



RAINBOW NEWSLETTER

ISSUE 8, MAY 2022

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

RAINBOW 2ND SOFTWARE RELEASE

This spring RAINBOW delivered the **second release prototype** of its integrated platform. In this version integration has been achieved among all platform components, and all functionalities and specified features are supported. The new release will soon be deployed to the use case providers for a second round of **rigorous testing and validation** of all available aspects according to each testing scenario.

Based on the invaluable feedback and needs of the demonstrators during the first phase of testing, to achieve improvements in terms of usability and performance and in order to satisfy an enriched feature set, the RAINBOW consortium decided to also deliver an **updated integrated platform architecture**. While the high-level architecture and principles of RAINBOW remained unaffected, the introduced updates to specific components and libraries as well as in integration logic among services led to **increased robustness and reliability** in the second version.



Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871403

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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Look for our hashtags!

#RAINBOW_H2020

#FogComputing

#Industry40

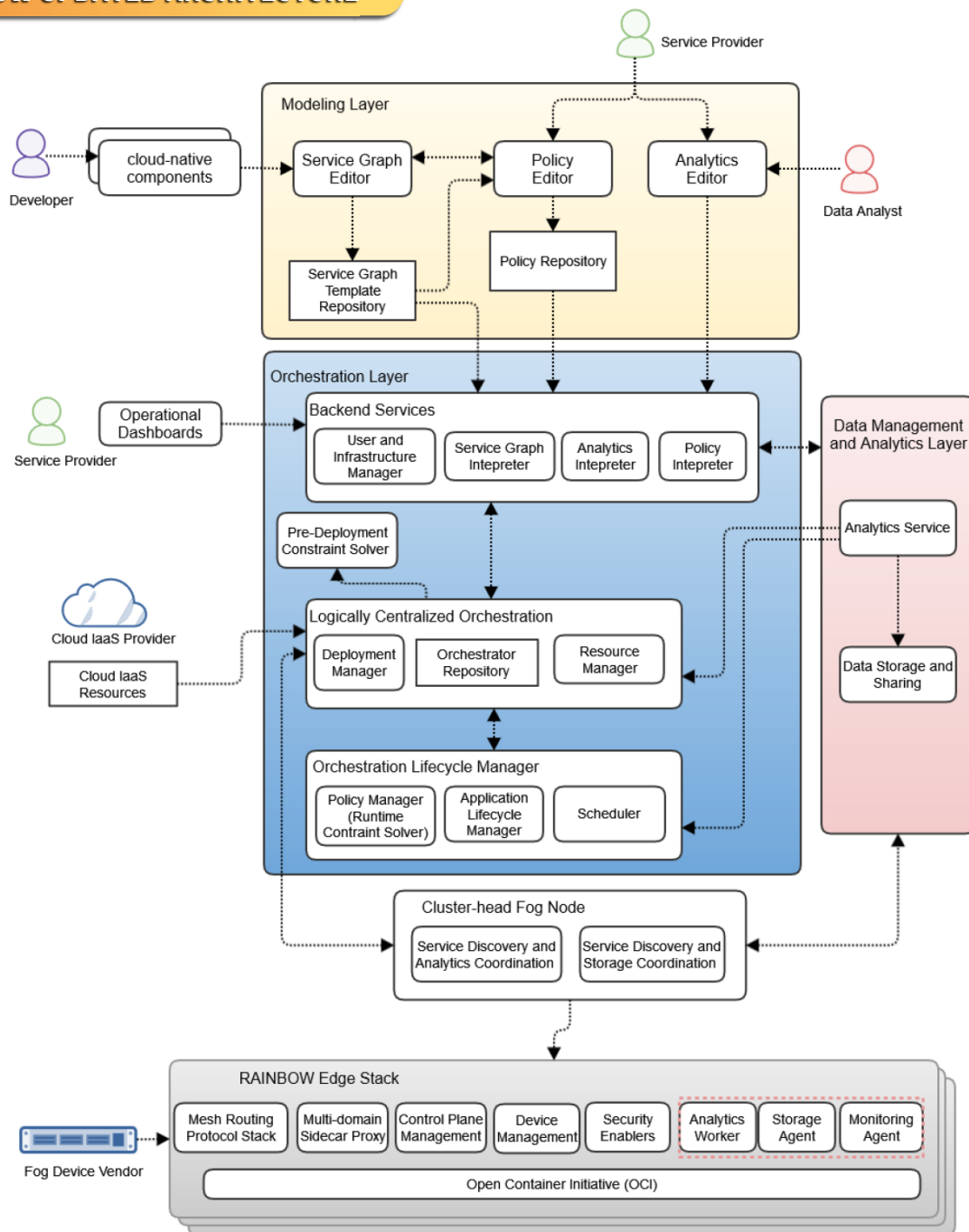
#EdgeComputing

#secureIoT



<https://rainbow-h2020.eu>

RAINBOW UPDATED ARCHITECTURE



Compared to the first release the main changes introduced are:

- Cluster-head Fog Node functionalities for **service discovery and coordination in storage and analytics**
- A separate **back-end component** in Orchestration Layer
- Removal of the “*Resource and Application Monitoring*” as a centralized component
- Extension of the Edge Stack to include **device and control plane management**



RAINBOW 2ND RELEASE FUNCTIONALITIES

For the second release, all components and planned functionalities are integrated and available through the updated RAINBOW dashboard based on feedback gained from the users during the initial testing phase. In summary, the Policy Editor has been updated and integrated with the rest of the platform so that policies and Service Level Objectives (SLOs) can be created and used through it. Through the policies the pre-deployment constraint solver is implemented and integrated, allowing the allocation of specific compute nodes based on user needs, while the optimization of deployments placement is also offered. The integration of CJDNS with the key-management allows the secure enrolment for on boarding new compute nodes in the cluster and verify that they are safe to use. Finally, the extended and improved analytics and editors now allow more complex SLOs to be supported and tested. The following components have extended functionality or introduced new features since the first RAINBOW platform release:

Modelling Layer and Dashboard

- Service Graph Editor & Repository
- Analytics Editor
- Policy Editor & Repository
- Dashboard

Orchestration Layer

- Orchestration Lifecycle Manager
- Pre-Deployment Constraint Solver
- Logically Centralized Orchestration
- Backend Services

Data Management & Analytics Layer

- Data Storage and Sharing
- Analytics Service

Edge Stack

- Mesh Routing Protocol Stack
- Multi-domain Sidecar Proxy
- Security Enablers
- Storage Agent
- Resource & Application Monitoring Agent
- Analytics Workers
- Device Management
- Control Plane Management Module

RAINBOW USE CASES VIDEO

The second video by RAINBOW seeks to inform the public about the 3 different real-life industrial scenarios that will be used to validate the applicability, usability, effectiveness and value of the RAINBOW integrated framework and services.



The RAINBOW Fog Computing platform will be evaluated and validated through a set of Use Cases, inspired by state-of-the-art applications. This production, focuses in describing the three project demonstrators, their challenges and how they are impacted by RAINBOW:

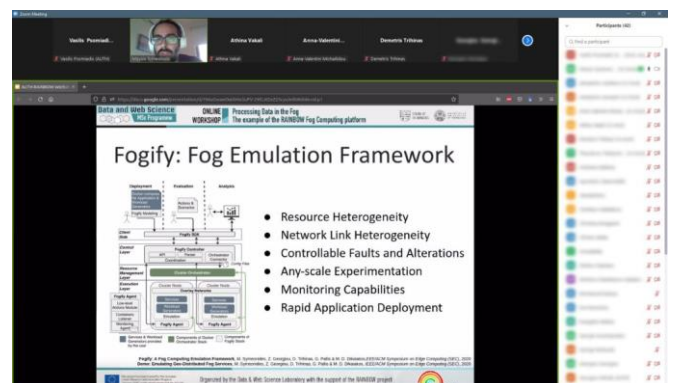
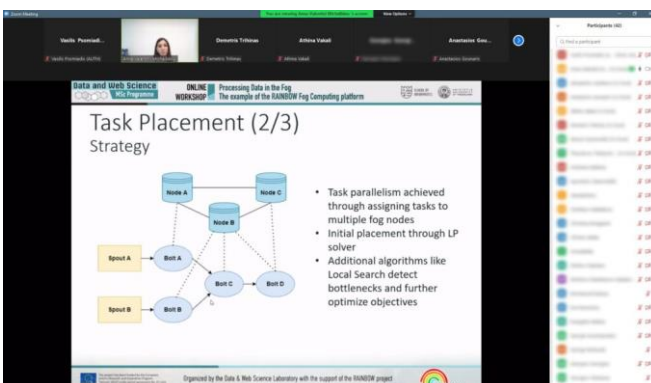
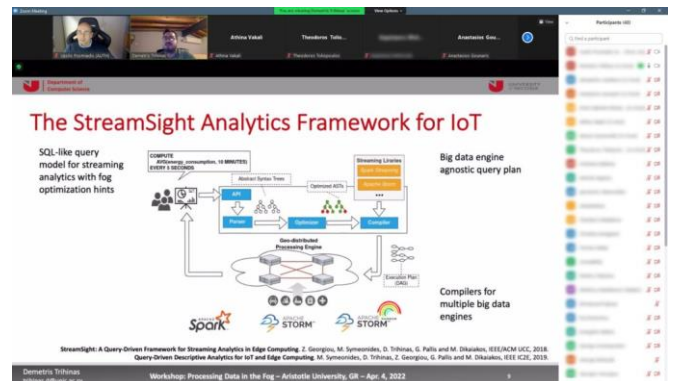
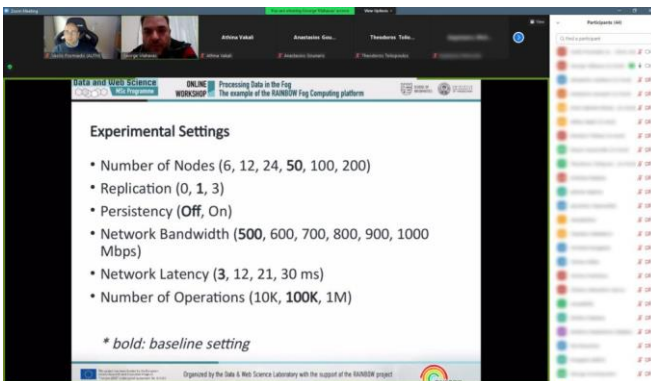
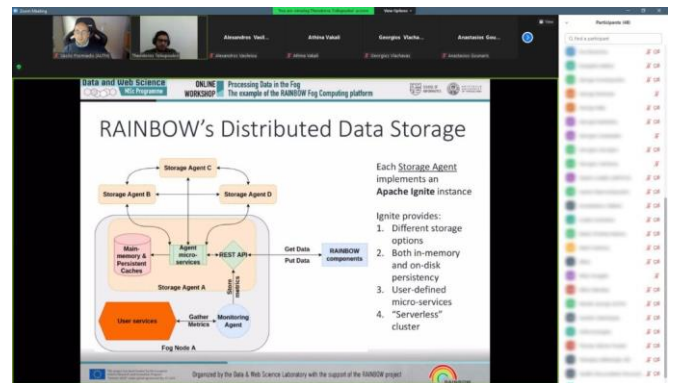
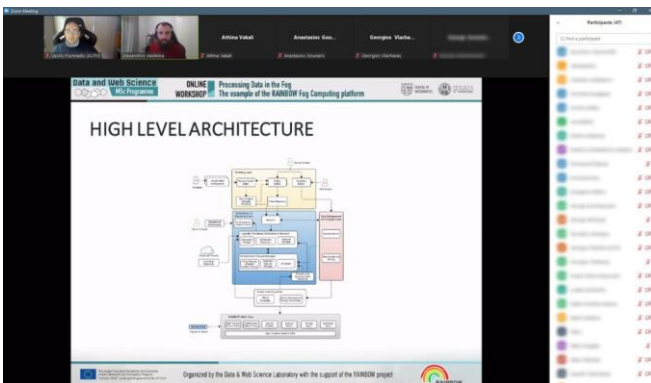
- The first Use Case concerns the Collaboration between Humans and Robots in Industrial Ecosystems
- The second Use Case regards Digital Transformation of Urban Mobility
- The third Use Case is about Power Line Surveillance via Swarm of Drones

The "RAINBOW Use Cases" video is available through RAINBOW's YouTube channel and can be found here: <https://www.youtube.com/watch?v=PfUdegKEhWI>



RAINBOW WORKSHOP

On 4th of April, 2022 the RAINBOW project organized a very successful online workshop on the topic of “*Processing Data in the Fog. The example of the RAINBOW Fog Computing platform*”. During the six sessions of the workshop, members of the research teams of Data & Web Science Laboratory of Aristotle University of Thessaloniki, UBITECH Ltd and Laboratory for Internet Computing of University of Cyprus, presented a series of **research challenges in Fog and Edge environments** from the scope of **data management and distributed data processing**, as well as the innovative solutions developed by RAINBOW to address them.





RAINBOW 2ND TECHNICAL WEBINAR

On May 27th, 2022 RAINBOW will host its second technical webinar titled "*The RAINBOW Data Management and Analytics Stack in Action!*" organized by the Laboratory for Internet Computing of University of Cyprus and supported by the Data & Web Science Laboratory of Aristotle University of Thessaloniki. This webinar provides a hands-on tutorial that showcases how IoT services can take advantage of in-place data management and distributed data processing offered by RAINBOW to derive analytic insights that can be used to enhance QoS and optimize resource management. To enhance this experience a realistic use-case of a smart transportation service will be used and our presenters will show how one can setup the RAINBOW services, configure monitoring and storage, and then explore smart data placement, resource- and energy-aware scheduling and finally quickly submit ad-hoc queries packaged as streaming analytic jobs.

WP4 TECHNICAL WEBINAR

THE RAINBOW DATA
MANAGEMENT AND ANALYTICS
STACK IN ACTION

FRIDAY 27 MAY 2022
10:00–11:00 CEST

RAINBOW

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EUROPEAN UNION'S RESEARCH AND
INNOVATION PROGRAM "HORIZON
2020" UNDER GRAND AGREEMENT NO.
871403

 <https://rainbow-h2020.eu/> 

The webinar is open to the public but prior registration is mandatory. You can find more information and register online by visiting the following link: <https://rainbow-h2020.eu/wp4-technical-webinar-the-rainbow-data-management-and-analytics-stack-in-action/>



RAINBOW EVENTS IN JUNE

RAINBOW is organizing or attending the following events in June 2022:

- RAINBOW will organize its 3rd **online technical webinar** on Wednesday, June 15, 2022 hosted by TU Wien aiming to showcase the **Service Level Objectives (SLOs) and elasticity components** used in the RAINBOW platform by leveraging the **Polaris Framework**. More information can be found in RAINBOW's website: <https://rainbow-h2020.eu/wp3-slo-webinar-edge-orchestration-workshop-in-june/>
- RAINBOW will be presented in a poster session during the **4th Summit on Gender Equality in Computing** that is co-organized by the Greek Chapter of ACM-Women and Aristotle University of Thessaloniki. This is going to be a hybrid event which will take place on June 16 & 17, 2022 with the physical part hosted at the Aristotle University Research Dissemination Center in Thessaloniki, Greece. For more info visit: <https://gec22.auth.gr>
- RAINBOW is also organizing an online workshop on Tuesday, June 21, 2022 hosted by TU Wien. This workshop is focusing on **Edge Orchestration** and aims to provide an overview of platforms for managing the Cloud-Edge continuum and applications. **Futurewei Technologies**, USA will present the open-source **Centaurus platform** for building unified and highly scalable distributed cloud-edge systems. Moreover, a panel of distinguished experts from academia and industry will discuss current challenges related with the main managing Cloud/Edge infrastructures and applications deployed on them. More information and registration details is made available in RAINBOW website: <https://rainbow-h2020.eu/wp3-slo-webinar-edge-orchestration-workshop-in-june/>



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