ViaLactea Knowledge Base

Release 0.1

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CHAPTER

ONE

QUERY STRING PARAMETERS

Service will parse URL's query string section for parameters. HTTP header fields are not observed. Note, that some parameter values might contain characters whith special meaning in client's environment. Follow the usual rules for encoding for your client.

1.1 Circular search

Search is performed by specifying a circular region in galactic coordinates by its center and radius [l,b;r] in degrees. Paramters are:

```
?l=_value_&b=_value_&r=_value_
```

Result is a list of datacubes whose area in glactic coordinates overlaps with the specified circle. Value of the circle radius must be positive and below 2 degrees. Special case of r = 0 is equivalent to point search.

1.2 Cylindrical search

Search is performed by specifying a circular region in galactic coordinates by its center and radius [l,b;r] in degrees and portion of spectral axis by velocity's lower and upper bound [vl,vu] in km/s.

```
?l=_value_&b=_value_&r=_value_&vl=_value_&vu=_value_
```

this will return a list of datacubes which overlap with the cylinder specified by [l,b;r] and [vl,vu]. Specifying for [vl,vu] theoretically possible lowest/highest velocity is equivalent to the circular search.

1.3 Rectangular search

General rectangular search is defined by a rectangle given by its center [l,b] and width [dl,db]:

```
?l=_value_&b=_value_&dl=_value_&db=_value_
```

All values are decimal numbers in units of degrees. The values of dl and db must be positive. Special case when dl=db=0 is equivalent to point search above.

1.4 Narrowing the scope of search

Search requests as described above will search in all database. Any of the search types can be narrowed down by survey name and/or species and/or transitions by adding all or some of the following paramters:

```
surveyname=_string_&species=_string_&transition=_string_
```

Accepted values are always strings. For actual values consult the TAP service.

1.5 Cutout

Cutout is specified by a PublisherDID and a region of interest. It is always performed against one specific datacube per request. Request parameters are:

```
?pubdid=_string_&<any of the parameters used in search>
```

where pubdid is the PublisherDID returned in the response of the search and identifies uniquely the datacube to be cut.

The result of a cutout is a FITS file. Note that FITS file headers naturally encode rectagular regions, so even if the region specified in input is a circle, data corresponding to square which encloses the input circle is returned.

The generated cutout FITS files are always derived from the original so their Header- encoding follows the original FITS file encoding. From this, exception is only made if the original encoding was not fully compatible with the reference papers (E. W. Greisen, M. R. Calabretta, F. G. Valdes, and S. L. Allen : Representations of spectral coordinates in FITS, Astronomy and Astrophysics 446, 747…771 (2006)). Specifically, it is made sure that the cutout file always contains CUNIT3 for the velocity access and RESTFRQ keywords, even if the oriiginal files do not contain these keywords.

The URL to the generated cutout fits file is returned in XML response under code{<URL>} tag. Response also contains code{<CUT>} tag, which designates the original file and pixel coordinates of the cut.

The cutout service also accepts an optional parameter:

```
nullvals <has no value>
```

The presence of this parameter in the cutout URL will trigger counting of undefined values in the cut cube. The retunred XML will contain <nullValues> node givining total number of pixels, number of pixels which are undefined and for convenience a percentage value (calculated from the previous two).

1.6 Merge

The merging service is defined by sky- and optional spectrum-coordinates and a list of PublisherDID's (separated by semicolon):

```
pubdid=PublisherDID;PublisherDID;PublisherDID
```

If the data covering those coordinates are stored in different FITS-files, the service will perform reprojection to a common space including eventual re-gridding. Finally it returns one FITS-file with data merged from several FITS-files.

Such functionality is possible only for consistent data. Data of a 'sub-survey' are considered consistent and so are mergeable. A sub-survey is defined by a triple:

```
sub-survey = survey + species + transition
```

So, for merge these parameters are mandatory.

CHAPTER

TWO

SUMMARY

This is summary table showing parameters in query string. All parameters must appear at most once in the query string. The sky coordinates are interpreted in Galactic coordinate system and velocities are referenced to LSRK frame.

Table 2.1: VLKB parameters in URL query string (mandatory, optional or not applicable)

Parameters	search	cutout	merge	Description
(l b) [deg]	mand	mand	mand	center point
r or (dl db) [deg]	mand	mand	mand	area: circle or rectangle
(vl vu) [km/s]	opt	opt	opt	velocity lower-upper bound
pubdid	n/a	mand	mand	PublisherDID
surveyname	opt	n/a	mand	
species	opt	n/a	mand	
transition	opt	n/a	mand	
nullvals	n/a	opt	n/a	undefined-pixel count

The mandatory pubdid parameter holds only one PublisherDID in case of cutout. It holds a list of PublisherDID's in case of merge, separated by semicolons.

CHAPTER

THREE

RESULTS

Results are always returned in XML-file. Such file will contain URL's from which the generated files can be downloaded.

3.1 Search

Search returns metadata for available FITS-images or FITS-cubes which satisfied the search query conditions. The XML-response file for search is build up as follows:

```
<result>
        <description>
        <input>
        <msg>
        <DatacubeCount>
        <survey>
                <datacube>
                <datacube>
                ...
        </survey>
         <survey>
                <datacube>
                <datacube>
                ...
        </survey>
        ...
</result>
```

Found datacubes are grouped by surveys. For convenience, input parameters are repeated and count of found datacubes is also given. Each survey also contains its descriptive metadata: its name, species, transition including rest-frequency and velocity unit.

The datacube node provides the following information:

- Overlap: quality of overlap (full-, partial-, no-overlap etc.)
- PublisherDID: unique identificator of the datacube (used in cutout)
- Datacube-bounds: in galactic sky coordintes and velocity on the spectral axis
- Datacube-vertices: in galactic sky coordintes and velocity on the spectral axis

Based on this data, client selects which datacubes are needed, and can perform a cut to retrieve only the required data.

The PublisherDID serves as datacube identificator. Clients should consider it opaque and not interpret it, only store and use where required (cutout, merge).

3.2 Cutout

The XML in response has the same preamble as search (nodes from begining until first <survey>). Then two nodes:

- CUT : FITS-filename from which cut originates with pixels coordinates
- URL : this url downloads the cutout file
- nullValues: optional node, which shows percentage of undefined pixels in the cut region

3.3 Merge

The XML contains the cubes identified by pubdid and lying in the requested region and being part of the sub-survey. It shows the cuts used from all files (one CUT-node for each). Finally, the URL-node contains the merged file ready to be downloaded by the client (like in in cutout).