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ASPIC: Public Spectroscopic Archives at CeSAM

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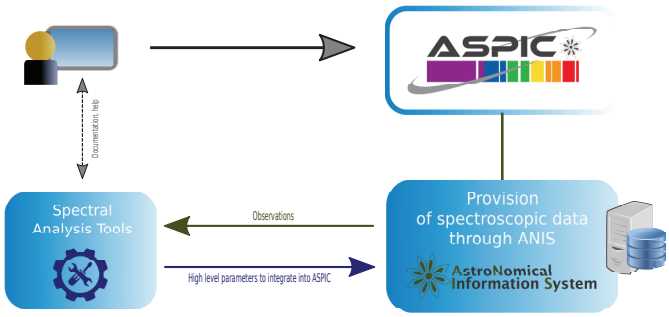
Abstract. Archive of Spectra Publicly available In Cesam (ASPIC) uses recognized LAM scientific and CeSAM (Centre de donnéeS Astrophysiques de Marseille) technical expertise to make available to the scientific community data and tools for spectroscopic massive programs. ASPIC originated from several deep galaxy surveys led at LAM or in which LAM is involved, including VVDS, zCOSMOS, VIPERS, and VUDS, cumulating a high level of expertise and international acknowledgement. It is expanded to host next generation surveys like EUCLID, PFS, or Athena. In each of these projects ASPIC has a major role: responsible for the development of the redshifts measurement and validation pipeline, 1D spectra production, spectra archiving. ASPIC is available upon request to host the spectroscopic data of any similar program originating from any country/institute. ASPIC not only makes available the spectroscopic data but also provides specific tools for value-added exploitation of the data from a user-friendly interface. The web application ANIS offers high level services which can operate directly on spectroscopic data during or after the period of operation of the mission or of the observer's program. There is no limitation on the wavelength domain of the data that can be hosted in ASPIC.

1. ASPIC Architecture



ASPIC produces and/or makes available the final spectroscopic data from large surveys, providing tools increasing their value during or after the period of operation of the survey. ASPIC relies on the web application ANIS[1] developed at CeSAM providing high level web services. In the ASPIC framework, a major evolution in terms of services will be the offering in the near future of a large range of spectral modeling tools.

[1]http://cesam.lam.fr/anis/

2. The ASPIC functionalities provided through the application ANIS

ASPIC makes use of ANIS (AstroNomical Information System) (Gimenez et al. 2014), a web generic tool developed at CeSAM by the Information Systems team, aiming at facilitating and homogenizing the implementation of astronomical datasets.

2.1. ANIS application

ANIS integrates:

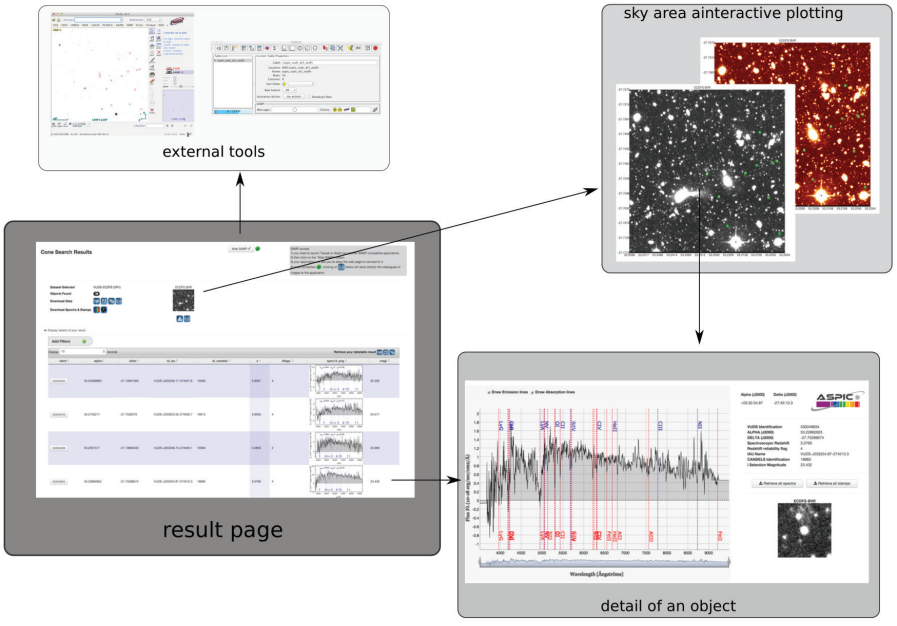
1. A user interface template that can be adapted to the datasets: The interface is made of search forms, built from the data description (metadata) provided by the data owner. It then provides several extraction and display tools.

2. A Framework: The Framework is an API developed with full PHP5 and composed of several packages according to the Model-View-Controller (MVC) pattern.

3. Databases to handle the data and the metadata, with web administration tools: The databases have been developed with PostgreSQL and optimized for astronomical requests. The metadata database allows us to manage the user interface, so each update of the metadata database automatically changes the user interface.

2.2. ASPIC Functionalities

ASPIC through ANIS provides high level services like search, extract and display for spectroscopic and imaging data using different search interfaces.

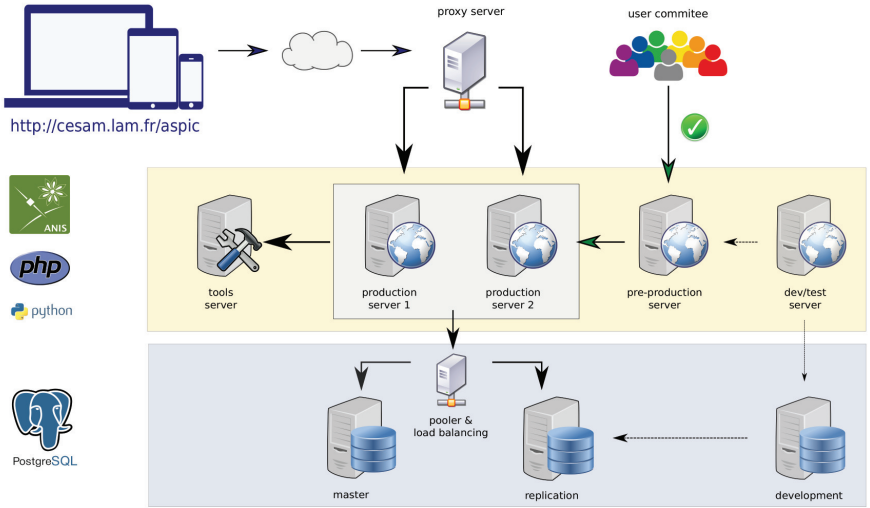


The extracted data are available as a table that can be sorted or filtered and from which the user can view the details of an object (photometry, spectroscopy, ...). We

developed this option by using the DataTables[2] jQuery plug-in which displays information through a table with several functionalities like sort by column or column filter. And by using the jqPlot[3] plug-in, we developed an interactive plot to display the sky area with the extracted data, in which the object information is available. The user can display the details of an object: the spec1d plot (made with the dygraphs[4] library) and general information including all available image stamps of the object.

ASPIC provides the direct download of the extracted data or complete catalogues in VO-Table, FITS, CSV and ASCII formats and SAMP broadcasting (Taylor et al. 2012) which allows it to send information to Topcat (Taylor 2005), Aladin (Bonnarel et al. 2000) or other VO compliant software directly from the information systems. The user may also, when data is available, download a spectra archive and corresponding FITS files and have a first look with multi-λ stamps.

3. ASPIC Infrastructure



The CeSAM Information Systems team manages specific activities: the database design, the data ingestion, the data handling and the validation of interface design.

The databases have been developed with the PostgreSQL 9.4 technology and optimized for astronomical requests. The architecture of the database system is based on a pooler with a load balancing system which distributes the requests on the master or

[2]https://www.datatables.net/

[3]http://www.jqplot.com/

[4]http://dygraphs.com/

replication server. Backup systems and development servers are configured to allow automatic recovery.

The architecture of the application system is based on a set of servers: production, pre-production and development servers. A proxy server distributes the HTTP requests to the production servers or to the pre-production servers if a rescue channel is needed.

For each new ingestion of data or new functionalities in ASPIC, we work on our development servers (database and application) and we deploy the new version on the pre-production server. After validation by the ASPIC users committee, we deploy the final version on the production servers to make the new data available.

4. Spectroscopic Data available in ASPIC

ASPIC produces and/or makes available the final spectroscopic data from large surveys, providing tools increasing their value during or after the period of operation of the survey. Data currently available in ASPIC:

- VVDS Final release (Le Fèvre et al. 2013): 53 848 objects,
- VUDS DR1 (Tasca et al. 2016): 698 objects,
- zCOSMOS 10k bright (Lilly et al. 2009): 10 645 objects,
- GAMA DR2 (Liske et al. 2015): 59 364 objects,
- 6dFGS DR3 (Jones et al. 2009): 125 071 objects

Other public data as the SDSS DR12, Deep2, 2dF are in the process of being ingested. PI data of the spectroscopic survey in the XMM-Newton XXL survey will also be made public through ASPIC in 2016. In a more distant future, we also plan to open the data storage possibilities to other wavelengths such as X-ray or millimeter.

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