

# ProvTAP :

A TAP service for providing IVOA provenance metadata



# ProvHIPS :

CDS ProvTAP implementation



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



# What is ProvTAP for ?

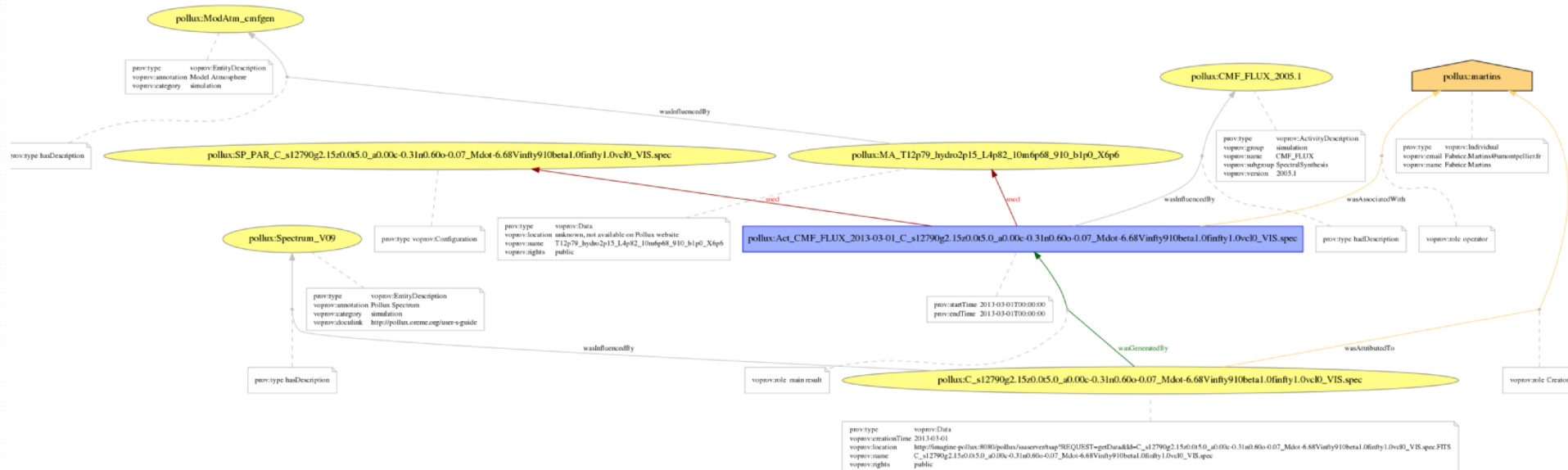
- Distributing provenance metadata for astronomical datasets
- Selecting datasets by provenance
- ProvTAP is a specification for services serializing IVOA provenance metadata model



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



# 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



## IVOA Provenance Table Access Protocol (ProvTAP)

Version 1.0

IVOA Working Draft 2019-03-22

Working group  
DM

This version  
<http://www.ivoa.net/documents/ProvTAP/20190322>

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

Previous versions

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### 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.





# 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	2018-01-17T16:49Z	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
TAP Service (19)		
TAP_SCHEMA (5)		
TAP_SCHEMA.col		
TAP_SCHEMA.key		
TAP_SCHEMA.key		
TAP_SCHEMA.sch		
TAP_SCHEMA.tab		
provenance (14)		
activity		
activitydescriptio		
agent		
entity		
entitydescription		
miniobscore		
parameter		
parameterdescri		

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

# ProvTAP : why TAP ?

- TAP is a specification which defines :
  - Interoperable table services, with relational view
  - Queriable via a sql-oriented language : ADQL
  - TAP is a major IVOA success.
- 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





# Some ProvTAP tables :

## Entity

Name	ucd	utype	datatype	status
e_id	meta.id	voprov:Entity.id	char	M
e_name	meta.title	voprov:Entity.name	char	O
e_type	meta.code.class	voprov:Entity.type	char	O
e_rights	meta.code.class	voprov:Entity.rights	char	O
e_location	meta.ref.url	voprov:Entity.location	char	O
e_generated	time.start	voprov:Entity.generatedAtTime	char	O
e_invalidated	time.stop	voprov:Entity.invalidatedAtTime	char	O
e_comment	meta.description	voprov:Entity.comment	char	O
e_classtype	meta.code.class	voprov:Entity.classtype	char OPTION	M
e_value	stat.value	voprov:Entity.value	char	O
→ e_description	meta.id	voprov:Entity.description_id	reference	O

*Table 2:* Column description for Entity table. The e\_classtype column may have the following two values : "dataset" and "value"

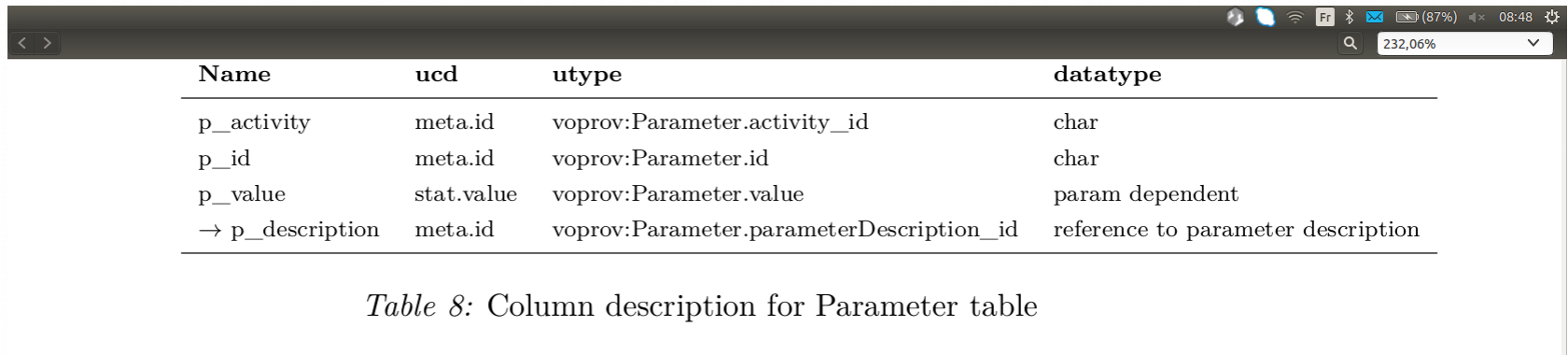




# Some ProvTAP tables : parameterDescription

Name	ucd	utype	datatype
pd_activitydescription	meta.id	voprov:ParameterDescription. activityDescription_id	char
pd_id	meta.id	voprov:ParameterDescription.id	char
pd_name	meta.title	voprov:ParameterDescription.name	param dependent
pd_description	meta.description	voprov:ParameterDescription.description	char
pd_datatype	meta	voprov:ParameterDescription.datatype	char
pd_unit	meta.unit	voprov:ParameterDescription.unit	char
pd_ucd	meta.ucd	voprov:ParameterDescription.ucd	char
pd_utype	meta	voprov:ParameterDescription.utype	char
pd_min	stat.min	voprov:ParameterDescription.min	param dependent
pd_max	stat.max	voprov:ParameterDescription.max	param dependent
pd_options	meta	voprov:ParameterDescription.options	param dependent

# Some ProvTAP tables : parameter



Name	ucd	utype	datatype
p_activity	meta.id	voprov:Parameter.activity_id	char
p_id	meta.id	voprov:Parameter.id	char
p_value	stat.value	voprov:Parameter.value	param dependent
→ p_description	meta.id	voprov:Parameter.parameterDescription_id	reference to parameter description

*Table 8:* Column description for Parameter table



# ProvHIPS :

CDS ProvTAP implementation  
For HiPS



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# Goals of ProvHiPS prototype

- Create a first ProvTAP implementation
- Integrate information on HiPS as well as classical images in the same design
- Full integration of HiPS provenance searches in the general VO framework
- Version 1 : based on Prov DM PR1 : HiPS generations
- Version 2 : work in progress : based on new datamodel, provenance of HiPS tiles for DSS images and HST images up to plates and raw data





# 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

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

### ADQL query

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**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

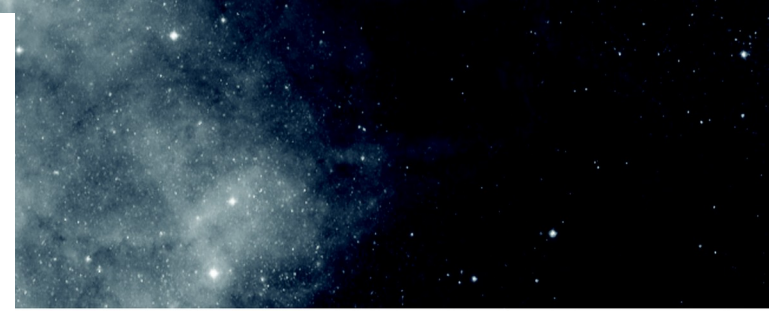
```
-<VOTABLE version="1.3" xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.3 http://www.ivoa.net/xml/VOTable/v1.3">
-<RESOURCE type="results">
  <INFO name="QUERY_STATUS" value="OK"/>
  <INFO name="PROVIDER" value="CDS"/>
  <INFO name="QUERY" value="SELECT * FROM entity;"/>
-<TABLE name="result_S1542030444145">
  <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/>
  </TR>
  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:
      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"

## 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

Service: TAP Service (19)

- TAP\_SCHEMA (5)
  - TAP\_SCHEMA.col
  - TAP\_SCHEMA.key
  - TAP\_SCHEMA.key
  - TAP\_SCHEMA.sch
  - TAP\_SCHEMA.tab
- provenance (14)
  - activity
  - activitydescriptio
  - agent
  - entity
  - entitydescription
  - miniscore
  - parameter
  - parameterdescri
  - used
  - useddescription

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)

The image shows two windows from the TOPCAT software. The left window, titled 'TOPCAT(8): Table Browser', displays the 'Current Table Properties' for a table named 'TAP\_12\_activitydescription,activity'. The properties include: Label: TAP\_12\_activitydescription,activity; Location: TAP\_12\_activitydescription,activity; Name: result\_S1542034451101; Rows: 2; Columns: 4; Sort Order: (arrow icon); Row Subset: All; Activation Action: (no action) [Broadcast Row]. Below this, a 'SAMP' section shows 'Messages: 0' and 'Clients: 2'. The right window, titled 'Window IAP Registry Edit Interop Help', shows a 'Select Service' window. It has tabs for 'Select Service', 'Use Service', 'Resume Job', and 'Running Jobs'. The 'Metadata' section shows 'Find:' with options for Name, Descrip, or Or. Below this, a tree view shows 'TAP Service (19)' containing 'TAP\_SCHEMA (5)' with sub-items 'TAP\_SCHEMA.col', 'TAP\_SCHEMA.key', and 'TAP\_SCHEMA.key'. The 'Service Capabilities' section shows 'Query Language: ADQL-2.0', 'Max Rows: 100000 (default)', and 'Uploads: unavailable'. The 'ADQL Text' section shows 'Mode: Synchronous' and a query: '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''. A 'Run Query' button is at the bottom right.

The image shows a Mozilla Firefox browser window. The address bar shows 'aladin.u-strasbg.fr/hips/#doc'. The page content includes a navigation menu with 'Portal', 'Simbad', 'VizieR', 'Aladin', 'X-Match', 'Other', and 'Help'. The main heading is 'HiPS Hierarchical Progressive Surveys'. Below this, there is an 'Introduction' section with a sub-section 'HiPS in action'. A red arrow points from the 'ad\_doculink' column in the table browser window above to the 'HiPS' heading on the website. The text 'Display Software documentation' is written in red over the browser window.



# 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	hips_frame	pos.frame	galactic
2	act:CDS/P/Finkbeiner	Generation of Finkbeiner Halpha composite s...	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...	hips_frame	pos.frame	galactic
5	act:CDS/P/Haslam408	Generation of Haslam 408MHz HIPS	hips_frame	pos.frame	galactic
6	act:CDS/P/Haslam408/V2	Generation of Haslam 408MHz reprocessed Hi...	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-LO1-1...	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

# ProvHiPS version 2

- Have the provenance of each HiPS tiles (describe original data and their « history » in term of provenance )
- A trainee student is currently tracing the provenance for DSS and HST HiPS tiles
- 14 000 drizzled and calibrated HST images headers have been parsed to extract provenance metadata



# ProvHiPS version 2 :

Some HiPS tiles provide links to original data : provide their provenance

10.0 \*\*\* BETA VERSION (based on v10.073) \*\*\*

HST B

00:42:35.48 +41:13:13.1

	RAJ2000	DEJ2000	id	access	FoV	INSTRUME	OPT ELE	DETECTOR	TIME MIN	TIME MAX	TIME EXP	WAVE MIN
■	10.67909	41.27306	<a href="#">l2vp03010 drz</a>	Display	FoV	ACS	F435W	WFC	53027.301453...	53027.332345...	2200.0	3.7E-07
■	10.68432	41.2691	<a href="#">l9am01010 drz</a>	Display	FoV	ACS	F435W	HRC	53901.9453937	53901.9615299	5576.67071996	3.7E-07
■	10.68429	41.26907	<a href="#">l9am01020 drz</a>	Display	FoV	ACS	F435W	HRC	53901.9622919	53901.9784281	5576.67071996	3.7E-07
■	10.71561	41.2775	<a href="#">l9ju01010 drz</a>	Display	FoV	ACS	F435W	WFC	53776.165378...	53776.261468...	4360.0	3.7E-07
■	10.71469	41.27828	<a href="#">l9ju06010 drz</a>	Display	FoV	ACS	F435W	WFC	54110.962538...	54111.176763...	4672.0	3.7E-07



# ProvHiPS version 2 : a look at the tables

The screenshot displays the Aladin v10.0 Server selector interface. The main window is titled "Server selector" and shows a query execution window for the "obsfb" catalog. The query is "SELECT \* FROM TAP\_SCHEMA.tables". The window includes a table list on the left, a "Constraints" section, and a "Max rows" dropdown set to 10. Below the query window is a table with the following columns: table index, schema\_name, table name, table type, and description.

table index	schema_name	table name	table type	description
0	provenance	entity	output	instances of Entity class
1	provenance	datasetdescript...	output	instances of DatasetDescription class
2	provenance	valuedescripti...	output	instance of ValueDescriptions class
3	provenance	activity	output	instances of Activity class
4	provenance	activitydescrip...	output	instance of Activity Descriptions
5	provenance	agent	output	instance of Agent class
6	provenance	parameter	output	instance of Parameter class
7	provenance	parameterdescr...	output	instance of Parameter Descriptions
8	provenance	used	output	instance of Used class
9	provenance	usagedescripti...	output	instance of Used Descriptions
10	provenance	wasgenerated...	output	instance of WasGeneratedBy class
11	provenance	generationdesch...	output	instance of WasGeneratedBy Descriptions
12	provenance	wasassociatedw...	output	instance of WasAssociatedWith class
13	provenance	wasattributedt...	output	instance of WasAttributedTo class
14	provenance	wasinformedby	output	instance of WasInformedBy relationship table
15	provenance	wasderivedfrom	output	instance of WasDerivedFrom relationship table
16	provenance	collection	output	instance of Collection relationship table
17	provenance	configfile	output	instances of Config file class
18	provenance	configfiledescrip...	output	instances of ConfigurationFileDescription class
19	provenance	wasconfigured...	output	instance of WasAttributedTo class
-1	TAP_SCHEMA	TAP_SCHEMA.s...	table	List of schemas published in this TAP service.
-1	TAP_SCHEMA	TAP_SCHEMA.ta...	table	List of tables published in this TAP service.
-1	TAP_SCHEMA	TAP_SCHEMA.co...	table	List of columns of all tables listed in TAP_SCHEMA.TABLES and published in this TAP service.
-1	TAP_SCHEMA	TAP_SCHEMA.k...	table	List all foreign keys but provides just the tables linked by the foreign key. To know more, see the documentation.
-1	TAP_SCHEMA	TAP_SCHEMA.ke...	table	List all foreign keys but provides just the columns linked by the foreign key. To know more, see the documentation.



# ProvHiPS version 2

## a look at the columns

\*\*\* BETA VERSION (based on v10.073) \*\*\*

Aladin v10.0 Server selector

Mode: Generic

Construct your query, verify and execute.

Table: SCHEMA.key\_columns Set ra, dec

Select:  All Constraints: Add new Max rows: 10

key\_id  
from\_column  
target\_column

Refresh query Check.. SYNC Async jobs>>

```
SELECT * FROM TAP_SCHEMA.columns
```

Reset Clear SUBMIT Close ?

			datatype	arraysize	size	utype
3	agent	ag_email	VARCHAR	-1	-1	voprov:Agent.em
4	agent	ag_affiliation	VARCHAR	-1	-1	voprov:Agent.aff
5	agent	ag_phone	VARCHAR	-1	-1	voprov:Agent.ph
6	agent	ag_comment	VARCHAR	-1	-1	voprov:Agent.c...
7	agent	p_id	VARCHAR	-1	-1	voprov:Paramete
1	parameter	p_name	VARCHAR	-1	-1	voprov:Paramete
2	parameter	p_value	VARCHAR	-1	-1	voprov:Paramete
3	parameter	p_description	VARCHAR	-1	-1	voprov:Paramete
0	parameterdescription	pd_activitydescri	VARCHAR	-1	-1	voprov:Paramete
1	parameterdescription	pd_id	VARCHAR	-1	-1	voprov:Paramete
2	parameterdescription	pd_name	VARCHAR	-1	-1	voprov:Paramete
3	parameterdescription	pd_description	VARCHAR	-1	-1	voprov:Paramete
4	parameterdescription	pd_docuLink	VARCHAR	-1	-1	voprov:Paramete
5	parameterdescription	pd_valuetype	VARCHAR	-1	-1	voprov:Paramete
6	parameterdescription	pd_unit	VARCHAR	-1	-1	voprov:Paramete
7	parameterdescription	pd_ucd	VARCHAR	-1	-1	voprov:Paramete
8	parameterdescription	pd_utype	VARCHAR	-1	-1	voprov:Paramete
9	parameterdescription	pd_min	VARCHAR	-1	-1	voprov:Paramete
10	parameterdescription	pd_max	VARCHAR	-1	-1	voprov:Paramete
11	parameterdescription	pd_default	VARCHAR	-1	-1	voprov:Paramete
12	parameterdescription	pd_options	VARCHAR	-1	-1	voprov:Paramete
0	used	u_entity	VARCHAR	-1	-1	voprov:Used.ent
1	used	u_activity	VARCHAR	-1	-1	voprov:Used.act
2	used	u_time	VARCHAR	-1	-1	voprov:Used.ti...
3	used	u_usageDescrip	VARCHAR	-1	-1	voprov:Used.usa
0	usagedescription	ud_id	VARCHAR	-1	-1	voprov:UsageDes
1	usagedescription	ud_entitydescri	VARCHAR	-1	-1	voprov:UsageDes
2	usagedescription	ud_activitydescri	VARCHAR	-1	-1	voprov:UsageDes
3	usagedescription	ud_role	VARCHAR	-1	-1	voprov:UsageDes
4	usagedescription	ud_type	VARCHAR	-1	-1	voprov:UsageDes

Available data →  
in view out view

Aladin images  
SkyView  
Sloan  
DSS...  
VIA...  
Archives...  
Others...

Available data →  
in view out view

hst → 442 / 23124  
→ 50 / 409  
6 / 27  
T → 6  
HLA → 3  
HST-UV: F170W  
HST-wideUV: F2  
HST-U: F336W, F  
HST-UV includes th  
HST-wideUV Includ  
HST-U includes th  
cal → 28 / 84  
T → 28  
HAT → 6  
HST PHAT - F275  
HST PHAT - F336  
HST PHAT - F475  
HST PHAT - F814  
HST PHAT - F110  
HST PHAT - F160  
GOODS → 5  
GOODS b  
GOODS v  
GOODS i  
GOODS color  
GOODS z  
HLA → 8  
HLA-B: F450W, F439W, F439W, F435W and F430W  
HLA-SDSSg: F475W  
HLA-V: F555W, F547W, F569W and F550W  
HLA-SDSSr: F625W and F622W  
HLA-R: F702W and F675W  
HLA-wideV: F606W and F600LP  
HLA-I: F814W, F791W, F785LP and F775W  
HLA-SDSSz: F850LP  
HST-B includes the following filters: F450W, F439W, F430W,  
HST-SDSSg includes the following filters: F475W  
HST-V includes the following filters: F555W, F547W, F569W and  
HST-SDSSr includes the following filters: F625W and F622W  
HST-R includes the following filters: F702W and F675W  
HST-wideV includes the following filters: F606W and F600LP  
HST-I includes the following filters: F814W, F791W, F785LP and  
HST-SDSSz includes the following filters: F850LP  
HST-Others includes the ALL the other filters not used in oth

lect: hst  
om: -- all collections --

epoch  
size  
dens.  
opac.  
zoom

Display[4]  
Display[3]  
Display[2]  
Display[1]  
Details CDS/P/HST/B  
CDS/P/HST/B

# ProvHiPS version 2

## drizzling activities for HST progenitors : names and comments

The screenshot displays the ProvHiPS web interface. At the top, there are navigation tabs for 'File', 'Fov...', and 'Tools...'. The main area is a query editor with a table named 'activity'. The table has columns for 'a\_id', 'a\_name', 'a\_starttime', and 'a\_endtime'. Below the table, there is a query editor with the text: `SELECT TOP 1000 a_name,a_comment FROM activity`. The interface also includes a 'Catalog servers' sidebar on the right with various server icons like All VizieR, SIMBAD, TAP, Gaia, SkyBot, NED, and VO. At the bottom, there is a table of results with columns 'a\_name' and 'a comment'. The table contains 20 rows of data, each representing a drizzling activity for a specific HST progenitor.

a_name	a comment
drw7v010 drc DrizzleGeneration	Production of image  drw7v010_drc by Drizzling of the 4 calibrated ACS HST images  drw7va6q fic.fits[sc1]  drw7va6q fic.fits[sc2]  drw7va6q fic...
dg354010 drc DrizzleGeneration	Production of image  dg354010_drc by Drizzling of the 4 calibrated ACS HST images  dg354smq fic.fits[sc1]  dg354smq fic.fits[sc2]  dg354spq...
dg346010 drc DrizzleGeneration	Production of image  dg346010_drc by Drizzling of the 4 calibrated ACS HST images  dg346yq fic.fits[sc1]  dg346yq fic.fits[sc2]  dg346yq fic...
dg342010 drc DrizzleGeneration	Production of image  dg342010_drc by Drizzling of the 4 calibrated ACS HST images  dg342f9q fic.fits[sc1]  dg342f9q fic.fits[sc2]  dg342f9q fic...
dg328buq drc DrizzleGeneration	Production of image  dg328buq_drc by Drizzling of the 2 calibrated ACS HST images  dg328buq fic.fits[sc1]  dg328buq fic.fits[sc2]  dg328buq fic...
dg312010 drc DrizzleGeneration	Production of image  dg312010_drc by Drizzling of the 4 calibrated ACS HST images  dg312i5q fic.fits[sc1]  dg312i5q fic.fits[sc2]  dg312i5q fic...
dpm05030 drc DrizzleGeneration	Production of image  dpm05030_drc by Drizzling of the 4 calibrated ACS HST images  dpm05hq fic.fits[sc1]  dpm05hq fic.fits[sc2]  dpm05hq fic...
dpm05020 drc DrizzleGeneration	Production of image  dpm05020_drc by Drizzling of the 4 calibrated ACS HST images  dpm05hfq fic.fits[sc1]  dpm05hfq fic.fits[sc2]  dpm05hfq fic...
dpm05010 drc DrizzleGeneration	Production of image  dpm05010_drc by Drizzling of the 6 calibrated ACS HST images  dpm05haq fic.fits[sc1]  dpm05haq fic.fits[sc2]  dpm05haq fic...
dox05pqq drc DrizzleGeneration	Production of image  dox05pqq_drc by Drizzling of the 2 calibrated ACS HST images  dox05pqq fic.fits[sc1]  dox05pqq fic.fits[sc2]  dox05pqq fic...
dox05pcq drc DrizzleGeneration	Production of image  dox05pcq_drc by Drizzling of the 2 calibrated ACS HST images  dox05pcq fic.fits[sc1]  dox05pcq fic.fits[sc2]  dox05pcq fic...
dox05p8q drc DrizzleGeneration	Production of image  dox05p8q_drc by Drizzling of the 2 calibrated ACS HST images  dox05p8q fic.fits[sc1]  dox05p8q fic.fits[sc2]  dox05p8q fic...
dox05p4q drc DrizzleGeneration	Production of image  dox05p4q_drc by Drizzling of the 2 calibrated ACS HST images  dox05p4q fic.fits[sc1]  dox05p4q fic.fits[sc2]  dox05p4q fic...
dox01bhq drc DrizzleGeneration	Production of image  dox01bhq_drc by Drizzling of the 2 calibrated ACS HST images  dox01bhq fic.fits[sc1]  dox01bhq fic.fits[sc2]  dox01bhq fic...
dox01b9q drc DrizzleGeneration	Production of image  dox01b9q_drc by Drizzling of the 2 calibrated ACS HST images  dox01b9q fic.fits[sc1]  dox01b9q fic.fits[sc2]  dox01b9q fic...
dnn10p30 drc DrizzleGeneration	Production of image  dnn10p30_drc by Drizzling of the 4 calibrated ACS HST images  dnn10p3q fic.fits[sc1]  dnn10p3q fic.fits[sc2]  dnn10p3q fic...
dnn09030 drc DrizzleGeneration	Production of image  dnn09030_drc by Drizzling of the 4 calibrated ACS HST images  dnn09ba fic.fits[sc1]  dnn09ba fic.fits[sc2]  dnn09ba fic...
dnn08030 drc DrizzleGeneration	Production of image  dnn08030_drc by Drizzling of the 4 calibrated ACS HST images  dnn08yq fic.fits[sc1]  dnn08yq fic.fits[sc2]  dnn08yq fic...
dnn08020 drc DrizzleGeneration	Production of image  dnn08020_drc by Drizzling of the 4 calibrated ACS HST images  dnn08yq fic.fits[sc1]  dnn08yq fic.fits[sc2]  dnn08yq fic...
dnn07020 drc DrizzleGeneration	Production of image  dnn07020_drc by Drizzling of the 4 calibrated ACS HST images  dnn07yq fic.fits[sc1]  dnn07yq fic.fits[sc2]  dnn07yq fic...
dnn07010 drc DrizzleGeneration	Production of image  dnn07010_drc by Drizzling of the 4 calibrated ACS HST images  dnn07yq fic.fits[sc1]  dnn07yq fic.fits[sc2]  dnn07yq fic...
dne08030 drc DrizzleGeneration	Production of image  dne08030_drc by Drizzling of the 6 calibrated ACS HST images  dne08yq fic.fits[sc1]  dne08yq fic.fits[sc2]  dne08yq fic...
dne06020 drc DrizzleGeneration	Production of image  dne06020_drc by Drizzling of the 8 calibrated ACS HST images  dne06cqa fic.fits[sc1]  dne06cqa fic.fits[sc2]  dne06cqa fic...
dne02020 drc DrizzleGeneration	Production of image  dne02020_drc by Drizzling of the 8 calibrated ACS HST images  dne02bmq fic.fits[sc1]  dne02bmq fic.fits[sc2]  dne02bmq fic...
dm96h020 drc DrizzleGeneration	Production of image  dm96h020_drc by Drizzling of the 4 calibrated ACS HST images  dm96h5a fic.fits[sc1]  dm96h5a fic.fits[sc2]  dm96h5a fic...
dm96e020 drc DrizzleGeneration	Production of image  dm96e020_drc by Drizzling of the 4 calibrated ACS HST images  dm96eina fic.fits[sc1]  dm96eina fic.fits[sc2]  dm96eina fic...
dm96c020 drc DrizzleGeneration	Production of image  dm96c020_drc by Drizzling of the 4 calibrated ACS HST images  dm96cn2q fic.fits[sc1]  dm96cn2q fic.fits[sc2]  dm96cn2q fic...
dm201020 drc DrizzleGeneration	Production of image  dm201020_drc by Drizzling of the 6 calibrated ACS HST images  dm201yq fic.fits[sc1]  dm201yq fic.fits[sc2]  dm201yq fic...
dip03020 drc DrizzleGeneration	Production of image  dip03020_drc by Drizzling of the 4 calibrated ACS HST images  dip03rcd fic.fits[sc1]  dip03rcd fic.fits[sc2]  dip03rcd fic...
dip01020 drc DrizzleGeneration	Production of image  dip01020_drc by Drizzling of the 6 calibrated ACS HST images  dip01fqa fic.fits[sc1]  dip01fqa fic.fits[sc2]  dip01fqa fic...
d866eqq drc DrizzleGeneration	Production of image  d866eqq_drc by Drizzling of the 2 calibrated ACS HST images  d866eqq fic.fits[sc1]  d866eqq fic.fits[sc2]  d866eqq fic...

# Conclusion/future work

- Complete provenance database for HST and HST HiPS tiles.
- Connect to full HiPS and surveys as data collections
- Release the prototype before next interop
- Help users to query the database by providing embedded sql functions
- Cross combine information with other provenance projects

