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.

REFERENCES