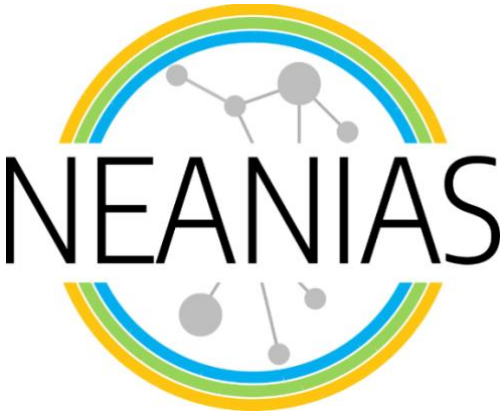

NEANIAS
Novel EOSC services for Emerging Atmosphere, Underwater and Space Challenges

Deliverable

Deliverable: D7.2 Software Delivery Infrastructure and Tools

30/04/2020

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Disclaimer

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NEANIAS is project that comprehensively addresses the 'Prototyping New Innovative Services' challenge set out in the 'Roadmap for EOSC' foreseen actions. It drives the co-design, delivery, and integration into EOSC of innovative thematic services, derived from state-of-the-art research assets and practices in three major sectors: underwater research, atmospheric research and space research. In each sector it engages a diverse set of research and business groups, practices, and technologies and will not only address its community-specific needs but will also enable the transition of the respective community to the EOSC concept and Open Science principles. NEANIAS provides its communities with plentiful resource access, collaboration instruments, and interdisciplinary research mechanisms, which will amplify and broaden each community's research and knowledge generation activities. NEANIAS delivers a rich set of services, designed to be flexible and extensible, able to accommodate the needs of communities beyond their original definition and to adapt to neighboring cases, fostering reproducibility and re-usability. NEANIAS identifies promising, cutting-edge business cases across several user communities and lays out several concrete exploitation opportunities.

The European Union (EU) was established in accordance with the Treaty on the European Union (Maastricht). There are currently 28 member states of the European Union. It is based on the European Communities and the member states' cooperation in the fields of Common Foreign and Security Policy and Justice and Home Affairs. The five main institutions of the European Union are the European Parliament, the Council of Ministers, the European Commission, the Court of Justice, and the Court of Auditors (http://europa.eu.int/).

Table of Contents

Abstract

NEANIAS aims at contributing to the materialization of the European Open Science Cloud (EOSC) by delivering innovative thematic services in the Underwater, Atmospheric and Space research sectors.

This deliverable, D7.2 “Software Delivery Infrastructure and Tools”, provides the delivery of the tools described in a wider context in deliverable D7.1 “Delivery activities Methodology and Plan”. These tools pursue the support of the NEANIAS services through their whole lifecycle: software development, documentation, testing, deployment, operation, monitoring and alerting.

This document provides an overview of these tools, complemented with screenshots where deemed appropriate.

1. Short deliverable report

1.1. Context

WP7 supports the NEANIAS Service delivery and operation by interacting with i) WP8 for the EOSC integration, ii) the thematic work packages WP2, WP3 and WP4 as adapted to the business cases through WP5, and iii) the core services established by WP6.

One of the objectives of WP7 is to provide the instruments and processes for the efficient delivery of quality software. This objective is tackled by the current Deliverable D7.2, "Software delivery infrastructure and tools", which stems from the work performed in task T7.2. D7.2 reports on the actual delivery of the tools to support software implementation and documentation, to operate and monitor the NEANIAS services and to supply feedback and resolve issues. These tools are described within a wider perspective in Deliverable D7.1, "Delivery Activities Methodology and Plan".

1.2. Work and outcomes summary

This deliverable, D7.2, focuses on the actual deployment and configuration of the tools described in deliverable D7.1. These are materialized by:

- https://gitlab.neanias.eu – supports:
  - Software implementation facilities
  - Continuous Integration and Deployment
  - Container image registry
- https://monitoring.neanias.eu – supports:
  - Operational service monitoring
  - Operational service alerting
- https://docs.neanias.eu – supports:
  - Software documentation
- https://ticketing.neanias.eu – supports:
  - Feedback and issue tracking
- https://cloud.garr.it – supports:
  - Virtual Machine image repository
  - NEANIAS services infrastructural resources

1.3. Further information

The tools described in this document will be enhanced and adapted to the NEANIAS service needs as their development evolves. The following sections provide an overview of these, complemented by screenshots where deemed appropriate.

2. Software Implementation

To support software implementation a Gitlab [1] instance, reachable at the https://gitlab.neanias.eu address has been created in the GARR Cloud Platform [6], and authentication through the NEANIAS single sign-on (SSO) credentials has been configured. Gitlab is an open source web-based platform which allows software developers to:

- manage Git source code repositories
- set up Continuous Integration and Delivery (CI/CD) pipelines
- publish Docker images through an embedded Docker registry

Virtual machine image publishing is also supported, through the image service of the GARR Cloud, based on OpenStack Glance.

2.1. Git repositories

Gitlab supports developers by providing Git source code repositories, included in *projects* which are organized in *groups*.

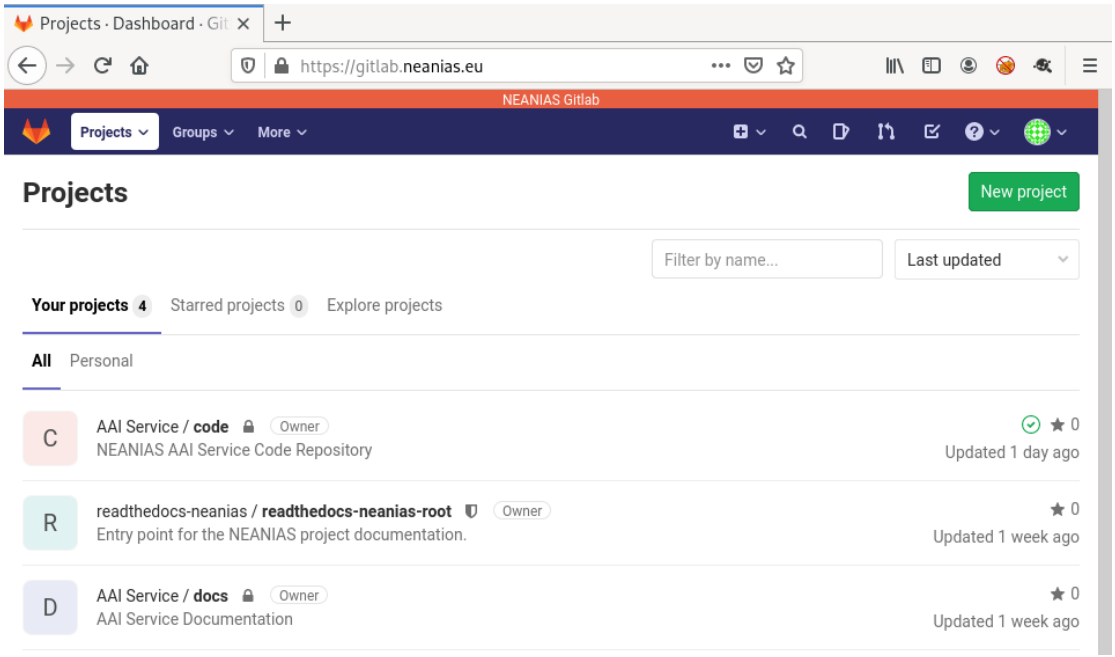

Figure 1 - Gitlab projects, containing source code repositories, organized in groups

Figure 1 shows a screenshot from the Gitlab instance at https://gitlab.neanias.eu, with a searchable list of projects.

2.2. Continuous Integration and Delivery (CI/CD)

Gitlab has built-in support for Continuous Integration and Delivery (CI/CD) workflows [2]. This allows NEANIAS service developers to define automatic building, testing and deployment pipelines for both the service source code and documentation. Scripts specified by developers are executed by Gitlab *runners*. For NEANIAS, Gitlab runners are bound to a dedicated virtual machine.

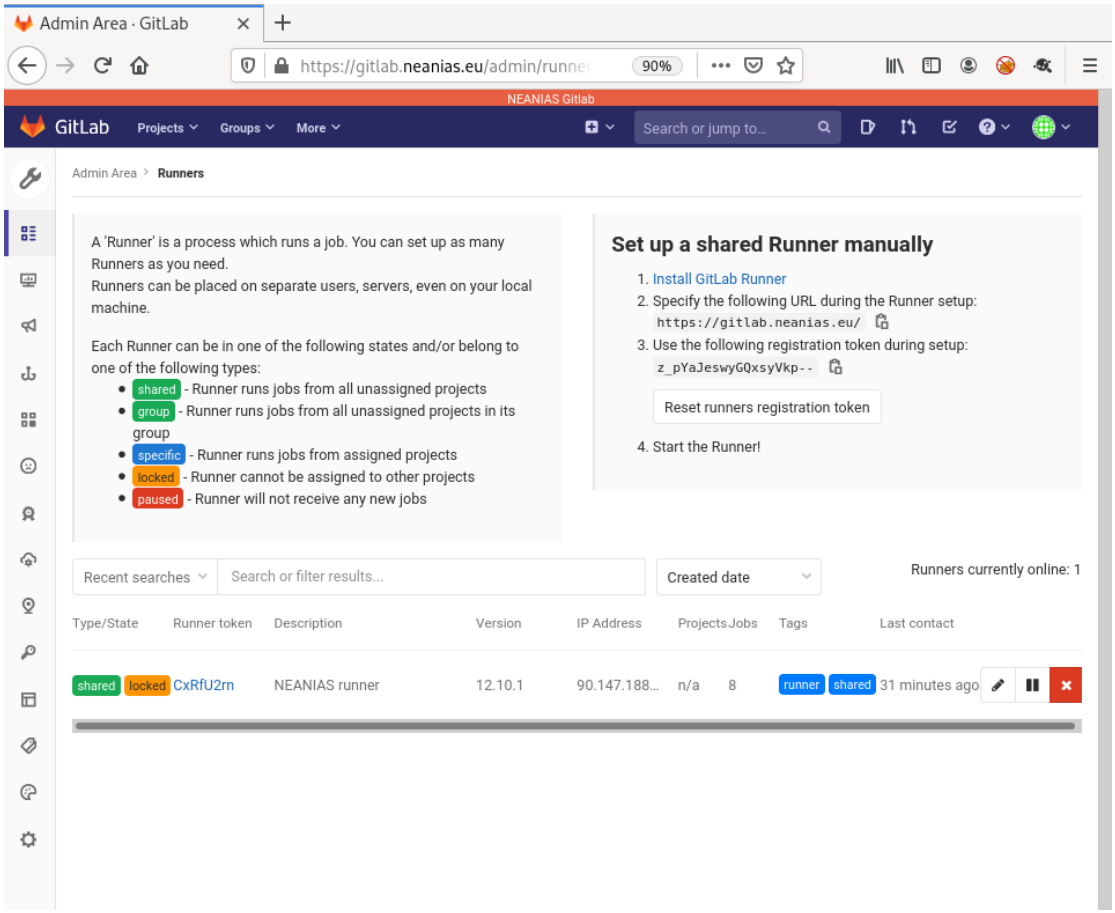

Figure 2 - Gitlab Runner setup, to execute Continuous Integration and Delivery scripts

Figure 2 shows the runner configuration from the Gitlab administrator point of view. New runners, potentially running at different locations, can be registered to gitlab.neanias.eu by using a registration token.

2.3. Docker registry

Giltab provides an integrated Docker image registry. This allows developers and operators to use the Docker *push* and *pull* commands to publish and download versioned and tagged images.

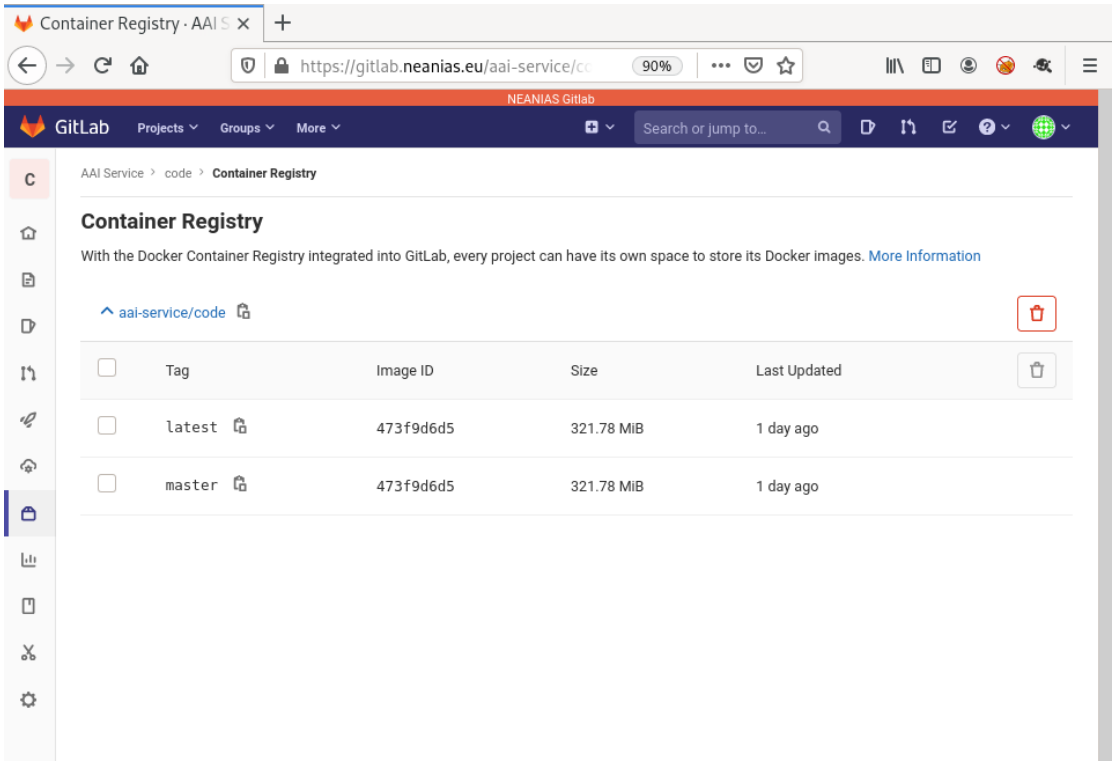

Figure 3 - Docker container image registry administration, backed by Gitlab

Figure 3 shows the Docker image administration page, associated to a Gitlab project.

2.4. Virtual Machine repository

The delivery of NEANIAS Services through virtual machine images can leverage the OpenStack Glance service of the GARR Cloud Platform. Glance allows the upload and discovery of virtual machine images, as well as the definition of attached metadata. Moreover, images stored in Glance are ready to be instantiated in OpenStack.

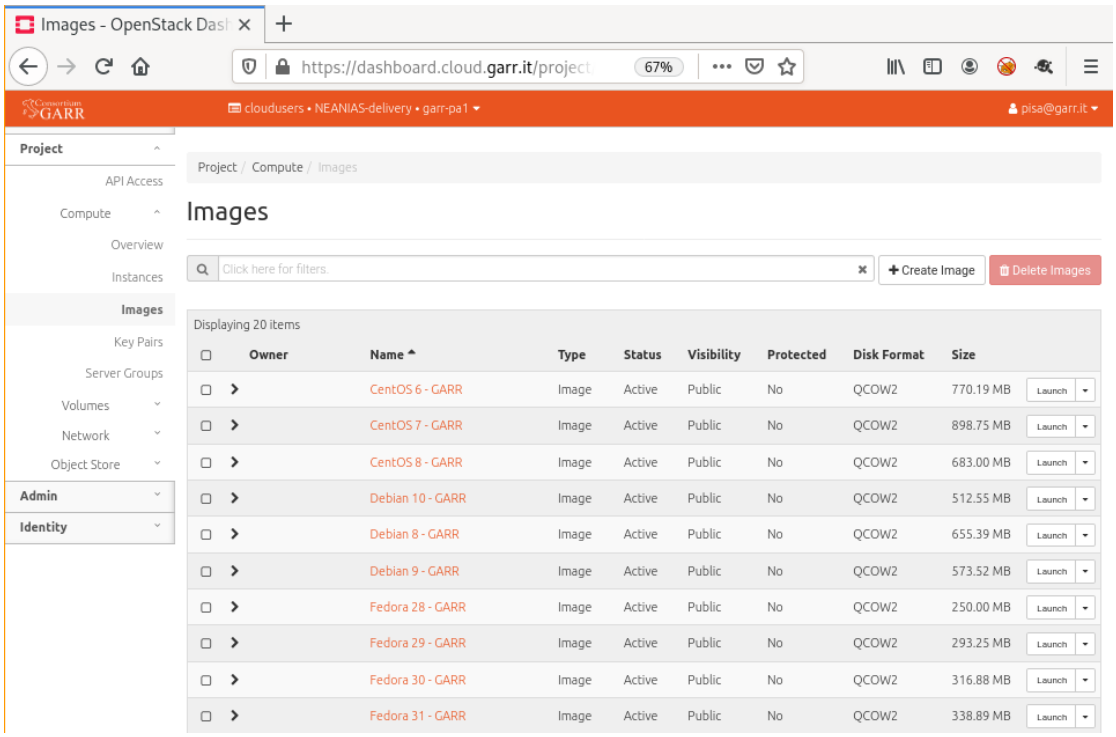

Figure 4 - Virtual machine image repository, backed by OpenStack Glance

Figure 4 shows a screenshot from the dashboard of the GARR Cloud Platform from which Virtual Machine images stored in OpenStack Glance can be managed.

3. Software Documentation

3.1. Public Documentation

To facilitate ease of discovery and consistent approach in the provided documentation, a single entry point for all documentation is provided. A root level project at the popular and widely used *Read the Docs* online document sharing environment (https://readthedocs.org/) has been created.

The online documentation made available is under the readthedocs.org domain but there a custom domain under neanias.eu has also been defined and is available through docs.neanias.eu. This way, users reading the documentation easily identify the scope of documentation.

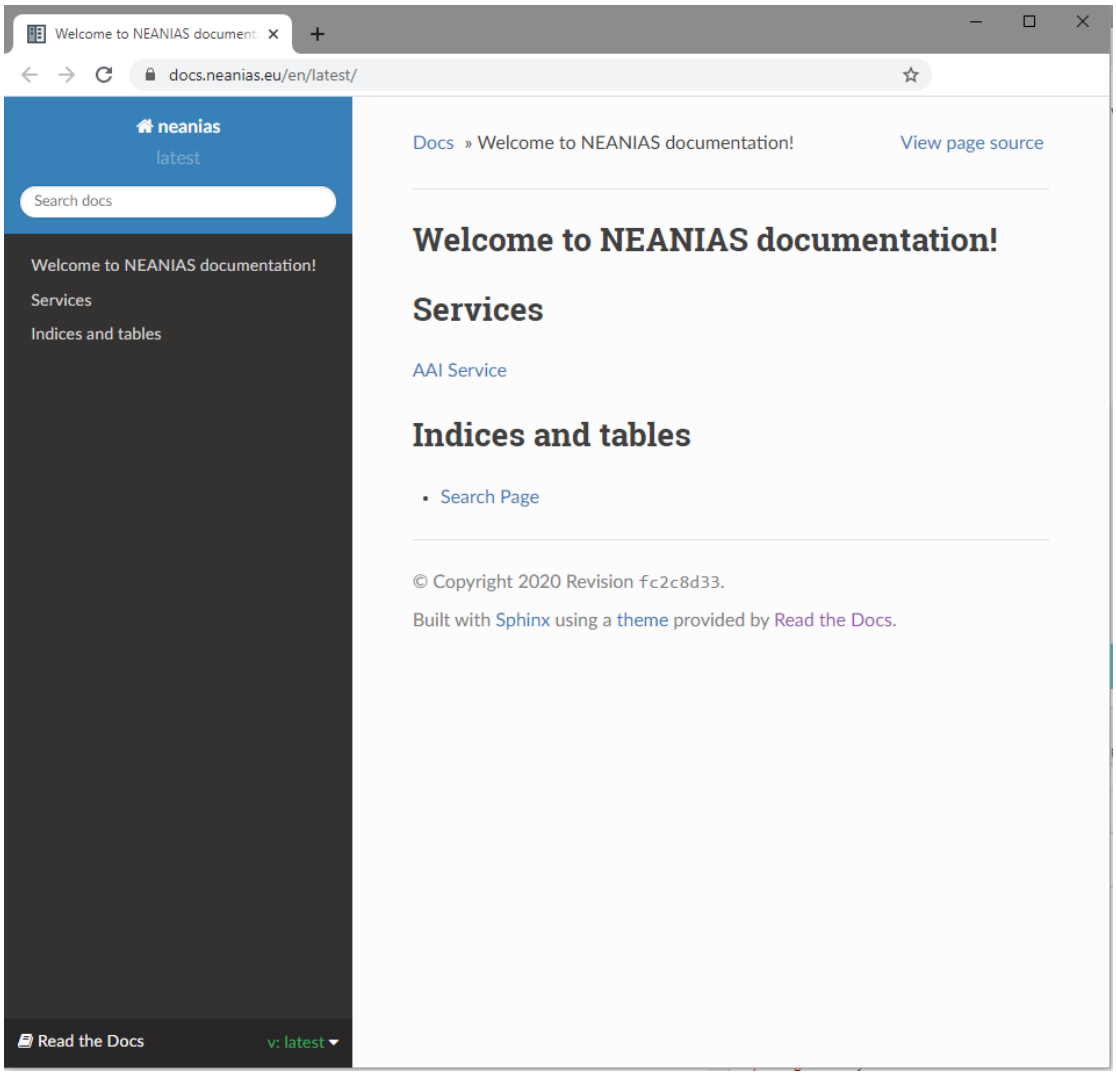

Figure 5 - Documentation Entry Point

Figure 5 - Documentation Entry Point presents the root entry point for all NEANIAS public documentation. Through this entry point, both project wide issues can be documented, as

well as provide the entry point to individual service documentation. An example of this structure is presented through the Authorization and Authentication Infrastructure (AAI) Service documentation.

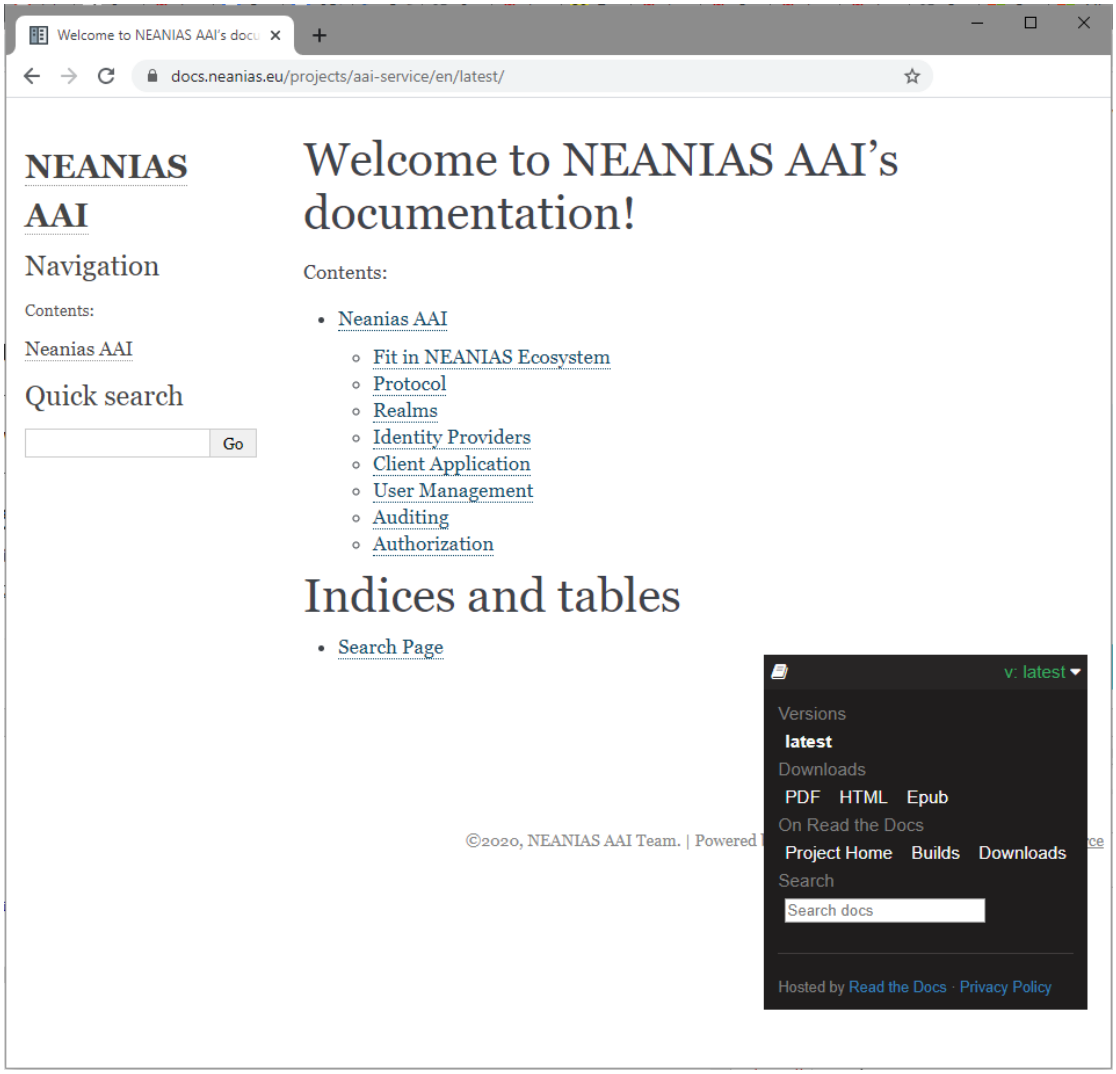

Figure 6 - Sub-project Documentation

Figure 6 - Sub-project Documentation presents initial documentation available for the AAI Service, directly linked under the root NEANIAS project. The ability to browse through different versions of the documentation is also presented, as well as the ability to download an offline archive of the documentation.

3.2. Controlled source

The repositories where the documentation source is maintained can be any of the platform's supported source control systems. Within the NEANIAS centrally offered source control management system, dedicated repositories are made available for each service, where the respective service provider documents their services. Additional documentation may exist in other platforms and external repositories. Still some information and at least linking content

will be available under the NEANIAS root structure and further information links can be provided to the externally hosted content.

As NEANIAS services evolve, so will the available documentation. Making use of the enabling functionality that source control systems offer, it is possible for a user to browse through different versions of the documentation and all service releases can be easily linked to the respective documentation version.

Semantic Versioning is used for the documentation and tags on the documentation source repository mark the respective version of the documentation.

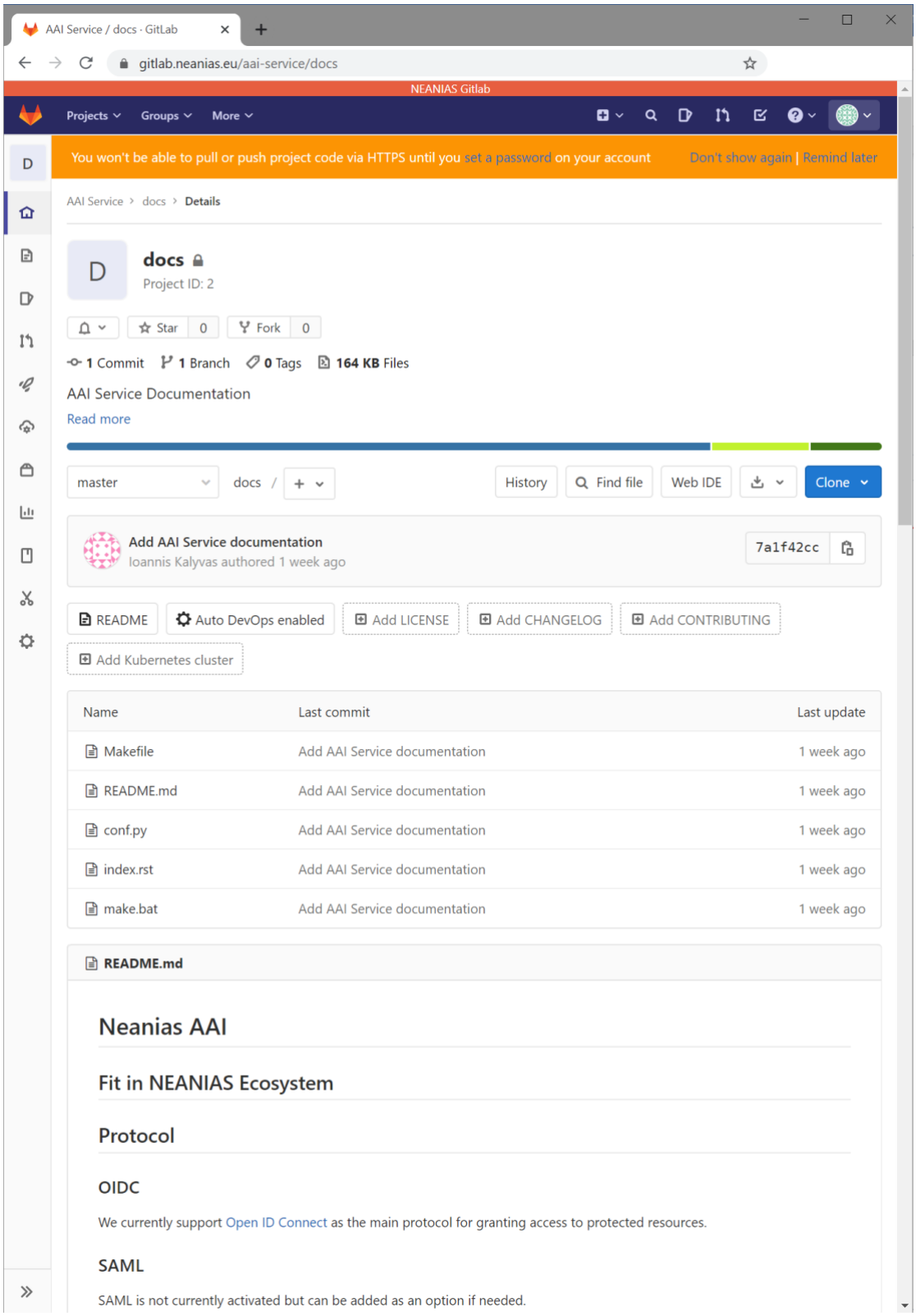

Figure 7 - Documentation source

Figure 7 - Documentation source shows the respective documentation source that through proper automation triggers feed the online documentation made available under the NEANIAS project for the AAI Service, as presented in Figure 6 - Sub-project Documentation. The source markup is hosted under the NEANIAS GitLab source control management system repositories.

4. Supplying Feedback and Resolving Issues

4.1. HelpDesk

To assist and support the end users of the NEANIAS offered Services, a Help Desk has been set up to act as the entry point for service consumers to report issues, incidents and requests in a structured fashion. The Help Desk main purpose is to collect:

- Incident Reports - Unplanned disruption of operation in a service or service component, or degradation of service quality versus the expected or agreed service level or operational level according to service level agreements (SLAs), operational level agreements (OLAs) and underpinning agreements (UAs)
- Service Requests - User request for information, advice, access to a service or a pre-approved change

For this purpose, a new space within the NEANIAS ticketing system has been created to serve as the single point of reference for Help Desk related activities. It is available under: https://ticketing.neanias.eu/projects/neanias-helpdesk

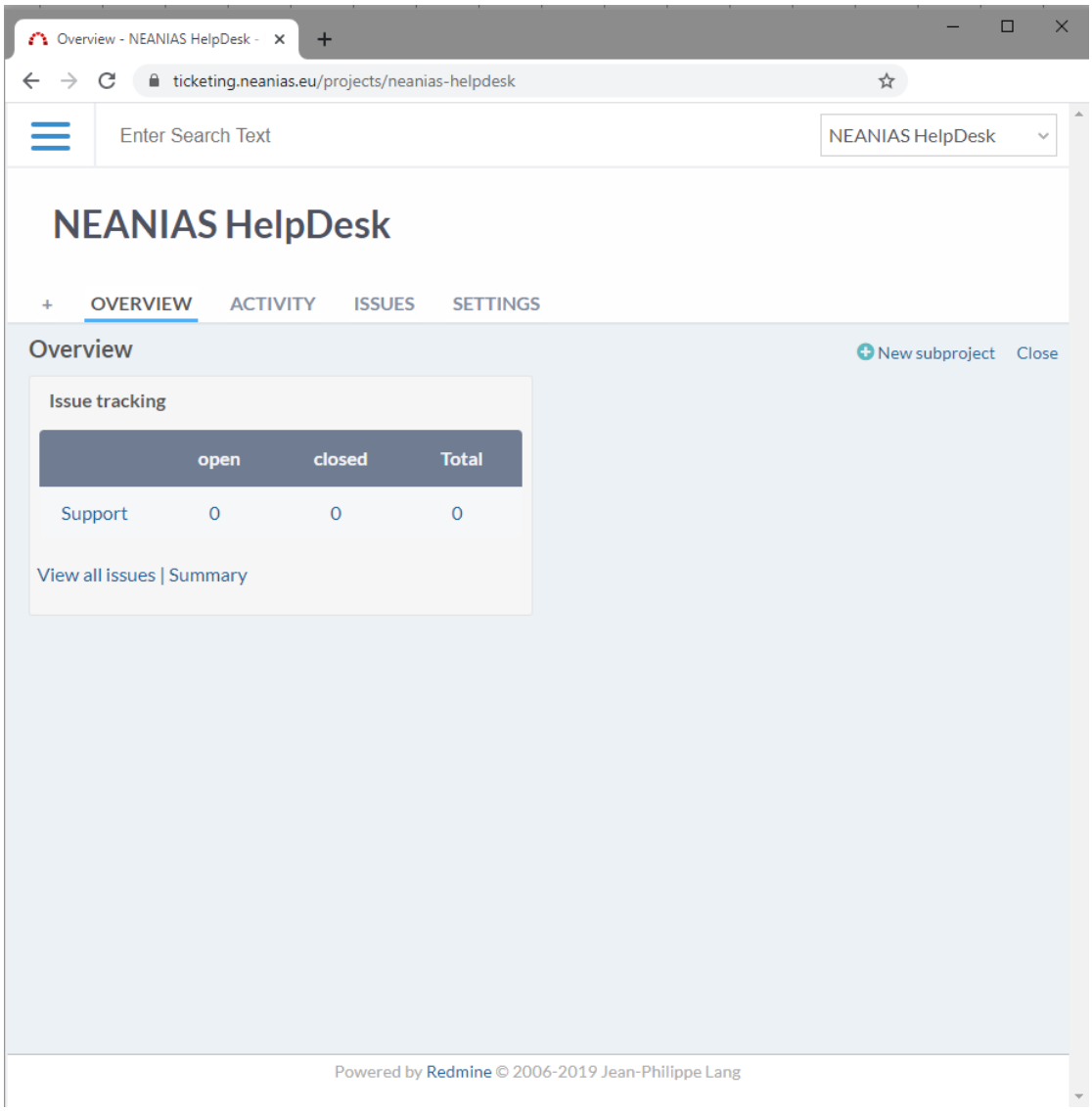

Figure 8 - HelpDesk Overview

Figure 8 - HelpDesk Overview presents an administrative overview all the HelpDesk environment. Users are authenticated through the NEANIAS SSO to submit their support requests.

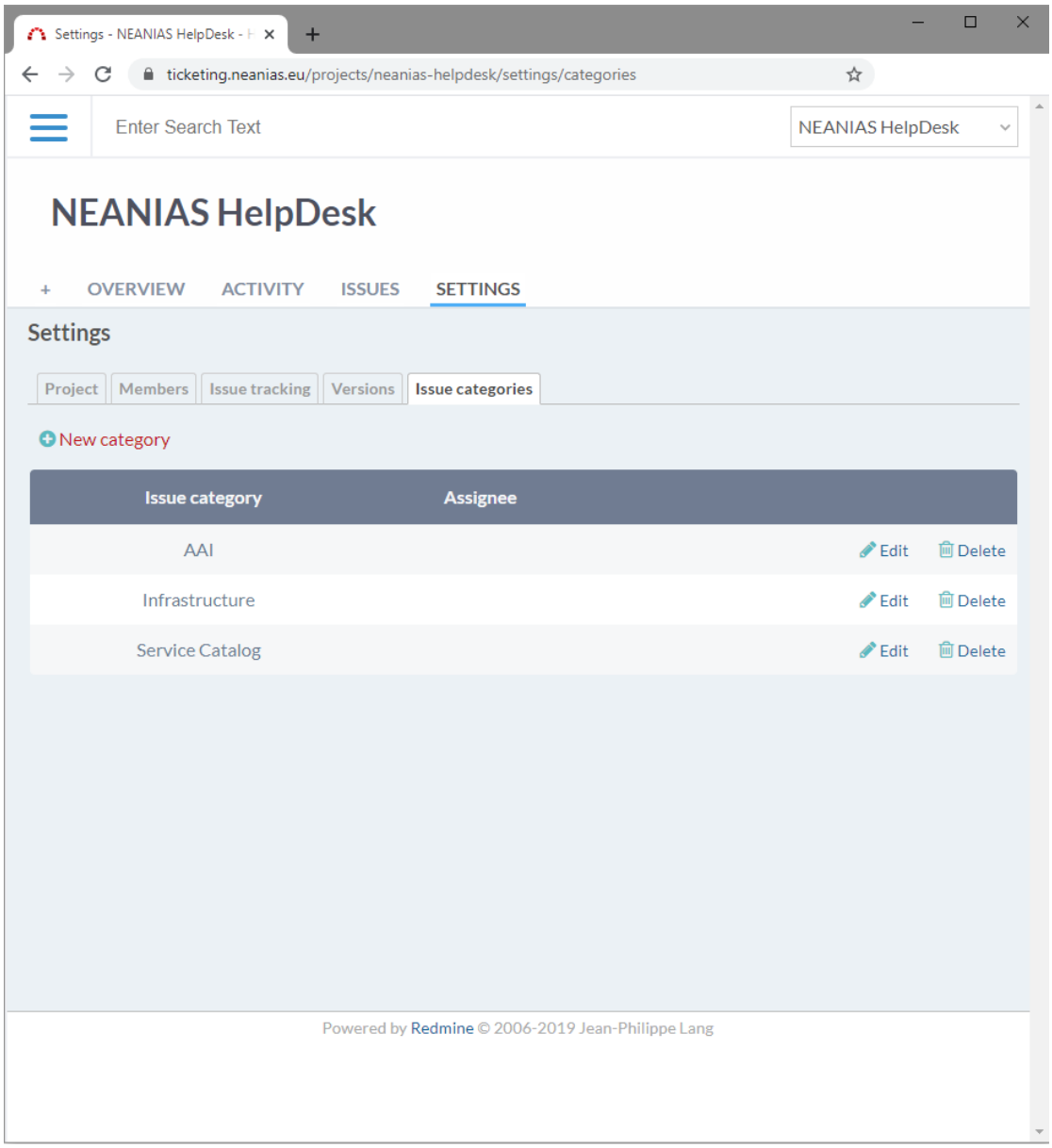

Figure 9 - HelpDesk Issue Categories

Figure 9 - HelpDesk Issue Categories presents the ability to categorize the issues based on coarse grained configured categories to allow quick identification of the affected services. Further refinements on the issues categories will be applied based on provided NEANAIS services.

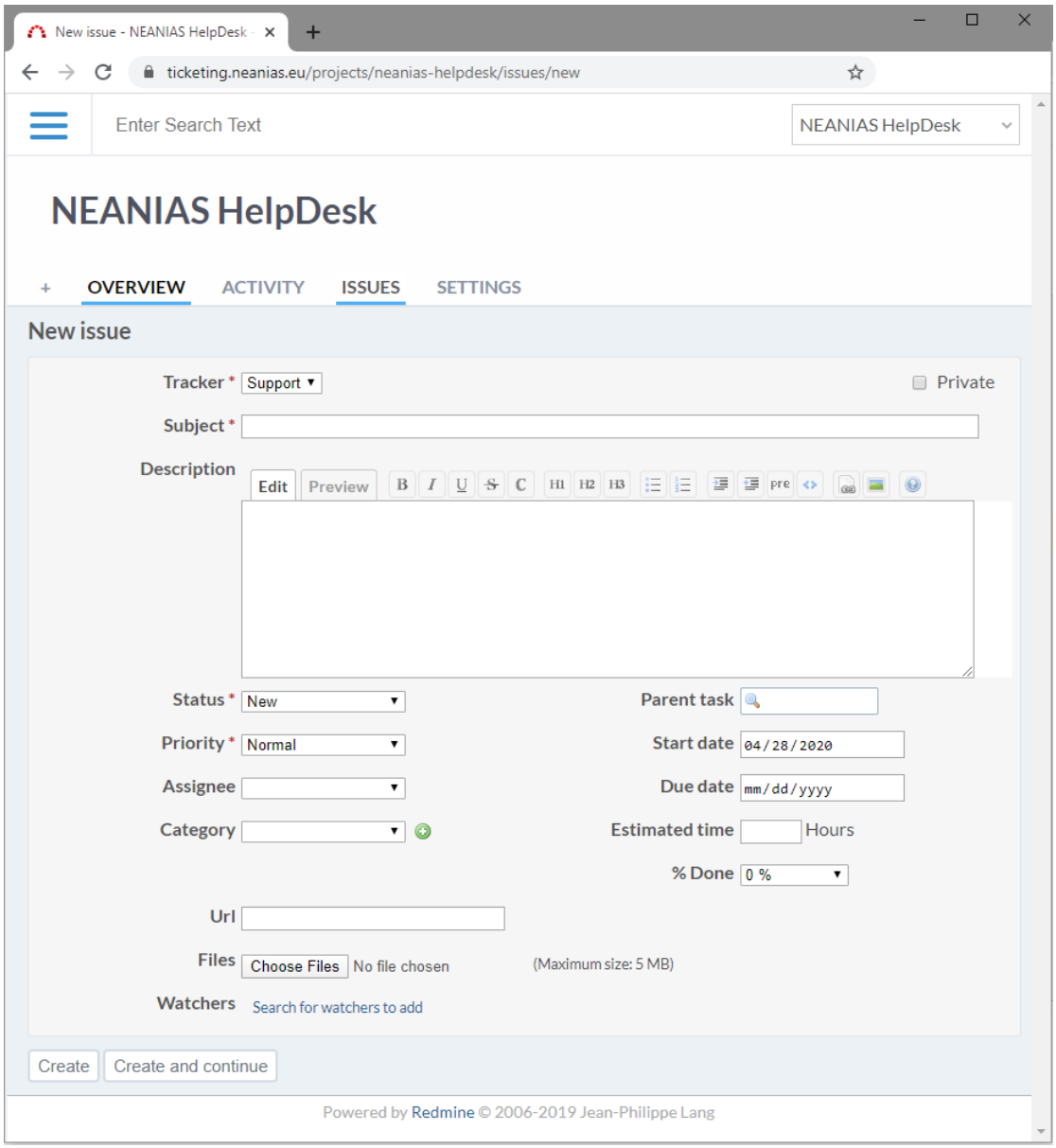

Figure 10 - HelpDesk New Support Request

Figure 10 - HelpDesk New Support Request displays the ability to add a new support request along with all relevant information that the user may choose to provide.

4.2. Inter-Service

For the needed Inter Service communication, organization of activities and interoperation related activities, NEANIAS offers a single ticketing system through which technical partners can coordinate their activities. The scope of this ticket system is to cover:

- Interoperation protocols
- API harmonization
- Release processes

- Deployment and runtime issues
- Issue and Service request tracking within the project

The target users of this ticketing system are the NEANIAS consortium members and the tracked issues involve the interoperation and management of the services within the context of NEANIAS.

For this purpose, the ticketing system is available at: https://ticketing.neanias.eu/projects/neanias-software

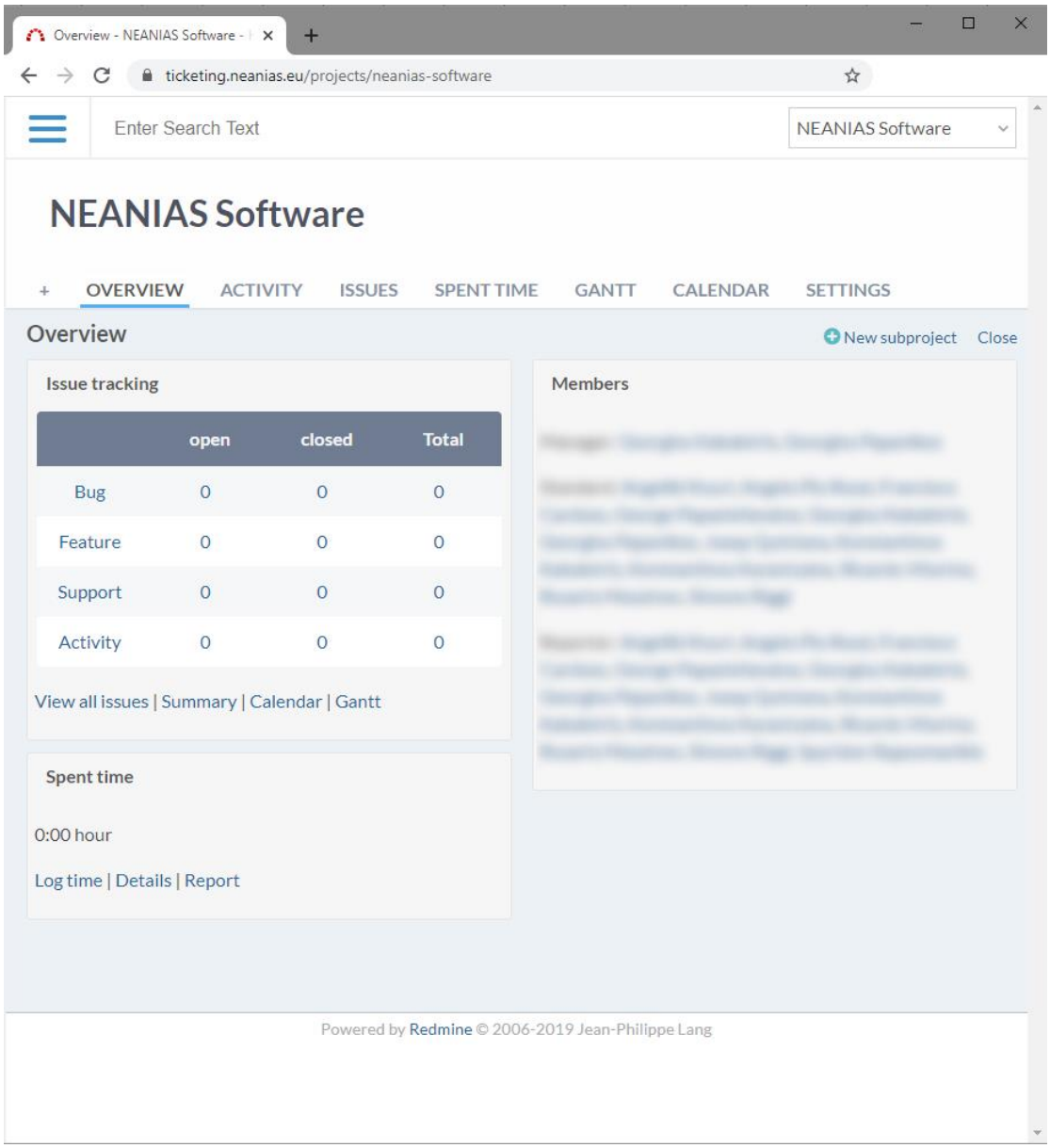

Figure 11 - Inter-Service Issue Tracking

Figure 11 - Inter-Service Issue Tracking displays an administrative overview of the available issue tracking ticketing system.

5. Monitoring and Alerting

The monitoring of the NEANIAS operational services can rely on the Nagios [3] and Grafana [4] facilities, hosted on the GARR Cloud Platform and reachable at monitoring.neanias.eu. Grafana can provide alerting and supports both Nagios and Prometheus [5] as data sources.

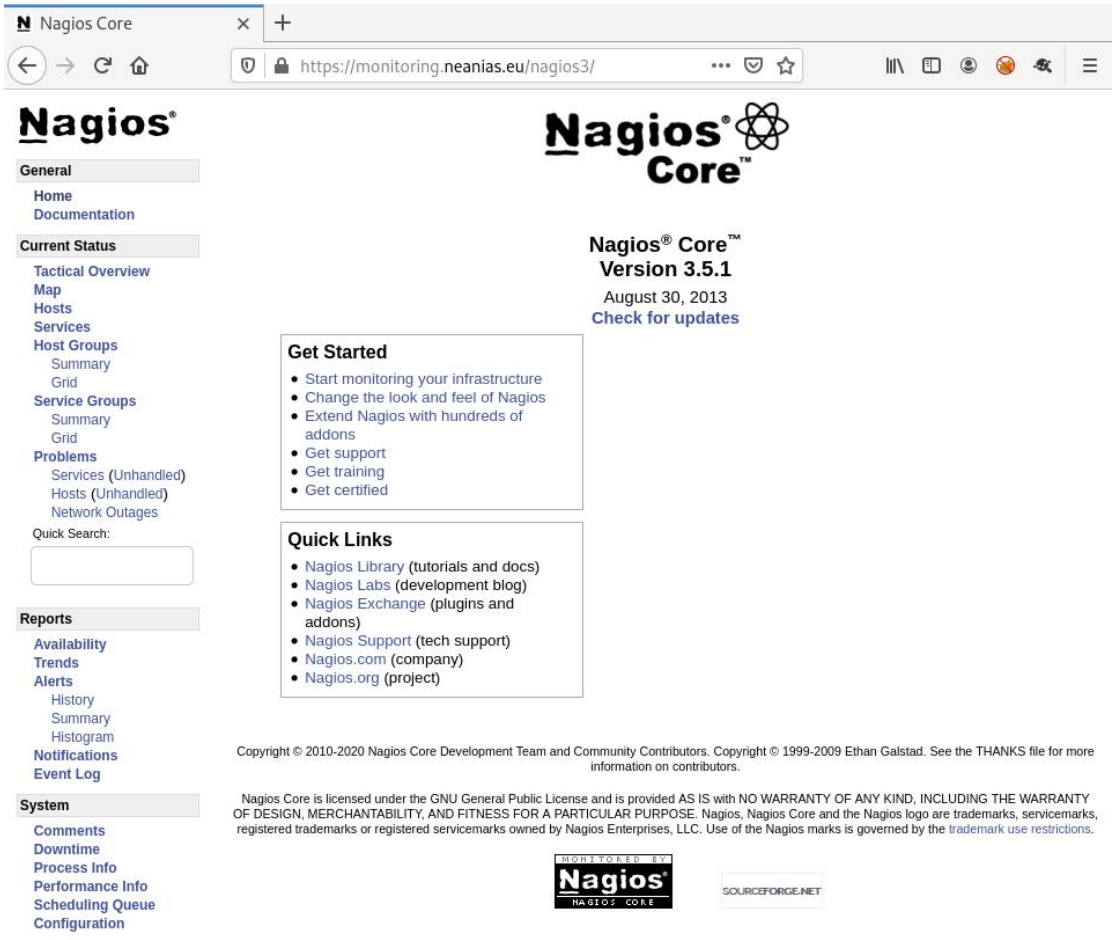

Figure 12 - Nagios server for NEANIAS service monitoring

Figure 12 shows a screenshot from the Nagios monitoring system. Hosts and services to be monitored will be added to the Nagios configuration. Nagios can alert and collect metrics aimed at Grafana-based visualization.

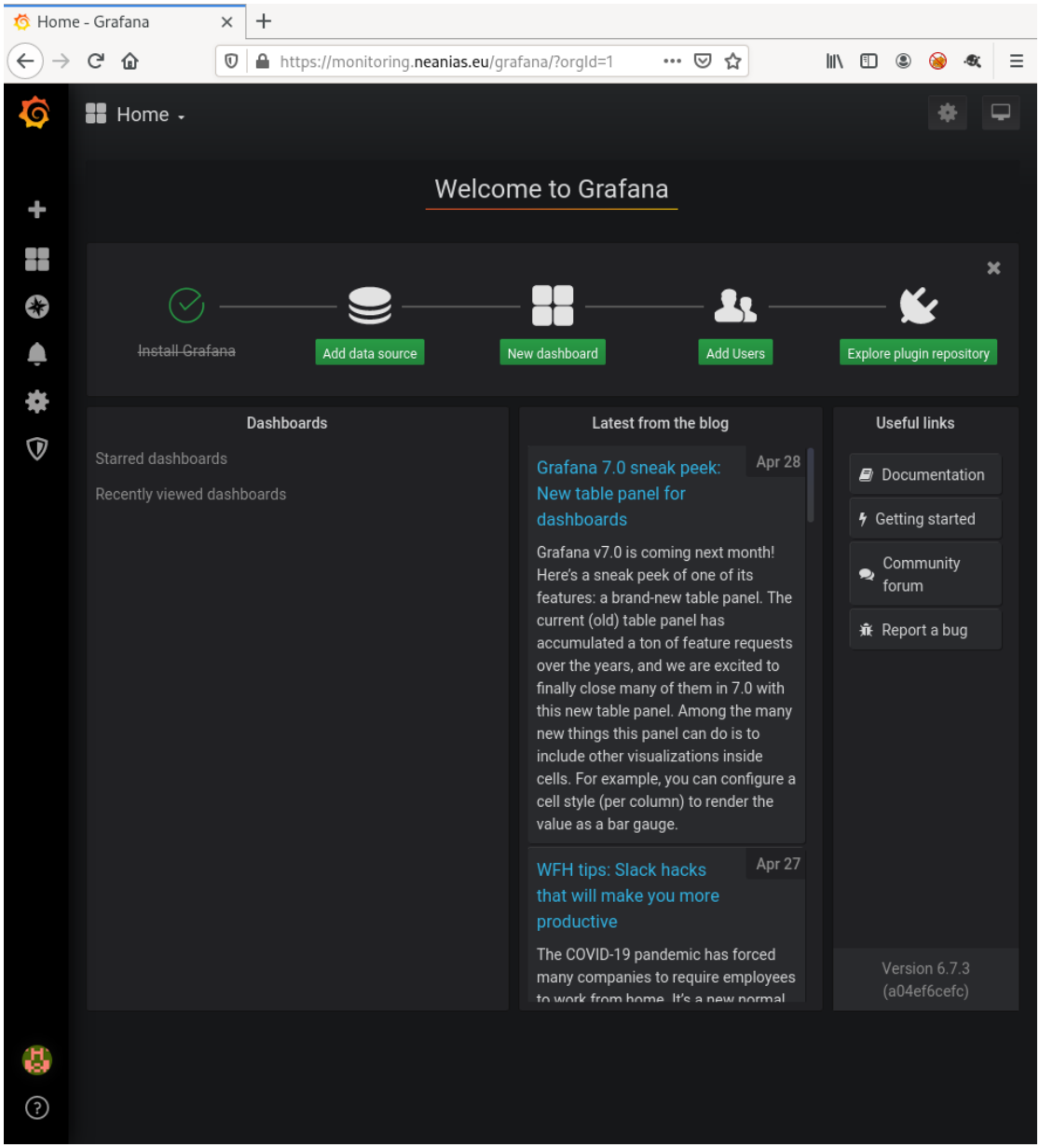

Figure 13 - Grafana, supporting alerting and metrics visualization

Figure 13 shows a screenshot from the Grafana visualization and alerting suite. New dashboards will be defined, which will include metric visualization graphs.

6. Service Delivery Infrastructure

The GARR Cloud Platform [6], based on OpenStack, has been pinpointed as the main infrastructure to provide computational and storage resources for the NEANIAS services delivery operations.

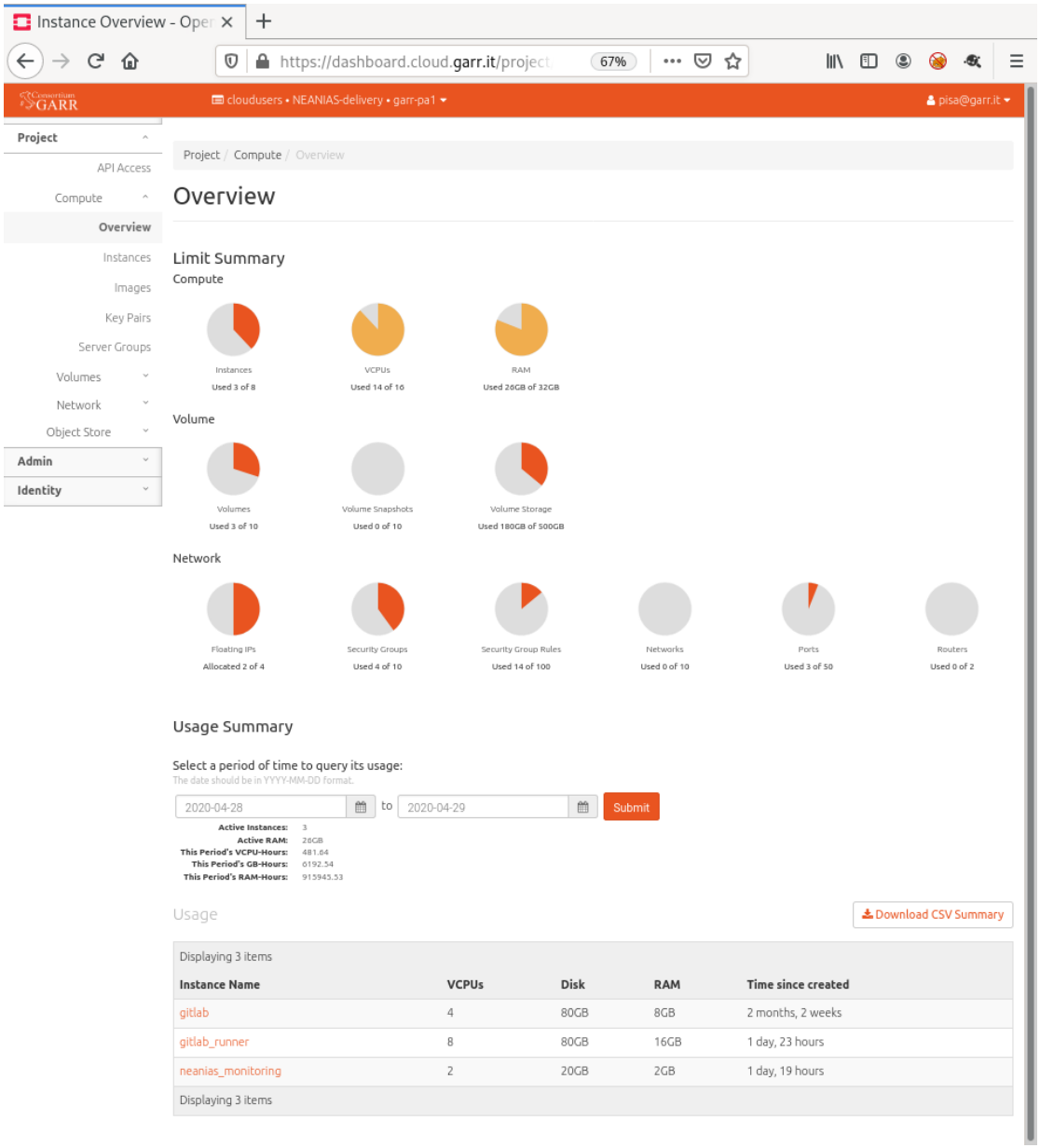

Figure 14 - GARR Cloud Platform OpenStack dashboard

Figure 14 reports a screenshot from the dashboard of the GARR Cloud Platform displaying an overview of the available resources for the selected OpenStack project.

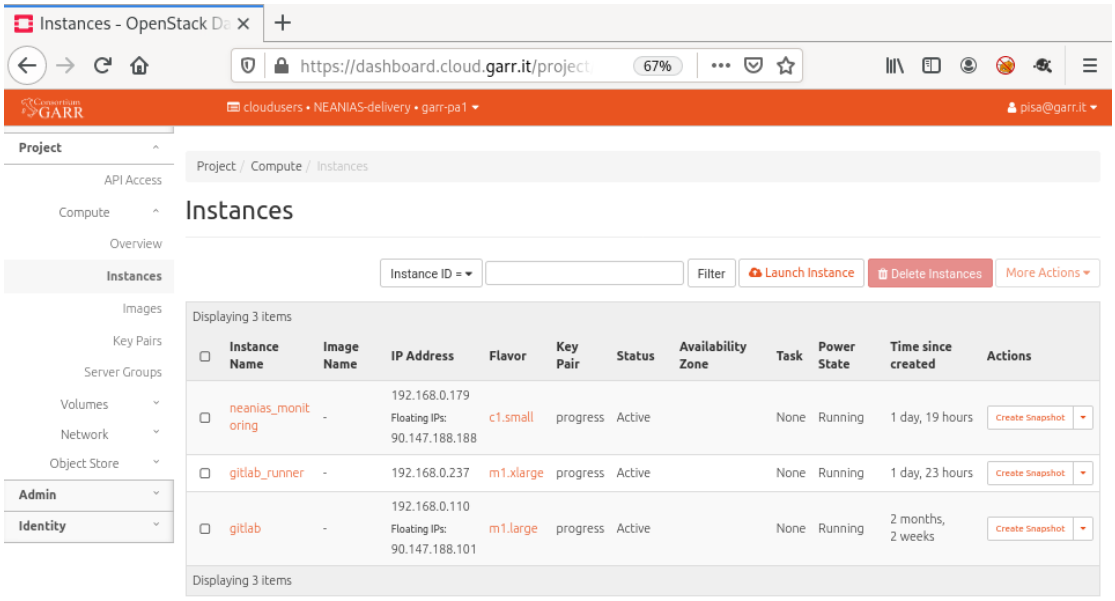

Figure 15 - GARR Cloud Platform dashboard instances panel

Figure 15 shows a screenshot from the dashboard of the GARR Cloud Platform. Instances (i.e. virtual machines) can be managed from the web interface.

7. Conclusions

This deliverable has provided the actual deployment and configuration of the tools, which are described in a wider perspective in deliverable D7.1, needed to deliver the NEANIAS services. These tools aim at supporting the service lifecycle covering several stages: software development, documentation, testing, deployment, operation, monitoring and alerting.

References

[1] Gitlab: https://about.gitlab.com/
[2] Gitlab CI/CD: https://docs.gitlab.com/ee/ci/
[3] Nagios: https://www.nagios.com/
[4] Grafana: https://grafana.com/
[5] Prometheus: https://prometheus.io/
[6] GARR Cloud Platform: https://cloud.garr.it/

List of acronyms

Acronym	Description
CI/CD	Continuous Integration and Delivery
SSO	Single sign-on
AAI	Authentication and Authorization Infrastructure