



This Communication is part of a project that has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N°101069732



**eclipse
stratOS**

EUROPEAN CLOUD-EDGE-IOT



aerOS

EUROPEAN IOT-EDGE-CLOUD

ECLIPSE stratOS

from EU research to open-source

23-Sep-2025

Open Source Community Day
2025

KEY POINTS

stratOS aims to **unify edge, cloud, and iot environments** through advanced orchestration and management capabilities.



BROAD COMPATIBILITY

Supports both Docker-based and Kubernetes-native setups, and is adaptable to future technologies like containerd and Wasm (WebAssembly).



FLEXIBLE AND SCALABLE ARCHITECTURE

Offers a more flexible, robust, and efficient alternative to existing solutions, suitable for dynamic and distributed environments.



CENTRALIZED INTERFACE, DECENTRALIZED OPERATION:

Provides a unified user interface for resource access and control, while orchestration decisions are made locally to avoid single points of failure.



STANDARD-BASED COMMUNICATION:

Uses widely accepted technologies such as HTTP REST APIs, OpenAPI, and NGSI-LD for data formats.



SECURE NETWORKING:

Employs VPN tunneling via Fully-Qualified Domain Names using Wireguard for secure communication across networks.



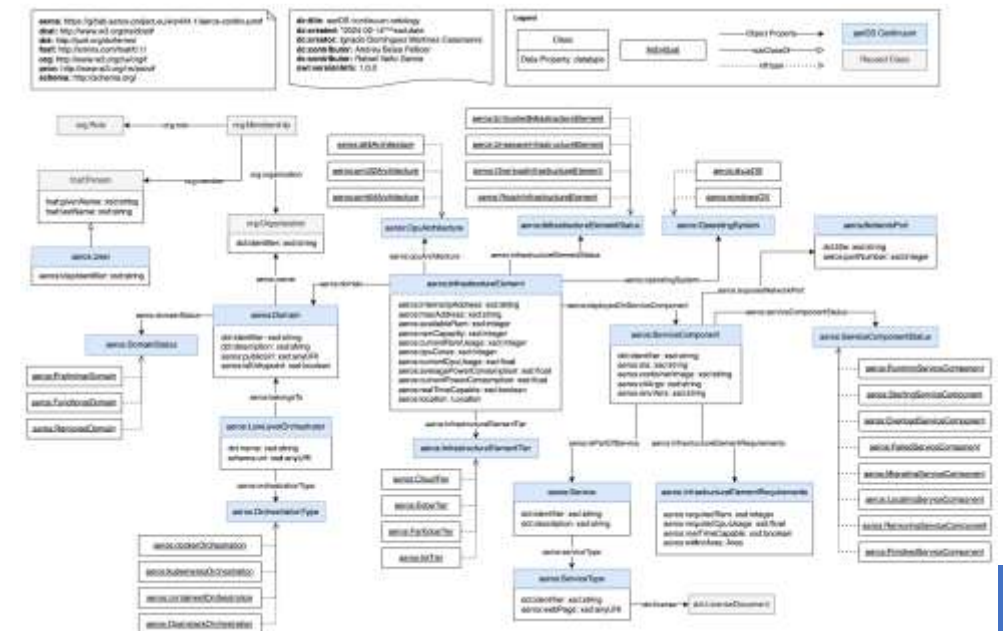
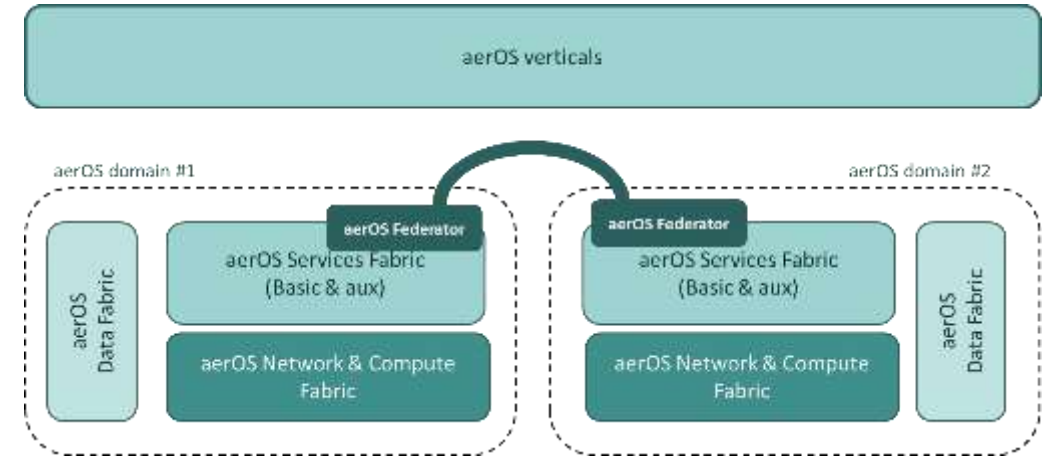
RESEARCH-BASED AND ALIGNED WITH EU INITIATIVES:

Inherits from a research project and aligns with initiatives like the EUCI TF3 Architecture.

Unique **technological** approach: Edge-native federation

- **Cloud-native concepts** brought to the edge (own technology, KubeEdge, ...)
- Ubiquitous access to the the state of the continuum in a decentralized way: **Distributed State Network of Brokers** with **no duplication or replication of data** (based on pub/sub NGSI-LD)
- Key data from CEI continuum in a **Data Fabric** – **NOVEL, custom ontology created from scratch**
- **Fully decentralized service orchestration** across all the CEI continuum

Accepted heterogeneous underlying container management frameworks: K8s, Docker, containerd...



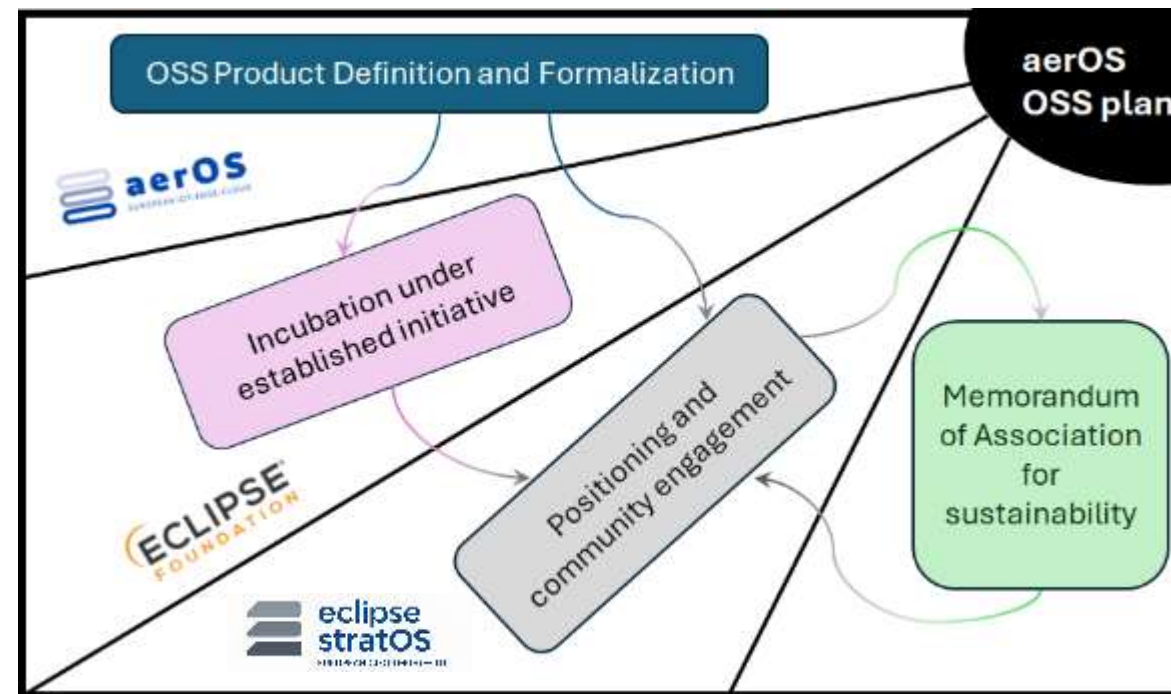
On-going **impact** generation!

- aerOS will finalise at the end of next month (31-October-2025).
- Several research projects have **already adopted the Meta OS**
 - SAFE-6G, 6G-BRICKS, O-CEI..
- Companies have **already inserted** (all or part of) aerOS in their operations
 - Internal – aerOS partners (SME, research...): CloudFerro, Prodevelop, IQB, TID, SIEMENS
 - External – Open Call winners – SMEs and Universities
- 8 Pilots have **successfully integrated** orchestration, network management, AI procedures, data Exchange, IoT deployment, trust via DLT, security, function-as-a-service, self-capabilities, among others...
- aerOS has devoted **900k€ to fund 15 projects from different sectors** and companies that have validated the Meta-OS



aerOS open-source strategy

	IoT	Edge	Cloud
Platform	aerOS Meta Operating System		
Virtualization Infrastructure	Docker/KubeEdge	Docker/K8s/K3s/KubeEdge	K8s (mandatory) + Docker
Applications	self-awareness monitoring, self-diagnose, self-adaptation (Python)	FlowerML	Grafana, OpenFaaS
Resource Management	NGSI-LD data model	Distributed Federated Orion-LD Context Brokers	Continuum Data Model and TOSCA
Device Management	IE self-configurator and orchestrator rules - via API	IE management via aerOS portal	Full options via aerOS Portal UI
Orchestration Management	Self-orchestrator (custom Python) and LLO - operator	HLO, LLO - K8s operators	HLO (custom Python components), Redpanda, Protobuf
Data Management / Processing / Storage	Data Fabric catalogue, security and flow	Data Fabric - Orion-LD	Federated Orion-LD, morph-KGC, Mintaka
Embedded Operating System	Multi-architecture Linux-based OS - arm, x86, RISC-V	Linux-based OS	Linux-based OS - recommended Ubuntu 22.04
Security and Privacy	Self-security - Suricata	KrakenD Gateway	OpenLDAP, KeyCloak and KrakenD
API Management	REST OpenAPI Python	REST OpenAPI	REST OpenAPI and KrakenD
Protocols / Device Connectivity	IEEE 802.11/b/n, MQTT, HTTP, Ethernet, 4G/5G		
Physical Connectivity	BLE, WiFi, 4G/5G, CANBUS, LoRa	WiFi, LAN	WiFi, LAN



<https://gitlab.eclipse.org/eclipsefdn/emo-team/emo/-/issues/1019>

Eclipse stratOS

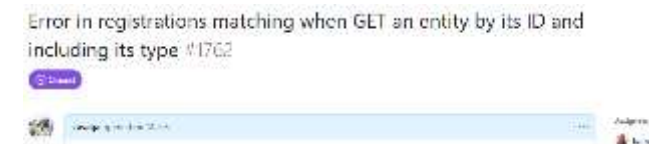
Open Issue created 1 month ago by Maria Teresa Delgado

The EMO is using this issue to track the progress of project creation. Help regarding the process can be found in the [Eclipse Foundation Project Handbook](#).



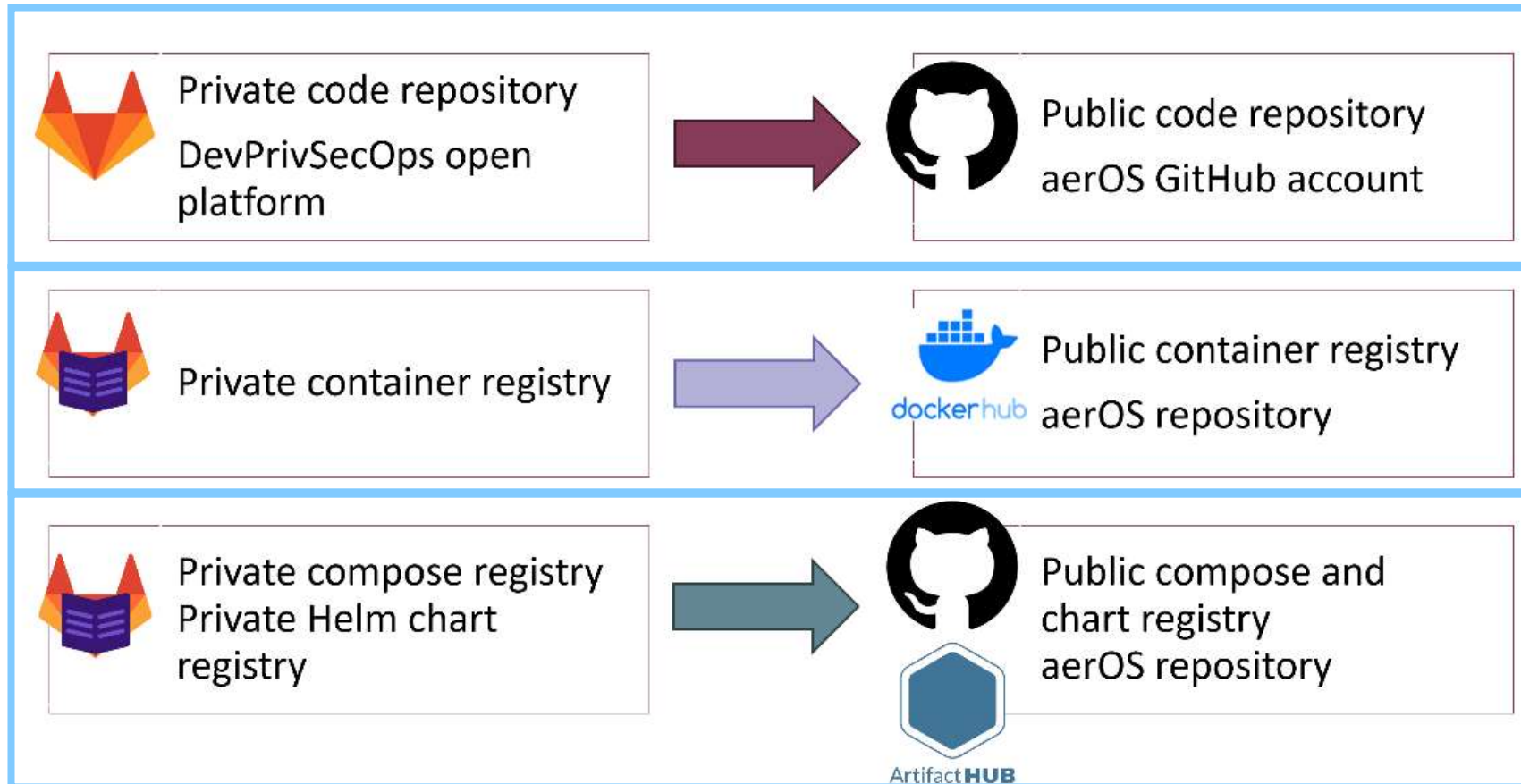
OSS during the Development process

- CNCF's cloud-native technologies and standards as a reference:
 - Kubernetes, KubeEdge, NATS, monitoring, security...
- Selection of popular and widely-used in production open-source technologies
- Custom adaptation of these technologies to edge-native principles to build the aerOS Meta-OS and target the full spectrum of the
- Collaboration with the community through issues and pull request:
 - Orion-LD, KubeEdge, IOTA, ...
- Collaboration with other EU research projects with similar goals:
 - EU-funded research results and outcomes are also open-source!



Oss in the Meta-os Publication process

- From private to public repositories



Code



Container images

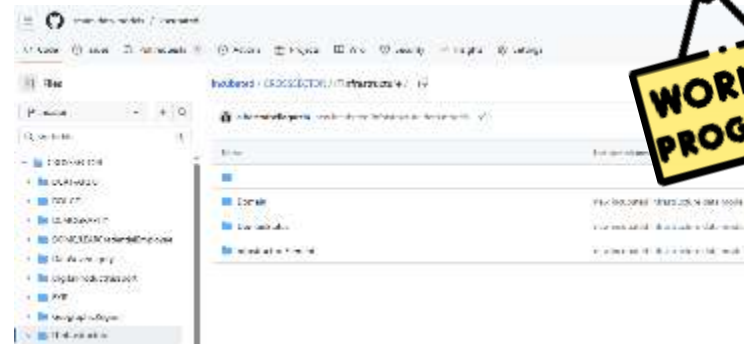


Deployment material

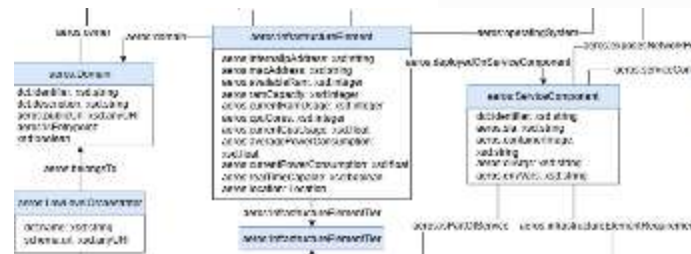


Cloud-Edge-IoT Continuum Data Model

- Not only code matters -> Also the way we define data
- No available data models to define the Cloud-Edge-IoT continuum:
 - Created from scratch and fine-tuned during the aerOS Project
 - Relevant open-source contribution due to its novelty
- Officially accepted as incubating under Smart Data Models



- Available as a semantic ontology developed following LOT Methodology: <https://w3id.org/aerOS/continuum>



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THANK YOU!

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