CLASS

COORDINATING EDGE AND CLOUD
FOR BIG DATA ANALYTICS

CLASS project overview: A novel software architecture

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General Information

- Edge and **Cl**oud Computation: **A** Highly Distributed **S**oftware Architecture for Big Data Analytic**S**
  - Under the scope of ***H2020 ICT16-2017 (RIA)*** - *Big data PPP: research addressing main technology challenges of the data economy*
  - **42 months** (starting January 2018)
  - **3.900.803 €** budget

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

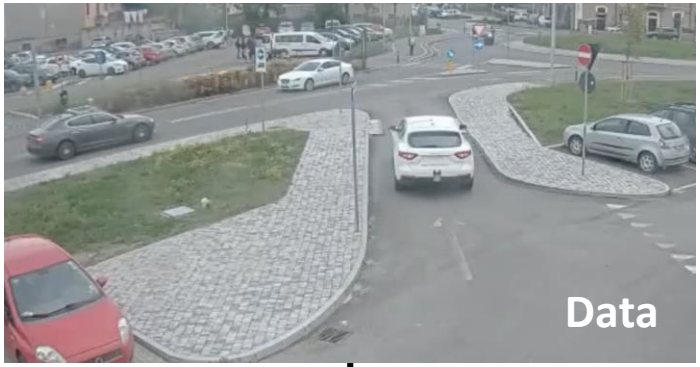
Comune di Modena

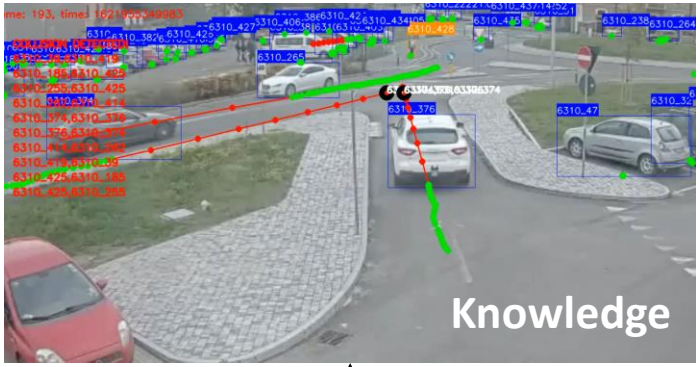
UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

IBM

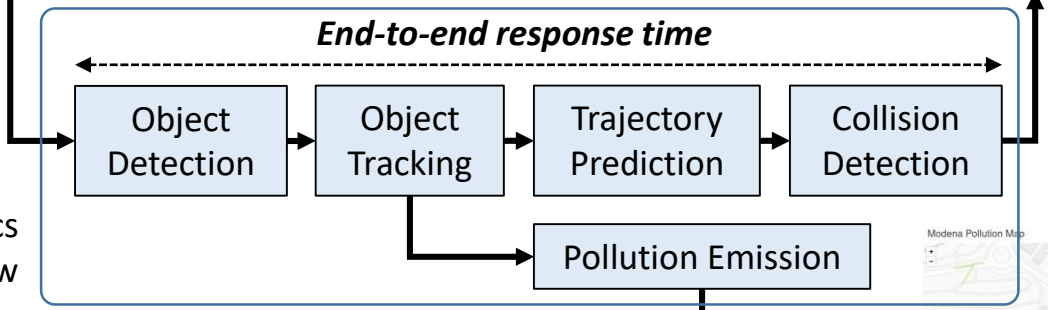
Atos

From Data to Real-time Knowledge



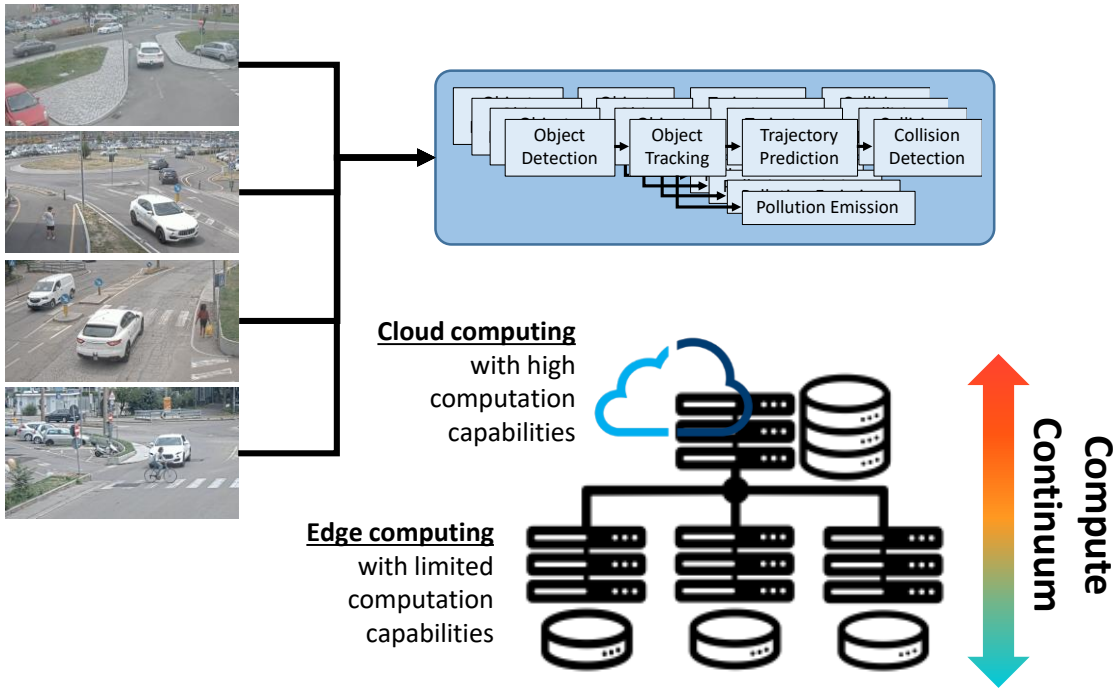


Data Analytics Workflow



Knowledge

From Data to Real-time Knowledge

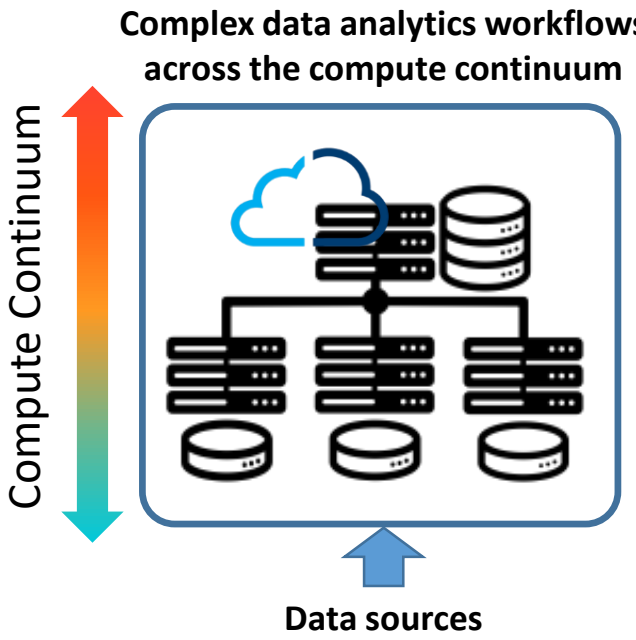


Challenges:

1. **Geographically distributed data sources** and so data analytics requirements, e.g., smart cities
2. The fulfillment of **real-time requirements** inherited from the application domain in a distributed environment

A coordination of **edge and cloud resources is needed!**

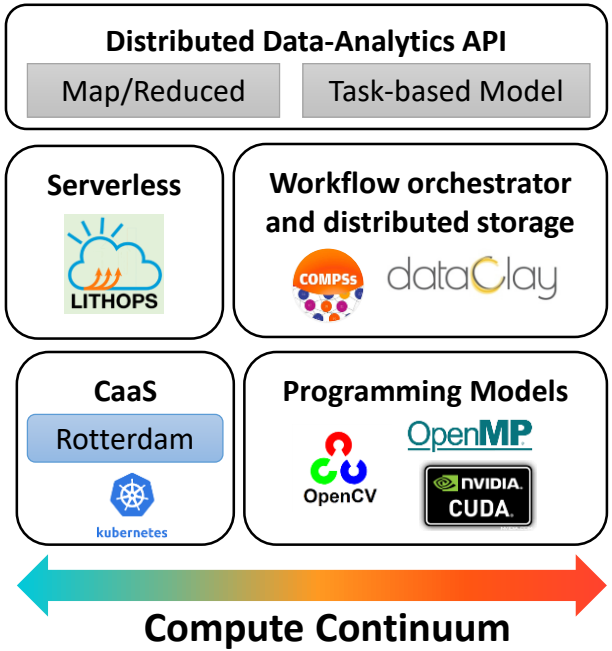
The Vision of CLASS



1. Significantly **increase the capabilities** of the data analytics
   - Integrate both responsive data-in-motion and latent data-at-rest analytics in a **single complex workflow**
2. Use advance parallel and energy-efficiency edge computing platforms
3. Fulfill the **real-time requirements**

Productivity
- \+ **Programmability**
- \+ **Portability/Scalability**
- \+ **(Guaranteed) Performance**

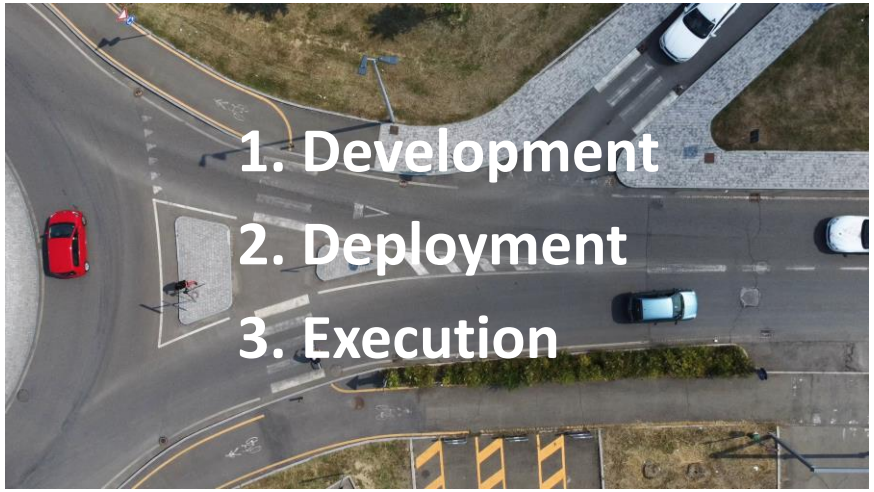
Main Contribution:
The CLASS Software Architecture



- Integrate technologies from different **computing domains** into a single development framework
  1. Powerful API for the development of advanced **data-analytics methods**
  2. **Advanced orchestration methods for time-predictable** workflow scheduling and deployment across the compute continuum
  3. **QoS Serverless** and **CaaS** cloud technologies
  4. Used of **advanced edge processor architectures**

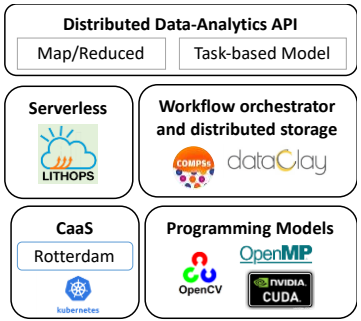
Smart City Use-Case

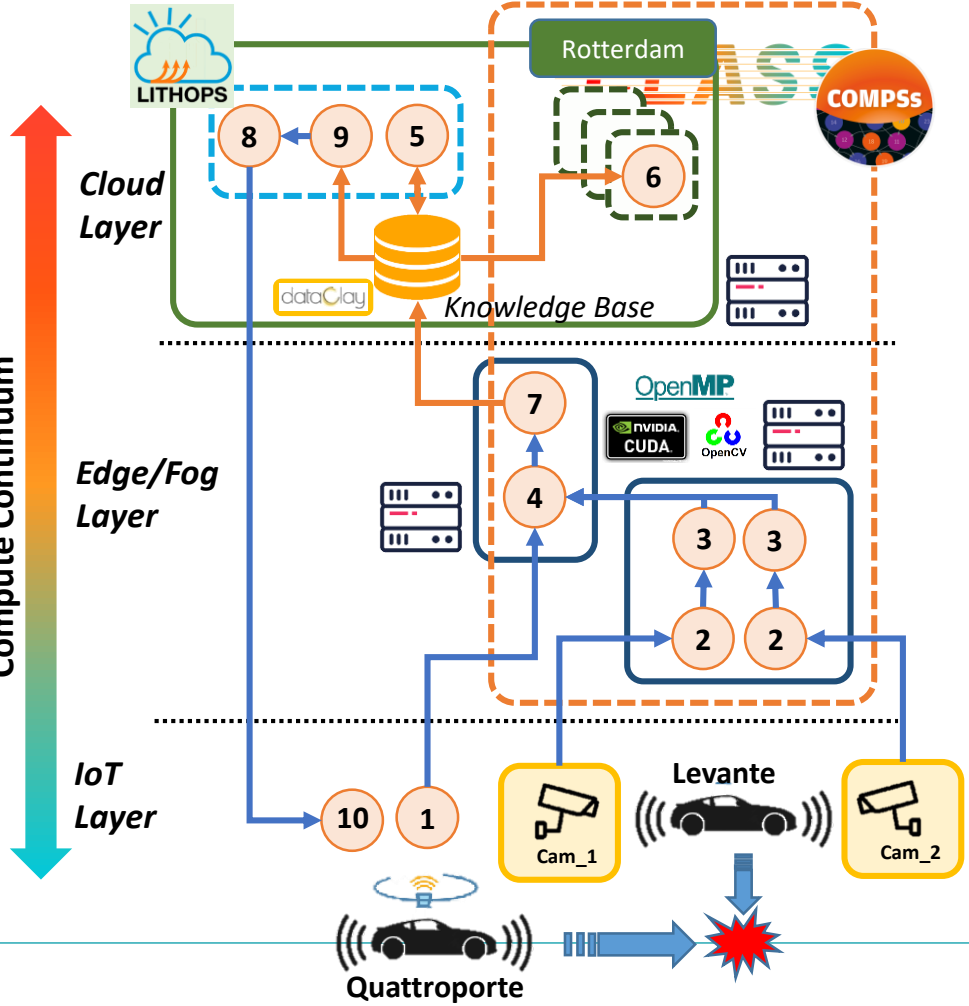
- Deployed on the **Modena Automotive Smart Area (MASA)** in the city of Modena (Italy)
  1. A **living lab urban area** with IoT connectivity and a compute continuum infrastructure
  2. **Two connected cars** equipped with sensors (cameras and LiDAR) and V2I communication
- Information exchange between the city and vehicles to enhance mobility
  1. Advanced Driving Assistant Systems based on collision detection
  2. Computation of emission of pollution in real-time

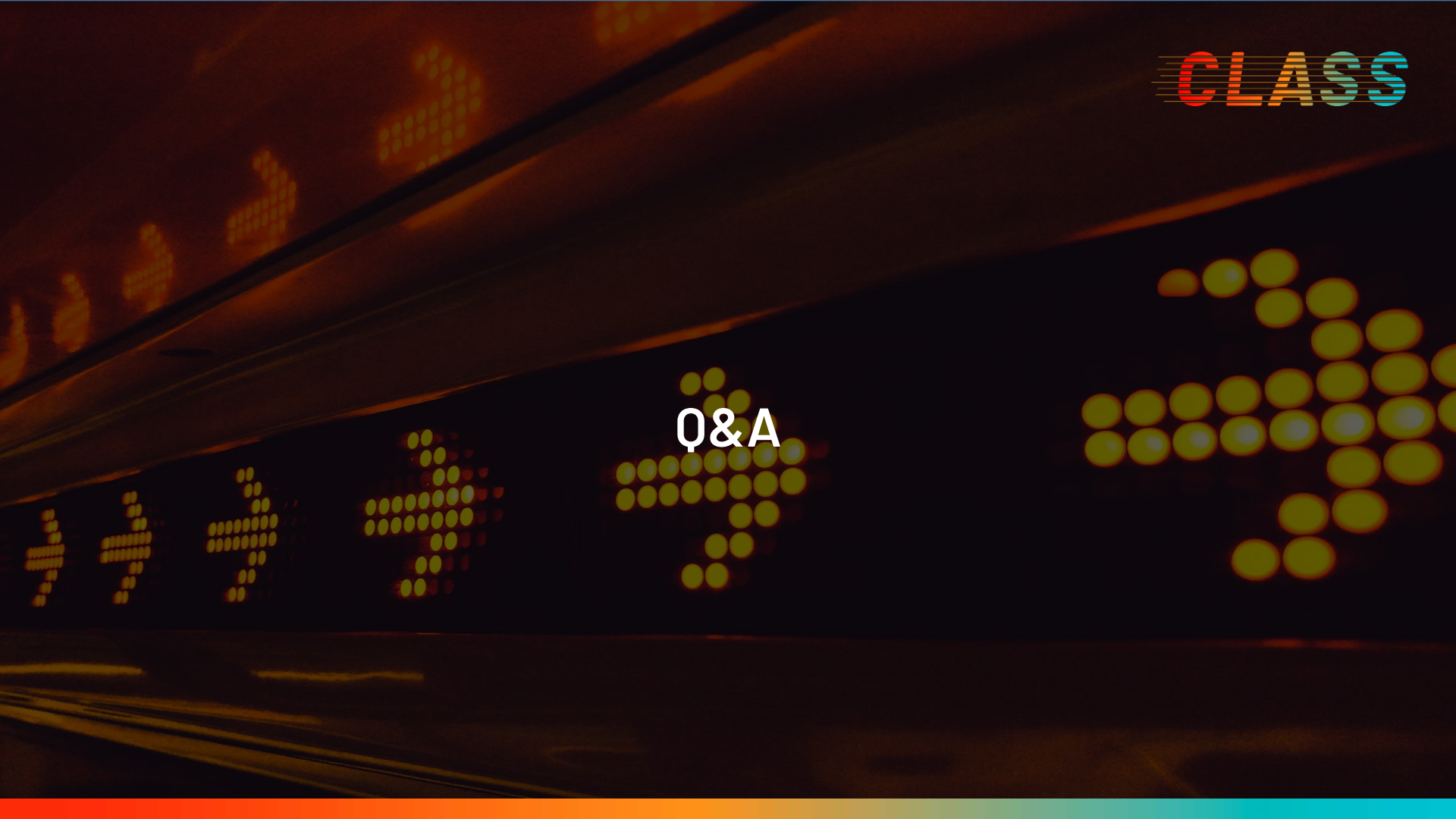


Data-Analytics Methods

1. Sensor Fusion
2. Object Detection
3. Object Tracking
4. Data deduplication
5. Trajectory Prediction
6. Air pollution computation
7. Data model creation
8. Collision Detection (CD)
9. Generation of WA
10. WA alert visualization



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