The RAINBOW paradigm: An open and trusted fog computing platform

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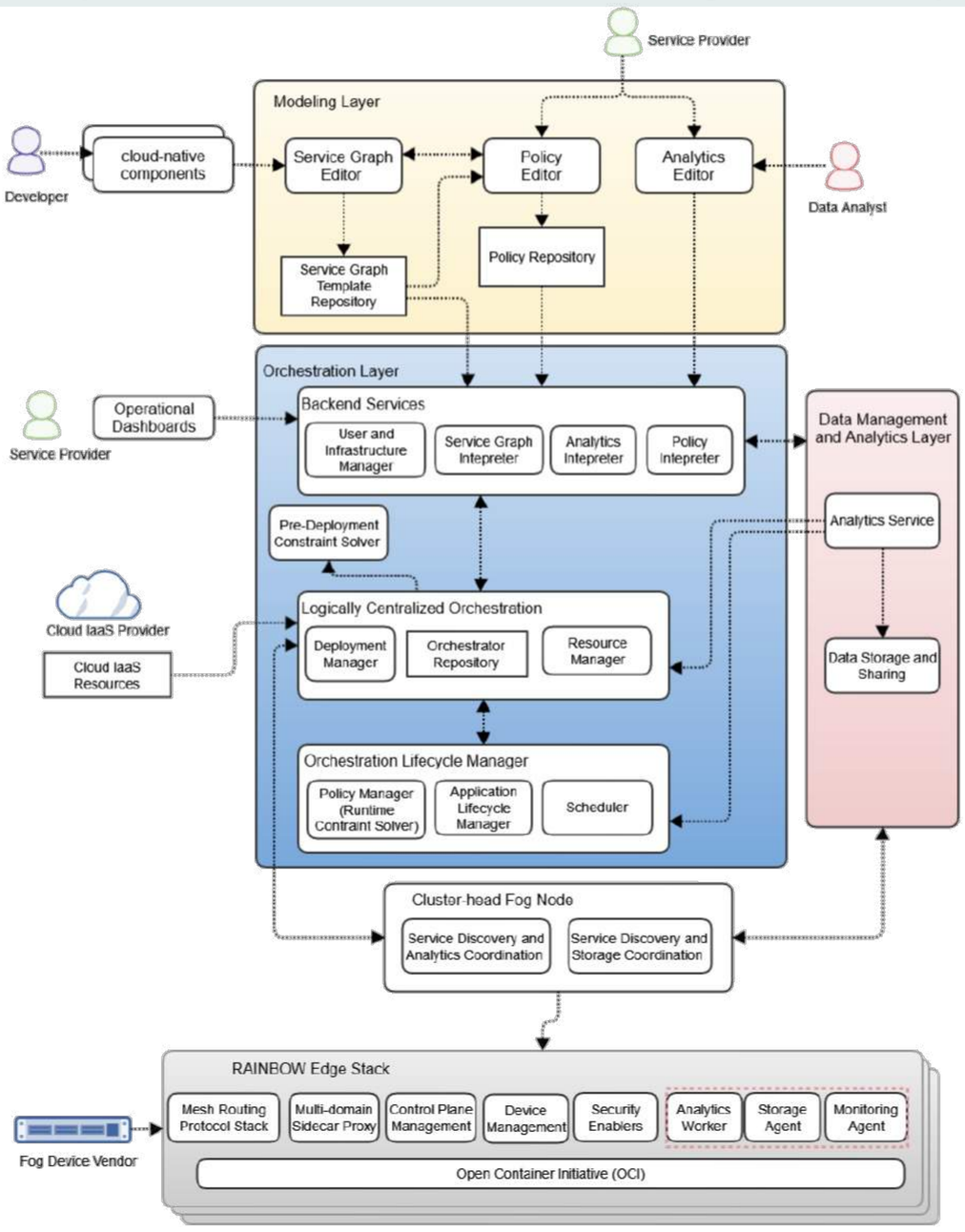
OVERVIEW

RAINBOW aims at extending the Cloud towards the IoT to achieve improved QoS and to empower latency-sensitive and bandwidth-hungry applications. RAINBOW responds to actual needs both of the majority of the industrial domains and of the public sector services as far as it concerns their digital transformation (enabling complement to the IoT+Edge and to the IoT+Cloud scenarios) towards a new era that has already started; an era that IoT devices are not considered just complementary equipment for collecting added-value data but have penetrated in the core of the business activities as irreplaceable tools for achieving efficiency, effectiveness and quality objectives.



RAINBOW provide users with:

1. an intuitive Dashboard and DevOps toolset enabling the description of application topologies and QoS requirements
2. a Fog Middleware with horizontal and vertical services for IoT orchestration, continuous service placement and management and adaptive monitoring
3. a Trusted Overlay Mesh Network as the control plane that abstracts the complexity of enforcing security and privacy crypto-primitives among fog services
4. a Sidecar Proxy providing an execution environment able to manage both fog node resources and high volumes of data, which can be collected, stored, & analysed in place to derive analytics.

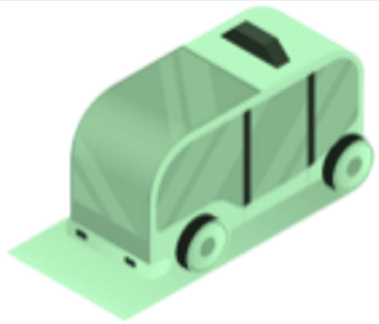
RAINBOW Use cases

Power Line Surveillance via Swarm of Drones

RAINBOW facilitates the adaptive onboarding of data processing tasks on a swarm of drones that scan entire power-line infrastructures.
This allows for performing coordinating routing alteration, image exchanging, and terrain overlapping avoidance tasks on the drones, thus leading to higher energy autonomy and enhanced monitoring capability w hile reducing overlaps in the image gathering process.

Human-Robot Collaboration in Industrial Ecosystems

RAINBOW deploys indoor positioning services to physical fog nodes that span across manufacturing factories with the task of processing, structuring and normalizing sensing data and then performing in place analysis to derive the coordination plan and collision detection.
Combining the aforementioned information, fog nodes can prevent collisions and fatal accidents.



Digital Transformation of Urban Mobility

RAINBOW creates a real-time georeferenced notification system for vehicles traveling in urban areas about critical situations for the city mobility network, due to any possible cause (e.g., severe weather, failure of road infrastructure, huge congestion). The main innovation is the adoption of bilateral exchange mechanisms and real-time “service availability” for “people on the move”.

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ACKNOWLEDGMENTS
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