DECENTER

Decentralised technologies for orchestrated Cloud-to-Edge Intelligence

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Website: www.decenter-project.eu
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Main facts

Research and Innovation Action (RIA) involving European and South Korean research partners

Topic: **Cloud, IoT and AI technologies**

Topic identifier: EUK-01-2018

Funded by European Commission (EC) and Korean Ministry of Science and ICT (MSIT)

European budget: € 2,197,700.00

Korean budget: KRW 3,161,100,000

Project duration: 36 months

Project start: 01/07/2018

Project end: 30/06/2021

Project structure:

11 partners, 6 European partners, 5 Korean partners

7 Work Packages
Our challenge

Cloud-based AI (today)

Issues

- Computing latency
- Bandwidth limitations
- Resource availability and ownership
- Data privacy

Cloud

Data

Things
Geographically-sparse
Heterogeneous
Decentralised ecosystem where resources owned by big and small providers can be harmoniously orchestrated throughout the cloud-to-things continuum (vertical) in dynamically created multi-cloud environments (horizontal)

**DECENTER** provides reactive and effective computation to deploy (distributed) AI applications
Key Innovations

Robust and secure Fog Computing Platform providing application-aware orchestration of resources and zero-touch provisioning of Microservices

Blockchain-based framework to catalyse offer and demand for Edge resources to draft and seal Smart Contracts, monitor their fulfillment and grant rewards

Smarter IoT fabric able to cope with the data deluge coming from multiple data sources for feature extraction, data filtering at the edge, etc.

Hybrid decentralised AI models exploiting DECENTER’s novel infrastructure and benefiting from data locality (e.g., time-critical scenarios)
A first glance at benefits

**Issues**

- Computing latency
- Bandwidth limitations
- Resource availability and ownership
- Data privacy

**Decentralised fog/edge computing** effectively offers timely computation.

**Pre-elaborated data in the fog-layer reduces need of bandwidth between cloud and edge.**

**Smart contracts enable successful (yet short-lived) resource sharing between providers.**

**Data filtering and processing at the edge allows to preserve confidential data.**
Objectives

Define **resource models** and associated SLAs for in-border and cross-border services

Develop a robust **multi-tier fog platform** to manage cloud-to-edge resources

Define and implement resource **orchestration** strategies to satisfy app requirements

Implement **blockchain-based smart contracts** and probing tools to validate their fulfillment

Privacy-preserving mechanism to represent users’ context

Facilitate **interoperable IoT** device management in the infrastructure

Develop hierarchical methods to map **AI algorithms** from the cloud to the edge

Develop **application data management** over the infrastructure for cross-border AI

**Validate** DECENTER innovations, and **demonstrate** them in real world pilots

Promote the **standardisation** and industrial application of DECENTER results
Use-cases

**Smart City: crossing safety**
Monitor road crossings to spot and signal in real-time potential dangers that might put pedestrian safety at risk.

**Robotic logistics**
Novel, cost-effective, robotic indoor transport solution specially suited for warhouses relying on time-sensitive edge-based automation.

**Smart Construction: safety at work**
AI methods for video stream analysis in a construction site scenario to provide early warning against accidents and more.

**Ambient Intelligence: safety at home and around**
AI powered by live data to timely discover possible dangerous situations at home and in other buildings, while ensuring data privacy.
Workplan

Coordination activities

WP1: Project coordination and management
WP7: Ethics requirements

Outreach activities

WP6: Dissemination, Communication, Standardization, Exploitation

Technical activities

WP2: Use cases, system architecture and business models
WP3: Decentralised computing infrastructure
WP4: Delivering applications intelligence at the edge
WP5: Integration and demonstration
Consortium

Large Industry
- Atos
- LG U+

SME
- daliworks
- gluesys
- Robotnik

Research center
- ENTEK
- KETI (Korea Electronics Technology Institute)
- CEA

EU coordinator
- Korean coordinator

Public Administration
- COMUNE DI BRENTO

University
- University of Ljubljana
- SEOUL NATIONAL UNIVERSITY
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