EPSC Abstracts
Vol. 6, EPSC-DPS2011-1355-1, 2011
EPSC-DPS Joint Meeting 2011

Proposed architecture for EuroPlaNet-IDIS Virtual Observatory

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Abstract

An objective of Europlanet-IDIS activity is to set the basis for a European Virtual Observatory in Planetary Science (tasks 2 and 3 of JRA4 in EuroPlaNet-RI). The objective in this first step is to facilitate searches in big archives and sparse data bases, as well as data access and visualization. Data bases 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 in 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. Some mechanisms under study are described in two companion abstracts (Cecconi et al [data model], Gangloff et al [access protocols], this issue).

Purpose

A general scheme 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...), and are possibly sent to more elaborated tools.

Data scope

The perimeter of data to be accessed by the IDIS VO derives from the objectives stated in the program proposal. It includes data bases produced by the various work packages during the program (including

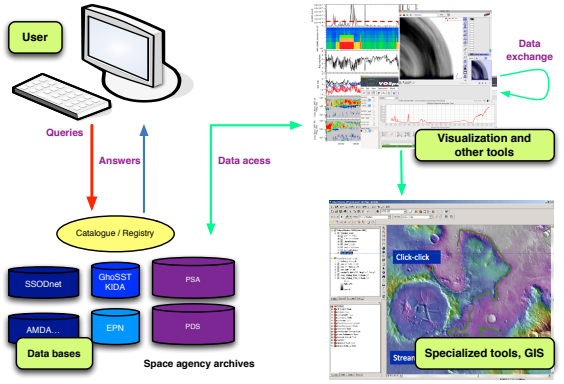

Figure 1: Overall scheme proposed for IDIS VO

JRA4/task4, TNA3...); a selection of space borne data from planetary missions (PSA); data of interest selected by SA-IDIS participants.

These data are extremely heterogenous. Some are organized in data services with specific access mechanisms (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.

The available data services are listed in a central IDIS 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.

Query mechanism

The user uses an IDIS client, which can be a java applet running in his browser (being studied). 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. The answer is a VOtable con-

taining an URL for the data files matching the query, and access mechanism.

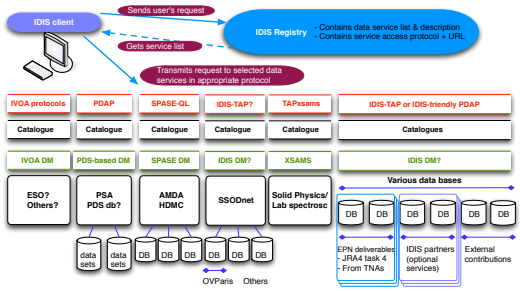

Figure 2: Data scope and query mechanism

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. Those include Aladin (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), 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.

Access mechanisms

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 data bases need to implement such mechanisms in order to be integrated in IDIS. Although PDAP is oriented towards the PDS format, it may be used in the broader IDIS context provided non-PDS keywords and values are used; alternatively, a variation of TAP is being studied for implementation of small databases (Gangloff et al, this issue).

In order to be fully searchable, data services must include a detailed description of their content. This is done with a Data Model, which can be then used by whichever access protocol. A general Planetary Science data model is being developed in IDIS, which will support space-based, telescopic, experimental, and computed data (Cecconi et al, this issue).

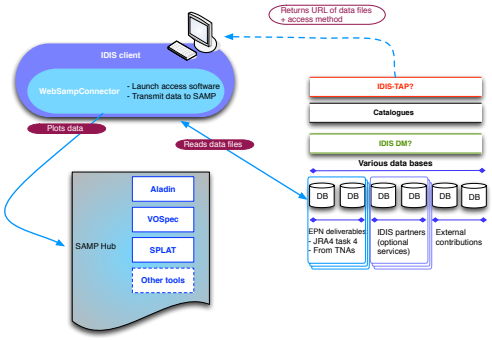

Figure 3: Data access and visualization services

Prospects

Some VO demonstrators are already available on line (http://voparis-europlanet.obspm.fr/otherserv.shtml). A first order implementation is expected to be released by the end of the EuroPlaNet-RI contract.