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

http://www.w3.org/TR/prov-overview/

W3C PROV (PROV-DM, 2013)

Word Wide Web Consortium

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**

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

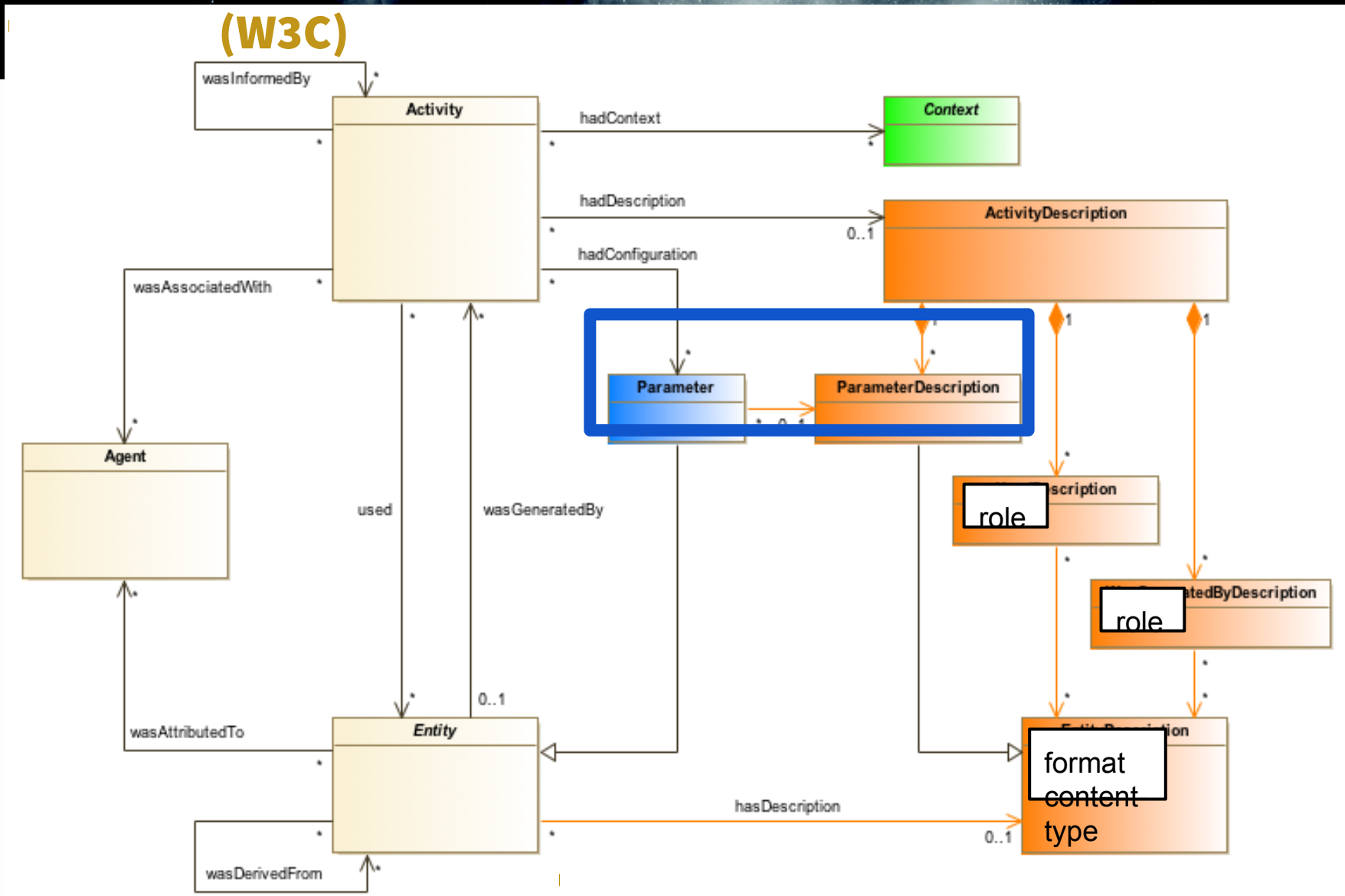
Judge the quality of an observation, production step or dataset.

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)



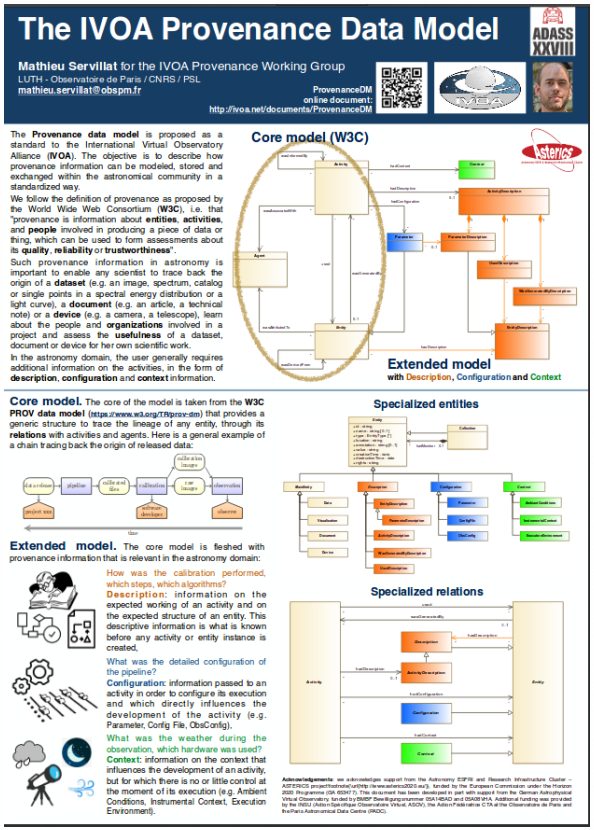
Provenance data model

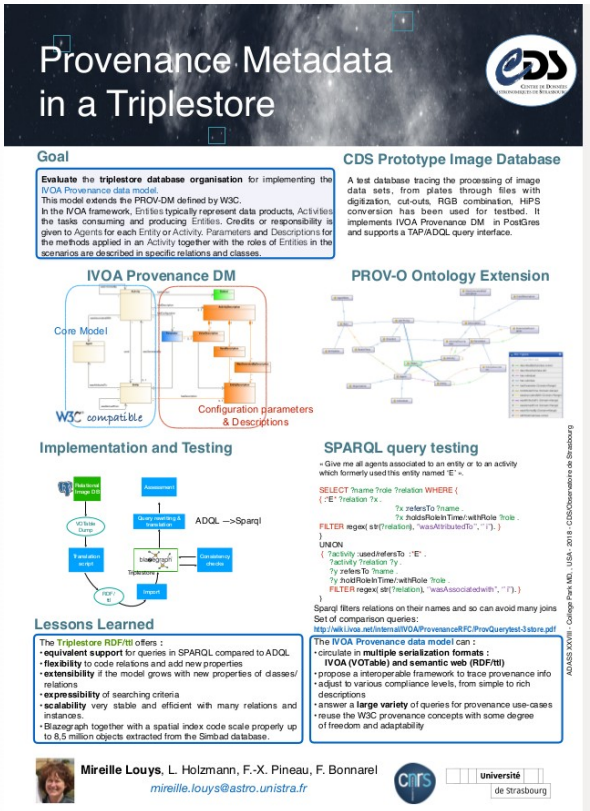
Hot Topic !

5 presentations during IVOA interoperability meeting last week.

2 Posters at this conference :

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





Serialisation and services : ProvSAP exists

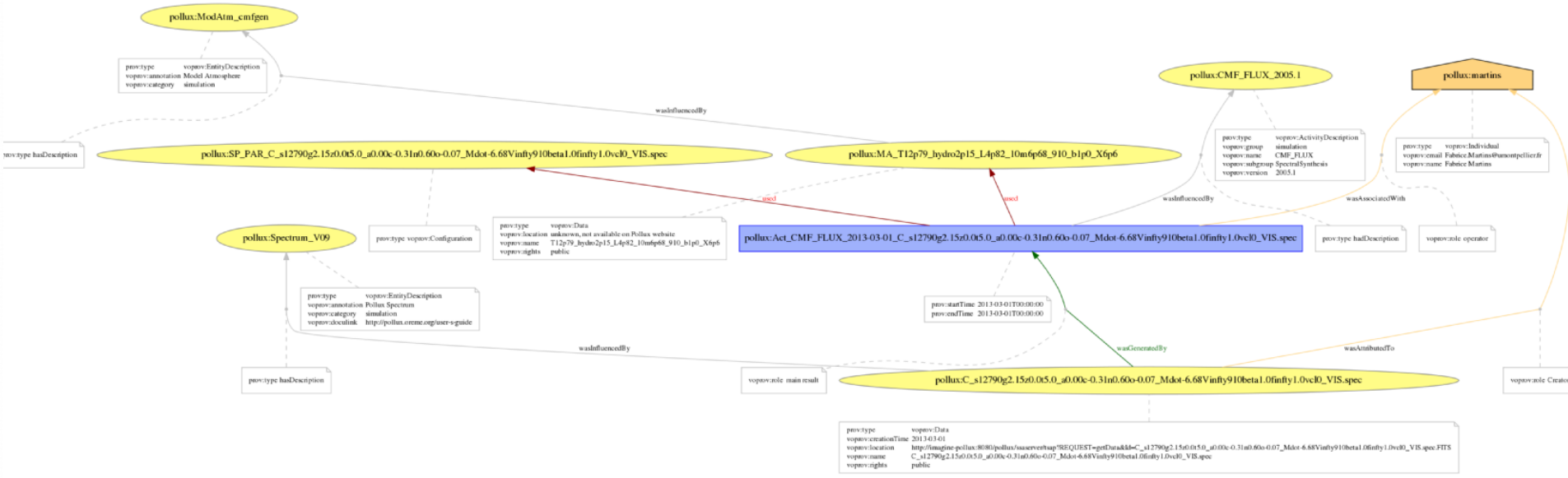
- A parameter based service

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

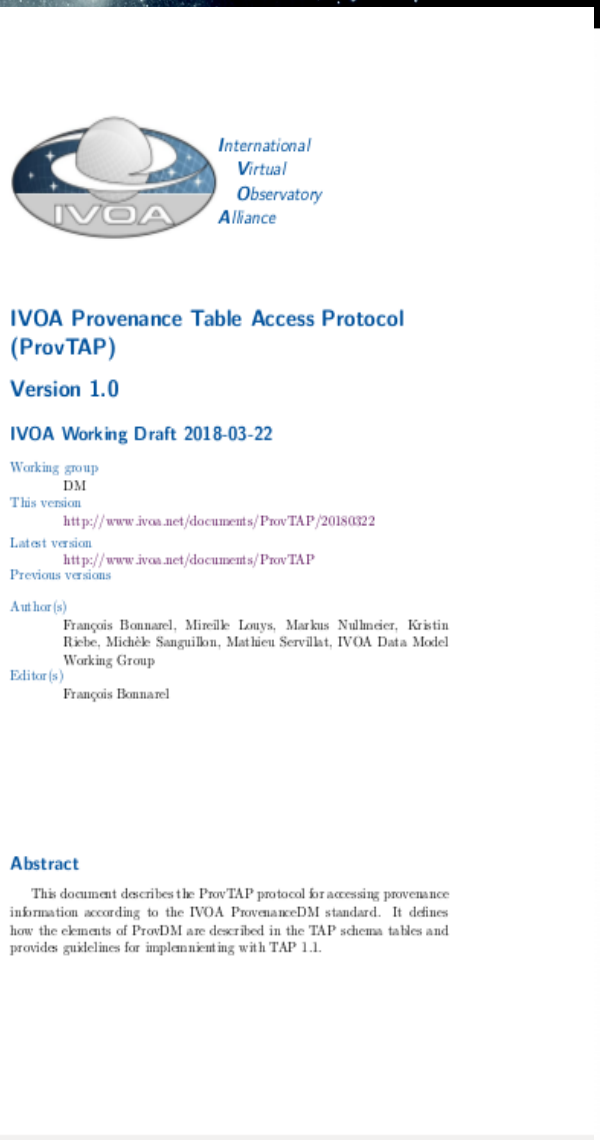


ProvTAP specification for datamodel serialisation and metadata service

1) ProvTAP is ….TAP

2) mapping of the model classes/attributes to the relational view.

3) specification is currently an internal IVOA draft



International Virtual Observatory Alliance

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

Author(s)
François Bonnarel, Mireille Louys, Markus Nullmeier, Kristin Riebe, Michèle Sanguillon, Mathieu Servillat, IVOA Data Model Working Group
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 implemnienting with TAP 1.1.

TAP

- A specification which defines :
  - Interoperable table services, with relational view
  - Queriable via a sql-oriented langage : 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 obect/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 developped at CDS

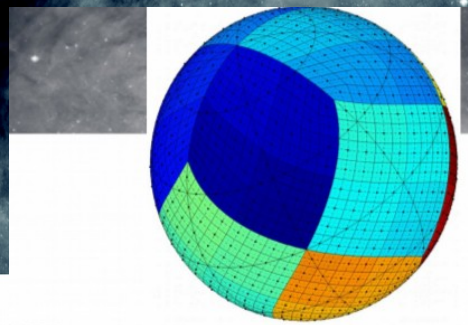
→ screenshots in next slides

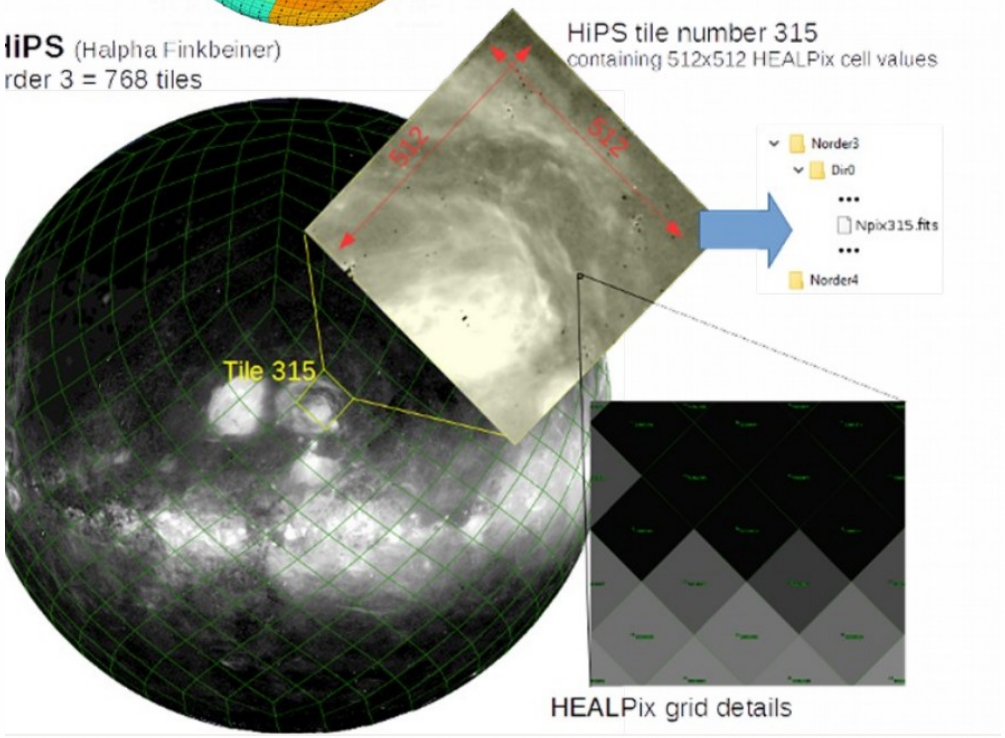
- CTA/HESS implementation in development in collaboration with CDS

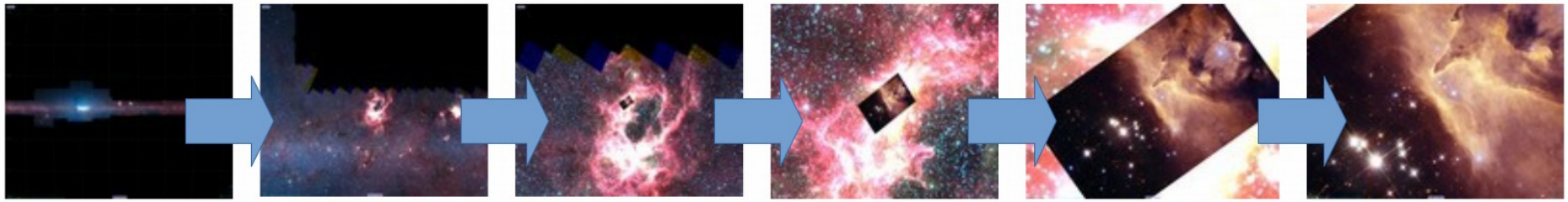
CDS prototype content : HiPS and progenitors

- 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 tile number 315
containing 512x512 HEALPix cell values
512
512
Norder3
Dir0
Npix315.fits
Norder4
Tile 315
HEALPix grid details



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: votable/td

Result limit: -1 rows *(0 to get only metadata ; a value < 0 means 'default value')*

Duration limit: -1 seconds *(a value ≤ 0 means 'default value')*

Execute!

Page generated by TAPLibrary v2.0

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>
```


```
    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:           "Generation of 2MASS color J (1.23um), H (1.66um), K (2.16um) HiPS"
    2:           "2013-01-14T09:45Z"
    3:           "2013-01-14T09:45Z"
    4:           "Generation of 2MASS color J (1.23um), H (1.66um), K (2.16um) HiPS"
    5:           "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"	"Qrizona 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)"

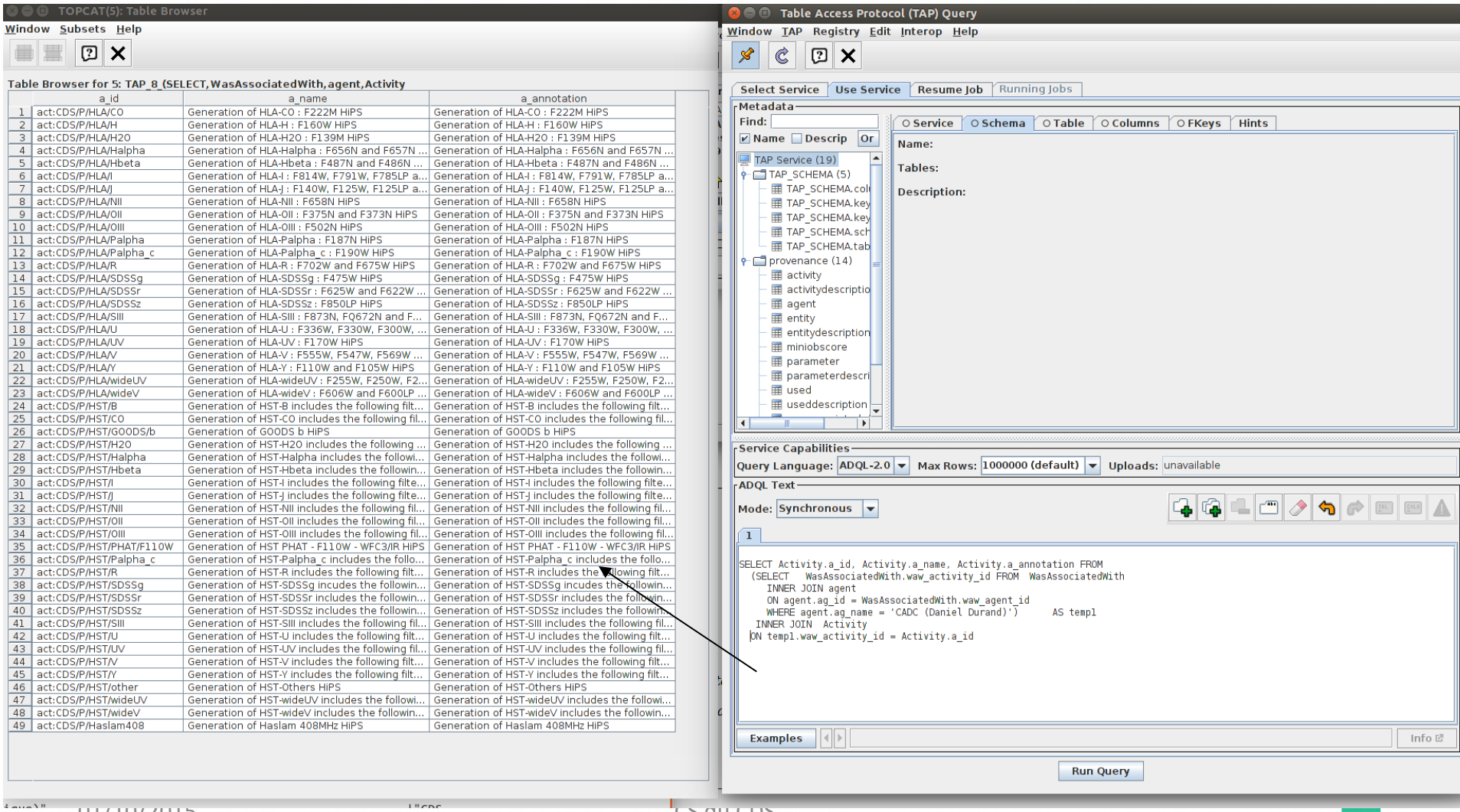
Configuration parameters with their description (name, ucd,unit And associated activity

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 »

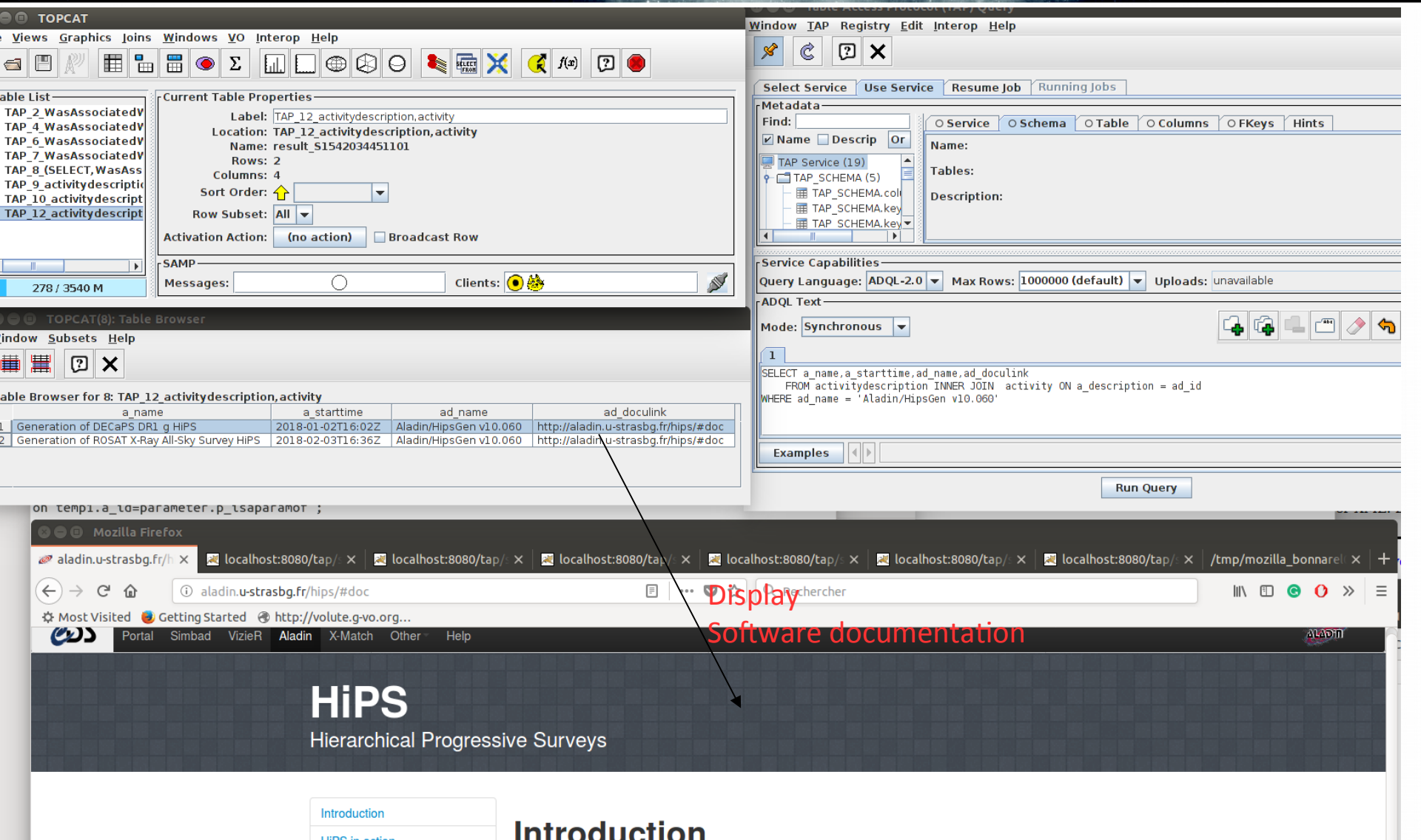
(here « CADC (Daniel Durand) »



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

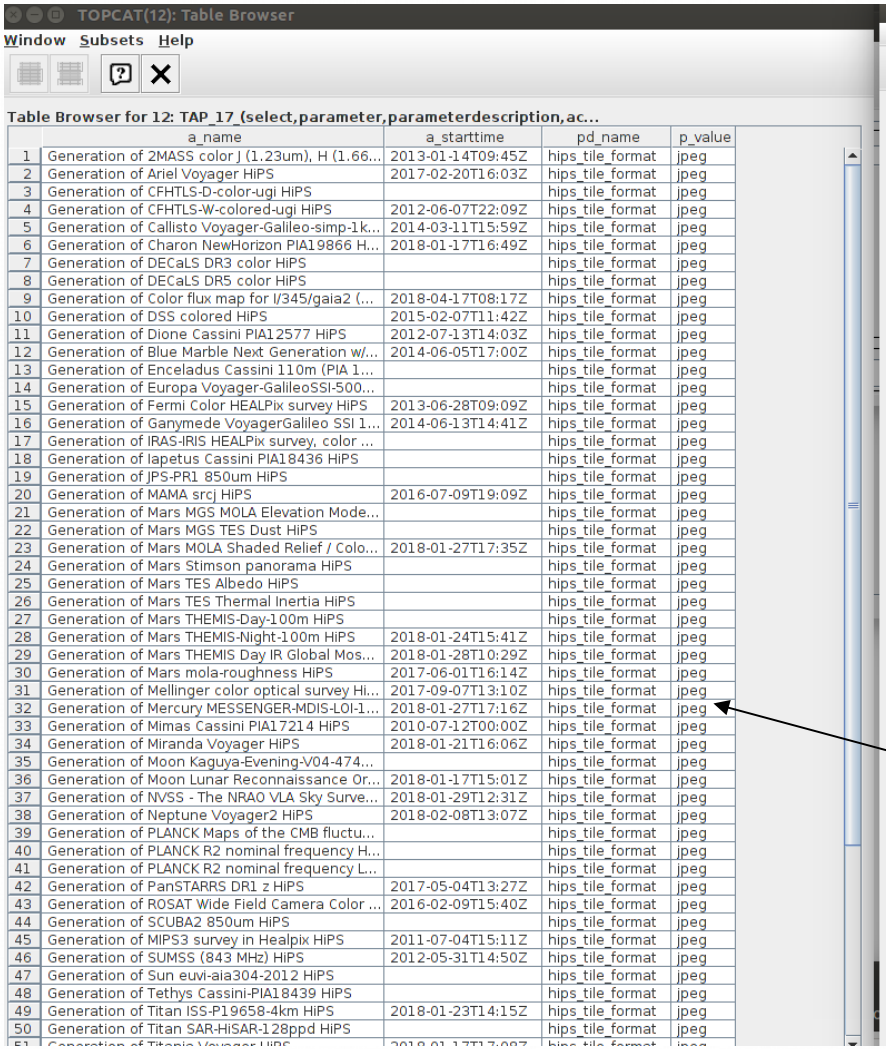
select activities described by the same ActivityDescription

(= here, running the same hipsgen software)

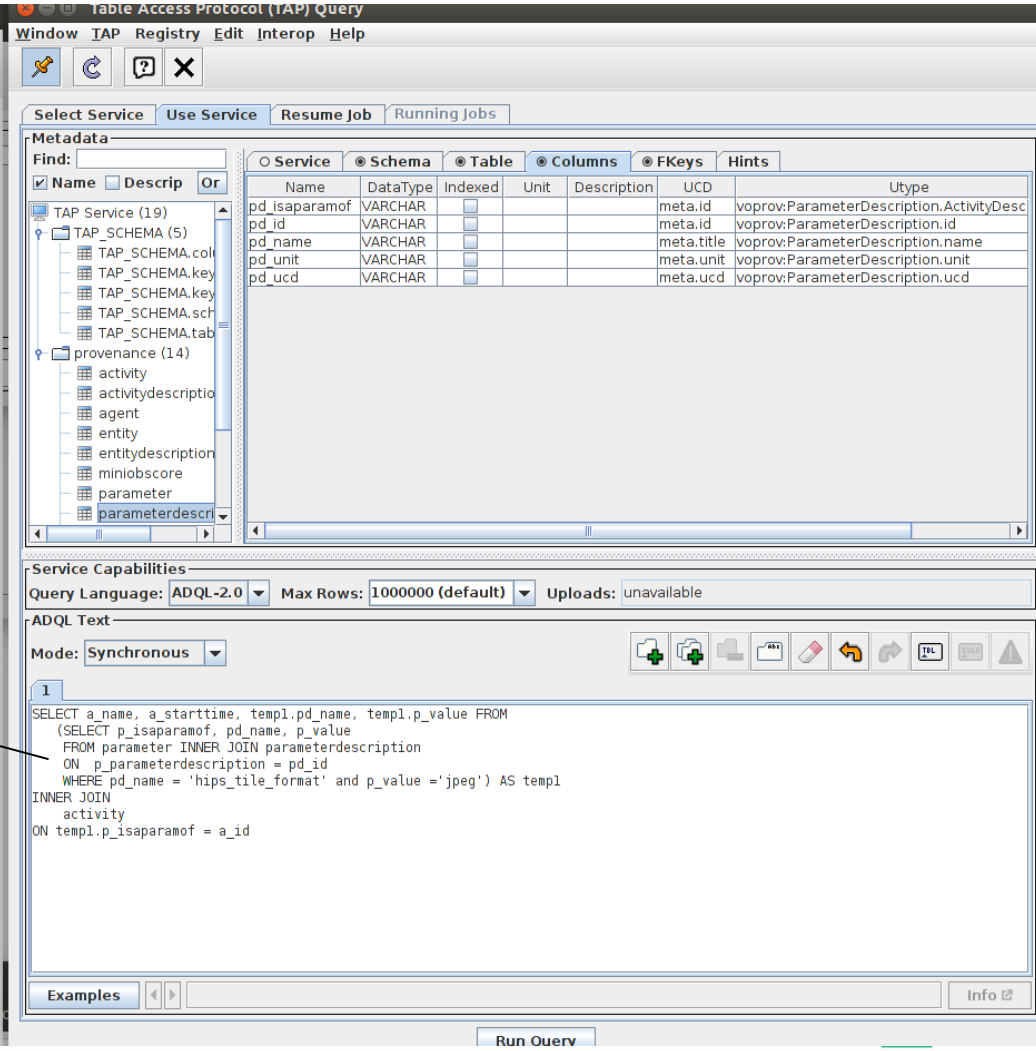


Select activities from some configuration parameters values

(here « created only in jpeg »)

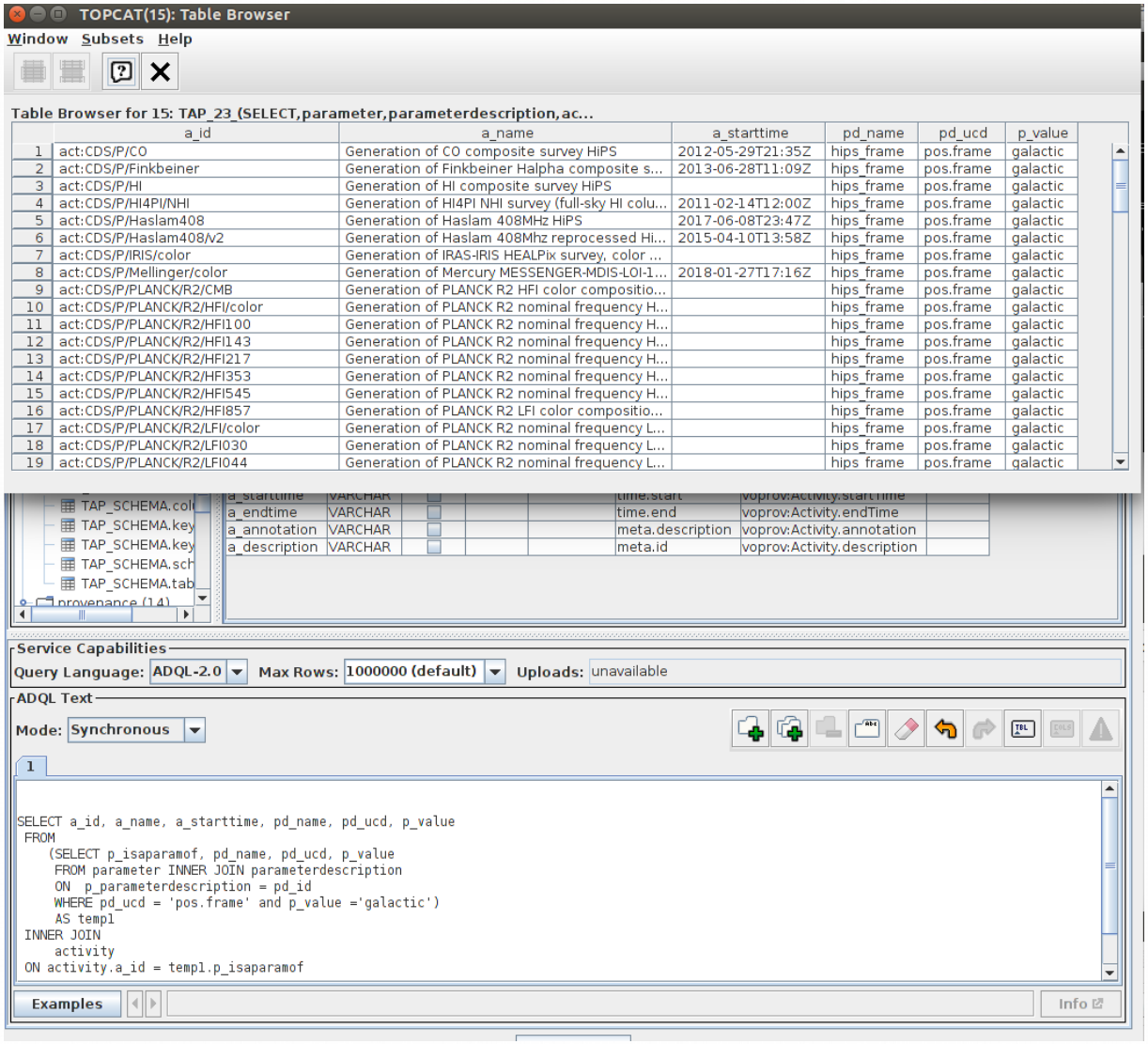


	a_name	a_starttime	pd_name	p_value
1	Generation of 2MASS color J (1.23um), H (1.66...	2013-01-14T09:45Z	hips_tile_format	jpeg
2	Generation of Ariel Voyager HiPS	2017-02-20T16:03Z	hips_tile_format	jpeg
3	Generation of CFHTLS-D-color-ugi HiPS		hips_tile_format	jpeg
4	Generation of CFHTLS-W-colored-ugi 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 euvi-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



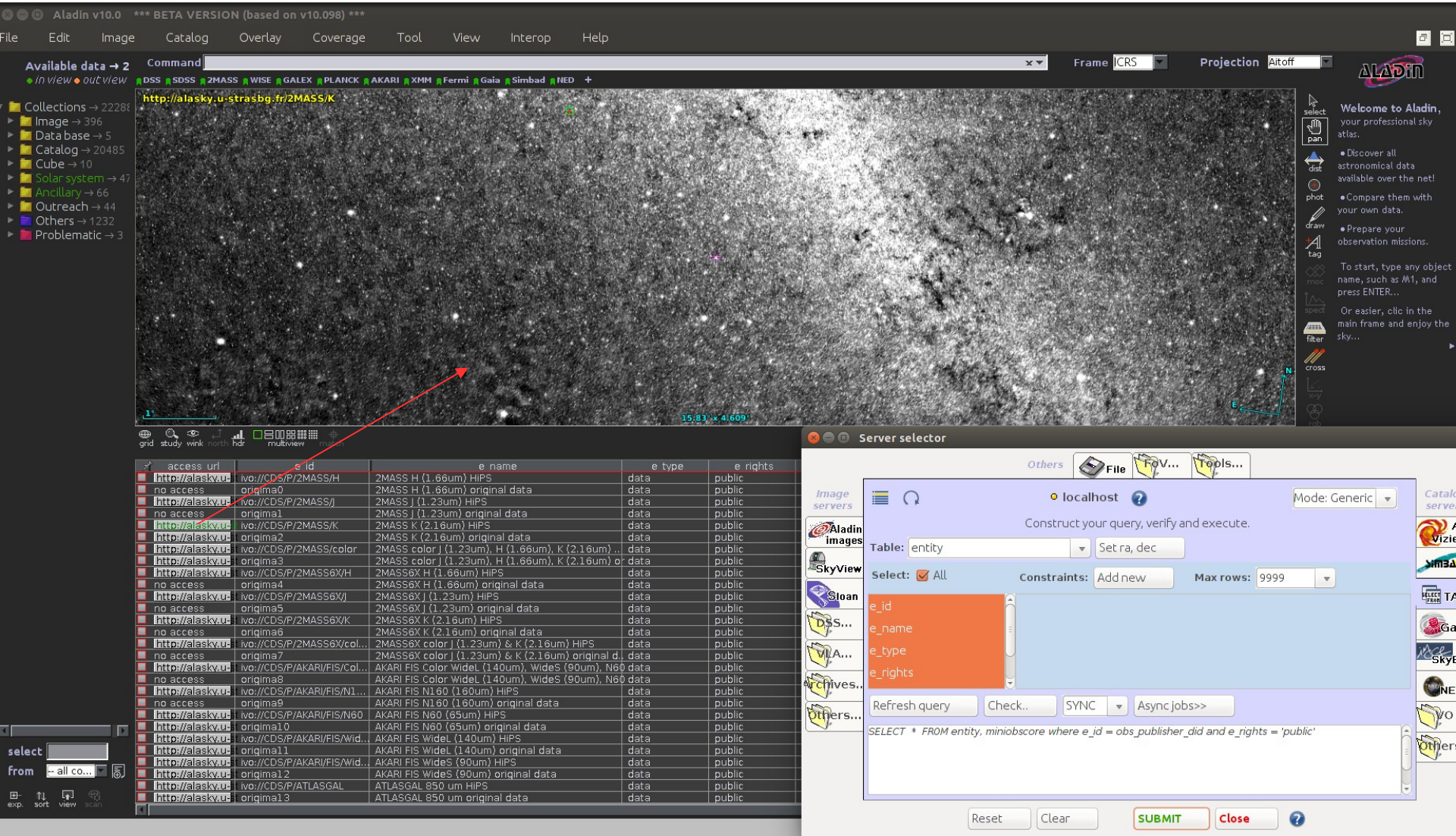
select activities from some configuration parameters values

(here selected by ucd and « created in galactic frame)



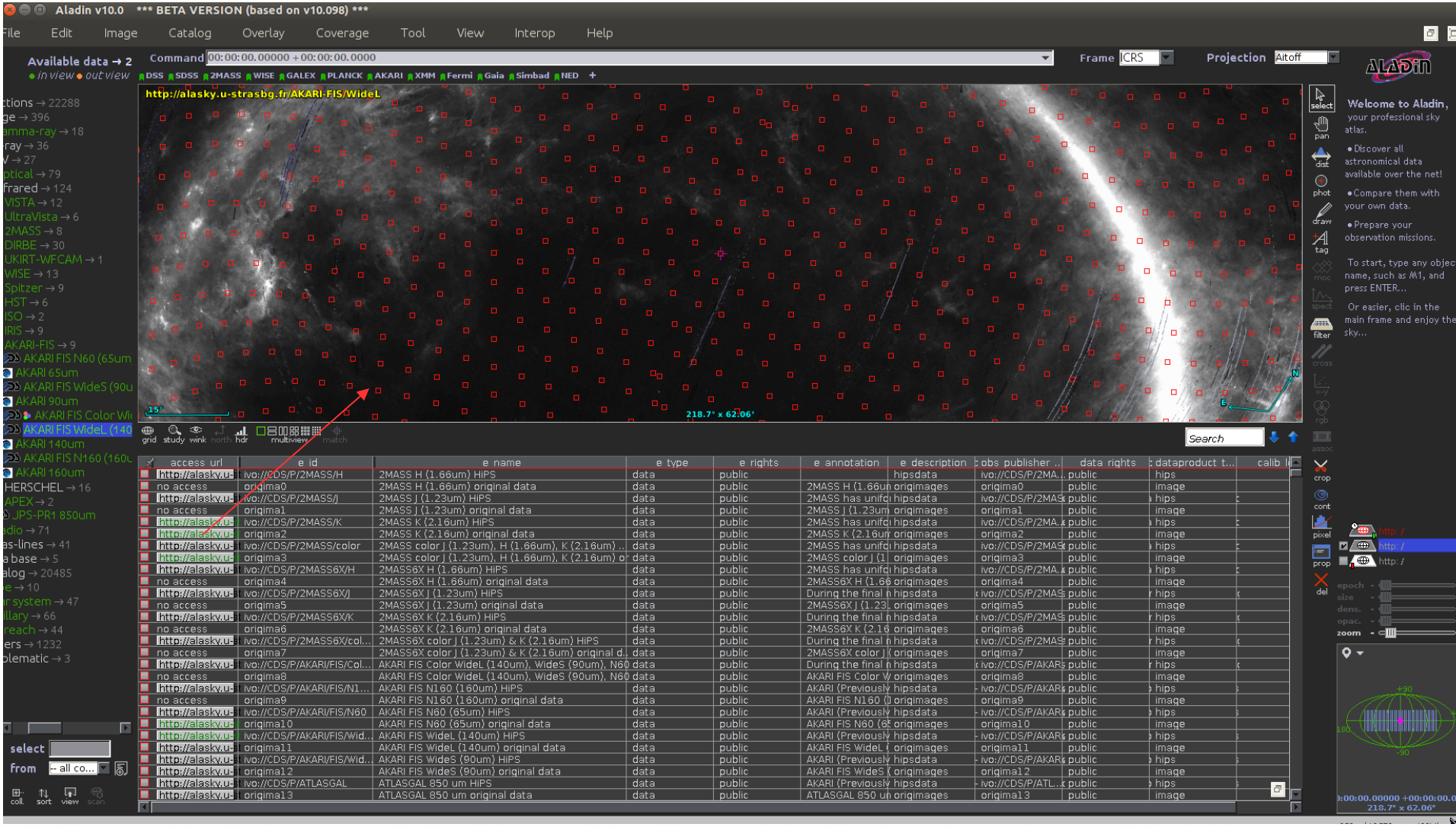
Select entities and display them in Aladin (HiPS or classical images)

(here « public » entities)



elect entities and display them in Aladin (HiPS or classical images)

(here progenitors centers overlay – ready to be loaded



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