SOAP based web services and their future role in VO projects

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Abstract

Modern state-of-the-art web services are from crucial importance for the interoperability of different VO tools existing in the planetary community. SOAP based web services assure the interconnectability between different data sources and tools by providing a common protocol for communication. This paper will point out a best practice approach with the Automated Multi-Dataset Analysis Tool (AMDA) developed by CDPP, Toulouse and the provision of VEX/MAG data from a remote database located at IWF, Graz. Furthermore a new FP7 project IMPEx will be introduced with a potential usage example of AMDA web services in conjunction with simulation models.

1 Introduction

In todays research environment the internet and it's global networking abilities play a significant role especially for providing and distributing data. Since the information density is growing steadily, data centers like CDPP are working heavily to make planetary data more accessible. In addition a serious amount of research is done to develop standards for data providers to make their lifes easier in integrating the data. The Automated Multi-Dataset Analysis Tool (AMDA, http://cdpp-amda.cesr.fr/) a service provided by CDPP is meeting the Virtual Observatory Paradigm. It gives a direct access to data from distant databases and includes a connection layer compliant with the SPASE-XML (http://www.spase-group.org/) standards [1]. A potential data provider needs to prepare his data files, describe the parameters and implement a defined set of remote procedure calls, so that AMDA can interact with the remote data center. The first section of this paper is devoted to a pratical example developed at the Plasma Node as part of the EuroPlaNet IDIS activities.

2 Remote web services for AMDA

One of the main difficulties to do comparative studies of planetary environments is that scientists have to exploit together data coming from many sources which can initially be heterogeneous in their organization, description and format [3]. The Automated Multi-Dataset Analyis Tool main goal is to support comparative studies and therefore it is necessary to define science use cases in order to integrate the needed datasets.

One request was directed to the VEX/MAG dataset which is stored at IWF, Graz servers and are available on request from PI Tielong Zhang. On the basis of collaborative work at the Plasma Node of EuroPlaNet IDIS (http://europlanet-plasmanode.oeaw.ac.at/) the first step was to describe all necessary information with the SPASE-XML standard and integrate it in an eXist database. The XML files are used to provide necessary metadata and will be transmitted with two SOAP (Simple Object Access Protocol) [2] remote procedure requests to AMDA: *getAvailableData* and *getDatasetInfoUrl*. AMDA acts as a client to the remote database and will receive requested datasets by calling the last remote procedure *getDatasetUrl*. Finally one can provide a WSDL descriptor which summarizes the web services in one XML file, see Figure 1 and [4].
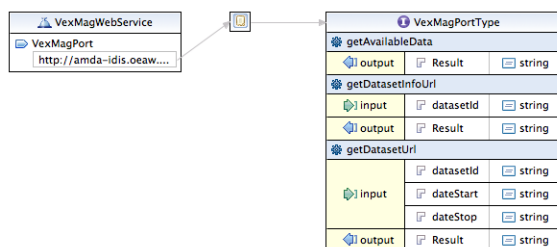

Figure 1: Schematic of VEX/MAG WSDL descriptor.

3 AMDA and correlations with IDIS

Since the integration of web services into AMDA is one of the main goals for the IDIS Plasma Node, it is from vital importance to share the knowledge of modern Virtual Observatory Paradigms within the IDIS community to evolve advanced tools among all thematic fields of planetary science. A iniative coming from the IDIS Plasma Node [5] started a similar approach with the PDAP protocol (http://www.planetarydata.org) which was developed by the International Planetary Data Alliance. The resources are described in a similar XML manner and the connection to a dataset using the PDAP standard will be possible over similar SOAP web services like in AMDA with SPASE.

4 AMDA and its future role in IMPEx

IMPEx (Integrated Medium for Planetary Exploration) is a new SPACE-FP7 project which is aimed at creation of an interactive computational framework where data from planetary missions will be interconnected with numerical models providing the possiblity to compare simulation results and in-situ measurements. AMDA will play the role of the mission data provider, so there is a strong need to adapt the same standards in this project to build up a coherent system.

4.1 Use Example: Mercury Surface Studies

A best practice example of how IMPEx could help scientists in their work is already being prepared. Studies about Mercury's surface compositions are made with measured Solar Wind data and a following simulation chain comprised of the 3D MHD/Hybrid plasma model, surface composition modelling and 3D exosphere codes [6]. The measured Solar Wind data will be extraced for time of the Messenger spacecraft flybys from AMDA and will provide the input for the simulation chain. By now, the exploitation of measurement data is done manually, but IMPEx will be able to provide a interactive databox, where a user can choose both available models and space mission data including trajectories for a specific solar system object. The major goal of the project is to provide one singular environment to simplify the scientific work.

5 Summary and Conclusions

Modern web services with the abilities to interconnect different sources of information are from vital importance for the planetary science community. The AMDA tool has shown an excellent example of interoperability between remote data sources and is evolving towards a multifunctional environment. IMPEx will be able to add valuable services with simulation data to this Virtual Observatory and contribute to the aim of having one standardised environment comprised of different planetary science disciplines.

Acknowledgements

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