Network Management as a Service

Status Update, New Use Case and Future Plans

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GN5-1

Agenda

- Introduction and Update on NMaaS as a GÉANT Production Service

- Open-Sourcing of NMaaS Software Components

- Virtual Laboratory Use Case

- Plans for the Future

What is NMaaS?

NMaaS is an open-source framework for orchestration of on-demand deployment of applications in a cloud environment

- Kubernetes-based infrastructure

- multi-tenant architecture

- software based VPNs

- easy application deployment process

- wide portfolio of applications

- GitOps approach for application instance configuration management
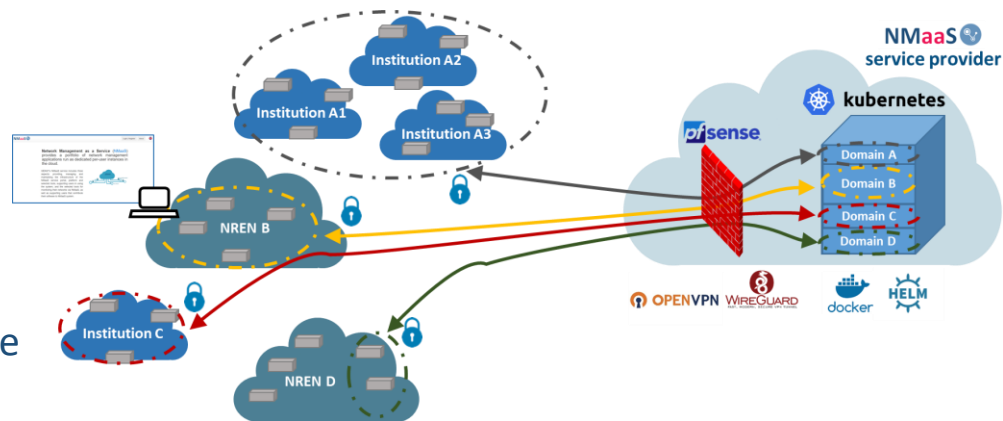
How can you use NMaaS?

MANAGED SERVICE

To set up your own NMS on the central GÉANT NMaaS

use NMaaS **production** instance: *https://nmaas.eu*

(secure, fully supported, up since December 2018)

To try NMaaS out or test offered applications

use NMaaS **sandbox** instance: *https://nmaas.geant.org*

(no configuration overhead, demo applications already deployed)
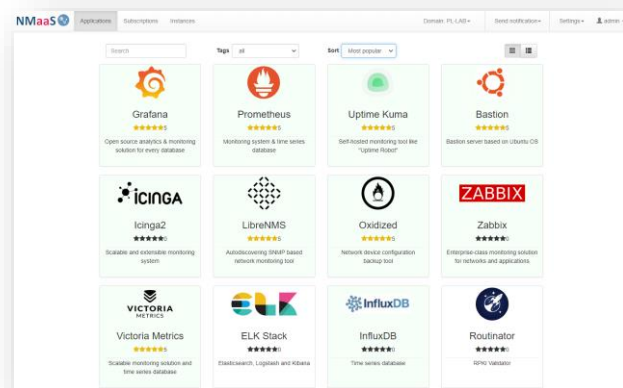
SELF-HOSTED

To run your own instance of NMaaS (Kubernetes cluster required)

visit NMaaS **Installation Guide**: *https://docs.nmaas.eu/self-hosted-nmaas/install-guide/*

To run Kubernetes cluster and NMaaS on local machine

visit **local** NMaaS **Testing Environment** Installation Guide: *https://docs.nmaas.eu/self-hosted-nmaas/local-vm/*

NMaaS Service offered by the GÉANT Project

- **Offered free of charge**

- Service **operated by a dedicated team** within the GÉANT Project

- **Current funding assured till end of 2024** (part of GÉANT 5-1)

- Statistics
  - Registered users: **160**
  - Domains: **29**
  - Offered applications: **28 + 2**
  - Deployed applications: **128**

ZABBIX   Uptime Kuma   netbox   Healthchecks

Who is using NMaaS?

- **NRENs**
  - CYNET
  - HEANET
  - ARNES
  - RENATER
  - SURFnet
  - URAN
  - PSNC / PIONIER
- **End institutions**
  - GÉANT
  - From: France, Germany, Slovenia, Ireland, Brazil, Spain, Serbia, North Macedonia, Italy, Cyprus

- **GÉANT Project teams**
  - Performance Measurement Platform (PMP)
  - RARE project (GP4L monitoring)
  - MP-LS domain
  - perfSONAR development team
- **Tool developers**
  - perfSONAR
  - WiFiMon
  - SPA / SPA Inventory

Update on NMaaS development, operations and dissemination

- **Recent release of NMaaS v1.5.2**
  - Bug fixes and Portal layout enhancements

- **Ongoing development of NMaaS v1.6.0**
  - New major features supporting a new use case
  - Access to logs of deployed applications
- **Continuous addition of new applications to the catalog**
  - In progress: Changedetection.io, Adminer

- **Ongoing maintenance of production and development Kubernetes clusters**

- **Continuous user support**
  - Configuration of new domains
  - VPN access configuration for new users

- **NMaaS presentation at APAN conference (along RARE)**
  - Interest from few Asian NRENs

- Presentation proposal submitted to Internet2 TechEX23

Open-Sourcing of NMaaS Software Components

The Power of a Community

- Building an **open and diverse community** around NMaaS

- NMaaS components were always free to download and use, but not open-sourced
    - Until now!

- Open-sourcing of all 4 major NMaaS components
    - **Apache 2.0 License**
    - Plans underway to gradually open-source the applications' specification as well

- All development is done via https://github.com/nmaas-platform
    - Contributions are welcome along with issue reports and feature requests
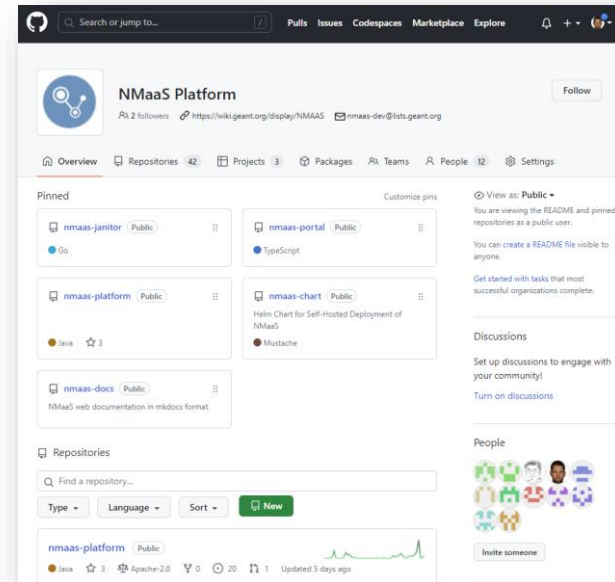
Documentation Improvements

- Open-sourcing the NMaaS documentation along with the components' source code

- Work has begun on **consolidating all NMaaS content in a single location**
  - https://docs.nmaas.eu

- Public contributions welcome
  - https://github.com/nmaas-platform/nmaas-docs

- Extending available content with **application guides** and description of various use-cases

- The previous Wiki page will gradually be deprecated as it is moved to the new location
  - https://wiki.geant.org/display/NMAAS/NMaaS+Home

New Use-Case: NMaaS as an enabler for Virtual Laboratories

NMaaS for Virtual Laboratories in a Nutshell

- The challenge of organizing hands-on educational exercises
  - Formal learning
  - Informal learning
- NMaaS as a **general-purpose application catalog**
- **Core idea:** Deployment of educational exercises not fundamentally different from network management applications
  - Same underlying concept and technologies
  - Containerization, orchestration, isolation, multi-tenancy

# Vision for the NMaaS Virtual Laboratories Use Case

- Benefits for educational staff
    - **<u>Reusable infrastructure</u>** across multiple courses, or even institutions
    - Granular management of users and scenarios
    - Tight access control
- Benefits for end-users
    - Deployment of complex applications, bypassing hardware requirements
    - Eliminating configuration overhead
    - Playground for testing new software
- **<u>Diverse set of applications</u>**, from different science domains
    - Not limited only to computer science!

Extending NMaaS for Virtual Laboratories (1)

- Adapting existing and adding new features

- Domains
  - Individual users, optional creation of shared domains (e.g., collaboration)

- Domain groups
  - Domain groupings, facilitating application deployment restrictions
  - The problem of personalized catalogs

- On-demand applications
  - Utilize the available hardware to its maximum

= Implemented   = In Development
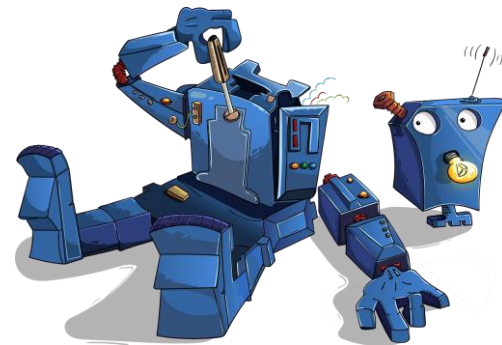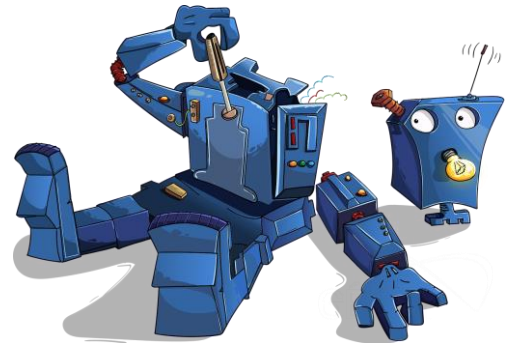
Extending NMaaS for Virtual Laboratories (2)

- 🏭 Bulk domain creation
  - Batch enrolment of large groups of users into the platform

- 🏭 Bulk application deployments
  - Hiding NMaaS from end-users

- 🏭 Application log viewing
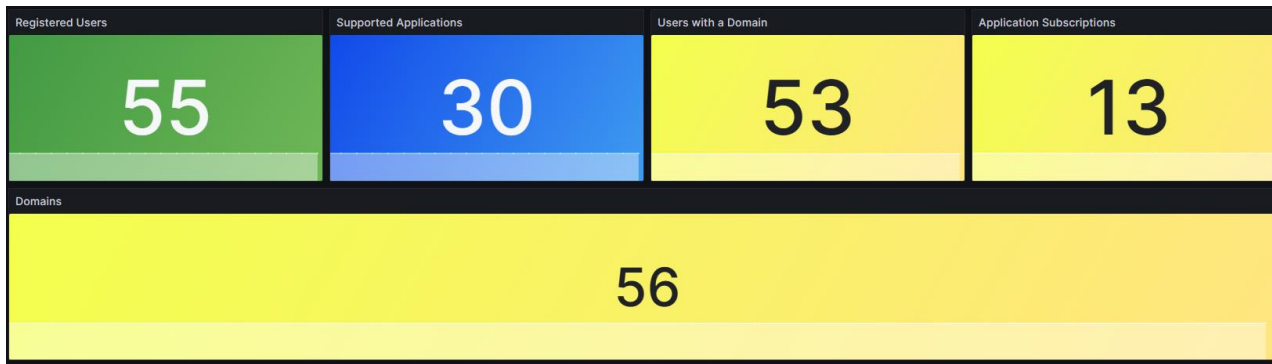 - Highly requested feature, easier troubleshooting

👍 = Implemented   🏭 = In Development

NMaaS for Virtual Laboratories Status Report

- Pilot underway at the Ss. Cyril and Methodius University in Skopje, North Macedonia
    - First real-world test with 45 participants from a single university course
    - Exercises related to cybersecurity
    - Applications are deployed by the users themselves using the NMaaS Portal
    - Idle applications are scaled down to conserve resources

Registered Users	Supported Applications	Users with a Domain	Application Subscriptions
55	30	53	13

| Domains |
|---|
| 56 |

Virtual Lab Progress Roadmap

- Finish the implementation of the planned features

- Add support for new scenarios, highest priority:
  - Jupyter notebooks
  - Integrated development environment servers (e.g., VSCode)
  - Database management software
  - Specialized software

- Share with the community not only the applications' specification, but also the laboratory scenarios as well
  - Continue the existing open-sourcing effort

Plans for the Future

The Road Ahead

- Migrating the production service to new hardware

- Upgrading the NMaaS playground instance

- Finalizing NMaaS v1.6.0 (August 2023)

- Enhancing the new documentation website

- Second pilot of Virtual Lab at UKIM (November 2023)
  - Support for new applications

- Contributions from the community
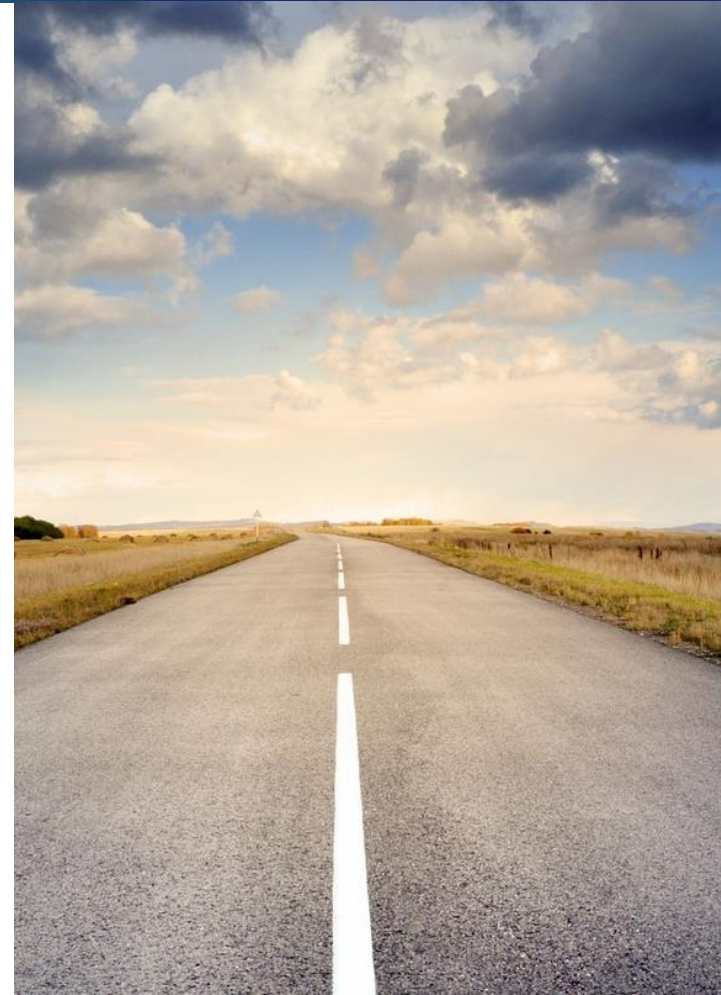
Thank You!

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