The new €3B IPCEI Cloud
Building a Sovereign Edge Cloud based on European technologies

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OpenNebula Systems

- The European **open source company** behind OpenNebula.
- HQ in **Madrid** (Spain), with offices in Brussels (BE), Brno (CZ) & USA.
- The only European open source **IaaS** solution, born in **2008**.
- A success story emerged from **EU innovation** programmes.
- Chairing the Cloud/Edge WG of the EC-sponsored **EU Cloud Alliance**.
What is OpenNebula?

The Only European Open Source Cloud & Edge Computing Platform

Virtual Machines

Kubernetes Clusters

✓ Multi-Tenancy
✓ Self-Service
✓ High Availability
✓ Federation
✓ Multi-Tier Apps
✓ Elasticity
✓ Automation
✓ Multi-Cloud
✓ VMs + Kubernetes
IPCEI Cloud – Fixing the EU Cloud Market

Cloud Services

Share of EU CSPs has declined (From 26% to <13%)

SysInfra SW Market

No top competitor from the EU (All of them are US companies)

Open Source SW

Marginal (<5%) role of EU code (Dominated by US organisations)
IPCEI Cloud – Fixing the EU Cloud Market

**Feb 2020**
European Strategy for Data aims to build a single market for data

**May 2020**
Recovery and Resilience Facility 20% Digital EU Flagship “Scale-up”

**Oct 2020**
Member States Declaration for next generation European cloud

**Mar 2021**
Digital Decade Strategy sets targets on edge and cloud for 2030

**May 2021**
Updated EU Industrial Strategy evidences strategic dependencies

IPCEI Cloud – Fixing the EU Cloud Market

In October 2020, all 27 EU Member States signed a joint declaration on “Building the next generation cloud for businesses and the public sector in the EU”:

- “The EU has a unique opportunity to address the need for more data sharing and decentralised data processing, closer to the user (at the edge)”.
- “Completely interoperable, open, multi-vendor cloud platforms and services, based on European, international or open source standards, will enable users to migrate effectively to the cloud (...)

The Signatories agreed on an ambitious investment plan gathering private, national and EU efforts and leading to the next generation of EU cloud and edge services...
IPCEI Cloud – Fixing the EU Cloud Market

✓ Enable Multi-Provider Cloud-Edge Continuum
✓ Strengthening of EU Digital Industry
✓ Development of European Open Source Technologies

IPCEI-CIS.eu
IPCEI Cloud – General Overview

Say ‘hello’ to the largest open source project in EU history!

★ Strategic co-investment programme approved by the EC in December 2023:
  ● 1,200 million EUR in State Aid + 1,400 million EUR in private funds.
  ● Expected to create more than 1000 highly-qualified jobs across the EU.
★ ~100 European companies from 12 Member States.

Commission approves up to €1.2 billion support by 7 Member States for an IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI CIS)

- Workstream 1: Cloud-Edge Continuum Infrastructure
- Workstream 2: Cloud-Edge Capabilities
- Workstream 3: Advanced smart data processing tools and services
- Workstream 4: Advanced Applications

- Deutsche Telekom
- Telefonica
- Atos
- Orange
- SAP
- Reply
- TIM
- Oktawave
- Atende Industries
- OpenNebula Systems
- Arsys Internet
- CloudFerro
- 4G
- E-Group
- IIT Software
- Toscali Italia
- Siemens
- Fincantieri
- Engineering
- Ingeregia
- Informatic

- 7 Member States: 🇪🇺 🇬🇧 🇩🇪 🇫🇷 🇬🇧 🇬🇷 🇪🇸
- 19 companies: Large Enterprises and SMEs
- 19 research, development and first industrial deployment projects
- +90 indirect partners
- Expected to unlock €1.4 billion of private investments

Contributes to key EU objectives
Boosts breakthrough innovation
Generates positive spill-over effects across the EU
Ensures proportionate public spending
Ensures fair competition
IPCEI Cloud – General Overview

Industry Facilitation Group

Chair

- Open Nebula
- CloudFerro
- Siemens
- Engineering

Vice-Chair

- SAP
- Open Nebula
- Telefónica
- Deutsche Telekom

WS1

WS2

WS3

WS4

Supervisory Board

( MS + EC )
IPCEI Cloud – General Overview

**WS1**
Cloud-Edge Infrastructure
- Private Cloud: On-premises Datacenter
- Public Cloud: 100 - 1000 km, 10 - 20 ms
- 5G / Near Edge: 1 - 100 km, 2 - 5 ms
- Private Edge: < 1 km, 1 ms

**WS2**
Cloud-Edge Capabilities
- 2.1. Federation and Multi-cloud
- 2.2. XaaS Layer
- 2.3. Integration, Monitoring, Management, and Optimization
- 2.4. Operating Systems and Virtualization
- 2.5. Technical Requirements and Architecture

**WS3**
Smart Advanced Data Processing
- 3.1. Data Exchange
- 3.2. Artificial Intelligence
- 3.3. App Deployment
- 3.4. Service Orchestration
- 3.5. Ecosystem Services

**WS4**
Use Cases
- 4.1. Mobility, Transport & Travel
- 4.2. Energy
- 4.3. Manufacturing & Industry 4.0/5.0
- 4.4. Health
- 4.5. Infrastructures, Smart Buildings & Cities
- 4.6. Tourism & Cultural Heritage
- 4.7. Agriculture & Environment
- 4.8. Media
IPCEI Cloud – General Overview

STATE OF THE ART

Cloud-Edge Hybrid Architectures
- Mostly based on proprietary, complex technologies, leading to vendor lock-in.
- Centralized cloud structures that assume highly homogeneous datacenters.

Multi-provider Interoperability and Portability
- Low adoption of standards, with abstraction layers based on containers with reduced security (i.e. K8s).
- Storage and network model not well suited for the highly distributed cloud-edge continuum.
- Partial use of automation techniques (e.g. IaC) for infrastructure provisioning automation.
- Lack of specific edge node architectures able to meet the needs of HPC and 5G/telco environments.

Multicloud Management and Orchestration
- Lack of AI used to optimize and automate cloud/edge infrastructure management.
- Centralized control planes that do not allow the federation of cloud and edge infrastructures.
- Limited support for optimized orchestration, energy efficiency, and enforcement of security policies.

Use Cases
- Deployed as static solutions on a case-by-case basis, lacking automation, interoperability and portability.
- Creating silos in strategic sectors based on different technological stacks and ad hoc implementations.
- Jeopardizes the consolidation of a cloud-edge continuum and an associated industry ecosystem.

FUTURE CHALLENGES

- Increasing number of edge providers in the market.
- Emergence of tens of thousands of geographically distributed edge nodes.
- Need for complete automation of cloud edge operations.
- New security threats and larger impact of vulnerabilities.
- Preference for energy-efficient nodes.
- Tendency to platform heterogeneity.
- Infrastructure dynamicity and volatile devices.
- Dependency on general-purpose, public networks.
- Widely distributed environments.
IPCEI Cloud – Integrating the Whole EU Cloud-Edge Ecosystem

Data Processing Services

Solution Providers (ISVs)

Integrators

End Users

Application Providers in Multiple Industries

Datacenter-Cloud-Edge Continuum
IPCEI Cloud – Example of Individual Project: ONEnextgen

Data Processing Services

Solution Providers (ISVs)

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Datacenters-Cloud-Edge Continuum

Data Centers

Cloud Providers

Edge Providers

Technology Extensions
IPCEI Cloud – Example of Individual Project: ONEnextgen

MAIN GEO-STRATEGIC CHALLENGES:

**Coordination Failure**
- Lack of coordination to deliver a suitable edge computing offering

**Concentrated Market Power**
- Market structure dominated by a few non-EU providers
- Vendor lock-in practices
- High barriers to entry for new cloud and edge providers

**Negative Externality**
- Excessive energy consumption and pollution from rapidly-expanding cloud infrastructure

OpenNebula.io/IPCEI-CIS
IPCEI Cloud – Example of Individual Project: ONEnextgen
"Strategic autonomy is not a question of isolating ourselves and trying to produce everything in Europe, but of giving ourselves the means to discuss from a position of strength with our foreign partners".

Josep Borrell
Quo Vadis Europa? (29/08/2022)

“When it comes to digital, Europe's resilience will depend on our ability to develop the next generation of cloud and edge capacities and invest massively in developing European alternatives to reduce our current dependencies”.

Thierry Breton
A European Sovereignty Fund for an industry “Made in Europe” (15/09/2022)
NexusForum2024 Summit – 19 & 20 September @ Brussels

The event series bringing together the whole EU cloud & edge innovation ecosystem
Thank you... and see you soon!

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