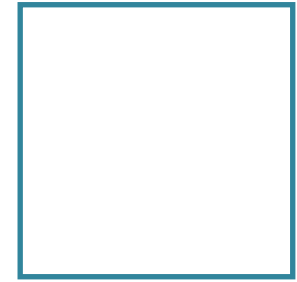


ProvTAP :



A TAP service for providing IVOA
provenance metadata

F.Bonnarel

on behalf of the « provenance datamodel »
author team of the IVOA



What is ProvTAP for ?

- Distributing provenance metadata for astronomical datasets
- Selecting datasets by provenance
- ProvTAP is a specification for services serializing IVOA provenance metadata model



Provenance data model

Let's speak first of the IVOA
provenance data model :

A lot of definitions are possible. Look at W3C one.



W3C PROV (PROV-DM, 2013)

Provenance is defined as a **record that describes the people, institutions, entities, and activities** involved in **producing, influencing, or delivering a piece of data or a thing**.

In particular, the provenance of information is crucial in deciding whether information is to be **trusted**, how it should be **integrated** with other diverse information sources, and how to **give credit** to its originators when reusing it.

Core concepts from the W3C PROV recommendations:

- **Entity - Activity - Agent**
- **Relations and roles:** e.g. generation, usage, influence, association, attribution, derivation, information
- W3C PROV has more relations (see components and extensions)
- IVOA Provenance connected to **VO concepts** and **astronomy needs**



Word Wide Web Consortium



Our Goals

A: Tracking the production history

Find out which steps were taken to produce a dataset and list the methods/tools/software that was involved.

B: Attribution and contact information

Find the people involved in the production of a dataset, that need to be cited or can be asked for more information.

C: Locate error sources

Find the location of possible error sources in the generation of a dataset.

D: Quality assessment

Judge the quality of an observation, production step or dataset.

E: Search in structured provenance metadata

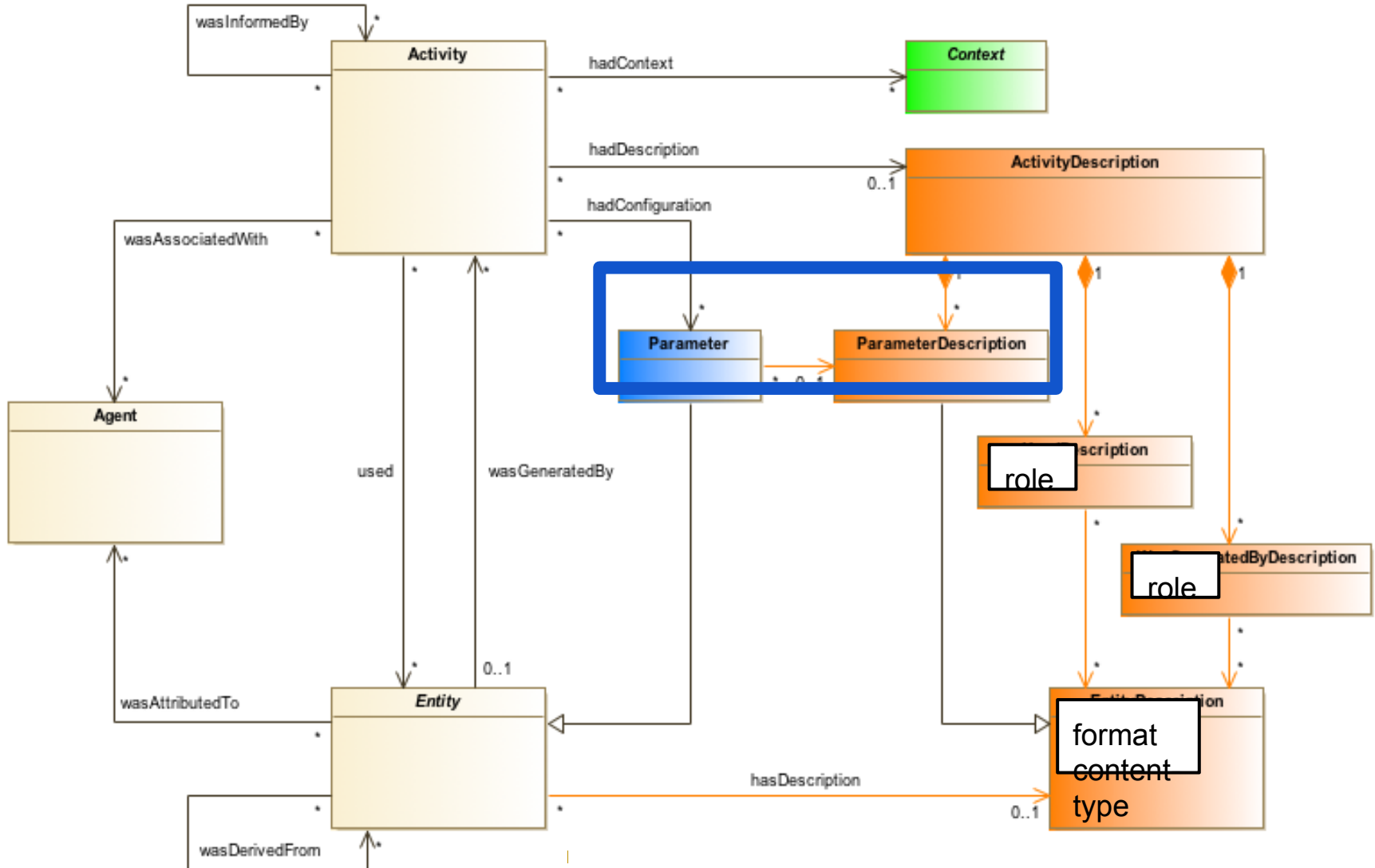
This would allow one to also do a “forward search”, i.e. locate derived datasets or outputs.



IVOA model Extends the W3C one

Core model

(W3C)



Provenance data model

Hot Topic !

5 presentations during IVOA interoperability meeting last week.

2 Posters at this conference :

« data model » (P11.6) and « provenance in triplestore » (P11.5)

The IVOA Provenance Data Model

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ProvenanceDM
online document:
<http://ivoa.net/documents/ProvenanceDM>

ADASS XXVIII

The Provenance data model is proposed as a standard to the International Virtual Observatory Alliance (IVOA). The objective is to describe how provenance information can be modeled, stored and exchanged within the astronomical community in a standardized way.

We follow the definition of provenance as proposed by the World Wide Web Consortium (W3C), i.e. that "provenance is information about **entities, activities, and people** involved in producing a piece of data or thing, which can be used to form assessments about its **quality, reliability or trustworthiness**".

Such provenance information in astronomy is important to enable any scientist to trace back the origin of a **dataset** (e.g. an image, spectrum, catalog or single points in a spectral energy distribution or a light curve), a **document** (e.g. an article, a technical note) or a **device** (e.g. a camera, a telescope), learn about the **people and organizations** involved in a project and assess the **usefulness** of a dataset, document or device for her own scientific work.

In the astronomy domain, the user generally requires additional information on the activities, in the form of **description, configuration and context** information.

Core model (W3C)

Extended model with Description, Configuration and Context

PROV data model

The core of the model is taken from the W3C PROV data model (<https://www.w3.org/2013/prov/>) that provides a generic structure to trace the lineage of any entity, through its relations with activities and agents. Here is a general example of a chain tracing back the origin of released data:

Specialized entities

Specialized relations

Extended model

The core model is fleshed with provenance information that is relevant in the astronomy domain.

How was the calibration performed, which steps, which algorithms?
Description: information on the expected working of an activity and on the expected structure of an entity. This descriptive information is what is known before any activity or entity instance is created.

What was the detailed configuration of the pipeline?
Configuration: information passed to an activity in order to configure its execution and which directly influences the development of the activity (e.g. Parameters, Config File, ObsID=xxx).

What was the weather during the observation, which hardware was used?
Context: information on the context that influences the development of an activity, but for which there is no or little control at the moment of its execution (e.g. Ambient Conditions, Instrumental Context, Execution Environment).

Acknowledgements: An acknowledgment is given to the International Virtual Observatory Alliance (IVOA) and the European Commission under the Horizon 2020 Programme (101017717). The research has been financed in part with support from the National Astronomical Observatories of China (NAOC) and the Chinese Academy of Sciences (CAS). Additional funding was also provided by the French National Research Agency (ANR) under the program ANR-18-CE31-0001-01. The authors are grateful to the International Virtual Observatory Alliance (IVOA) and the European Commission for their support.

Provenance Metadata in a Triplestore

EDS

Goal

Evaluate the triplestore database organisation for implementing the IVOA Provenance data model.
This model extends the PROV-DM defined by W3C. In the IVOA framework, Entities typically represent data products, Activities the tasks consuming and producing Entities. Credits or responsibility is given to Agents for each Entity or Activity. Parameters and Descriptions for the methods applied in an Activity together with the roles of Entities in the scenarios are described in specific relations and classes.

CDS Prototype Image Database

A test database tracing the processing of image data sets, from plates through files with digitization, cut-outs, RGB combination, HPS conversion has been used for testing. It implements IVOA Provenance DM in PostGres and supports a TAP/ADQL query interface.

Implementation and Testing

W3C compatible
Configuration parameters & Descriptions

SPARQL query testing

Give me all agents associated to an entity or to an activity which formerly used this entity named "E".

```

SELECT Name, Role, Relation WHERE {
  (?E ?Relation ?x)
  ?x ?relatesTo ?name
  ?x ?hasRole ?role
  ?relatesTo ?name
  ?relatesTo ?role
  ?relatesTo ?role
  FILTER regex(?relatesTo, "wasAssociatedWith", "r")
}
    
```

SPARQL filters relations on their names and so can avoid many joins
Set of companion queries: <http://ivoa.net/documents/IVOA-Provenance-FC-ProvQueryTest-3store.pdf>

Lessons Learned

The Triplestore RDF/III offers:

- equivalent support for queries in SPARQL compared to ADQL
- flexibility to code relations and add new properties
- extensibility if the model grows with new properties of classes/relations
- expressibility of searching criteria
- scalability very stable and efficient with many relations and instances.

Example together with a spatial index code scale properly up to 8.5 million objects extracted from the Simbad database.

The IVOA Provenance data model can:

- circulate in multiple serialization formats:
- IVOA (VOTable) and semantic web (RDF/III)
- propose an interoperable framework to trace provenance info
- adjust to various compliance levels, from simple to rich descriptions
- answer a large variety of queries for provenance use-cases
- reuse the W3C provenance concepts with some degree of freedom and adaptability

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01/10/2015

CS du CDS



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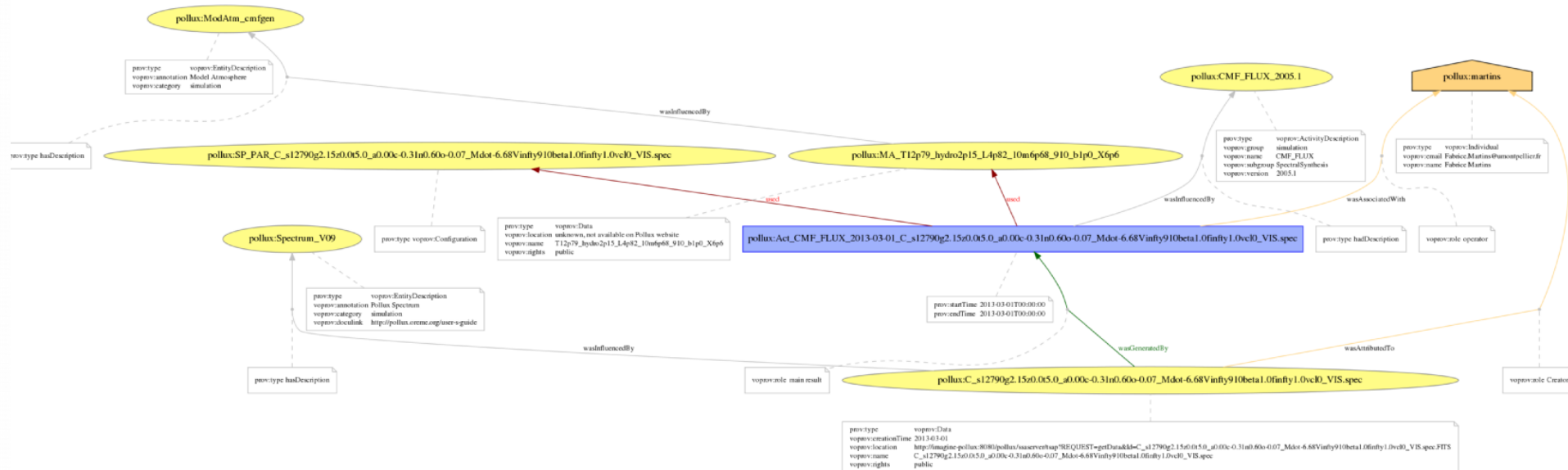
univ. de Strasbourg



Serialisation and services : ProvSAP exists

- A parameter based service to get provenance information for a dataset in several formats including graphical format

Parameter	Values	Description
Mandatory	ID	qualified ID a valid qualified identifier for an entity, activity or agent (can occur multiple times)
	DEPTH	0,1,2,..., ALL number of relations to be followed or ALL for everything, independent of the relation type
	RESPONSEFORMAT	PROV-N, PROV-JSON, PROV-XML, PROV-VOTABLE serialisation format of the response
Optional	DIRECTION	BACK, FORTH BACK = track the provenance history, FORTH = explore the results of activities and where entities have been used
	MEMBERS	true (1) or false (0) if true/1, retrieve and track members of collections
	STEPS	true (1) or false (0) if true/1, retrieve and track steps of activityFlows
	AGENT	true (1) or false (0) if true/1, explore all relations for agents, i.e. find out what an agent is responsible for
	MODEL	IVOA or W3C compatibility of the serialization to IVOA or W3C



ProvTAP specification for datamodel serialisation and metadata service

- 1) ProvTAP isTAP
- 2) mapping of the model classes/attributes to the relational view.
- 3) specification is currently an internal IVOA draft



IVOA Provenance Table Access Protocol (ProvTAP)

Version 1.0

IVOA Working Draft 2018-03-22

Working group
DM

This version
<http://www.ivoa.net/documents/ProvTAP/20180322>

Latest version
<http://www.ivoa.net/documents/ProvTAP>

Previous versions

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Editor(s)

François Bonnarel

Abstract

This document describes the ProvTAP protocol for accessing provenance information according to the IVOA ProvenanceDM standard. It defines how the elements of ProvDM are described in the TAP schema tables and provides guidelines for implementing with TAP 1.1.

TAP

- A specification which defines :
 - Interoperable table services, with relational view
 - Queriable via a sql-oriented language : ADQL
 - Lot of tap services in many datacenters and big projects archives.
- DataModels can be mapped in TAP via the « TAP schema » (the database schema) using object/relational mapping guidelines



ProvTAP

- A TAP schema has been defined
 - All classes and attributes of the model are mapped onto tables and columns of the schema
 - A Prototype has been recently developed at CDS
- screenshots in next slides
- CTA/HESS implementation in development in collaboration with CDS

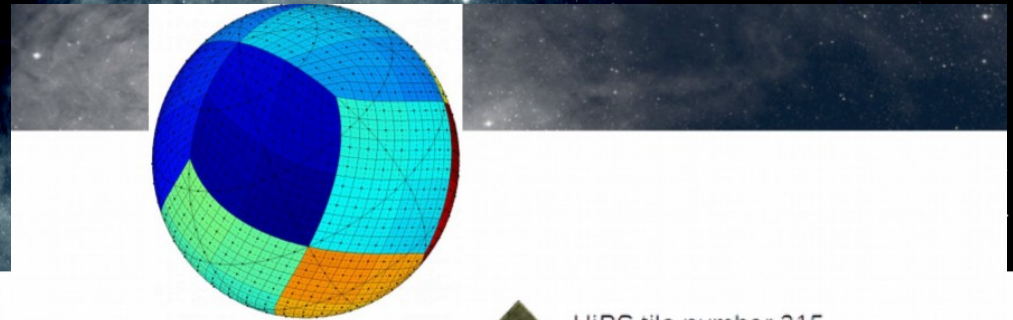


CDS prototype content : HiPS and progenitors

- HiPS
 - Multiresolution all sky view, hierarchical, based on healpix cells at all orders
 - needs processing of « original images » to be generated
 - It's a VO standard.
- Tools exist to generate and read it
- Progenitors are some time available
- Metainformation on the HiPS has been transferred in a relational database underlying the ProvTAP service

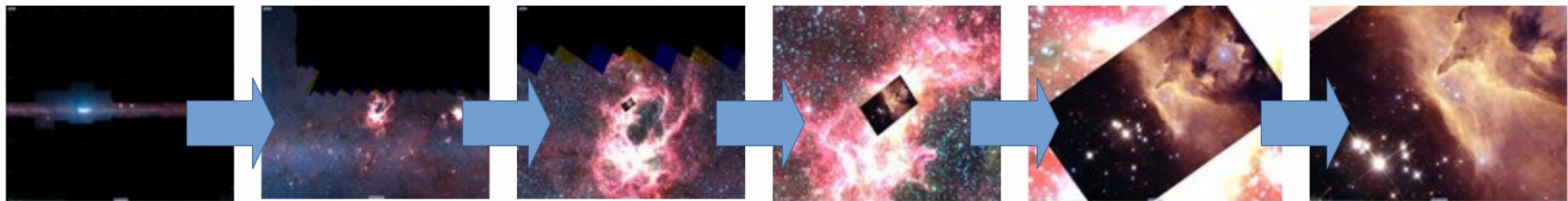
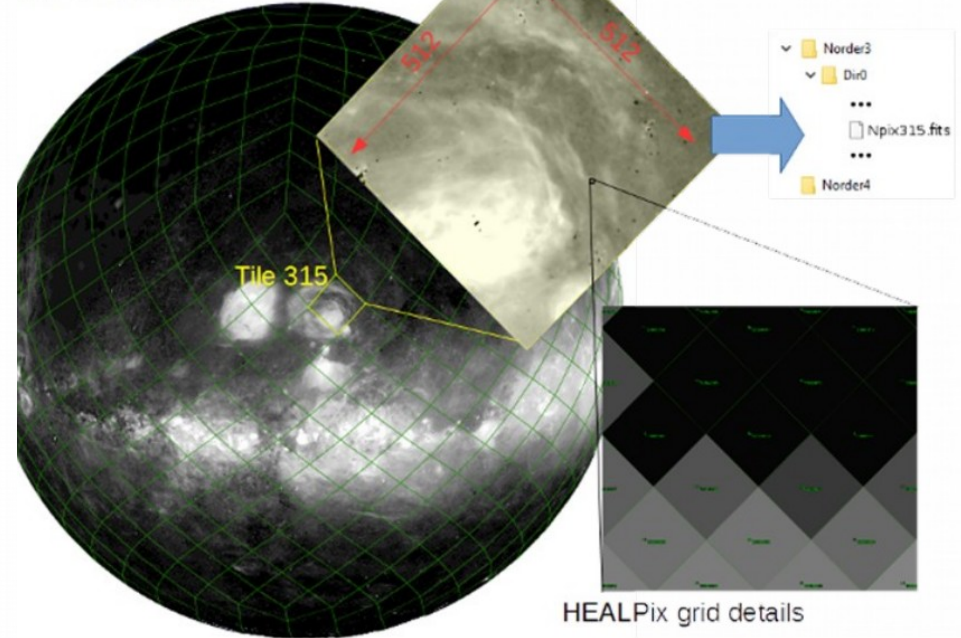


HiPS



HiPS (Halpa Finkbeiner)
order 3 = 768 tiles

HiPS tile number 315
containing 512x512 HEALPix cell values



Goals of the prototype

- Create a first ProvtAP implementation
- Integrate information on HiPS as well as classical images in the same design
- Full integration of provenance searches in the VO framework



Simple queries to browse the content

- Entities
- Activities
- Agents
- Select parameters with associated ParameterDescriptions and activities to which they are related



first query in the html interface provided with the TAP library (G.Mantelet) : select * from entity

TAP HOME PAGE

- CDS -

Available resources

- [tables](#)
- [sync](#)
- [capabilities](#)
- [async](#)
- [availability](#)

ADQL query

Query:

```
SELECT *  
FROM entity;
```



Execution mode: Asynchronous/Batch Synchronous

Format:

Result limit: rows (*0 to get only metadata ; a value < 0 means 'default value'*)

Duration limit: seconds (*a value ≤ 0 means 'default value'*)

Execute!

VOTable response

```
-<VOTABLE version="1.3" xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.3 http://www.ivoa.net/xml/VOTable/v1.3">
-<RESOURCE type="results">
  <INFO name="QUERY_STATUS" value="OK"/>
  <INFO name="PROVIDER" value="CDS"/>
  <INFO name="QUERY" value="SELECT * FROM entity;"/>
-<TABLE name="result_S1542030444145">
  <FIELD arraysize="*" datatype="char" name="e_id" ucd="meta.id" utype="voprov:Entity.id"/>
  <FIELD arraysize="*" datatype="char" name="e_name" ucd="meta.title" utype="voprov:Entity.name"/>
  <FIELD arraysize="*" datatype="char" name="e_type" ucd="meta.code.class" utype="voprov:Entity.type"/>
  <FIELD arraysize="*" datatype="char" name="e_rights" ucd="meta.code.class" utype="voprov:Entity.rights"/>
  <FIELD arraysize="*" datatype="char" name="e_annotation" ucd="meta.description" utype="voprov:Entity.annotation"/>
  <FIELD arraysize="*" datatype="char" name="e_description" ucd="meta.id" utype="voprov:Entity.description"/>
-<DATA>
-<TABLEDATA>
  -<TR>
    <TD>ivo://CDS/P/2MASS/H</TD>
    <TD>2MASS H (1.66um) HiPS</TD>
    <TD>data</TD>
    <TD>public</TD>
    <TD/>
    <TD>hipsdata</TD>
  </TR>
  -<TR>
    <TD>origima0</TD>
    <TD>2MASS H (1.66um) original data</TD>
    <TD>data</TD>
    <TD>public</TD>
    <TD>2MASS H (1.66um) original data</TD>
    <TD>origimages</TD>
  </TR>
  -<TR>
    <TD>ivo://CDS/P/2MASS/J</TD>
    <TD>2MASS J (1.23um) HiPS</TD>
    <TD>data</TD>
    <TD>public</TD>
  </TD>
  2MASS has uniformly scanned the entire sky in three near-infrared bands to detect and characterize point sources brighter than about 1 mJy in each band, with signal-to-noise ratio (SNR) greater than 10, using a pixel size of 2.0". This has achieved an 80,000-fold improvement in sensitivity relative to earlier surveys. 2MASS used two highly-automated 1.3-m telescopes, one at Mt. Hopkins, AZ, and one at CTIO, Chile. Each telescope was equipped with a three-channel camera, each channel consisting of a 256x256 array of HgCdTe detectors, capable of observing the sky simultaneously at J (1.25 microns), H (1.65 microns), and Ks (2.17 microns). The University of Massachusetts (UMass) was responsible for the overall management of the project, and for developing the infrared cameras and on-site computing systems at both facilities. The Infrared Processing and Analysis Center (IPAC) is responsible for all data processing through the Production Pipeline, and construction and distribution of the data products. Funding is provided primarily by NASA and the NSF
  </TD>
  <TD>hipsdata</TD>
  </TR>
  -<TR>
    <TD>origima1</TD>
    <TD>2MASS J (1.23um) original data</TD>
    <TD>data</TD>
    <TD>public</TD>
    <TD>2MASS J (1.23um) original data</TD>
    <TD>origimages</TD>
```

01/10/2015



```

datatype: "char"
arraysize: "*"
ucd: "meta.description"
utype: "voprov:Activity.annotation"
▼ 5:
  name: "a_description"
  datatype: "char"
  arraysize: "*"
  ucd: "meta.id"
  utype: "voprov:Activity.description"
▼ data:
  ▼ 0:
    0: "act:CDS/P/2MASS/H"
    1: "Generation of 2MASS H (1.66um) HiPS"
    2: null
    3: null
    4: "Generation of 2MASS H (1.66um) HiPS"
    5: "hipsgen0"
  ▼ 1:
    0: "act:CDS/P/2MASS/J"
    1: "Generation of 2MASS J (1.23um) HiPS"
    2: "2013-05-06T20:36Z"
    3: "2013-05-06T20:36Z"
    4: "Generation of 2MASS J (1.23um) HiPS"
    5: "hipsgen0"
  ▼ 2:
    0: "act:CDS/P/2MASS/K"
    1: "Generation of 2MASS K (2.16um) HiPS"
    2: "2014-02-11T11:28Z"
    3: "2014-02-11T11:28Z"
    4: "Generation of 2MASS K (2.16um) HiPS"
    5: "hipsgen0"
  ▼ 3:
    0: "act:CDS/P/2MASS/color"
    ▼ 1:
      0: "Generation of 2MASS color J (1.23um), H (1.66um), K (2.16um) HiPS"
      1: "2013-01-14T09:45Z"
      2: "2013-01-14T09:45Z"
    ▼ 4:
      0: "Generation of 2MASS color J (1.23um), H (1.66um), K (2.16um) HiPS"
      1: "hipsgen0"
  ▼ 4:
    0: "act:CDS/P/2MASS6X/H"
    1: "Generation of 2MASS6X H (1.66um) HiPS"
    2: "2012-02-24T12:43Z"
    3: "2012-02-24T12:43Z"
    4: "Generation of 2MASS6X H (1.66um) HiPS"
    5: "hipsgen1"
  ▼ 5:

```



SELECT * FROM ACTIVITY

JSON Response



Agents – text format

ag_id	ag_name	ag_type
"noagent"	"noname"	"notype"
"agent_1_277"	"1.0"	"Organisation"
"agent_1_328"	"Pierre Fernique [CDS]"	"Organisation"
"agent_1_537"	"L. Michel [Observatoire de Strasbourg]"	"Organisation"
"agent_1_222"	"P.fernique [CDS]"	"Organisation"
"agent_1_190"	"P.Fernique (CDS)"	"Organisation"
"agent_1_378"	"ESA (ESDC & Planck Science Office)"	"Organisation"
"agent_1_5"	"CDS (T.Boch)"	"Organisation"
"agent_1_318"	"Stefan Meingast (Institute for Astrophysics, University of Vienna)"	"Organisation"
"agent_1_371"	"ESA/ESDC"	"Organisation"
"agent_1_191"	"CDS (Pierre Fernique)"	"Organisation"
"agent_1_432"	"D. Paradis (IRAP/CADE)"	"Organisation"
"agent_1_330"	"Thomas Boch [CDS]"	"Organisation"
"agent_1_33"	"CDS (Thomas Boch)"	"Organisation"
"agent_1_407"	"Guilherme Soares"	"Organisation"
"agent_1_36"	"Thomas Boch"	"Organisation"
"agent_1_99"	"CDS (A.Oberto, P.Fernique)"	"Organisation"
"agent_1_97"	"CDS (P.Fernique)"	"Organisation"
"agent_1_8"	"CDS [P.Fernique]"	"Organisation"
"agent_1_44"	"T. Boch"	"Organisation"
"agent_1_7"	"CDS"	"Organisation"
"agent_1_352"	"ESA (ESDC & Herschel SOC)"	"Organisation"
"agent_1_342"	"China-VO"	"Organisation"
"agent_1_130"	"CADC (Daniel Durand)"	"Organisation"
"agent_1_409"	"NASA/HEASARC"	"Organisation"
"agent_1_9"	"P. Fernique [CDS]"	"Organisation"
"agent_1_14"	"M.Buga [CDS]"	"Organisation"
"agent_1_354"	"ESA (ESDC & Herschel Science Centre)"	"Organisation"
"agent_1_16"	"P.Fernique [CDS]"	"Organisation"
"agent_1_536"	"WFAU, Institute for Astronomy, University of Edinburgh"	"Organisation"
"agent_1_126"	"Christoph Deil, Axel Donath, Pierre Fernique"	"Organisation"
"agent_1_1"	"CDS (A.Oberto)"	"Organisation"
"agent_2_225"	"Axel Mellinger"	"Organisation"
"agent_2_227"	"JPL/Photojournal"	"Organisation"
"agent_2_535"	"SVO, CAB (INTA-CSIC)"	"Organisation"
"agent_2_221"	"Orizona State University"	"Organisation"
"agent_2_350"	"http://archives.esac.esa.int/hsa/whsa/"	"Organisation"
"agent_2_36"	"http://portal.nersc.gov/project/cosmo/data/decaps/dr1/coadd/"	"Organisation"
"agent_2_232"	"USGS Astrogeology Science Center from Arizona State University"	"Organisation"
"agent_2_170"	"MAST archives"	"Organisation"
"agent_2_114"	"NASA s Earth Observatory"	"Organisation"
"agent_2_34"	"http://portal.nersc.gov/project/cosmo/data/legacysurvey/dr5/coadd/"	"Organisation"
"agent_2_216"	"https://photojournal.jpl.nasa.gov/catalog/PIA20284"	"Organisation"
"agent_2_377"	"http://iso.esac.esa.int/ida/"	"Organisation"
"agent_2_17"	"CFHT"	"Organisation"


```

SELECT p_isaparamof,pd_name, pd_ucd, pd_unit, p_value
FROM parameter INNER JOIN parameterdescription
ON parameter.p_parameterdescription = parameterdescription.pd_id;

```

p_isaparamof	pd_name	pd_ucd	pd_unit	p_value
"act:CDS/P/2MASS/H"	"hips_order"			"9"
"act:CDS/P/2MASS/H"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS/H"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS/H"
"act:CDS/P/2MASS/H"	"obs_title"	"meta.title"		"2MASS H (1.66um)"
"act:CDS/P/2MASS/H"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS/H"	"hips_tile_format"	"meta.format"		"jpeg fits"
"act:CDS/P/2MASS/J"	"hips_order"			"9"
"act:CDS/P/2MASS/J"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS/J"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS/J"
"act:CDS/P/2MASS/J"	"obs_title"	"meta.title"		"2MASS J (1.23um)"
"act:CDS/P/2MASS/J"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS/J"	"hips_tile_format"	"meta.format"		"jpeg fits"
"act:CDS/P/2MASS/K"	"hips_order"			"9"
"act:CDS/P/2MASS/K"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS/K"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS/K"
"act:CDS/P/2MASS/K"	"obs_title"	"meta.title"		"2MASS K (2.16um)"
"act:CDS/P/2MASS/K"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS/K"	"hips_tile_format"	"meta.format"		"jpeg fits"
"act:CDS/P/2MASS/color"	"hips_order"			"9"
"act:CDS/P/2MASS/color"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS/color"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS/color"
"act:CDS/P/2MASS/color"	"obs_title"	"meta.title"		"2MASS color J (1.23um), H (1.66um), K (2.16um)"
"act:CDS/P/2MASS/color"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS/color"	"hips_tile_format"	"meta.format"		"jpeg"
"act:CDS/P/2MASS6X/H"	"hips_order"			"9"
"act:CDS/P/2MASS6X/H"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS6X/H"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS6X/H"
"act:CDS/P/2MASS6X/H"	"obs_title"	"meta.title"		"2MASS6X H (1.66um)"
"act:CDS/P/2MASS6X/H"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS6X/H"	"hips_tile_format"	"meta.format"		"png jpeg fits"
"act:CDS/P/2MASS6X/J"	"hips_order"			"9"
"act:CDS/P/2MASS6X/J"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS6X/J"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS6X/J"
"act:CDS/P/2MASS6X/J"	"obs_title"	"meta.title"		"2MASS6X J (1.23um)"
"act:CDS/P/2MASS6X/J"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS6X/J"	"hips_tile_format"	"meta.format"		"jpeg fits"
"act:CDS/P/2MASS6X/K"	"hips_order"			"9"
"act:CDS/P/2MASS6X/K"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS6X/K"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS6X/K"
"act:CDS/P/2MASS6X/K"	"obs_title"	"meta.title"		"2MASS6X K (2.16um)"
"act:CDS/P/2MASS6X/K"	"hips_tile_width"		"px"	"512"
"act:CDS/P/2MASS6X/K"	"hips_tile_format"	"meta.format"		"jpeg fits"
"act:CDS/P/2MASS6X/color"	"hips_order"			"9"
"act:CDS/P/2MASS6X/color"	"hips_frame"			"equatorial"
"act:CDS/P/2MASS6X/color"	"hips_frame"	"meta.id"		"ivo://CDS/P/2MASS6X/color"
"act:CDS/P/2MASS6X/color"	"obs_title"	"meta.title"		"2MASS6X color J (1.23um) & K (2.16um)"

Configuration parameters with their description (name, ucd,unit) And associated activity

Real-life queries :

To select HiPS activities or entities via criteria

- Select activities which have been attributed to a given « Agent »
- Select activities described by the same ActivityDescription (= here, running the same software)
- Select activities from some configuration parameters values
- Select entities and display them in Aladin (HiPS or classical images)



Select activities which have been attributed to a given « Agent » (here « CADC (Daniel Durand) »)

TOPCAT(5): Table Browser

Window Subsets Help

Table Browser for 5: TAP_8 (SELECT, WasAssociatedWith, agent, Activity)

a_id	a_name	a_annotation
1	act:CDS/P/HLA/C0	Generation of HLA-C0 : F222M HIPS
2	act:CDS/P/HLA/H	Generation of HLA-H : F160W HIPS
3	act:CDS/P/HLA/H20	Generation of HLA-H20 : F139M HIPS
4	act:CDS/P/HLA/Halpha	Generation of HLA-Halpha : F656N and F657N ...
5	act:CDS/P/HLA/Hbeta	Generation of HLA-Hbeta : F487N and F486N ...
6	act:CDS/P/HLA/I	Generation of HLA-I : F814W, F791W, F785LP a...
7	act:CDS/P/HLA/J	Generation of HLA-J : F140W, F125W, F125LP a...
8	act:CDS/P/HLA/NII	Generation of HLA-NII : F658N HIPS
9	act:CDS/P/HLA/OII	Generation of HLA-OII : F375N and F373N HIPS
10	act:CDS/P/HLA/OIII	Generation of HLA-OIII : F502N HIPS
11	act:CDS/P/HLA/Palpha	Generation of HLA-Palpha : F187N HIPS
12	act:CDS/P/HLA/Palpha_c	Generation of HLA-Palpha_c : F190W HIPS
13	act:CDS/P/HLA/R	Generation of HLA-R : F702W and F675W HIPS
14	act:CDS/P/HLA/SDSSg	Generation of HLA-SDSSg : F475W HIPS
15	act:CDS/P/HLA/SDSSr	Generation of HLA-SDSSr : F625W and F622W ...
16	act:CDS/P/HLA/SDSSz	Generation of HLA-SDSSz : F850LP HIPS
17	act:CDS/P/HLA/SIII	Generation of HLA-SIII : F873N, FQ672N and F...
18	act:CDS/P/HLA/U	Generation of HLA-U : F336W, F330W, F300W, ...
19	act:CDS/P/HLA/UV	Generation of HLA-UV : F170W HIPS
20	act:CDS/P/HLA/V	Generation of HLA-V : F555W, F547W, F569W ...
21	act:CDS/P/HLA/Y	Generation of HLA-Y : F110W and F105W HIPS
22	act:CDS/P/HLA/wideUV	Generation of HLA-wideUV : F255W, F250W, F2...
23	act:CDS/P/HLA/wideV	Generation of HLA-wideV : F606W and F600LP ...
24	act:CDS/P/HST/B	Generation of HST-B includes the following fil...
25	act:CDS/P/HST/C0	Generation of HST-C0 includes the following fil...
26	act:CDS/P/HST/GOODS/b	Generation of GOODS b HIPS
27	act:CDS/P/HST/H20	Generation of HST-H20 includes the following ...
28	act:CDS/P/HST/Halpha	Generation of HST-Halpha includes the followi...
29	act:CDS/P/HST/Hbeta	Generation of HST-Hbeta includes the followin...
30	act:CDS/P/HST/I	Generation of HST-I includes the following filte...
31	act:CDS/P/HST/J	Generation of HST-J includes the following filte...
32	act:CDS/P/HST/NII	Generation of HST-NII includes the following fil...
33	act:CDS/P/HST/OII	Generation of HST-OII includes the following fil...
34	act:CDS/P/HST/OIII	Generation of HST-OIII includes the following fil...
35	act:CDS/P/HST/PHAT/F110W	Generation of HST PHAT - F110W - WFC3/IR HIPS
36	act:CDS/P/HST/Palpha_c	Generation of HST-Palpha_c includes the follo...
37	act:CDS/P/HST/R	Generation of HST-R includes the following fil...
38	act:CDS/P/HST/SDSSg	Generation of HST-SDSSg includes the followin...
39	act:CDS/P/HST/SDSSr	Generation of HST-SDSSr includes the followin...
40	act:CDS/P/HST/SDSSz	Generation of HST-SDSSz includes the followin...
41	act:CDS/P/HST/SIII	Generation of HST-SIII includes the following fil...
42	act:CDS/P/HST/U	Generation of HST-U includes the following fil...
43	act:CDS/P/HST/UV	Generation of HST-UV includes the following fil...
44	act:CDS/P/HST/V	Generation of HST-V includes the following fil...
45	act:CDS/P/HST/Y	Generation of HST-Y includes the following fil...
46	act:CDS/P/HST/other	Generation of HST-Others HIPS
47	act:CDS/P/HST/wideUV	Generation of HST-wideUV includes the followi...
48	act:CDS/P/HST/wideV	Generation of HST-wideV includes the followin...
49	act:CDS/P/Haslam408	Generation of Haslam 408MHz HIPS

Table Access Protocol (TAP) Query

Window TAP Registry Edit Interop Help

Select Service Use Service Resume Job Running Jobs

Metadata

Find:

Name Descrip Or

Name:

Tables:

Description:

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 1000000 (default) Uploads: unavailable

ADQL Text

Mode: Synchronous

```
1
SELECT Activity.a_id, Activity.a_name, Activity.a_annotation FROM
(SELECT WasAssociatedWith.waw_activity_id FROM WasAssociatedWith
INNER JOIN agent
ON agent.ag_id = WasAssociatedWith.waw_agent_id
WHERE agent.ag_name = 'CADC (Daniel Durand)') AS temp1
INNER JOIN Activity
ON temp1.waw_activity_id = Activity.a_id
```

Run Query

select activities described by the same ActivityDescription (= here, running the same hipsgen software)

TOPCAT

Views Graphics Joins Windows VO Interop Help

Table List

- TAP_2_WasAssociatedV
- TAP_4_WasAssociatedV
- TAP_6_WasAssociatedV
- TAP_7_WasAssociatedV
- TAP_8 (SELECT, WasAss
- TAP_9_activitydescript
- TAP_10_activitydescript
- TAP_12_activitydescript

Current Table Properties

Label: TAP_12_activitydescription,activity
Location: TAP_12_activitydescription,activity
Name: result_S1542034451101
Rows: 2
Columns: 4
Sort Order: [dropdown]
Row Subset: All
Activation Action: (no action) [Broadcast Row]

SAMP

Messages: [input] Clients: [icons]

278 / 3540 M

TOPCAT(8): Table Browser

Window Subsets Help

Table Browser for 8: TAP_12_activitydescription,activity

	a_name	a_starttime	ad_name	ad_doculink
1	Generation of DECaPS DR1 g HIPS	2018-01-02T16:02Z	Aladin/HipsGen v10.060	http://aladin.u-strasbg.fr/hips/#doc
2	Generation of ROSAT X-Ray All-Sky Survey HIPS	2018-02-03T16:36Z	Aladin/HipsGen v10.060	http://aladin.u-strasbg.fr/hips/#doc

Window IAP Registry Edit Interop Help

Select Service Use Service Resume Job Running Jobs

Metadata

Find: [input] [Service] [Schema] [Table] [Columns] [FKKeys] [Hints]

Name Descrip Or

TAP Service (19)

- TAP_SCHEMA (5)
 - TAP_SCHEMA.col
 - TAP_SCHEMA.key
 - TAP_SCHEMA.key

Name: [input]
Tables: [input]
Description: [input]

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 1000000 (default) Uploads: unavailable

ADQL Text

Mode: Synchronous

```
1  
SELECT a_name,a_starttime,ad_name,ad_doculink  
FROM activitydescription INNER JOIN activity ON a_description = ad_id  
WHERE ad_name = 'Aladin/HipsGen v10.060'
```

Run Query

on temp1.a_id=parameter.p_tsaparamot ;

Mozilla Firefox

aladin.u-strasbg.fr/hips/#doc

Display Software documentation

HiPS

Hierarchical Progressive Surveys

Introduction

HiPS in action

Select activities from some configuration parameters values (here « created only in jpeg »)

TOPCAT(12): Table Browser

Window Subsets Help

Table Browser for 12: TAP_17 (select,parameter,parameterdescription,ac...

	a_name	a_starttime	pd_name	p_value
1	Generation of 2MASS color J (1.23um), H (1.66...	2013-01-14T09:45Z	hips_tile_format	jpeg
2	Generation of Ariel Voyager HIPS	2017-02-20T16:03Z	hips_tile_format	jpeg
3	Generation of CFHTLS-D-color-ugl HIPS		hips_tile_format	jpeg
4	Generation of CFHTLS-W-colored-ugl HIPS	2012-06-07T22:09Z	hips_tile_format	jpeg
5	Generation of Callisto Voyager-Galileo-simp-1k...	2014-03-11T15:59Z	hips_tile_format	jpeg
6	Generation of Charon NewHorizon PIA19866 H...	2018-01-17T16:49Z	hips_tile_format	jpeg
7	Generation of DECaLS DR3 color HIPS		hips_tile_format	jpeg
8	Generation of DECaLS DR5 color HIPS		hips_tile_format	jpeg
9	Generation of Color flux map for I/345/gaia2 (...)	2018-04-17T08:17Z	hips_tile_format	jpeg
10	Generation of DSS colored HIPS	2015-02-07T11:42Z	hips_tile_format	jpeg
11	Generation of Dione Cassini PIA12577 HIPS	2012-07-13T14:03Z	hips_tile_format	jpeg
12	Generation of Blue Marble Next Generation w/...	2014-06-05T17:00Z	hips_tile_format	jpeg
13	Generation of Enceladus Cassini 110m (PIA 1...		hips_tile_format	jpeg
14	Generation of Europa Voyager-GalileoSSI-500...		hips_tile_format	jpeg
15	Generation of Fermi Color HEALPix survey HIPS	2013-06-28T09:09Z	hips_tile_format	jpeg
16	Generation of Ganymede VoyagerGalileo SSI 1...	2014-06-13T14:41Z	hips_tile_format	jpeg
17	Generation of IRAS-IRIS HEALPix survey, color ...		hips_tile_format	jpeg
18	Generation of Iapetus Cassini PIA18436 HIPS		hips_tile_format	jpeg
19	Generation of JPS-PR1 850um HIPS		hips_tile_format	jpeg
20	Generation of MAMA srcj HIPS	2016-07-09T19:09Z	hips_tile_format	jpeg
21	Generation of Mars MGS MOLA Elevation Mode...		hips_tile_format	jpeg
22	Generation of Mars MGS TES Dust HIPS		hips_tile_format	jpeg
23	Generation of Mars MOLA Shaded Relief / Colo...	2018-01-27T17:35Z	hips_tile_format	jpeg
24	Generation of Mars Stimson panorama HIPS		hips_tile_format	jpeg
25	Generation of Mars TES Albedo HIPS		hips_tile_format	jpeg
26	Generation of Mars TES Thermal Inertia HIPS		hips_tile_format	jpeg
27	Generation of Mars THEMIS-Day-100m HIPS		hips_tile_format	jpeg
28	Generation of Mars THEMIS-Night-100m HIPS	2018-01-24T15:41Z	hips_tile_format	jpeg
29	Generation of Mars THEMIS Day IR Global Mos...	2018-01-28T10:29Z	hips_tile_format	jpeg
30	Generation of Mars mola-roughness HIPS	2017-06-01T16:14Z	hips_tile_format	jpeg
31	Generation of Mellinger color optical survey Hi...	2017-09-07T13:10Z	hips_tile_format	jpeg
32	Generation of Mercury MESSENGER-MDIS-LOI-1...	2018-01-27T17:16Z	hips_tile_format	jpeg
33	Generation of Mimas Cassini PIA17214 HIPS	2010-07-12T00:00Z	hips_tile_format	jpeg
34	Generation of Miranda Voyager HIPS	2018-01-21T16:06Z	hips_tile_format	jpeg
35	Generation of Moon Kaguya-Evening-V04-474...		hips_tile_format	jpeg
36	Generation of Moon Lunar Reconnaissance Or...	2018-01-17T15:01Z	hips_tile_format	jpeg
37	Generation of NVSS - The NRAO VLA Sky Surve...	2018-01-29T12:31Z	hips_tile_format	jpeg
38	Generation of Neptune Voyager2 HIPS	2018-02-08T13:07Z	hips_tile_format	jpeg
39	Generation of PLANCK Maps of the CMB fluctu...		hips_tile_format	jpeg
40	Generation of PLANCK R2 nominal frequency H...		hips_tile_format	jpeg
41	Generation of PLANCK R2 nominal frequency L...		hips_tile_format	jpeg
42	Generation of PanSTARRS DR1 z HIPS	2017-05-04T13:27Z	hips_tile_format	jpeg
43	Generation of ROSAT Wide Field Camera Color ...	2016-02-09T15:40Z	hips_tile_format	jpeg
44	Generation of SCUBA2 850um HIPS		hips_tile_format	jpeg
45	Generation of MIPS3 survey in Healpix HIPS	2011-07-04T15:11Z	hips_tile_format	jpeg
46	Generation of SUMSS (843 MHz) HIPS	2012-05-31T14:50Z	hips_tile_format	jpeg
47	Generation of Sun ewi-aia304-2012 HIPS		hips_tile_format	jpeg
48	Generation of Tethys Cassini-PIA18439 HIPS		hips_tile_format	jpeg
49	Generation of Titan ISS-P19658-4km HIPS	2018-01-23T14:15Z	hips_tile_format	jpeg
50	Generation of Titan SAR-HISAR-128ppd HIPS		hips_tile_format	jpeg
51	Generation of Titan Voyager HIPS	2018-01-17T17:00Z	hips_tile_format	jpeg

Table Access Protocol (TAP) Query

Window IAP Registry Edit Interop Help

Select Service Use Service Resume Job Running Jobs

Metadata

Find:

Name	Descr	Or	Service	Schema	Table	Columns	FKeys	Hints
pd_isaparamof								meta.id voprov:ParameterDescription.ActivityDesc
pd_id								meta.id voprov:ParameterDescription.id
pd_name								meta.title voprov:ParameterDescription.name
pd_unit								meta.unit voprov:ParameterDescription.unit
pd_ucd								meta.ucd voprov:ParameterDescription.ucd

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 1000000 (default) Uploads: unavailable

ADQL Text

Mode: Synchronous

```
1
SELECT a_name, a_starttime, templ.pd_name, templ.p_value FROM
(SELECT p_isaparamof, pd_name, p_value
FROM parameter INNER JOIN parameterdescription
ON p_parameterdescription = pd_id
WHERE pd_name = 'hips_tile_format' and p_value = 'jpeg') AS templ
INNER JOIN
activity
ON templ.p_isaparamof = a_id
```

Run Query

select activities from some configuration parameters values (here selected by ucd and « created in galactic frame)

TOPCAT(15): Table Browser

Window Subsets Help

Table Browser for 15: TAP_23 (SELECT,parameter,parameterdescription,ac...

	a_id	a_name	a_starttime	pd_name	pd_ucd	p_value
1	act:CDS/P/CO	Generation of CO composite survey HIPS	2012-05-29T21:35Z	hips_frame	pos.frame	galactic
2	act:CDS/P/Finkbeiner	Generation of Finkbeiner Halpha composite s...	2013-06-28T11:09Z	hips_frame	pos.frame	galactic
3	act:CDS/P/Hi	Generation of HI composite survey HIPS		hips_frame	pos.frame	galactic
4	act:CDS/P/Hi4PI/NHI	Generation of Hi4PI NHI survey (full-sky HI colu...	2011-02-14T12:00Z	hips_frame	pos.frame	galactic
5	act:CDS/P/Haslam408	Generation of Haslam 408MHz HIPS	2017-06-08T23:47Z	hips_frame	pos.frame	galactic
6	act:CDS/P/Haslam408/V2	Generation of Haslam 408MHz reprocessed Hi...	2015-04-10T13:58Z	hips_frame	pos.frame	galactic
7	act:CDS/P/IRIS/color	Generation of IRAS-IRIS HEALPix survey, color ...		hips_frame	pos.frame	galactic
8	act:CDS/P/Mellinger/color	Generation of Mercury MESSENGER-MDIS-L01-1...	2018-01-27T17:16Z	hips_frame	pos.frame	galactic
9	act:CDS/P/PLANCK/R2/CMB	Generation of PLANCK R2 HFI color compositio...		hips_frame	pos.frame	galactic
10	act:CDS/P/PLANCK/R2/HFI/color	Generation of PLANCK R2 nominal frequency H...		hips_frame	pos.frame	galactic
11	act:CDS/P/PLANCK/R2/HFI100	Generation of PLANCK R2 nominal frequency H...		hips_frame	pos.frame	galactic
12	act:CDS/P/PLANCK/R2/HFI143	Generation of PLANCK R2 nominal frequency H...		hips_frame	pos.frame	galactic
13	act:CDS/P/PLANCK/R2/HFI217	Generation of PLANCK R2 nominal frequency H...		hips_frame	pos.frame	galactic
14	act:CDS/P/PLANCK/R2/HFI353	Generation of PLANCK R2 nominal frequency H...		hips_frame	pos.frame	galactic
15	act:CDS/P/PLANCK/R2/HFI545	Generation of PLANCK R2 nominal frequency H...		hips_frame	pos.frame	galactic
16	act:CDS/P/PLANCK/R2/HFI857	Generation of PLANCK R2 LFI color compositio...		hips_frame	pos.frame	galactic
17	act:CDS/P/PLANCK/R2/LFI/color	Generation of PLANCK R2 nominal frequency L...		hips_frame	pos.frame	galactic
18	act:CDS/P/PLANCK/R2/LFI030	Generation of PLANCK R2 nominal frequency L...		hips_frame	pos.frame	galactic
19	act:CDS/P/PLANCK/R2/LFI044	Generation of PLANCK R2 nominal frequency L...		hips_frame	pos.frame	galactic

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 1000000 (default) Uploads: unavailable

ADQL Text

Mode: Synchronous

```
SELECT a_id, a_name, a_starttime, pd_name, pd_ucd, p_value
FROM
  (SELECT p_isaparamof, pd_name, pd_ucd, p_value
   FROM parameter INNER JOIN parameterdescription
   ON p_parameterdescription = pd_id
   WHERE pd_ucd = 'pos.frame' and p_value = 'galactic')
AS templ
INNER JOIN
  activity
ON activity.a_id = templ.p_isaparamof
```

Examples Info



Select entities and display them in Aladin (HiPS or classical images) (here « public » entities)

The screenshot displays the Aladin v10.0 interface. At the top, the title bar reads "Aladin v10.0 *** BETA VERSION (based on v10.098) ***". The main window is divided into several sections:

- Left Panel:** A sidebar with "Available data → 2" and a tree view showing collections like "Image → 396", "Data base → 5", "Catalog → 20485", "Cube → 10", "Solar system → 47", "Ancillary → 66", "Outreach → 44", "Others → 1232", and "Problematic → 3".
- Top Panel:** A "Command" bar with a search field containing "http://alasky.u-strasbg.fr/2MASS/K". Below it, a "Frame" dropdown is set to "ICRS" and a "Projection" dropdown is set to "Aitoff".
- Main View:** A large astronomical image of a star field. A red arrow points from the "2MASS/K" entry in the table below to a specific star in the image. The image has a coordinate display at the bottom right: "15.83° x 4.609°".
- Bottom Left Panel:** A table listing entities with columns for "access url", "e_id", "e name", "e type", and "e rights".
- Bottom Right Panel:** A "Server selector" window with a "Query editor" showing a query: "SELECT * FROM entity, miniobscore where e_id = obs_publisher_did and e_rights = 'public'".
- Right Panel:** A "Welcome to Aladin" sidebar with navigation icons (select, pan, dist, phot, draw, tag, moc, speed, filter, cross) and introductory text.

access url	e_id	e name	e type	e rights
http://alasky.u-strasbg.fr/2MASS/H	ivo://CDS/P/2MASS/H	2MASS H (1.66um) HiPS	data	public
no access	origima0	2MASS H (1.66um) original data	data0	public
http://alasky.u-strasbg.fr/2MASS/J	ivo://CDS/P/2MASS/J	2MASS J (1.23um) HiPS	data	public
no access	origima1	2MASS J (1.23um) original data	data1	public
http://alasky.u-strasbg.fr/2MASS/K	ivo://CDS/P/2MASS/K	2MASS K (2.16um) HiPS	data	public
no access	origima2	2MASS K (2.16um) original data	data2	public
http://alasky.u-strasbg.fr/2MASS/color	ivo://CDS/P/2MASS/color	2MASS color J (1.23um), H (1.66um), K (2.16um) original data	data	public
no access	origima3	2MASS color J (1.23um), H (1.66um), K (2.16um) original data	data3	public
http://alasky.u-strasbg.fr/2MASS6X/H	ivo://CDS/P/2MASS6X/H	2MASS6X H (1.66um) HiPS	data	public
no access	origima4	2MASS6X H (1.66um) original data	data4	public
http://alasky.u-strasbg.fr/2MASS6X/J	ivo://CDS/P/2MASS6X/J	2MASS6X J (1.23um) HiPS	data	public
no access	origima5	2MASS6X J (1.23um) original data	data5	public
http://alasky.u-strasbg.fr/2MASS6X/K	ivo://CDS/P/2MASS6X/K	2MASS6X K (2.16um) HiPS	data	public
no access	origima6	2MASS6X K (2.16um) original data	data6	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) HiPS	data	public
no access	origima7	2MASS6X color J (1.23um) & K (2.16um) original data	data7	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) original data	data8	public
no access	origima8	2MASS6X color J (1.23um) & K (2.16um) original data	data8	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) original data	data9	public
no access	origima9	2MASS6X color J (1.23um) & K (2.16um) original data	data9	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) original data	data10	public
no access	origima10	2MASS6X color J (1.23um) & K (2.16um) original data	data10	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) original data	data11	public
no access	origima11	2MASS6X color J (1.23um) & K (2.16um) original data	data11	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) original data	data12	public
no access	origima12	2MASS6X color J (1.23um) & K (2.16um) original data	data12	public
http://alasky.u-strasbg.fr/2MASS6X/col...	ivo://CDS/P/2MASS6X/col...	2MASS6X color J (1.23um) & K (2.16um) original data	data13	public
no access	origima13	2MASS6X color J (1.23um) & K (2.16um) original data	data13	public

elect entities and display them in Aladin

(HiPS or classical images)

(here progenitors centers overlay – ready to be loaded)

Aladin v10.0 *** BETA VERSION (based on v10.098) ***

File Edit Image Catalog Overlay Coverage Tool View Interop Help

Available data to 2 Command 00:00:00.00000 +00:00:00.00000 Frame ICRS Projection Altoff

DSS SDSS 2MASS WISE GALEX PLANCK AKARI XMM Fermi Gaia Simbad NED +

http://alasky.u-strasbg.fr/AKARI-FIS/WideL

AKARI FIS → 9
 AKARI FIS N60 (65um)
 AKARI 65um
 AKARI FIS WideS (90u
 AKARI 90um
 AKARI FIS Color W
 AKARI FIS WideL (14
 AKARI 140um
 AKARI FIS N160 (160
 AKARI 160um

access url	e id	e name	e type	e rights	e annotation	e description	obs publisher	data rights	dataproduc t...	calib
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS/H	origima0	2MASS H (1.66um) HIPS	data	public		hipsdata	ivo://CDs/P/2MA...	public	hips	
no access	origima1	2MASS H (1.66um) original data	data	public	2MASS has unific	hipsdata	origima0	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS/J	origima2	2MASS J (1.23um) HIPS	data	public		2MASS J (1.23um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima3	2MASS J (1.23um) original data	data	public	2MASS has unific	hipsdata	origima1	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS/K	origima4	2MASS K (2.16um) HIPS	data	public		2MASS K (2.16um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima5	2MASS K (2.16um) original data	data	public	2MASS has unific	hipsdata	origima2	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS/color	origima6	2MASS color J (1.23um), H (1.66um), K (2.16um)...	data	public		2MASS color J (1.23um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima7	2MASS color J (1.23um), H (1.66um), K (2.16um) original data	data	public	2MASS has unific	hipsdata	origima3	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS6X/H	origima8	2MASS6X H (1.66um) HIPS	data	public		2MASS6X H (1.66um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima9	2MASS6X H (1.66um) original data	data	public	2MASS has unific	hipsdata	origima4	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS6X/J	origima10	2MASS6X J (1.23um) HIPS	data	public		2MASS6X J (1.23um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima11	2MASS6X J (1.23um) original data	data	public	2MASS6X has unific	hipsdata	origima5	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS6X/K	origima12	2MASS6X K (2.16um) HIPS	data	public		2MASS6X K (2.16um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima13	2MASS6X K (2.16um) original data	data	public	2MASS6X has unific	hipsdata	origima6	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/2MASS6X/color	origima14	2MASS6X color J (1.23um) & K (2.16um) HIPS	data	public		2MASS6X color J (1.23um) origimaes	ivo://CDs/P/2MA...	public	hips	
no access	origima15	2MASS6X color J (1.23um) & K (2.16um) original data	data	public	2MASS6X has unific	hipsdata	origima7	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/AKARI/FIS/color	origima16	AKARI FIS Color WideL (140um), WideS (90um), N60	data	public		AKARI FIS Color W origimaes	ivo://CDs/P/AKAR...	public	hips	
no access	origima17	AKARI FIS Color WideL (140um), WideS (90um), N60 original data	data	public	AKARI FIS Color W origimaes	hipsdata	origima8	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/AKARI/FIS/N160	origima18	AKARI FIS N160 (160um) HIPS	data	public		AKARI FIS N160 (origimaes	ivo://CDs/P/AKAR...	public	hips	
no access	origima19	AKARI FIS N160 (160um) original data	data	public	AKARI FIS N160 (origimaes	hipsdata	origima9	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/AKARI/FIS/N60	origima20	AKARI FIS N60 (65um) HIPS	data	public		AKARI FIS N60 (origimaes	ivo://CDs/P/AKAR...	public	hips	
no access	origima21	AKARI FIS N60 (65um) original data	data	public	AKARI FIS N60 (origimaes	hipsdata	origima10	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/AKARI/FIS/WideL	origima22	AKARI FIS WideL (140um) HIPS	data	public		AKARI FIS WideL (origimaes	ivo://CDs/P/AKAR...	public	hips	
no access	origima23	AKARI FIS WideL (140um) original data	data	public	AKARI FIS WideL (origimaes	hipsdata	origima11	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/AKARI/FIS/WideS	origima24	AKARI FIS WideS (90um) HIPS	data	public		AKARI FIS WideS (origimaes	ivo://CDs/P/AKAR...	public	hips	
no access	origima25	AKARI FIS WideS (90um) original data	data	public	AKARI FIS WideS (origimaes	hipsdata	origima12	public	image	
http://alasky.u-strasbg.fr/ivo://cds/p/ATLASGAL	origima26	ATLASGAL 850 um HIPS	data	public		AKARI (Previously hipsdata	ivo://CDs/P/ATL...	public	hips	
no access	origima27	ATLASGAL 850 um original data	data	public	AKARI (Previously hipsdata	hipsdata	origima13	public	image	

Search

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Functions for complex queries (M.Nulmeier Heidelberg)

- ADQL queries on a database with 14 or more tables may rapidly become difficult to write
- Graph query technology required
- Implementation experimented via predefined functions, recursive CTE, etc..
- ProvSAP functionalities can be reproduced



Conclusion/future work

- Add provenance information for HiPS progenitors
 - Schmidt plate digitization
 - Raw data if available
- Enrich HiPS description in the service
- Cross combine information with HESS/CTA database

