Exploring TAP services with **TapHandle**

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TAP and the Simple Protocols

Simple protocols (SIAP, SSAP, CSP SLAP…) :

- *One data collection per service*
- *One data category per protocol*
- *Parameter query language*
- *Output format defined by the protocol*

TAP is not a simple protocol

- ***TAP exposes tabular data***
- ***TAP services are self-describing.***
  - *TAP_SCHEMA, capability* `/table`
- ***Data are selected by a structured query language (derived from SQL)***
  - *Geometrical functions but neither database update nor procedure*
- ***Asynchronous query processing***

The TAP Client Challenge

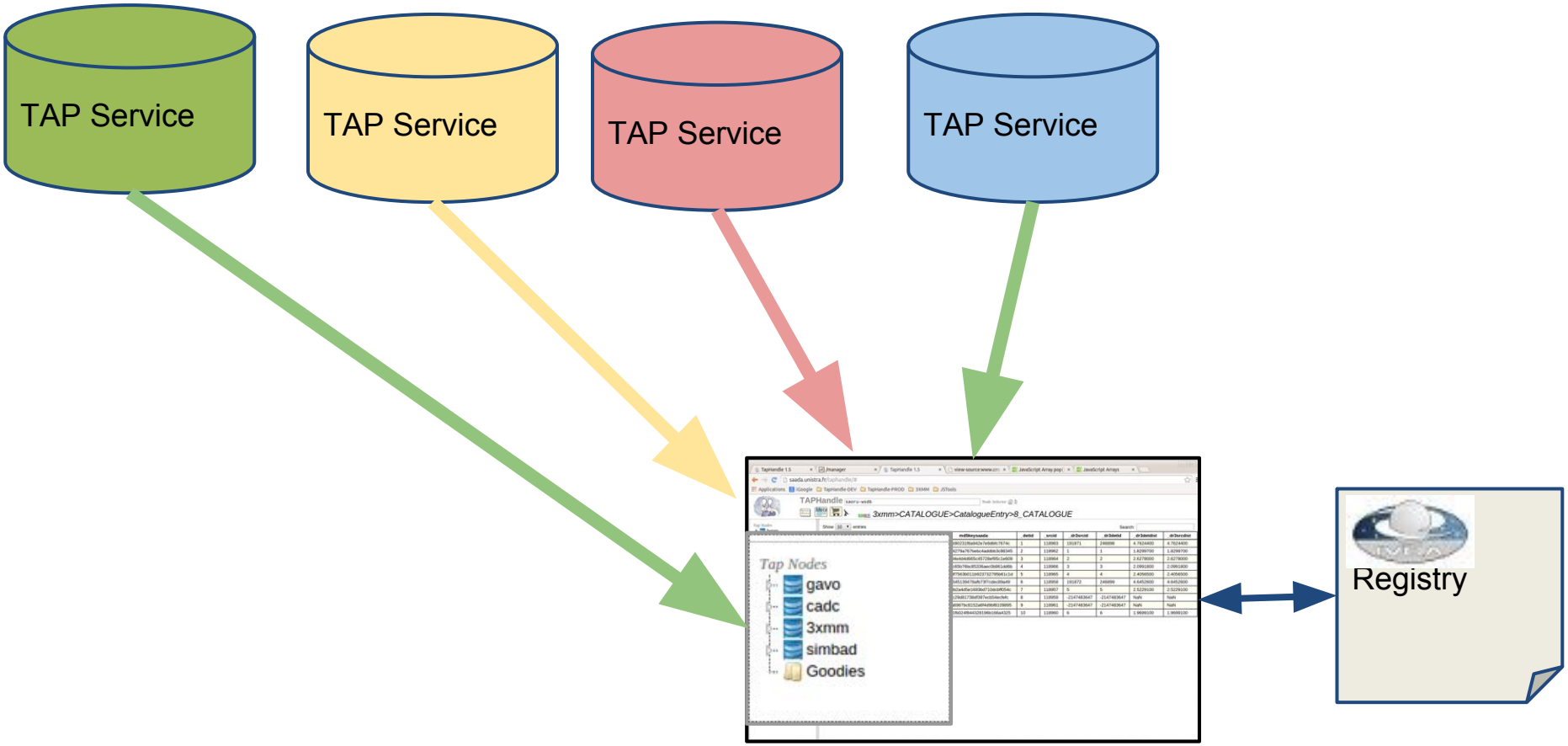
Being both interactive and generic.

- ***The client doesn't know about the data it will access***
  - *Data are discovered thanks to both TAP_SCHEMA and `/tables` capability*
- ***The query editor has to tackle with the meta-data of the current service***
  - *Designing an ADQL editor both rich and user friendly is not that easy*
- ***The client has to tackle with the capabilities really available***
  - *TAP being a complex protocol, we have to consider dealing with partial implementations*

The Goal of TapHandle

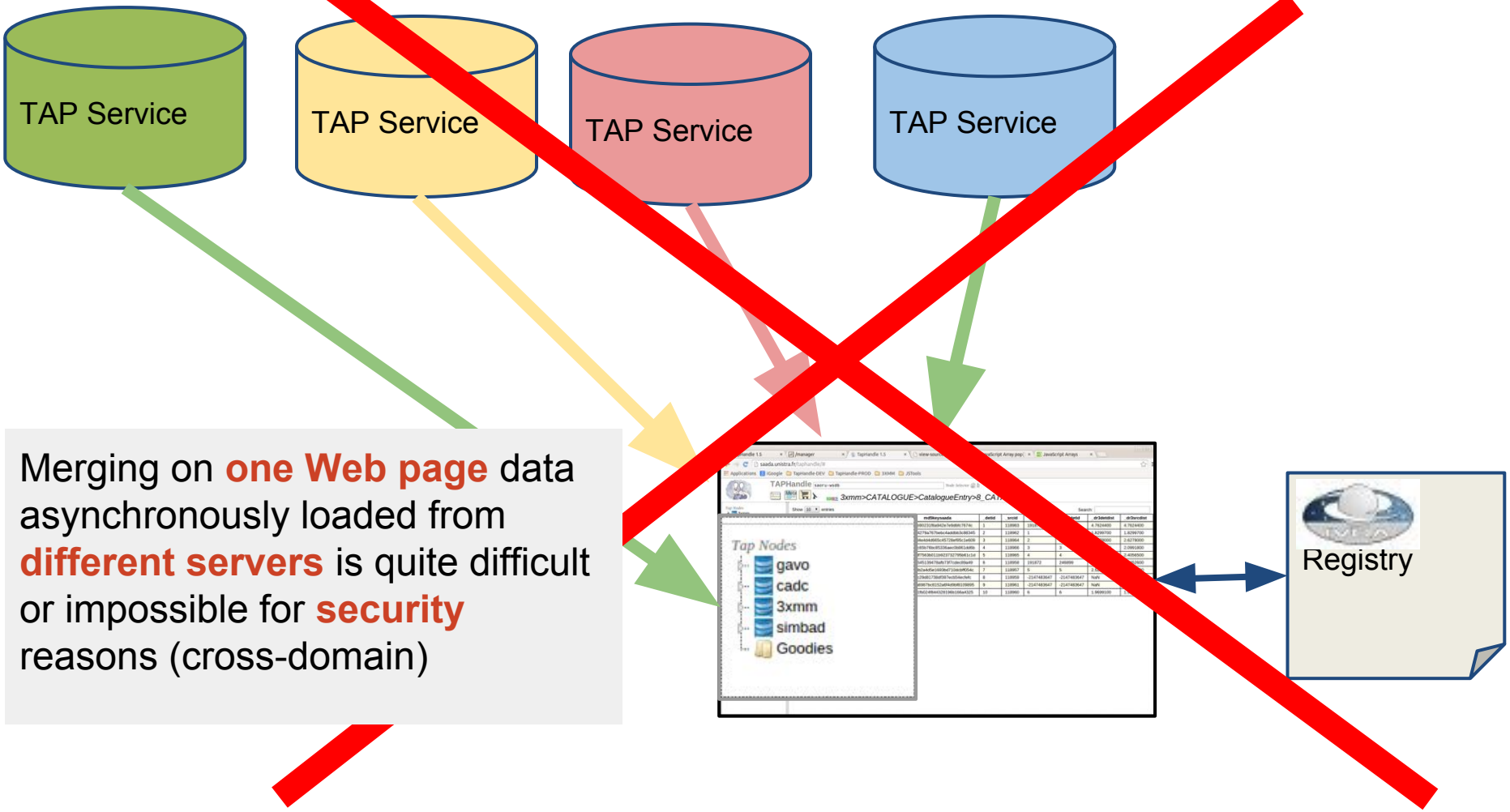
- **A tool designed for discovering data exposed in any TAP service.**
  - No prior knowledge about the data content
- **Accessing TAP services with a WEB browser.**
  - Accessing meta-data
  - Accessing data
  - Query editor
  - Downloading results
  - Interoperability
- **Accessing simultaneously multiple TAP services**
  - Services merged in a single view
- **Using the browser facilities as much as possible for data display**
  - VOTables displayed as HTML tables
  - File with universal types (PNG, JPEG, PDF, text…) are taken in charge by the browser
  - Astronomical data format can be redirected to SAMP clients

The Concept of TapHandle



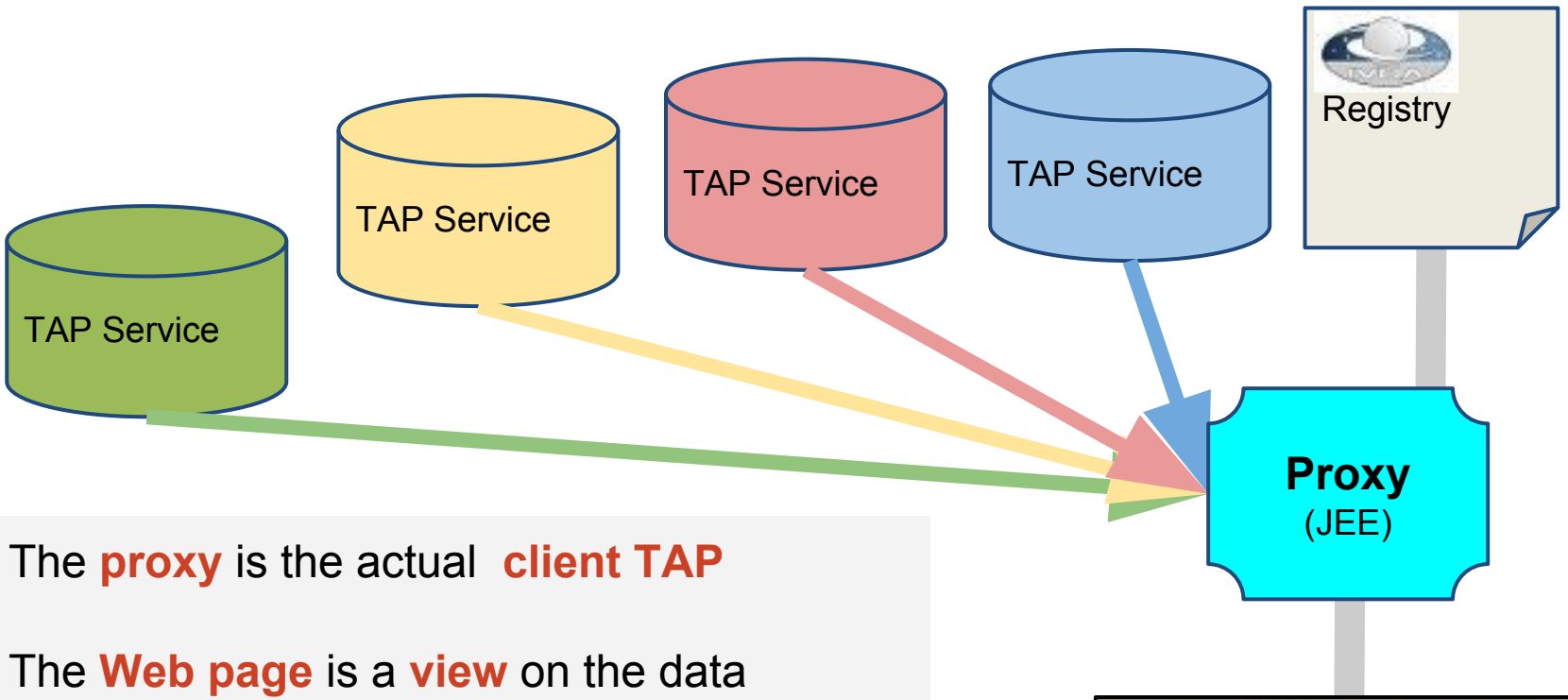
Several TAP services - One single view

TapHandle Architecture

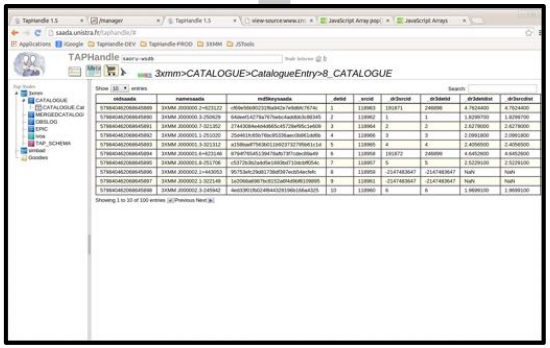


Merging on **one Web page** data asynchronously loaded from **different servers** is quite difficult or impossible for **security** reasons (cross-domain)

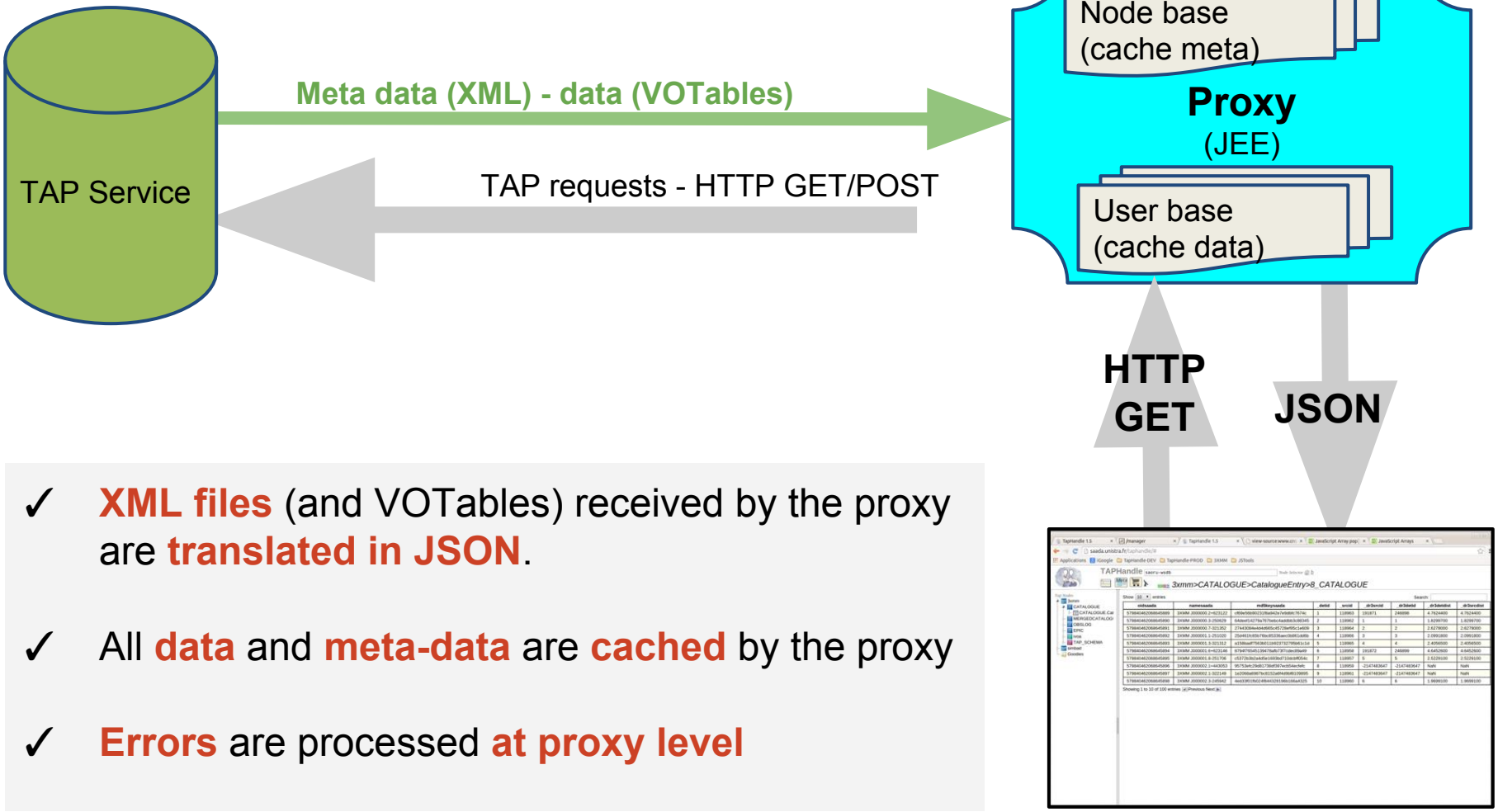
TapHandle Proxy



- ✓ The **proxy** is the actual **client TAP**
- ✓ The **Web page** is a **view** on the data available on the proxy
- ✓ The proxy/browser **communication** is done by **AJAX queries** with an **ad-hoc protocol**



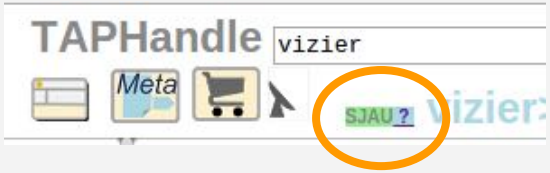
The TapHandle Proxy



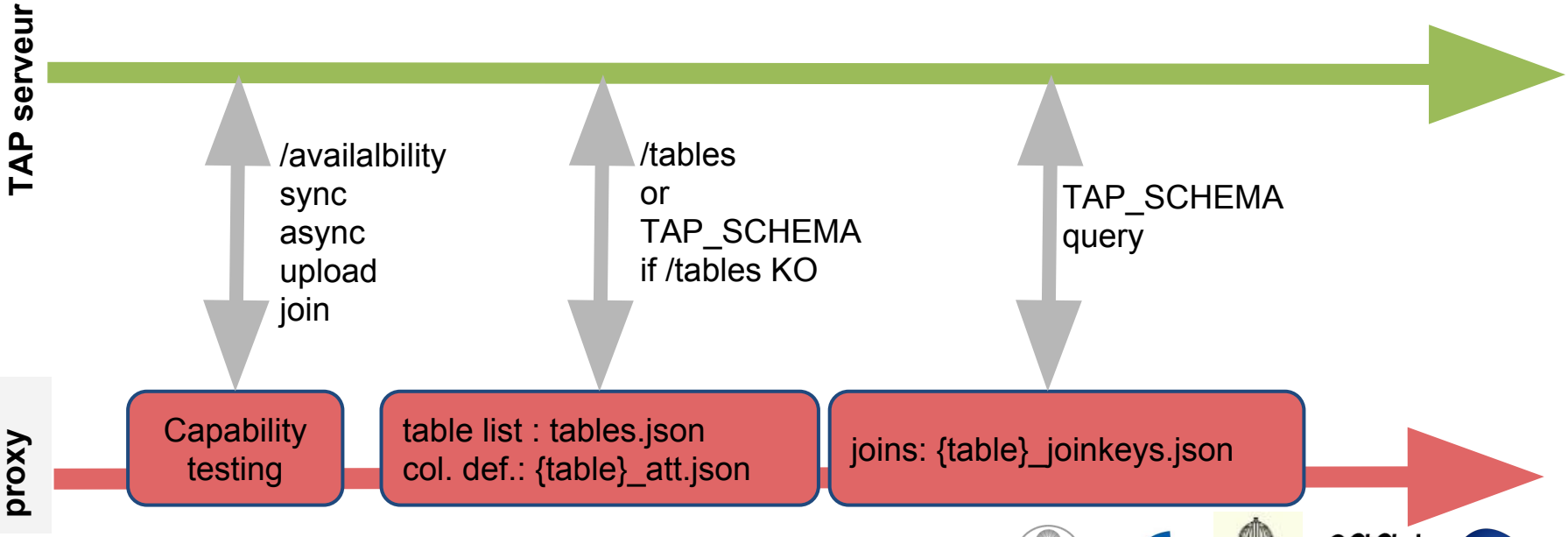
- ✓ **XML files** (and VOTables) received by the proxy are **translated in JSON**.
- ✓ All **data** and **meta-data** are **cached** by the proxy
- ✓ **Errors** are processed **at proxy level**

TapHandle : Connecting a Service

- ✓ The */tables* output is split into individual per table files
- ✓ Documented table joins are taken out from the TAP_SCHEMA
- ✓ Declared capabilities are tested one by one
  - sync, async, upload, table joins



- ✓ Job results are converted on the fly in JSON messages (Stilts)



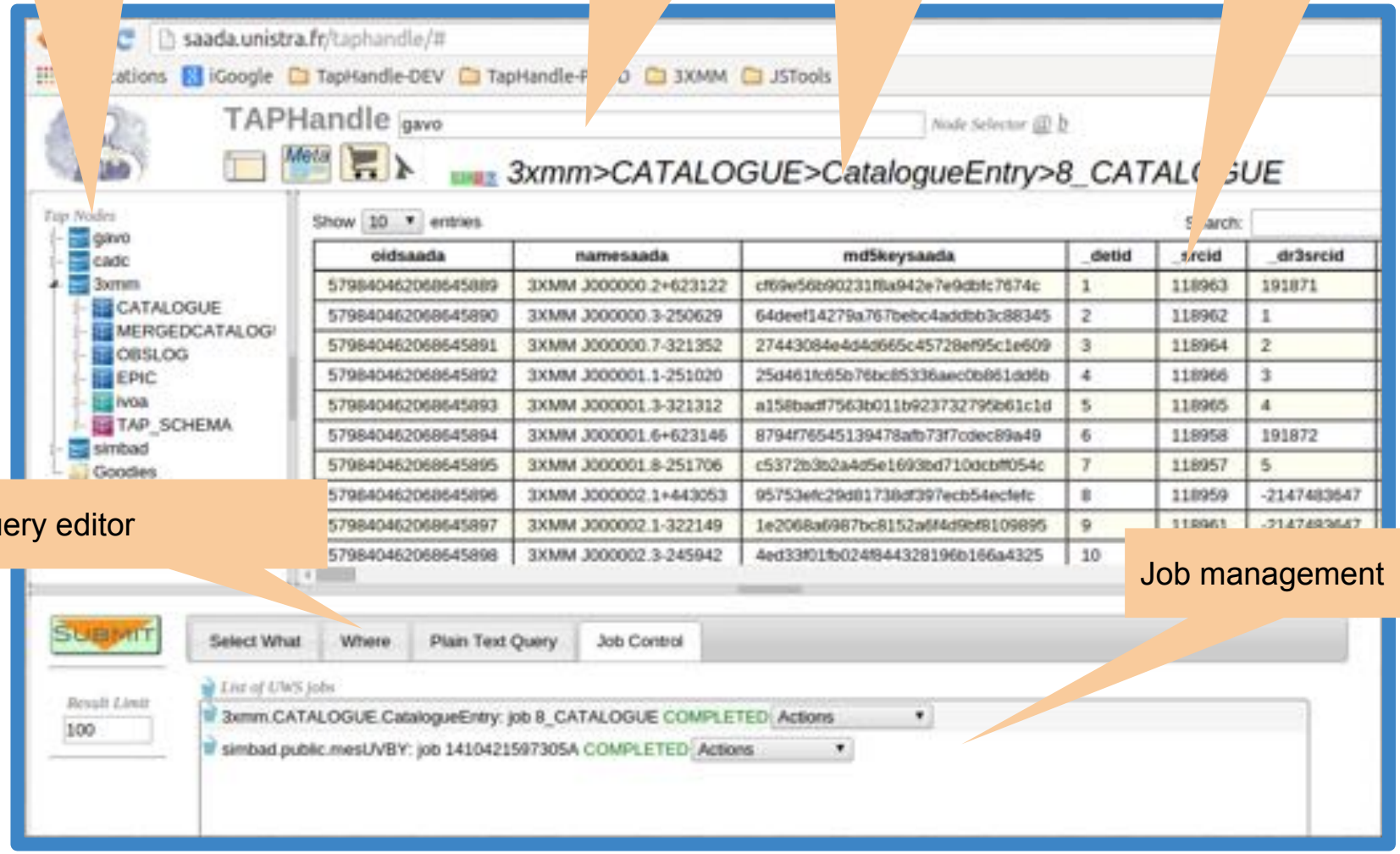
The TapHandle Main Screen

Tree of accessible resources

Search bar for TAP services

Path of the current resource

Query result

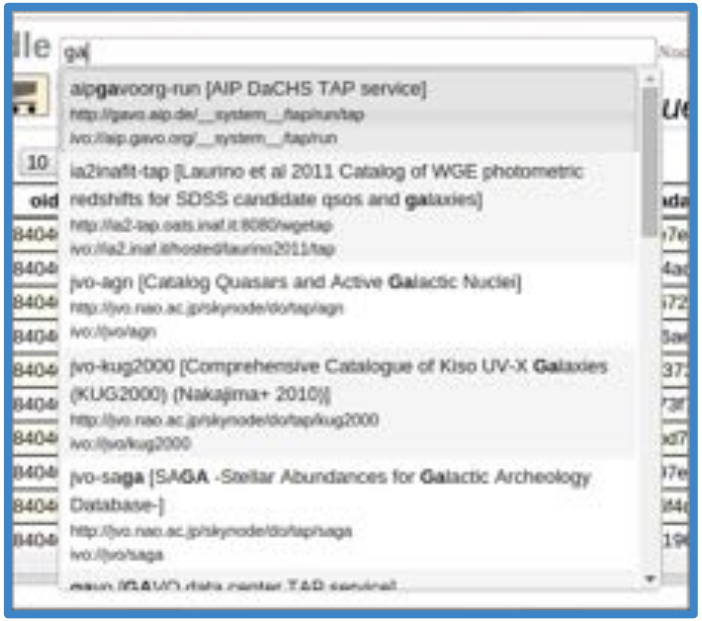


Query editor

Job management

Connecting the Registry

- ✓ The proxy gets the **description** of all TAP services harvested by the **GAVO TAP-Regext**
- ✓ Registry data are searched by a **TAP query**
- ✓ The list of **declared services** is sent to each client at **starting time**.

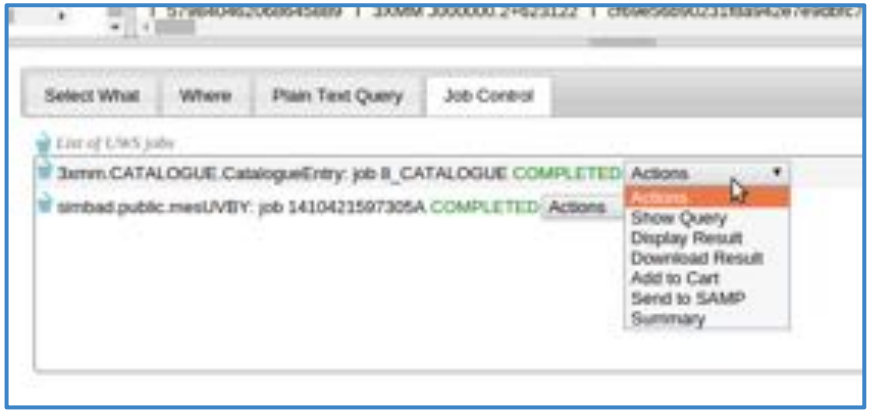



```
SELECT ivoid, access_url, res_title
FROM rr.capability
    NATURAL JOIN rr.interface
    NATURAL JOIN rr.resource
WHERE standard_id='ivo://ivoa.net/std/tap'
  AND intf_type = 'vs:paramhttp'
```

Tap Service Selection

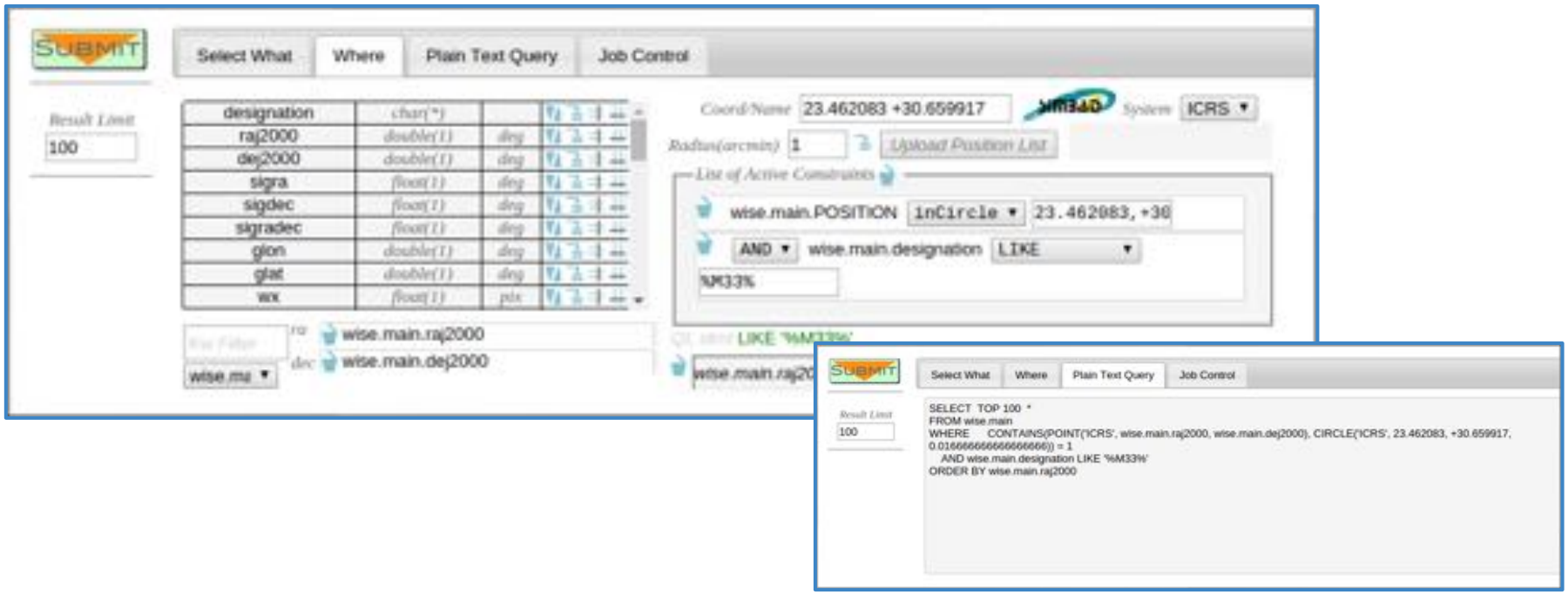
✓ A suggest-list shows out the TAP services matching the typed text.

Job Management



- ✓ Jobs are **systematically** executed in **asynchronous** mode (if supported).
- ✓ The interface waits **10" at the most** on the result.
- ✓ Output of **previous jobs** remain **accessible**
  - To display the result
  - To refine the query
  - To be put in the shopping cart
  - To be send to SAMP clients

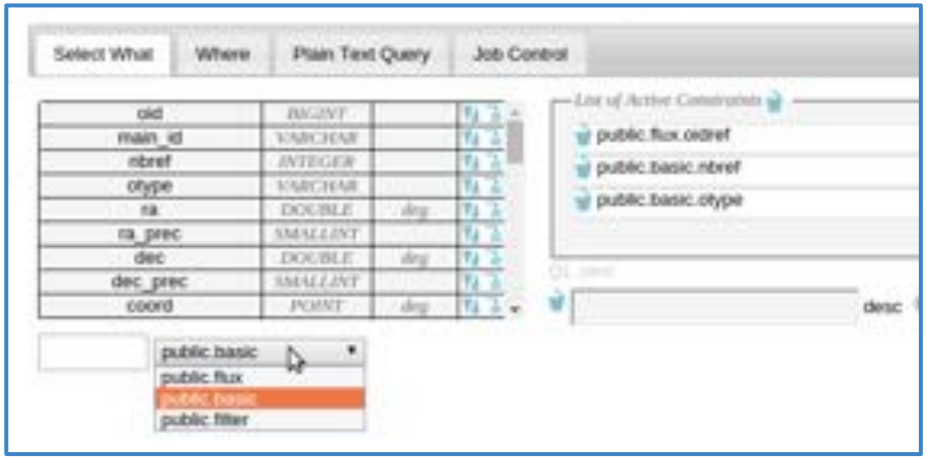
Query Editor

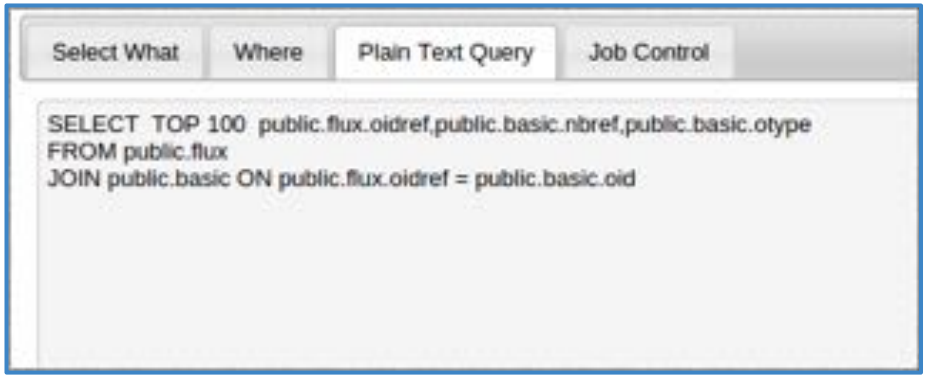


- ✓ Constraints are **edited one by one** from the list of available columns.
- ✓ Constraints are **stacked** in a container.
- ✓ ADQL queries can be **refined by hand**

Table Join Management

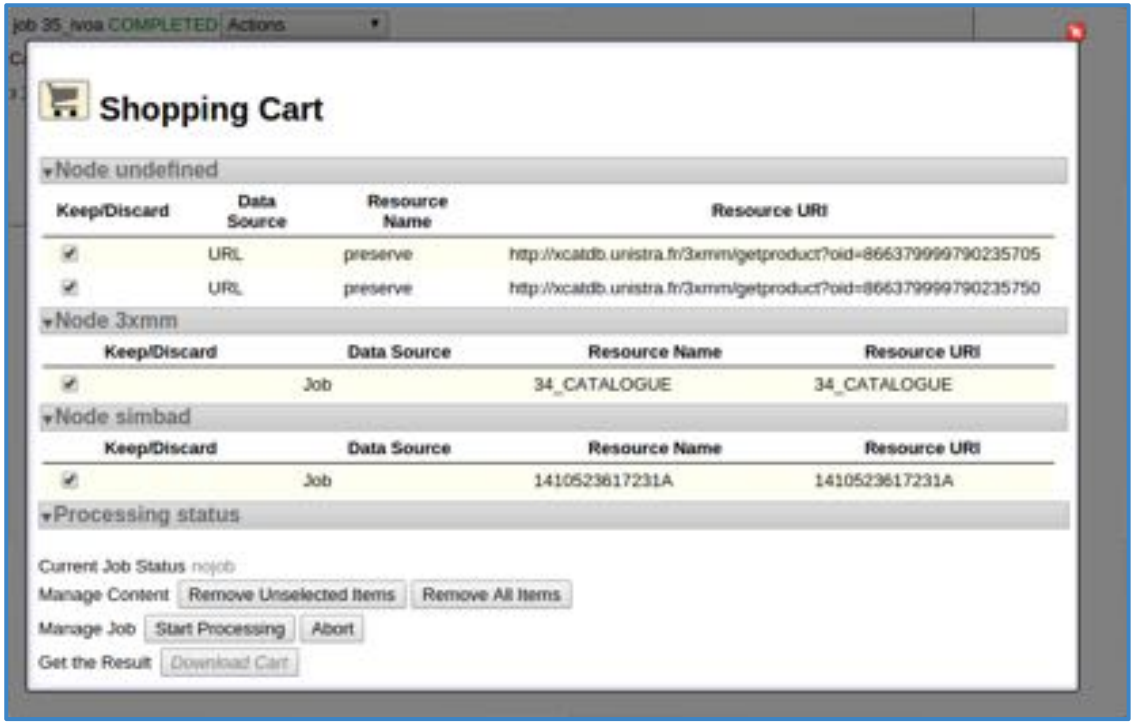
- ✓ The query editor **gathers the tables** declared as **joined** in the TAP_SCHEMA
- ✓ **Join** statements are **automatically set** into the query





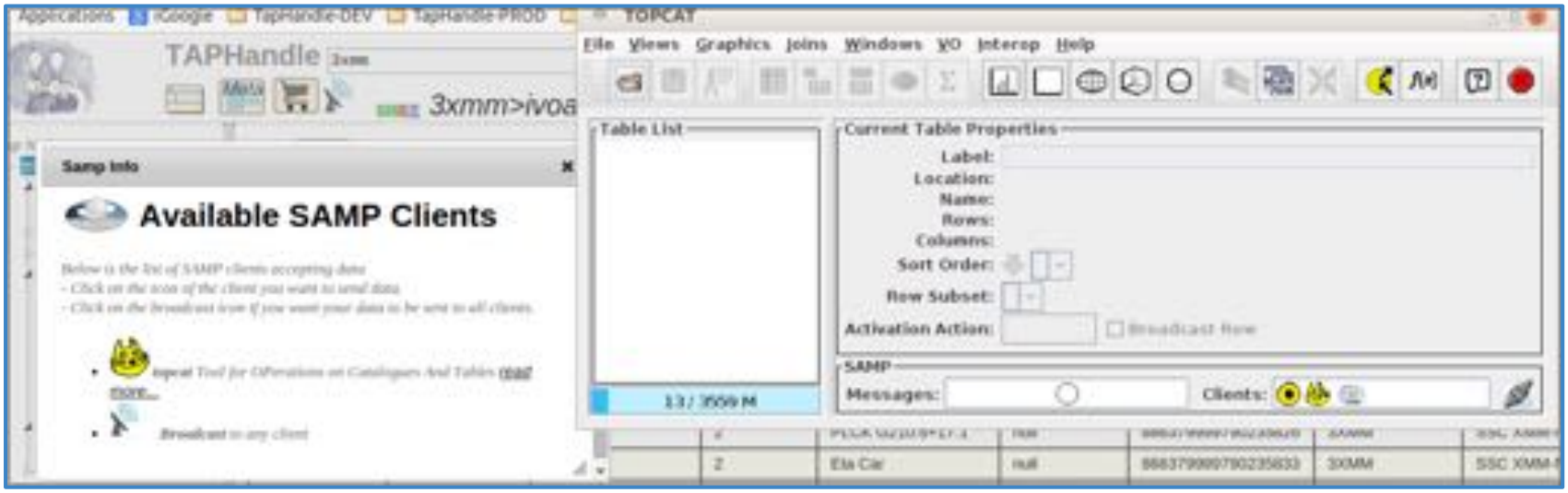
Shoppping Cart Facility

- ✓ **Query results** or **data files** referenced by them can be put in the **cart.**
- ✓ The **shopping cart** content can be downloaded in a **ZIP archive**.
  - Asynchronously processed



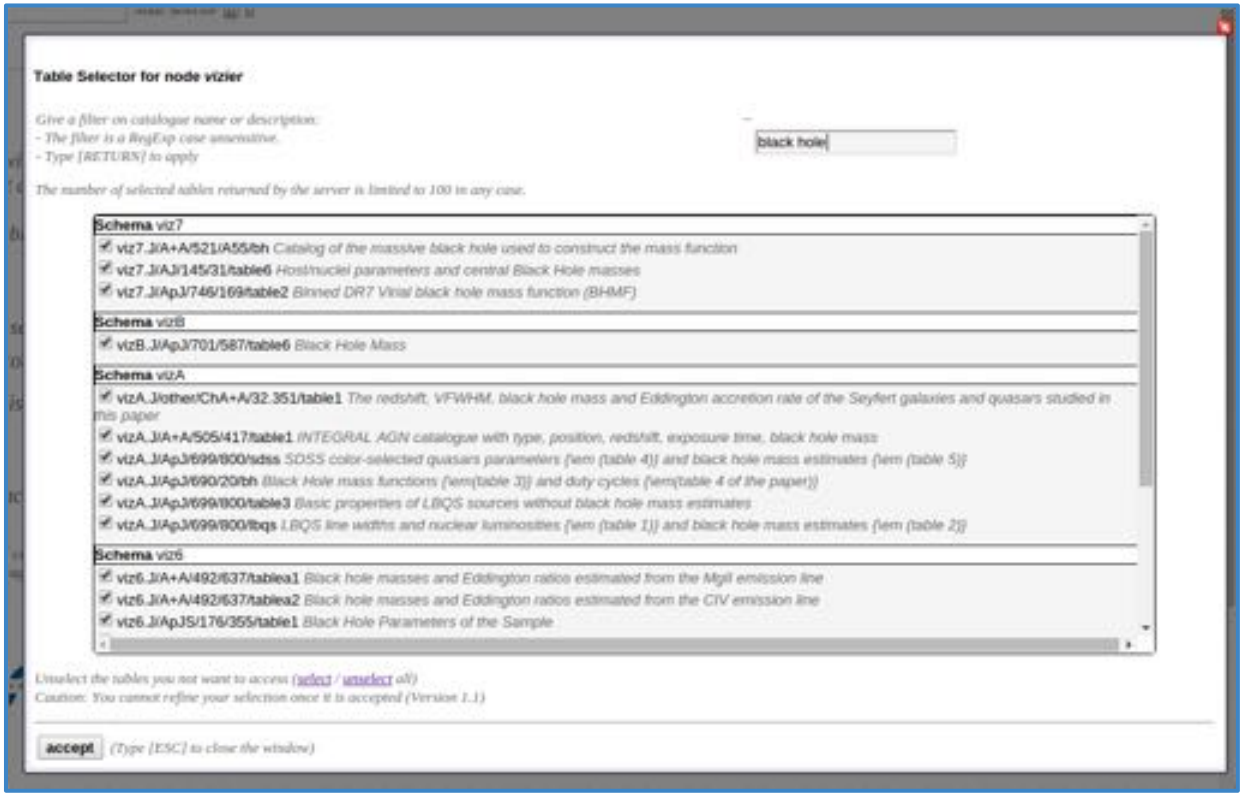
Interoperability

- ✓ **Data searched** in TAP nodes can be exported with **SAMP**
  - Query results
  - Data files referenced by query results

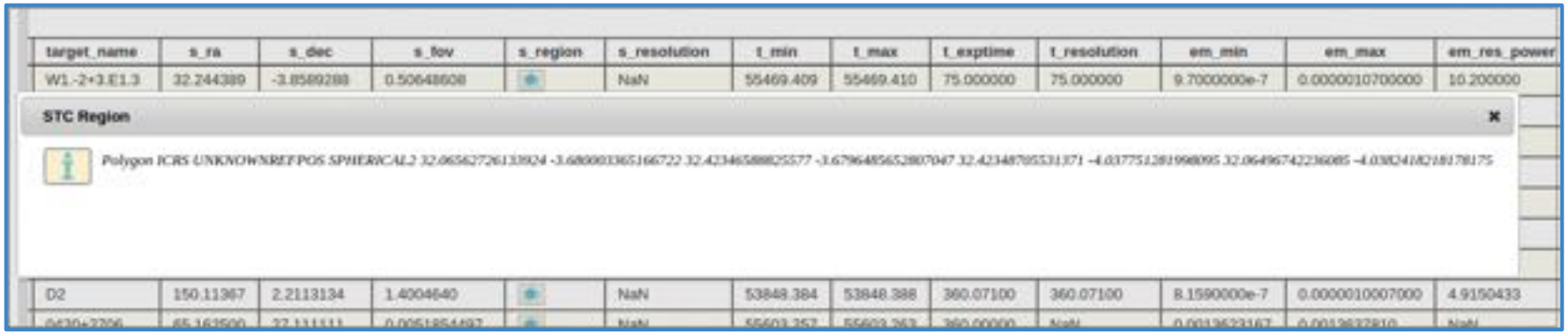


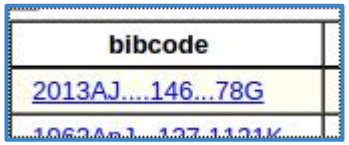
Resource Filtering

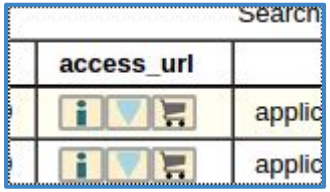
- ✓ Both **schemas and tables** exposed by a service can be **filtered**
  - Essential for huge resources like Vizier

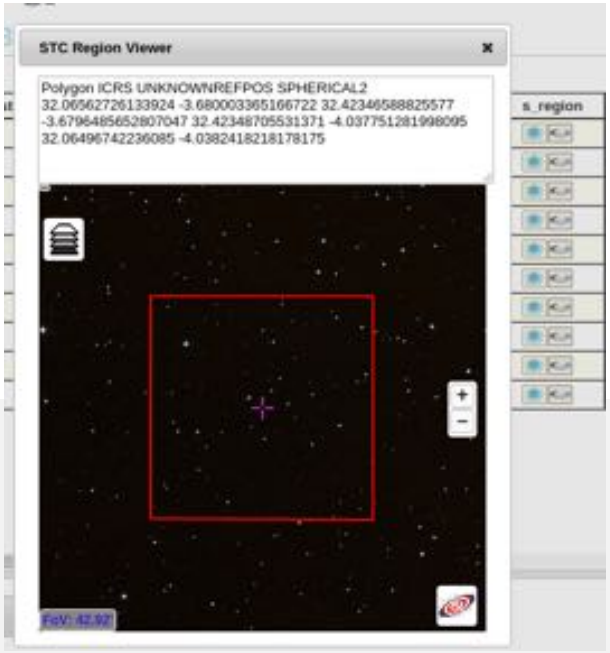


Data Formatting



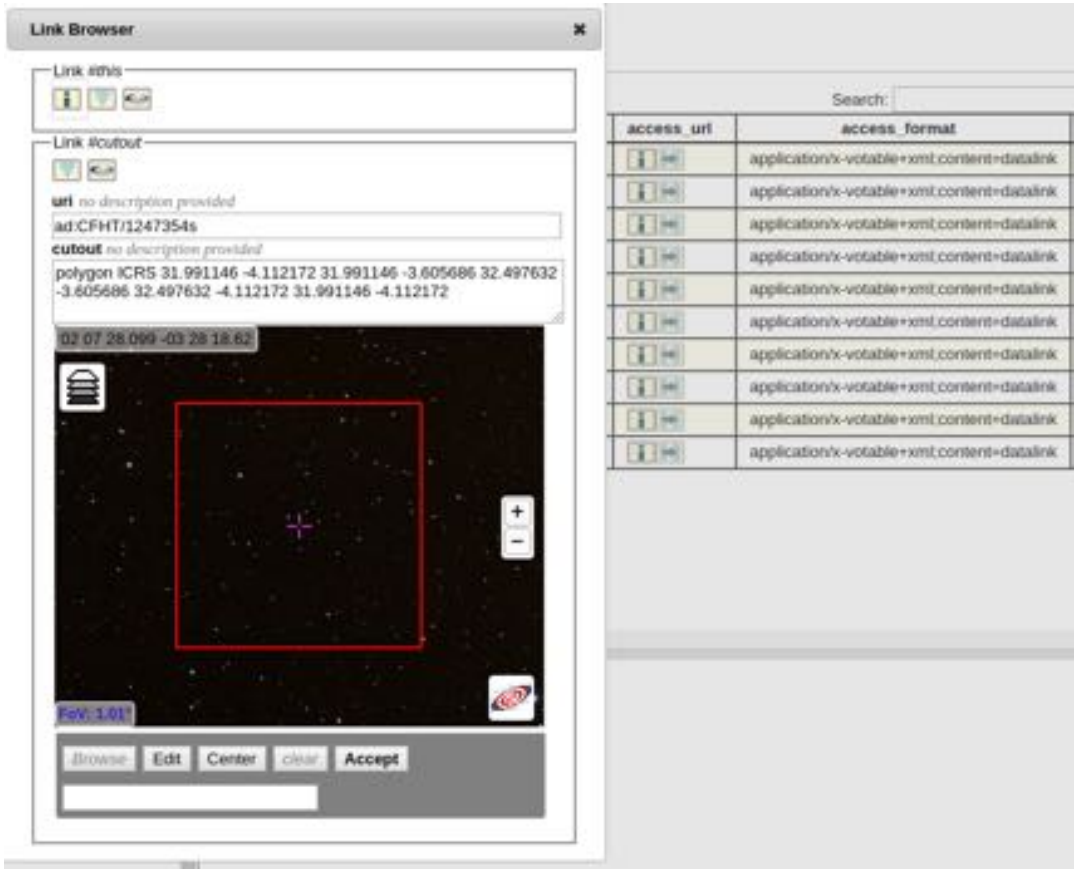






- ✓ Displayed data are **formatted on the fly**
  - URLs
  - Vectors
  - Bibcodes
  - STC Regions

Datalink Support



- ✓ Datalink responses are shown as **forms built on the fly**
  - SAMP connection for linked files
  - Region editor for cutouts
  - HTML forms when input parameters are requested

Service Survey

- ✓ Capabilities as tested by TapHandle
  - One row per server (not per service)

A	B	C	D	E	F	G	H	I	J
http://dc.zah.uni-heidelberg.de/tap	ivo://org.gavo.dc	gavo-tap	CAPABILITY	TABLES	JOIN	SYNC	ASYNC	UPLOAD	GAVO Data Cent
http://wfaudata.roe.ac.uk/6df-dsa/TAP	ivo://wfau.roe.ac	wfauroe-6df-dsa	CAPABILITY	NOTABLES	NOJOIN	SYNC	ASYNC	NOUPLOAD	6dF Galaxy Surv
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http://voparis-tap.obspm.fr/__system__/tap/v	ivo://vopdc.obsp	voparis-epn	CAPABILITY	TABLES	JOIN	SYNC	ASYNC	UPLOAD	Auroral Planetary
http://ia2-tap.oats.inaf.it:8080/wgetap	ivo://ia2.inaf.it/tv	ia2inafit-tap	CAPABILITY	TABLES	NOJOIN	SYNC	ASYNC	UPLOAD	Laurino et al 201
http://tools.asdc.asi.it/TAP	ivo://asdc/tap	asdc-tap	CAPABILITY	TABLES	JOIN	SYNC	ASYNC	NOUPLOAD	ASDC TAP Servi
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http://cass123-zone1.ast.cam.ac.uk/2dFGR	ivo://uk.ac.cam./	camast-object_c	NOCAPABILITY	NOTABLES	NOJOIN	SYNC	ASYNC	NOUPLOAD	2dF Galaxy Redt
http://heasarc.gsfc.nasa.gov/xamin/vo/tap	ivo://nasa.heasa	heasarc-xamin	CAPABILITY	TABLES	JOIN	SYNC	ASYNC	UPLOAD	HEASARC Xami
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http://gavo.aip.de/tap	ivo://aip.gavo.or	aipgavoorg-tap	CAPABILITY	TABLES	JOIN	SYNC	ASYNC	UPLOAD	AIP DaCHS TAP

Prospects

- **Scheduled**
  - Uploading position lists
  - Uploading job results
  - Support of extended functions by the query editor
    - Aggregation (count, min, max…)
    - ADQL functions.
  - Better error handling
  - Lot of minor changes making together the interface more comprehensive

- **Thinking about a better use of the meta data**
  - Better representation of joined table sets.
  - Extended use of the meta data
    - plain text meta data
    - Units
    - UCDs

- **Thinking about persistence for the query results**
  - User sessions
  - Connecting VOSpace?