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EuroPlaNet VO architecture

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Abstract

An objective of Europlanet-IDIS activity is to set the basis for a European Virtual Observatory in Planetary Science (JRA4 in EuroPlaNet-RI). The objective in this first step is to facilitate searches in big archives and sparse databases, as well as data access and visualization. Databases produced in the EuroPlaNet-RI framework are expected to become available in this context (task 4 of JRA4, TNAs). In the long run, this system should be extensible to all fields of Planetary Science, and open to external data providers.

An overall design has been studied and is described here. It makes intensive use of studies and developments led in Astronomy (IVAO), Solar Science (HELIO), and space-borne archive services (IPDA). In particular, it remains consistent with extensions of IVOA standards. Use cases and potential applications are described in several posters in this conference.

1. Introduction

A general scheme of a Planetary Science VO is proposed in Fig. 1: The user is working at his computer, sends queries to data bases, and gets answers. Data of interest are identified through automated requests to data services. Selected data are then loaded in memory, plotted according to their format (images, spectra\dots), and are possibly sent to more elaborated tools for analysis.

2. Data scope

The perimeter of data to be accessed by the Europlanet VO derives from the objectives stated in the program proposal. It includes databases produced by the various work packages during the program (including JRA4/task4, TNA3…); a selection of space borne data from planetary missions (PSA); data of interest selected by SA-IDIS participants, etc…

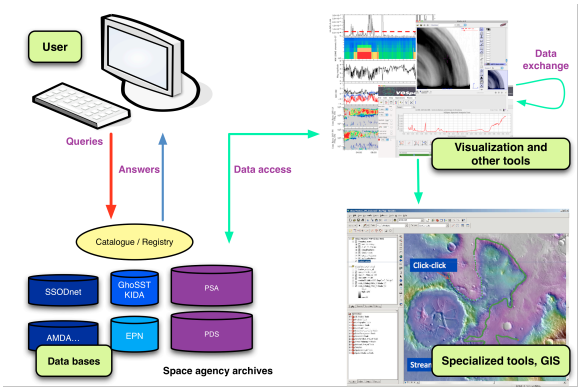

Figure 1: Overall scheme for Europlanet VO

These data are extremely heterogeneous. Some are organized in data services with specific access mechanisms (e.g. PSA for space missions, AMDA for plasma data, SSODnet for small bodies properties, GhoSST for laboratory spectroscopy…), some are available as small data bases or even simple tables on the web (Fig. 2).

The available data services are listed in a catalogue with architecture consistent with IVOA's registries. This catalogue includes a short description of the data services, as well as a mention of the access mechanisms they support.

In order to be fully searchable, data services must include a detailed description of their content. This is based on a Data Model, which can be then used by whichever access protocol. A general Planetary Science Data Model is being developed, which supports space-based, telescopic, experimental, and computed data [1].

3. Query mechanism

The user works with a specific client, which can be a Java applet running in his browser. The client allows the user to write a query and sends it to the catalogue. Services of interest are returned to the user, who can manually restrain the search. The client transmits the query to the selected services according to the access protocols indicated (Fig. 3). The answer is a VOtable containing an URL for the data files matching the query, and access mechanism.

This mechanism is derived from IVOA's TAP protocol, and is based on a restricted number of parameters, sufficient to characterize a wide range of planetary data [2]. This protocol can be extended in the future, or for special applications.

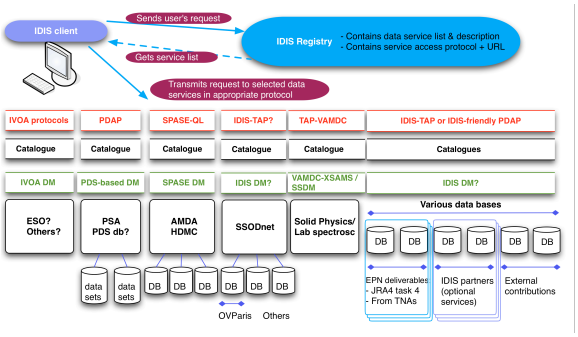

Figure 2: Data scope and query mechanism

4. Data visualization

Visualization will make extensive use of IVOA services and applications. Once the data are loaded in memory, they are sent to a common hub where they become available to clients supporting the SAMP protocol. These include Aladin (a sophisticated image/cube viewer with sky coordinates support), VOspec and SPLAT-VO (spectral viewers including measurement tools), VOplot (general-purpose vector viewer), SAOimage (sky image viewer), TopCat (tabular data-oriented), and VisiVO (volume data-oriented).

In this context, IDIS is studying a possible bridge with tools developed in the OGC context (Open Geospatial Consortium), which would provide support for planetary surface mapping.

5. Access mechanism

Some of the data services listed above already support an access protocol to handle automatic queries: SSODnet support IVOA protocols (in particular TAP), AMDA supports the SPASE system, the PSA will be accessible through PDAP, and GhoSST has developed a variation of TAP for solid Physics. Smaller databases need to implement such mechanisms in order to be integrated to the Europlanet VO.

Data services can be set up using a server being implemented in SITools2 (a CNES software to manage database access). An on-line TAP client is being developed at OV-Paris to query such services.

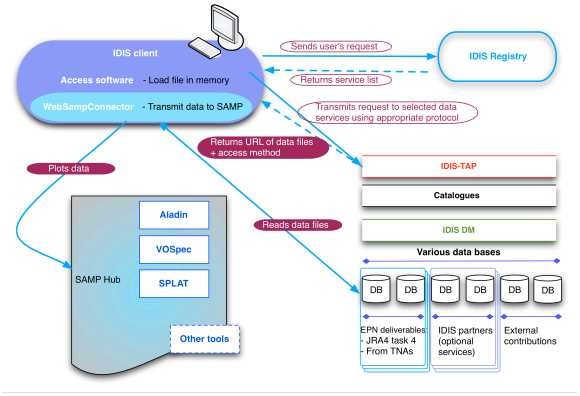

Figure 3: Data access and visualization services

6. Prospects

Some VO demonstrators are already available on line (http://voparis-europlanet.obspm.fr/otherserv.shtml). A detailed documentation will be released by the end of the EuroPlaNet-RI contract.

Acknowledgements

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References

[1] Cecconi et al, this issue.

[2] Le Sidaner et al, this issue.

See posters by IDIS partners in this conference illustrating VO use cases.