

EDYCE Prediction Capabilities in CORE Hybrid Cloud infrastructure

Prepared by:

Dimitris Lokas



Core Innovation Center R&I Project Manager

MSc Civil Engineer / University of Patras

MSc IoT and Smart Systems / University of Thessaly



Introduction

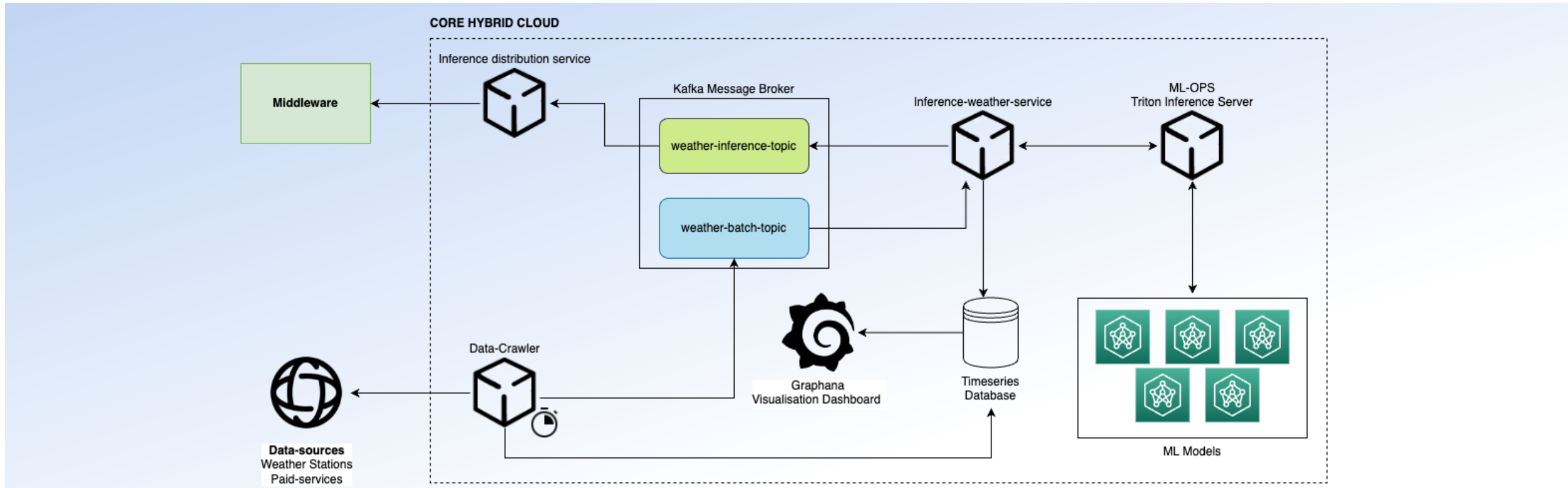
Objective:

- Discuss CORE IC Hybrid Cloud Infrastructure in EDYCE Project

Topics:

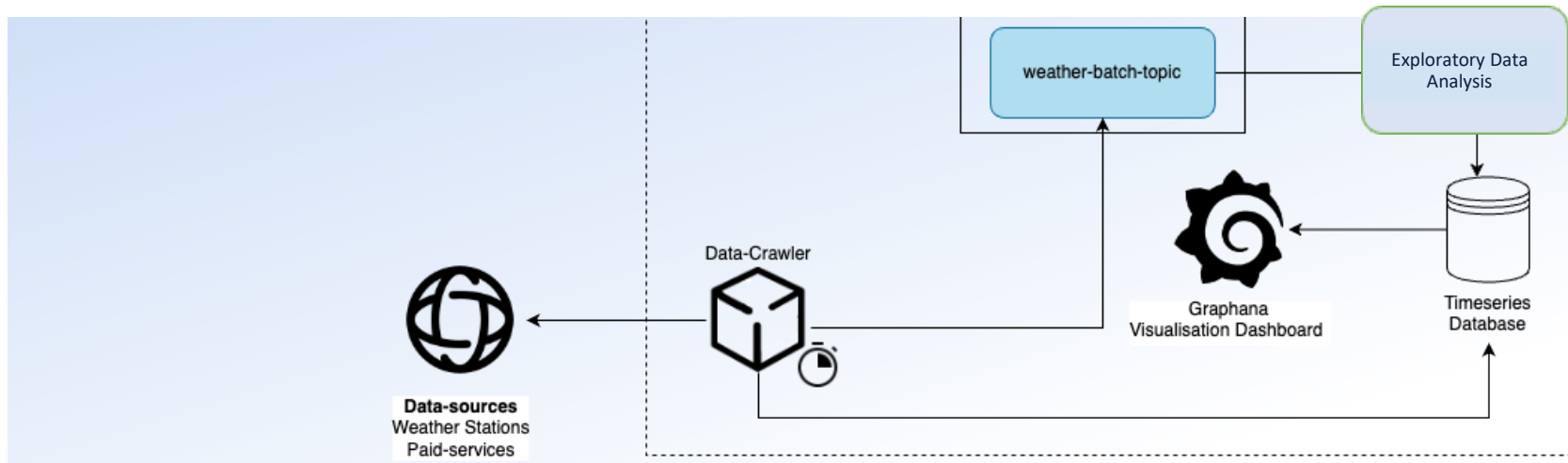
- Historical Data Collection and Deep Learning Models development
- Inference CORE Module and variants
- Model outputs and protocols
- Cloud services communication and connectivity options

Further information on CORE IC Hybrid Cloud application in EDYCE D3.4 “Prediction Capabilities”
<https://edyce.eu/reports-and-results/>



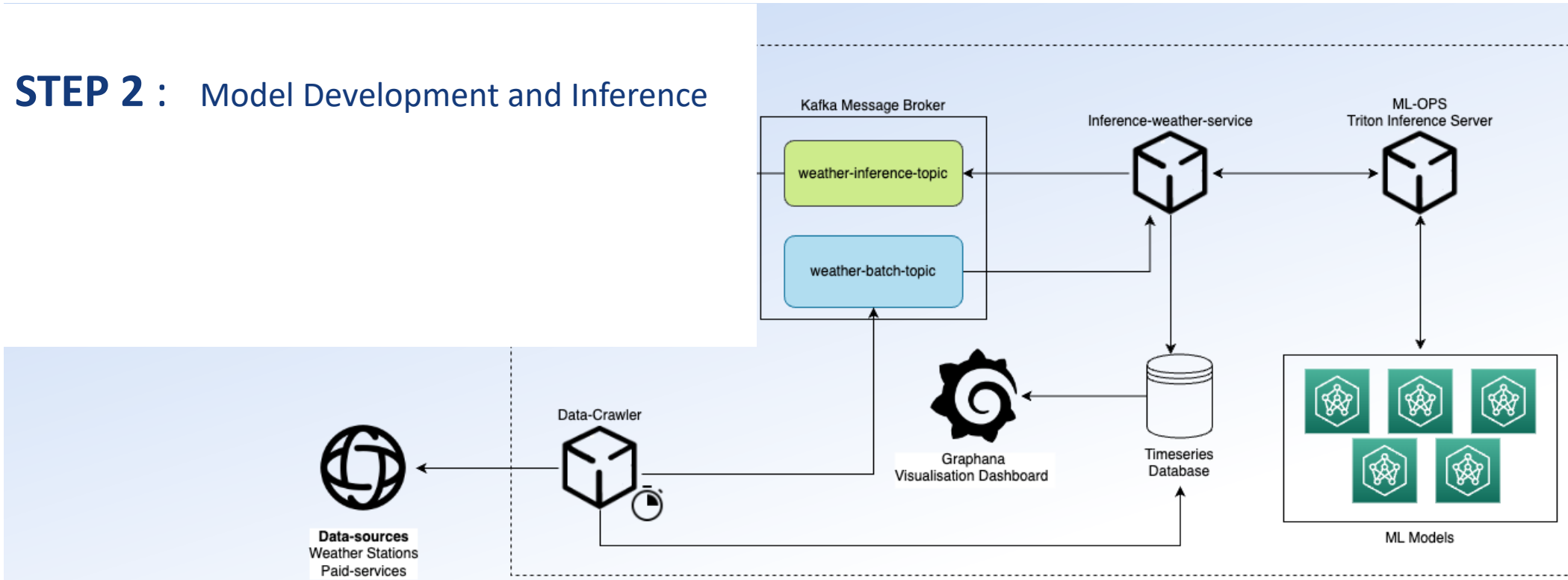
- Weather Service Example
- 3 Steps development
- Black Box Architecture

STEP 1 : Exploratory Data Analysis



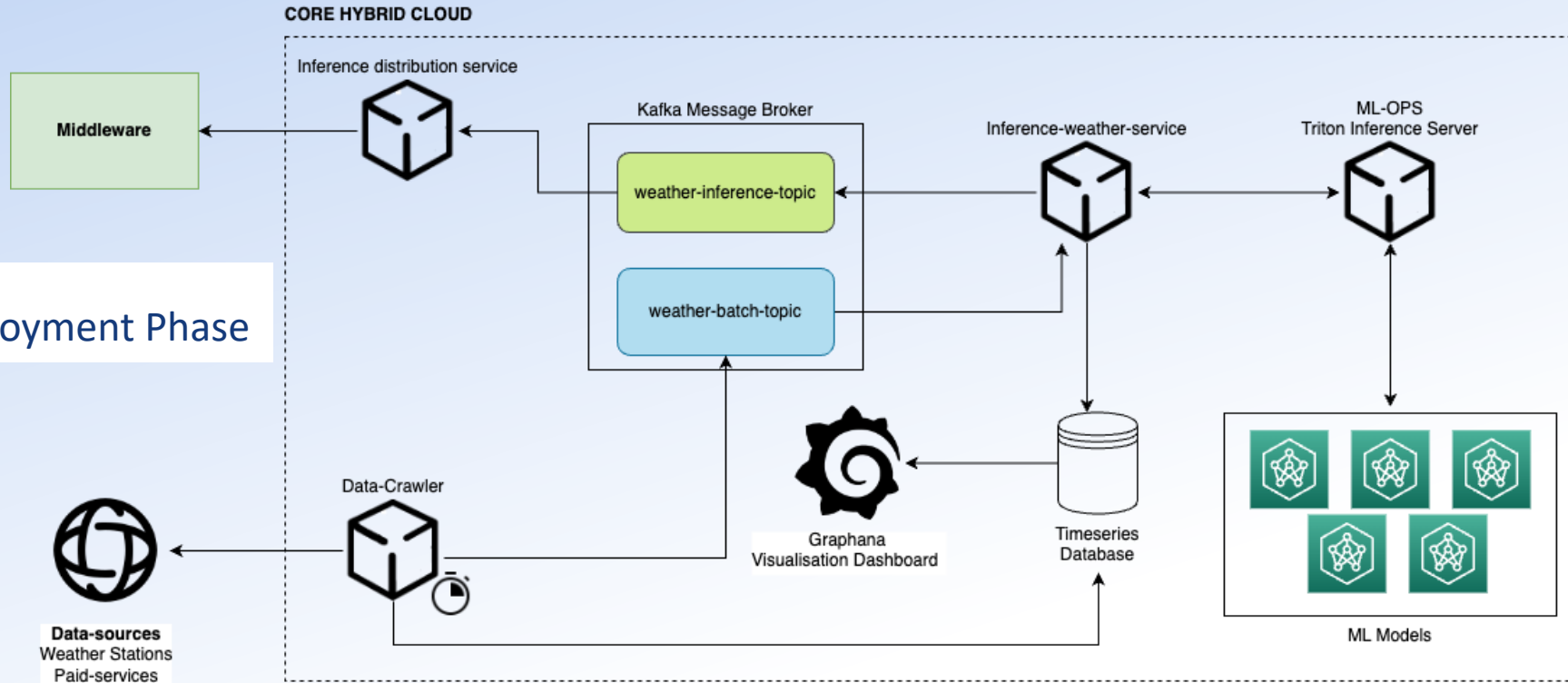
- Weather Service Example
- 3 Steps development
- Black Box Architecture

STEP 2 : Model Development and Inference



- Weather Service Example
- 3 Steps development
- Black Box Architecture

STEP 3 : Deployment Phase

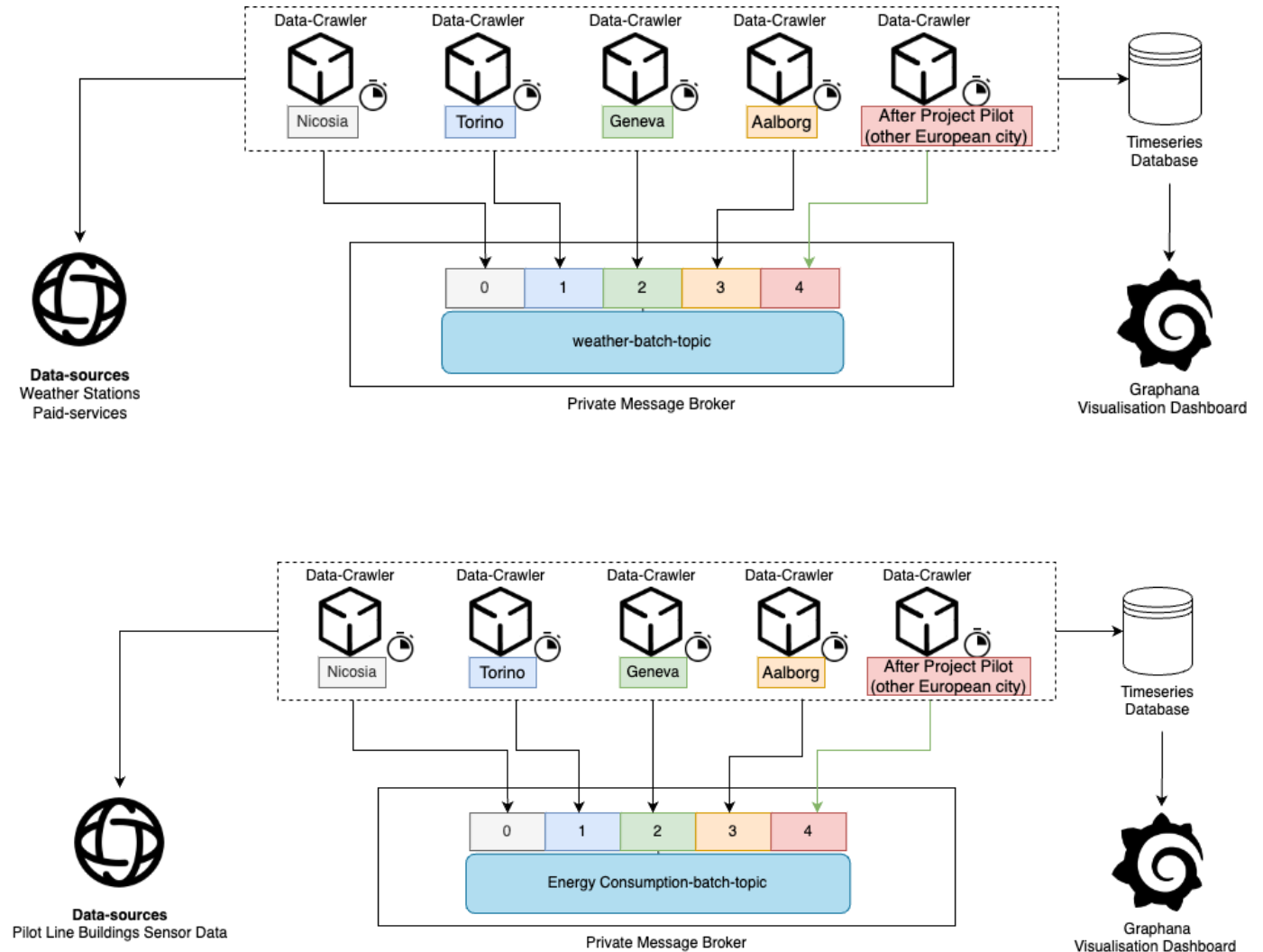


- Weather Service Example
- 3 Steps development
- Black Box Architecture

Historical Data Collection

Features

- Exploratory Data Analysis
- Scalability - addition option for future pilots and sites
- Persistence - Data availability for future access and developments
- Multiple database options (MongoDB, InfluxDB etc)
- Remote Accessibility (Data is gathered in local CORE-IC fail safe store database with access from cloud)
- Visualisation Options (Graphana, other dashboards)



Inference Core IC Module

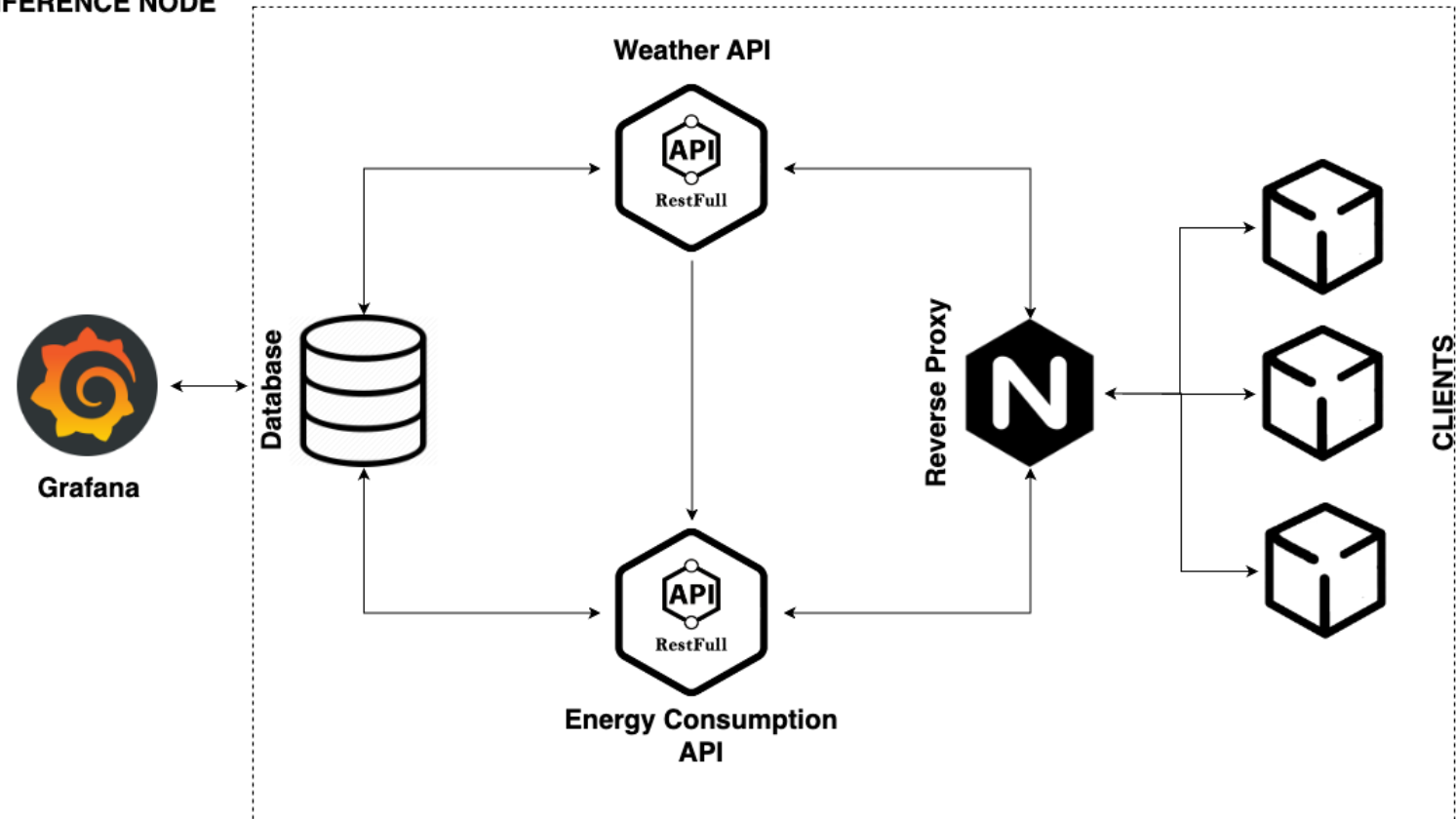
Scope

1. to consume the data streams produced by data acquisition pipeline
2. apply the necessary data pre-processing steps (e.g. scaling, handle outliers)
3. prepare the batch to be sent for inference
4. generate predictions

Core Inference Node Characteristics

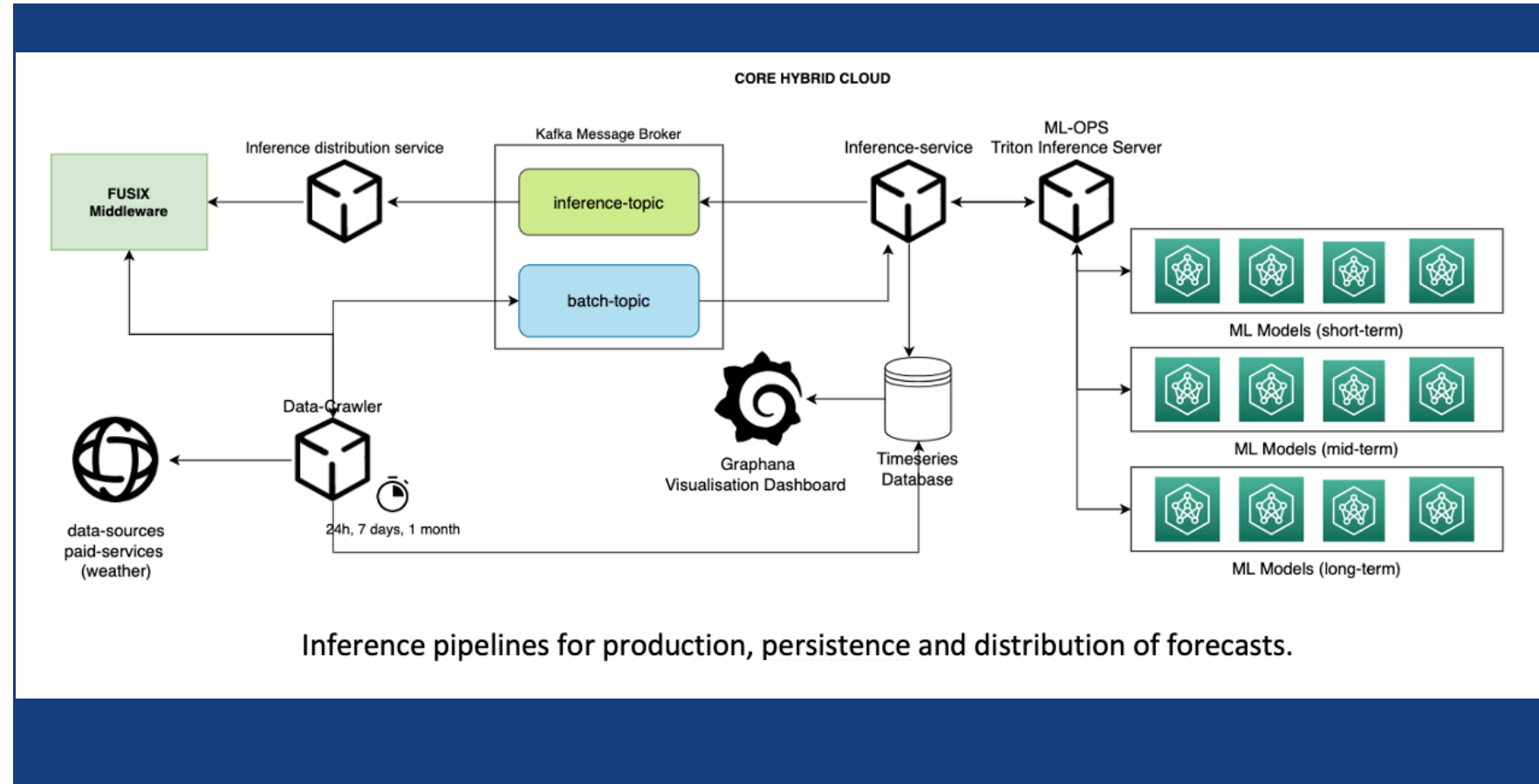
- Scalable architecture
- API correlations development
- Nvidia Triton Inference as Docker Image
- Restfull architecture
- Grafana dashboard for visualisation

CORE HYBRID CLOUD INFERENCE NODE

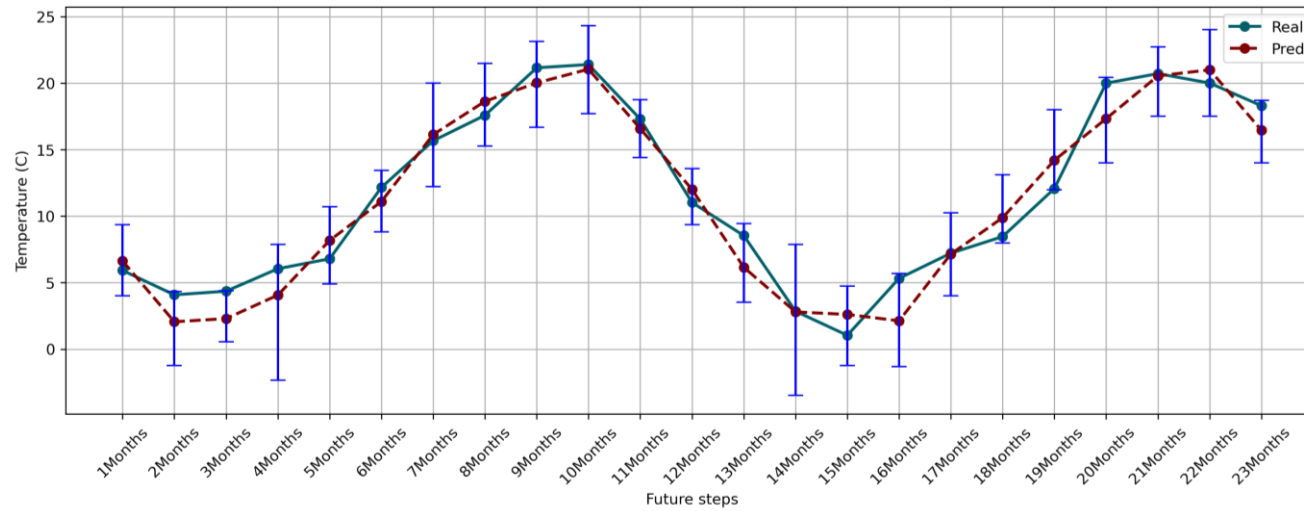


EDYCE Project CORE HYBRID CLOUD IMPLEMENTATION

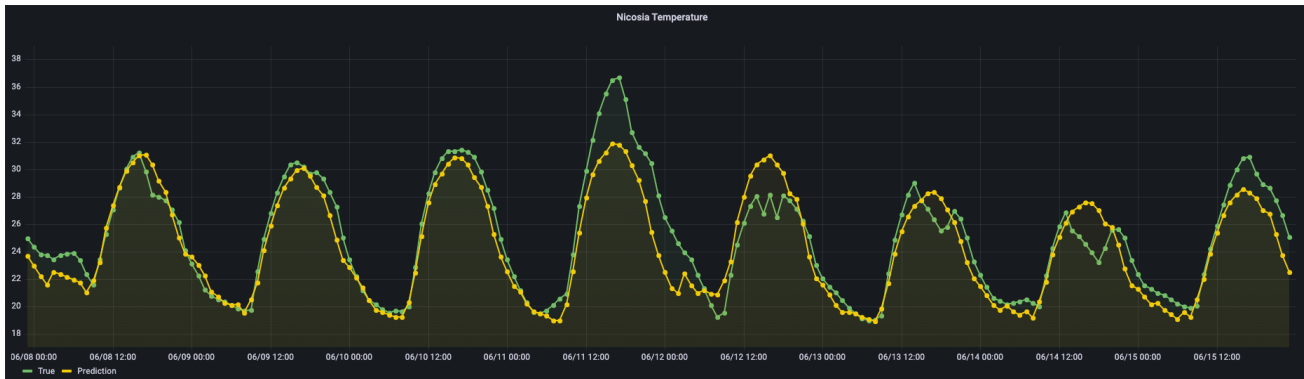
1. Triton Inference stack
2. Short Term
3. Mid Term
4. Long Term



Model outputs and impact towards Dynamic EPC

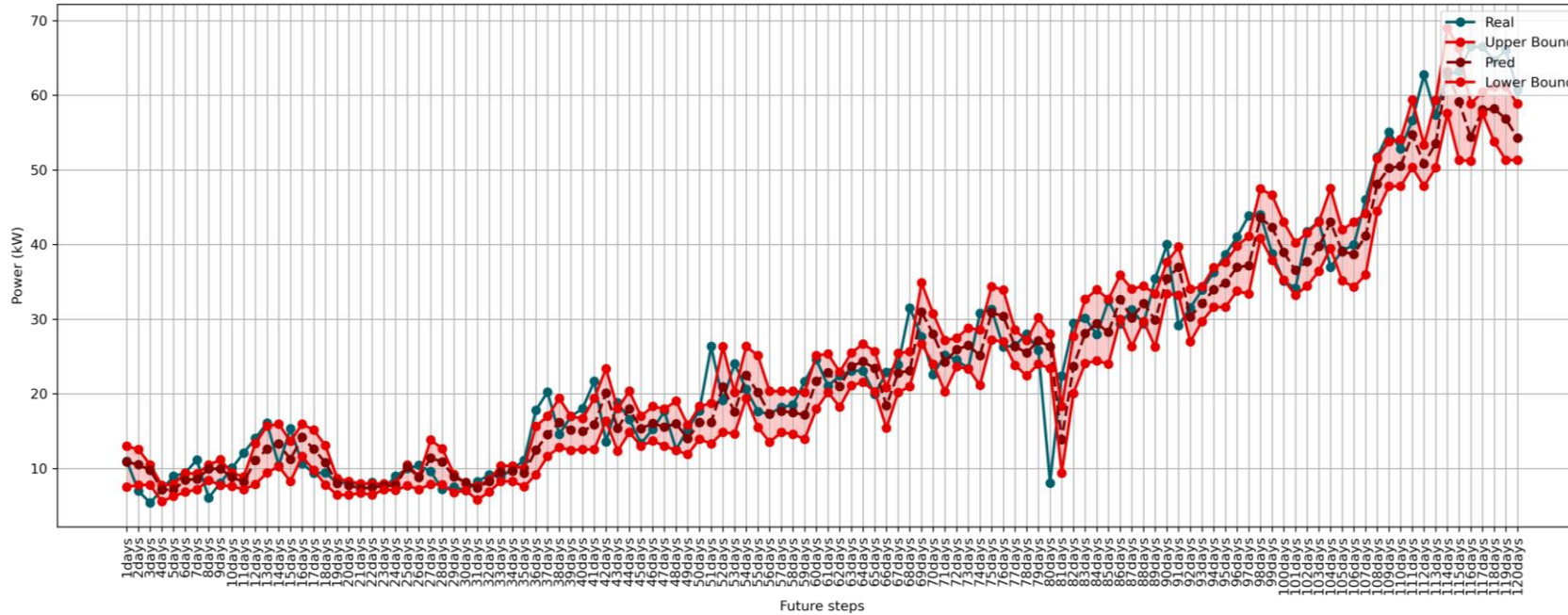


- Temperature Long Term Forecast for Seasonal Models



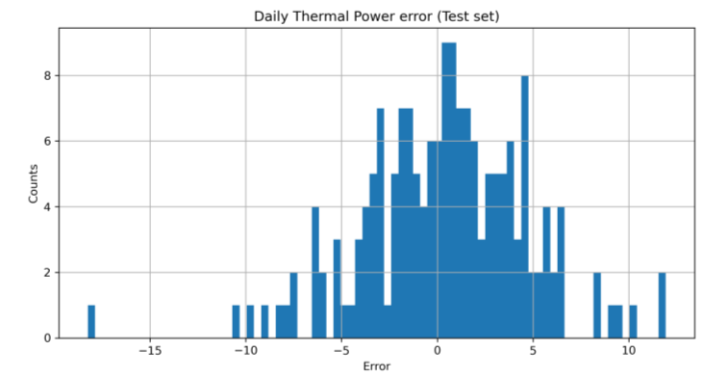
- Temperature Short Term Forecast(24h)

Energy Prediction – (Mid-Term) B4 Aalborg



- Energy consumption prediction forecast for accurate DEPC Model calculations

	El. Power consumption (kW)
R^2	0.9425
RMSE	4.253
MAE	3.265



Wide Connectivity options

Our CORE Inference Cloud infrastructure is compatible with all the know state of the art and widely established communication protocols and the individual services structured upon those interfaces.



*MQTT is established by OASIS foundation
KAFKA is APACHE[®] trademark

Project partners:



Web: E-DYCE.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 893945.