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Software & Standards for
Smart Networks & Services

From Telco Edge Cloud to AI Factory: Powering Next-Gen Smart Networks & Services with OpenNebula

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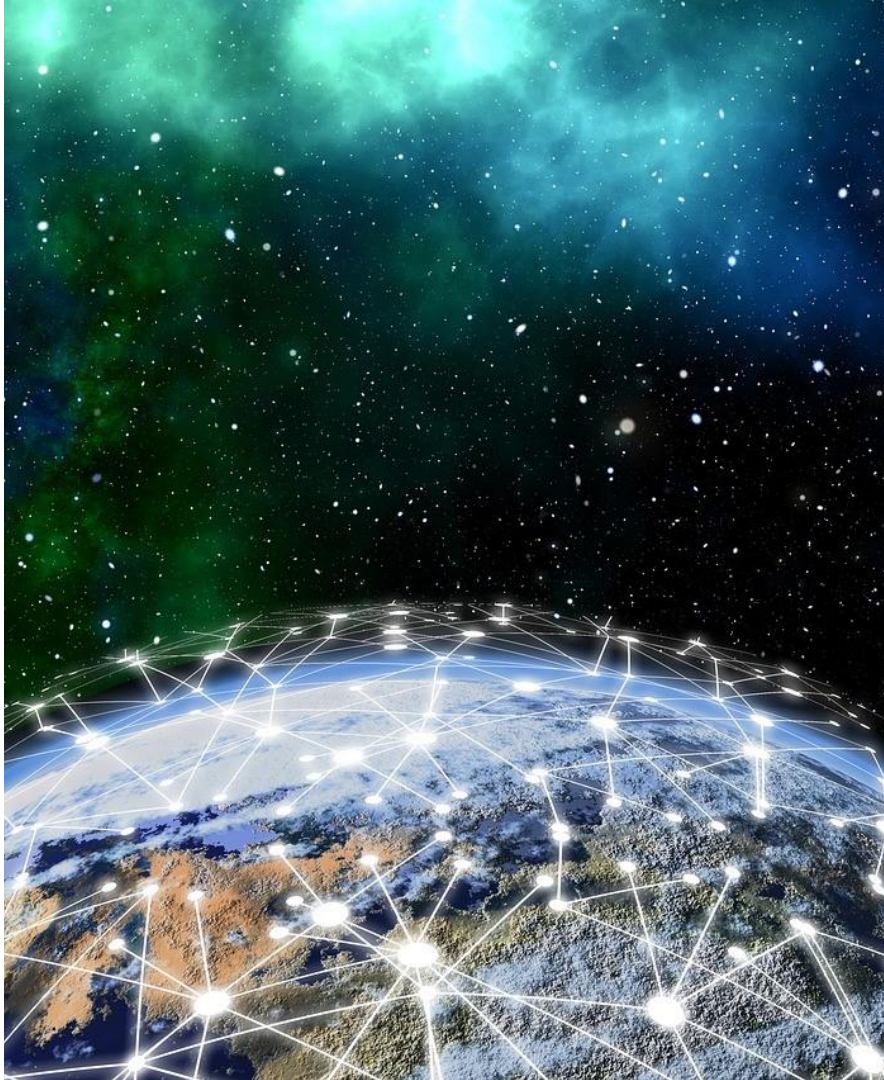
OpenNebula

04/02/2026



What is OpenNebula?

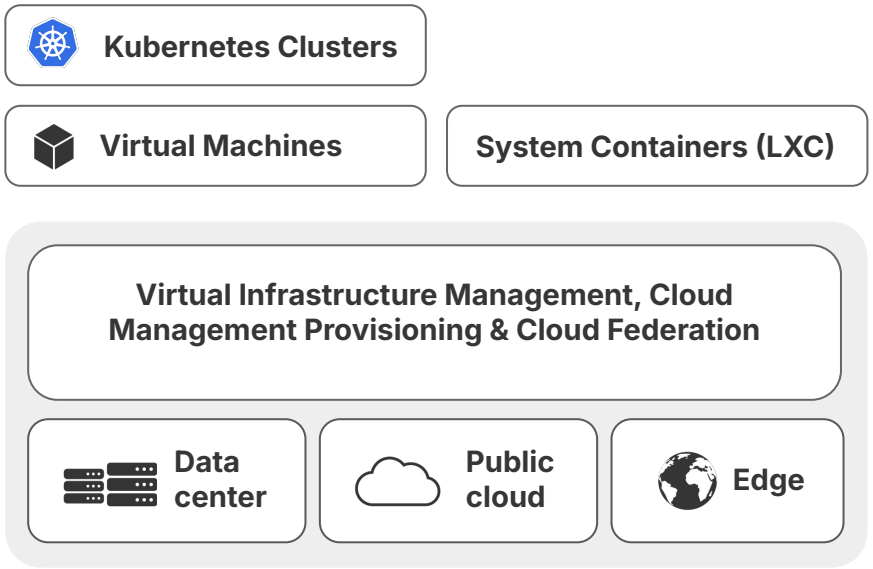
The Open Cloud & Edge Computing Platform

Workload Orchestration – App Management

- Streamlines application operations
- Container and VMs execution
- Isolation & multi-tenancy
- App portability & scaling

Cloud and Virtualization – Infra Management

- Unified on-demand provisioning
- Automates K8s lifecycle
- Delivers hybrid & multi-tenant clouds
- Optimizes infrastructure usage



Expanding to the Hybrid Cloud

OpenNebula

Building a private cloud overlay using Public Cloud Resources

Any Application

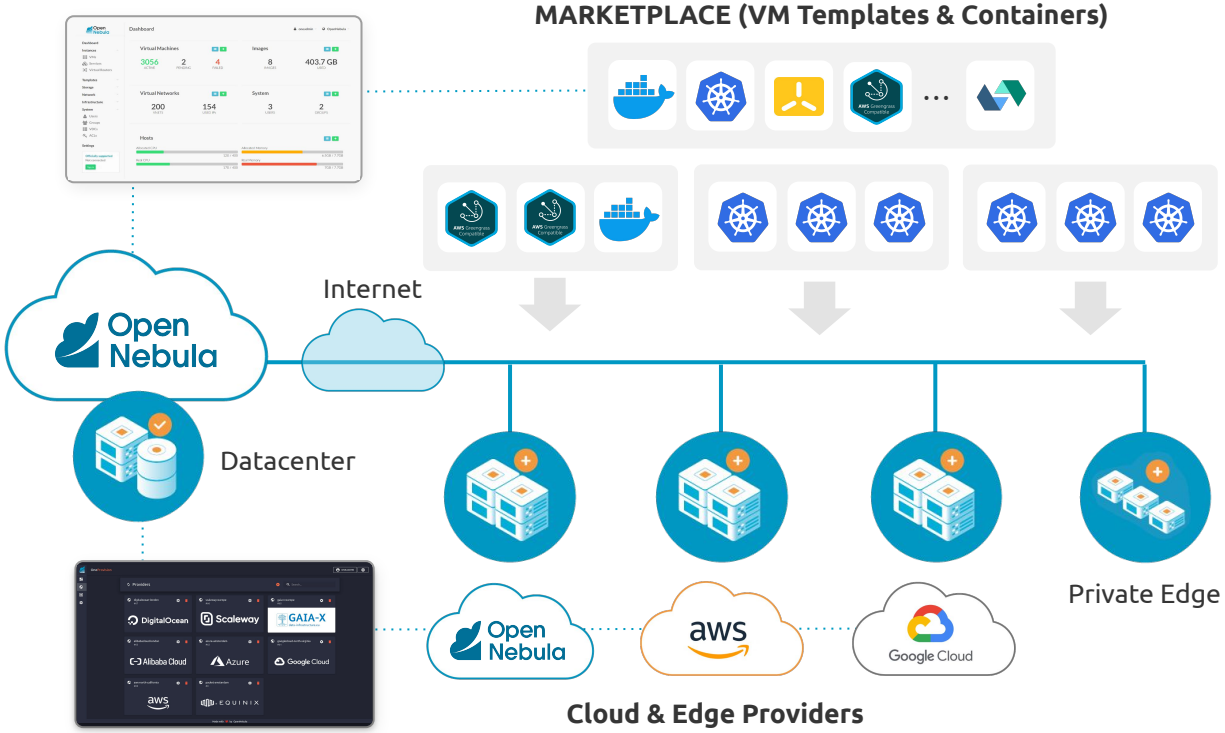
VMs, multi-VM services, **containers**, and **K8s clusters** on a shared environment.

Uniform Management

Homogeneous layer for user and workload management and operation.

Any Infrastructure

Automatic provision of resources from **cloud providers.**



OpenNebula for the Telco Cloud

Enhanced Platform Awareness

Extensive Collaborative Work with Customers & Partners:

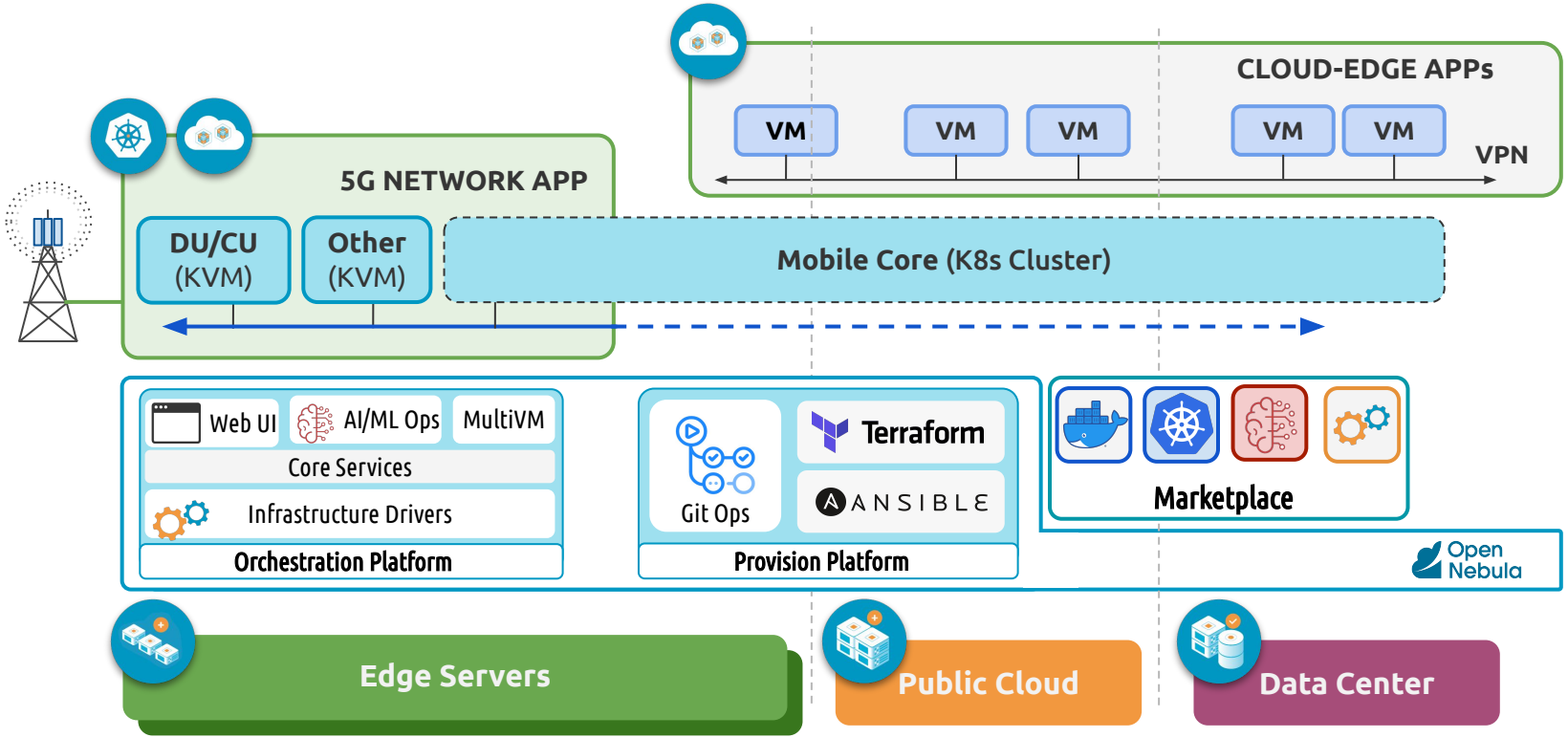
- ✓ Host CPU feature request
- ✓ PCI passthrough
- ✓ HugePages support
- ✓ NUMA Awareness
- ✓ IO based NUMA scheduling
- ✓ CPU Pinning
- ✓ CPU Threading Policies
- ✓ OVS-DPDK
- ✓ Port forwarding
- ✓ GPU hardware support
- ✓ Bare Metal automation provisioning
- ✓ Multi-Clustering support

More Info: https://support.opennebula.pro/hc/en-us/articles/6265169735185-White-Paper-OpenNebula-Enhanced-Platform-Awareness

Expanding to the Telco Edge Cloud

OpenNebula

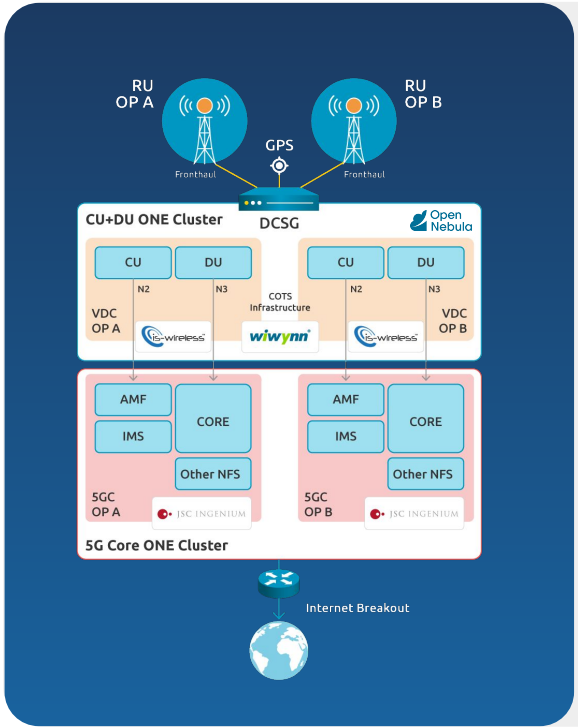
Unified Management Across the Entire Hybrid Multi-cloud Continuum



Network Virtualization for Telco Clouds and 5G

OpenNebula

A Carrier-grade Cloud Platform that Supports both VNFs and CNFs



Sylva Project

Open source standard infrastructure for telco cloud to enable interoperability

5G Neutral Host

Enabling multiple wireless service providers to operate within the same 5G cell tower infrastructure

Distributed NFV

Deployment of Virtual Network Functions across a distributed cloud-edge infrastructure

Virtualized RAN

Cloud-based approach to deploying radio network functions (RNFs)

AI/RAN

Accelerated 5G vRAN and AI inference infrastructure with multitenancy for each customer

Prepare for 6G

Experiment with future 6G networks and innovative applications

More Info: https://opennebula.io/edge-cloud/

Distributed Edge Environment for NFV

OpenNebula

Global Connectivity Services

Challenges:

- ✓ Coexistence of **virtual machines** and **containers**
- ✓ **Multi-tenancy** in **resource-constrained** environments
- ✓ Traditional cloud and virtualization platforms are **complex** and **expensive**

Solution:

- ✓ **Automatic on-demand** deployment of PoPs on bare-metal servers running KVM hypervisor
- ✓ Use **local storage**, and DPDK or SR-IOV for **high performance**
- ✓ Central **multi-tenant, AI-driven** NOC management
- ✓ **Minimal hardware** infrastructure at NOC and PoPs
- ✓ Avoid lock-in, increase **flexibility** and **minimize costs**

Partners:

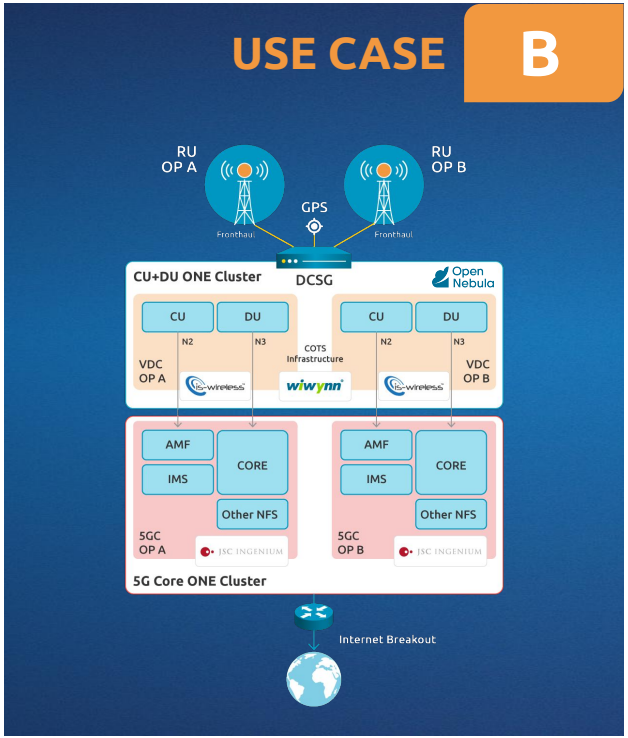
- ✓ Telco NFV/Edge Platform certified by **Telefónica GS**

Industries:

- ✓ Tier-1 Telcos, Wholesale ISPs, MVNE, NaaS Providers, …

5G RAN Virtualization

Neutral Host, Private 5G Networks | Edge for Telecom



Challenges:

- ✓ Growing demand to provide neutral hosting edge nodes for **MNO**, **MVNO**, **private 5G**, and 3rd-party services
- ✓ **Neutral hosting multi-tenancy** is a must and has to be lightweight
- ✓ Lack of expertise in integrating an **open multi-provider** working solution

Solution:

- ✓ Cell site **hardened edge computing infrastructure**
- ✓ **O-RAN compliant** for multi-operator and multi-tenancy
- ✓ **Fully integrated solution**
- ✓ Plus Telco services that can be hosted
  - ○ **Mobile core** & 3rd-party services

Partners:

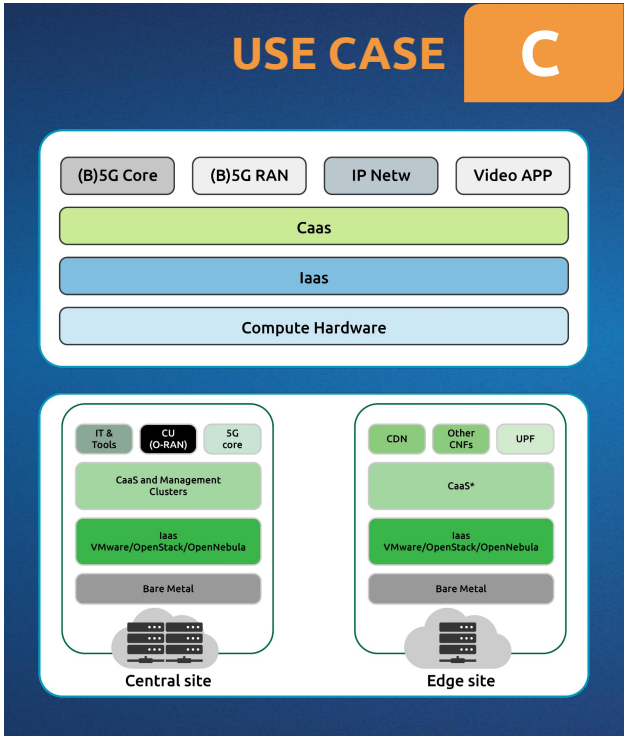
- ✓ Vantage Towers, IS-Wireless, Universidad de Málaga

Industries:

- ✓ Tower Companies, FiberCos, Neutral Hosts, Smart Cities, …

Sylva - Telco Cloud Software Framework

Validation Platform Powered by OpenNebula



Challenges:

- ✓ Infrastructure **fragmentation**
- ✓ Difficulty in **unifying the lifecycle management** of clusters
- ✓ Lack of standardized, automated environments to **certify CNFs**
- ✓ Unnecessary **complexity** for vendors

Solution:

- ✓ **OpenNebula Cluster API provider (CAPONE)** to fully automate the lifecycle of Sylva-compliant Kubernetes clusters
- ✓ **Custom Kubernetes Cloud Provider Interface (CPI)** for efficient, on-demand management of cloud resources
- ✓ **GitOps automation** for declarative deployment (via FluxCD), allowing Sylva to interact directly with OpenNebula for bootstrapping and scaling
- ✓ **Dedicated validation platform** to certify community CNFs

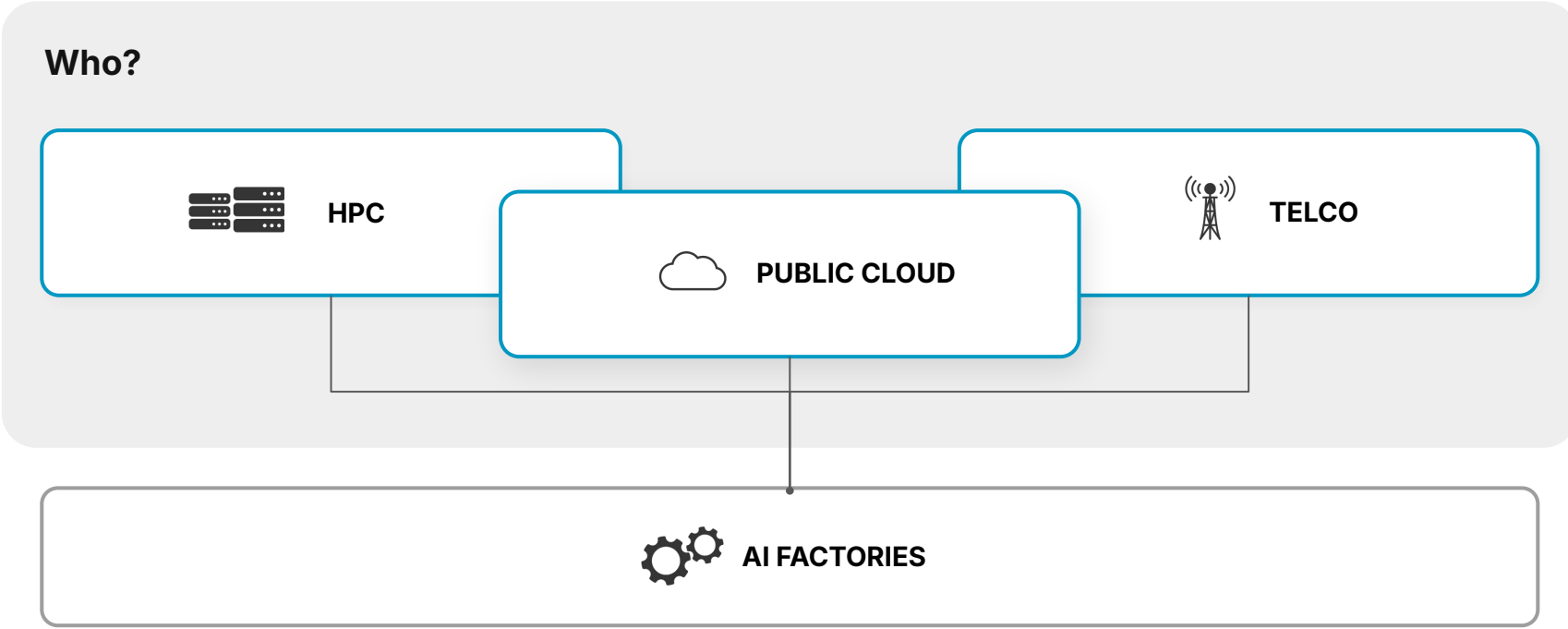
Industries:

- ✓ All major european telco operators (and not only)

OpenNebula for Building & Managing AI Factories

OpenNebula

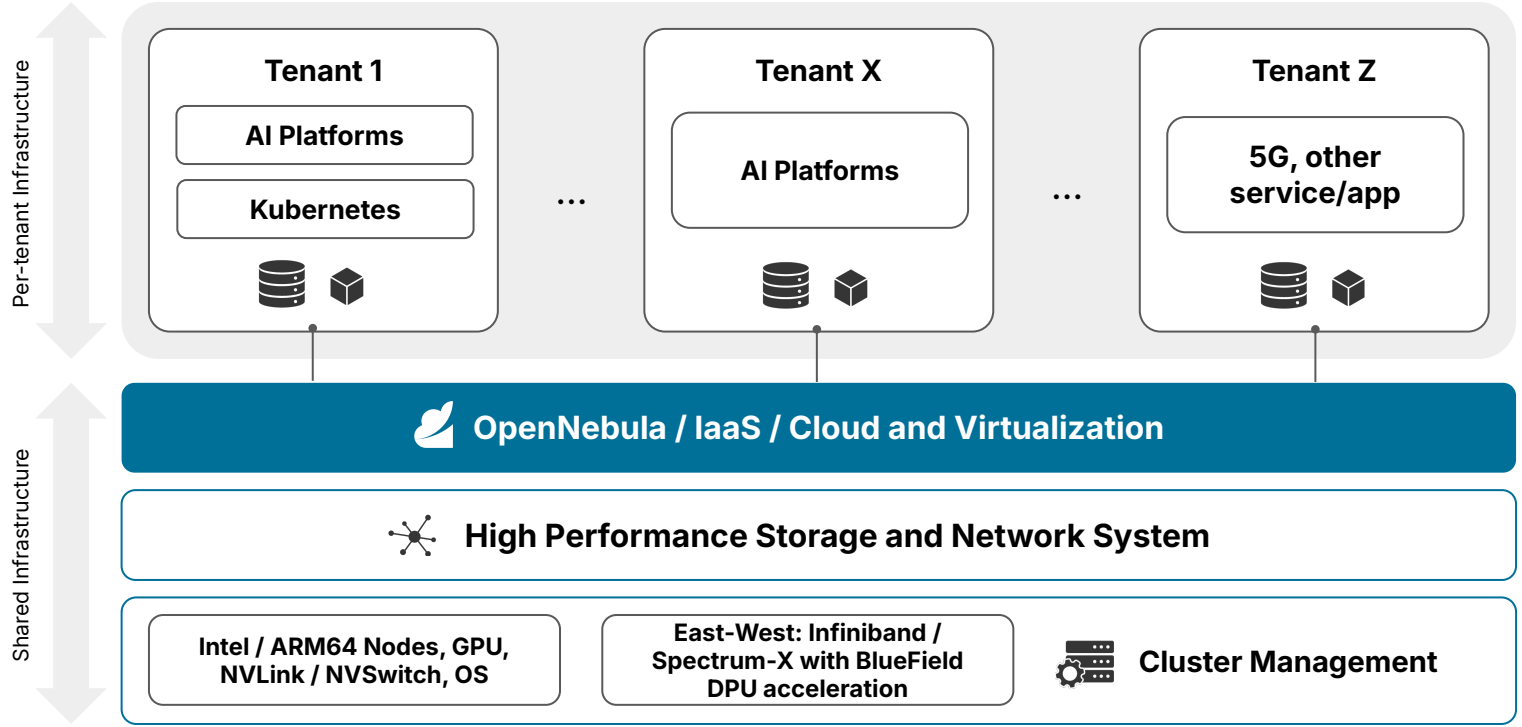
Making Enterprise AI a Reality with Multi-Tenancy, GPU-aaS, and vLLM



OpenNebula for Building & Managing AI Factories

OpenNebula

Cloud-like Provisioning, Workload Governance, and GPU-first Infrastructure



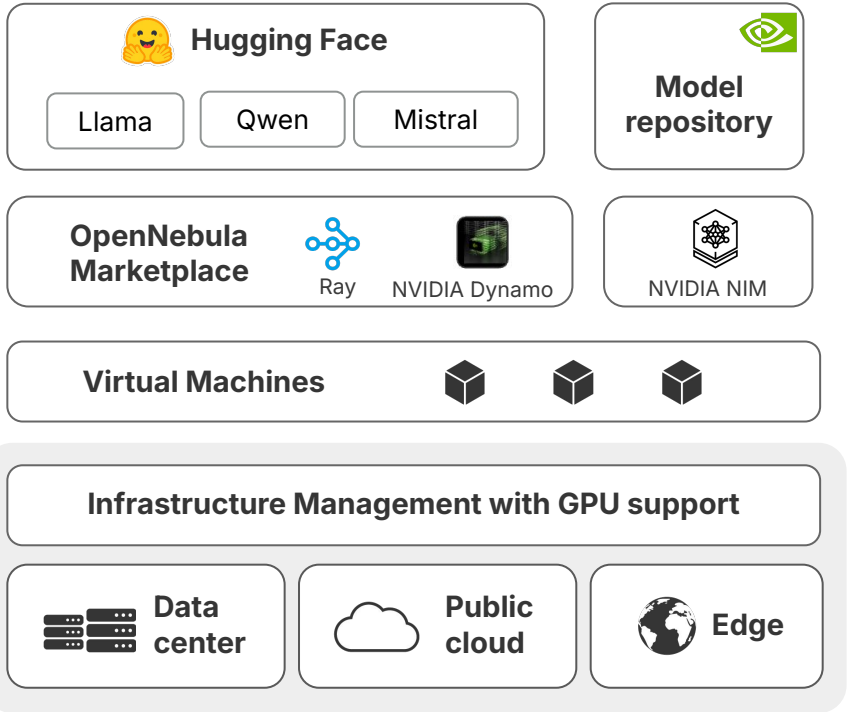
OpenNebula for Building & Managing AI Factories

Multi-Tenant LLMaaS for AI Factories

We have built a **multi-tenant AI-as-as-Service solution** for deploying and scaling LLMs in your own GPU-enabled infrastructure.

Core Features:

- **Deployment Frameworks**: Ray, NVIDIA Dynamo and NVIDIA NIM.
- **Inference Engines**: vLLM, Hugging Face and Tensor-RT.
- **Available LLMs**: pre-built LLMs (LLaMA, Qwen, Mistral) and LLM repository for NVIDIA NIM.
- **OpenAI API** compatible + **Quantization.**
- **GPU-native** (vGPUs, passthrough, multi-GPU).
- **Runs on any cloud**: on-prem, public, at the edge.



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Thank You!

OpenNebula.io

ONEnextgen

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IPCEI-CIS

Next-Generation European Platform for the Datacenter-Cloud-Edge Continuum

Initiative supported by the Spanish Ministry for Digital Transformation and Civil Service through the **ONEnextgen Project: Next-Generation European Platform for the Datacenter-Cloud-Edge Continuum** (UNICO IPCEI-2023-003) and co-funded by the European Union's NextGenerationEU instrument through the Recovery and Resilience Facility (RRF).

Financiado por la Unión Europea NextGenerationEU

Plan de Recuperación, Transformación y Resiliencia

GOBIERNO DE ESPAÑA MINISTERIO PARA LA TRANSFORMACIÓN DIGITAL Y DE LA FUNCIÓN PÚBLICA SECRETARÍA DE ESTADO DE TELECOMUNICACIONES E INFRAESTRUCTURAS DIGITALES

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