Python and Javascript modular components for quick retrieval of VO data collections

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Outline

- Astroquery.cds
  - Description and how it works
  - Demo
  - Future developments
- A new data collections discovery widget for web portals
  - Features description
  - Demo

Astroquery.cds

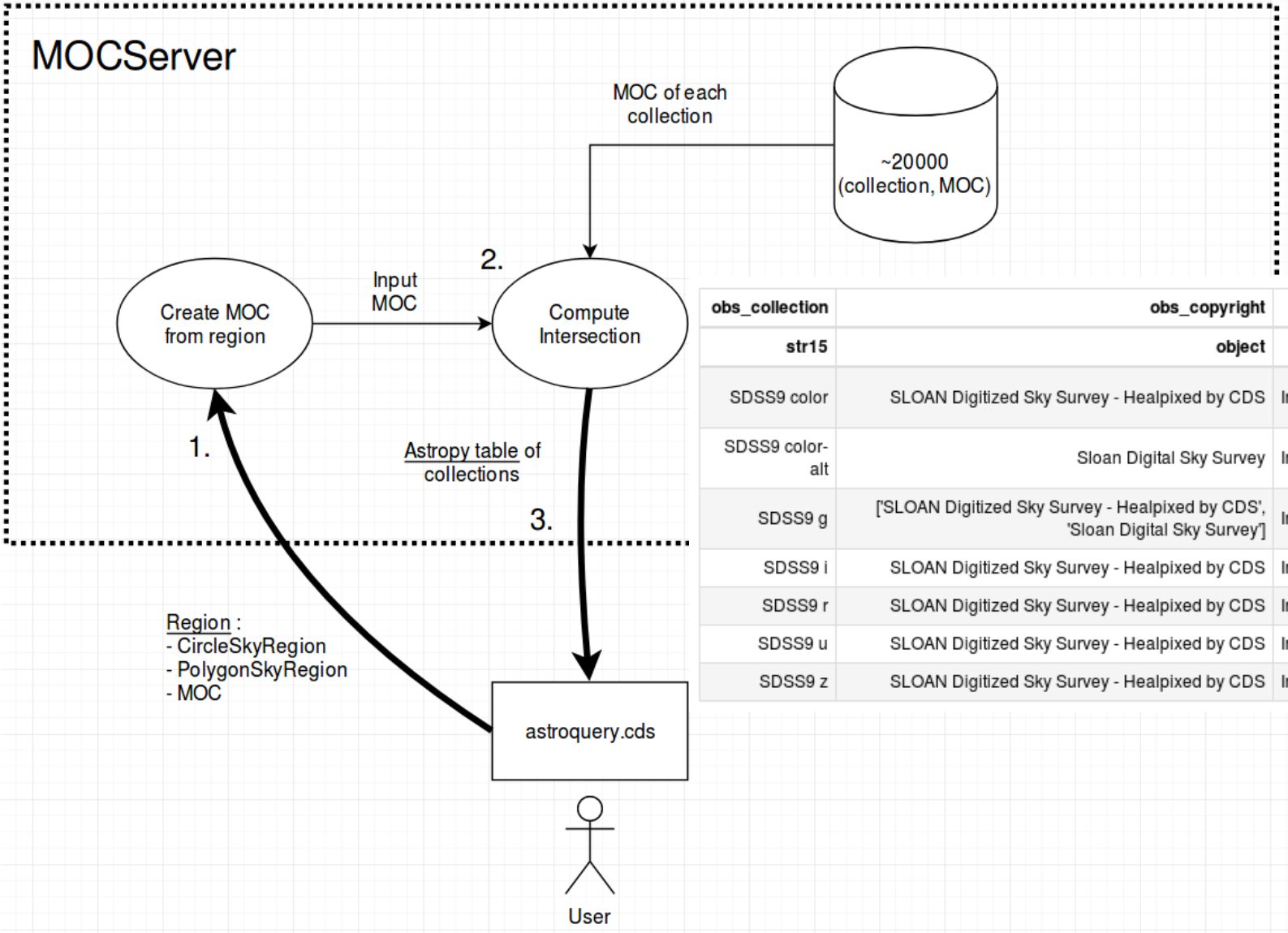
- A new astroquery module that queries the CDS MOCServer
- Merged into the master branch on July 23
  - Available since astroquery v0.3.9
    - pip install -U astroquery
  - Dependencies
    - astropy/regions
    - astropy-healpix
    - mocpy

Astroquery.cds :

Returns the collections

- Having some sources in a specific region
- Of specific meta-data values
  - Examples :
    - Get the collections having a MOC covering at least 30 % of the sky
    - Retrieve all HST collections
    - Get the collection with a specific bibcode

Astroquery.cds



obs_collection	obs_copyright	client_category	creator_did	
str15	object	str18	str27	
SDSS9 color	SLOAN Digitized Sky Survey - Healpixed by CDS	Image/Optical/SDSS	ivo://CDS/P/SDSS9/color	CDS/P
SDSS9 color-alt	Sloan Digital Sky Survey	Image/Optical/SDSS	ivo://CDS/P/SDSS9/color-alt	C
SDSS9 g	['SLOAN Digitized Sky Survey - Healpixed by CDS', 'Sloan Digital Sky Survey']	Image/Optical/SDSS	ivo://CDS/P/SDSS9/g	CD
SDSS9 i	SLOAN Digitized Sky Survey - Healpixed by CDS	Image/Optical/SDSS	--	CD
SDSS9 r	SLOAN Digitized Sky Survey - Healpixed by CDS	Image/Optical/SDSS	ivo://CDS/P/SDSS9/r	CD
SDSS9 u	SLOAN Digitized Sky Survey - Healpixed by CDS	Image/Optical/SDSS	ivo://CDS/P/SDSS9/u	CD
SDSS9 z	SLOAN Digitized Sky Survey - Healpixed by CDS	Image/Optical/SDSS	ivo://CDS/P/SDSS9/z	CD

Demonstration

In [2]:
```
from astropy.coordinates import Angle, SkyCoord
from regions import CircleSkyRegion
# Define a `regions.CircleSkyRegion`
center = SkyCoord(10.8, 32.2, unit='deg')
radius = Angle(1.5, unit='deg')
cone = CircleSkyRegion(center, radius)
```

In [3]:
```
# Get an `astropy.table.Table` of all the datasets having observations in the cone
datasets_in_region = cds.query_region(region=cone, fields=['obs_title', 'moc_sky_fraction', 'em_min'])
datasets_in_region
```

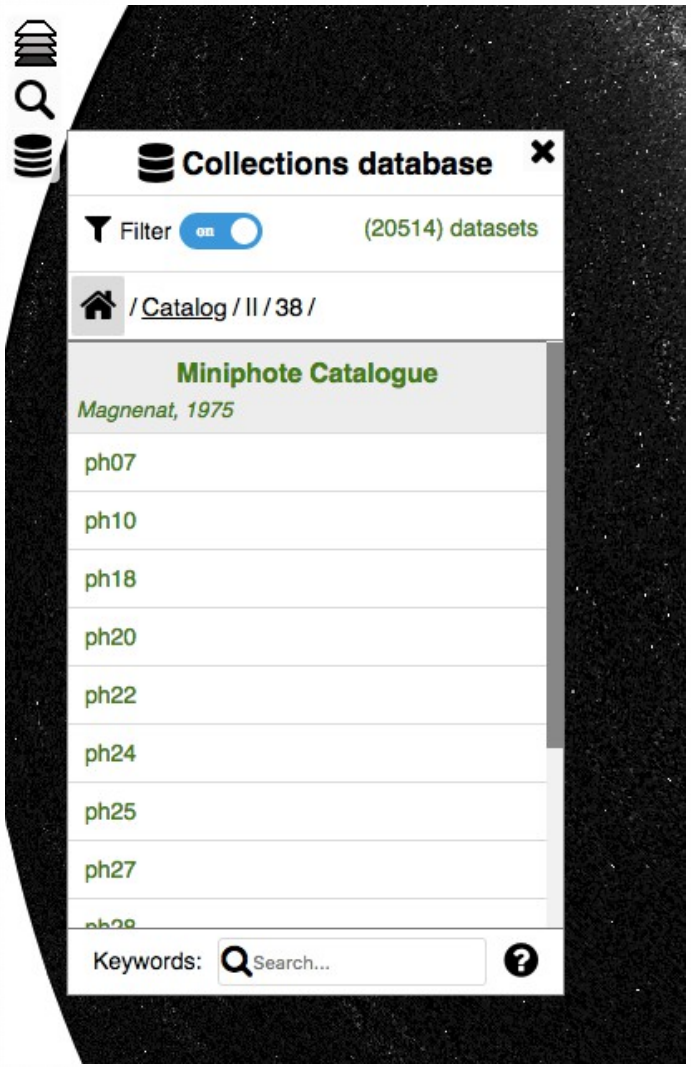
Out[3]: *Table masked=True length=1468*

obs_title	ID	em_min	moc_sky_fraction
str91	str48	float64	float64
Associated data in VizieR (G.Landais, 2016) (obscore)	CDS/B/assocdata/obscore	--	0.0588
Cataclysmic Binaries, LMXBs, and related objects (Ritter+, 2004) (lmxbdata)	CDS/B/cb/lmxbdata	--	2.066e-06
Log of CFHT Exposures (CADC, 1979-) (cfht)	CDS/B/cfht/cfht	--	0.002134
Log of CFHT Exposures (CADC, 1979-) (obscore)	CDS/B/cfht/obscore	--	0.003107
The Chandra Archive Log (CXC, 1999-2014) (chandra)	CDS/B/chandra/chandra	--	0.0001764
ESO Science Archive Catalog (ESO, 1991-2019) (eso_arc)	CDS/B/eso/eso_arc	--	0.008365
General Catalogue of Variable Stars (Samus+, 2007-2017) (gcvs_cat)	CDS/B/gcvs/gcvs_cat	--	0.0009891
General Catalogue of Variable Stars (Samus+, 2007-2017) (nsv_cat)	CDS/B/gcvs/nsv_cat	--	0.0004252
The Gemini Observation Log (CADC, 2001-) (obscore)	CDS/B/gemini/obscore	--	0.0006163

Future developments

- Integration of MOCs in astropy/regions :
  - See PR #219 in astropy/regions github repo.
  - **regions.MOCSkyRegion** new class for the next **regions** v0.4 release
- Add a method in astroquery.Simbad/Vizier to query them by a MOC.

VO Data Collections Discovery Tree



Global view of the discovery tree

- GUI allowing a fast and easy discovery and retrieval of VO data services (astronomical catalogs and image sky surveys) from a web app
  - Similar to the Data discovery tree in Aladin Desktop v10
  - Queries the MOCServer (populated from the VO Registry)
- Generic self-contained widget embeddable in different web portals (Aladin Lite, Firefly, …)

VO Data Collections Discovery Tree

- Written in Typescript + VueJS web framework
  - Typescript
    - superset of JS, compiled to JS
    - **Strong type checking** during compilation
    - syntaxical warnings
    - use **const** keywords for immutable variables…
  - VueJS
    - similar to React or AngularJS
    - based on nested components.
      Each component is encapsulated in a class with an HTML template and CSS code associated.

VO Data Collections Discovery Tree

- Source code on github repo
- Features listed in README
- Currently in prototype status
  - Demo page
- Future developments
  - Improve data access
    (query by cone, polygon, access to TAP services)
  - Integration in Aladin Lite previewer