



Maat

Source of Truth

Inventory Component

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PSNC



Infoshare

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Public (PU)



Maat – Source of Truth (SoT)



Maat stores the information about the intended network state – the information about the resources and services



A key component of the network orchestration and automation management system



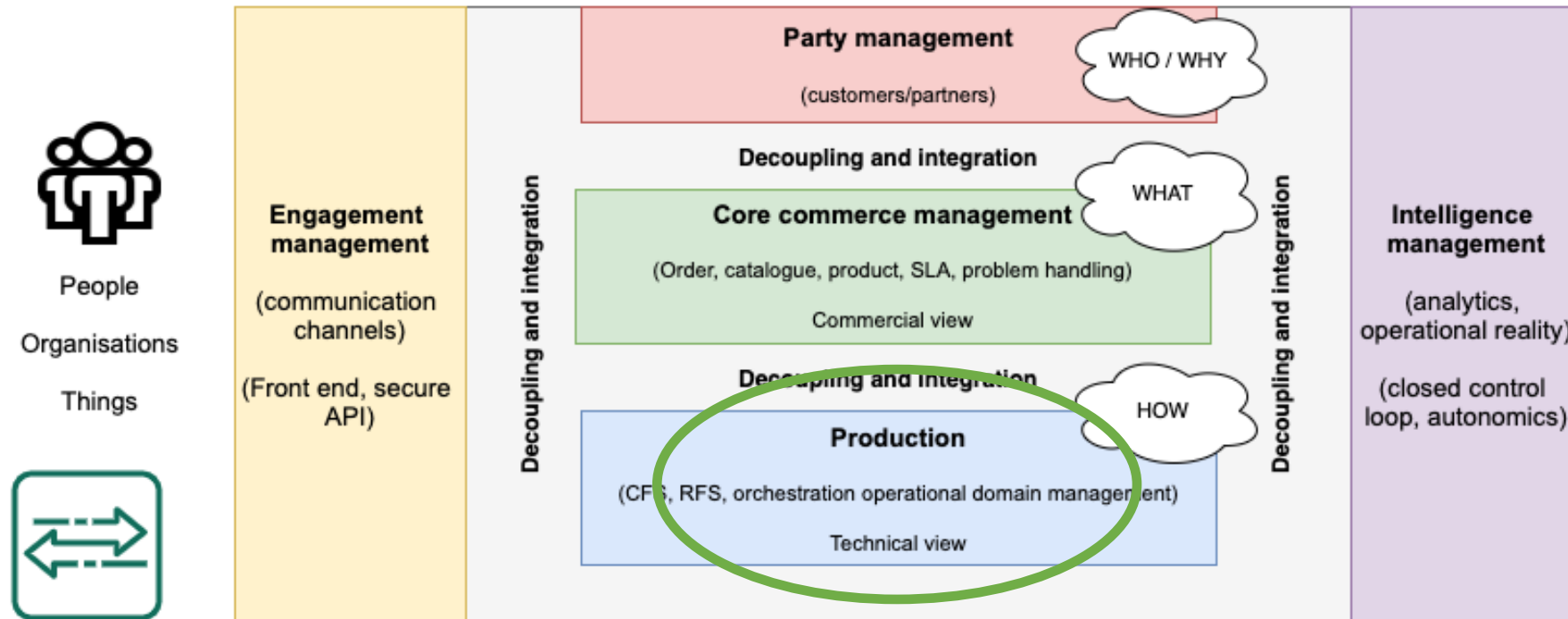
Compliant with the TMF Open Digital Architecture (ODA)



Production deployment
in PIONIER in 2024



TMF Open Digital Architecture (ODA)



<https://www.tmforum.org/oda/>

<https://wiki.geant.org/display/NETDEV/OAV+Architectures>

TMF ODA components

Engagement Management

- Channel Management >
- Content Management >
- Experience Mgt Strategy & Planning >
- Navigation Management >

Core Commerce Management

- Bill Calculation (TMFC031) >
- Commission Management (TMFC059) >
- Product Assurance Management >
- Product Catalog Management (TMFC001) >
- Product Configurator (TMFC027) >
- Product Inventory (TMFC005) >
- Product Order Capture &... (TMFC002) >
- Product Order Delivery Orch & Mgt (TMFC003) >
- Product Test Management (TMFC054) >
- Product Usage Management (TMFC040) >
- Purchase Management (TMFC033) >

Party Management

- Agreement Management (TMFC039) >
- Bill Generation Management (TMFC030) >
- Billing Account Management (TMFC024) >
- Billing Inquiries Management (TMFC025) >
- Debt Collection Management (TMFC026) >
- Digital Identity Management (TMFC020) >
- Document Management (TMFC051) >
- Lead & Opportunity Management (TMFC036) >
- Marketing Communications (TMFC049) >
- Party Interaction Management (TMFC023) >
- Party Management (TMFC028) >
- Party Privacy Management (TMFC022) >
- Party Problem Management (TMFC047) >
- Party Roles Permissions Mgt (TMFC035) >
- Payment Management (TMFC029) >
- Sales Strategy & Planning (TMFC048) >

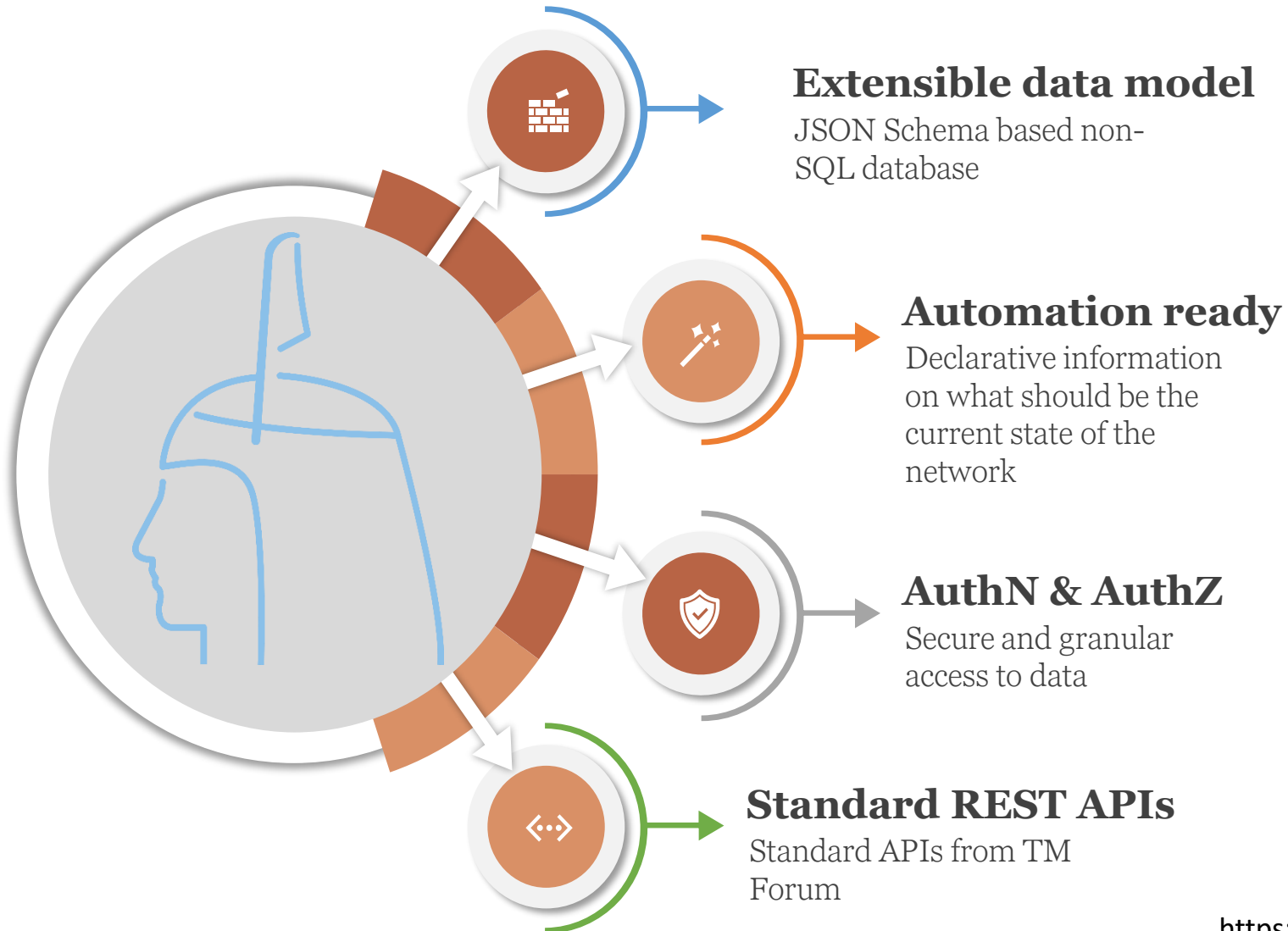
Production

- IT and Network Infrastructure... (TMFC052) >
- Location Management (TMFC014) >
- Resource Capability Delivery >
- Resource Catalog Management (TMFC010) >
- Resource Configuration and... (TMFC062) >
- Resource Discovery and Reconciliation (TMFC045) >
- Resource Inventory (TMFC012) >
- Resource Order Management (TMFC011) >
- Resource Test Management (TMFC056) >
- Resource Usage Management (TMFC016) >
- Service Balance Management (TMFC013) >
- Service Catalog Management (TMFC006) >
- Service Inventory (TMFC008) >
- Service Order Management (TMFC007) >
- Service Qualification... (TMFC009) >
- Service Quality Management (TMFC053) >
- Service Test Management (TMFC055) >
- Service Usage Management (TMFC015) >
- Strategic Resource Planning (TMFC044) >
- Supply Chain Management (TMFC032) >
- Work Order Management (TMFC061) >
- Workforce Management (TMFC046) >

Intelligence Management

- Accounting Management >
- Anomaly Management (TMFC041) >
- Campaign Management (TMFC057) >
- Experience Insight Management >
- Knowledge Management (TMFC060) >
- Product / Sales Performance... (TMFC058) >
- Recommendation Management (TMFC050) >
- Resource Performance Mgt (TMFC038) >
- Service Performance Mgt (TMFC037) >

Maat – main features



Technology stack

```

1 package org.geant.maat.resource;
2
3 import com.fasterxml.jackson.databind.ObjectMapper;
4 import io.vavr.control.Either;
5 import org.geant.maat.infrastructure.Database;
6 import org.geant.maat.notification.Event;
7 import org.geant.maat.notification.Notification;
8 import org.geant.maat.notification.NotificationDTO;
9 import org.slf4j.Logger;
10 import org.slf4j.LoggerFactory;
11
12 import java.util.*;
13
14 public class BaseResourceService implements ResourceService {
15
16     private final ResourceRepository repository;
17     private final ResourceCreator creator;
18     private final NotificationService notificationService;
19     private final ResourceUpdater updater;
20     private final ResourceFinder finder;
21
22     BaseResourceService(
23         ResourceRepository repository,
24         NotificationService notificationService,
25         ResourceCreator creator,
26         ResourceUpdater updater,
27         ResourceFinder finder) {
28         this.repository = repository;
29         this.notificationService = notificationService;
30         this.creator = creator;
31         this.updater = new ResourceUpdater(repository);
32         this.finder = new ResourceFinder(repository);
33     }
34
35     @Override
36     public Optional<Resource> findById(Long id) {
37         BaseResourceLogger.info("Getting resource with id: " + id);
38
39         var resource = repository.findById(id);
40
41         resource.ifPresentOrElse(
42             r -> BaseResourceLogger.infoJson("Resource found:", r.toJson()),
43             () -> BaseResourceLogger.info("Could not find resource " + id));
44
45         return resource;
46     }
47 }

```

Linux recommended

Java 21 or higher

Spring Boot 3 library

NoSQL database (MongoDB)

Docker

Kubernetes 

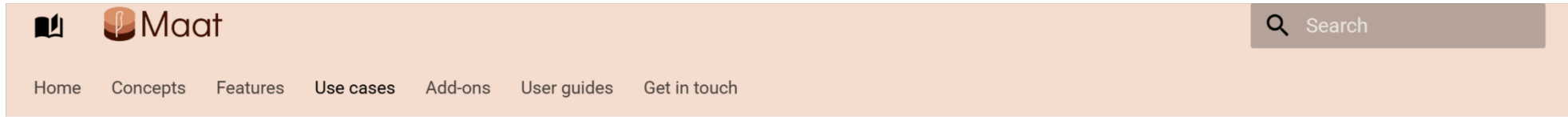
Keycloak

OAuthN 2.0



Maat's use cases

<https://geant-netdev.gitlab-pages.pcss.pl/MaatDocs/use-cases/>



Use cases

- PIONIER L2 circuits
- GP4L L2 circuits

Production deployment in 2025

Orchestrated network service provisioning

Apache Airflow workflows

Maat Use-Cases

Maat is more than just a network management tool; it's a catalyst for digital transformation. Whether your goal is to modernize your network infrastructure, improve operational efficiency, or enable new business services, Maat can provide the foundation you need.

As an inspiration, take a look at some of the use-cases where our partners and collaborators have opted to use Maat as the single source of truth in their solutions:


- PIONIER L2 Circuit Orchestration and Automation
- GP4L L2 Circuit Orchestration and Automation


More use-cases and related information coming soon



Maat's add-ons

<https://geant-netdev.gitlab-pages.pcss.pl/MaatDocs/add-ons/>




Maat

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Add-ons

Maat Data Exporter

Maat Java Library

Mini side projects

MaatDex

Overview

MaatDex is a Python application designed to fetch and process network topology data from Maat. The application supports saving the fetched data in JSON or CSV format.

Installation

1. Clone the repository:

```
git clone <repository_url>
cd project
```

2. Create a virtual environment and activate it:

```
python -m venv venv
source venv/bin/activate # On Windows use `venv\Scripts\activate`
```

3. Install the required dependencies:

```
pip install -r requirements.txt
```

Table of contents

Overview

Installation

Configuration

Usage

Arguments



Maat UI

Maat service url:
<https://maat.pionier.net.pl/resourceInventoryManagement/v4.0.0/resource>

Create new Category

- ▼ vendor
 - Juniper
 - GBC Photonics
- ▼ model
 - PTX10001-36MR
 - MX304
 - ACX7024
 - ACX7100-48L
 - VRR
- > customer
- > **site**
- > device.router
 - interface

Table | JSON

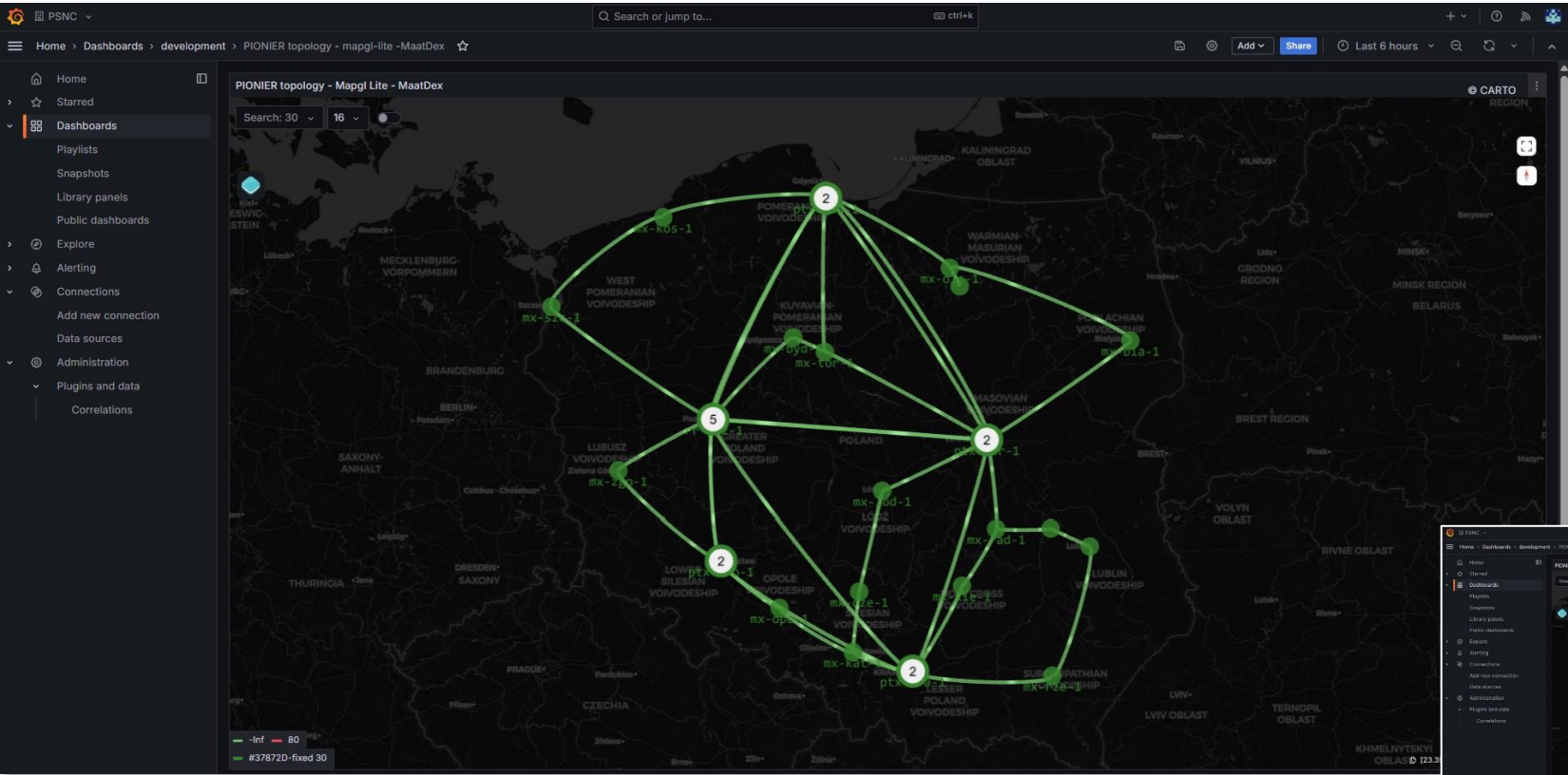
CREATE NEW ENTRY

Actions	Name	Description	Type	Category	StartOperatingDate	LastUpdateDate	Id
	Baldy_UWM	Baldy_UWM	PhysicalResource	site	2025-02-07T18:07:33Z	2025-02-07T18:10:00Z	b88db8d5-df69-4fe8-a62b-8d23ccea...
	Bialystok_PB	Bialystok_PB	PhysicalResource	site	2025-02-07T18:07:33Z	2025-02-07T18:09:07Z	5a610d68-830f-4a76-a9b0-25c0418e...
	Bydgoszcz_PBS	Bydgoszcz_PBS	PhysicalResource	site	2025-02-07T18:07:33Z	2025-02-07T18:07:43Z	28a093eb-3795-4e34-91e0-ee0e5d9c...
	Czestochowa_PCz	Czestochowa_PCz	PhysicalResource	site	2025-02-07T18:07:34Z	2025-02-07T18:09:11Z	bafb736d-10a0-4b61-af53-6acdd4bd...
	Gdansk_PG	Gdansk_PG	PhysicalResource	site	2025-02-07T18:07:34Z	2025-02-07T18:10:14Z	694b893e-95c4-42af-ae7f-aade6a4c...
	Gniezno_PWSZ	Gniezno_PWSZ	PhysicalResource	site	2025-02-07T18:07:34Z	2025-02-07T18:08:19Z	7f272899-97b1-48ad-8657-3d0b819a...
	Goledzkie	Goledzkie	PhysicalResource	site	2025-02-07T18:07:34Z	2025-02-07T18:08:10Z	03ef1a38-a5b7-44f6-9d73-fe0ea8840...
	Gorki	Gorki	PhysicalResource	site	2025-02-07T18:07:34Z	2025-02-07T18:08:06Z	80c6e3b6-a77c-4fce-af65-1ea094842...

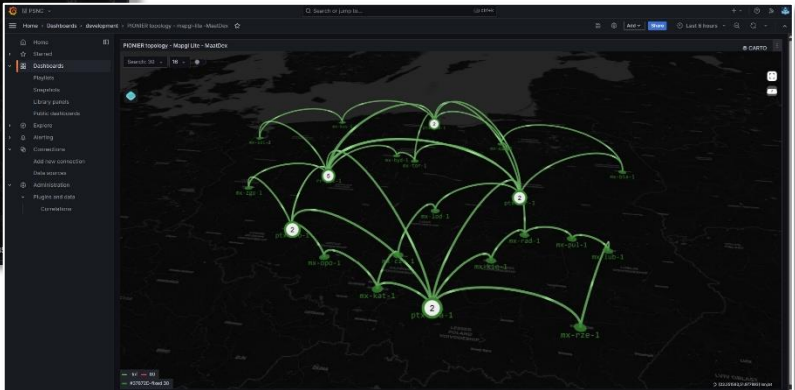
... but REST API is still the main API !

Maat for the visualisation – topology and measurements

Maat + Grafana + Mapgl plugin



New features in Mapgl
early development stage
not public yet!



Maat for the visualisation – tracking of changes in SoT

Maat + EventListener + Grafana + Maat UI

Event ID	Event Time	Event Type	Record ID	Record Name
2442e4e8-3319-4914-9e53-f0334ac8df...	2025-04-02 16:14:34	ResourceCreateEvent	3f7b66a1-7bfc-4f0b-9589-6cd60c68b...	resource1
7d76b8cc-1eb2-40ae-a154-eb62296ae91a	2025-04-02 16:14:39	ResourceCreateEvent	4ef82f93-11e7-4385-9aeb-79393ccba...	resource2
82821602-fde0-4b04-aaaa-d6d60200f0...	2025-04-02 16:16:20	ResourceAttributeValueChangeEvent	4ef82f93-11e7-4385-9aeb-79393ccba...	resource2
67faecd6-eb78-4e67-a558-859e851ddb...	2025-04-02 16:14:43	ResourceCreateEvent	0a41a490-e1cb-4e0e-957a-db081f812f...	resource3
ad925961-3c82-484d-a705-c779e5942...	2025-04-02 16:16:41	ResourceDeleteEvent	0a41a490-e1cb-4e0e-957a-db081f812f...	resource3
4eb5d67a-55ec-4474-bf95-11552f6d71a6	2025-04-02 16:14:49	ResourceCreateEvent	f79ea86b-95a4-4c71-8c6c-c2d2c376c...	resource4
88928f04-4305-4eb2-8651-7791e94dc...	2025-04-02 16:15:06	ResourceCreateEvent	99508aaf-274a-4ce4-b79d-2324d71ef...	resource5
8a2bdfbb-e342-441a-8031-615ac8932d...	2025-04-02 16:15:59	ResourceAttributeValueChangeEvent	99508aaf-274a-4ce4-b79d-2324d71ef...	resource5
d3b0d5ce-4d9c-4321-9b90-00c24a724...	2025-04-02 16:12:10	ServiceCreateEvent	a633cc7d-593e-4cdc-874c-dcc9ab59...	service1
778a7127-b7b9-4297-8fbf-2b9655cbe6f5	2025-04-02 16:17:56	ServiceDeleteEvent	a633cc7d-593e-4cdc-874c-dcc9ab59...	service1
45ccdbf9-07cc-4e7c-be14-8f2004dbed97	2025-04-02 16:12:16	ServiceCreateEvent	b059dd53-59f7-4195-97eb-dec10e093...	service2
33cecbd7-7432-4fb8-99be-3ed75ee62...	2025-04-02 16:17:37	ServiceAttributeValueChangeEvent	b059dd53-59f7-4195-97eb-dec10e093...	service2
7ce46fa4-c0ff-4e07-ad3e-9f6b79f1bce7	2025-04-02 16:12:23	ServiceCreateEvent	4eedd41f-0bd0-4df6-991f-6cb8a7c93...	service2

The screenshot shows the Maat UI interface. At the top, there are tabs for 'Resources' and 'Services'. Below the tabs, the 'Maat service url:' is displayed as 'https://172.30.136.58:8082/serviceInventoryManagement/v4.0.0/service'. There is a 'Submit edited object' button on the right. On the left, a sidebar shows a tree view with 'category1', 'service2' (selected), and 'category2'. The main area shows a form for editing a service. The form has two tabs: 'Table' and 'JSON'. The 'Table' tab is active, showing fields for 'name:' (with value 'service2'), 'serviceType:' (with a dropdown menu), 'Link', 'category:' (with value 'category1'), 'description:' (with a text area containing 'New service description'), '@type:' (with a dropdown menu set to 'EntityRef'), and '@schemaLocation:'.

Maat chat bot in PIONIER

Chat bot in Mattermost

Errbot framework + integration with Maat via REST API

Simplified READ access for NOC

Implementation of set of queries/commands

TODO: Integration with the monitoring system

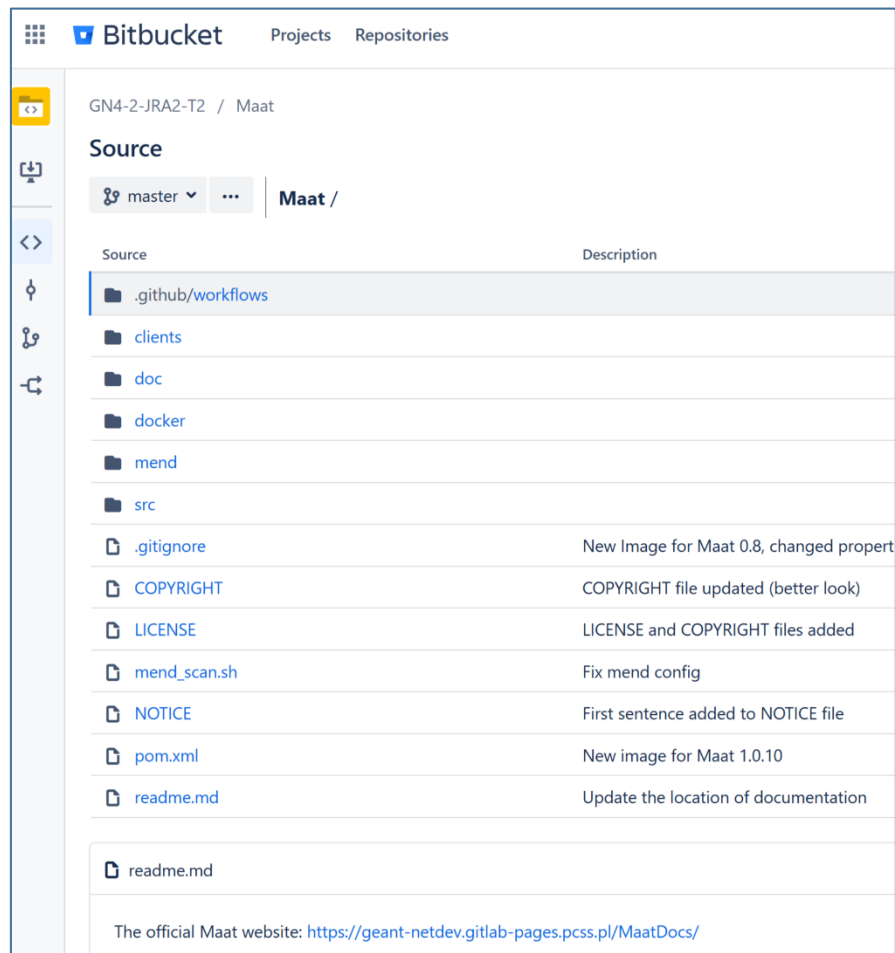
maat BOT 13:32
Services on mx-kat-1 ae0 interface

VID	Name	Description	Category
1100	GWS_Pgw7_SASK	GWS_Pgw7_SASK	I2.circuit
1102	GWS_Pgw8_SASK	GWS_Pgw8_SASK	I2.circuit
1104	PCWS_Pgw5_SASK	PCWS_Pgw5_SASK	I2.circuit
1106	PCWS_Pgw6_SASK	PCWS_Pgw6_SASK	I2.circuit
1108	IX_rtr_Pgw2_SASK	IX_rtr_Pgw2_SASK	I2.circuit
110	TP_com_Lgw2_SASK	TP_com_Lgw2_SASK	I2.circuit
111	TP_com_cPOP_Lgw2_SASK	TP_com_cPOP_Lgw2_SASK	I2.circuit
583	WASK-SASK	WASK-SASK	I2.circuit
209	SASK-POZMAN	SASK-POZMAN	I2.circuit
587	SASK-KIELMAN	SASK-KIELMAN	I2.circuit
551	SASK-CZESTMAN	SASK-CZESTMAN	I2.circuit
533	SASK-BYDMAN	SASK-BYDMAN	I2.circuit
581	SASK-TASK	SASK-TASK	I2.circuit

<https://github.com/errbotio/errbot>

<https://github.com/errbotio/err-backend-mattermost>

Maat – open source project



Bitbucket Projects Repositories

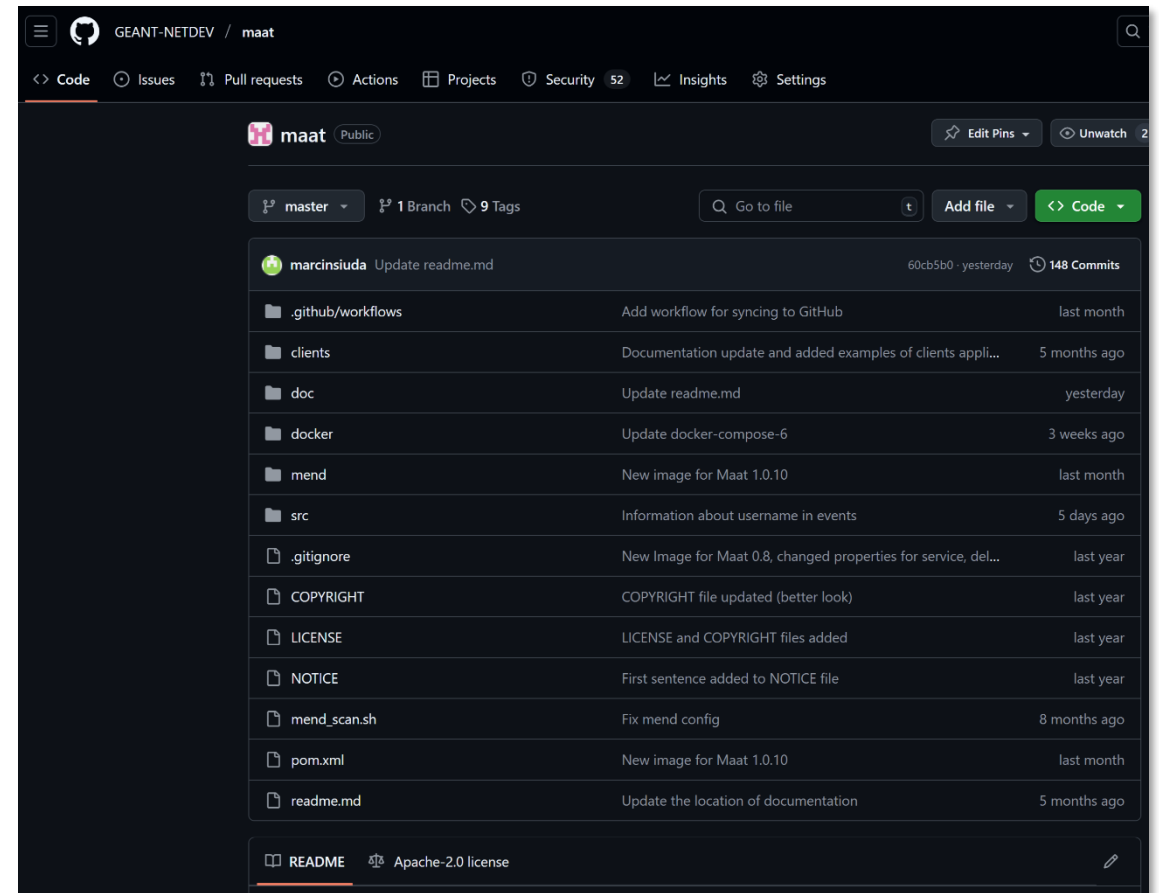
GN4-2-JRA2-T2 / Maat

Source

master Maat /

Source	Description
.github/workflows	
clients	
doc	
docker	
mend	
src	
.gitignore	New Image for Maat 0.8, changed propert
COPYRIGHT	COPYRIGHT file updated (better look)
LICENSE	LICENSE and COPYRIGHT files added
mend_scan.sh	Fix mend config
NOTICE	First sentence added to NOTICE file
pom.xml	New image for Maat 1.0.10
readme.md	Update the location of documentation
readme.md	

The official Maat website: <https://geant-netdev.gitlab-pages.pcss.pl/MaatDocs/>



GEANT-NETDEV / maat

Code Issues Pull requests Actions Projects Security 52 Insights Settings

maat Public

master 1 Branch 9 Tags

Go to file Add file Code

marcinsiuda Update readme.md 60cb5b0 · yesterday 148 Commits

.github/workflows	Add workflow for syncing to GitHub	last month
clients	Documentation update and added examples of clients appli...	5 months ago
doc	Update readme.md	yesterday
docker	Update docker-compose-6	3 weeks ago
mend	New image for Maat 1.0.10	last month
src	Information about username in events	5 days ago
.gitignore	New Image for Maat 0.8, changed properties for service, del...	last year
COPYRIGHT	COPYRIGHT file updated (better look)	last year
LICENSE	LICENSE and COPYRIGHT files added	last year
NOTICE	First sentence added to NOTICE file	last year
mend_scan.sh	Fix mend config	8 months ago
pom.xml	New image for Maat 1.0.10	last month
readme.md	Update the location of documentation	5 months ago

[README](#) Apache-2.0 license

MIRROR: <https://github.com/GEANT-NETDEV/maat>

<https://bitbucket.software.geant.org/projects/OSSBSS/repos/maat>



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Thank You

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<https://geant-netdev.gitlab-pages.pcss.pl/MaatDocs/>



www.geant.org



<https://en.wikipedia.org/wiki/Maat>



Maat or Ma'at (Egyptian: mꜣꜥt /'murʕat/, Coptic: ⲙⲉⲓ) comprised the ancient Egyptian concepts of truth, balance, order, harmony, law, morality, and justice. Ma'at was also the goddess who personified these concepts, and regulated the stars, seasons, and the actions of mortals and the deities who had brought order from chaos at the moment of creation. Her ideological opposite was Isfet (Egyptian jzft), meaning injustice, chaos, violence or to do evil.