RAINBOW NEWSLETTER
THE FINAL ISSUE

RAINBOW is a Research and Innovation Action funded under the EU Horizon 2020 framework programme, focusing on developing an open, trusted **fog computing platform** facilitating the deployment, orchestration and management of scalable, heterogeneous and secure IoT services and cross-cloud apps.

IMPACT OF RAINBOW

RAINBOW's goal is to let developers, service providers and infrastructure do what they do best without having to develop complex services for smart resource provisioning, monitoring and service orchestration. At the same time, developers and IT solution providers (with emphasis on the SMEs that cannot invest on expensive proprietary modules) could get at their hands a complete solution which can guarantee device and mesh network security, data protection, identity management, anonymity and resource integrity at all networking layers.

Throughout the course of 36 months, between the beginning of 2020 and the end of 2022, the RAINBOW project managed to create measurable impact from **technical outputs** and **scientific progress** beyond the state-of-the-art to contribution to **standards** and **policies**, **strategic** and **economic initiatives**, to **raising awareness** and achieving **public outreach**.

PROJECT INFORMATION

TITLE: RAINBOW - *A fog platform for secured IoT services*
GRANT AGREEMENT NO: 871403
CALL ID: ICT-15-2019-2020
CALL TOPIC: Cloud Computing
START DATE: January 1st, 2020
END DATE: December 31st, 2022
COORDINATOR: UBITECH Ubiquitous Solutions

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#RAINBOW_H2020
#FogComputing   #Industry40
#EdgeComputing   #secureIoT

https://rainbow-h2020.eu

STRATEGIC IMPACTS

- RAINBOW **responds to actual digital transformation needs** of both a wide spectrum of industrial domains as well as public sector services, by enabling scenarios which complement the IoT & Edge and the IoT & Cloud continuum.

- RAINBOW **provides a new prospect** for the development of innovative Fog and cross-cloud services directly exploitable at the industrial level by facilitating the deployment and management of scalable, heterogeneous, and secure IoT services and cross-cloud applications (i.e., microservices).

- RAINBOW components **expose open and easy-to-use APIs** while also trying to **enhance popular and well-known software stacks** via APIs, direct integration, or code extension in order to provide more advanced technologies and foster uptake from the industry.

- RAINBOW **helps the European providers** to remotely manage their infrastructure that is running, potentially, on hundreds or thousands of edge devices.

- The standardization efforts of RAINBOW can **influence Fog Computing architectures of future applications** and allow them to benefit from the outcomes of the RAINBOW project.

IMPACT ON DEMONSTRATORS

RAINBOW has been built based on the needs of major project stakeholders, namely: being business-oriented and user-friendly, offering simplified deployment of complex applications and easy-to-understand visualisations of interdependencies and application architectures. Throughout organized platform testing and validation actions, all three demonstrators reported that RAINBOW managed to positively impact crucial parts of their workflow (e.g., reduce latency and power consumption, increase performance and effectiveness, enhance security, improve usability, etc.) and highlighted that RAINBOW:

- ☑ **automates** and **simplifies** the **deployment** of containerised applications;
- ☑ creates an abstraction layer between the infrastructure and the end-user through **intuitive visualisations** and **easy to use UI**;
- ☑ **offers secure communication** between components out-of-the-box;
- ☑ **specifies complex SLOs** that can be used in conjunction with multiple elasticity strategies to adapt deployments at runtime;
- ☑ **adjusts performance** and **adapts automatically** to the infrastructure and available hardware resources.

RESEARCH, POLICY & INDUSTRY BENEFITS

- RAINBOW contributed to the **Trusted Computing Group**, a not-for-profit organization for global industry specifications and standards on interoperable trusted computing platforms, with related technical know-how based on the latest advances in Direct Anonymous Attestation and attestation/revocation that have been performed during the development of RAINBOW's security enablers.

- RAINBOW offered the Polaris SLO Framework and the Fogify emulator to the **Linux Foundation Edge** project **Open Horizon**, a platform that enables autonomous management of applications deployed to distributed webscale fleets of edge computing nodes and devices without requiring on-premise administrators.

- RAINBOW forked its scheduler to the **Linux Foundation** project **Centaurus**, a novel open-source platform for building unified and highly scalable public or private distributed cloud and edge systems.

- RAINBOW contributed to three of the **OpenFog architecture** perspectives, namely to Security, Manageability and Data Analytics & Control, and extended the specification to include rapid prototyping and testing, which is very important for the next generation of data intensive geo-distributed IoT services.

- RAINBOW submitted an **Eclipse IoT** project proposal on a Secure Admission Control Protocol for Kubernetes in Mobile Ad-Hoc Networks, a very common type of network in fog computing that is currently not sufficiently addressed by the Kubernetes community.

- RAINBOW submitted in the **Horizon Results Platform** two key exploitable results of the project: the RAINBOW Fog Computing platform and the Fogify Fog Computing Emulator Framework.

KNOWLEDGE TRANSFER

RAINBOW organized a series of impactful **dissemination and communication activities** which aimed at demonstrating the project outcomes and were focused on the engagement and interaction with targeted groups.

- RAINBOW achieved a total of **28 scientific publications** in high-quality journals and international conferences organized by recognized scientific societies and associations.

- RAINBOW organized (or co-organized) **5 scientific workshops** on scientific topics highly relevant to Edge, Fog and Cloud Computing research and technologies that are part of the core features of the RAINBOW solution.

- RAINBOW successfully organized a total of **6 webinars** covering various aspects of its technological innovations as well as the industrial use cases that validated its solutions.

- RAINBOW organized a **panel session** titled "*Next-generation platforms for Europe's Cloud continuum*" that was hosted under the European Big Data Value Forum 2022 and illustrated how beyond the state-of-the-art developments in the Edge, Fog and Cloud Continuum can strengthen the competitiveness of the European Union.

- RAINBOW organized **2 hackathon activities** with computer science students in order to allow the participants to experience first-hand the capabilities of the RAINBOW platform and utilize its tools to develop their unique solutions.

- RAINBOW participated in **35 events** that include scientific conferences, workshops, webinars, community events, technology forums, industrial and innovation expos.

- RAINBOW established **links and synergies** with **11 other projects and initiatives** and participated in **14 joint activities**, such as scientific workshops, webinars, expert panels, surveys and position papers.

- RAINBOW disseminated the project progress, news and outcomes to 11 national or regional **industrial communities** through the collaboration networks of its consortium.

- RAINBOW build a **strong web presence** (almost 7,000 unique website visitors and more than 100 blog articles) and an **active online community** (around 1,200 followers with more than 1,200 posts in the project's social media channels) to create interest in scientific, research and industrial communities and sustain stakeholders' engagement.

- RAINBOW made publicly available **detailed documentation and guidelines** for the installation, configuration and use of its platform to empower developers and early adopters.

- RAINBOW produced and issued several **communication materials** (videos, leaflets, posters, newsletters, press releases).

3RD RAINBOW VIDEO

RAINBOW published its **third official video** that provides a tour of the features and functionalities offered by the RAINBOW Fog Computing platform. The video is available within the project's YouTube channel: https://www.youtube.com/watch?v=6niveu1I5qk

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