Virtual Observatory tools and services

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**VO tools and services**

VO tools offer a variety of functionalities:
- data discovery / data mining
- cross correlation
- spectra visualisation
- catalogue/table manipulation
- image handling
- plotting

**SAMP:** a messaging protocol allowing various tools to communicate with each other

*existing tool, adapted to “speak” SAMP

<table>
<thead>
<tr>
<th>Data Discovery</th>
<th>Spectral Analysis</th>
<th>Data visualisation and handling</th>
<th>SED building and fitting</th>
<th>Cross-correlation</th>
<th>Footprints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aladin</td>
<td>SPLAT</td>
<td>TOPCAT/STILTS</td>
<td>VOSED</td>
<td>TOPCAT/STILTS</td>
<td>NVO Footprint</td>
</tr>
<tr>
<td>VO Desktop</td>
<td>VOSpec</td>
<td>Aladin</td>
<td>VOSA</td>
<td>Aladin</td>
<td>Aladin</td>
</tr>
<tr>
<td>Datascope</td>
<td>Specview</td>
<td>VOPlot</td>
<td>easy-z*</td>
<td>Open SkyQuery</td>
<td>VirGO*</td>
</tr>
<tr>
<td>Octet</td>
<td>NVO Spectrum</td>
<td>VisIVO</td>
<td>GOSSIP*</td>
<td>VODesktop</td>
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</tr>
<tr>
<td>NED</td>
<td>[EURO-3D]</td>
<td>VOCat</td>
<td>NVO Filter</td>
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<tr>
<td>VoEventNet</td>
<td></td>
<td>Montage</td>
<td>VOSpec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASPID</td>
<td></td>
<td></td>
<td>VOSpec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VirGO*</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SkyView</td>
<td></td>
<td></td>
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</tbody>
</table>

**Table:**
- **Data Discovery:** Aladin, VO Desktop, Datascope, Octet, NED, VoEventNet, ASPID, VirGO*, SkyView
- **Spectral Analysis:** SPLAT, VOSpec, Specview, NVO Spectrum, [EURO-3D]
- **Data visualisation and handling:** TOPCAT/STILTS, Aladin, VOPlot, VisIVO, VOCat, Montage, VOSpec, VOSpec, Mirage*
- **SED building and fitting:** VOSED, VOSA, easy-z*, GOSSIP*, NVO Filter
- **Cross-correlation:** TOPCAT/STILTS, Aladin
- **Footprints:** NVO Footprint, Aladin, Open SkyQuery, VirGO*, VODesktop, Miragè*, VOSpec, VOSpec
### Image servers

<table>
<thead>
<tr>
<th>Server Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Aladin image server (CDS/Strasbourg) - DSS/MAM...</td>
<td>Ok</td>
</tr>
<tr>
<td>SDSS DR7 images</td>
<td>Ok</td>
</tr>
<tr>
<td>Multimission Archive at STScI (MAST)</td>
<td>Ok</td>
</tr>
<tr>
<td>Canadian Astronomical Data Center (CADC)</td>
<td>Ok</td>
</tr>
<tr>
<td>Hubble press release images</td>
<td>No result</td>
</tr>
<tr>
<td>MAMA ESO R Atlas - VO-Paris (Fr)</td>
<td>Ok</td>
</tr>
<tr>
<td>Chandra X-Ray Observatory Data Archive</td>
<td>Ok</td>
</tr>
<tr>
<td>NOAO Science Archive</td>
<td>No result</td>
</tr>
<tr>
<td>SAI Supernova light curve catalogue</td>
<td>Ok</td>
</tr>
<tr>
<td>Observations of neutron stars</td>
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</tr>
<tr>
<td>IA2 Italian Center for Astronomical Archive: TNG</td>
<td>Querying</td>
</tr>
<tr>
<td>VO-Paris MAMA ESO R Atlas</td>
<td>No result</td>
</tr>
<tr>
<td>HST-ACS GOODS data within Chandra Deep Field South (CDF)</td>
<td>No result</td>
</tr>
</tbody>
</table>

### CADC

**Description:** Canadian Astronomical Data Center (CADC)

**Type:** Image


**Status:** Ok

**Identifier:** CADC

The Canadian Virtual Observatory (CVO) provides this SIA server access for some CADC archives (decompose mosaic images into single extension FITS files, cutout of the region-of-interest when it is smaller than the image, WCS correction of returned FITS files.)
Positional cross-match

Only positional offset is used to find the matches.

- **2MASS All-Sky Extended Source Catalog**: 3 objects
  - RA: ra
  - DEC: dec

- **SuperCOSMOS catalog (SSS.cat)**: 2212 objects
  - RA: ra
  - DEC: dec

Threshold is the source separation in arcsec

0 <= threshold <= 4

Choose match method

- [ ] Best matches
- [ ] All matches
- [ ] Sources without match

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**TOPCAT/STILTS - the table ‘wizard’**

### Table Columns for 1: Lockman_old_sample.dat

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<thead>
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<td>ObjID</td>
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<td>RA</td>
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</table>

### Table Parameters for 1: Lockman_old_sample.dat

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>/Users/ehatzimi/Desktop/Lockman_old_sample.dat</td>
<td>Table name</td>
</tr>
<tr>
<td>URL</td>
<td>file:/Users/ehatzimi/Desktop/Lockman_old_sample.dat</td>
<td>URL of original table</td>
</tr>
<tr>
<td>Column Count</td>
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<td>Number of columns</td>
</tr>
<tr>
<td>Row Count</td>
<td>165</td>
<td>Number of rows</td>
</tr>
</tbody>
</table>
VOSpec, SPLAT, Specview - the spectral analysis tools

SPLAT-VO and Specview offer similar data access and similar analysis functionalities.
Scripting

### Complete Examples

The following links provide complete scripts which perform the described action. You can copy paste form the pages or download all the scripts from the tar file linked at the bottom.

- Search a catalogue for sources in a number of positions
- Search a catalogue for sources in a number of positions (parallel version)
- Search for images covering selected objects or areas
- Cross Match tables (NED, 2MASS, SDSS, UKIDSS)
- Submit an ADQL query to UKIDSS DR1
- Cross Match two tables returned by ADQL queries (IPHAS + 2MASS)
- Convert between file formats (e.g. VOTABLE to FITS)
- Extract objects from images using SExtractor

These and other Python scripts are available as a tar file: [python.tar.gz](http://www.astrogrid.org/wiki/Help/IntroScripting/AstrogridPython)

- ColourCutter: Crossmatch catalogue data selected by colour (FIR to optical)

but also:
- Aladin macros
- STILTS
How to find VO tools

EURO-VO pages: http://www.euro-vo.org/pub/fc/software.html