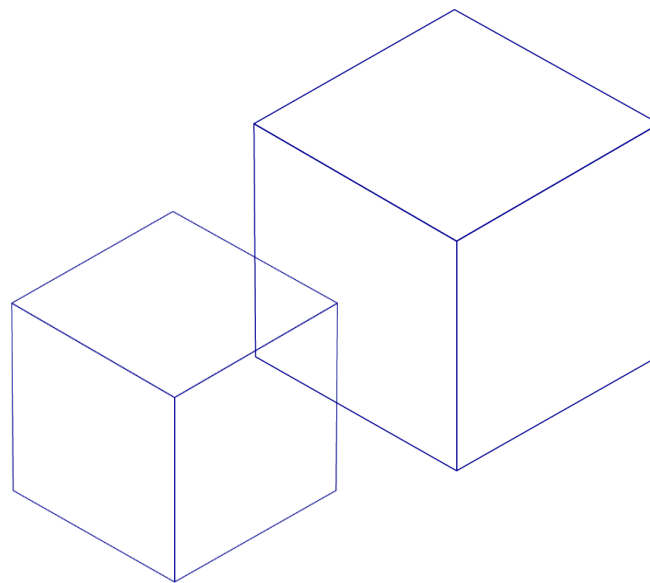


Gaia-X Hackathon Report

Results and Lessons from the Gaia-X Hackathon #4

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Executive summary

The Gaia-X Hackathon #4, a virtual event that took place on 20-21 June and contributed to hands-on development presented an important occasion to answer the question of what it takes to be Gaia-X Compliant.

Participants enhanced their understanding of how the Trust Framework developed in the Compliance Working Group translates into actual software; got to try the Gaia-X Compliance Service and worked together to create valid Self-Descriptions.

There were **ten hacking sessions** split into **two tracks**: the **Provider/Federator** and the **User/Use-cases**. The session's concrete results are detailed below.

Overall, **more than sixty new compliant [Self-Descriptions](#) were created**, which can be used as best practice examples to enable anyone to create their own Self-Descriptions. Several tools were integrated with the Gaia-X Compliance Service and everyone who wanted to understand more or learn how to use the service got to interact with the development teams per session.

Introduction

This iteration of the [hackathon](#) was all about compliance, with four main goals outlined by the Gaia-X CTO Office:

- A. Increase Gaia-X knowledge in the community, encourage collaboration, and enable participants to make use of current open-source implementations and codebases.
- B. Develop tools for creating/validating Self-Descriptions.
- C. Use and further develop of the Gaia-X Compliance Service and Trust Framework.
- D. Check and validate Gaia-X state (concerning architecture, specifications, technology, processes, and general terms & conditions) via the creation of Gaia-X compliant federation services and service offerings leveraging Gaia-X architecture and projects.

All proposed [sessions](#) followed a template to outline how their topic was related to these goals and had specified outcomes. As the hackathon progressed, the session organisers could support each other in tackling challenges; and enable newcomers to explore the projects and discuss them directly with the developers.

Sessions

1. Introduction to Self-Description

This presentation was an introduction to what Self-Descriptions are, why they are used, and why a common vocabulary is needed to describe the entities that are part of the Gaia-X ecosystem.

In addition, the session clarified the difference between various types of Self-Descriptions (Claims, Verifiable Credentials, and Verifiable Presentation) and gave an insight into how they can be used in real-life service offerings and for the identification of participants.

Outcome & take-aways

Significant interest was raised about the technical details. For example: how to create and use a DID document or where to find the Gaia-X schemas. During this session, participants in the hackathon could directly discuss with the experts on how the attributes found in Self-Descriptions are used to evaluate the compliance of service offerings.

2. Gaia-X Lab: Compliance and Registry

This session focused on answering what it takes to be Gaia-X compliant. Building on the previous presentation, the participants saw how the Gaia-X Compliance and Registry services use Self-Descriptions. Then, in the hacking room, everyone got to deep-dive and got hands-on with using the Gaia-X Compliance Service and integrating it into their projects.

Outcome & take-aways

A signing tool was provided to the community to ease testing, and all valid Self-Descriptions were added to the hackathon example folder [1].

The [Minimal Viable Gaia-X Portal](#) has been updated during the Hackathon to use the Gaia-X Compliance Service both prior and after publication to the catalogue. Furthermore, it was showcased how Gaia-X can be used for the Compute-to-Data use-case, using two different domains: environment monitoring (with the [Iliad project](#)), and manufacturing (with the [EuProGigant](#) lighthouse project).

Everyone who wanted to better understand or try the Compliance Service was able to directly discuss with the team and get support in creating, signing, and validating their Self-Descriptions.

3. Gaia-X Lab: Kalg - Gaia-X compliant Data Exchange using Apache Camel

This session introduced Kalg, a project aiming to prototype a possible way to implement data exchange between organisations. The goal of the hackathon was to improve the data transfer flow by using the Gaia-X Compliance Service to verify Self-Descriptions before calling the policy rule engine and improving the policy rule engine.

Outcome & Take-aways

The hackathon allowed the team to discuss with other participants possible implementations for the policy rule engine. A direct result of the hackathon created a Merge Request with the first implementation of it, based on Apache Lucene.

Other topics like connectors for data transfer, integration with the Gaia-X Compliance Service, and policy rule enforcement were discussed at a technical level in the hacking room.

4. Structura-X: Gaia-X Compliance Service in Three-Fold Cloud Federator Portal

This session aimed to create valid Self-Descriptions needed for the Structura-X Lighthouse project- an ecosystem for Cloud Service and Infrastructure Providers. The use-cases of the hackathon aimed to provide internet capacity in a decentralised way, using concepts like farming from blockchain technologies.

Outcome & Take-aways

In the hacking session, two Self-Descriptions for participants were created:

- **Farmer** (entity providing internet capacity)
- **Twin** (unique identifier of where a Farmer can be found digitally).

The process was also automated and integrated with the Portal UI, where the user can fill in the data needed for the Self-Description, validate it through the Gaia-X Compliance service; store the result and retrieve it for later use. SCS: Advance Generation of Self-Descriptions and submit to compliance service.

This proposal aims to use the discoverability features of modern cloud/container platforms and use them to generate Self-Descriptions automatically. Access to the test environment and the [generation tools](#) were made available to the participants in the hacking room.

Outcome & Take-aways

During this session a Self-Description for *IaaS* was created as well as a *Participant* one. The resulting files were signed and verified by the Gaia-X Compliance Service.

While the activity during the two-days event produced a limited number of properties, the team continued the development of their tool for the whole week, adding more attributes to the Self-Description for a more comprehensive description of the service.

5. EDC: Multi-cloud federation with Eclipse Foundation Technologies

This session focused on setting up a Minimum Viable Dataspace. Here it can be demonstrated how users and corresponding use-cases can connect to a federation; register via Gaia-X TF compliant Self-Descriptions (Participant/Service Offering), and finally exchange data via the Eclipse Dataspace Connector.

Outcome & Take-aways

The contributors to this session could access the testing environment and deploy participant's services in a setup similar to the EONA-X data space.

Participant Self-Descriptions were created during the two-day's event, signed using the Gaia-X [signing tool](#) (developed in the track from Session #2), and validated by the Gaia-X [Compliance Service](#). Their attributes (e.g., location) were based on the schema defined in the Gaia-X Trust Framework and were used to enforce policy rules to decide which services can be provided to participants.

6. Proof-of-Concept: Support interoperability of Infrastructure-as-a-Service Offering in Gaia-X Self-Description

The target for this session was to investigate what it takes to migrate cloud resources between different cloud providers automatically based on Self-Descriptions only. During the hacking time, the team aimed to answer questions like:

- Is standardisation necessary on both sides to support interoperability?
- Which properties of IaaS offerings must be included in Self-Descriptions to support interoperability?

Outcome & Take-aways

This session joined forces with Session #5, where SCS and C&H were used as cloud infrastructures for the migration. Here it was discussed how information from the OpenStack flavours can be used to describe properties in Self-Descriptions.

Several Service and one Participant Self-Descriptions were created during the hackathon, as well as an initial implementation for a migration tool that is based on these files, currently with stubs. Unfortunately, the Self-Descriptions were not signed and therefore did not pass the validation of the Gaia-X Compliance Service.

7. Gaia-X DLT Network: Including DLT components in the Gaia-X Framework of Self-Descriptions and Federation Services

This session covered the creation of Self-Descriptions for a federation service that sets up and deploys a Minimal Viable Gaia-X test network node. It also covered what a test-net is and how nodes contribute to creating Proof of Authority.

Outcome & Take-aways

During the hacking time, the team set up a DLT Archive Node on an Arsys Server, then created and validated [Participant](#) and [Service](#) Self-Descriptions for the node and the DLT network.

The contributors to the session were able to see how interaction with the Archive Node and the Gaia-X Testnet can be done and discuss in-depth the Contracting Service, Catalogue, and Exchange Logging Service implemented using DLT.

8. EuProGigant: Integration of a Manufacturing Use Case into the Gaia-X Framework and Minimal Viable Gaia-X

The session investigated how to become Gaia-X compliant as an ecosystem, focusing on the manufacturing domain. It showed how everything comes together:

- Starting with the real-life use-case of a manufacturing machine that generates data.
- Mapping that with the taxonomy defined in the Gaia-X documents.
- Building a service offering.
- Translating that into Self-Descriptions.
- Signing them and validating them through the Gaia-X Compliance Service.

Outcome & Take-aways

The team successfully accomplished all the items they were aiming for during the hacking time and produced several *Participant* and *Service* Offering Self-Descriptions.

In addition, the EuProGigant Portal has been extended with a [verification functionality](#), which calls the Gaia-X Compliance Service API in the background. Therefore, Self-Descriptions from EuProGigant are published in the Minimal Gaia-X Catalogue, where Self-Descriptions can also be verified with a push of a button. It is important to mention that Self-Descriptions could be verified before publication and after retrieval from the Federated Catalogue, while it is possible to store Self-Descriptions on-chain and off-chain.

9. MVG Pilot: Build MVG Pilot services identity by Gaia-X Compliance Service

This session had a use-case of data-to-compute, where a user wants to utilise an AI service that can classify pictures of objects into categories. In addition, the user wants to ensure that the service and data providers have certain certifications. The goal of the hackathon was to create and validate the Self-Descriptions needed for this use-case.

Outcome & Take-aways

During the hacking session, a company DID: WEB was created for dNation, as it is a prerequisite for creating a Self-Description. The *Participant* [Self-Description](#) was created, as well as several *Services*. All of them were signed and manually verified using the Gaia-X Compliance Service.

Feedback from the participants

The hands-on format of the event was appreciated, and we got a lot of positive reviews on how helpful it was to understand Gaia-X core concepts and the tools that are ready to use.

While most considered the tasks assigned to participants rather challenging, we received an average of 4 out of 5 stars on the satisfaction and usefulness of the event from the people taking the survey. Below are some testimonials about the event.

“Thank you very much, it was a great event, with excellent topics, presenters, slides, hands-on sessions, guidance, supplementary materials, and moderator(s) - perfectly organized. I would recommend this event to anybody who is really interested in Gaia-X.”

“The hackathon provided a great opportunity to convene and align in terms of development and common challenges. A lot of participants were able to successfully make their first steps and learn more about the technical inner working of Gaia-X.”

“I loved the enthusiasm and commitment showed on the progress being made in the form of working software”.

Conclusions

All the participants in these sessions did a fantastic job of creating compliant Self-Descriptions. Some took it one step further, creating automation tools and integrating the calls to the Gaia-X Compliance Service directly in their portals or catalogues.

One of the key learnings of the event was the challenge that signing the Self-Descriptions poses, and the team was very supportive in creating the signing tool, to help with the testing. However, we had five participants (EuProGigant, deltaDAO, ChainStep, dNation, Eustema) who used their own keys for signing, which is an excellent signal of the progress we want to make.

Overall, the objectives of the event were achieved with the support of the vibrant and engaging Gaia-X Open-Source Community that we are looking forward to seeing and working with in the next Hackathon.