Big Data Analytics for Smart Cities: The H2020 CLASS Project

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CCS CONCEPTS

• **Computer systems organization → Cloud computing**; **Embedded systems**; • **Software and its engineering → Real-time schedulability**; • **Theory of computation → MapReduce algorithms**;

1 INTRODUCTION

Applying big-data technologies to field applications has resulted in several new needs. First, processing data across a *compute continuum* spanning from cloud to edge to devices, with varying capacity, architecture etc. Second, some computations need to be made *predictable* (real-time response), thus supporting both *data-in-motion* processing and larger-scale *data-at-rest* processing. Last, employing an event-driven programming model that supports mixing different APIs and models, such as Map/Reduce, CEP, sequential code, etc.

2 THE H2020 CLASS PROJECT

CLASS aims to create a platform that allows users to develop and execute their applications efficiently. At the resource level, *fog*[3] principles are applied, of distributing computation across the continuum using COMPSs [1], and taking decisions closer to the data origin to reduce communication. On the edge, new embedded architectures (e.g., GPUs, many-core) are used. On the cloud side CLASS aims to maximize throughput while maintaining latency requirements. Last, CLASS aims to explore a serverless polyglot event-driven platform of Apache OpenWhisk [2] and extend it with real-time requirements, both for analytics foundation and for the programming model.

3 SMART CITY USE-CASE

CLASS software will be evaluated in the *Modena Automotive Smart Area* (MASA), a real urban laboratory in Modena, Italy, equipped with sensors, cellular and optic connectivity. Maserati provides prototypes of highly-connected cars with sensors, such as radars. The use-case consists of the following set of CLASS applications:

- **Intelligent traffic management**, dynamically controlling traffic lights and smart road signals based on traffic conditions, e.g., to reduce fuel consumption and providing "green routes" for emergency vehicles.
- **Advanced driving assistance** providing obstacle avoidance, dynamic path/route planning and parking assistance.

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