



# SOLARNET–Italian Solar Archive Federation

## The First Italian Virtual Observatory Application

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**Abstract.** We describe the implementation of the national project SOLARNET (SOLar ARchive NETwork) aimed at federating the heterogeneous Italian solar data archives into a VO (Virtual Observatory) framework as a single integrated database, and providing users with tools to search and retrieve specific data sets. It interoperates using the SOAP/XML Web Services exposed by each single node and managed via a unified Portal. This project is the first real Italian Virtual Observatory application using the standard defined by the IVOA (International Virtual Observatory Alliance) working groups.

### 1. Introduction

The goal of SOLARNET is to allow the solar community to query all the existing Italian solar data archive via a unified and simple Web interface (the Portal). It has been a test-bed for the larger and more advanced project EGSO (European Grid for Solar Observations). The SOLARNET is operational and represents the first Italian application fully integrated in the VO framework.

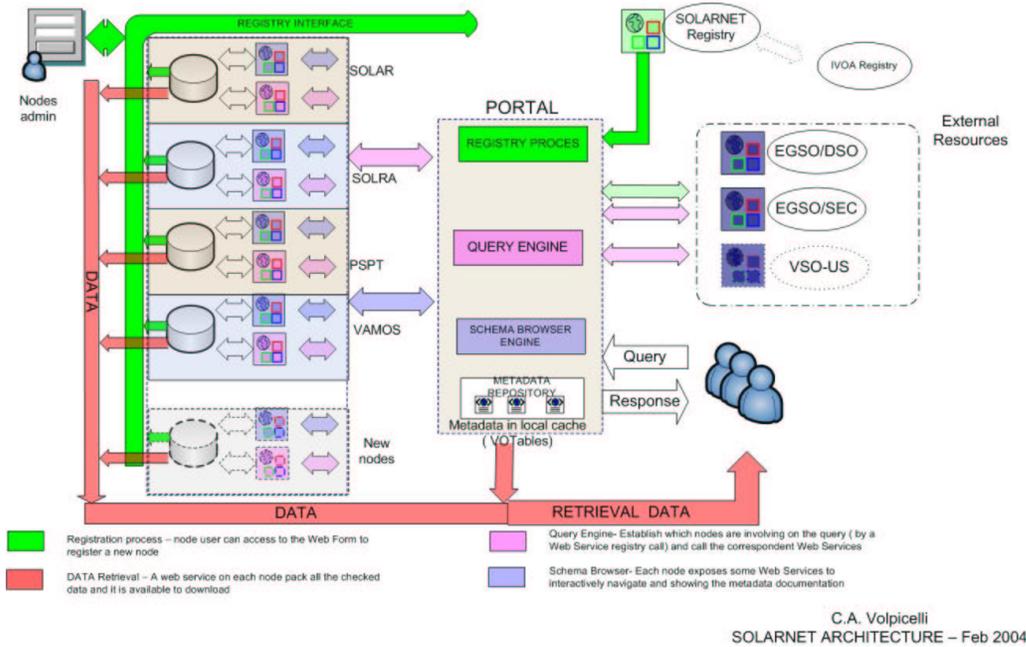
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### 2. SOLARNET Architecture

The SOLARNET architecture is based on the SOAP (Simple Object Access Protocol) XML Web Services technology. Each federated node exposes some web services allowing a complete inter-operability. The current implementation has five main tasks that cooperate to achieve the federation's scope and each one has a web service that exposes various methods. The tasks are Portal, Registry, Query/Response, Browsing Meta-Data, Retrieval (see fig. 1).



**Fig. 1.** SOLARNET Architecture

### 2.1. Portal

SOLARNET's Portal home page highlights, with green or red colors, which nodes are federated and which services are currently active. Availability can be checked at anytime by clicking the "Check" button. The search page allows the users to query all the currently federated and active archives. The main roles of the Portal is to collect information from the Registry about all the available providers, to perform data and meta-data searches, to organize and control the end user interaction and the execution of her/his requests.

### 2.2. Registry

SOLARNET's Registry has the role to keep information on all nodes participating to the federation and on which resources and features they offer to the community. A node can become federated to SOLARNET by simply filling a registration form. The Registry service exposes our simple methods to manage the registry process: *insert* a new node, *update* the ex-

isting node, *delete* a node and *select* method to search on the existing node. After the form submission, the node will be fully integrated in the SOLARNET architecture and all portal interfaces will be able to query the new node using its web-service.

### 2.3. Browsing Meta-Data

The idea to publish the content and organization of some tables and their description is a way to notify to the user what each archive is storing. Browsing meta-data information is allowed by a web service implemented on each node with two simple methods: *Tables* and *Columns*. The first one returns a list of all published tables and the second one a list of all columns in each table with a brief description of its meaning.

### 2.4. Query/Response

The QUERY/RESPONSE engine's job is to collect data from each participating and active

node when a user submits the query by a pre-defined interface. The query is sent to all the nodes available and the results are displayed on web.

### 2.5. Retrieval

The VOTable returned from each web service is rendered in a human readable format. It is available as well a raw VOTable stored in the local cache. Actually it is possible to download each data file just clicking on its name. In the future we are planning to implement on each node a web service that will take care of packaging the data and send an e-mail to the user with the URL of the zipped file to be downloaded. The user will mark the preferred rows and a request will be sent to a remote site to ask for the data. The portal will take care of sending to the user also the meta-data, stored as VOTable format. The retrieval process will be split in more tasks to reduce network loading.

## 3. Conclusions

The SOLARNET Portal allows to browse and retrieve data from the Italian Solar Archives. It is available on-line at the URL <http://solarnet.to.astro.it:8080/portal/>. At the present SOLARNET federates the following archives:

1. SOLAR,(SOHO Long-term ARchive) operational at INAF/Observatory of Torino
2. SOLRA (SOLar Radio data Archive) operational at INAF/Observatory of Trieste

3. PSPT the archive of the solar data operational at INAF/Observatory of Roma
4. VAMOS archive at the Observatory of Capodimonte

and the following services developed by the Italian solar community for the EGSO project:

1. EGSO/SEC (Solar Events Catalogue) at INAF/Observatory of Trieste and Capodimonte
2. EGSO/DSO (Database for Solar Observatories) at INAF/Observatory of Capodimonte and Torino

It is foreseen to include in SOLARNET the database relative to the solar data detected at the Catania Observatory and the Unified solar Observations Catalogue (EGSO/UOC) at the Observatory of Torino and Trieste. In the future it will be possible to include more data stored by the Italian institution and presently not yet available as on-line databases. SOLARNET contributes in making data sets available to the local participating science teams and the solar physics community and furthermore it provides access to a wider audience.

## References

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