

# As If You Were There

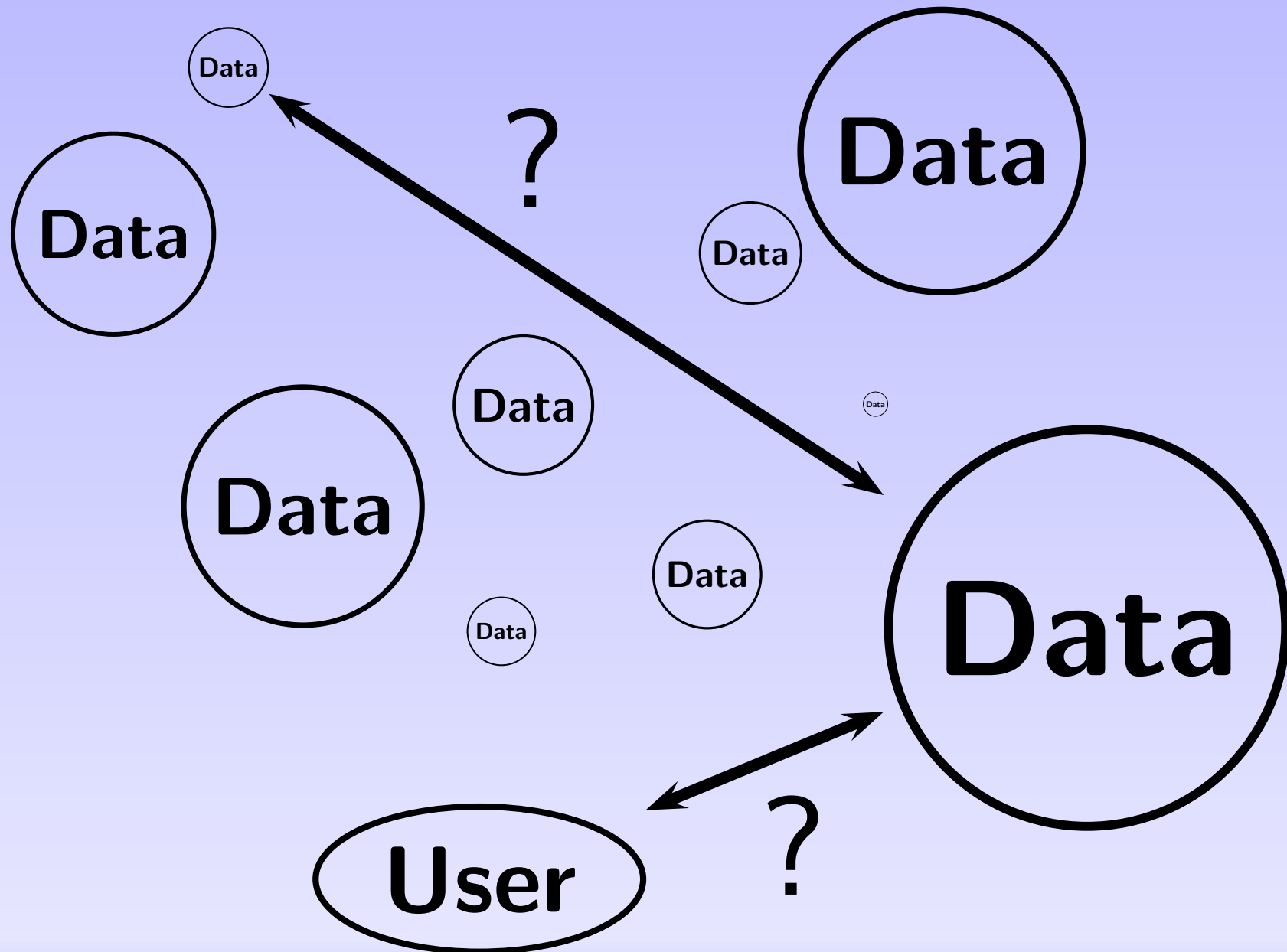
## Remote Queries in the Virtual Observatory

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### Agenda

- Locating data
- Sending queries
- Orchestrating servers

# The Problem



# The VO's solution: TAP

The **T**able **A**ccess **P**rotocol transmits (ADQL) queries and ancillary data to servers, and lets you manage jobs and results, and provides for some service introspection.

TAP's typical pattern:

1. Define a job (set the query, add uploads, change limits)
2. Start it
3. Check progress (or not, if you're not curious)
4. When you see it's done, retrieve or use result
5. Clean up (if you're nice)

# Async? Show me.

In case there's no net, a screenshot:

```
tapsh> select * from ppmx.data where cmag between 10 and 11 and deltaFloat>80
tapsh> start
tapsh> job
Job nicked zowize (remote id o8JfWP)
phase EXECUTING, destruction due 2010-09-05T09:52:02, time limit 3600
-----
select * from ppmx.data where cmag between 10 and 11 and deltaFloat>80
tapsh> job
Job nicked zowize (remote id o8JfWP)
phase EXECUTING, destruction due 2010-09-05T09:52:02, time limit 3600
-----
select * from ppmx.data where cmag between 10 and 11 and deltaFloat>80
tapsh> job
Job nicked zowize (remote id o8JfWP)
phase COMPLETED, destruction due 2010-09-05T09:52:02, time limit 3600
-----
select * from ppmx.data where cmag between 10 and 11 and deltaFloat>80
tapsh> █
```

# What's out there?

To find out what is already on TAP, you could ask the registry, use VO-Desktop, or query each server's TAP\_SCHEMA yourself. Or you could just use <GloTS>.

Reference URL >>

Try ADQL to query our data.

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Vmag	magnitude, V or other (see n_Vmag)	phot.mag;em.opt.V mag 0	<a href="#">verongsos_data</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
mv	Visual magnitude	phot.mag;em.opt.V mag 0	<a href="#">dmubin.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
vmag	Magnitude in Johnson V	phot.mag;em.opt.V mag 0	<a href="#">hipparcos.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
Hpmag	Median magnitude in Hipparcos system	phot.mag;em.opt.V mag 0	<a href="#">hipparcos.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
Hpscat	Scatter on median magnitude	phot.mag;em.opt.V mag 0	<a href="#">hipparcos.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
Hpmax	Hpmag at maximum (5th percentile)	phot.mag;em.opt.V mag 0	<a href="#">hipparcos.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
Hpmin	Hpmag at minimum (95th percentile)	phot.mag;em.opt.V mag 0	<a href="#">hipparcos.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
Vmag	Optical V magnitude	phot.mag;em.opt.V mag 0	<a href="#">lspm.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>
Vmag_e	Estimated V mag	phot.mag;em.opt.V mag 0	<a href="#">lspm.main</a>	<a href="#">org.gavo.v</a> <a href="#">/tap/run</a>

UCD  [\[?char expr.\]](#)  
UCD of column (many services still have 1.0 UCDs).

Table words   
Terms in table description (case does not matter, patterns not allowed)

Column words   
Terms in column description (case does not matter, patterns not allowed)

Table Sort by  Limit to  items.

Output format

Go

# Running Queries

Though many services will let your web browser operate a TAP services more or less crudely, you definitely want specialized TAP client software:

- `<VODesktop>`
- `<TAP shell>`
- `<tapquery>` – a python library that's part of GAVO's python votable package
- more soon, or so we hope...

Here, I'm running the TAP shell.

# A quick example

Let's look for really red objects close to quasars in the redshift range between 0.1 and 0.12.

**Parameters**

- Column words: redshift
- Table words: quasar

**Result**

Matched: 4

Column	Description	UCD	Unit	Index?	Table description	Table name	id	Src
z	Redshift	N/A	N/A	N/A	The catalog of all confirmed quasars in SDSS Data Release 3. <i>NOTE: The DRxQuasarCatalog a derived science table that may not be loaded for every release or	<a href="http://wfau.oe.ac.uk/sdssdr7-dsa">unknown.DR3QuasarCatalog wfau.oe.ac.uk/sdssdr7-dsa</a>		<a href="http://wfau.oe.ac.uk/sdssdr7-dsa">http://wfau.oe.ac.uk/sdssdr7-dsa</a>

# Query WFAU

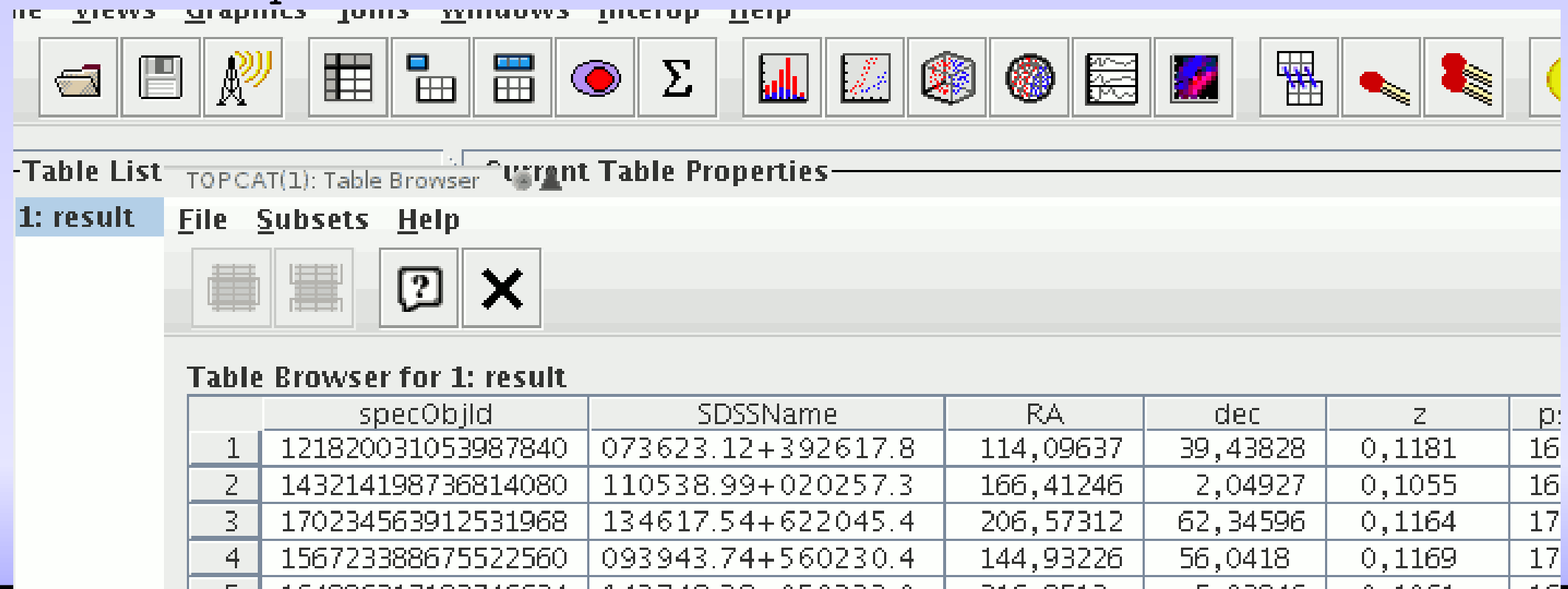
That's almost enough to let us query the service. In tapsh, using tab-completion, say:

```
server ivo://wfau.roe.ac.uk/sdssdr7-dsa
```

```
select * from DR5QuasarCatalog as t where t.z between 0.1  
and 0.12
```

```
run
```

```
send to topcat
```



The screenshot shows the TOPCAT software interface. At the top is a menu bar with options like 'Views', 'Graphics', 'Tools', 'Windows', 'Help', and 'Server'. Below the menu is a toolbar with various icons for file operations, data visualization, and analysis. The main window is titled 'TOPCAT(1): Table Browser' and 'Current Table Properties'. The 'Table List' on the left shows '1: result'. The main area displays a table with the following data:

	specObjId	SDSSName	RA	dec	z	p:
1	121820031053987840	073623.12+392617.8	114,09637	39,43828	0,1181	16
2	143214198736814080	110538.99+020257.3	166,41246	2,04927	0,1055	16
3	170234563912531968	134617.54+622045.4	206,57312	62,34596	0,1164	17
4	156723388675522560	093943.74+560230.4	144,93226	56,0418	0,1169	17
5	164885317102315520	143749.29+050232.0	216,0512	5,02315	0,1051	16

## ...and search on

Now find a table with the UCD mag.phot;em.IR.K. Let's use PPMXL. We need to upload the last result; therefore, we give it a fixed nick.

```
nick quas
```

```
server ivo://org.gavo.dc/__system__/tap/run
```

```
select * from TAP_UPLOAD.uploaded as u join ppmxl.main  
as p on (1=contains(point('ICRS', p.raj2000, p.dej2000),  
circle('ICRS', ra, dec, 0.5))) where kmag-jmag>0.5
```

```
upload result quas as uploaded
```

```
run
```

```
send to topcat
```

# What next?

- Clean up: `echo "purge all" | tapsh`
- `<Download tapsh>` (and, of course, `<topcat>`); see <http://www.g-vo.org>
- Complain to whoever made your favourite data set if it's not yet on TAP; tell them to talk to us if they don't know how to get it there.
- Report bugs, problems, and ideas.
- Be almost there!