



PLEDGER

Paving the way for next-generation edge computing

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KEY FACTS

- PROJECT NAME:**
PLEDGER: Performance optimization and edge computing orchestration for enhanced experience and Quality of Service
- GRANT AGREEMENT NO**
871536
- TOPIC**
ICT-15-2019-2020
- CALL**
H2020-ICT-2018-20
- FUNDING SCHEM:**
Research & Innovation Action (RIA)
- FUNDED UNDER**
H2020 Framework
- DURATION**
36 months

ABOUT PLEDGER

PLEDGER is a new project coordinated by ATOS Spain. It is funded by the European Union's Horizon 2020 research and innovation programme.

The project aims to deliver a new architectural paradigm that will pave the way for next-generation edge computing infrastructures, tackling the modern challenges and coupling the benefits of low latencies on the Edge with the robustness and resilience of cloud infrastructures. It will also allow edge computing users to understand the nature of their applications, research understandable quality of service metrics and optimise the competitiveness of their infrastructures.

Enjoy reading all about the PLEDGER project!

CHALLENGE AND SOLUTION

One of the main drawbacks and hindering factors in the process envisioned by Pledger is the lack of cross-layer knowledge and the inability to exchange it that are enforced upon the involved roles:

THE IAAS PROVIDERS that require improved awareness on the types of applications executed by their customers,

THE ADOPTERS/CONSUMERS (e.g. SaaS providers) of infrastructure services, that require improved awareness on the types of physical nodes their applications will be executed on.

PLEDGER introduces necessary improvements across this value chain by following a black box approach in all the involved layers, in order to adapt to the specifics of the ecosystems in question and the corresponding lack of knowledge. The proposed approach does not assume any kind of Adopter-Provider interaction, but all the necessary information is extracted via non-intrusive methods abiding to this role separation imposed by the Cloud business model.

OUR LATEST BLOG POSTS



THE GROWING EDGE COMPUTING OPEN SOURCE LANDSCAPE As Edge computing is gaining more maturity in the market diverse open source initiatives are emerging in order to provide open source solutions to the challenge of managing applications at the Edge. Here we will look at three of these initiatives: EdgeXFoundry, KubeEdge and Star-tlingX.

EdgeX Foundry¹ is a vendor-neutral interoperability framework to enable collaboration on open and interoperable IoT solution with existing and self-created connectivity standards. Edge X Foundry^[1] offers a micro-services software platform which permits to build an IoT gateway functionality out of an Edge device. EdgeX Foundry software components allow to obtain data from the so-called South Side (IoT objects within the physical realm) with Cloud Services (North Side) in which data can be stored, aggregated, analysed and converted into actionable information. It is important to remark that the framework also contemplates actuation processes from north side to south side.

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PLEDGER: COUPLING BLOCKCHAINS WITH EDGE COMPUTING With the recent introduction of blockchains as an enabling technology for distributed and peer-to-peer systems, it comes as a challenge to check whether modern edge computing approaches are suitable for being coupled with emerging decentralised applications built on blockchains.

A distributed trust technology, ensuring scalability, privacy, and reliability, is a cornerstone for the growth of IoT and edge computing environments. In recent years, the blockchain technology has matured significantly and is seen as a promising solution in achieving a set of goals that have to do with trust due to its capabilities, such as immutability, transparency, auditability, data encryption and operational resilience^[1]. Data integrity in distributed applications based on edge servers is a significant challenge as the data streams aggregated from widely dispersed sensors can be utilised in making timely decisions. Thus, it is essential to protect data integrity of the system and make sure that no malicious data will be injected affecting decision-making.

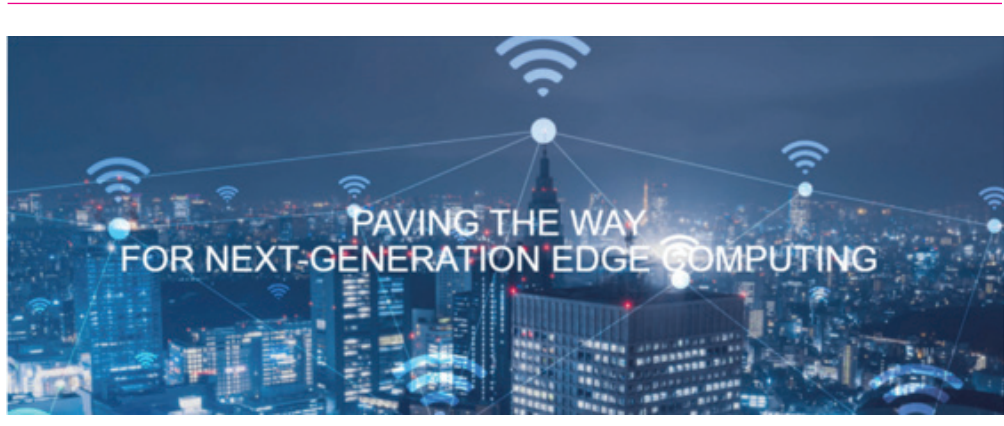
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PLEDGER: LEVERAGING THE EUROPEAN INDUSTRY (DIGITAL) TRANSFORMATION The Digital Single Market Strategy set the basis for accessing to the online world to individuals and businesses. 75 billion connected devices are expected to be installed worldwide by 2025. The rise of new technologies such as Internet of Things (IoT), cloud computing or the imminent impact of 5G supported the digitisation and digitalisation of current business infrastructures. Companies are not only digitizing their information but gaining value from it improving their processes and developing new digital businesses. This fast evolution of the market has shown gaps in the current technologies.

Digitised and digitalised industries require large IoT deployments and processing the massive amount of data they generated. Current approaches do not fit anymore in these scenarios where speed, latency and reliability play a crucial role.

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ENHANCING CITIZEN SAFETY WITH EDGE COMPUTING IN PLEDGER While the number of traffic accidents resulting in serious injuries or deaths has been decreasing over the last years in Europe, the number of accidents that involve vulnerable road users (VRUs) in cities is stalling or has even increased^[1]. In many cities, the road infrastructure is not laid out to support an increasing number of VRUs, such as bicycles or new types of transportation, such as electric scooters. Also, regulations of the mobility of bikes and scooters are often missing or not correctly applied. As a result, they are often involved in traffic accidents.

The European Commission has released a new European Mobility Package and Vision Zero^[2], with the goal of a reduction of 50% in fatalities and serious injuries by 2030 and a reduction to 0% by 2050. While there is a general decrease of road victims in Europe, the number of VRU victims has a great share and is still high, even tending to increase in cities.

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FINDING THE BEST PERFORMANCE FOR YOUR WORKLOADS ON CLOUD AND EDGE THROUGH BENCHMARKING

Benchmarking is a widely adopted technique to assess performance of computing systems. It consists in executing a known workload in a System Under Test (SUT) to stress the usage of its resources (e.g. CPU, memory, network) and observe the response of the system by measuring one (or more) quality metrics of interest (e.g. I/O throughput, computation latency) that allow to evaluate its performance. In contrast with other approaches like prediction or simulation, benchmarking allows to test the real system, taking into account all the factors that can have an impact on the execution. Data collected by benchmarking multiple systems can be used to rank them by performance and to take an informed decision on the most suitable system for a given workload.

Benchmarks programs are very specialized tools and their evolution followed closely the evolution of computing architectures:

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WHY EDGE COMPUTING IS SO VALUABLE FOR MIXED REALITY APPLICATIONS The lack of computational and graphical performance of mixed reality glasses narrowed down the range of use cases for quite some time. Using edge computing, developers from Holo-Light now have found a way to visualize complex 3D models with every detail, in life size and real time. Pre-requisite for the widespread deployment of edge architecture is its stability and performance efficiency. The PLEDGER project of the EU (Ref.871536) has been set up to bring edge networks to an advanced level.

No longer a utopia: Boundaries between the digital and the physical world start to blur. Buildings, factories or other complex forms can get visualized in life size. And even real-time interaction with this massive virtual content is possible. The key to this scenario lies in edge computing: an architecture, which brings processing and graphic power closer to the edge or less metaphorically: to a server, which is geographically adjacent to the end device.

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GENERATING SAFER PLACES FOR VULNERABLE ROAD USERS Description of Scenario:

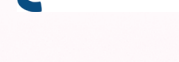
To address global road safety challenges, the United Nations included targets in its 2030 Agenda for Sustainable Development. A sustainable development goal was established to ensure:

- Access to safe, affordable, accessible and sustainable transportation systems for all citizens
 - Improvements in road safety (in particular by expanding and offering safe public transportation)
 - Special attention to the mobility and safety needs of vulnerable citizens
- In line with this global goal, the European Commission released a new European Mobility Package. This package includes a long-term policy framework and strategy for Vision Zero, the EU's goal of moving towards no traffic fatalities and serious injuries by 2050, with a target to halve such outcomes by 2030.

The goal of this Pledger use case is to assist drivers with enhanced perception capabilities, in order to reduce the number of accidents, especially with Vulnerable Road Users (VRUs). In particular, Pledger will be focusing on intersections where the drivers' visibility may be obstructed, thus missing the presence of a pedestrian or a bicycle approaching. Through smart Edge Cloud infrastructure, the pedestrian or the bicycle will be detected and the surrounding drivers will be notified about their presence.

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