Transparent Application Deployment in a Secure, Accelerated and Cognitive Cloud Continuum

ICCS   Mellanox TECHNOLOGIES   Chocolate Cloud   Universität Stuttgart   ARISTOTLE UNIVERSITY OF THESSALONIKI   INTRASOFT INTERNATIONAL

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SERRANO envisages the creation of an infrastructure agnostic automation process that will translate applications' high-level requirements to infrastructure-aware configuration parameters, which are then applied on secure and accelerated resources.

At a glance: SERRANO

Project Website: ict-serrano.eu

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Duration: 36 months

Partners:

Institute of Communication and Computer Systems – ICCS (Greece), Mellanox Technologies Ltd – MLNX (Israel), Chocolate Cloud ApS – CC (Denmark), Universitaet Stuttgart – USTUTT/HLRS (Germany), Aristotelio Panepistimio Thessalonikis – AUTH (Greece), INTRASOFT International SA – INTRA (Luxembourg), Inbestme Europe Agencia de Valores S.A. – INB (Spain), Innovation Acts Limited – INNOV (Cyprus), IDEKO S COOP – IDEKO (Spain), Universitatea de Vest din Timişoara – UVT (Romania), Nubificus Ltd – NBFC (United Kingdom)

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The Challenge

We are witnessing a wave of emerging cloud computing technologies and services that empower advanced applications from different vertical sectors, with diverse requirements. Also, there is a movement from top-down-designed architectures, applying centralized resource control, towards federations of loosely coupled autonomous or semi-autonomous systems, managed by multiple independent actors that are self-organized in a distributed manner. These trends give rise to several fundamental challenges that relate to the application deployment, the support of heterogeneous infrastructures and the provided security.

Vision

SERRANO targets the efficient and transparent integration of heterogeneous resources, providing an infrastructure that goes beyond the scope of the "normal" cloud and realizes a true computing continuum. SERRANO will introduce a novel ecosystem of cloud-based hardware and software technologies. This will enable application-specific service instantiation and optimal customizations, thus supporting highly demanding, dynamic and security-critical applications. The overall orchestration will be performed in a lean, automated, holistic and integrated manner.
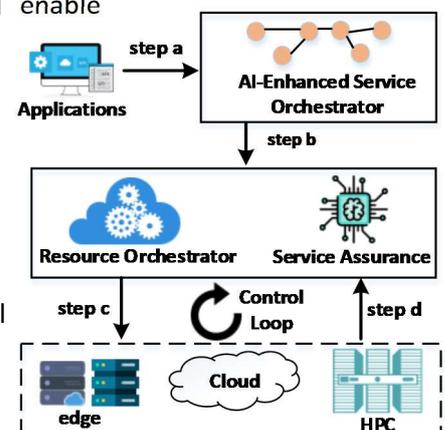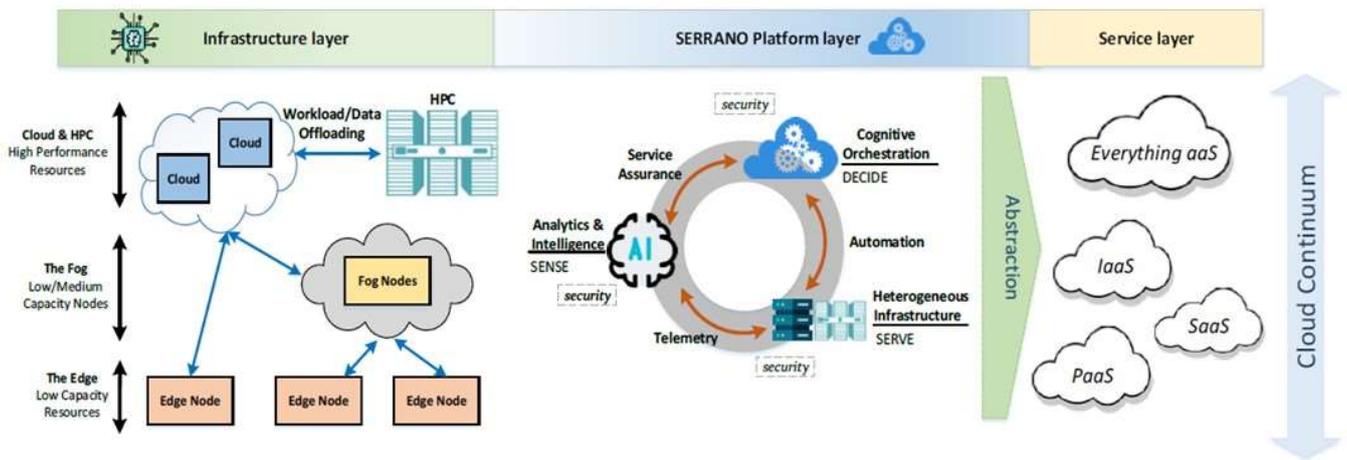
Project Objectives

SERRANO will create an abstraction layer that translates applications' high-level requirements to infrastructure-aware configuration parameters. The SERRANO platform will automatically determine the most appropriate resources to be used, and then transparently deploy workloads and coordinate data movement. Service assurance mechanisms based on artificial intelligence and machine learning techniques will facilitate the autonomous adaptation and management of the deployed services and resources. These mechanisms will be dynamically triggered by a data-driven cloud and network telemetry framework. SERRANO platform will also develop hardware and software-based mechanisms that provide security, privacy and multi-tenancy by design. In this way, applications and users will be able to maintain control over their data integrity and privacy when relying on publicly shared edge and cloud infrastructures. SERRANO will capitalize on the benefits offered by hardware accelerators used to execute prototype tasks that arise often in applications, coupled with novel transprecision computing mechanisms to exploit the accuracy versus resource usage tradeoff. Finally, SERRANO will demonstrate its advanced and innovative capabilities through three well-defined use cases in cloud storage services, fintech and manufacturing.

Technology Exploitation

SERRANO's modular-by-design approach supports the creation of a plethora of services that can be placed in the center of an innovative market ecosystem, which drives business innovation and enterprise transformation. These SERRANO services include: (i) secure, accelerated, federated infrastructures consisting of edge, cloud and HPC resources that also utilize novel cognitive mechanisms for the automation and optimization of their internal operations (SERRANO IaaS), (ii) domain specific and generic platforms for deploying and executing safety-critical, low-latency, data-intensive applications and other workflows (SERRANO PaaS), (iii) Cognitive Distributed Secure Storage as a Service (CDSSaaS) and Extreme Scale Analytics as a Service (ESAaaS) (SERRANO SaaS), (iv) business processes (e.g. for fintech and manufacturing) as a service (SERRANO BPaas). The SERRANO enabled IaaS, PaaS, SaaS and other product variants can be introduced in the today's and future's cloud computing market.