ELASTIC: A Software Architecture for Extreme-ScaLe Big-Data AnalyticS in Fog CompuTIng ECosystems

Description

Big data is nowadays being integrated in systems requiring to process a vast amount of information from (geographically) distributed data sources, while fulfilling the non-functional properties (real-time, energy-efficiency, communication quality andsecurity) inherited from the domain in which analytics are applied. Examples include smart cities or smart manufacturingdomains. ELASTIC will develop a novel software architecture (SA) to help system designers to address this challenge. The SA will incorporate a novel elasticity concept to distribute and orchestrate the resources across the compute continuum (from edge to cloud) in an innovative fog computing environment. The new elasticity concept will enable to match analyticsworkload demands and fulfilling non-functional properties. The fog computing architecture will incorporate energy-efficient parallel architectures, combined with innovative distributed storage, secure communications and advanced cloud solutions.

Overall, the SA will enable the combination of reactive data-in-motion and latent data-at-rest analytics into a single extreme-scale analytics solution, in which the analytics workloads will be efficiently distributed across the compute continuum based on their suitability and data processing needs. The capabilities of ELASTIC will be demonstrated on a real smart-mobility use case, featuring a heavy sensor infrastructure to collect data across the Florence tramway network, equipped with advanced embedded architectures, heterogeneous sensors, V2I connectivity and access to cloud resources. Representative applications for advanced driving assistant systems, predictive maintenance and public/private transport interaction, have been selected to efficiently process very large heterogeneous data streams from distributed sensors. ELASTIC technology will enable the development of innovative mobility services while preparing the technological background for the advent of full autonomous mobility systems.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación