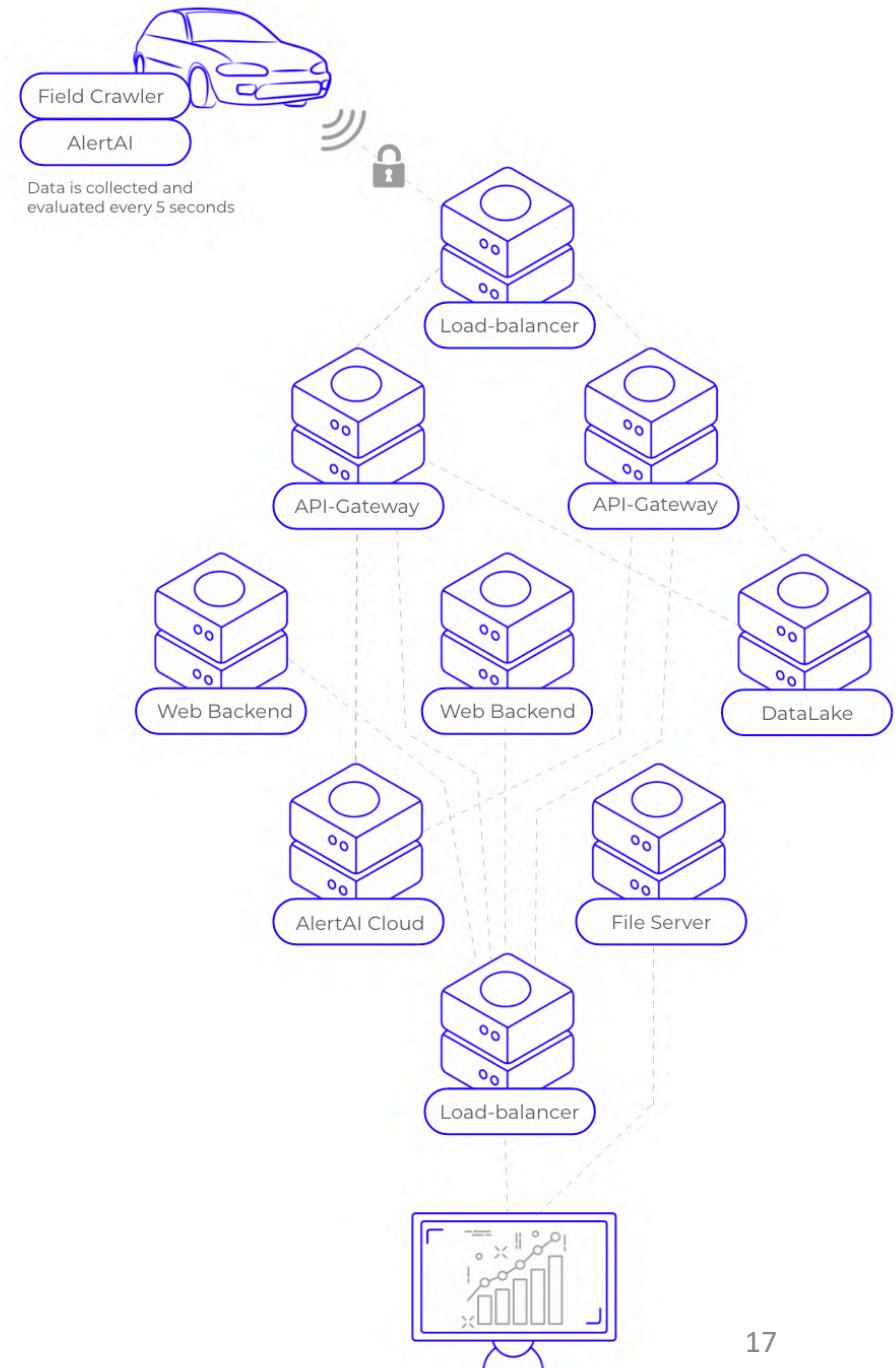
Final infrastructure



Final infrastructure

QA - Availability

- One-to-one asynchronous communication using queues
- Replication of instances
- Load balancing



Final infrastructure

Google Cloud

The screenshot shows the Google Cloud VM instances dashboard. At the top, there are navigation icons for creating a new instance, download, refresh, and more. Below the header is a search bar labeled "Filter VM instances" and a "Columns" dropdown. The main table lists 10 VM instances with the following details:

| Name | Zone | Recommendation | In use by | Internal IP | External IP | Connect |
|---------------------|----------------|----------------|-----------|--------------------|------------------|---------|
| alertai-cloud | europe-west1-b | | | 10.132.0.2 (nic0) | 34.76.239.59 ↗ | SSH ⏺ |
| apigateway | europe-west2-c | | | 10.154.0.4 (nic0) | 35.189.102.211 ↗ | SSH ⏺ |
| apigateway-2 | europe-west2-c | | | 10.154.0.5 (nic0) | 35.246.77.69 ↗ | SSH ⏺ |
| apigateway-datalake | europe-west2-c | | | 10.154.0.2 (nic0) | 34.105.216.153 ↗ | SSH ⏺ |
| apigateway-nginx | europe-west2-c | | | 10.154.0.7 (nic0) | 35.246.18.105 ↗ | SSH ⏺ |
| backend-mysql | us-west1-b | | | 10.138.0.37 (nic0) | 35.247.41.216 | SSH ⏺ |
| backend-nginx | us-west1-b | | | 10.138.0.40 (nic0) | 34.82.167.68 | SSH ⏺ |
| backend1 | us-west1-b | | | 10.138.0.38 (nic0) | 35.227.156.210 | SSH ⏺ |
| backend2 | us-west1-b | | | 10.138.0.39 (nic0) | 34.83.175.179 | SSH ⏺ |
| frontend | us-west1-b | | | 10.138.0.41 (nic0) | 35.247.44.100 | SSH ⏺ |

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