



A standard data access layer for fusion devices R&D programs

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Abstract

Each EURATOM Association stores data using proprietary schemes, usually developed by the research unit or using third party software. The temporary exchange of researchers between laboratories is a common practice nowadays. When the researchers returns to the home laboratory, there is usually the need to follow the work. The amount of available data is becoming enormous and the main data index is changing from shot number to time and events, where the pulse number is just one among the most relevant events against data is catalogued.

These difficulties can be overcome by using a common software layer between end-users and laboratories. The components needed to create this software abstraction layer, between users and laboratories data, have already been developed using a universal and well known remote procedure call standard (RPC) based on the eXtensible Markup Language (XML): XML-RPC.

The library allows data retrieval using the same methods for all associations. Users are authenticated through the PAPI system (<http://papi.rediris.es>), allowing each organization to use its own authentication schema.

Presently there are libraries and server implementations in Java and C++. These libraries have been included and tested in some of the most common data analysis programs such as MatLab and IDL. The system is already being used in ISTTOK/PT and CASTOR/CZ.

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1. Introduction

With the internationalisation of science it is very common that scientists need to access data from different laboratories. Each laboratory has its own way of retrieving data and users need to adapt themselves. Instead of concentrating in the data analysis, scientists

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have to spend time and effort learning how the different data access schemes work, change their analysis codes for each experiment and manage an updated version for the different programs and libraries which are required to fetch data in the different scenarios.

To solve this problem the best approach is to hide all the complexity from end-users, so that users only have to learn once how to access data and to maintain a single updated version of libraries and software.

This does not mean that every association must store and retrieve data in the same way, not limiting therefore the test of new technologies and new data stores solutions and algorithms. The key point is that scientists must be as isolated as possible from different IT (information technology) tests and solutions and should only have to worry about data analysis and results.

This paper presents a solution that implements the ideas described above.

2. Interface layer

In order for users to always use the same methods to interact with data, a common layer must exist and be installed in every association.

Users do not request data or information directly to the association's database but to this software layer, which then communicates with the specific data storage mechanism. The connection between the layer and the data storage schema, named *connector*, must be developed for each association's needs and must be able to translate the queries sent by the layer into the database syntax. In order to do so, a common interface is provided to the connector's developers. Some

generic connectors, mainly for relational databases, are already available.

2.1. XML-remote procedure call

Remote procedure calls (RPC) allow the execution of functions on a remote server and to receive values from it. XML-RPC [2] is a special case of RPC where the requests and the returned values are translated into XML before each communication. It is a simple but powerful protocol which allows passing and retrieving standard parameters such as numbers, strings and dates; and also complex structures like lists and records. Support for base64 binary data is also available.

The layer defined in Section 2 is composed by a XML-RPC server and the defined *connector*, together referred as Shared Data Access System (SDAS) server. Fig. 1 shows how the system is connected.

One might think about the performance issues introduced by the overhead of the XML tags. The solution to this problem lies on its nature: although the tags add some extra bytes, they are extremely repetitive and can be compressed by any compression algorithm.

XML-RPC is independent of the system architecture, operating system or computer language. It is a very stable protocol, available on almost every computer language.

2.2. Connector

Once the XML-RPC server is configured and installed on the host of the association, the next step is the development of the connector.

An interface with the methods that must be implemented by the host, in order to translate SDAS queries

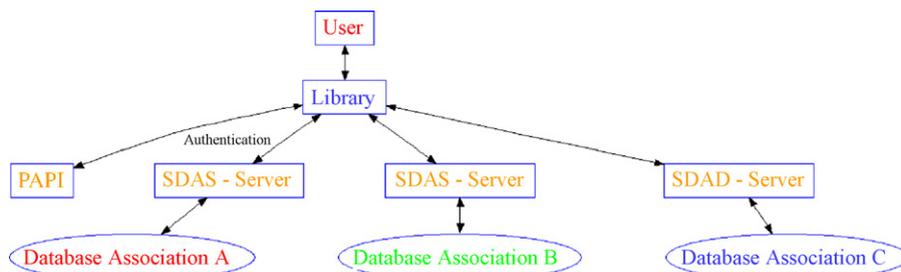


Fig. 1. Schema of the SDAS system. Users use the same libraries and programs to interact with different associations.

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