TAP and ADQL

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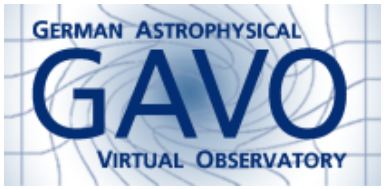


Table Access Protocol (TAP) ...

- is a **web service protocol** providing access to collections of tabular data ("tablesets")
- accepts queries against a tableset and responds to a query by generating an output table
- supports various query languages
  - support for **ADQL** (Astronomical Data Query Language) is mandatory
- is available via **TOPCAT** (besides various other services like VizieR or cone search)
  - TOPCAT's TAP client enables you to access astronomical tables at remote data centres all over the world

Astronomical Data Query Language (ADQL)

- based on **SQL** (Structured Query Language)
- consists of a subset of the SQL grammar extended for astronomical needs
  - e.g. support for geometrical functions

- basic query syntax:

```
SELECT [ TOP <#rows> ] <column name #1> <column name #2> ...
    FROM <table name>
    [ WHERE <conditions> ]
    [ GROUP BY <columns> ]
    [ ORDER BY <columns> ]
```

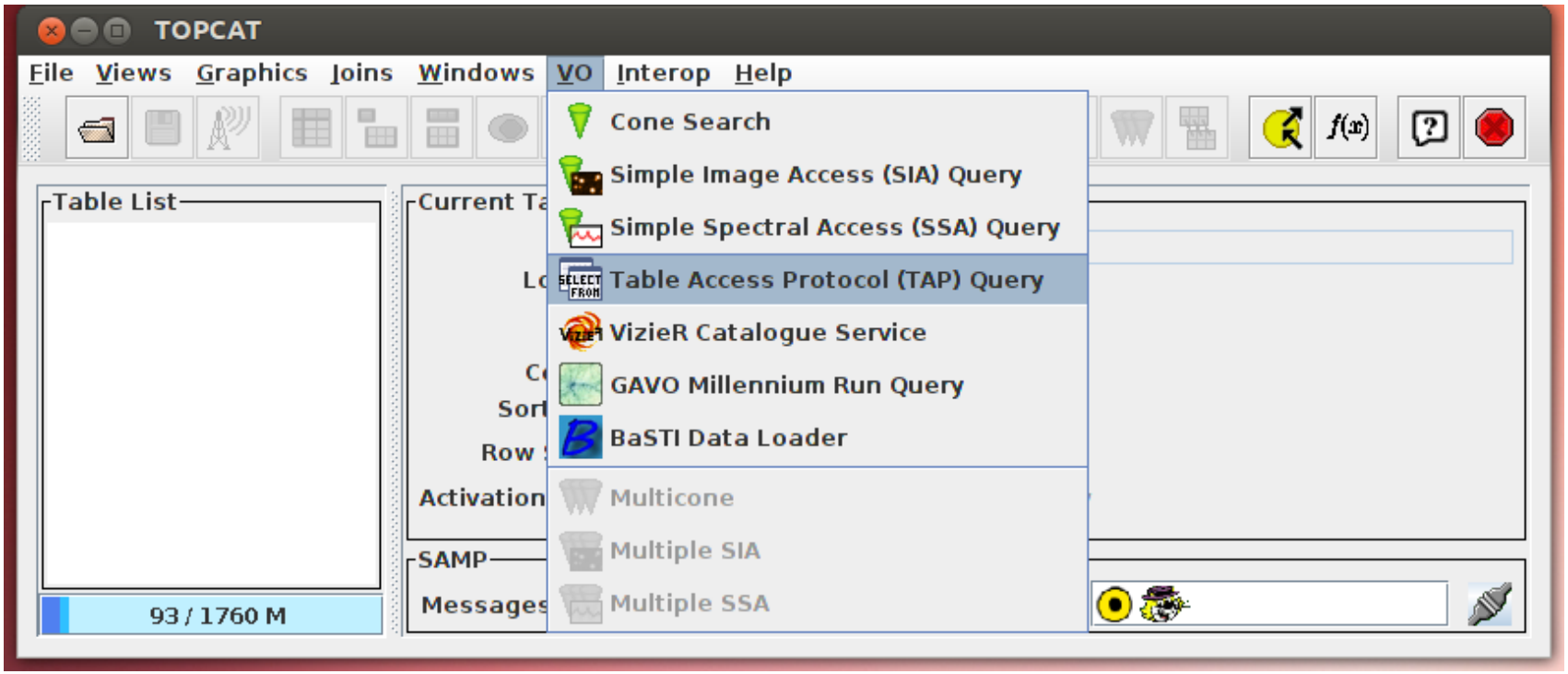
  - squared brackets above mean: **optional**
  - to select all columns of a table, the $*$ symbol can be used, e.g. `SELECT * FROM mytable`

TAP/ADQL – The Kitchenware

- an application like **TOPCAT** which "speaks" TAP
- a **data centre** providing one or several tablesets of interest
- a **query** formulated in ADQL

TAP/ADQL – Let's Start Cooking...

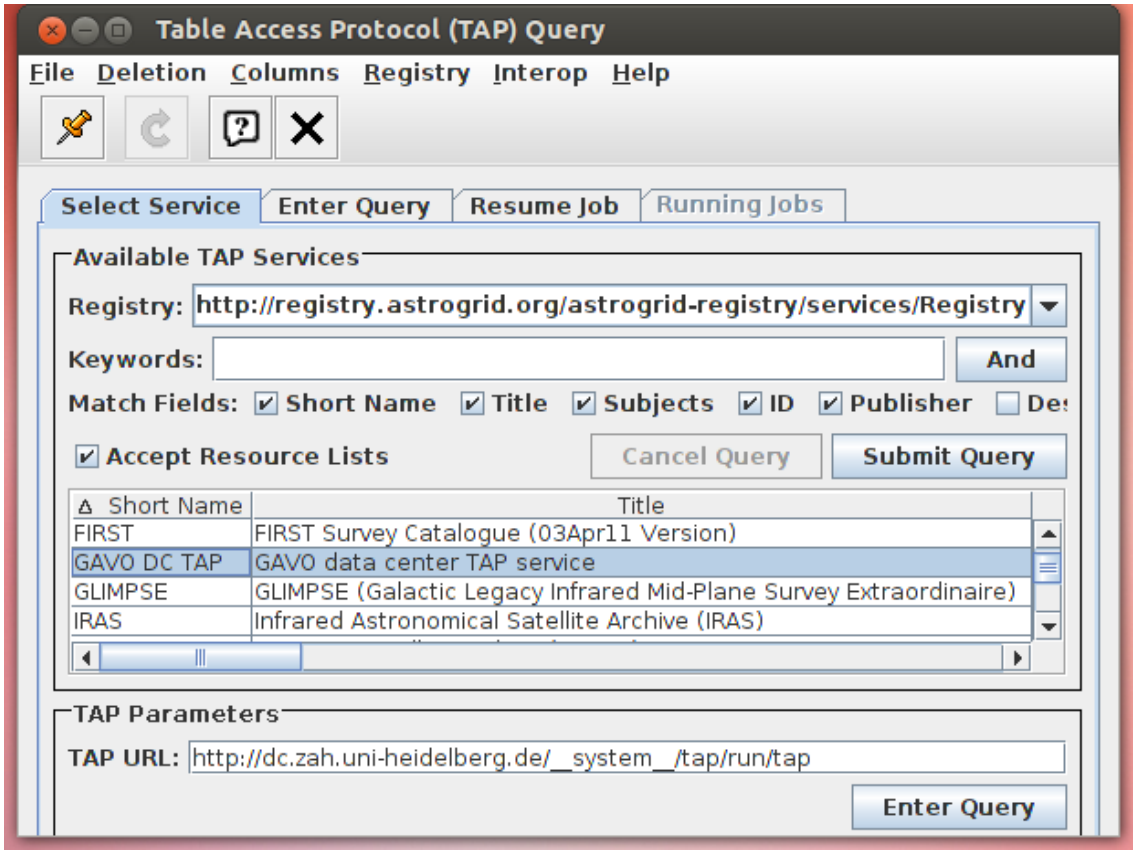
- access TAP via TOPCAT



- click on **"VO"** → **"Table Access Protocol (TAP) Query"**

TAP/ADQL – Let's Start Cooking...

- search the registry for TAP services
  - click on **"Submit Query"** (you can leave the **"Keywords"** line blank)



  - click on **"Enter Query"**

TAP/ADQL – Let's Start Cooking...

- select a table, e.g. **"rave.main"** (spectroscopic radial velocities of 50000 stars in the Milky-Way Southern hemisphere)
  - column information is displayed

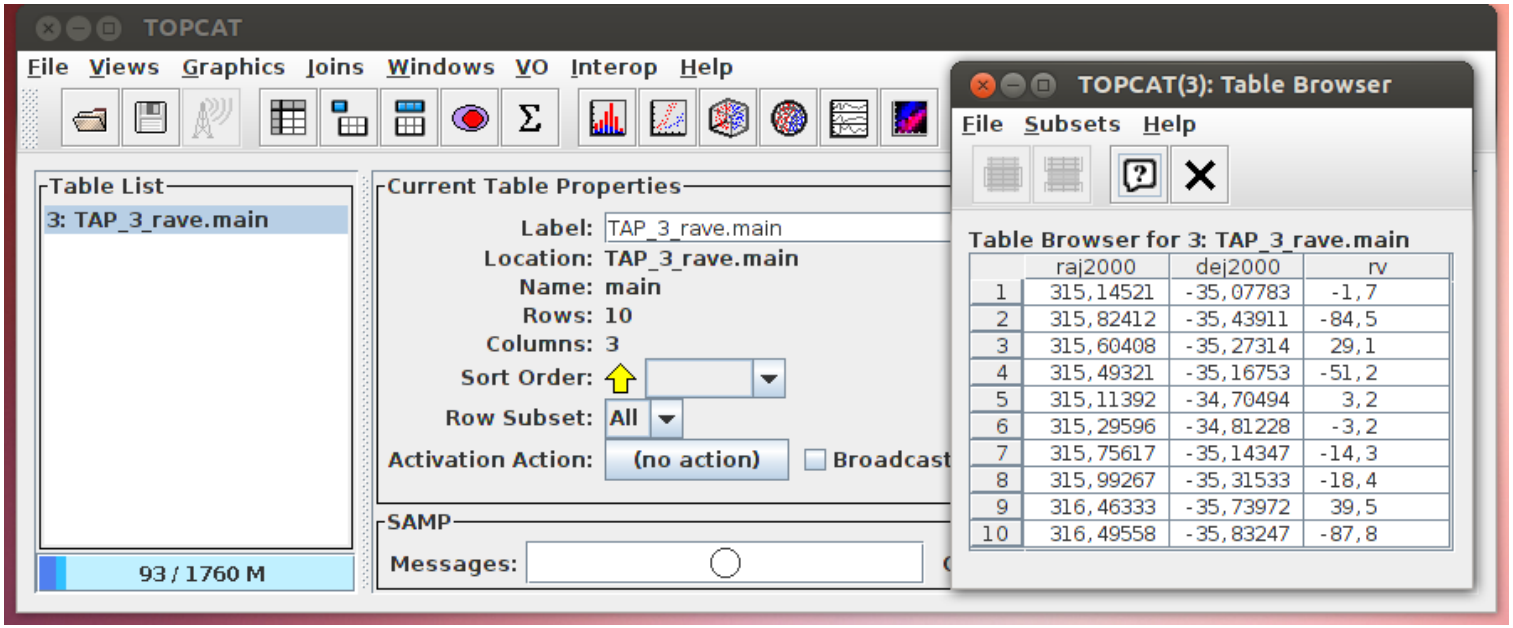
- enter your ADQL query in the **"ADQL Text"** box, e.g.

```
SELECT [ TOP 10 ] raj2000, dej2000, rv FROM rave.main
```

  - hint: clicking button **"Examples"** provides several example queries

TAP/ADQL – Your Meal Is Being Served...

- query output: table with three columns (right ascension, declination, radial velocity) and ten rows (the first ten rows of our input table)



  - use TOPCAT to display your data, cross-match them with other tabular data, ...

Special Devices: The ADQL Mixer

- the mixer allows you to have columns from different input tables in your output table

- technically, it's a table join
  - ADQL knows a so-called `JOIN ... USING` and a `JOIN ... ON`

```
SELECT [ TOP <setLimit> ] <columnList>
    FROM <table1>
    JOIN <table2>
    USING <columnName>
```

  - `columnName` is a column which is present in `table1` and `table2`

```
SELECT [ TOP <setLimit> ] <columnList>
    FROM <table1>
    JOIN <table2>
    ON <searchCondition>
```

  - `searchCondition` defines the conditions which must be satisfied to join rows from `table1` and `table2`, e.g. matching coordinates

TAP/ADQL Exercises

- you will get and learn more recipes in the following by our short exercise course
- don't hesitate to ask if you get stuck or feel unsure

We hope that you'll enjoy the course...
and get inspired to satisfy your (g)astronomical delights...

References


P. Dowler et al.: Table Access Protocol – Version 1.0, IVOA Recommendation (27th of March 2010).


I. Ortiz et al.: IVOA Astronomical Data Query Language – Version 2.0, IVOA Recommendation (30th of October 2008).


M. Demleitner: GAVO web page offering a short course on ADQL and TAP, `http://docs.g-vo.org/adql/html/`.


M. Taylor: TOPCAT – Tool for OPerations on Catalogues And Tables, `http://www.star.bris.ac.uk/~mbt/topcat/`.