



Efficient, portable And Secure orchestration for reliable services

Date | Place | Presenter/Organisation



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Project Identity Card

elastic



Project Consortium: 13 partners



Project Type:
Research & Innovation Action



Duration: 36 Months



Start Date: 1 March 2024



Total Budget: €3,999,990



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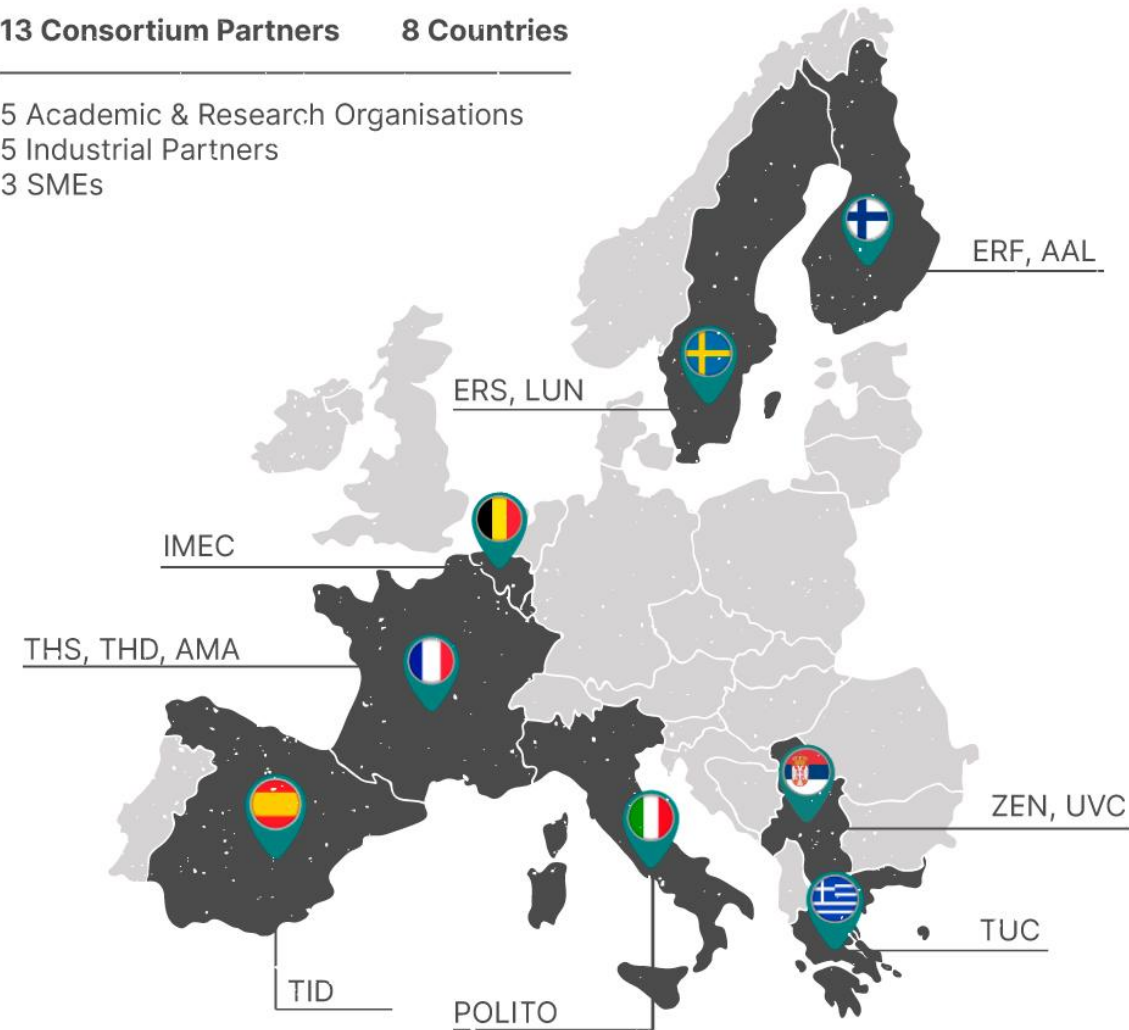
ELASTIC Consortium

elastic

1. POLYTECHNEIO KRITIS (**TUC**)
2. ERICSSON AB SE (**ERS**)
3. OY L M ERICSSON AB (**ERF**)
4. TELEFONICA INVESTIGACION Y DESARROLLO SA (**TID**)
5. THALES SIX GTS FRANCE SAS (**THS**)
6. THALES DIS FRANCE SAS (**THD**)
7. INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM (**IMEC**)
8. ULTRAVIOLET CONSULT DOO (**UVC**)
9. AALTO KORKEAKOULUSAATIO SR (**AAL**)
10. LUNDS UNIVERSITET (**LUN**)
11. ABSTRACT MACHINES SAS (**AMA**)
12. PRIVREDNO DRUSTVO ZENTRIX LAB DRUSTVO SA OGRAN (**ZEN**)
13. POLITECNICO DI TORINO (**POLITO**)

13 Consortium Partners 8 Countries

5 Academic & Research Organisations
5 Industrial Partners
3 SMEs



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Motivation



6G communication networks

Important to **ensure efficient and effective orchestration** of its broad range of services and resources



Edge cloud computing

Increasingly important as the data volumes rise with the number of the connected devices



Security in 6G

Critical issue in 6G services due to privacy and confidentiality of sensitive data

Challenges

1

Security of lightweight and portable executable isolation

- Secure portable and lightweight workloads
- Improve orchestration monitoring latencies

3

Privacy-preserving multi-party confidential computing

- HW CPU extensions for creating secure enclaves

2

Efficient and secure serverless orchestration over a heterogeneous continuum

- Fast and secure orchestration services

4

Portable and secure workload distribution and execution over constrained far-edge IoT devices

- Efficient process orchestration and execution over 6G networks

Our mission



ELASTIC aims to enhance the **efficiency and security of service orchestration** within the highly distributed and heterogeneous context of **cloud-fog-edge continuum** technologies.

ELASTIC will focus on **combining** impactful **key technologies** from modern **cloud-native ecosystems** to enhance **service orchestration** and **security** over **6G networks**.



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Challenges

WebAssembly (Wasm)

High efficiency and security of cloud orchestration

High service portability

Support a variety of programming languages

Lightweight computation

Serverless Function-as-a-Service (FaaS)

High scalability and efficient architecture

Responsiveness and adaptability to conditions changes

Automatic scaling up or down

Latency reduction

Confidential Computing

Trusted Execution Environments (TEEs)

Cryptographic CPU HW extensions

Sensitive data protection

Unauthorised code access protection

eBPF/XDP

Real-time monitoring and security scanning

Low-latency network packet processing

Framework that combines all the above tools across cluster-based environments

Objectives



Analyse **executable isolation techniques**, and **improve efficiency, portability, and security** for secure **in-network cloud and edge** computing across the entire lifecycle



Research and design **secure, architecture-agnostic serverless FaaS orchestration** for diverse artifacts and workloads. Ensure **data authenticity** and **trusted digital interactions** in dynamic service environments



Implement a **secure, privacy-preserving, architecture-agnostic execution environment** utilising confidential computing and privacy-enhancing technologies to ensure secure services on a programmable platform for multi-stakeholders



Design and implement **efficient, secure edge and far-edge (IoT) workload orchestration** for critical **6G infrastructure**, ensuring **reliability, trust, and resilience** in a globally connected continuum of heterogeneous environments facilitated by network and IT system convergence for future digital services



Facilitate **6G standardisation, exploitation, and dissemination** of developed technologies, aligning with **EU supply capabilities** for efficient, secure, and privacy-preserving service deployment

Pilot 1 - Smart Connected Factory of the Future

IoT data fabric solution for hyper-scale data processing in a 6G timeframe

Tools:

- eBPF for security vulnerabilities
- WebAssembly and FaaS security frameworks
- Hardware-based, embedded low-power modules for security issues detection

ELASTIC goals & scenarios:

- In-transit **IoT data processing using FaaS**
- Use **lightweight virtualisation** to minimise processing **latency** and **resource utilisation**
- Deploy ELASTIC **stateless and minimal-state** processing on **resource-constrained device clusters**
- Deploy **privacy-aware mechanisms** for sharing threat information among distinct ELASTIC instances



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Pilot 2 - IT/OT - Privacy-preserving confidential computing platform to migrate on-premise sensitive IT services to the cloud

Confidential computing for secure migration of sensitive services to the cloud

Tools:

- VM-based Trusted Execution Environments
- HW platform abstractions
- Wasm containers
- eBPF monitoring

ELASTIC goals & scenarios:

- Automated handling (i.e., creation and initialisation of confidential VM)
- TEE abstractions to use any CSP infrastructure (e.g., Gardeners to start irrigation)
- Handle remote attestations
- Software Management Agents (SMAs) for confidential VMs





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