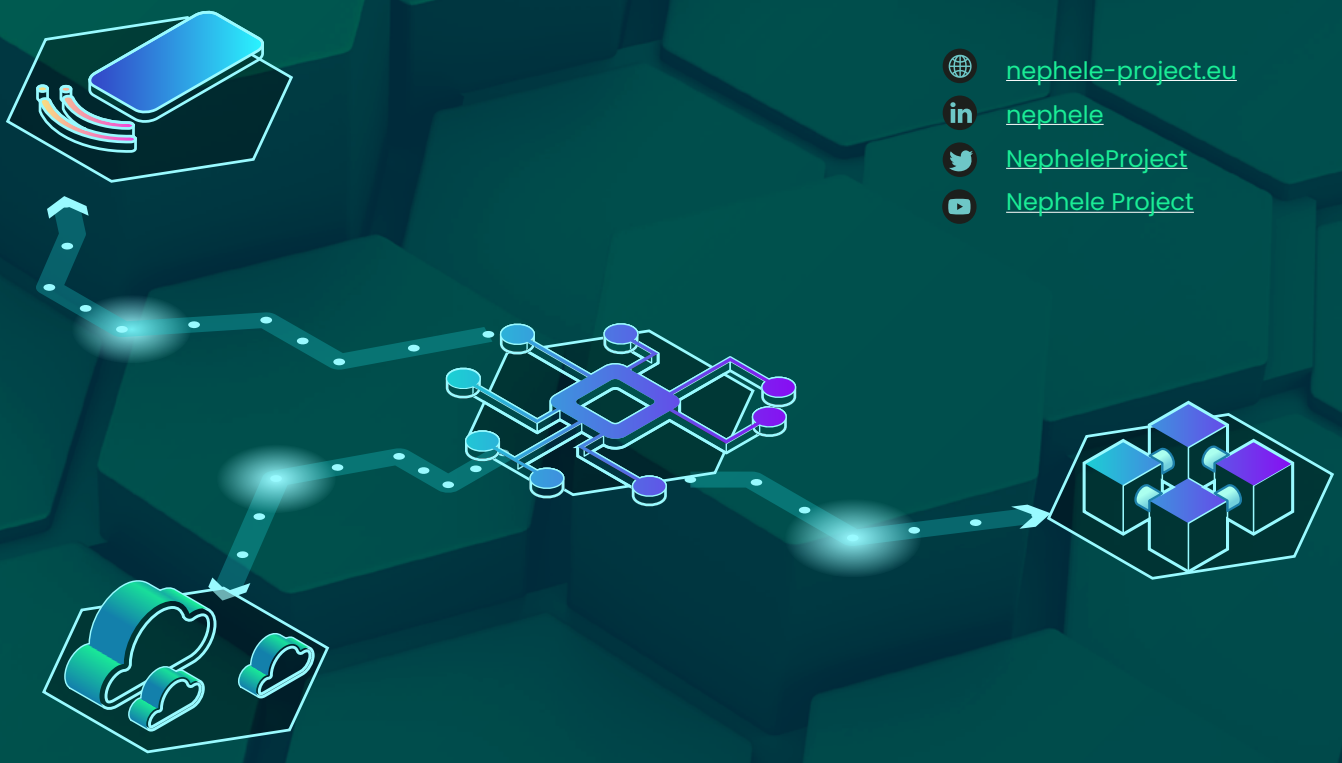
Newsletter #1 March 2023

nephele

Part of EUCloudEdgeIoT.eu

A lightweight software stack and synergetic metaorchestration framework for the next generation compute continuum

Contents



nephele-project.eu
nephele
NepheleProject
Nephele Project

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017111.

Editor's note

Welcome to the NEPHELE project!

NEPHELE aims *to* **eliminate the barriers** for the convergence of IoT technologies with edge/cloud computing orchestration platforms. NEPHELE's vision is to **enable the efficient, reliable and secure end-to-end orchestration** of distributed applications over programmable infrastructure that is spanning across the compute continuum from Cloud-to-Edge-to-IoT, **removing** existing openness and interoperability **barriers.**

The NEPHELE project aims to introduce two core innovations, namely:

- An **IoT and edge computing software stack** (VOStack) for leveraging virtualization of IoT devices at the edge and supporting openness and interoperability aspects in a device-independent way.
- A **synergetic meta-orchestration framework** for managing distributed applications in the compute continuum based on the adoption of a "system of systems" approach.

The NEPHELE outcomes are going to be demonstrated in use cases across various vertical industries, including areas such as **disaster** management, **logistic** operations in ports, **energy** management in smart buildings and remote **healthcare** services. Two successive open calls are planned as well.

Undoubtedly, a project as ambitious as this one requires a high degree of **specialisation** and a great deal of **effort** from all the partners involved. In these few months that we have been running, as coordinator I have been able to see that the **extraordinary team** that the consortium brings to NEPHELE meets both requirements, so I can confidently affirm that in the months that this adventure will last, NEPHELE will fulfil its role.

To see for yourself, just **subscribe to this newsletter and follow the project's social networks** - stay tuned!

Thank you very much for reading,

Symeon Papavassiliou,
Project Coordinator

nephele
Part of EUCloudEdgeIoT.eu

The NEPHELE Ecosystem

NEPHELE cooperates with the other RIA projects funded under the Horizon Europe programme's Cluster 4, Destination 3: **"Future European Platforms for the Edge: Meta-Operating Systems"** and addressing the same topic (call topic HORIZON-CL4-2021-DATA-01-05) in order to exploit results and synergies, maximize impacts of the Cloud-Edge-IoT project portfolio and coordinate dissemination activities. In addition, NEPHELE is already contributing to the consolidation and coherence work implemented by the two CSAs related: OpenContinuum and Unlock-CEI (HORIZON-CL4-2021-DATA-01-07) that are joining their efforts within the **EUCloudEdgeIoT** initiative (see below).

Read more about our sibling projects!

These RIAs are **aeROS, FluiDOS, ICOS, Nebulous** and **NEMO.**

aerOS
EUROPEAN IOT-EDGE-CLOUD

FLUIDOS

ICOS

nebulous

NEMO

nephele
Part of EUCloudEdgeIoT.eu

NEPHELE as a part of EUCloudEdgeIoT.eu

Cloud, Edge and IoT technologies are critical for Europe's future in different domains, leveraging low latency responses that can positively impact several domains: from **energy infrastructures** to **national security** to **healthcare** and **economics** in larger terms. These technologies also play an essential role in achieving **sustainability** goals in both rural and urban contexts. From an industrial perspective, the cloud, edge and IoT convergence creates a wide range of opportunities for different companies by significantly improving network latency and traffic.

EUCloudEdgeIoT.eu

However, because this is still a relatively fragmented market with no dominant player, European Union policies can influence its future shape. This explains the need of initiatives like **EUCloudEdgeIoT.eu.**

EUCloudEdgeIoT.eu aims to unlock the potential of these transformative technologies by helping business users, industrial associations, tech providers and developers, research and innovation organisations and policy makers to access the benefits of **enhancing supply-demand dialogue and collaboration,** and to understand the supply and demand value chains in Europe.

The initiative also brings value added **services for citizens** in areas like **health** (e.g., improving at-home medical monitoring, providing healthcare services in remote or rural areas), **mobility** (e.g., car performance monitoring, autonomous driving), and **retail** (e.g. identification, reduction and prevention of out-of-stock, supply chain traceability to be informed about food origin and quality).

This European Commission's funded initiative is supported by the effort of two Coordination and Support Actions (CSAs), namely Open Continuum and UNLOCKCEI, which will cooperate to reach the stated common goal, focusing respectively on the **supply and demand sides of the CEI (Cloud, Edge & IoT) Continuum.** These will also benefit from the synergies and legacy of other existing EU projects in the domains of Cloud, Edge, IoT, AI, and connectivity.

The EUCloudEdgeIoT.eu initiative offers to their members a set of cooperation mechanisms in the form of six individual task forces. Acting as a multiplier, the goal of these task forces is to create common strategies, approaches and methodologies to common areas of interest, to assist in the coordination and dissemination efforts and to **increase the visibility** of the Cloud, Edge and IoT continuum towards the development of the community. These task forces avoid overlap of work between projects, enable project amplification and allow the identification of potential **areas of collaboration and conflict.** The six task forces are**: Strategic Liaisons, Open Source Engagement, Architecture, Ecosystem Engagement, Market & Sectors** and **Communication.** Each task force targets specific types of projects and stakeholders.

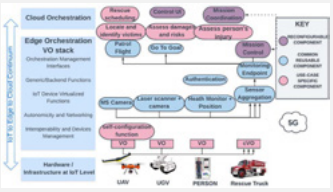
EUCloudEdgeIoT.eu coordinates a portfolio of projects in the CEI Computing Continuum to ensure consistent exploitation of these projects outcomes to help regain European competitiveness in core internet infrastructures. NEPHELE - and also the projects in its ecosystem - is part of this initiative.

More on this joint initiative

nephele
Part of EUCloudEdgeIoT.eu

First NEPHELE paper

The paper "*The Cloud-to-Edge-to-IoT continuum as an Enabler for Search and Rescue (SAR) Operations*" - recently published in the special issue "*Moving towards 6G Wireless Technologies*" of the Future Internet Journal - introduces the technologies and the challenges for SAR operations and solutions for the cloud-to-edge-to-IoT continuum and presents NEPHELE as an enabler for these operations.



Search and Rescue Operations is the first of NEPHELE's use cases.

Read the open access paper

News & Events

NEPHELE Kick off meeting

11-12 October 2023 Athens (Greece) - Hybrid event

The NEPHELE project kick-off was an opportunity to meet each participant in person and to present the partners' capabilities to the whole consortium. The coordinator presented the work plan and introduced the work packages and task leaders, as they presented the objectives, the work to be done, the milestones to be reached and the deliverables to be produced.

The kick-off meeting also served as an opportunity for the group discussion and opinion exchange. The open call plan and communication and dissemination activities were presented as well.

AIOTI webinar: "IoT, Cloud, Edge Computing Continuum: from research to deployment"

30 November 2022

On November 30, Leonardo Militano, from partner ZHAW (Zurich University of Applied Sciences) represented NEPHELE at the AIOTI (Alliance for IoT and Edge Computing Innovation) webinar "IoT, Cloud, Edge Computing Continuum: from research to deployment". ZHAW had the opportunity to present NEPHELE's 1st Use Case: "Emergency and Disaster Recovery".

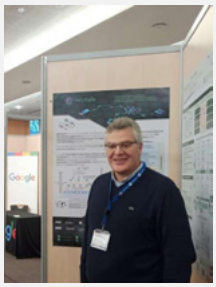
The webinar agenda included presentations from sibling EU projects AEROS, FLUIDOS, ICOS and NEMO, among other projects related to the topic.

We thank EUCloudEdgeIoT for the initiative.

Check on all the webinar's presentations.

HiPEAC 2023

16-18 January 2023, Toulouse (France)



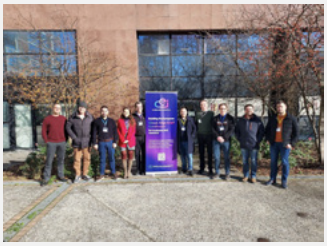
On behalf of NEPHELE, **Dimitrios Soudris** from our coordinator partner National Technical University of Athens **(NTUA),** presented our poster in the STEM/Industrial poster session in Toulouse on January 17th within the HiPEAC 2023 paralell program. The objective was to share the NEPHELE vision with the HiPEAC participants, given that this conference is the premier European forum for experts in computer architecture, programming models, compilers and operating systems for general-purpose, embedded and cyber-physical systems.

EUCloudEdgeIoT Workshop 2 - Market and Sectors Task Force

13 February 2023 (online event)

On February 13th, NEPHELE participated in Workshop 2 - Task Force 4 "Market and Sectors" hosted by EUCloudEdgeIoT. This was the second workshop in a series centered on discussing how to develop market ready and sustainable Cloud-Edge-IoT use cases in several projects. Our cluster has divided all use cases into smaller workshops according to different topics.

On behalf of NEPHELE **Leonardo Militano** from **ZHAW,** and **Nathalie Milton** and **Hazem Chaabi** from **Inria**, **Rudolf Susnik** from the **Internet Institute** (**ININ**) and **Panagiotis Papadimitriou**, **Ilias Sakellariou** and **George Papathanail** from **University of Macedonia (UoM)** attended the event. Hazem briefly presented NEPHELE Use Case 1 and Rudolf presented Use Case 2. Commonalities and potential synergies with other use cases from other projects were widely discussed.



First meeting of the CEI Open Source Task Force

18 February 2023, Toulouse (France)

The Open Source Task Force, part of the European Cloud, Edge & IoT Continuum, organized the first face-to-face meeting with the cluster of RIAs that had already started, the HORIZON-CL4-2021-DATA-01-05: Future European Platforms for the Edge: Meta Operating Systems (2021-2017). This meeting was collocated with the HiPEAC conference in Toulouse.

The **Eclipse Foundation** guided the discussion with the projects about architectures. The Open Source Task Force will provide strategy and tools to promote the establishment of a European industrial Open ecosystem for continuum computing based on open-source and open standards.

Mobile World Congress (MWC)

27 February- 2 March 2023, Barcelona (Spain)

A presentation of NEPHELE project was shown at the booth of **UoM** at Mobile World Congress 2023 in Barcelona. The presentation that was displayed by a **UoM** delegate highlighted the main concepts and innovations of the project, the use cases related to various verticals and the NEPHELE ecosystem.

UPCOMING EVENTS

Embedded World

14-16 March 2023, Nuremberg (Germany)

This edition of the Embedded World Exhibition & Conference will provide a global platform and a place to meet for the entire embedded community, including leading experts, key players and industry associations.

Panagiotis Papadimitriou from University of Macedonia will present “NEPHELE: A lightweight software stack and synergetic metaorchestration framework for the next generation compute continuum” at the booth of Eclipse Foundation on 16th March at 12:00.

IFIP Networking

12-15 June 2023, Barcelona (Spain)

NEPHELE will participate in the 22nd edition of the IFIP Networking organised by the International Federation for Information Processing in Barcelona (Spain). Within this major event, NEPHELE will take part in the International Workshop on Time-Sensitive and Deterministic Networking (TENSOR 2023) on June 12th.

nephele
Part of EUCloudEdgeIoT.eu

Meet our Partners

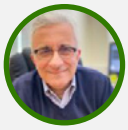
THIS SECTION WILL BE PRESENTING THE PARTNERS OF THE CONSORTIUM, THEIR PROFILE, MAIN EXPERTISE AND CONTRIBUTION TO THE PROJECT.

National Technical University of Athens (NTUA

NATIONAL TECHNICAL UNIVERSITY OF ATHENS

The National Technical University of Athens (NTUA), founded in 1837, is NEPHELE Project Coordinator. NTUA, through the NETMODE lab undertakes not only the administrative project management but also the scientific and technical coordination.

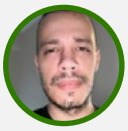
NTUA is the oldest and most prestigious educational technical institution of Greece. More than 3.000 scientists are currently involved in NTUA activities. NTUA is currently participating in 250 Horizon 2020 projects (ranked 10th among EU Organisations) and more than 1500 on-going national and European research projects (1st place in Greece as Participant and as Coordinator). the University has a long track-record in research and academic excellence in IoT, edge/cloud computing, networking and robotics.



Prof. Symeon Papavassiliou
Project Coordinator

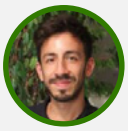
Anastasios Zafeiropoulos
Technical Coordinator

Prof. Dimitrios Soudris

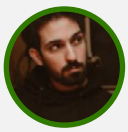


Ioannis Dimolitsas

Eleni Fotopoulou

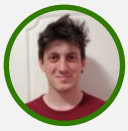


Nikolaos Filinis



Dimitris Spatharakis

Athina Thanou



Ioannis Tzanettis

Constantinos Vassilakis

Visit NTUA website

Visit NETMODE laboratory website

nephele
Part of EUCloudEdgeIoT.eu

Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT)

CNIT - Consorzio Nazionale Interuniversitario per le Telecomunicazioni is a non-profit consortium, established in 1995, bringing together **39 public Italian universities** to perform **research, innovation** and **education/training** activities in the field of the Information and Communication Technology.

CNIT operates **47 Research Units,** one for each member university plus 8 other belonging to institutes of the National Research Council (Consiglio Nazionale delle Ricerche), the largest public research institution in Italy, that keeps a cooperation agreement with CNIT. Additionally, CNIT operates **7 Italian National Laboratories.**

The CNIT entities involved in NEPHELE are the S2N (Smart and Secure Networks Lab), the CNIT Unit at University Mediterranea of Reggio Calabria and the CNIT Unit at University of Calabria.

The most relevant CNIT areas of expertise as partner in NEPHELE are:

- 5G orchestration platforms
- 5G networkservices in programmable #infrastructures
- In-Network programmability
- Network Function Virtualization (NFV) & Software Defined Networking (SDN)
- IoT & object virtualization
- Device-Edge-cloud continuum

In NEPHELE, CNIT leads the **Virtual Object Stack Development** work package, and the IoT **Device Virtualized and Supportive Functions and Compute Continuum Network Management** tasks.

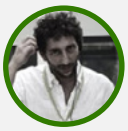

Franco Davoli


Raffaele Bolla


Antonella Molinaro


Antonio Iera


Floriano De Rango


Giacomo Genovese

Visit CNIT website

Siemens AG

SIEMENS

Siemens AG is a multinational conglomerate corporation and **the largest industrial manufacturing company in Europe.** The principal divisions of the corporation are industry, energy, healthcare, and infrastructure & cities.

Siemens Technology is the Research and Development division of the company which takes care of technology to transform the everyday. Its headquarters are located in Munich and counts on R&D centers in Europe, USA and Asia. They are specialists in **digital transformation, Internet of Things (IoT), artificial intelligence (AI), automation, sustainability** and **cybersecurity.**

Siemens relevant expertise for NEPHELE is related to **semantic modeling and interoperability** for intelligent iot devices, digital twin, Thing Description, KGs, IoT device engineering & management, low-code approaches, intelligence on IoT Devices, event processing, TinyML, federated learning, stream reasoning, domain expertise in Building Automation Systems, use case specification and implementation, standardisation, W3C Web of Things and OPC foundation.

In NEPHELE, Siemens will oversee **IoT Devices Modeling, Management and Interoperability, intelligence on IoT Devices** and **interplay with virtual objects (VOs).** They also will perform the design, implementation and evaluation on NEPHELE use case related to **energy management in smart buildings/cities**.

Darko Anicic

Haoyu Ren

Pedram Hadjian

Visit Siemens global website

Visit Siemens Collaborations and Open Innovationglobal website

nephele

Part of EUCloudEdgeIoT.eu

nephele-project.eu
nephele
NepheleProject
Nephele Project

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017111.