ProvTAP access to provenance Metadata :

specification and ProvHiPS reference implementation

F.Bonnarel, CDS on behalf of M.Servillat, M.Louys, M.Nullmeier, M.Sanguillon, L.Michel, G.Mantelet, A.Egner, D.Durand

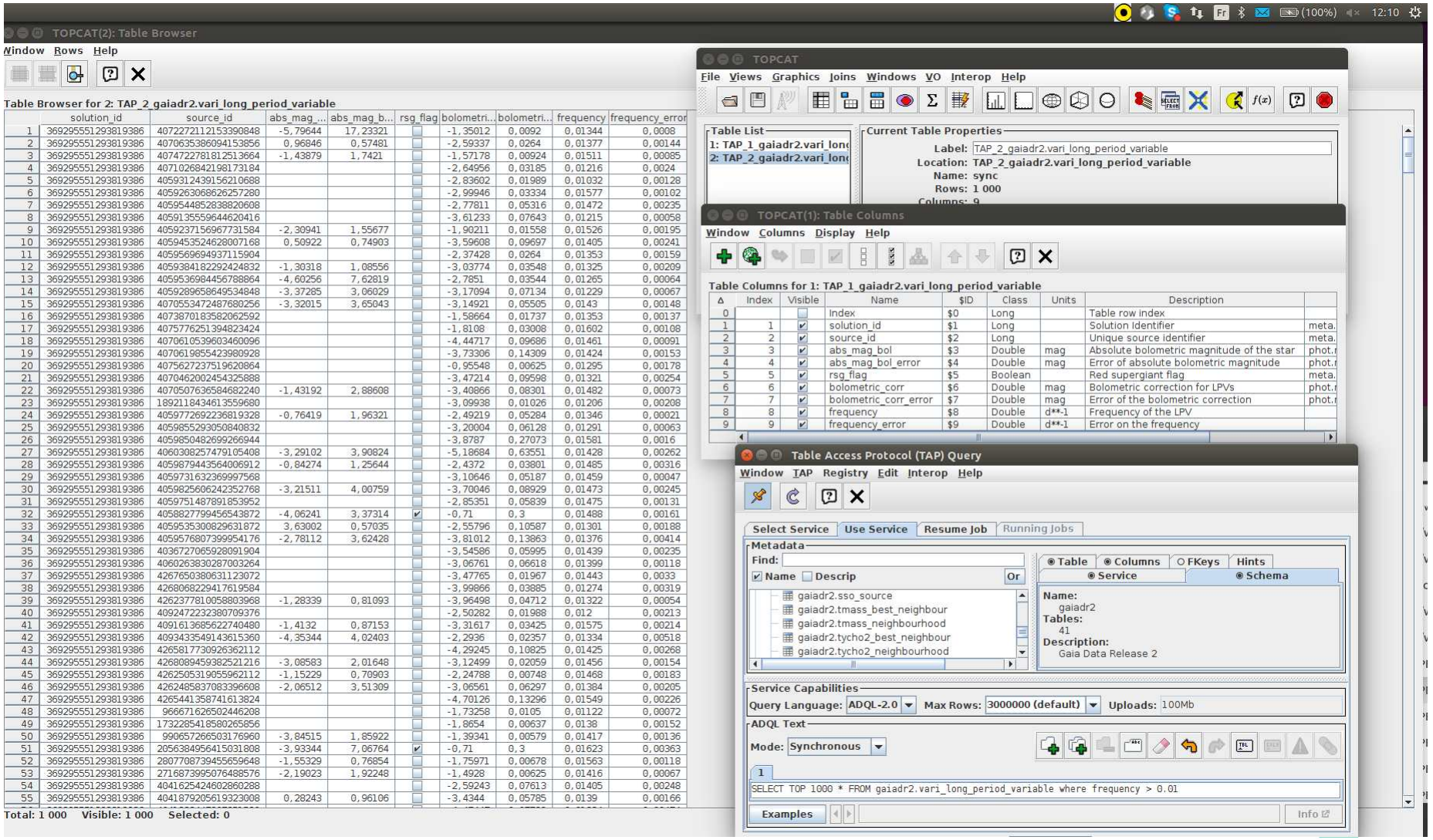
CENTRE DE DONNÉES ASTRONOMIQUES DE STRASBOURG

TAP

- ProvTAP is a TAP service → what is TAP ?
- Most of astronomical archives and services rely on relational databases
  - Too much various DBMS remote interfaces and SQL-like langages

    → an issue for interoperability
  - TAP :
    - specification defining an interoperable interface layer on top of DBMS.
    - Using an universal SQL-like langage adapted to astronomy : ADQL
    - TAP schema = describes available tables and columns
    - Example : Gaia catalog query

TAP service distributing Gaia at ESAVO



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2	36929555129381938 6	40706353860941538 56	0,96846	0,57481		-2,59337	0,0264	0,01377	0,00144
3	36929555129381938 6	40747227818125136 64	-1,43879	1,7421		-1,57178	0,00924	0,01511	0,00085
4	36929555129381938 6	40710268421981731 84				-2,64956	0,03185	0,01216	0,0024
5	36929555129381938 6	40593124391562106 88				-2,83602	0,01989	0,01032	0,00128
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9	36929555129381938 6	40592371569677315 84	-2,30941	1,55677		-1,90211	0,01558	0,01526	0,00195
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11	36929555129381938 6	40595696949371159 04				-2,37428	0,0264	0,01353	0,00159
12	36929555129381938 6	40593841822924248 32	-1,30318	1,08556		-3,03774	0,03548	0,01325	0,00209
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43	36929555129381938 6	42658177309263621 12				-4,29245	0,10825	0,01425	0,00268
44	36929555129381938 6	42680894593825212 16	-3,08583	2,01648		-3,12499	0,02059	0,01456	0,00154
45	36929555129381938 6	42625053190559621 12	-1,15229	0,70903		-2,24788	0,00748	0,01468	0,00183
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49	36929555129381938 6	17322854185802656 56				-1,8654	0,00637	0,0138	0,00152
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51	36929555129381938 6	20563849564150318 08	-3,93344	7,06764	✔	-0,71	0,3	0,01623	0,00363
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53	36929555129381938 6	27168739950764885 76	-2,19023	1,92248		-1,4928	0,00625	0,01416	0,00067
54	36929555129381938 6	40416254246026802 88				-2,59243	0,07613	0,01405	0,00248
55	36929555129381938 6	40418792056193230 08	0,28243	0,96106		-3,4344	0,05785	0,0139	0,00166

Total: 1 000 Visible: 1 000 Selected: 0

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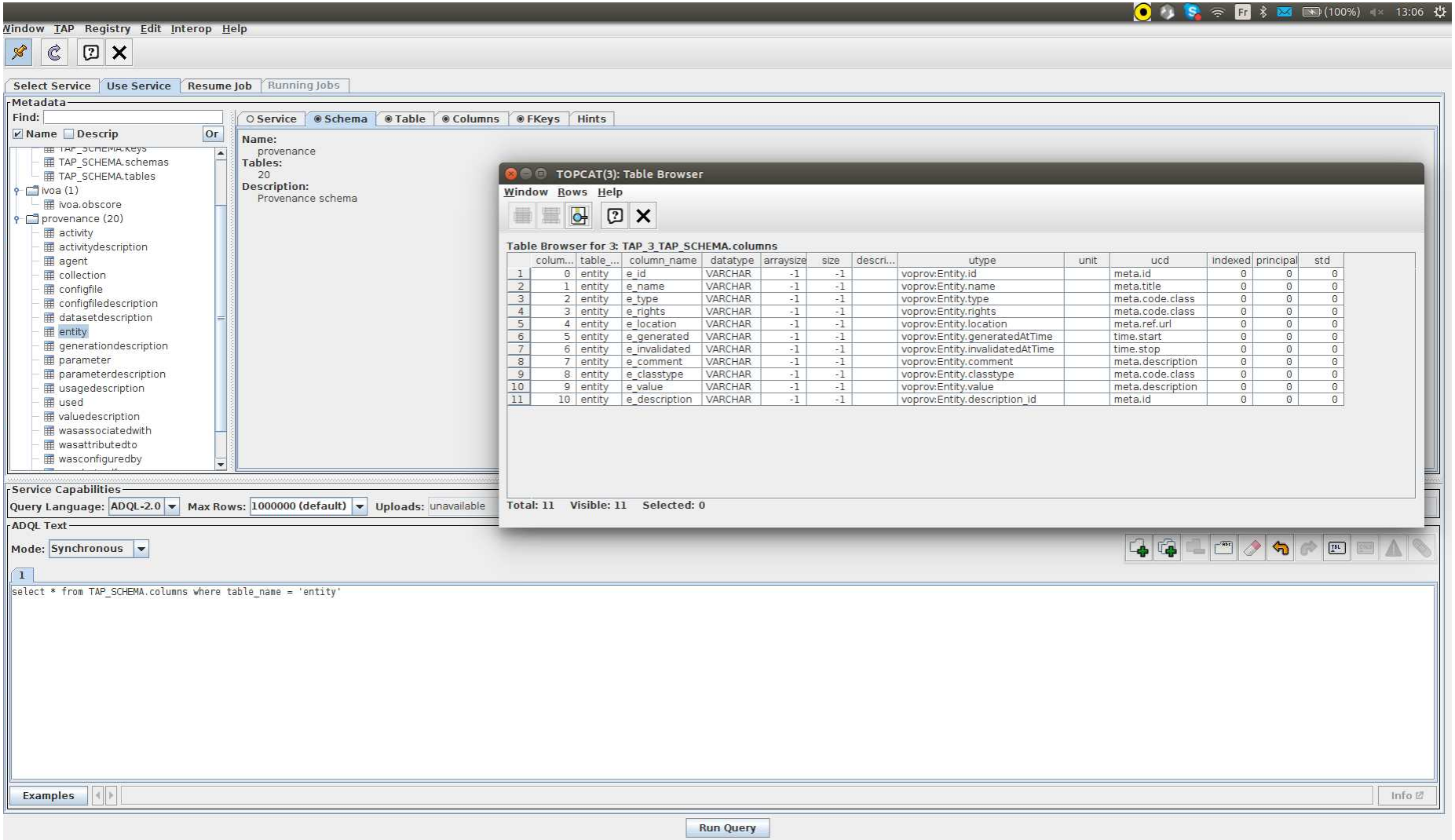
2	2	✔	source_id	$2	Long		Unique source identifier	meta.
3	3	✔	abs_mag_bol	$3	Double	mag	Absolute bolometric magnitude of the star	phot.r
4	4	✔	abs_mag_bol_error	$4	Double	mag	Error of absolute bolometric magnitude	phot.r
5	5	✔	rsg_flag	$5	Boolean		Red supergiant flag	meta.
6	6	✔	bolometric_corr	$6	Double	mag	Bolometric correction for LPVs	phot.r
7	7	✔	bolometric_corr_error	$7	Double	mag	Error of the bolometric correction	phot.r
8	8	✔	frequency	$8	Double	d**-1	Frequency of the LPV	
9	9	✔	frequency_error	$9	Double	d**-1	Error on the frequency	

ProvTAP

- ProvTAP specification is mapping IVOA Provenance data model onto the TAP schema.
- The TAP schema defines
  - table and columns names,
  - Datatypes,
  - Units,
  - Ucds
  - and utypes (model attributed id)
  - → for each model feature !

TAP SCHEMA = Entity table



ProvTAP specification

for IVOA provenance datamodel serialisation and metadata service

- specification is currently an internal IVOA draft → WD Before interop

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

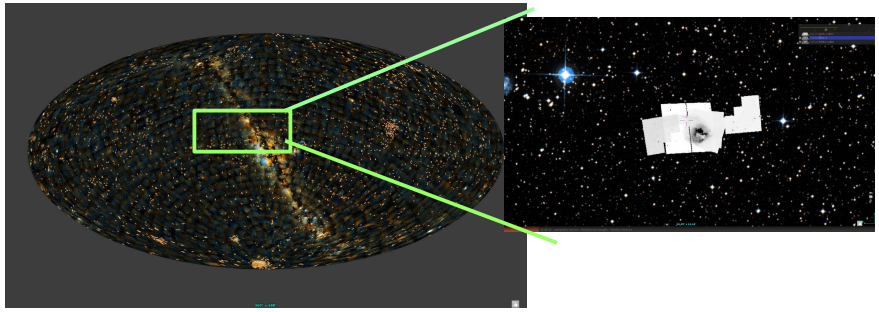
Author(s)
François Bonnarel, Mireille Louys, Markus Nullmeier, Kristin Riebe, Michèle Sanguillon, Mathieu Servillat, IVOA Data Model Working Group
Editor(s)
François Bonnarel

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 implementing with TAP 1.1.

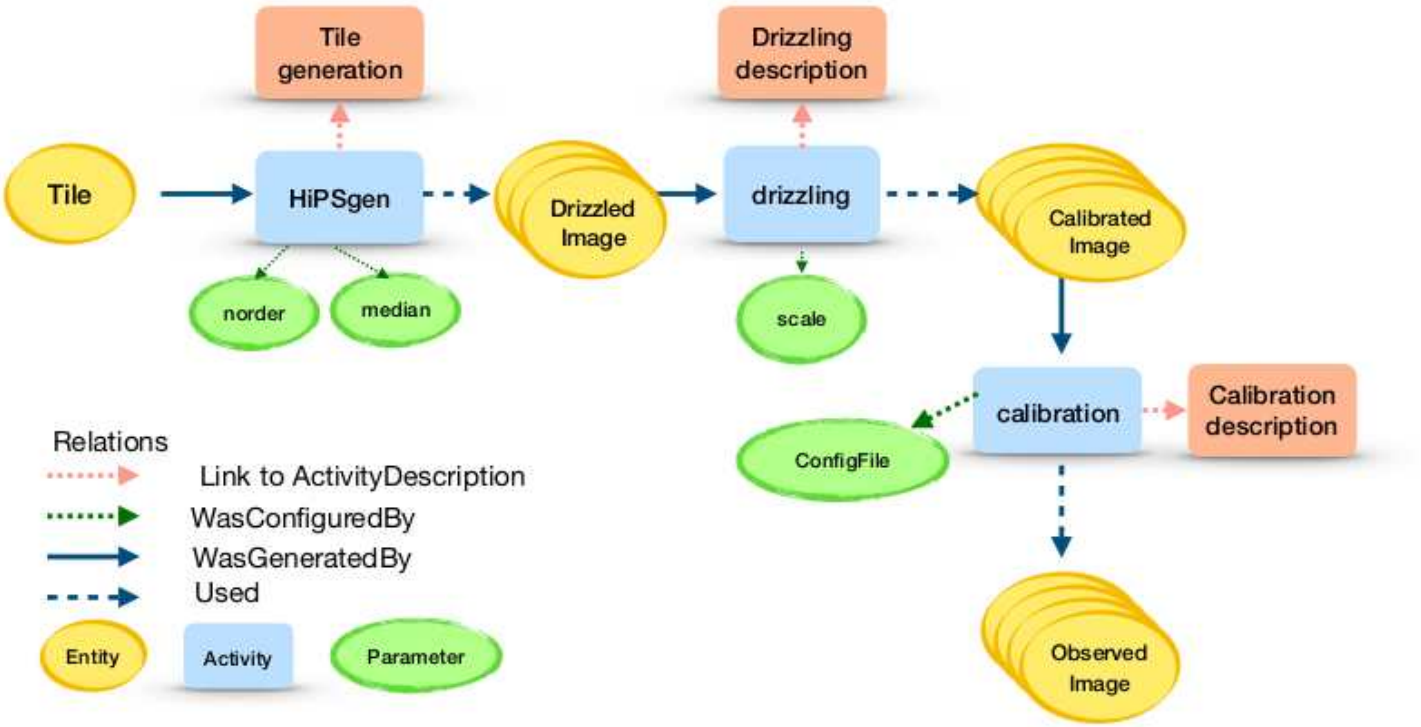
ProvHiPS project

- Tracing provenance of HiPS and HiPS tiles
  - From HiPS tiles back to raw HST images,
  - through « drizzled » images
  - and « calibrated » images



- ProvHiPS is a testbed for « On Top provenance » for image processing in optical astronomy.
  - See examples next slides

«HiPS» Provenance diagram

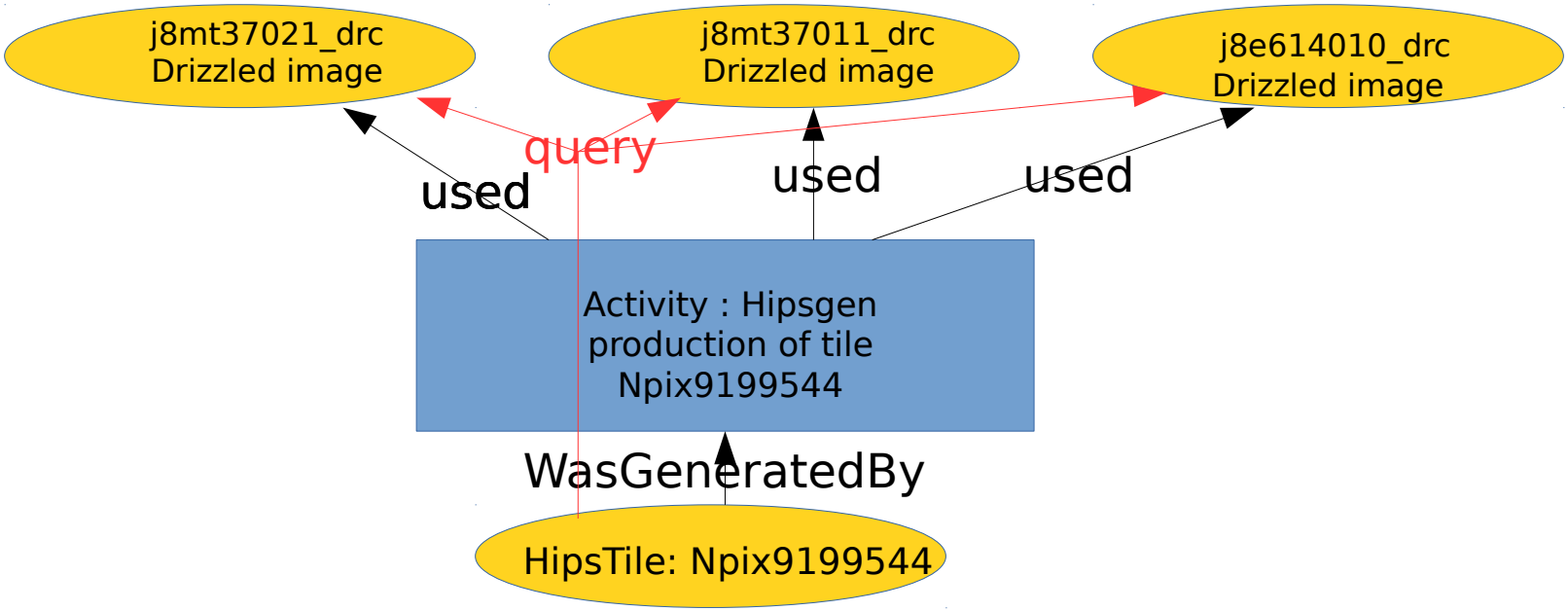


Provenance tracking for Prov-HiPS

ltiples

ProvHiPS ADQL query examples :

Finding out drizzled images « progenitors » of a specific HiPS tile.



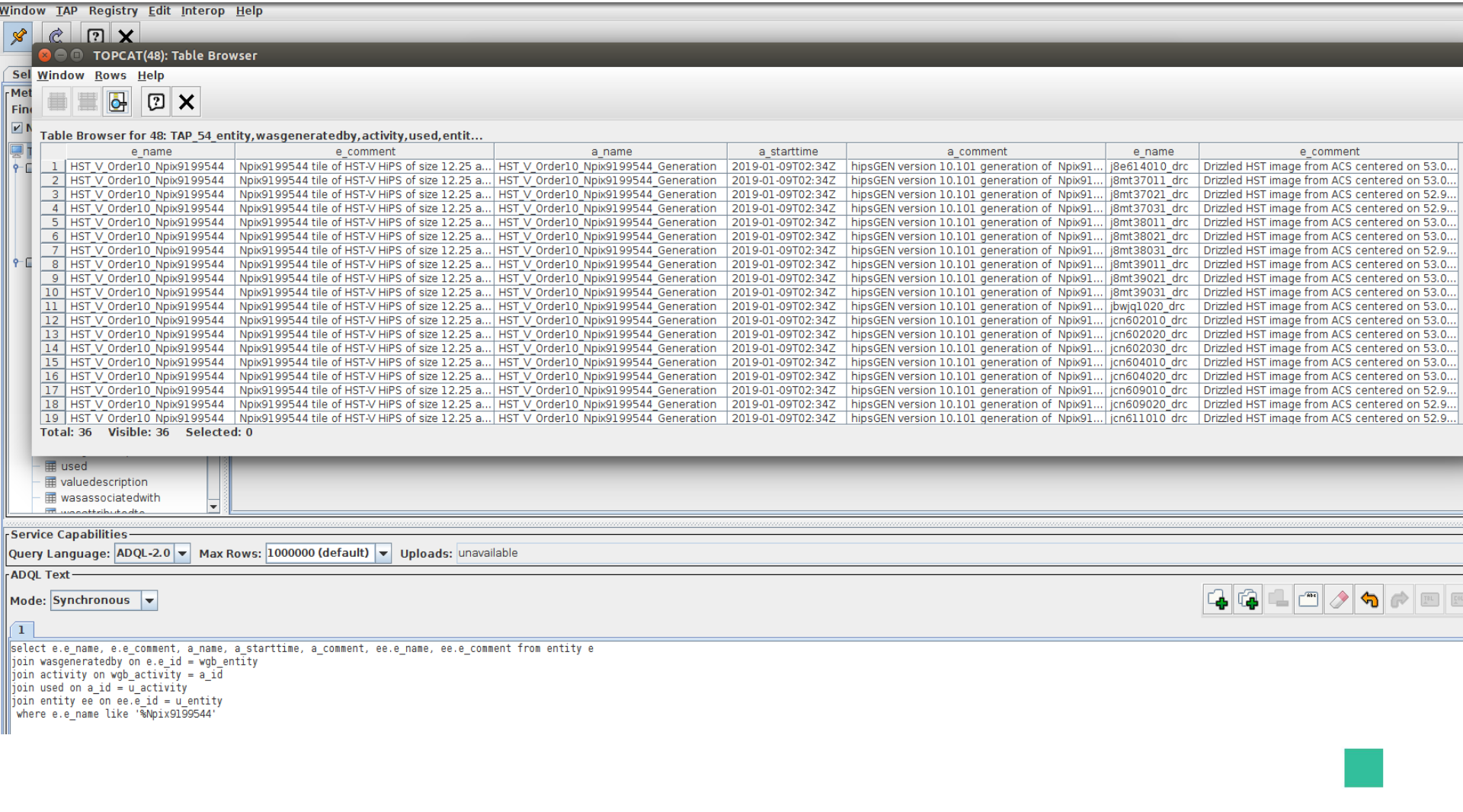
ProvHiPS ADQL query examples :

Finding out drizzled images « progenitors » of a specific HiPS tile.

```
select tile.e_name, tile.e_comment, hipsgen.a_name,
 hipsgen.a_starttime, hipsgen.a_comment, drizzle.e_name,
    drizzle.e_comment from entity tile
join wasgeneratedby on tile.e_id = wgb_entity
join activity hipsgen on wgb_activity = hipsgen.a_id
join used on hipsgen.a_id = u_activity
join entity drizzle   on drizzle.e_id = u_entity
where tile.e_name like '%Npix9199544'
```

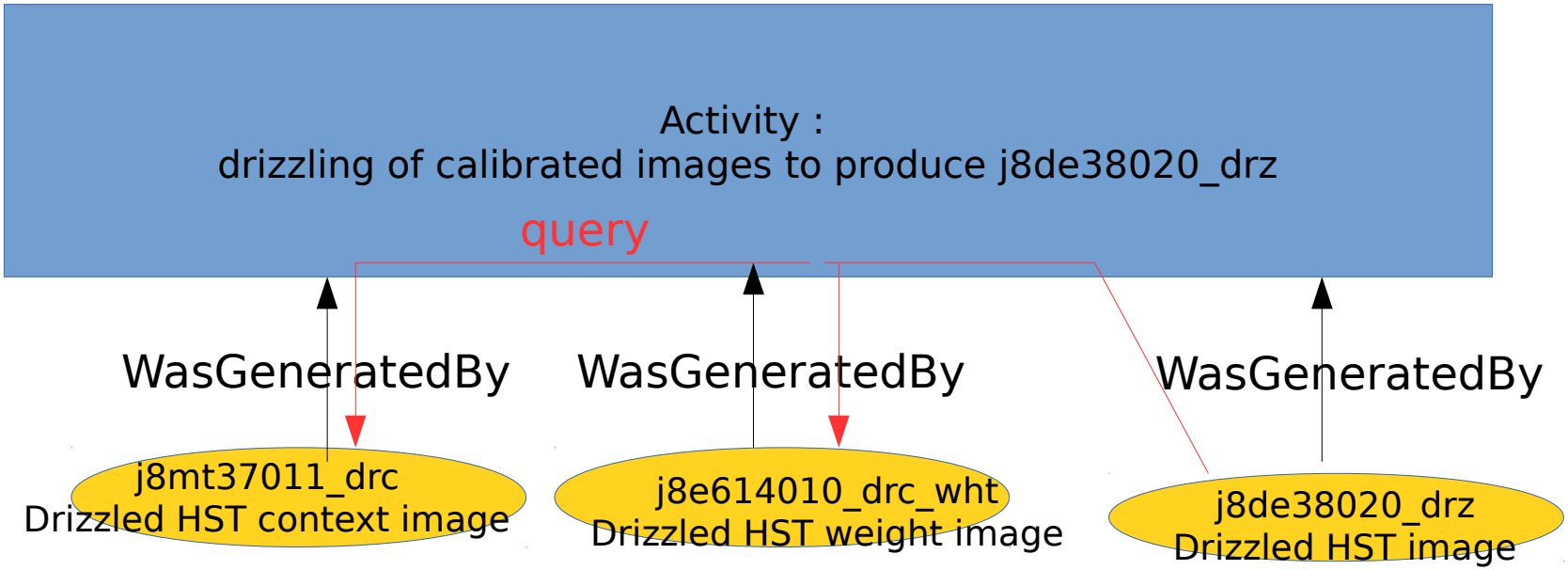
ProvHiPS ADQL query examples :

Finding out drizzled images « progenitors » of a specific HiPS tile.



ProvHiPS ADQL query examples :

Finding out other products of a drizzling activity which generated a specific drizzled image.



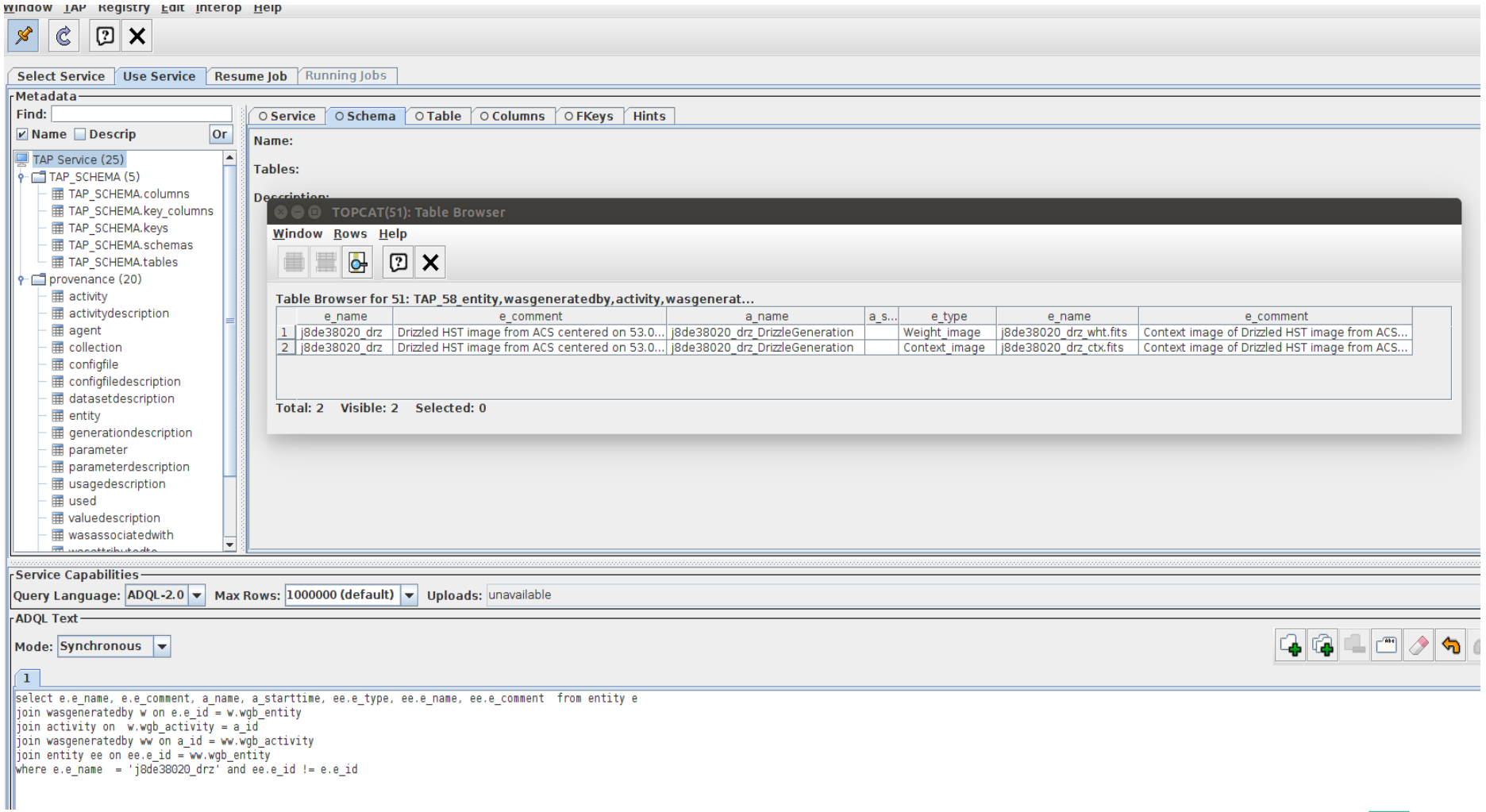
ProvHiPS ADQL query examples :

Finding out other products of a drizzling activity which generated a specific drizzled image

```
select drizzle.e_name, drizzle.e_comment,
 drizzling.a_name, drizzling.a_starttime,
 drizzleaux.e_type, drizzleaux.e_name, drizzleaux.e_comment
from entity drizzle
join wasgeneratedby w on drizzle.e_id = w.wgb_entity
join activity drizzling on  w.wgb_activity = drizzling.a_id
join wasgeneratedby ww on drizzling.a_id = ww.wgb_activity join
    entity drizzleaux on drizzleaux.e_id = ww.wgb_entity
where drizzle.e_name  = 'j8de38020_drz'
and drizzleaux.e_id != drizzle.e_id
```

ProvHiPS ADQL query examples :

Finding out other products of a drizzling activity which generated a specific drizzled image



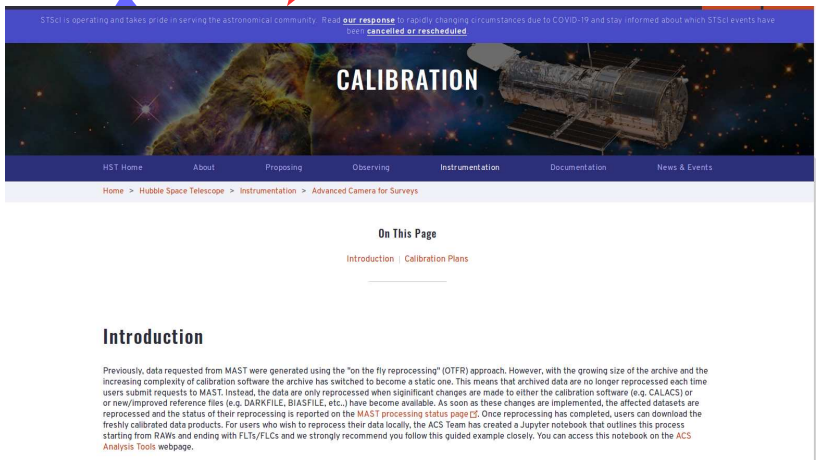
ProvHiPS ADQL query examples :

Displaying some activities documentation for specific activities through their activity description

Calibration
Activity description
-name
- docURL
-etc...

query

Activity : calibration of
Image so and so ... ;



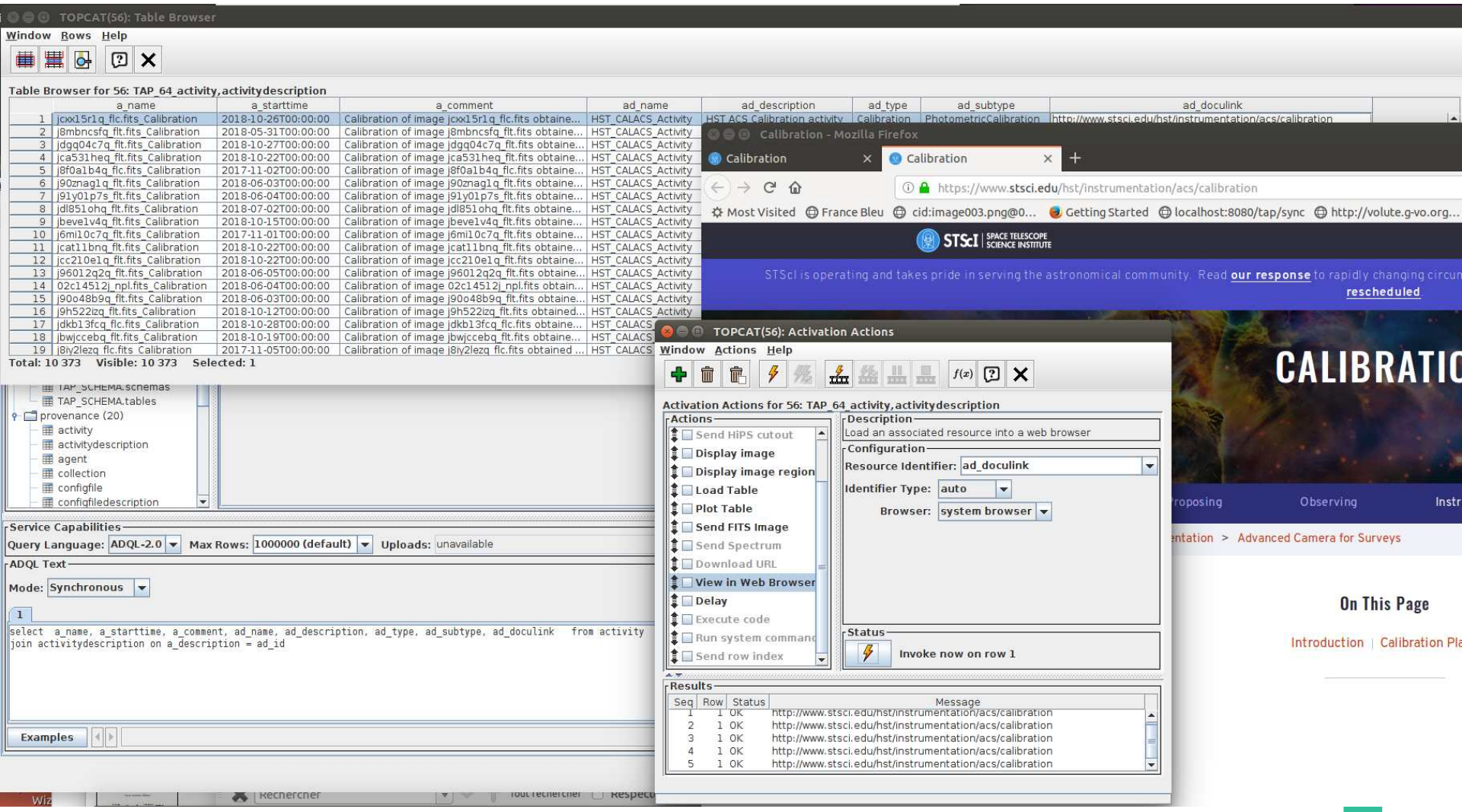
ProvHiPS ADQL query examples :

Displaying some activities documentation for specific activities through their activity description

```
select  anyact.a_name, anyact.a_starttime,
    anyact.a_comment,
 ad_name, ad_description, ad_type, ad_subtype,
    ad_docurl
from activity anyact
join activitydescription on a_description = anycat.ad_id
```

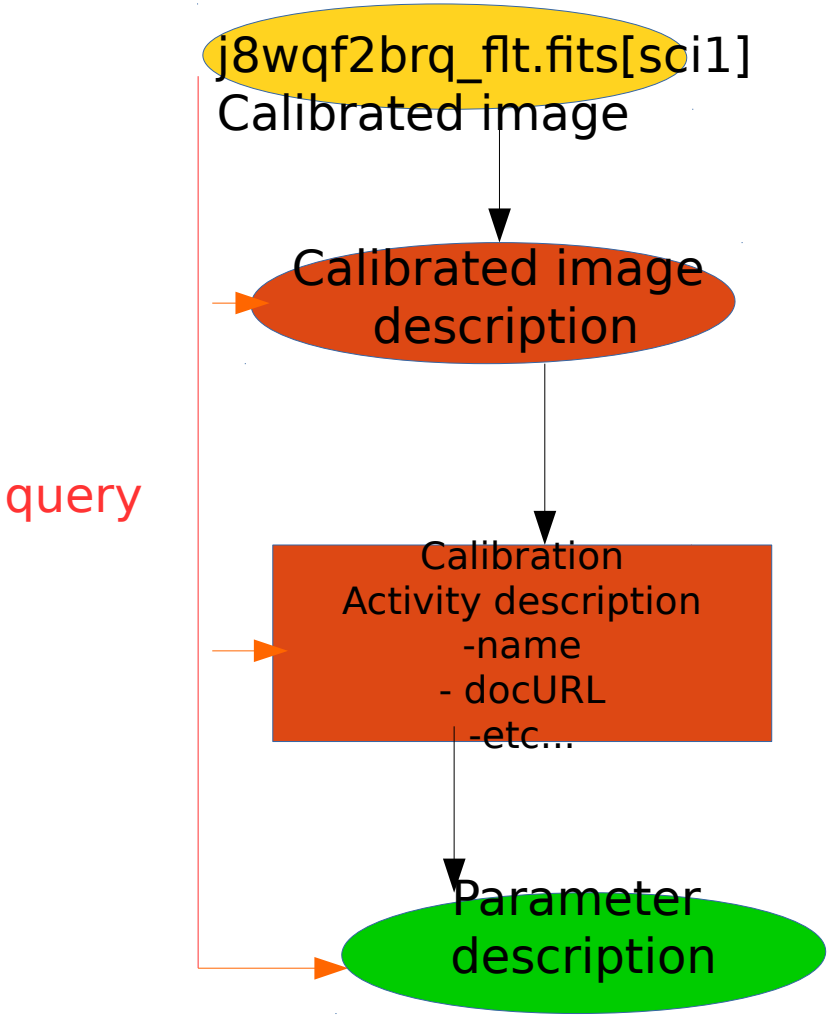
ProvHiPS ADQL query examples :

Displaying some activities documentation for specific activities through their activity description



ProvHiPS ADQL query examples :

Find out parameter descriptions of parameter used to generate a calibrated file



ProvHiPS ADQL query examples :

Find out parameter descriptions of parameter used to generate a calibrated file

```
select top 3 * from entity
join datasetdescription on e_description = dd_id
join generationdescription on gd_entitydescription =dd_id
join activitydescription on ad_id = gd_activitydescription
join parameterdescription on pd_activitydescription = ad_id
where e_name = 'j8wqf2brq_flt.fits[sci1]' ;
```

ProvHiPS ADQL query examples :

Find out parameter descriptions of parameter used to generate a calibrated file