A Semantic Interface for OpenLab Network Measurement Infrastructures

Jorge E. López de Vergara, Víctor Acero, Mario Poyato, and Javier Aracil

High Performance Computing and Networking Research Group,
Escuela Politécnica Superior, Universidad Autónoma de Madrid, Madrid, Spain
jorge.lopez_vergara@uam.es

Abstract. This demo presents a semantic approach to integrate network measurement information. For this, we use a common ontology for network measurements, taking the results of the ETSI Monitoring Ontology for the Internet (MOI). This ontology allows working with a common information model, but it is also necessary to define mappings to each measurement database schema. Finally, the user can get the integrated information by distributing a semantic query among every data sources containing the monitored information.

1   Introduction

OpenLab[1] is a European project that aims at providing large scale shared experimental network facilities. OpenLab is composed of several testbeds, where each one includes monitoring tools to obtain network measurements, such as packet delays and losses, link bandwidth usage, etc. It is important for the testbed users to have an integrated view of their experiments measurements. However, each monitoring tool provides its own view of the network measurements. Most times, these measurements deal with very similar information, but represented following different structures.

2   Demonstration Description

The proposed demonstration shows how the measurement information can be integrated from multiple measurement repositories. To get the information from them, a single integrated query will be needed. Using the concepts defined in the MOI ontology[2], the query will be distributed among the available repositories.

The information in the repositories is usually represented in different formats. For this reason, a mapping between each measurement repository schema and the MOI ontology concepts is defined. The researcher aiming to query network measurements will not have to know the underlying databases that contain such data, but only the MOI ontology.

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[1] http://www.ict-openlab.eu/
[2] http://portal.etsi.org/portal/server.pt/community/MOI

To achieve the semantic integration, a system capable of querying multiple measurement repositories is needed. Users send integrated SPARQL[3] queries to an interface, which are then translated and distributed to the multiple measurement repositories. Each SQL repository has an SPARQL endpoint provided by a D2R server[4] that maps each database table to a set of ontology concepts. Then, a mapping file is defined for each repository.

In order to obtain a better performance when translating SPARQL queries into SQL ones, the code of the D2R server has been modified to use less redundant aliases in table joins. Another modification has also been done to automatically assign super-classes of a specified class in a `ClassMap`, making the mapping process easier.

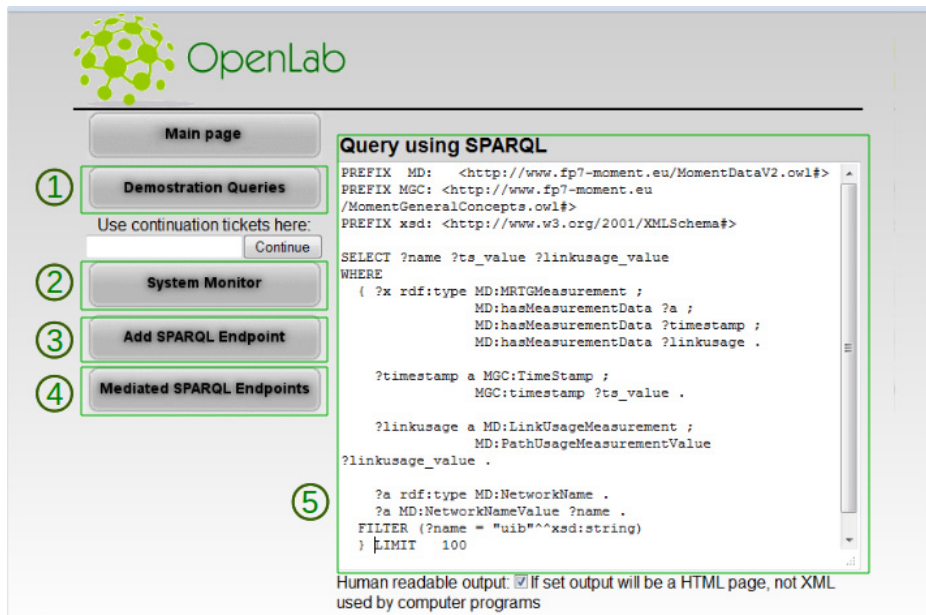The semantic query system has a graphical interface, shown in the figure below:

Fig. 1. OpenLab Semantic query interface

The elements of the interface (highlighted in Fig. 1) are the following:

1. In "Demonstration Queries", a set of predefined SPARQL queries can be executed.
2. In "System Monitor", currently executing queries can be checked.
3. In "Add SPARQL Endpoint", a new data repository can be added to the system.
4. In "Mediated SPARQL Endpoints", a list of available data repositories can be checked.
5. This area is the core of the system, allowing a user to write a SPARQL query for the requested network measurements.

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[3] `http://www.w3.org/TR/rdf-sparql-query/`
[4] `http://d2rq.org/d2r-serverD2`