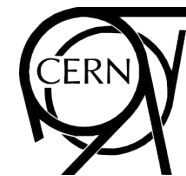


ami

Scientific Metadata Ecosystem

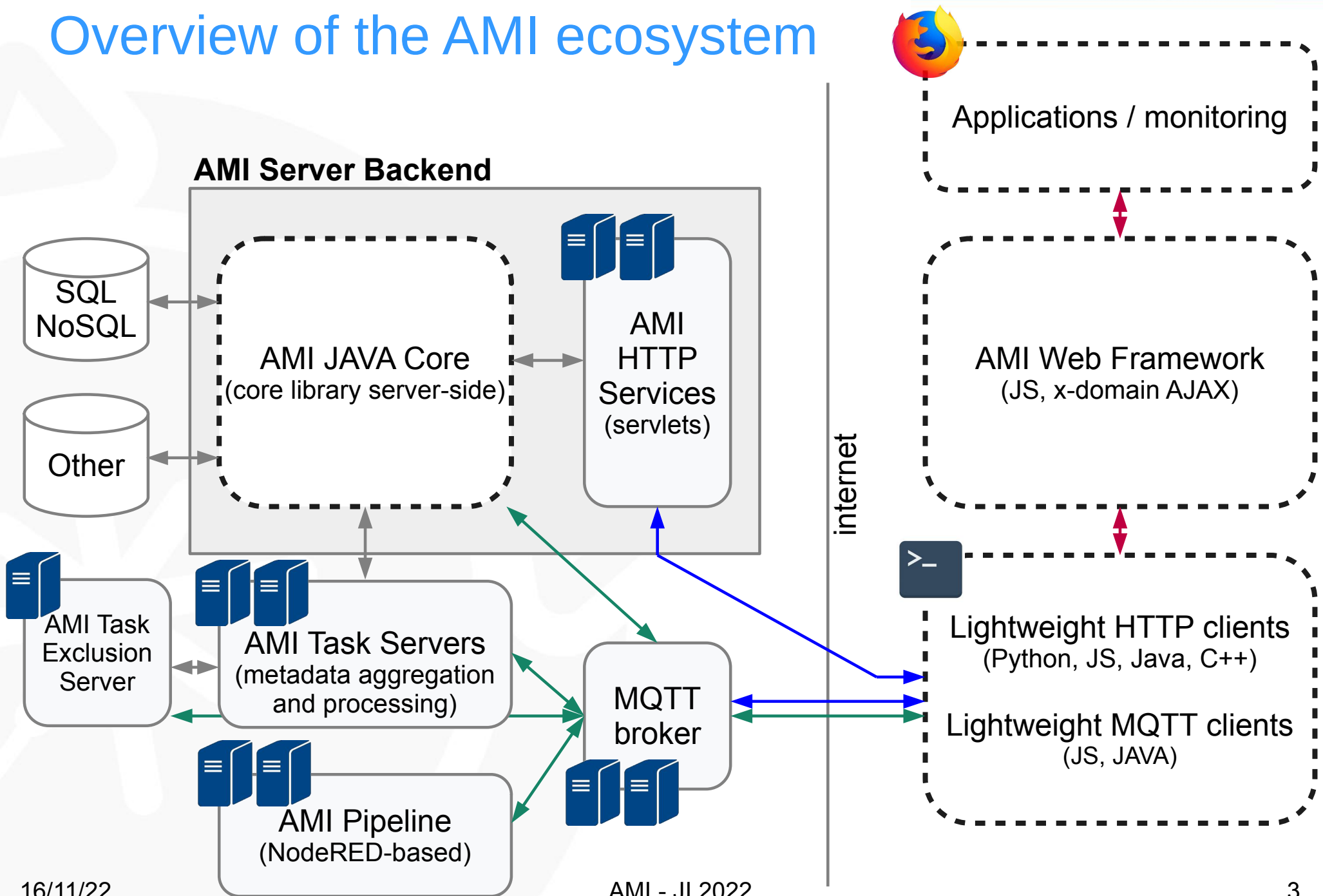
Fabian Lambert, Jérôme Fulachier, Jérôme Odier, Maxime Jaume, Pierre-Antoine Delsart



What is AMI?

- **AMI (ATLAS Metadata Interface) is a generic ecosystem for metadata:**
 - Heterogenous datasource connectivity
 - Primitives for metadata extraction and processing
 - High level tools for selecting data by metadata criteria
- The ecosystem has development kits for:
 - Developing JAVA business objects (server-side)
 - Developing metadata-oriented Web applications (client-side)
- AMI is designed for:
 - **Scalability, evolutivity and maintainability**

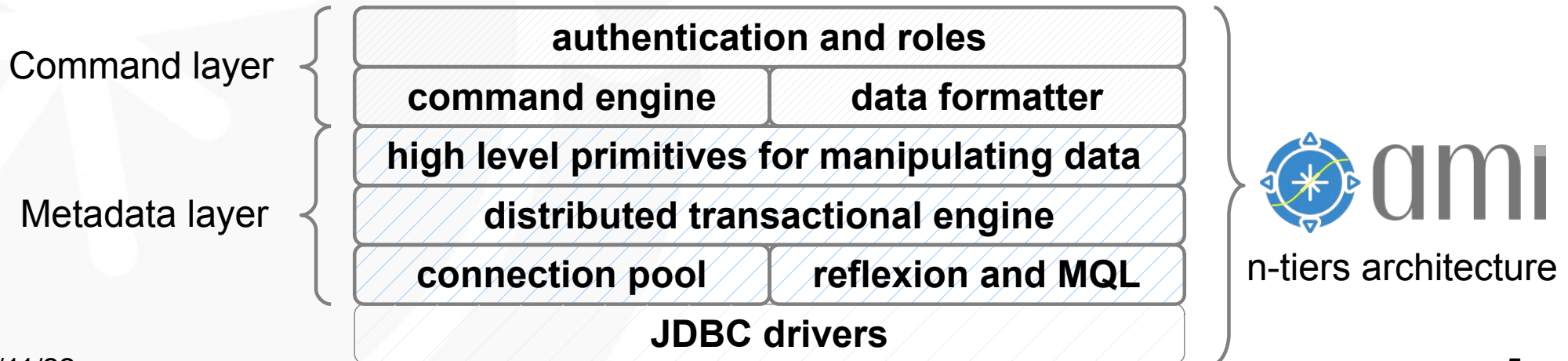
Overview of the AMI ecosystem



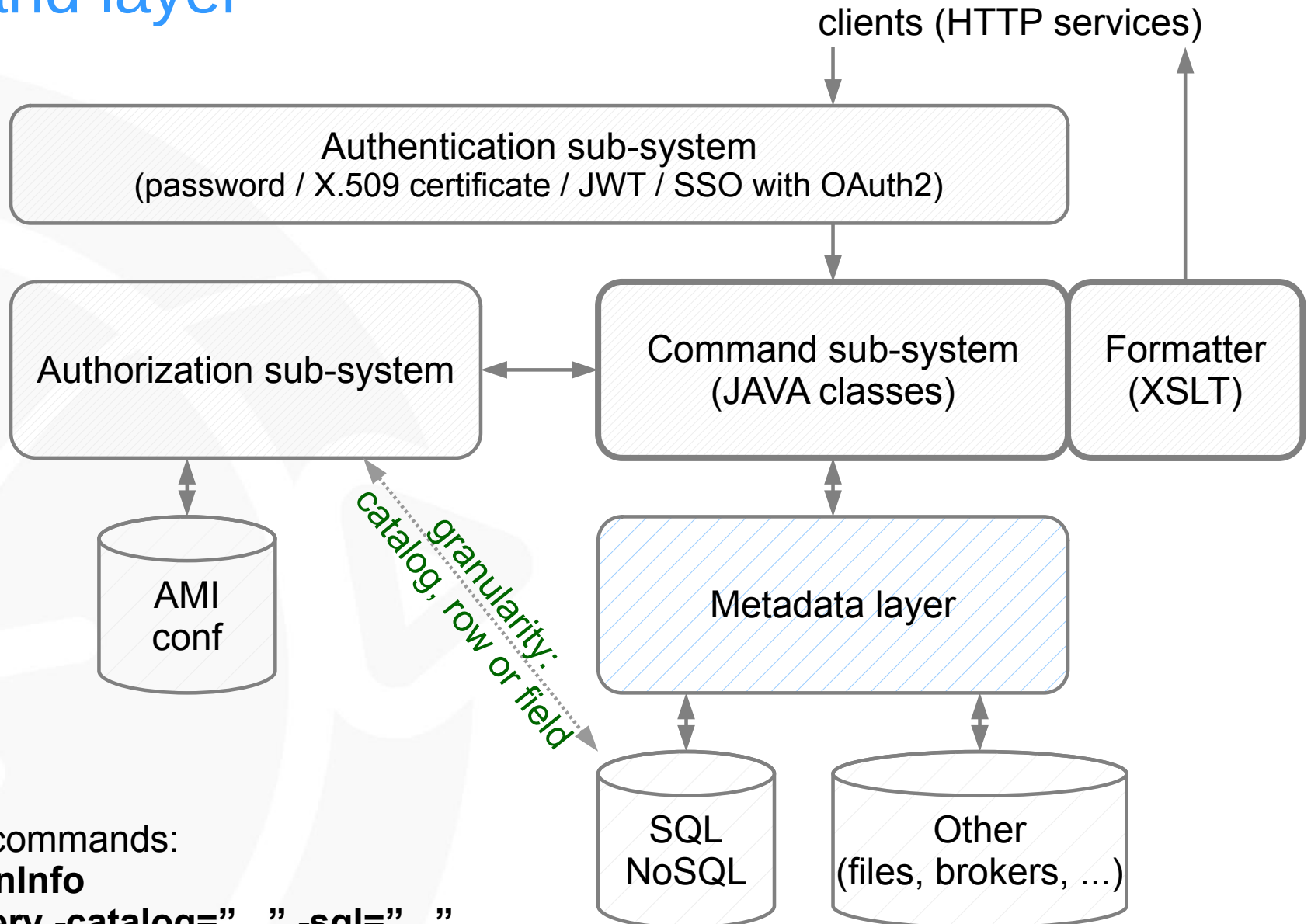
AMI JAVA Core

AMI JAVA Core features

- AMI JAVA Core is the central part of the AMI ecosystem
- Main features:
 - Authentication (SSO, OAuth2) and authorizations
 - Command engine (~100 generic commands)
 - Metadata queries (trivial [SQL, MQL] or more complex, read or write), experiment-specific commands, service administration, ...
 - Metadata Query Language (MQL) and Structured Query Language (SQL)
 - High level primitives for manipulating data
 - DB rowsets, JSON documents, XML documents, remote access, ...



Command layer



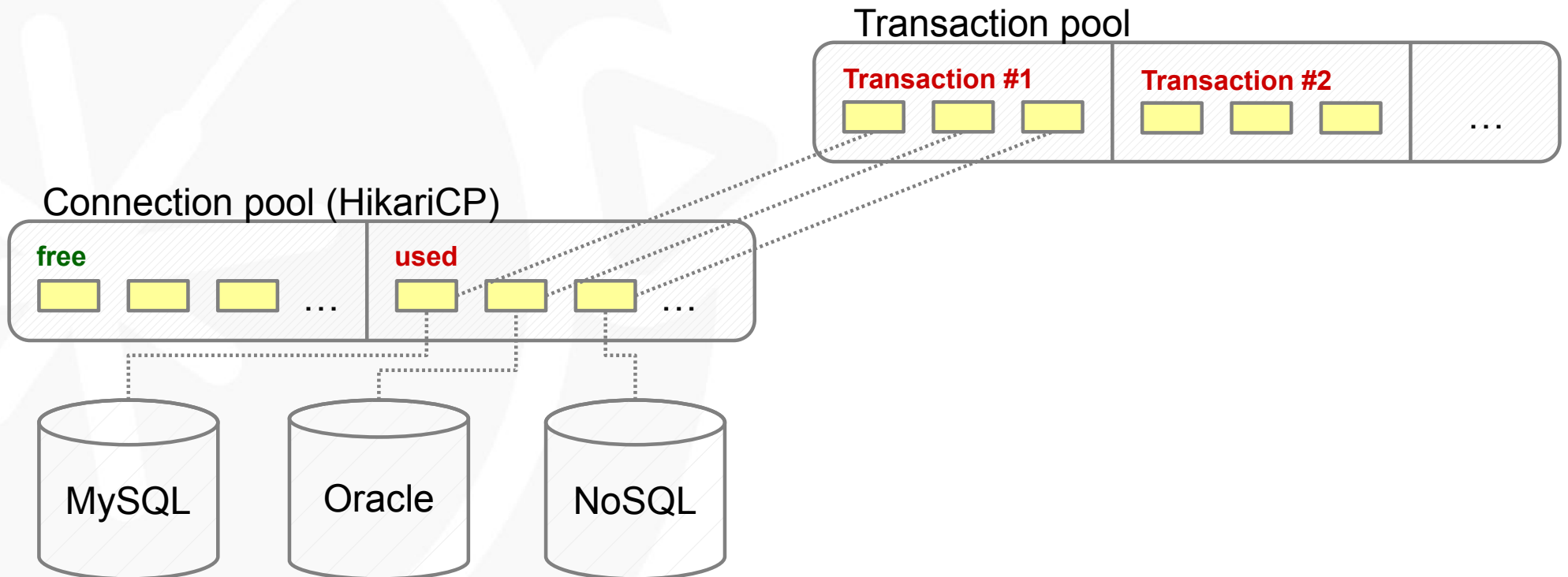
Example of commands:

GetSessionInfo

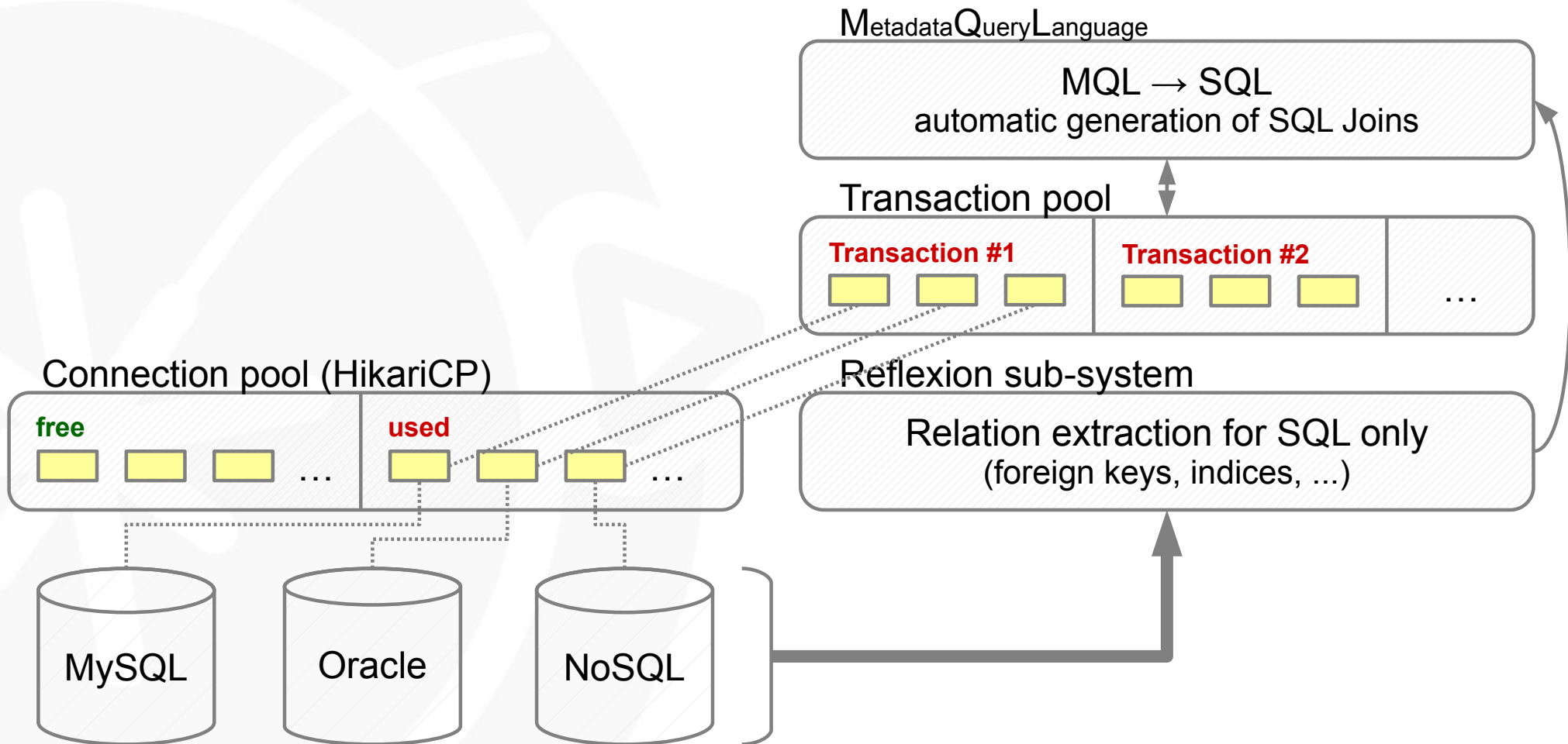
SearchQuery -catalog="..." -sql="..."

GetDatasetInfo -logicalDatasetName="..." (for ATLAS, getting detailed dataset info)

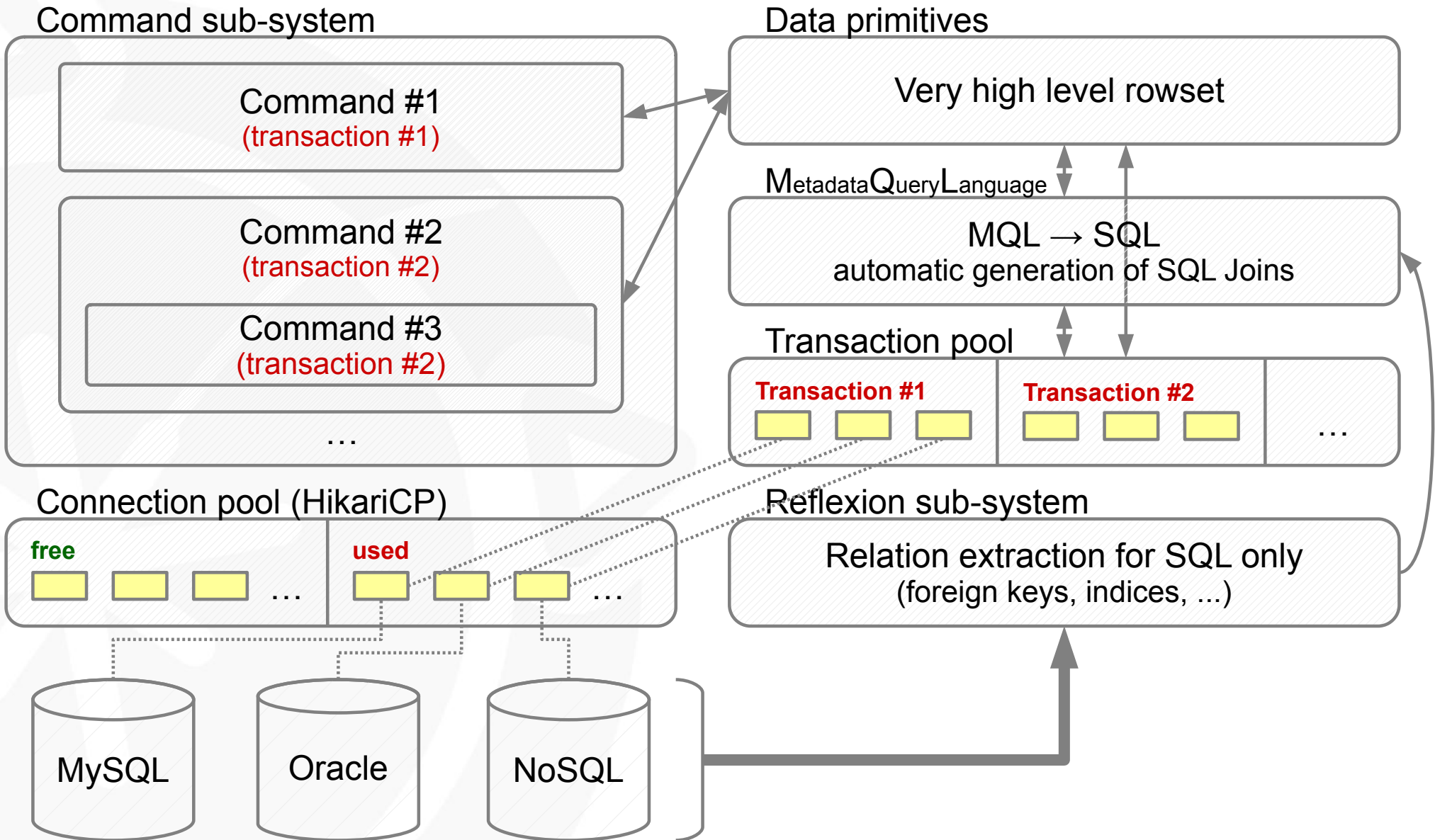
Metadata layer



Metadata layer



Metadata layer



Metadata Query Language (MQL)

- MQL is a kind of SQL without FROM clause nor join
- It makes it possible to build queries without (precisely) knowing relations
- Joins are automatically generated from the reflexion sub-system info
- MQL turns DB-oriented point of view to metadata-oriented point of view
- When there are cycles in relations, there is a dedicated syntax to apply path constraints

```
SELECT * WHERE (`AMISTATUS` = 'VALID')
AND
[`DATASET_KEYWORDS`.`KEYWORD` = 'stau']
AND
[`KEYWORD` = 'stop']
```

MQL to SQL

```
SELECT * FROM `ATLAS_AMI_MC16_02`,`DATASET`
WHERE
(
  `ATLAS_AMI_MC16_02`,`DATASET`,`AMISTATUS` = 'VALID'
)
AND (
  `ATLAS_AMI_MC16_02`,`DATASET`,`IDENTIFIER` IN (
    SELECT
      `ATLAS_AMI_MC16_02`,`DATASET`,`IDENTIFIER`
    FROM
      `ATLAS_AMI_MC16_02`,`DATASET_KEYWORDS`,
      `ATLAS_AMI_MC16_02`,`DATASET`
    WHERE
      (
        `ATLAS_AMI_MC16_02`,`DATASET_KEYWORDS`,`KEYWORD` = 'stau'
      )
      AND `ATLAS_AMI_MC16_02`,`DATASET_KEYWORDS`,`DATASETFK` = `ATLAS_AMI_MC16_02`,`DATASET`,`IDENTIFIER`
    )
  )
)
AND (
  `ATLAS_AMI_MC16_02`,`DATASET`,`IDENTIFIER` IN (
    SELECT
      `ATLAS_AMI_MC16_02`,`DATASET`,`IDENTIFIER`
    FROM
      `ATLAS_AMI_MC16_02`,`DATASET_KEYWORDS`,
      `ATLAS_AMI_MC16_02`,`DATASET`
    WHERE
      (
        `ATLAS_AMI_MC16_02`,`DATASET_KEYWORDS`,`KEYWORD` = 'stop'
      )
      AND `ATLAS_AMI_MC16_02`,`DATASET_KEYWORDS`,`DATASETFK` = `ATLAS_AMI_MC16_02`,`DATASET`,`IDENTIFIER`
    )
  )
)
```

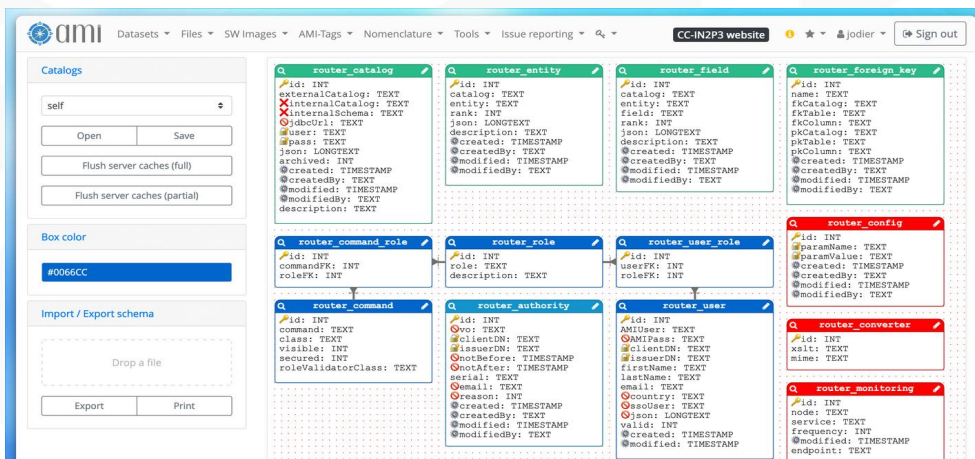
MQTT

- For about 1 year, each sub-system of the AMI ecosystem can connect to an optional MQTT broker for:
 - Monitoring purpose (cpu usage, ram usage, disk usage, ...)
 - Sending AMI commands and / or providing custom AMI commands
- We provide:
 - A library to develop MQTT-based services (for exemple the AMI Task Servers, ...)
 - A standalone JavaScript client and a Vue.js 3-based micro-framework to develop Web applications
- Eclipse Mosquitto with JWT token authentication
 - <https://github.com/odier-io/mosquitto-ip-jwt-auth>
- Websockets with HTTPS handshake

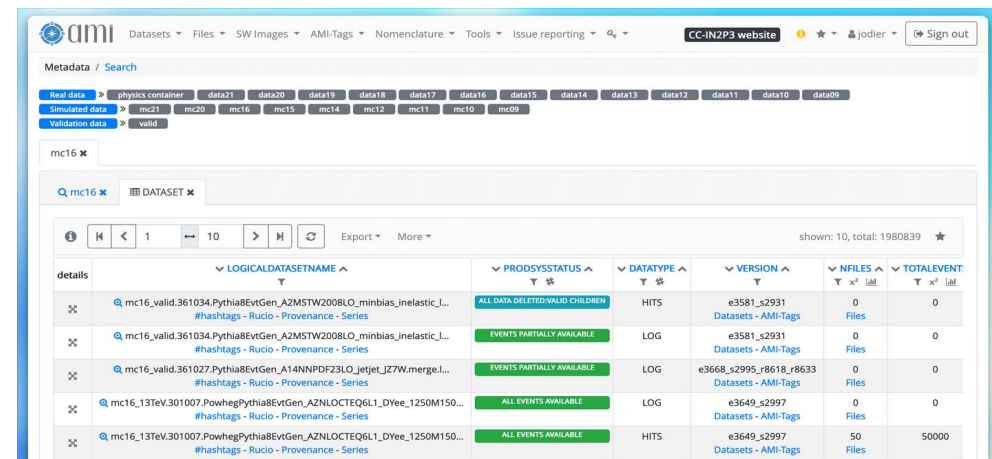
AMI Web Framework

AMI Web Framework (AWF)

- A Web framework for designing metadata-oriented applications
- AWF can be used without the AMI Server Backend
 - Server-side, libraries AMIMini{PHP,Python,JAVA} can easily bridge AWF to existing services
- AWF is based on standard technologies:
 - JS2020 (JS5 bundles with using Webpack and Babel), CSS3, HTML5
 - Bootstrap 5, AMI-Twig (MVC pattern, JS Twig template engine implementation), Vue.js 3 (MVVM pattern) natively or with the AMI MQTT micro-framework
- Nginx-based image on Docker Hub



The screenshot shows the AMI web interface with a metadata editor. The main area displays several entity definitions for 'router' related entities, including 'router_catalog', 'router_entity', 'router_field', 'router_foreign_key', 'router_command_role', 'router_role', 'router_user_role', 'router_config', 'router_command', 'router_authority', 'router_user', 'router_converter', and 'router_monitoring'. Each entity definition lists its fields and their data types, such as 'id: INT', 'catalog: TEXT', 'entity: TEXT', 'rank: INT', 'description: TEXT', 'created: TIMESTAMP', and 'modified: TEXT'.



The screenshot shows the AMI web interface with a metadata search results page. The search criteria are 'mc16' and 'LOGICALDATASETNAME'. The results table shows 10 items, with a total of 1980839 items. The table columns include 'LOGICALDATASETNAME', 'PRODSYSSTATUS', 'DATATYPE', 'VERSION', 'NFILES', and 'TOALEVENT'. The first few rows show results for 'Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_L...' with various statuses like 'ALL DATA DELETED-VALID CHILDREN', 'EVENTS PARTIALLY AVAILABLE', and 'ALL EVENTS AVAILABLE'.

LOGICALDATASETNAME	PRODSYSSTATUS	DATATYPE	VERSION	NFILES	TOALEVENT
mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_L... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED-VALID CHILDREN	HITS	e3581_s2931 Datasets - AMI-Tags	0 Files	0
mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_L... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3581_s2931 Datasets - AMI-Tags	0 Files	0
mc16_valid.361027.Pythia8EvtGen_A14NNPDF23LO_jetjet_IJZ7W.merge.L... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3668_s2995_r8618_r8633 Datasets - AMI-Tags	0 Files	0
mc16_13TeV.301007.PowhegPythia8EvtGen_A2NLOCTEQ6L1_Dvee_1250M150... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3649_s2997 Datasets - AMI-Tags	0 Files	0
mc16_13TeV.301007.PowhegPythia8EvtGen_A2NLOCTEQ6L1_Dvee_1250M150... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	HITS	e3649_s2997 Datasets - AMI-Tags	50 Files	50000

Features and patterns

- Authentication & roles
- URL router, short URLs
- Sub-applications and reusable graphic controls (object paradigm)
- Centralized resource live cycle management (CSS, JS, JSON, xml, Twig files; AMI sub-applications; AMI controls)
- Wizards for generating sub-application and control skeletons
- Patterns:
 - MVC
 - Model → AMI commands
 - View → TWIG templates
 - Controller → classes `ami.SubApp`, `ami.Control` (JavaScript)
 - MVVM
 - based on `Vue.js 3`

Default controls and applications

- Controls can be embedded in external Web pages such as wikis
- Applications are generally built by assembling controls
- Main available controls:
 - Dialog boxes
 - Controls for searching (Google-like Search, Criteria Search, ...)
 - Controls for displaying (Schema Viewer, Tab, Table, Element Info, ...)
 - Controls for annotating entities (WhiteBoard, ...)
- Main available applications:
 - Embedded CMS
 - AMI command interpreter
 - Admin Dashboard and Monitoring
 - Schema Viewer, Table Viewer, Simple Search, Criteria Search, Search Modeler, ...

Screenshots

Searching ATLAS datasets by criteria

Displaying search results in AMI

Search Form

View Selection Selected datasets: 39287 (events: 44508947520 , files: 7130962)

Simulated Data mc16

- Valid datasets
- projectName
- productionStep
- dataType
- version (AMI Tag)
- logicalDatasetName
- campaign
- subcampaign
- bunchspacing
- geometryVersion
- prodsysStatus
- datasetNumber
- generatorName
- ecmEnergy
- generatorTune

version (AMI Tag)

Any

- e2623_s2997_r8957
- e2623_s2997_r8957_r8996
- e2623_s2997_r9191
- e2623_s2997_r9191_r9128
- e2623_s2997_r9370
- e2623_s2997_r9370_r9315

Exact

dataType

Any

- AOD
- DAOD_BPHY1
- DAOD_BPHY4
- DAOD_BPHY5
- DAOD_BPHY6
- DAOD_BPHY7

Select

details	LOGICALDATASETNAME	PRODSYSSTATUS	DATATYPE	VERSION	NFILES	TOTALEVENTS
✖	mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_C... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED/VALID CHILDREN	HITS	e3581_s2931 Datasets - AMI-Tags	0 Files	0
✖	mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_C... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3581_s2931 Datasets - AMI-Tags	0 Files	0
✖	mc16_valid.361027.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ7W.merge.L... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3668_s2995_r8618_r8633 Datasets - AMI-Tags	0 Files	0
✖	mc16_13TeV.301007.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1250M150... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3649_s2997 Datasets - AMI-Tags	0 Files	0
✖	mc16_13TeV.301007.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1250M150... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	HITS	e3649_s2997 Datasets - AMI-Tags	50 Files	50000
✖	mc16_13TeV.423000.ParticleGun_single_electron_egammaET.simul.log... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3566_s3007 Datasets - AMI-Tags	0 Files	0
✖	mc16_13TeV.423000.ParticleGun_single_electron_egammaET.simul.HIT... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED/VALID CHILDREN	HITS	e3566_s3007 Datasets - AMI-Tags	0 Files	0
✖	mc16_13TeV.301006.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1000M125... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED/VALID CHILDREN	HITS	e3649_s2997 Datasets - AMI-Tags	0 Files	0
✖	mc16_13TeV.301006.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1000M125... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3649_s2997 Datasets - AMI-Tags	0 Files	0
✖	mc16_13TeV.361021.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ1W.simul.L... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3569_s2997 Datasets - AMI-Tags	0 Files	0

Support

MC16 Dibosons samples

Datasets below have their "processGroup" in the form "Diboson_XXX_YYYY"

MC16 Powheg samples

dibosons processes generated by Powheg

Datasets found : 1163

mc16_13TeV.363893.PowhegPy8EG_CT10nloME_AZNLOCTEQ6L1_ZZqqll_mq20ml20

EVNT HITS AOD NTUP_PILEUP dataset ✖

Details Empty fields hidden

Metadata	
Identifier	301372
logicalDatasetName	mc16_13TeV.363893.PowhegPy8EG_CT10nloME_AZNLOCTEQ6L1_ZZqqll_mq20ml20.simul.HITS.e5154_s3126
nFiles	5983
totalEvents	7977350
totalSize	5553506367244
dataType	HITS
prodsysStatus	EVENTS PARTIALLY AVAILABLE
completion	99.97

AMI-Tags / Add/Reset/Clone 66 new version 99

AMI-Tag name: r8410

AMI-Tag type: r

Production step: recon (f, k, r, v, w, x)

Release: AtlasProduction_20.20.5.4

Transform: Reco_tf.py

additional dpds

```

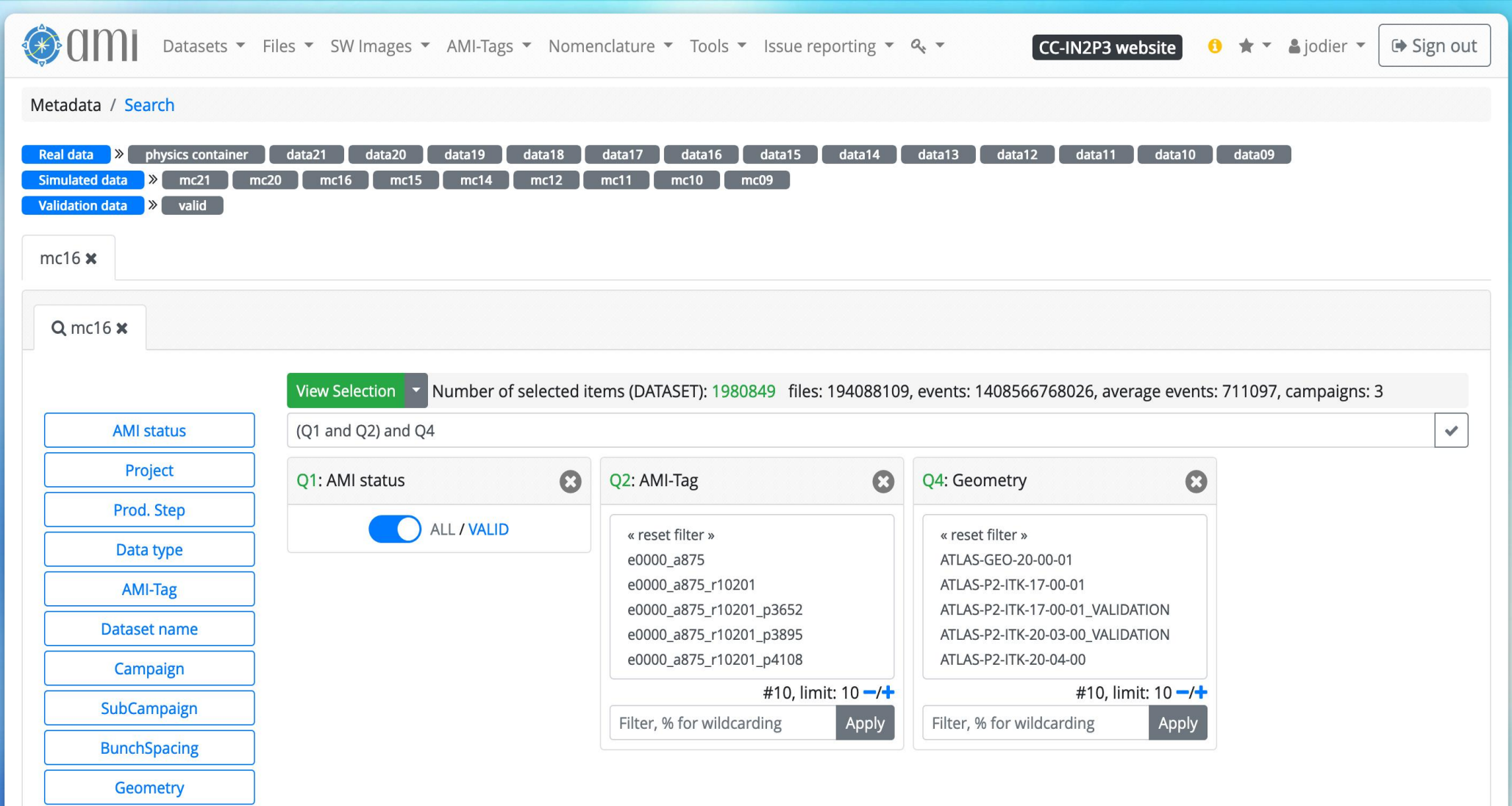
outputDAOD_HSG2File file<AOD> outputDESDM_ZMUMUFile file<ESD> outputNTUP_EHBIASFile file<NTUP>
outputNTUP_FASTMONFile file<NTUP> outputNTUP_FastCaloSimFile file<NTUP>
outputNTUP_HEGNOISEFile file<NTUP> outputNTUP_HIGMULTFile file<NTUP>
outputNTUP_LARNOISEFile file<NTUP> outputNTUP_MCPScaleFile file<NTUP> outputNTUP_MCPPTFile file<NTUP>
outputNTUP_MUONCALIBFile file<NTUP> outputNTUP_PROMPTPHOTFile file<NTUP> outputNTUP_SCTFile file<NTUP>
outputNTUP_SUSYTRUTHFile file<NTUP> outputNTUP_TRKVALIDFile file<NTUP> outputNTUP_TRTFile file<NTUP>
    
```

A control embedded in a wiki and connected to the central AMI service

The AMI-Tags application

This control executes the **GetDatasetInfo** command

Screenshots



The screenshot displays the AMI web application interface. At the top, there is a navigation bar with the AMI logo and various menu items: Datasets, Files, SW Images, AMI-Tags, Nomenclature, Tools, Issue reporting, and a search icon. On the right side of the navigation bar, there is a 'CC-IN2P3 website' button, a star icon, a user profile icon labeled 'jodier', and a 'Sign out' button.

Below the navigation bar, the main content area is titled 'Metadata / Search'. There are three main categories of data filters: 'Real data' (with sub-filters: physics container, data21, data20, data19, data18, data17, data16, data15, data14, data13, data12, data11, data10, data09), 'Simulated data' (with sub-filters: mc21, mc20, mc16, mc15, mc14, mc12, mc11, mc10, mc09), and 'Validation data' (with sub-filter: valid).

The search results for 'mc16' are displayed. A search bar at the top left of the results area contains 'Q mc16'. Below the search bar, there is a 'View Selection' dropdown menu showing 'Number of selected items (DATASET): 1980849 files: 194088109, events: 1408566768026, average events: 711097, campaigns: 3'. Below this, a filter '(Q1 and Q2) and Q4' is applied.

On the left side of the results area, there is a vertical list of filter buttons: AMI status, Project, Prod. Step, Data type, AMI-Tag, Dataset name, Campaign, SubCampaign, BunchSpacing, and Geometry.



The results area contains three filter panels:

- Q1: AMI status**: A toggle switch is set to 'ALL / VALID'.
- Q2: AMI-Tag**: A list of tags is shown: « reset filter », e0000_a875, e0000_a875_r10201, e0000_a875_r10201_p3652, e0000_a875_r10201_p3895, e0000_a875_r10201_p4108. Below the list, it says '#10, limit: 10 -/+'. There is a 'Filter, % for wildcarding' input field and an 'Apply' button.
- Q4: Geometry**: A list of geometry tags is shown: « reset filter », ATLAS-GEO-20-00-01, ATLAS-P2-ITK-17-00-01, ATLAS-P2-ITK-17-00-01_VALIDATION, ATLAS-P2-ITK-20-03-00_VALIDATION, ATLAS-P2-ITK-20-04-00. Below the list, it says '#10, limit: 10 -/+'. There is a 'Filter, % for wildcarding' input field and an 'Apply' button.

Screenshots

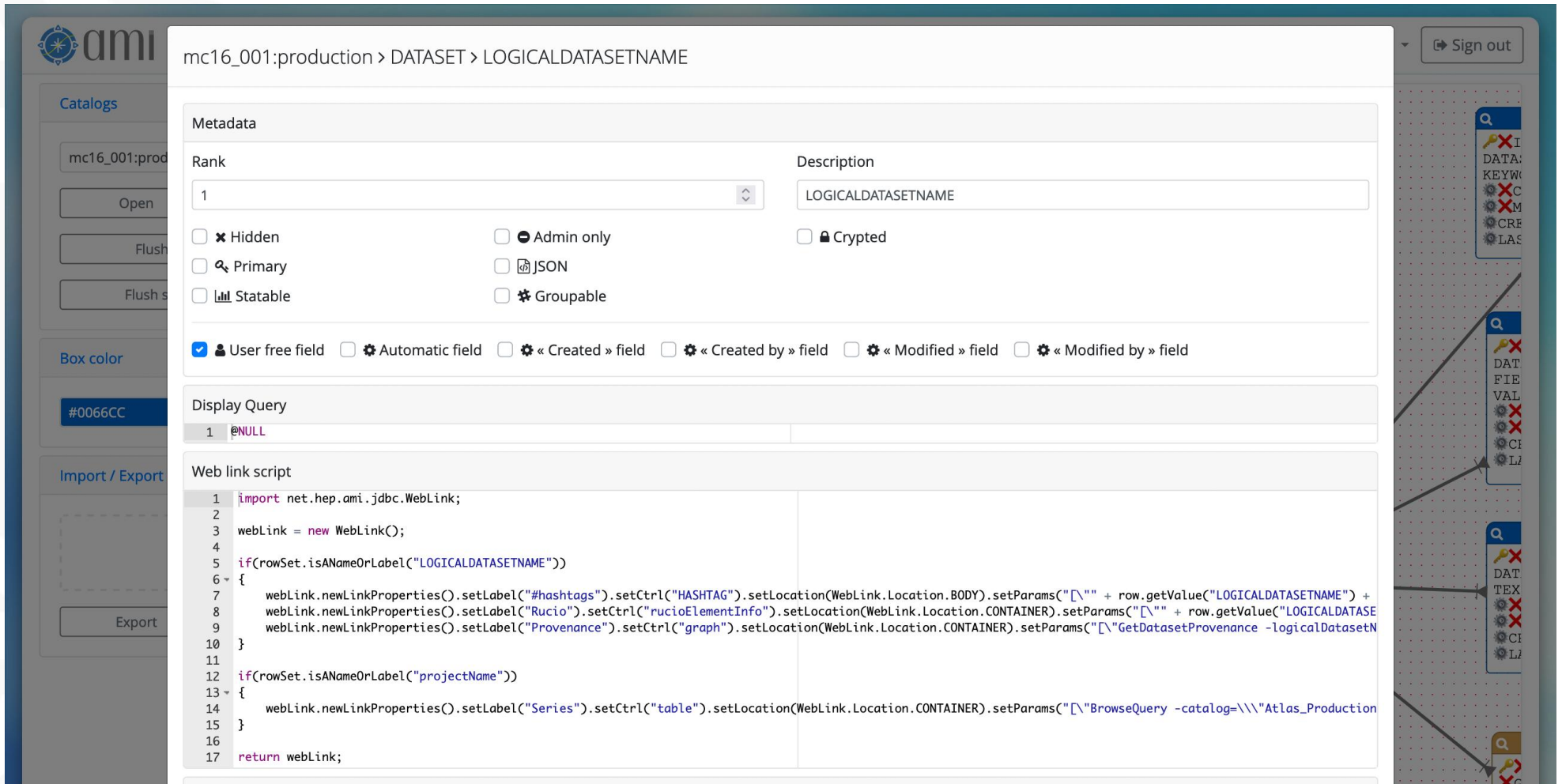
ⓘ ⏪ ⏩ 1 ↔ 10 ⏴ ⏵ 🔄 Export More shown: 10, total: 1980839 ★						
details	LOGICALDATASETNAME	PRODSYSSTATUS	DATATYPE	VERSION	NFILES	TOTALEVENTS
	⌵	⌵	⌵	⌵	⌵	⌵
✕	mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_I... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED:VALID CHILDREN	HITS	e3581_s2931 Datasets - AMI-Tags	0 Files	0
✕	mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_I... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3581_s2931 Datasets - AMI-Tags	0 Files	0
✕	mc16_valid.361027.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ7W.merge.I... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3668_s2995_r8618_r8633 Datasets - AMI-Tags	0 Files	0
✕	mc16_13TeV.301007.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1250M150... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3649_s2997 Datasets - AMI-Tags	0 Files	0
✕	mc16_13TeV.301007.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1250M150... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	HITS	e3649_s2997 Datasets - AMI-Tags	50 Files	50000
✕	mc16_13TeV.423000.ParticleGun_single_electron_egammaET.simul.log... #hashtags - Rucio - Provenance - Series	EVENTS PARTIALLY AVAILABLE	LOG	e3566_s3007 Datasets - AMI-Tags	0 Files	0
✕	mc16_13TeV.423000.ParticleGun_single_electron_egammaET.simul.HIT... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED:VALID CHILDREN	HITS	e3566_s3007 Datasets - AMI-Tags	0 Files	0
✕	mc16_13TeV.301006.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1000M125... #hashtags - Rucio - Provenance - Series	ALL DATA DELETED:VALID CHILDREN	HITS	e3649_s2997 Datasets - AMI-Tags	0 Files	0
✕	mc16_13TeV.301006.PowhegPythia8EvtGen_AZNLOCTEQ6L1_DYee_1000M125... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3649_s2997 Datasets - AMI-Tags	0 Files	0
✕	mc16_13TeV.361021.Pythia8EvtGen_A14NNPDF23LO_jetjet_JZ1W.simul.I... #hashtags - Rucio - Provenance - Series	ALL EVENTS AVAILABLE	LOG	e3569_s2997 Datasets - AMI-Tags	0 Files	0

Screenshots



 empty fields hidden / shown More... ★

Metadata		Linked Entities	
LOGICALDATASETNAME	mc16_valid.361034.Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_l... #hashtags - Rucio - Provenance - Series	←	DATASET_COMMENT 0 record(s)
PRODSYSSTATUS	EVENTS PARTIALLY AVAILABLE	←	DATASET_EXTRA 1 record(s)
DATATYPE	LOG	←	DATASET_KEYWORDS 0 record(s)
VERSION	e3581_s2931 Datasets - AMI-Tags	⇄	PHYSICSPARAMETERS 0 record(s)
NFILES	0 Files	←	DATASET_PROPERTY_BRIDGE 0 record(s)
TOTALEVENTS	0	←	FILES 0 record(s)
COMPLETION	99.0 %	←	JOBOPTIONS 0 record(s)
STATSALGORITHM	exclude_outliers	←	PRODSYS_TASK 1 record(s)
PROJECTNAME	mc16_valid Project	←	PHYSICSPARAMETERVALS_ALL 0 record(s)
PHYSICSSHORT	Pythia8EvtGen_A2MSTW2008LO_minbias_inelastic_low	←	EI_METADATA_STATES_ALL 1 record(s)
PHYSICISTRESPONSIBLE	UNKNOWN	←	HASHTAGS 0 record(s)
PRINCIPALPHYSICSGROUP	gen-user	←	CAMPAIGN 1 record(s)
DATASETNUMBER	361034	←	PHYSICSPARAMETERVALS 0 record(s)
GEOMETRYVERSION	ATLAS-R2-2016-00-00-00_VALIDATION		
CONDITIONSTAG	OFLCOND-MC16-SDR-03		
BEAMTYPE	collisions		
RELATIONALLOADED	0		
PRODUCTIONSTEP	simul		
REQUESTEDBY	ycoadou		
AMISTATUS	VALID		
CREATED	2016-06-14 05:13:24.189510		
LASTMODIFIED	2019-11-05 14:57:35.720279		
GID	267210643		

Screenshots



The screenshot displays the AMI web interface for configuring a logical dataset. The breadcrumb path is `mc16_001:production > DATASET > LOGICALDATASETNAME`.

Metadata

Rank:

Description:

~~x~~ Hidden
 ~~o~~ Admin only
 ~~l~~ Crypted
 ~~q~~ Primary
 ~~h~~ JSON
 ~~l~~ Statable
 ~~s~~ Groupable

~~u~~ User free field
 ~~s~~ Automatic field
 ~~s~~ « Created » field
 ~~s~~ « Created by » field
 ~~s~~ « Modified » field
 ~~s~~ « Modified by » field

Display Query

1 @NULL

Web link script

```

1 import net.hep.ami.jdbc.WebLink;
2
3 webLink = new WebLink();
4
5 if(rowSet.isANameOrLabel("LOGICALDATASETNAME"))
6 {
7     webLink.newLinkProperties().setLabel("#hashtags").setCtrl("HASHTAG").setLocation(WebLink.Location.BODY).setParams("[\"" + row.getValue("LOGICALDATASETNAME") +
8     webLink.newLinkProperties().setLabel("Rucio").setCtrl("rucioElementInfo").setLocation(WebLink.Location.CONTAINER).setParams("[\"" + row.getValue("LOGICALDATASE
9     webLink.newLinkProperties().setLabel("Provenance").setCtrl("graph").setLocation(WebLink.Location.CONTAINER).setParams("[\"GetDatasetProvenance -logicalDatasetN
10 }
11
12 if(rowSet.isANameOrLabel("projectName"))
13 {
14     webLink.newLinkProperties().setLabel("Series").setCtrl("table").setLocation(WebLink.Location.CONTAINER).setParams("[\"BrowseQuery -catalog=\\\"Atlas_Production
15 }
16
17 return webLink;
  
```

The interface includes a sidebar with navigation options like 'Catalogs', 'Box color', and 'Import / Export'. A 'Sign out' button is visible in the top right corner. A vertical toolbar on the right side contains various icons for data management and visualization.

Screenshots


ami Datasets Files SW Images AMI-Tags Nomenclature Tools Issue reporting CC-IN2P3 website jodier Sign out

Metadata / Search Modeler

Search interfaces

- AMI-Tag :: dataset goto
- AMI-Tag :: software goto
- Software :: image goto
- AMI-TagTest :: dataset goto
- Real data :: physics container goto
- Real data :: data21 goto
- Real data :: data20 goto
- Real data :: data19 goto
- Real data :: data18 goto
- Real data :: data17 goto
- Real data :: data16 goto
- Real data :: data15 goto
- Real data :: data14 goto
- Real data :: data13 goto
- Real data :: data12 goto
- Real data :: data11 goto
- Real data :: data10 goto
- Real data :: data09 goto
- Simulated data :: mc21 goto
- Simulated data :: mc20 goto
- Simulated data :: mc16 goto
- Simulated data :: mc15 goto
- Simulated data :: mc14 goto
- Simulated data :: mc12 goto
- Simulated data :: mc11 goto
- Simulated data :: mc10 goto
- Simulated data :: mc09 goto
- Validation data :: valid goto

Search interface modeler



Group*
Real data

Catalog*
data16_001:real_data

Name*
data16

Entity*
DATASET

Archived
 no / yes

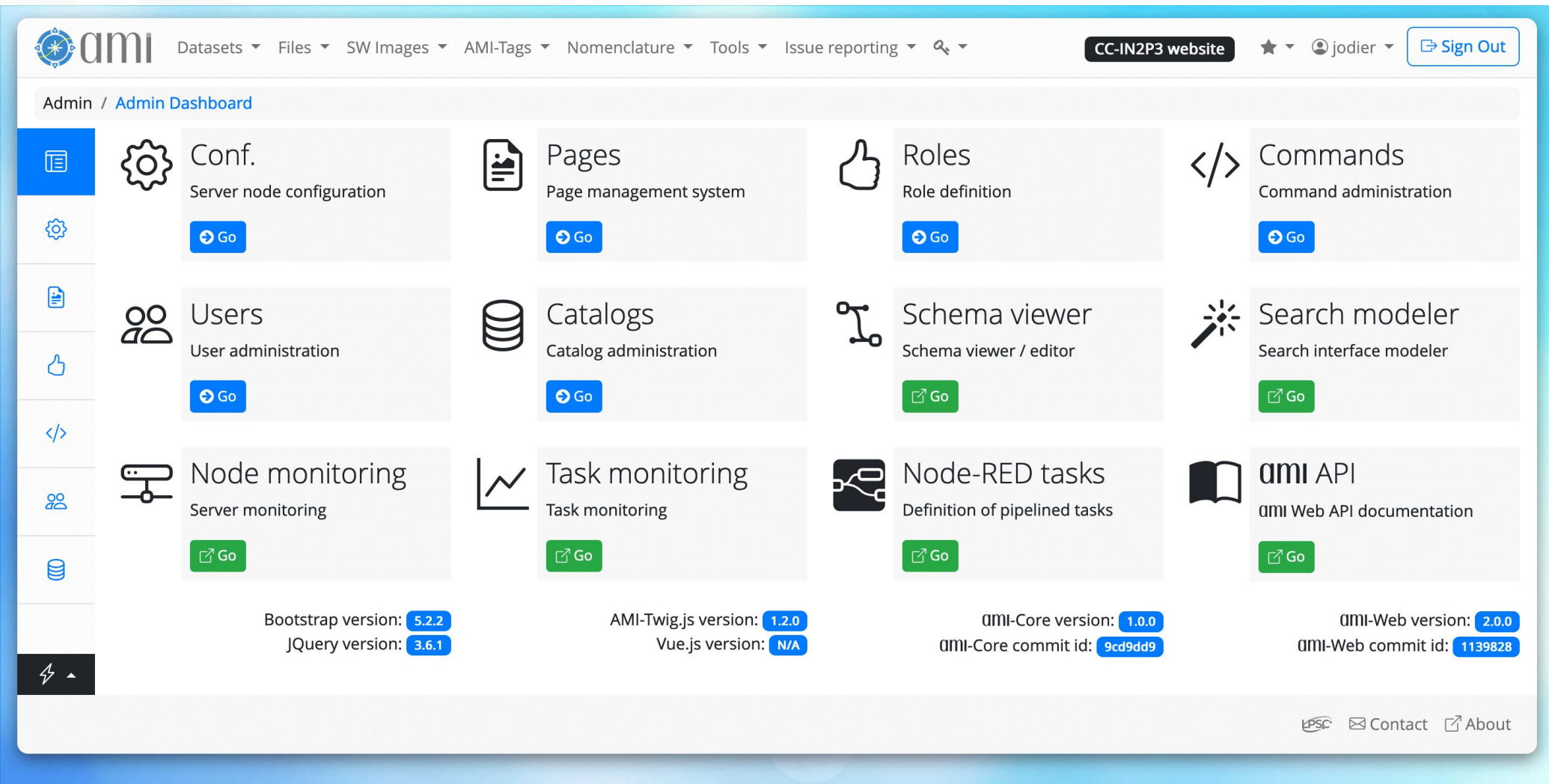
Options

Primary field*
IDENTIFIER

Criteria (alias, catalog*, entity*, field*, type*) [Add simple criterion](#) [Add key/val criterion](#)

AMI status	data16_001:real_data	DATASET	AMISTATUS	boolean	<input type="button" value=""/>	<input type="button" value=""/>
Project	data16_001:real_data	DATASET	PROJECTNAME	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
Run number	data16_001:real_data	DATASET	RUNNUMBER	text (many results)	<input type="button" value=""/>	<input type="button" value=""/>
Stream	data16_001:real_data	DATASET	STREAMNAME	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
Prod. Step	data16_001:real_data	DATASET	PRODSTEP	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
Data type	data16_001:real_data	DATASET	DATATYPE	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
AMI-Tag	data16_001:real_data	DATASET	VERSION	text (many results)	<input type="button" value=""/>	<input type="button" value=""/>
Dataset name	data16_001:real_data	DATASET	LOGICALDATASETNAME	text (many results)	<input type="button" value=""/>	<input type="button" value=""/>
Campaign	data16_001:real_data	CAMPAIGN	CAMPAIGNNAME	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
Period	data16_001:real_data	DATASET	PERIOD	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
Geometry	data16_001:real_data	DATASET	GEOMETRYVERSION	text (many results)	<input type="button" value=""/>	<input type="button" value=""/>
Status	data16_001:real_data	DATASET	PRODSYSSTATUS	text (few results)	<input type="button" value=""/>	<input type="button" value=""/>
ECM energy	data16_001:real_data	DATASET	ECMENERGY	number	<input type="button" value=""/>	<input type="button" value=""/>

Screenshots



The screenshot displays the AMI Admin Dashboard. At the top, there is a navigation bar with the AMI logo, a search icon, and a list of menu items: Datasets, Files, SW Images, AMI-Tags, Nomenclature, Tools, and Issue reporting. On the right side of the navigation bar, there is a 'CC-IN2P3 website' badge, a star icon, a user profile for 'jodier', and a 'Sign Out' button.

Below the navigation bar, the breadcrumb 'Admin / Admin Dashboard' is visible. The main content area is a grid of 12 dashboard cards, each with an icon, a title, a subtitle, and a 'Go' button:

- Conf.** (Gear icon): Server node configuration. Blue 'Go' button.
- Pages** (Document icon): Page management system. Blue 'Go' button.
- Roles** (Thumbs up icon): Role definition. Blue 'Go' button.
- Commands** (Code icon): Command administration. Blue 'Go' button.
- Users** (People icon): User administration. Blue 'Go' button.
- Catalogs** (Database icon): Catalog administration. Blue 'Go' button.
- Schema viewer** (Network icon): Schema viewer / editor. Green 'Go' button.
- Search modeler** (Magnifying glass icon): Search interface modeler. Green 'Go' button.
- Node monitoring** (Server icon): Server monitoring. Green 'Go' button.
- Task monitoring** (Line graph icon): Task monitoring. Green 'Go' button.
- Node-RED tasks** (Node-RED icon): Definition of pipelined tasks. Green 'Go' button.
- AMI API** (Book icon): AMI Web API documentation. Green 'Go' button.

At the bottom of the dashboard, there are four version/commit information blocks:

- Bootstrap version: 5.2.2
- jQuery version: 3.6.1
- AMI-Twig.js version: 1.2.0
- Vue.js version: N/A
- AMI-Core version: 1.0.0
- AMI-Core commit id: 9cd9dd9
- AMI-Web version: 2.0.0
- AMI-Web commit id: 1139828

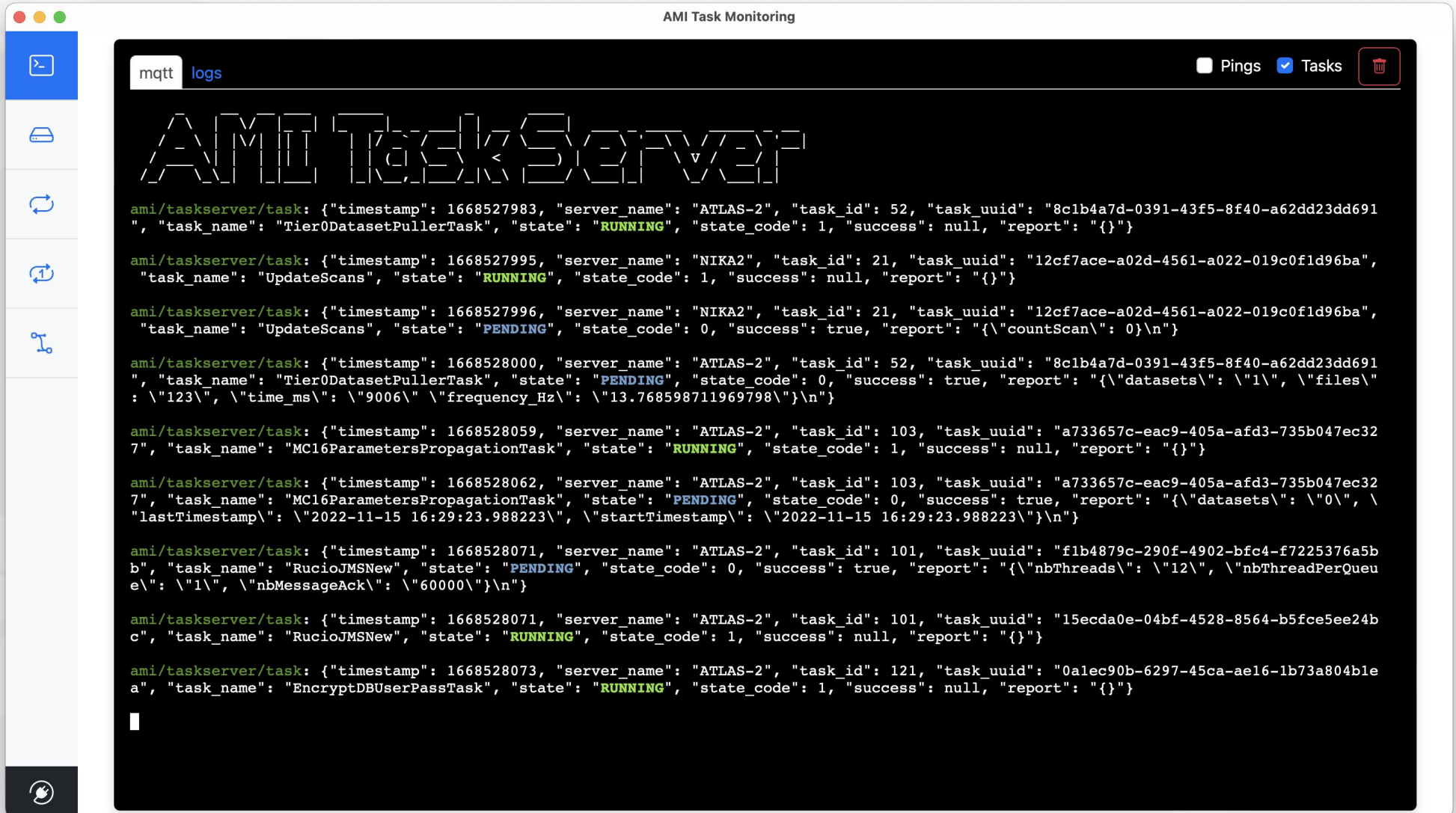
In the bottom right corner, there are links for 'LPSC', 'Contact', and 'About'.

AMI Task Server and AMI Pipeline

AMI Task Server features

- The AMI Task Server is used for:
 - Extracting metadata from primary sources (pull mode)
 - (Re)Processing and storing metadata in AMI
- It can run any kind of tasks (shell, python, java, ...)
- Can optionally benefit from the AMI Java Core library
- Main features:
 - Kind of super CRON
 - The AMI Task Server is distributed
 - Control and monitoring via MQTT
 - Mutual exclusion mechanism between tasks (with the AMI Exclusion Server)
 - Priority lottery scheduler for avoiding starvation (not real time)
 - Pipelined tasks with execution report
 - Image in Docker Hub

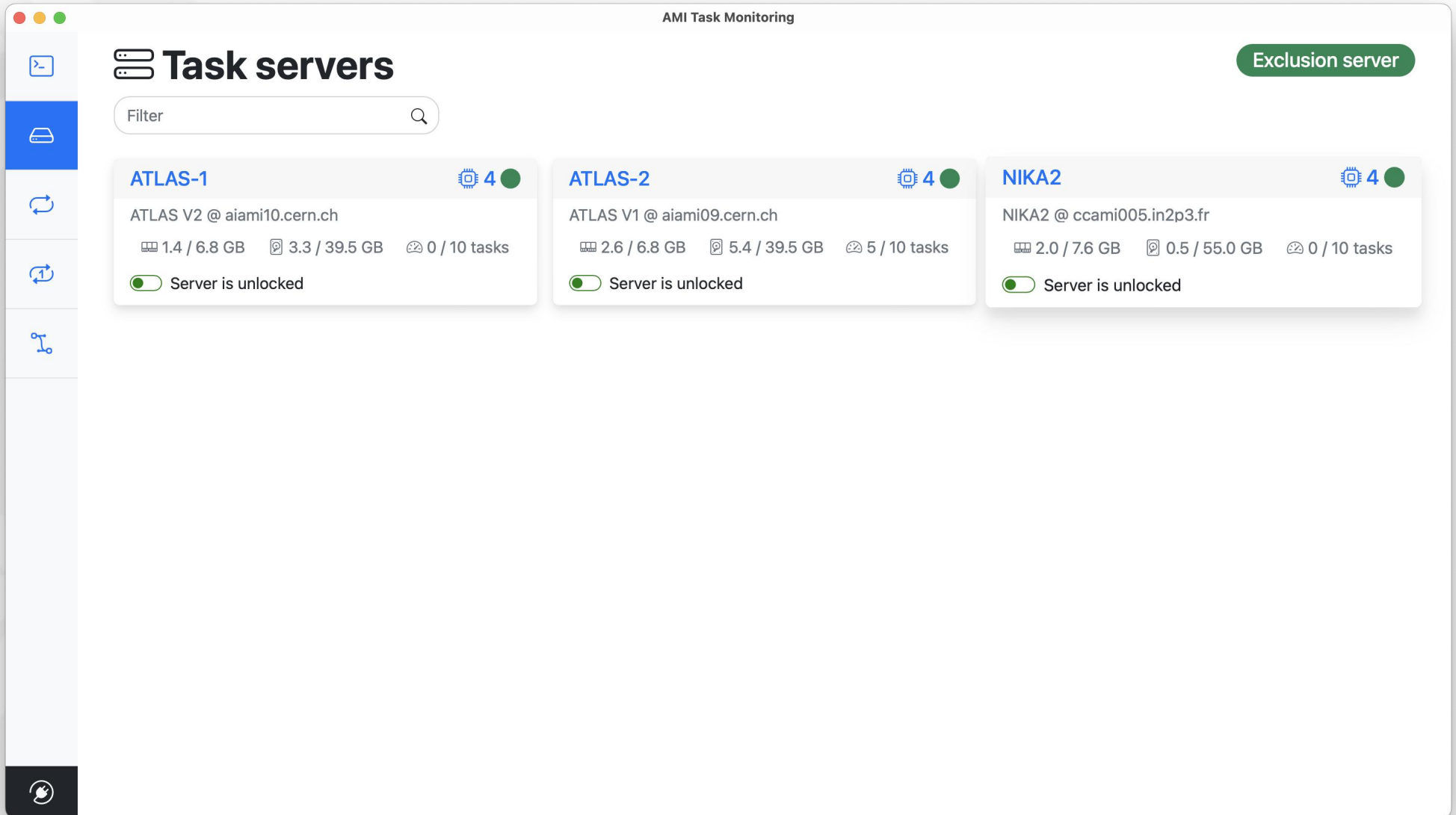
AMI Task Monitoring (app based on the AMI MQTT micro-framework)



```
ami/taskserver/task: {"timestamp": 1668527983, "server_name": "ATLAS-2", "task_id": 52, "task_uuid": "8c1b4a7d-0391-43f5-8f40-a62dd23dd691", "task_name": "Tier0DatasetPullerTask", "state": "RUNNING", "state_code": 1, "success": null, "report": "{}"}
ami/taskserver/task: {"timestamp": 1668527995, "server_name": "NIKA2", "task_id": 21, "task_uuid": "12cf7ace-a02d-4561-a022-019c0f1d96ba", "task_name": "UpdateScans", "state": "RUNNING", "state_code": 1, "success": null, "report": "{}"}
ami/taskserver/task: {"timestamp": 1668527996, "server_name": "NIKA2", "task_id": 21, "task_uuid": "12cf7ace-a02d-4561-a022-019c0f1d96ba", "task_name": "UpdateScans", "state": "PENDING", "state_code": 0, "success": true, "report": "{\"countScan\": 0}\n"}
ami/taskserver/task: {"timestamp": 1668528000, "server_name": "ATLAS-2", "task_id": 52, "task_uuid": "8c1b4a7d-0391-43f5-8f40-a62dd23dd691", "task_name": "Tier0DatasetPullerTask", "state": "PENDING", "state_code": 0, "success": true, "report": "{\"datasets\": \"1\", \"files\": \"123\", \"time_ms\": \"9006\" \"frequency_Hz\": \"13.768598711969798\"}\n"}
ami/taskserver/task: {"timestamp": 1668528059, "server_name": "ATLAS-2", "task_id": 103, "task_uuid": "a733657c-eac9-405a-afd3-735b047ec327", "task_name": "MC16ParametersPropagationTask", "state": "RUNNING", "state_code": 1, "success": null, "report": "{}"}
ami/taskserver/task: {"timestamp": 1668528062, "server_name": "ATLAS-2", "task_id": 103, "task_uuid": "a733657c-eac9-405a-afd3-735b047ec327", "task_name": "MC16ParametersPropagationTask", "state": "PENDING", "state_code": 0, "success": true, "report": "{\"datasets\": \"0\", \"lastTimestamp\": \"2022-11-15 16:29:23.988223\", \"startTimestamp\": \"2022-11-15 16:29:23.988223\"}\n"}
ami/taskserver/task: {"timestamp": 1668528071, "server_name": "ATLAS-2", "task_id": 101, "task_uuid": "f1b4879c-290f-4902-bfc4-f7225376a5bb", "task_name": "RucioJMSNew", "state": "PENDING", "state_code": 0, "success": true, "report": "{\"nbThreads\": \"12\", \"nbThreadPerQueue\": \"1\", \"nbMessageAck\": \"60000\"}\n"}
ami/taskserver/task: {"timestamp": 1668528071, "server_name": "ATLAS-2", "task_id": 101, "task_uuid": "15ecda0e-04bf-4528-8564-b5fce5ee24bc", "task_name": "RucioJMSNew", "state": "RUNNING", "state_code": 1, "success": null, "report": "{}"}
ami/taskserver/task: {"timestamp": 1668528073, "server_name": "ATLAS-2", "task_id": 121, "task_uuid": "0a1ec90b-6297-45ca-ae16-1b73a804b1ea", "task_name": "EncryptDBUserPassTask", "state": "RUNNING", "state_code": 1, "success": null, "report": "{}"}

```

AMI Task Monitoring (app based on the AMI MQTT micro-framework)



The screenshot displays the 'AMI Task Monitoring' application window. The main heading is 'Task servers' with a search filter. A sidebar on the left contains navigation icons. A green button labeled 'Exclusion server' is in the top right. Three server cards are shown, each with a gear icon, a green dot, and a '4' indicating task count. Each card shows server name, location, and resource usage (RAM, disk, tasks) along with a 'Server is unlocked' toggle.

Server Name	Location	RAM	Disk	Tasks	Status
ATLAS-1	ATLAS V2 @ aiami10.cern.ch	1.4 / 6.8 GB	3.3 / 39.5 GB	0 / 10 tasks	Server is unlocked
ATLAS-2	ATLAS V1 @ aiami09.cern.ch	2.6 / 6.8 GB	5.4 / 39.5 GB	5 / 10 tasks	Server is unlocked
NIKA2	NIKA2 @ ccami005.in2p3.fr	2.0 / 7.6 GB	0.5 / 55.0 GB	0 / 10 tasks	Server is unlocked

AMI Task Monitoring (app based on the AMI MQTT micro-framework)

AMI Task Monitoring

Tasks for **ATLAS-2**

+ New task Columns ▾

ID ↕	Name ↕	Server name ↕	Status ↕	Success ↕	Time step ↕	Last start date ↕	Last stop date ↕
41	JEDIDBCleanAMIFlagTask	ATLAS-2	Pending	Success	3600/0	2022-11-15 16:57:35	2022-11-15 16:57:39
52	Tier0DatasetPullerTask	ATLAS-2	Pending	Success	300/0	2022-11-15 16:59:43	2022-11-15 17:00:00
53	Tier0DatasetProvenanceTask	ATLAS-2	Pending	Success	3600/0	2022-11-15 16:22:00	2022-11-15 16:22:08
78	CleanRouterCommandError	ATLAS-2	Pending	Success	86400/0	2022-11-15 15:58:49	2022-11-15 15:58:52
101	RucioJMSNew	ATLAS-2	Running	Success	1/0	2022-11-15 17:01:11	2022-11-15 17:01:11
102	MC15ParametersPropagationTask	ATLAS-2	Pending	Success	300/1	2022-11-15 17:01:30	2022-11-15 17:01:33
103	MC16ParametersPropagationTask	ATLAS-2	Pending	Success	300/1	2022-11-15 17:00:59	2022-11-15 17:01:02
104	MC20ParametersPropagationTask	ATLAS-2	Pending	Success	300/1	2022-11-15 17:01:36	2022-11-15 17:01:40
105	MC21ParametersPropagationTask	ATLAS-2	Pending	Success	300/1	2022-11-15 16:57:17	2022-11-15 16:57:19
106	AMIFixSuperContainerStats	ATLAS-2	Pending	Success	3600/1	2022-11-15 16:06:50	2022-11-15 16:06:53
111	SetContainerMembershipTask	ATLAS-2	Pending	Success	3000/1	2022-11-15 16:25:48	2022-11-15 16:40:51
112	CampaignUpdater	ATLAS-2	Pending	Success	72000/1	2022-11-15 06:40:38	2022-11-15 06:40:54
113	UpdateDatasetDoc	ATLAS-2	Pending	Success	3600/1	2022-11-15 16:33:31	2022-11-15 16:33:37
121	EncryptDBUserPassTask	ATLAS-2	Pending	Success	3600/1	2022-11-15 17:01:13	2022-11-15 17:01:19
122	RunPeriodFromCOMA	ATLAS-2	Pending	Success	1200/1	2022-11-15 16:47:10	2022-11-15 16:49:40

AMI Task Monitoring (app based on the AMI MQTT micro-framework)

AMI Task Monitoring

Task RucioJMSNew ●

Last start date: 2022-11-15 17:01:11 - Last stop date: 2022-11-15 17:01:11 - ✔ Success

View server
Start task
Kill task
Remove task

mqtt
report
stdout
stderr
logs

```
{"nbThreads": "12", "nbThreadPerQueue": "1", "nbMessageAck": "60000"}
```

Server name

Task name

Description

Command

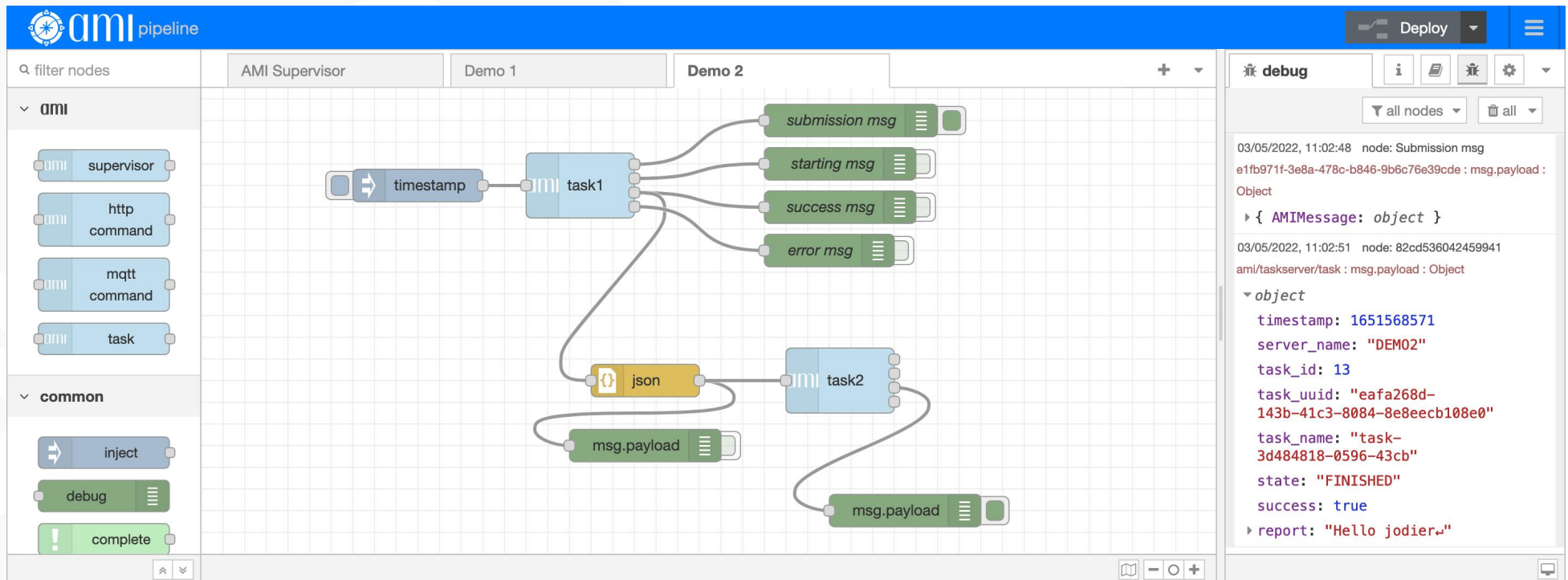
Priority [> 0] Time step [s]

Exclusion locks

Task is unlocked ✔ Update

AMI Pipeline features

- AMI provides a Node-RED-based low-code programming system for task pipeline definitions
- Image available on Docker Hub



The screenshot displays the AMI Pipeline interface, which is a Node-RED-based low-code programming system. The interface is divided into several sections:

- Header:** The top bar features the AMI logo and the text "ami pipeline". On the right, there is a "Deploy" button and a menu icon.
- Navigation:** Below the header, there are tabs for "AMI Supervisor", "Demo 1", and "Demo 2". A search bar labeled "filter nodes" is also present.
- Node Palette:** On the left, there are two categories of nodes:
 - ami:** Contains nodes for "supervisor", "http command", "mqtt command", and "task".
 - common:** Contains nodes for "inject", "debug", and "complete".
- Canvas:** The central workspace shows a workflow diagram. It starts with a "timestamp" node connected to a "task1" node. "task1" has four outgoing connections to "submission msg", "starting msg", "success msg", and "error msg" nodes. A "json" node is connected to "task1" and "task2". "task2" has two outgoing connections to "msg.payload" nodes.
- Debug Console:** On the right, the "debug" panel shows a list of messages. The selected message is:


```
03/05/2022, 11:02:51 node: 82cd536042459941
ami/taskserver/task : msg.payload : Object
  object
    timestamp: 1651568571
    server_name: "DEM02"
    task_id: 13
    task_uuid: "eafa268d-143b-41c3-8084-8e8eecb108e0"
    task_name: "task-3d484818-0596-43cb"
    state: "FINISHED"
    success: true
    report: "Hello jodier."
```

3 commands to test the AMI ecosystem!

```
git clone https://github.com/ami-team/AMIDemo.git
cd AMIDemo
docker-compose up
```

- Runs: AMI server, AMI Task Server, AMI Task Exclusion, AMI Pipeline, Eclipse Mosquitto with our JWT authentication plugin, ...
- See more information there:
 - <https://github.com/ami-team/AMIDemo>

Conclusion

Conclusion

- AMI is mature metadata ecosystem of more than 20 years of existence
- AMI Java Core
 - High level server-side JAVA library for processing metadata
 - i) High level primitives for manipulating metadata,
 - ii) Metadata Query Language (MQL),
 - iii) datasource connectivity.
- AMI Services + lightweight clients
 - AMI HTTP command service (proprietary), REST API, MQTT server control and monitoring
- AMI Web Framework
 - For developing metadata-oriented Web applications and graphic controls
- AMI Task Server
 - Distributed system for extracting, processing and storing metadata
- AMI Pipeline
 - Low-code programming for task pipeline definitions
- <https://hub.docker.com/repository/docker/amiteam/>

Questions?