Abstract:

PowSyBl:
An open source, high-performance and modular framework for power system simulations and analytics

What is PowSyBl?

Powsybl (**Pow**er **Sy**stem **Bl**ocks, https://www.powsybl.org) is an open source framework written in Java that makes it easy to write complex and industrial software for power systems' simulations and analysis. Its modular approach allows developers to extend or customize its features.

Powsybl is part of the LF Energy Foundation, a project of The Linux Foundation that supports open source innovation projects within the energy and electricity sectors.

Features:

Powsybl provides IIDM (iTesla Internal Data Model), a complete grid model (substations, voltage levels, AC and DC lines, two and three windings transformers, generators, loads, shunt and static VAR compensators…). The grid model can be extended with extensions to complete the modelling of equipment.

It also provides importers and exporters for several common exchange formats (Entso-E CIM/CGMES, UCTE-DEF…).

It also allows the integration of computation modules such as Power flows, Optimizers and time domain simulation.

Management of the CIM /CGMES format in PowSyBl:

For the management of CIM / CGMES data in the PowSyBl project we have moved from a model-driven approach to a more flexible alternative based on a specific purpose database: a triple store engine.

The previously explored model-driven approach used automated Java code generation from UML formal description of CIM through XMI files. The generated classes were not able to support non-standard information (extensions for which a formal description may not be available), and even small changes in CIM definitions required full model regeneration as completely different set of classes under a different namespace, resulting in duplicated code and introducing serious maintainability issues.

Using a native storage of the RDF triples defined in the CIM RDF/XML files offers some advantages in this context: all information present in the input files can be preserved without additional efforts, as no semantic knowledge is required for keeping non-standard data; support for small evolutions of CIM / CGMES can be easily implemented through separate sets of SPARQL queries, avoiding code duplication. Separation of statements coming from different instance files can be kept using triple store contexts.

Performance penalty introduced by the use of generic triple stores is compensated using in-memory implementations of the data store.

Co-presenters:

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Bachelor's Degree in Computer Science. Awarded for Extraordinary Degree. Universitat Autònoma de Barcelona, 1992.
With more than 25 years of experience at AIA, a software engineering firm based in Spain.
Currently working in Product Development for the Energy market, where I deal with:
Observation, analysis and optimal operation of power system networks in real time;
Analysis and optimization of automated actions on contingencies;
Verification of transient stability in automatically-built restoration plans through time domain dynamic simulations;
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Jean-Baptiste Heyberger, jean-baptiste.heyberger@rte-france.com (RTE, France):
JB Heyberger obtained an MSc Degree in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign (USA) and from Supélec (France) in 2003.
In 2003, he joined the R&D department of RTE as a developer of tools for the security analysis of electrical grids.
From 2012 to 2015, he was involved as a technical coordinator in the R&D European project iTesla to prototype new methods of security assessment.
Since 2015 he is managing a R&D team developing new tools for security analysis.

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Marco Chiaramello obtained an MSc Degree in Nuclear Engineering from Politecnico di Torino (Italy) school in 2013.
From 2013 to 2014 he joined the Los Alamos National Laboratory (USA, NM) working on Plasma Physics and Applied Mathematics.
In 2016 he obtained a PhD in Physics from Ecole Polytechnique (France, Paris) summa cum laude.
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