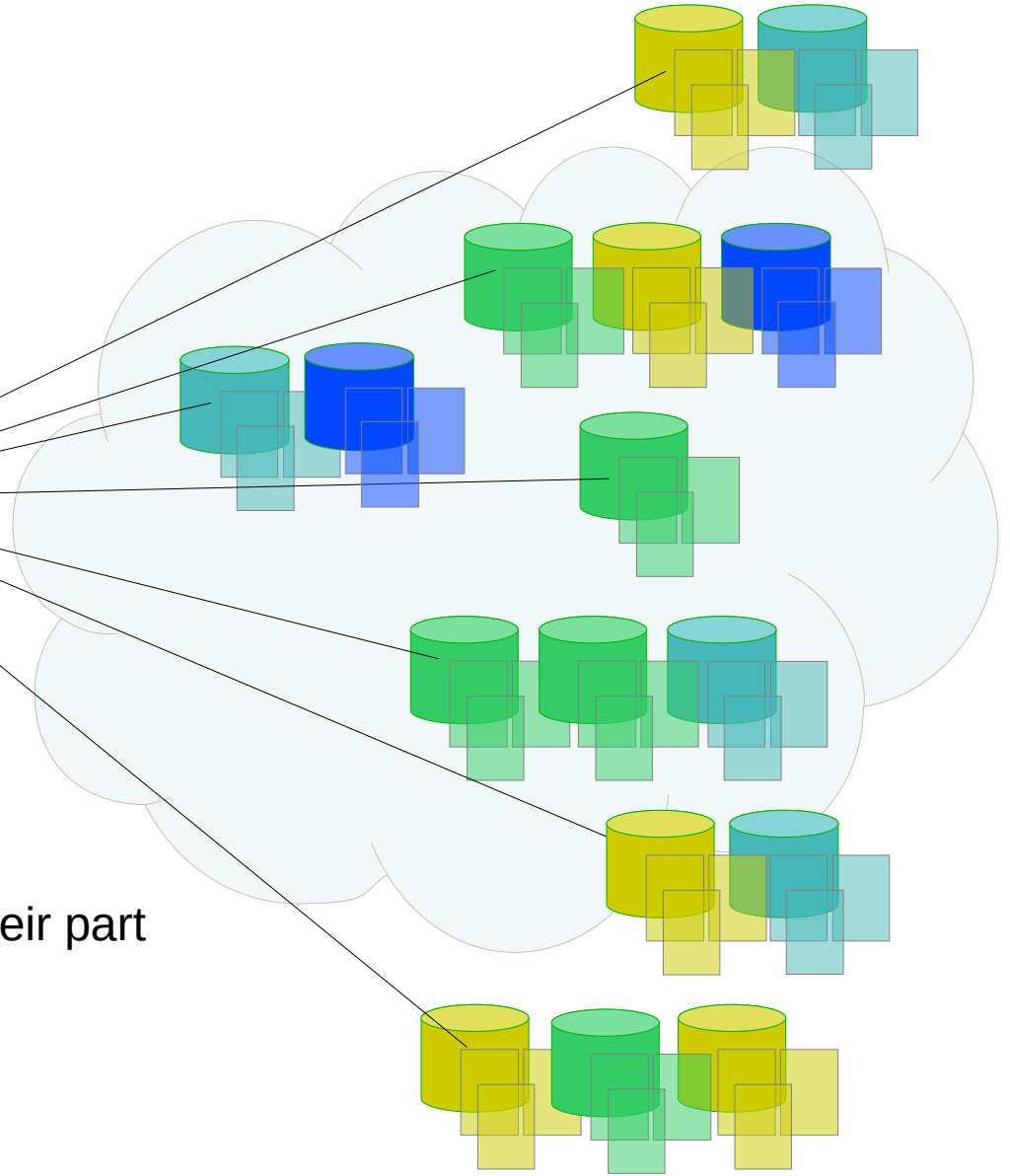
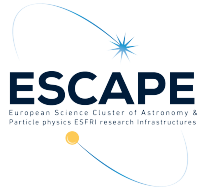


## The Virtual Observatory

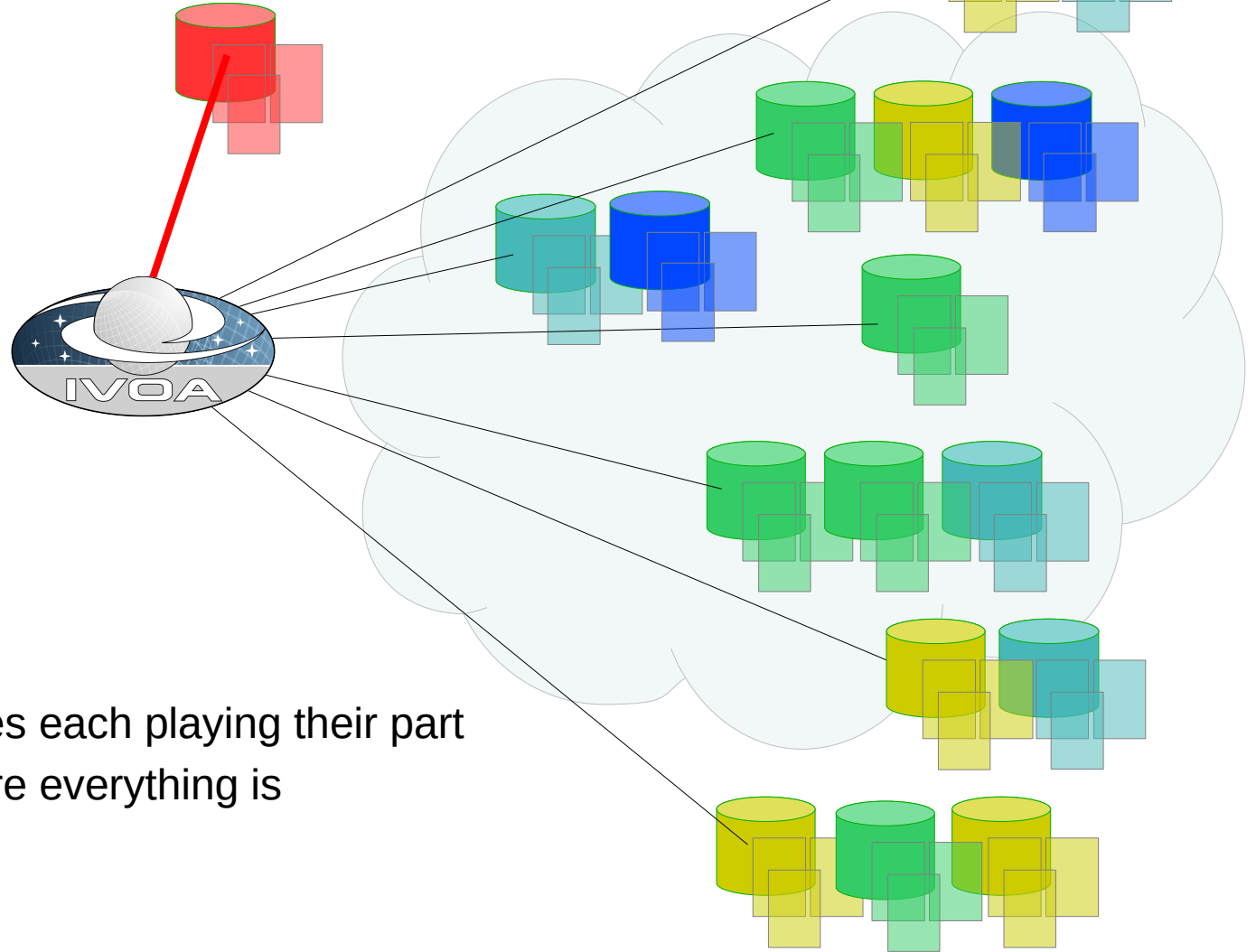
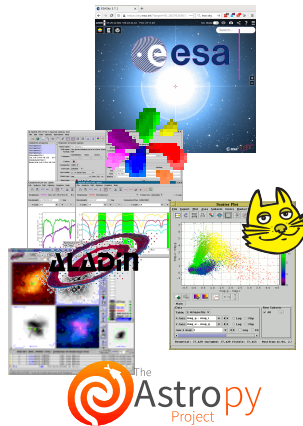
All the data from all the world .... in the cloud





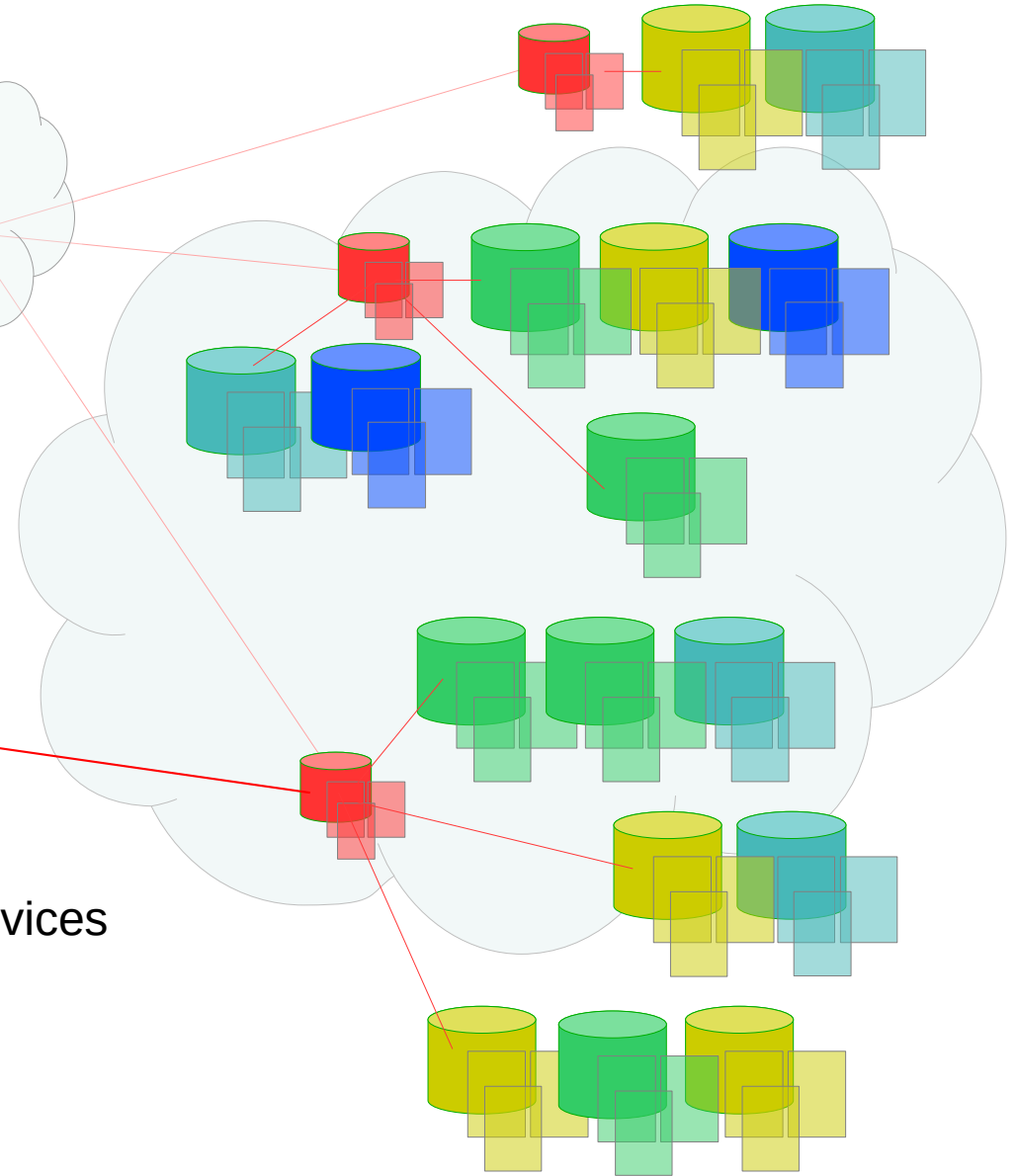
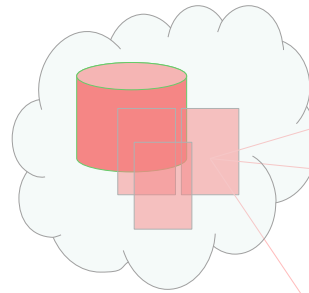
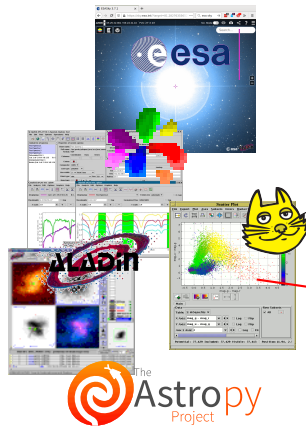
Lots of individual services each playing their part





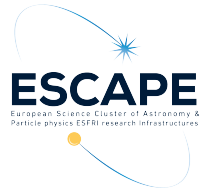
Lots of individual services each playing their part  
The registry knows where everything is





The registry itself is made up of many services  
Data is replicated between the nodes  
Query any leaf to get the same result





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IVOA interop meeting  
May 2021

## Cone search

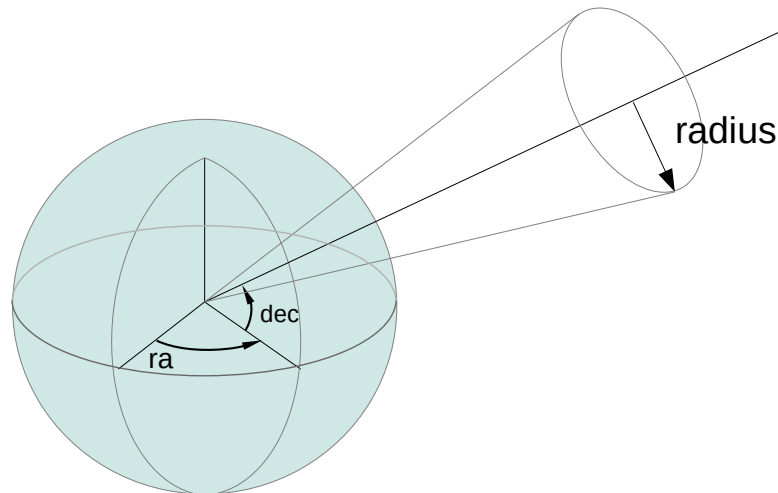
One of the earliest user-facing  
services define by the IVOA

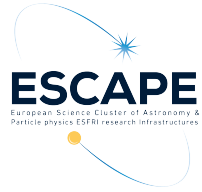
Version 1.0 adopted as an  
IVOA recommendation in 2006

RA = 170° (deg)

DEC = 25° (deg)

SR = 30° (deg)

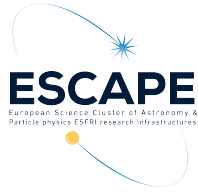




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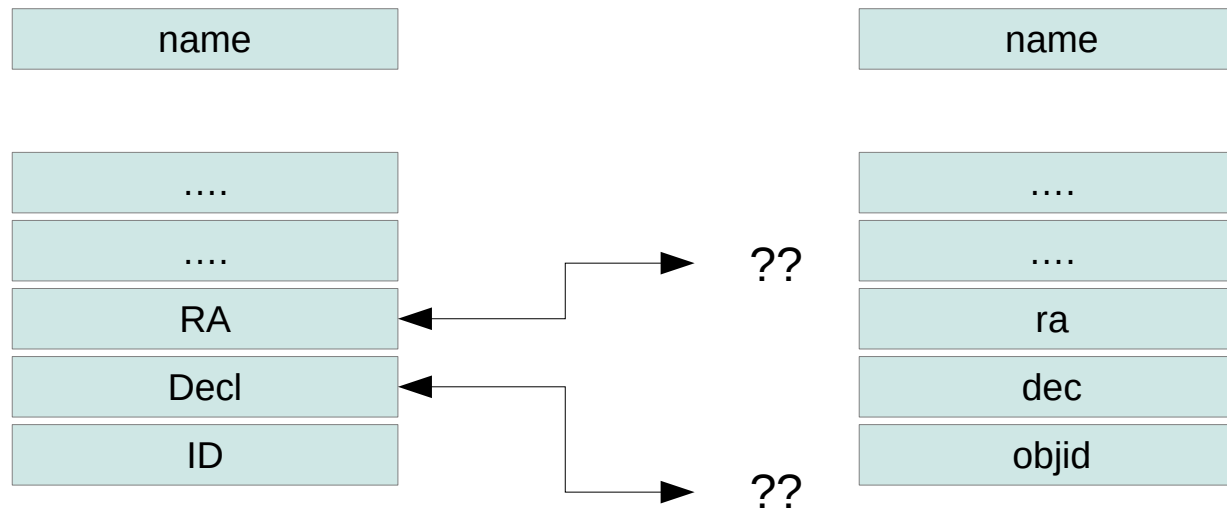


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IVOA interop meeting  
May 2021



ANTARES 2007-2017

SDSS





ANTARES 2007-2017

SDSS

name	UCD	UCD	name
....	....	....	....
....	....	....	....
RA	POS_EQ_RA_MAIN	pos.eq.ra;meta.main	ra
Decl	POS_EQ_DEC_MAIN	pos.eq.dec;meta.main	dec
ID	ID_MAIN	meta.id;meta.main	objid



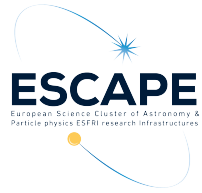
ANTARES 2007-2017

SDSS

name	UCD	UCD	name
RA	POS_EQ_RA_MAIN	pos.eq.ra;meta.main	ra
Decl	POS_EQ_DEC_MAIN	pos.eq.dec;meta.main	dec

```
CONTAINS(  
  POINT('ICRS', sdss.ra, sdss.dec),  
  CIRCLE('ICRS', antares.ra, antares.dec, 10./3600.)  
)
```

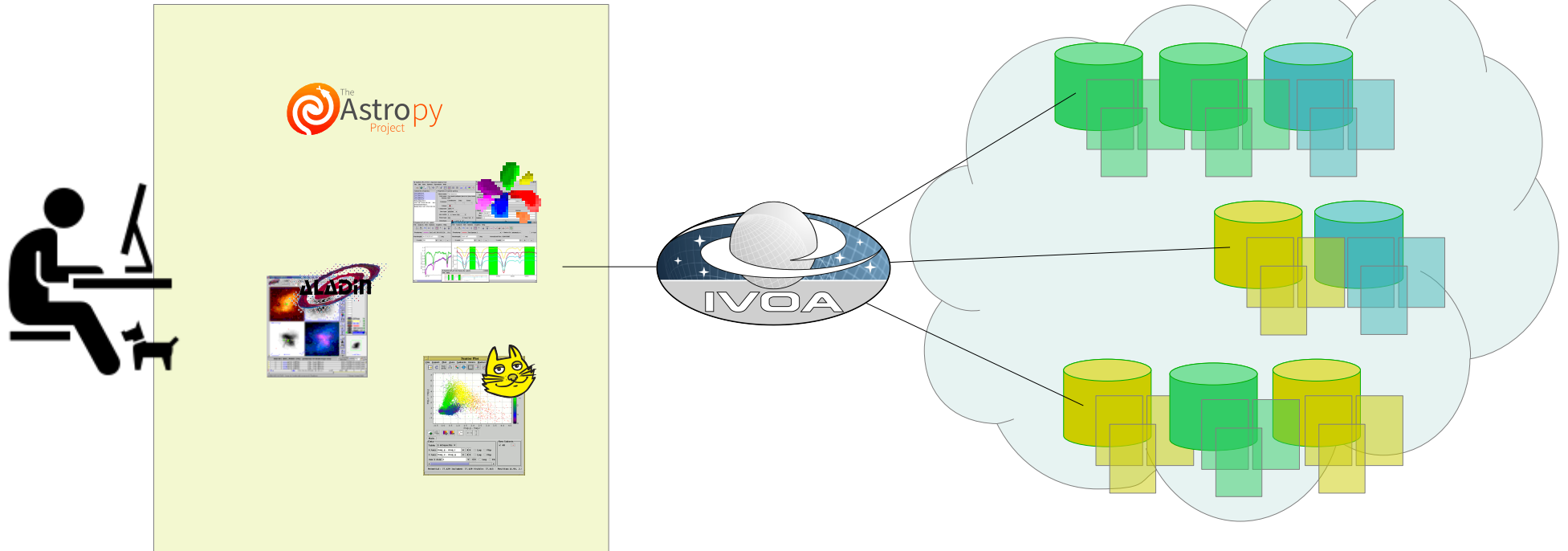




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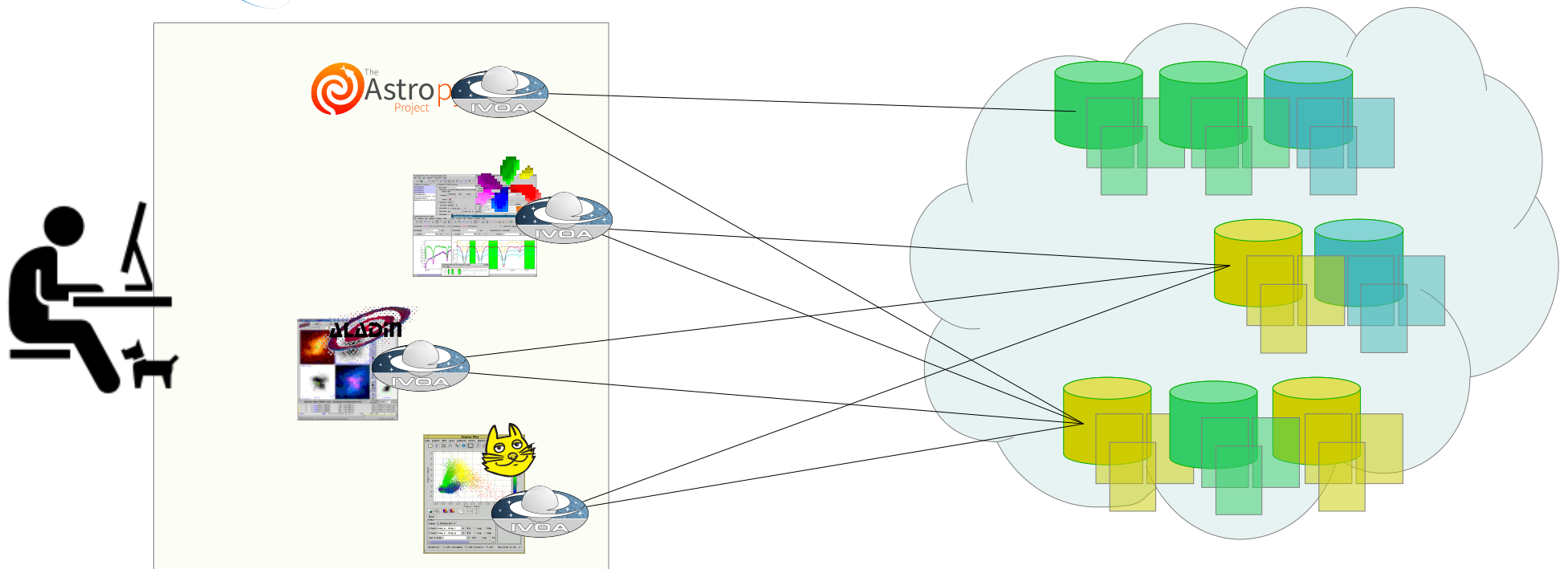
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IVOA interop meeting  
May 2021



## The Virtual Observatory

All the data from the cloud .... available on your desktop

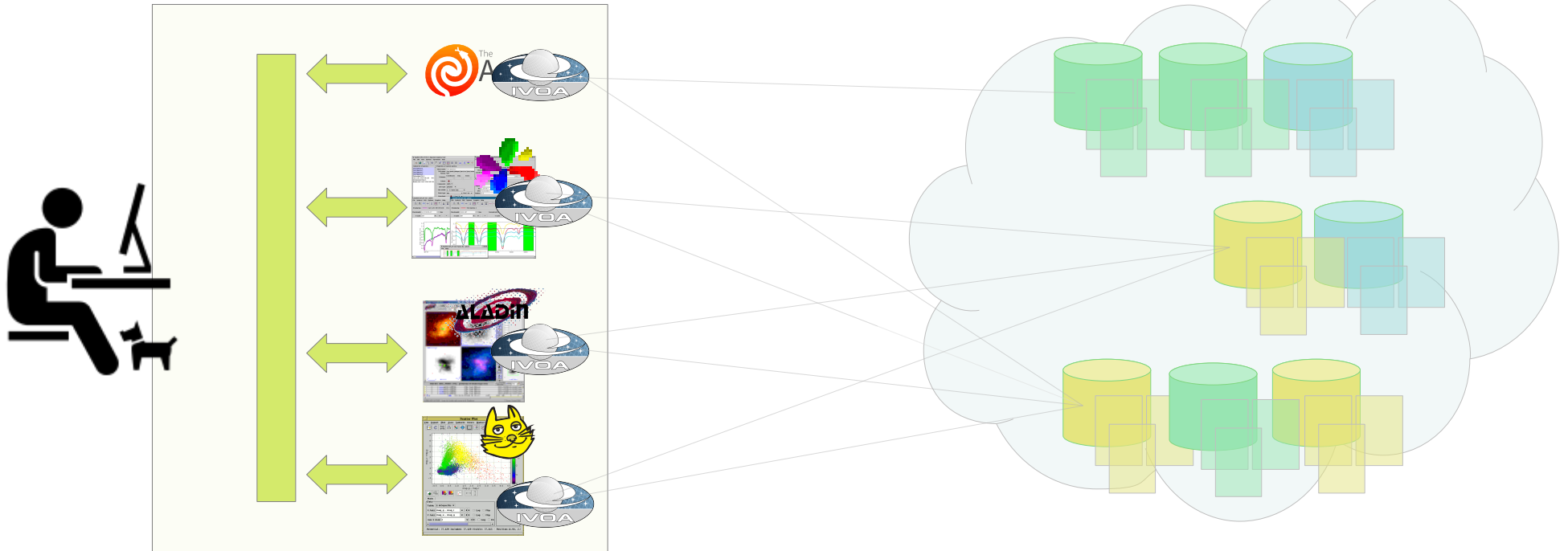




All the data from the cloud .... to each desktop app

Each application maintains its own connection to the VO





SAMP is a message bus within your local computer

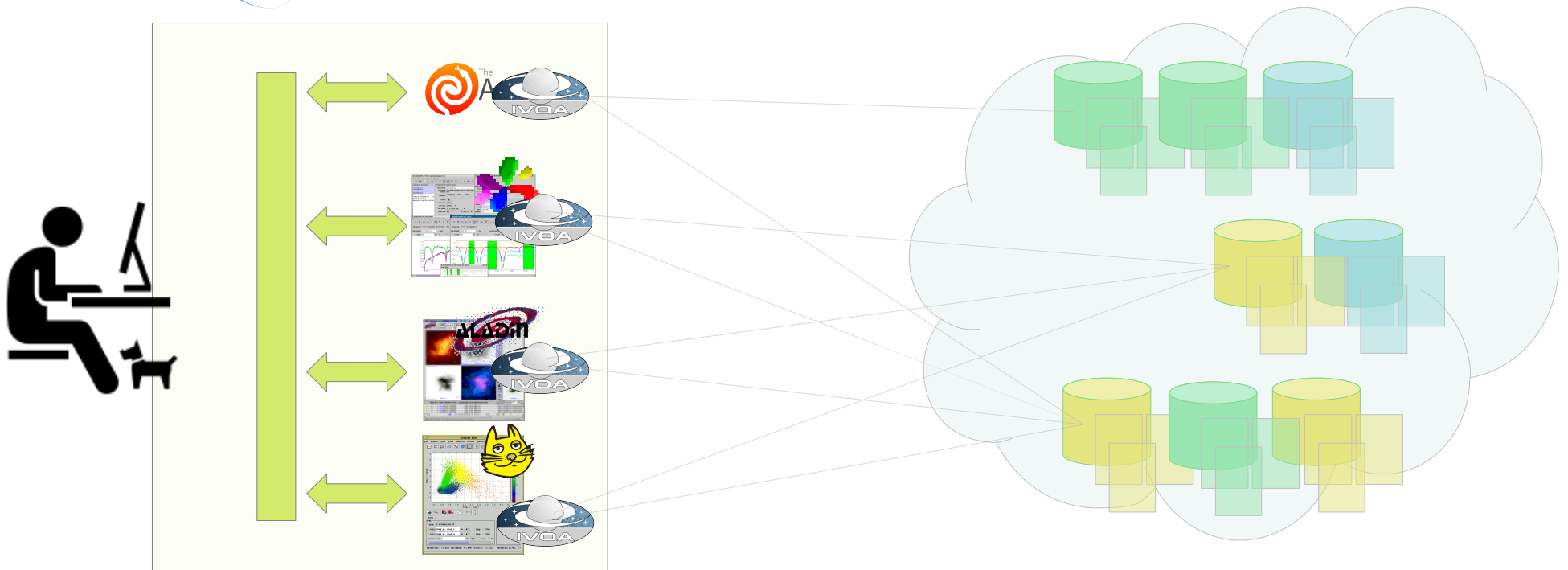
Applications can use SAMP to send messages to each other

`table.load.votable <http://example.org/.../table.vot>`

`image.load.fits <http://example.org/.../image.fits>`

`coord.pointAt.sky <ra,dec>`





Messages can be sent to specific applications

Send to Aladin:

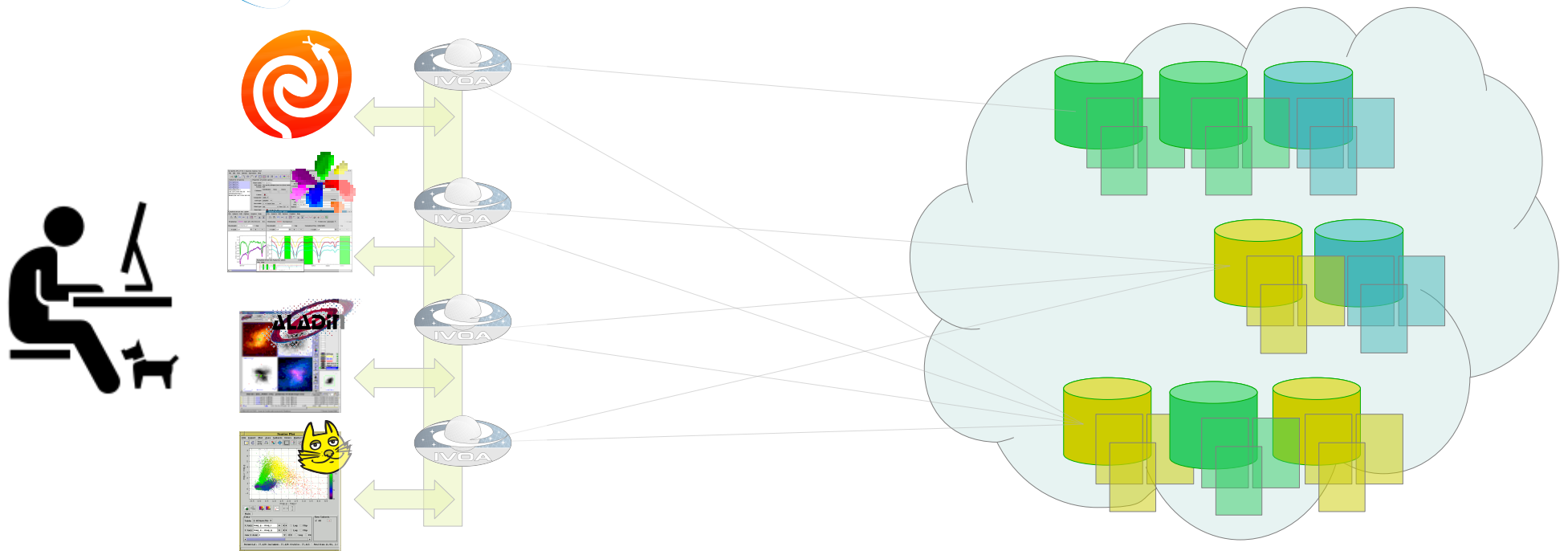
image.load.fits <<http://example.org/.../image.fits>>

Or broadcast to all listeners

Send to all:

coord.pointAt.sky <ra,dec>





## The Virtual Observatory

If we have done our job right, all the details disappear

All the data from the cloud .... available on your desktop







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May 2021



Everyone invited to develop science use cases

Science based interest groups

Scientific use cases

transients  
time-series

Science priorities for the IVOA

Science platforms

Machine learning

Multi-messenger astronomy

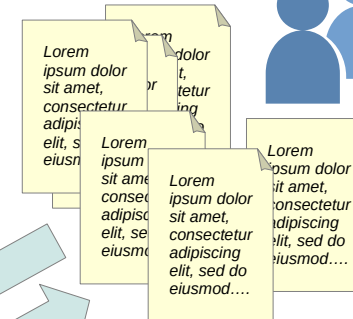
Science priorities committee



Scientists from IVOA members and major astronomy projects

IVOA working groups  
e.g. DataAccessLayer,  
Applications,  
Semantics

Working group email list



Everyone invited to discuss

New standards being developed

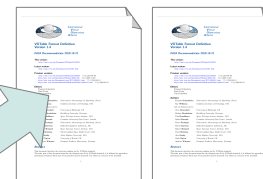
ObjVisSAP ObsLocTAP

TIMESYS Multi-order Coverage (MOC)

Hierarchical Progressive Surveys (HiPS)

Request For Comment (RFC) document

IVOA recommendation



Everyone invited to comment



Anyone can raise issues



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May 2021

