# Nubo

## A French government sovereign cloud

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Thierry Carrez (OpenInfra Foundation)


# Who are we?

Louis Vigneras (@louisvgn@pouet.chapril.org)

- Master student in European affairs, Sciences-Po Paris
- Apprentice at Public Finance General Directorate, French Finance ministry
- Liber-IT association Co-founder & President

Thierry Carrez (@tcarrez@fosstodon.org)

- General Manager, OpenInfra Foundation
- Vice-chair, Open Source Initiative
- Release Manager for OpenStack


# OpenStack history

- Openly-developed open source cloud software
- Global community (50 % EMEA, 20 % NA, 30 % APAC)
- Kubernetes did not kill OpenStack, it reinforced it

# OpenStack today

- 15th birthday this year, age of maturity
- >50M CPU Cores driven by OpenStack
- Public clouds :


- Private clouds :

# Beyond OpenStack: OpenInfra

- Providing infrastructure using open source solutions
- Linux + OpenStack + Kubernetes (+ Ceph...)
- Making infrastructure technology accessible to all


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# 3 key trends for OpenInfra growth

- AI infrastructure requiring new accelerated capacity
- VMWare escapees
- Digital sovereignty

# The need for local infrastructure

- Need for programmable compute infrastructure
- Need for resiliency against weaponizing access
- Need for resiliency against state actor espionage
- Need for applying EU privacy laws to our data in the cloud

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# Open source for digital sovereignty

- Availability – permissionless access to technology
- Independence – no dependency on a specific actor
- Transparency – open governance, open development
- Interoperability – compatible providers rather than a hyperscaler

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# A brief History


# Initial Context

- Investment plan for the future (*Plan d'investissement pour l'avenir,* PIA)
- Objectives:
  - Modernization and rationalization of state-run hosting infrastructures
  - Industrialization of computing environment for the State's IT teams
  - Security and resilience
  - Inter-ministerial by default
  - Sovereignty and independence

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# A two-part project

- **Set of tooling** to create and manage an Open Source Cloud
  - Industrial-scale cloud infrastructure management (provisions of VMs, billing, upgrades without downtime, etc.)
  - **Based on free software** (community versions)
- An inter-ministerial **hosting offer**
  - Based on the Open Source Cloud
  - Consume pay-as-you-go resources
  - IaaS + security and customer support

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# Milestones in the NUBO History

| 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|

- Project Start — Sept 2016
- Interministerial demonstrator — Apr 2017
- **Production Start-up first platform** — **Jul 2018**
- Interministerial Gitlab CE — Apr 2019
- **Customer portal & centre of excellence** — **Nov 2019**
- Web tools Zammad, Pago, Doc, etc.
- Vault/encryption — Nov 2021
- DNSaaS — Fev 2022
- Web tools Flow, ResaNubo
- 24/7 supervision by MI
- DIVIDO Dual-site load balancing service — Nov 2023
- Debian migration — Q1-Q3 2024
- OBJEKTO Dual-site S3 object storage service — Dec 2024

**4 major OpenStack upgrades via Kolla-Ansible**

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# The offer as it Stands Today

## Site 1

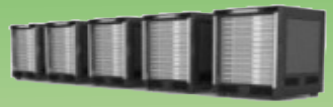
### Nubo 02 (Internet exposed)

Availability Zone 1

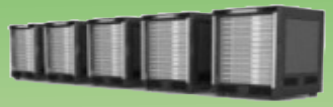
Availability Zone 2

### Nubo 01 (RIE exposed)

Availability Zone 1



Availability Zone 2



## Site 2

### Nubo 12 (Internet exposed)

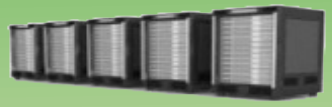
Availability Zone 1

Availability Zone 2

### Nubo 11 (RIE exposed)

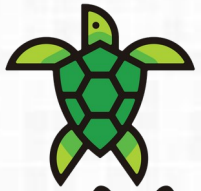
Availability Zone 1

Availability Zone 2



# The Offer as it Stands Today

- Deployed OpenStack components
  - Keystone (Authentication)
  - Nova (VM)
  - Glance (Images)
  - Cinder (Volumes)
  - Neutron (Network)
  - Designate (DNS)
  - Barbican (Vault)
  - Heat (Templates) but Terraform privileged
  - Horizon (Dashboard)
  - Swift (Object storage)





Logos from OpenStack Community CC-BY-NC

- Observability through :
  - EFK (ElasticSearch, Fluentd, Kibana)
  - Prometheus / Grafana


- Customer portal for on-boarding and support

Grafana logo from Github repo AGPL-3.0-only
Prometheus logo from Github repo Apache-2.0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# Numbers

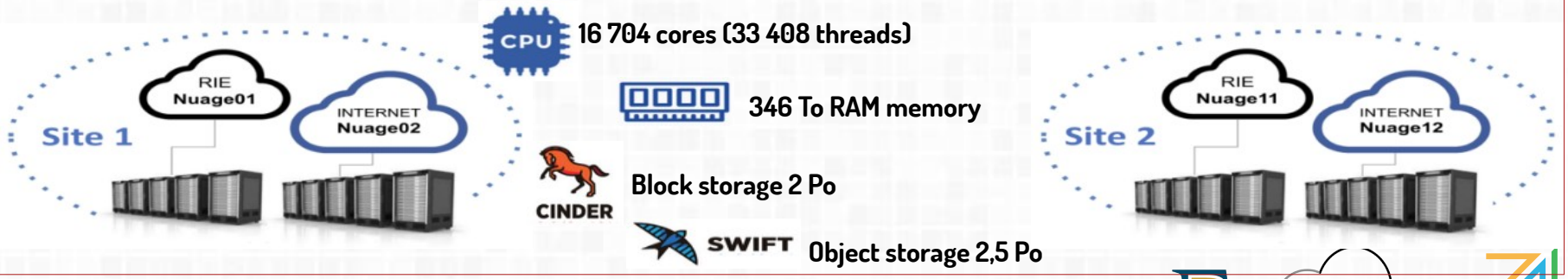
**In short**

| Projects/Teams | Tenants | Instances (VM) | Virtual processors (vCPU) |
|---|---|---|---|
| **~450** | **~2 000** | **~13 500** | **~38 500** |

**Customers**

**~15** different public administrations

**Infrastructure**

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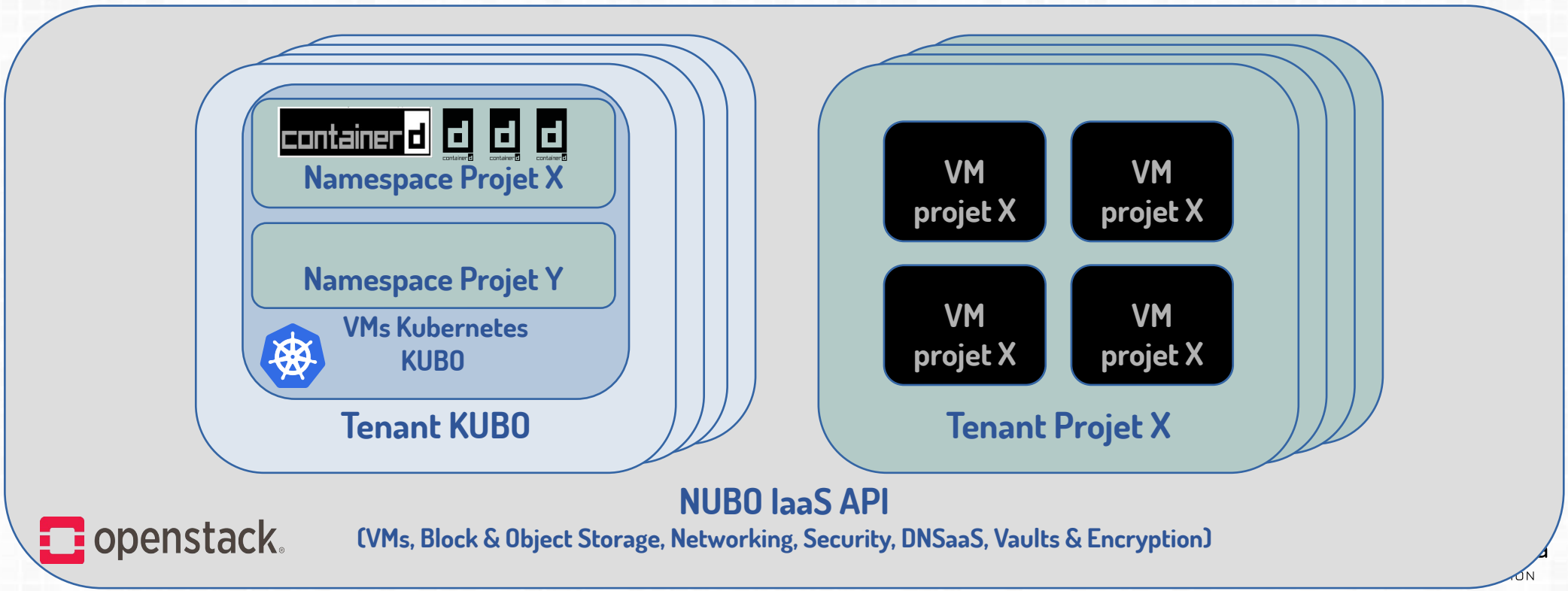
# Kubo : Namespace aaS Offer



# Free software: The Chosen Path Towards Sovereignty


# Product *vs* Project

- Distinction between product and project
  - Product is:
    - Source code, the licence (and maybe documentation)
  - Project is:
    - Everything around it (maintenance, support, etc.)
- See : https://bzg.fr/logiciel-produit-projet/

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# Free Software: Formal Freedoms

- Using free software **as a product** guarantees independence over the code
- As Renaud Chaillat puts it: « Independence is a guarantee of control over the technological and financial trajectory. »
- The **four essential freedoms** enable:
  - **Transparency**, and thus **security** by proof, not trust to a third party (*freedom 1*)
  - Prevent **vendor lock-in** (cf. Rufus Pollock); the freedoms allow us to modify, upgrade, extend, and eliminate ties to unchangeable code bases (*freedom 0-3*)
  - Meet our **specific needs** (*freedom 1*)
  - **Cost-saving,** not reinventing the wheel, re-buying new licences (*freedom 0, 2 & 3*)


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# The Problem Using the Product

- The way the **project handles the product** may **not align** with our goals:
  - RedHat moves in 2020 and 2023 (costs us 3 quarters of update from CentOS to Debian for OpenStack base)
  - Geopolitics : XZ utils
- Maintaining one's own fork is neither feasible nor desirable


XZ logo, as contributed by Jia Tan


# From Formal to Real Freedoms

- **Community versions** → *possibility* to take part of the collaboration, contribution and governance of *projects*
- But, need to **internalize competencies**
  - The DGFIP - Finance Ministry: a **long history** using Free Software for production-critical applications
  - Inter-ministerial public market for open source support/maintenance
  - Largest information system of Europe
  - Prefers to **internalize competencies** rather than **licenses**

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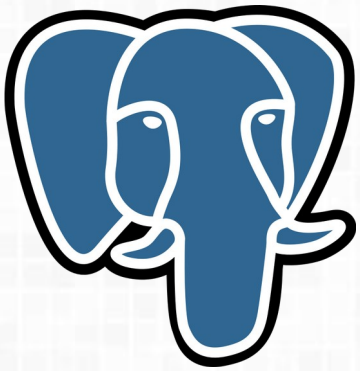

| Free Software at DGFIP - Finance Ministry: a long story | |
|---|---|
| **2000-2004** | X86 & Linux<br>Java/Tomcat/JBoss |
| **2004 - 2008** | Deployment automation<br>Managment configuration (Puppet)<br>A little bit of virtualization with Xen |
| **2008 - 2012** | Massive, automated virtualization<br>(KVM / OpenVSwitch / Cobbler / Puppet)<br>Internal tools in Python / Django<br>(modeling and deployment) |
| **2012** | **PostgreSQL preferred over Oracle** |
| **2012 - 2014** | First OpenStack POCs (promising... but complicated!) |
| **2015** | NUBO financing<br>(interministerial sovereign cloud) |

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# Sovereignty: a Definition Attempt

- « The ultimate authority in the decision-making process of the State and in the maintenance of order » (Britannica Academic)
- Context of a State's cloud
  - « a computing environment that is **owned**, **controlled**, and **operated** by the State »
  - Ensures data and services are subject to its laws and regulations
- It is not just mere *independence*


# Where Are We Going From Here?

- Free software has provided us with significant benefits and independence
- Contributions:
  - Openvswitch, Opennebula, ManageIQ
  - Challenges: the migration from CentOS to Debian
- Looking ahead: committed to increasing our contributions in various forms
- Open source distribution Kubo
- Great collaboration with DINUM on open source projects

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# Thank you!