



ProvHiPS

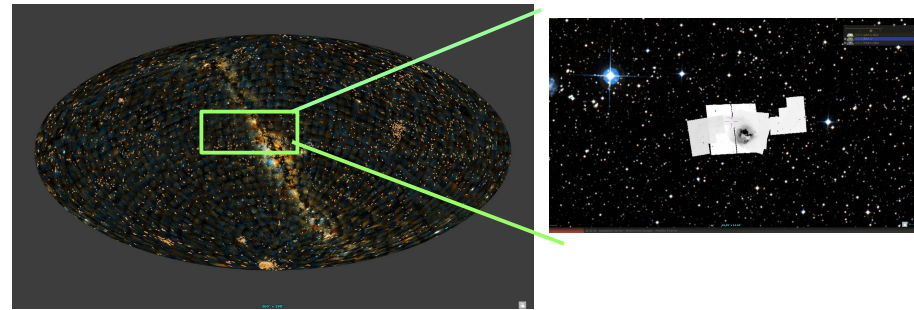
An « on top » provenance implementation

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



ProvHiPS project

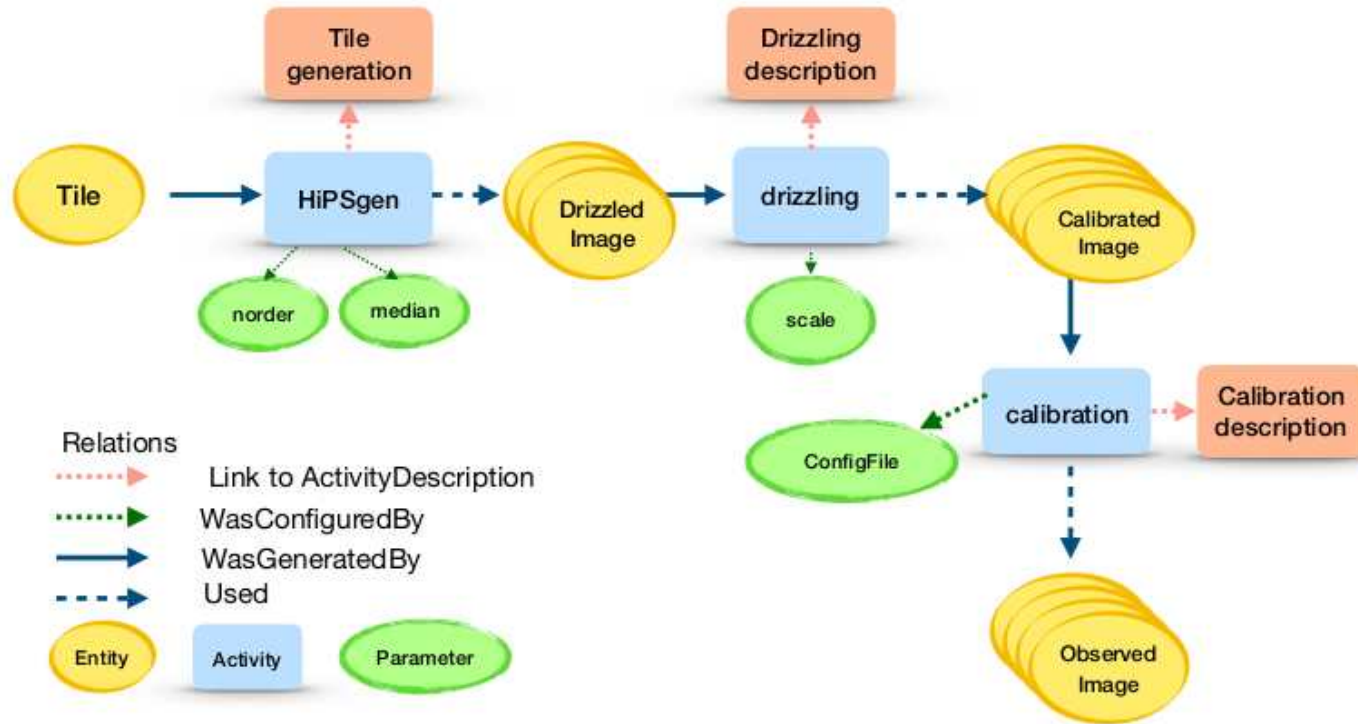
- Tracing provenance of HiPS and HiPS tiles
 - From HiPS tiles back to raw HST images, through « drizzled » images and single « calibrated » images



- ProvHiPS is both :
 - A testbed for « On Top provenance » for image processing in optical astronomy.
 - See examples next slides
 - A reference implementation of ProvTAP
 - ProvTAP is basically a « TAP schema » mapping the Provenance DM.
 - Allows to deliver provenance information using TAP services
 - ProvTAP is currently adapted by authors with respect to the DM Recommendation
 - Soon published as a Working Draft



«HiPS» Provenance diagram



Itiples

Provenance tracking for Prov-HiPS



ProvHiPS ADQL query examples

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

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

- Finding out drizzling activities attributed to a specific agent

```
select a_name, a_comment, a_starttime, waw_role, ag_name, ag_type from agent  
join wasassociatedwith on ag_id = waw_agent  
join activity on a_id = waw_activity  
where ag_name = 'Ms Ann Drizzler'
```



ProvHiPS ADQL query examples

- Displaying some activities documentation for specific activities through their activity description

```
select a_name, a_starttime, a_comment, ad_name, ad_description,  
       ad_type, ad_subtype, ad_doculink  
from activity  
join activitydescription on a_description = ad_id
```

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

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



HiPS tile progenitor

Window TAP Registry Edit Interop Help

TOPCAT(48): Table Browser

Table Browser for 48: TAP_54_entity,wasgeneratedby,activity,used,entit...

	e_name	e_comment	a_name	a_starttime	a_comment	e_name	e_comment
1	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8e614010_drc	Drizzled HST image from ACS centered on 53.0...
2	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt37011_drc	Drizzled HST image from ACS centered on 53.0...
3	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt37021_drc	Drizzled HST image from ACS centered on 52.9...
4	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt37031_drc	Drizzled HST image from ACS centered on 52.9...
5	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt38011_drc	Drizzled HST image from ACS centered on 53.0...
6	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt38021_drc	Drizzled HST image from ACS centered on 53.0...
7	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt38031_drc	Drizzled HST image from ACS centered on 52.9...
8	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt39011_drc	Drizzled HST image from ACS centered on 53.0...
9	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt39021_drc	Drizzled HST image from ACS centered on 53.0...
10	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	j8mt39031_drc	Drizzled HST image from ACS centered on 53.0...
11	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jbwj1020_drc	Drizzled HST image from ACS centered on 53.0...
12	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc602020_drc	Drizzled HST image from ACS centered on 53.0...
13	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc602020_drc	Drizzled HST image from ACS centered on 53.0...
14	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc602030_drc	Drizzled HST image from ACS centered on 53.0...
15	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc604010_drc	Drizzled HST image from ACS centered on 53.0...
16	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc604020_drc	Drizzled HST image from ACS centered on 53.0...
17	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc609010_drc	Drizzled HST image from ACS centered on 52.9...
18	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc609020_drc	Drizzled HST image from ACS centered on 52.9...
19	HST_V_Order10_Npix9199544	Npix9199544 tile of HST-V HIPS of size 12.25 a...	HST_V_Order10_Npix9199544 Generation	2019-01-09T02:34Z	hipsGEN version 10.101 generation of Npix91...	jc611010_drc	Drizzled HST image from ACS centered on 52.9...

Total: 36 Visible: 36 Selected: 0

used
valuedescription
wasassociatedwith
unattributed

Service Capabilities

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

ADQL Text

Mode: Synchronous

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



Co-generated products of a specific activity

Window TAP Registry Edit Interop Help

Select Service Use Service Resume Job Running Jobs

Metadata

Find:

Name Descrip Or

- TAP Service (25)
 - TAP_SCHEMA (5)
 - TAP_SCHEMA.columns
 - TAP_SCHEMA.key_columns
 - TAP_SCHEMA.keys
 - TAP_SCHEMA.schemas
 - TAP_SCHEMA.tables
 - provenance (20)
 - activity
 - activitydescription
 - agent
 - collection
 - configfile
 - configfiledescription
 - datasetdescription
 - entity
 - generationdescription
 - parameter
 - parameterdescription
 - usagedescription
 - used
 - valuedescription
 - wasassociatedwith
 - wasattibutedto

Service: Schema Table Columns FKeys Hints

Name:

Tables:

Description:

TOPCAT(51): Table Browser

Window Rows Help

Table Browser for 51: TAP_58_entity,wasgeneratedby,activity,wasgenerat...

	e_name	e_comment	a_name	a_s...	e_type	e_name	e_comment
1	j8de38020_drz	Drizzled HST image from ACS centered on 53.0...	j8de38020_drz_DrizzleGeneration		Weight_image	j8de38020_drz_wht.fits	Context image of Drizzled HST image from ACS...
2	j8de38020_drz	Drizzled HST image from ACS centered on 53.0...	j8de38020_drz_DrizzleGeneration		Context_image	j8de38020_drz_ctx.fits	Context image of Drizzled HST image from ACS...

Total: 2 Visible: 2 Selected: 0

Service Capabilities

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

ADQL Text

Mode: Synchronous

```
1
select e.e_name, e.e_comment, a_name, a_starttime, ee.e_type, ee.e_name, ee.e_comment from entity e
join wasgeneratedby w on e.e_id = w.wgb_entity
join activity on w.wgb_activity = a_id
join wasgeneratedby ww on a_id = ww.wgb_activity
join entity ee on ee.e_id = ww.wgb_entity
where e.e_name = 'j8de38020_drz' and ee.e_id != e.e_id
```



Documentation for specific activities through their activity description

The image shows a screenshot of the TOPCAT software interface. The main window displays a table with 19 rows of activity descriptions. The columns include a_name, a_starttime, a_comment, ad_name, ad_description, ad_type, ad_subtype, and ad_doculink. The table is titled "Table Browser for 56: TAP_64_activity,activitydescription".

	a_name	a_starttime	a_comment	ad_name	ad_description	ad_type	ad_subtype	ad_doculink
1	jcx15r1q.flc.fits_Calibration	2018-10-26T00:00:00	Calibration of image jcx15r1q.flc.fits obtaine...	HST_CALACS_Activity	HST_ACS_Calibration activity - Calibration	PhotometricCalibration		http://www.stsci.edu/hst/instrumentation/acs/calibration
2	j8mbncsfq.flc.fits_Calibration	2018-05-31T00:00:00	Calibration of image j8mbncsfq.flc.fits obtaine...	HST_CALACS_Activity				
3	jdgg04c7q.flc.fits_Calibration	2018-10-27T00:00:00	Calibration of image jdgg04c7q.flc.fits obtaine...	HST_CALACS_Activity				
4	jca531heq.flc.fits_Calibration	2018-10-22T00:00:00	Calibration of image jca531heq.flc.fits obtaine...	HST_CALACS_Activity				
5	j8f0a1b4q.flc.fits_Calibration	2017-11-02T00:00:00	Calibration of image j8f0a1b4q.flc.fits obtaine...	HST_CALACS_Activity				
6	j90znag1q.flc.fits_Calibration	2018-06-03T00:00:00	Calibration of image j90znag1q.flc.fits obtaine...	HST_CALACS_Activity				
7	j91y01p7s.flc.fits_Calibration	2018-06-04T00:00:00	Calibration of image j91y01p7s.flc.fits obtaine...	HST_CALACS_Activity				
8	jd851ohq.flc.fits_Calibration	2018-07-02T00:00:00	Calibration of image jd851ohq.flc.fits obtaine...	HST_CALACS_Activity				
9	jbeve1v4q.flc.fits_Calibration	2018-10-15T00:00:00	Calibration of image jbeve1v4q.flc.fits obtaine...	HST_CALACS_Activity				
10	j6mi10c7q.flc.fits_Calibration	2017-11-01T00:00:00	Calibration of image j6mi10c7q.flc.fits obtaine...	HST_CALACS_Activity				
11	jcat11bnq.flc.fits_Calibration	2018-10-22T00:00:00	Calibration of image jcat11bnq.flc.fits obtaine...	HST_CALACS_Activity				
12	jcc210e1q.flc.fits_Calibration	2018-10-22T00:00:00	Calibration of image jcc210e1q.flc.fits obtaine...	HST_CALACS_Activity				
13	j96012q2q.flc.fits_Calibration	2018-06-05T00:00:00	Calibration of image j96012q2q.flc.fits obtaine...	HST_CALACS_Activity				
14	02c14512j.npl.fits_Calibration	2018-06-04T00:00:00	Calibration of image 02c14512j.npl.fits obtaine...	HST_CALACS_Activity				
15	j90o48b9q.flc.fits_Calibration	2018-06-03T00:00:00	Calibration of image j90o48b9q.flc.fits obtaine...	HST_CALACS_Activity				
16	j9h522zq.flc.fits_Calibration	2018-10-12T00:00:00	Calibration of image j9h522zq.flc.fits obtained...	HST_CALACS_Activity				
17	jdkb13fcq.flc.fits_Calibration	2018-10-28T00:00:00	Calibration of image jdkb13fcq.flc.fits obtaine...	HST_CALACS_Activity				
18	jbwjccbeq.flc.fits_Calibration	2018-10-19T00:00:00	Calibration of image jbwjccbeq.flc.fits obtaine...	HST_CALACS_Activity				
19	j8y2leqz.flc.fits_Calibration	2017-11-05T00:00:00	Calibration of image j8y2leqz.flc.fits obtained...	HST_CALACS_Activity				

The "Activation Actions" dialog box is open, showing a list of actions for the selected row. The "View in Web Browser" action is selected. The configuration for this action is shown on the right, including the Resource Identifier (ad_doculink), Identifier Type (auto), and Browser (system browser). The status bar indicates "Invoke now on row 1".

The "Results" table shows the execution of the "View in Web Browser" action for the first five rows, all with a status of "OK".

Seq	Row	Status	Message
1	1	OK	http://www.stsci.edu/hst/instrumentation/acs/calibration
2	1	OK	http://www.stsci.edu/hst/instrumentation/acs/calibration
3	1	OK	http://www.stsci.edu/hst/instrumentation/acs/calibration
4	1	OK	http://www.stsci.edu/hst/instrumentation/acs/calibration
5	1	OK	http://www.stsci.edu/hst/instrumentation/acs/calibration