Virtual Network Operation Center (NOC) with nmaas

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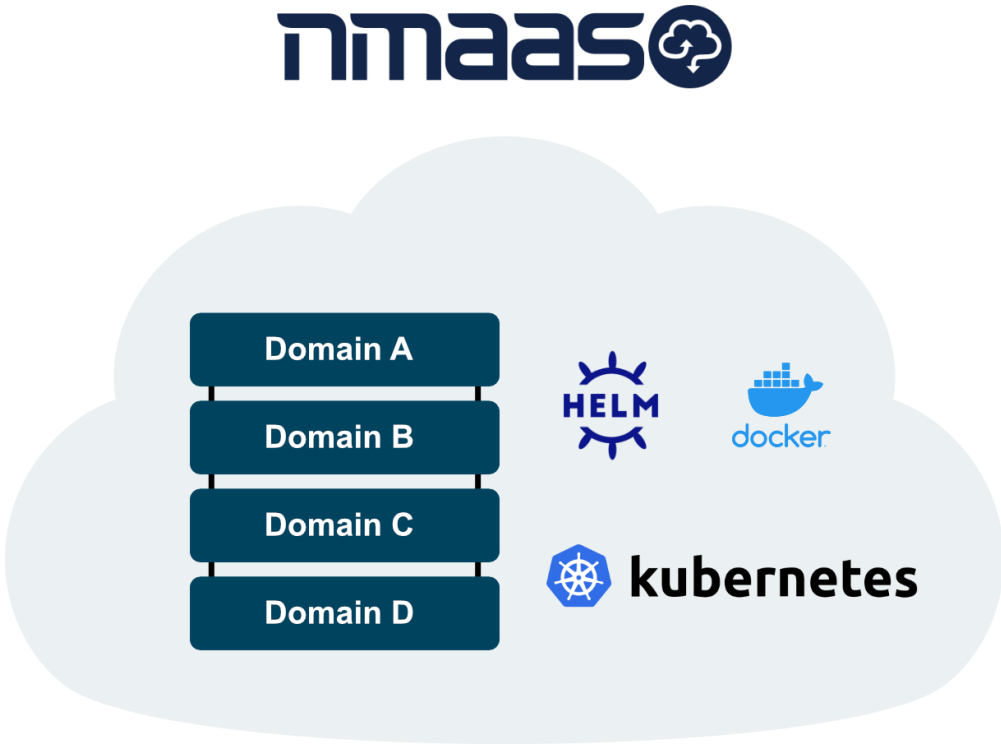
Agenda

- Introduction to the nmaas Platform
  - Orchestration
  - Use-cases
- nmaas in Practice
  - Virtual NOC
  - Application Catalog
  - GitOps Configuration
- Conclusion

Introduction to nmaas

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

- Kubernetes-based infrastructure
- Multi-tenant architecture
- Simple application deployment and upgrade process
- Wide and easily extendable portfolio of applications
- GitOps approach for application instance configuration management
- Easy troubleshooting



Source code available at https://gitlab.software.geant.org/nmaas

nmaas Flavors and Use-Cases

- Support for multiple use-cases by providing relevant software features and deployable applications
- Currently supported use-cases on top a common code base
  - **nmaas for Virtual NOC** (originally referred to as NMaaS - Network Management as a Service)
  - **nmaas for Virtual Lab** (new use-case for online hands-on exercises in an education context)

https://nmaas.eu/

https//vlab.dev.nmaas.eu

nmaas for Virtual Labs in a Nutshell

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

nmaas for Virtual NOC (vNOC)

New name for NMaaS (Network Management as a Service)

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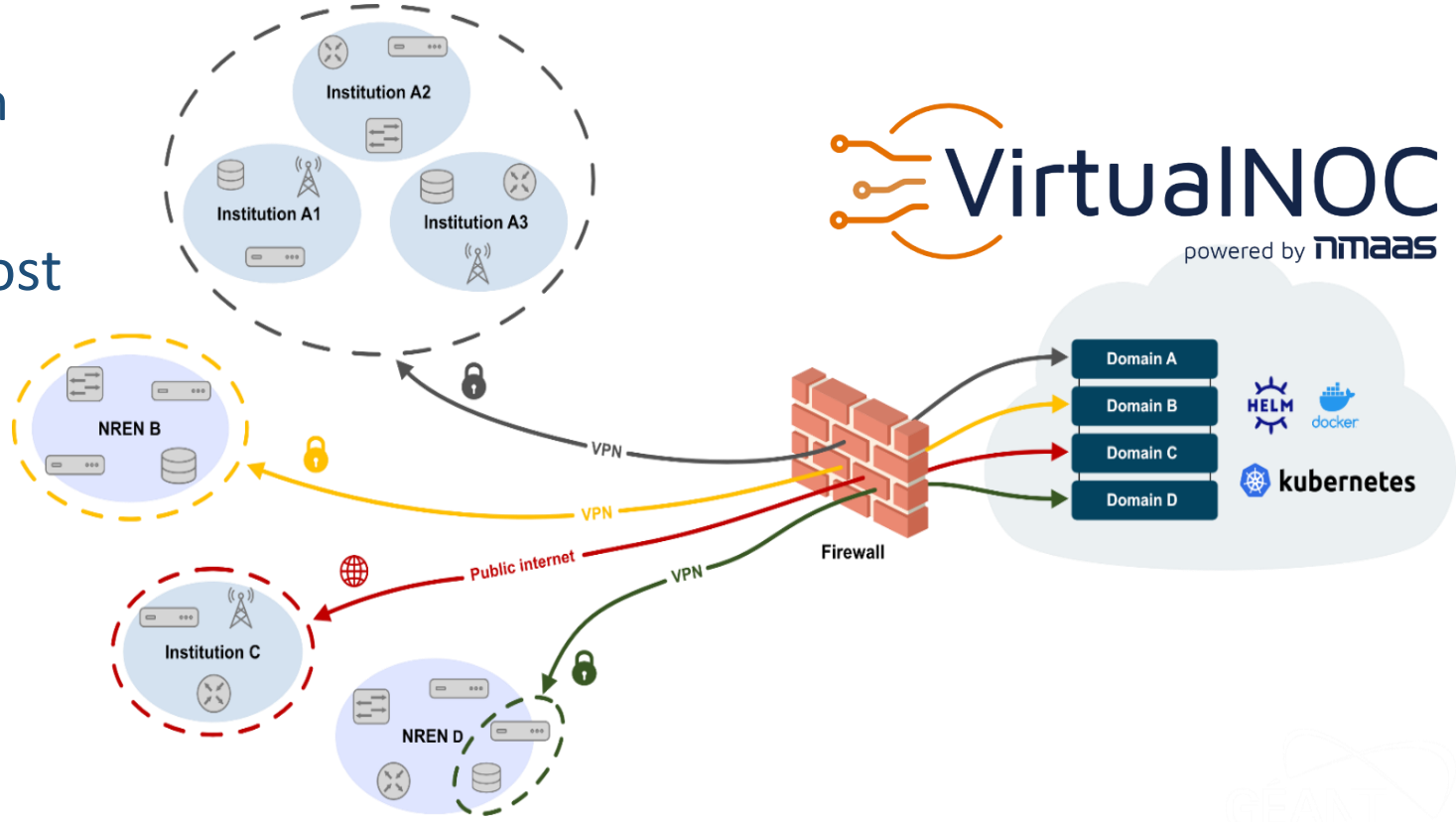
nmaas for Virtual NOC

- Versatility of nmaas as an open-source orchestration platform
- NMaaS (Network Management as a Service) as the initial use-case
- Rebranding
  - nmaas – the underlying platform
  - nmaas for Virtual NOC
- Application catalog containing most popular network management applications
- Continuous improvement



Why use nmaas for Virtual NOC

VirtualNOC powered by nmaas

Eases the process of **trying a new network** management and monitoring application

Multiple customers can have their infrastructure managed by a single entity

Customers **do not require** extensive **on-premise infrastructure**

Focus on **managing** networks and services

nmaas for Virtual NOC: Target Groups

- Target groups
  - End institutions with limited capacity for in-house network management
    - Universities, high schools, primary schools
  - International research projects with (distributed) hardware resources
  - Development/infrastructure teams requiring external health monitoring and alerting for their applications

VirtualNOC
powered by nmaas

nmaas for Virtual NOC: Connectivity

- Site-to-Site VPN
  - Connectivity between nmaas infrastructure and client environment
  - Wireguard (preferred) or OpenVPN
- Client access VPN
  - Secure access running applications (including sensitive data)
  - Preferable eduVPN, based on OpenVPN and WireGuard
- Public access
  - Some applications can be exposed publicly (e.g. Grafana, Healthchecks...)

VirtualNOC
powered by nmaas

eduVPN + nmaas

- eduVPN as the VPN solution to access deployed applications securely
- Ensures infrastructure security and integrity + user privacy
- eduVPN is developed as open-source software within the GEANT project
- Supports both the OpenVPN and Wireguard protocols
- Client-Access VPN technology
- Self-service portal for authenticated users
- Can use either the standalone eduVPN client or any other OpenVPN/Wireguard compatible client

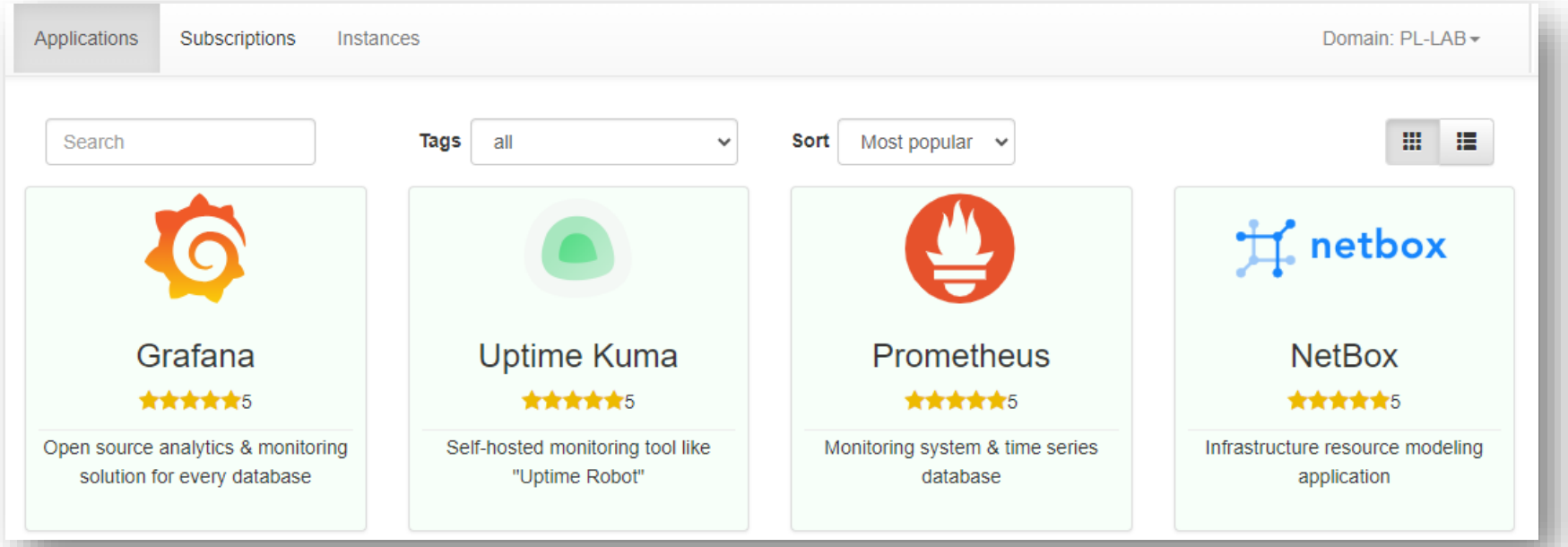
OPENVPN

WIREGUARD
FAST, MODERN, SECURE VPN TUNNEL

eduVPN

nmaas Feature Highlights: Extensible Application Catalog

- Self-service catalog of deployable applications
- Easily extensible using the industry standard Helm package manager
  - Each application represented by a Helm chart
- Application settings can be customized during deployment or while running



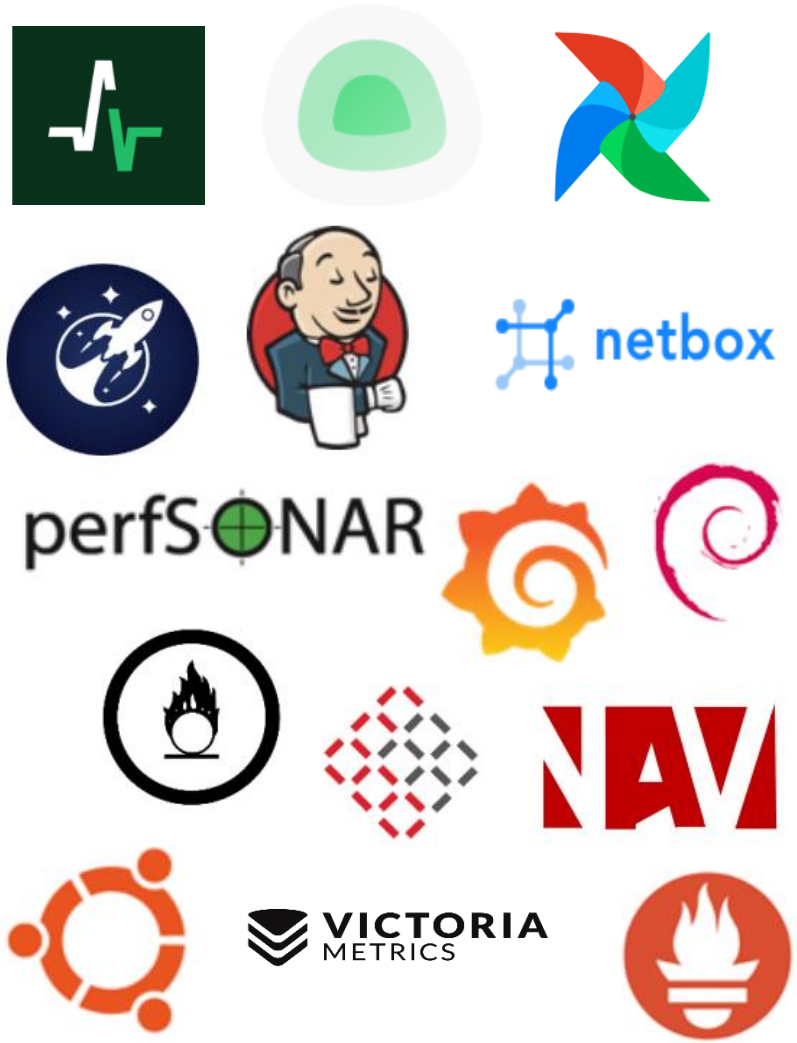
nmaas Feature Highlights: Extensible Application Catalog

30 applications available in the marketplace

Adminer
Apache Airflow
Bastion
Booked
ChangeDetection.io
CodiMD
Debian repository
Grafana
Jenkins
LibreNMS
NetBox
Oxidized
Prometheus
Routinator
Synapse
Telegraf

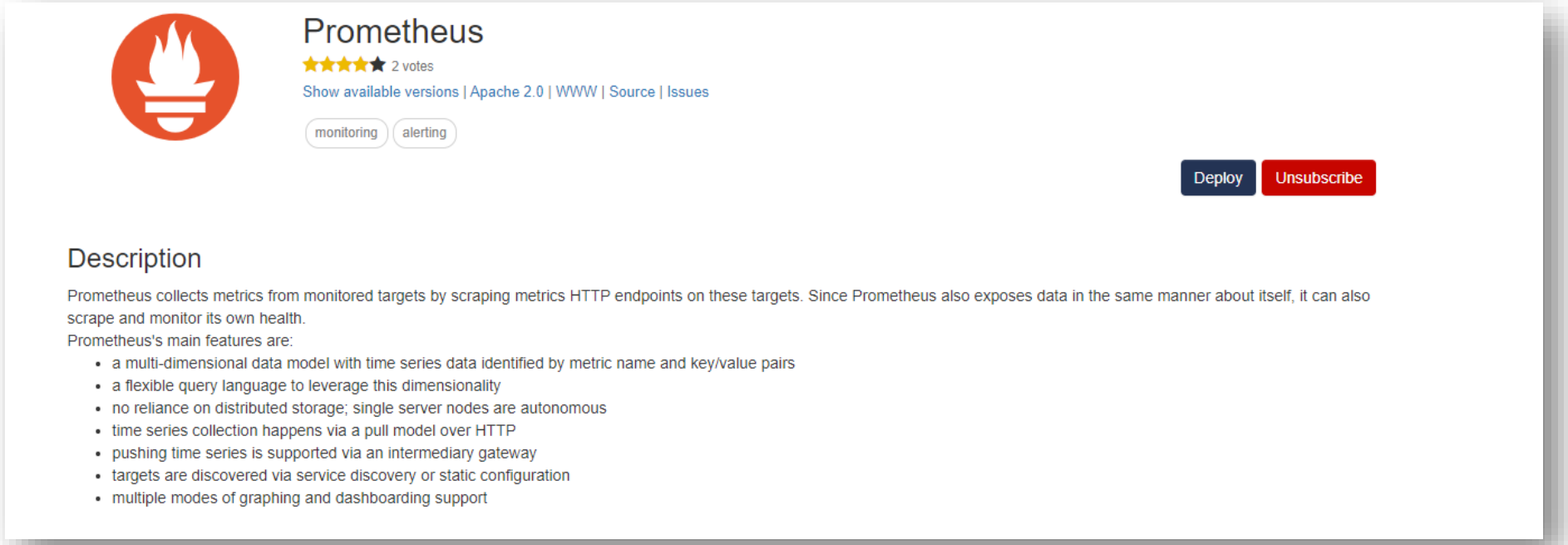
Maat
perfSONAR
Camunda

Uptime Kuma
Victoria Metrics
WebDAV Server
Healthchecks
Zabbix



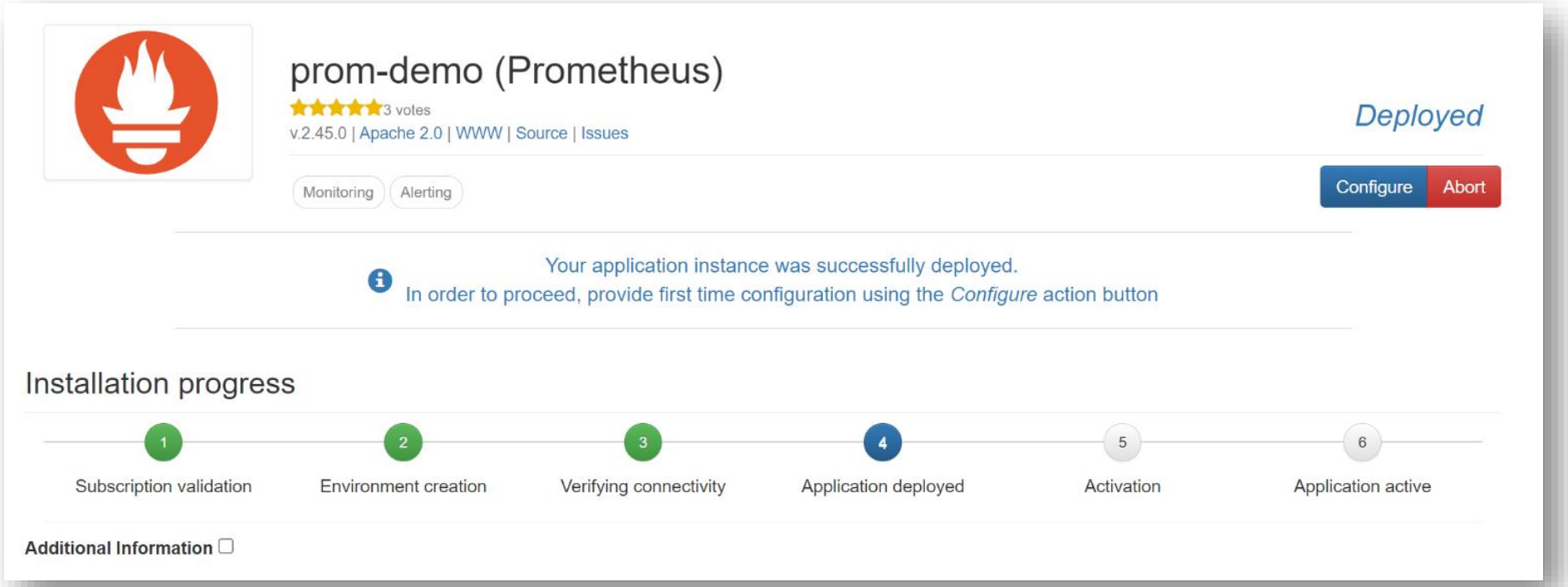
nmaas Feature Highlights: Subscribe application

- Subscription is required before deployment
  - Only these applications can be further deployed in the nmaas cloud within the scope of particular domain.

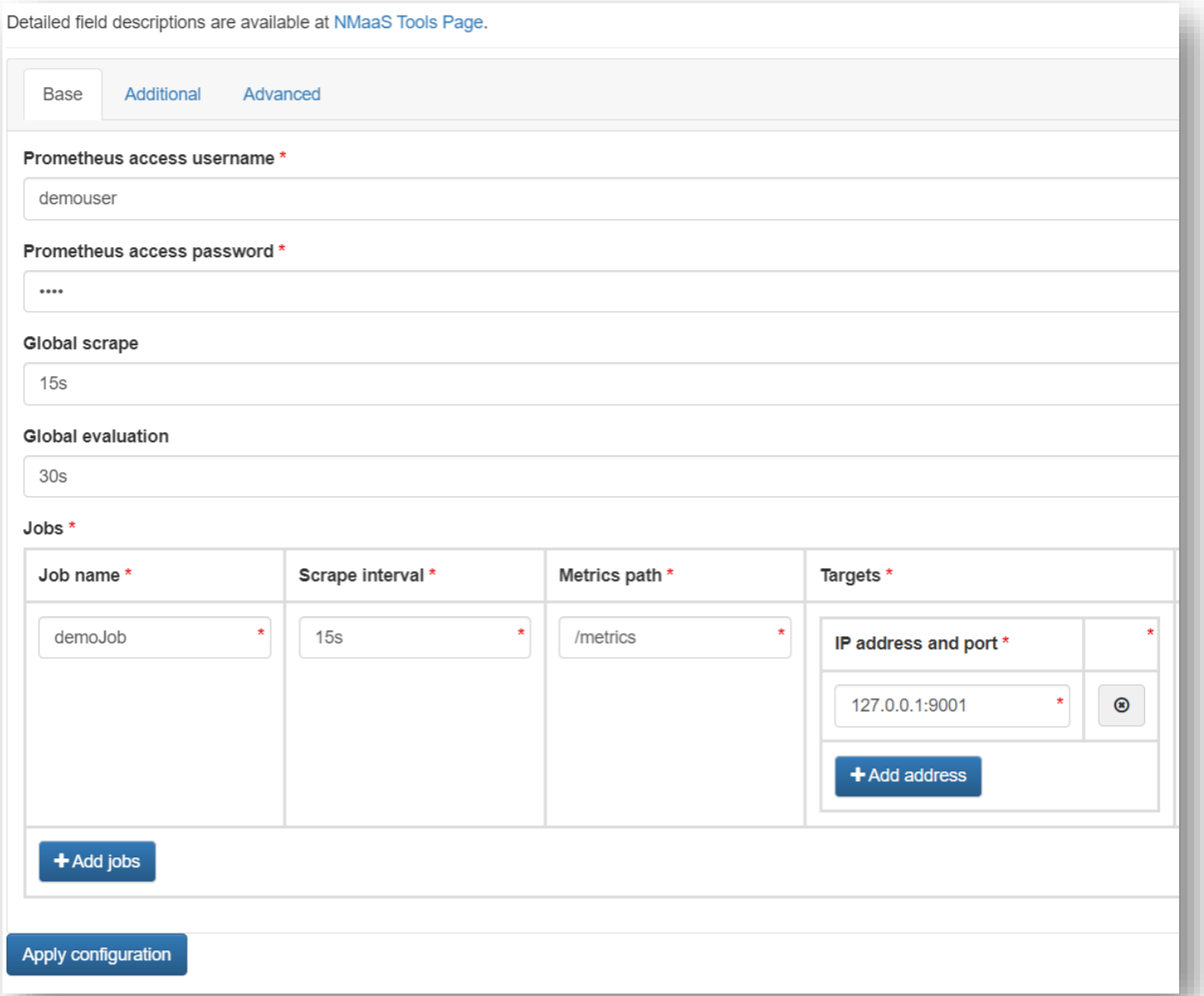


nmaas Feature Highlights: Guided Configuration Wizard (1)

- Configuration wizard to aid initial application deployment
  - Options dependent on the application at hand
  - Possible integration with Git



nmaas Feature Highlights: Guided Configuration Wizard (2)



nmaas Feature Highlights: Guided Configuration Wizard (2)

demo › prometheus-1496 › Repository

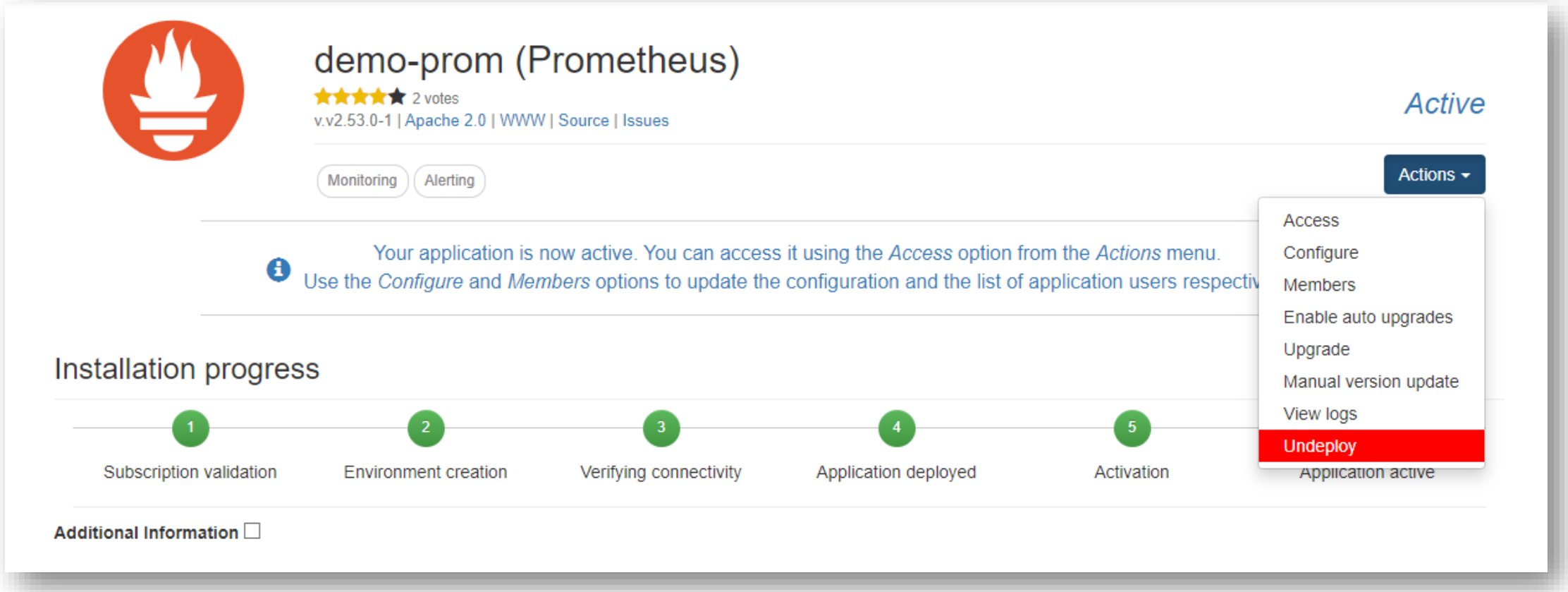
master | prometheus-1496 / **prometheus.yml**

Initial commit of prometheus.yml
nmaas bot authored 2 minutes ago

prometheus.yml 296 Bytes

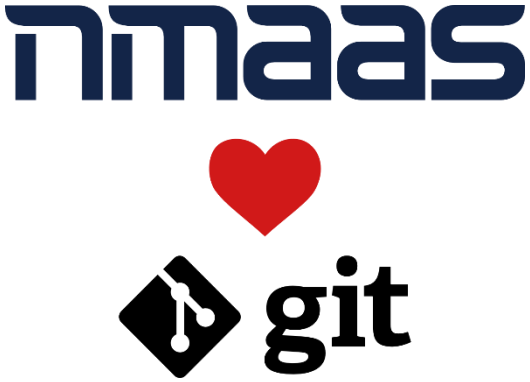
```
1  global:
2    scrape_interval: 15s
3    evaluation_interval: 30s
4  alerting:
5    alertmanagers:
6      - static_configs:
7        - targets:
8  rule_files:
9  scrape_configs:
10   - job_name: 'demoJob'
11     metrics_path: /metrics
12     scrape_interval: 15s
13     static_configs:
14     - targets: ['127.0.0.1:9001']
15       labels:
```

nmaas Feature Highlights: Guided Configuration Wizard (3)



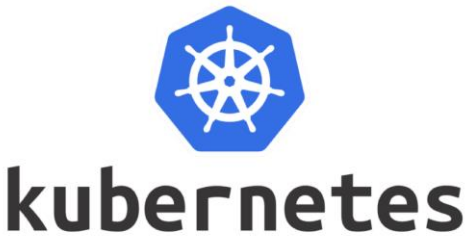
nmaas Feature Highlights: GitOps Configuration

- Problem: Many applications use text-based configuration files. How to manage them at scale in a cloud environment?
- Solution: nmaas adopts the GitOps approach
- Workflow:
  - Configuration files placed in a private Git repository
  - User clones the repository using their credentials
  - Changes are pushed upstream
  - The altered files are synced to the running container
  - The application is reloaded/restarted
- Examples: Prometheus, Zabbix, Icinga2, Airflow



nmaas Feature Highlights: Kubernetes

- nmaas Janitor
  - Responsible for communication to GitLab & Kubernetes
- Kubernetes cluster in background
  - Domain is mapped to namespace
  - All application deployed as Docker containters
- Helm Chart
  - Industry standard
  - Easier additions of new application



nmaas for Virtual NOC: Recent Developments

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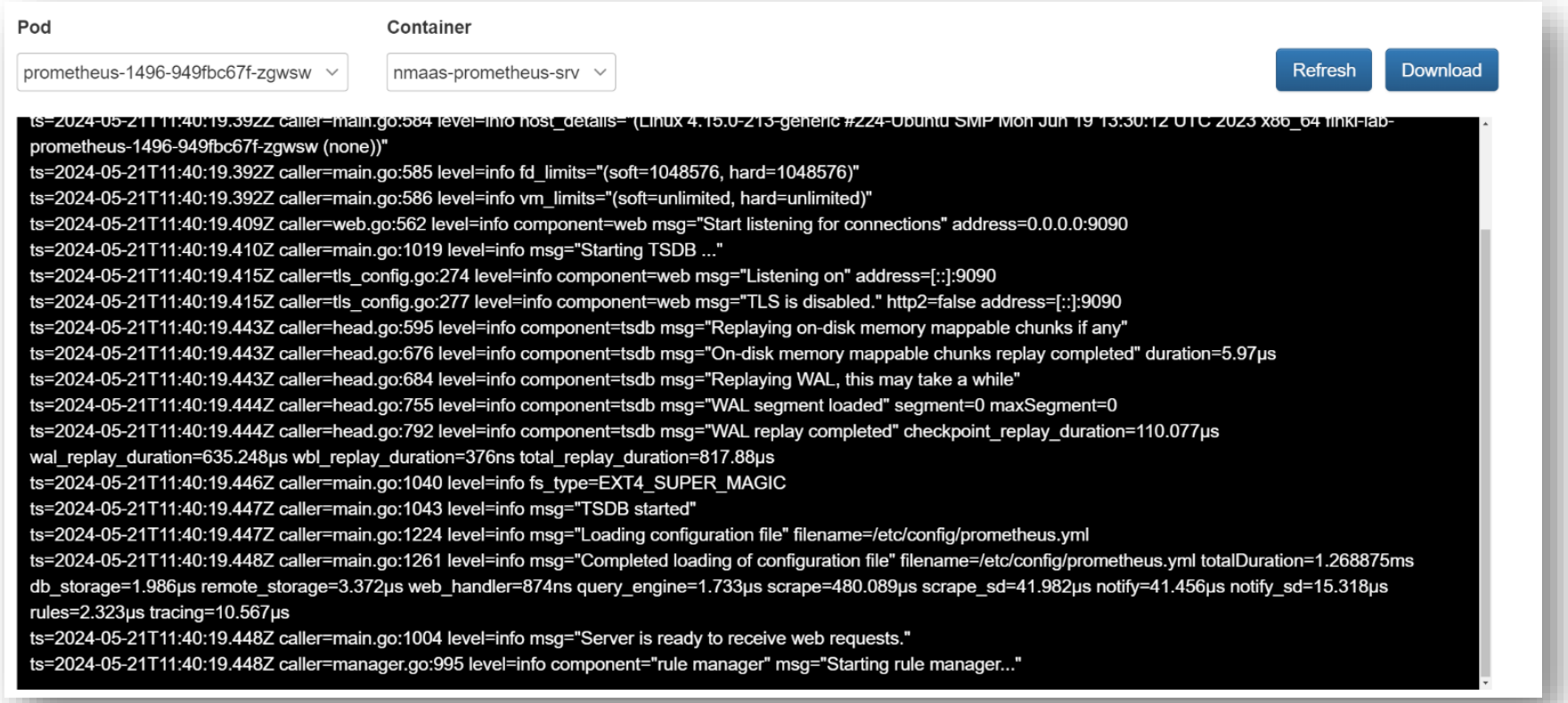
- Manual/Automatic application version upgrades
- Overview of application instance deployment parameters
- **Application log viewing**



nmaas Use and Deployment Options

Running a vLAB or a vNOC using nmaas on your own infrastructure

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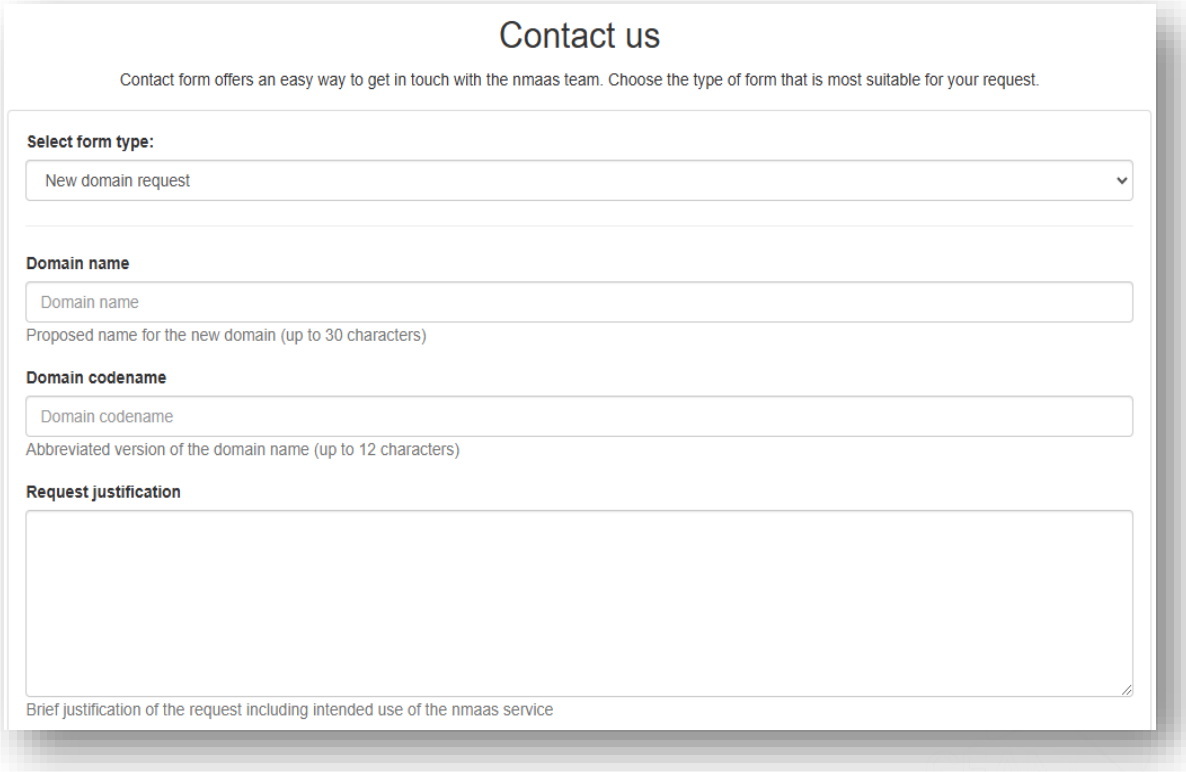
nmaas for Virtual NOC: How you can use vNOC service?

Can be used either as a self-hosted or managed solution

- https://nmaas.eu is the managed production instance for the Virtual NOC use-case

User can request their domain and support from our team using contact section.



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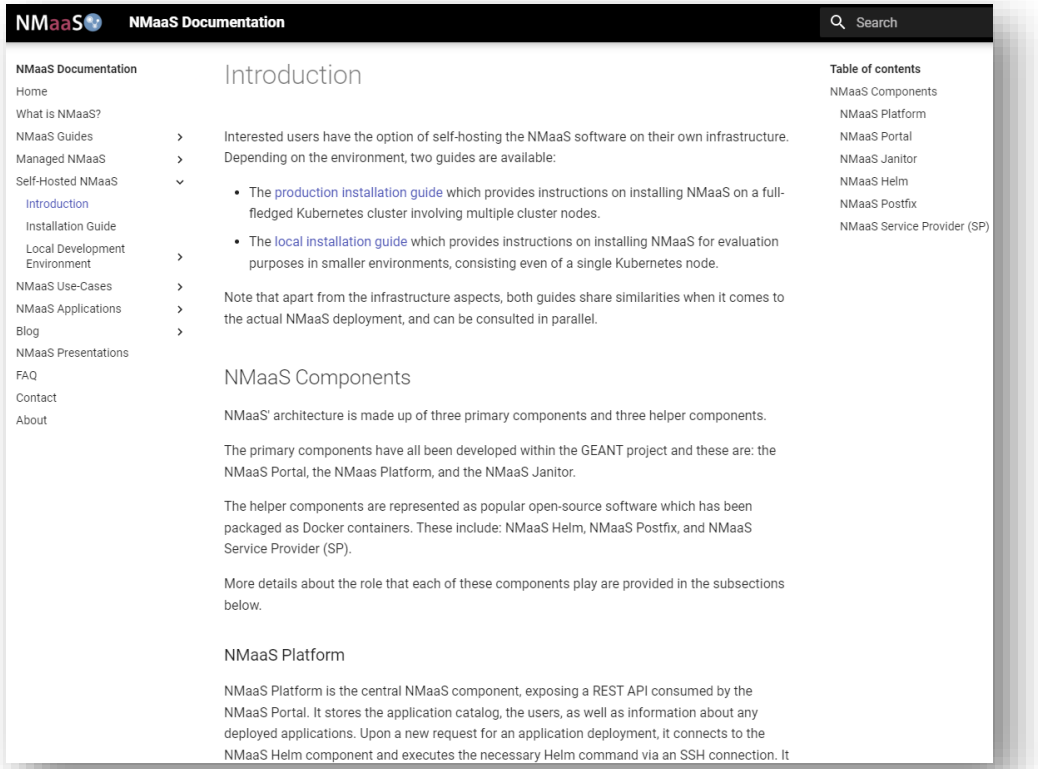
Running nmaas on your own

- Two options for running a **self hosted instance of nmaas**
  - Local evaluation environment on a single node cluster (non-production workloads only)
  - On an existing full-fledged Kubernetes cluster (suitable for both Virtual NOC and Virtual Lab)

- Complete guide available at *https://docs.nmaas.eu*
- **nmaas team will provide all required support**



Contact the nmaas Team: nmaas@lists.geant.org

Subscribe to the nmaas users list: nmaas-users@lists.geant.org

Conclusion

Conclusion

- nmaas as a versatile orchestration platform
  - Based on popular and well-known technologies
  - Open source (Apache 2.0, https://gitlab.software.geant.org/nmaas)
  - Suitable for hosting diverse set of applications
  - **Not limited to a given use case**

- **You are welcome to share ideas and requirements**
  - Missing features or applications
  - Brand new use cases

The Road Ahead

- Discovering additional use-cases
- Enhancements to vNOC:
  - Application bundles
  - VPN provisioning
  - Improvements to domain provisioning
- General quality of life improvements:
  - Extending the portfolio of supported scenarios
  - User interface re-design

Thank You

Documentation *https://docs.nmaas.eu/*

Contact the NMaaS team *nmaas@lists.geant.org*

www.geant.org

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