Master Thesis – Query based interface to Netconf/YANG models

Background
Within every deployment of a telecom network, a multitude of “nodes” are used to cooperate and interact with each other to provide the service requested. All these nodes use configuration data to control their activity and one type of interface used for operating on this configuration data is the command line interface (CLI).

The traditional CLI, such as found on many routers and other telecom nodes, does not scale naturally to managing a large set of nodes of the same type, or nodes with huge amount of configuration data. This can be compared to the interface used to manage the content of a database, structured query language (SQL). As for a heterogenous, federated database system, the ability to translate between semantically comparable configuration structures is an important quality of scalable command language and/or its execution environment.

Can database query processing and schema mapping techniques be used as a base for defining a CLI language and for Netconf/Yang based telecom nodes? The target is to achieve sub-linear computational complexity. The interest and need for a solution to this problem is high and is expected to be further increased in cloud deployments and multi-vendor scenarios.

Thesis Description
The thesis work is expected to be divided in several steps with the end goal of presenting a definition and prototype implementation of a distributed query and command language. The following steps are part of the thesis work:

- Investigate and understand the problem area.
- Investigate and compare relevant research and existing command and query language techniques as well as schema mapping techniques.
- Propose a command language syntax and semantics with the desired properties, including a method for describing the mapping between slightly different configuration models.
- Implement and demonstrate a prototype of at least two of the following parts; basic commend executing component, distribution over multiple nodes, schema mapping.
- Analyze results and evaluate expected improvements over using existing CLI formalism.

Qualifications
This project aims at students in computer science or computer engineering with a focus on database technologies, formal languages, programming language techniques (compilers and interpreters) and algorithm construction.

Extent
1-2 students, 30hp each

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Keywords
C/C++/Java, Erlang, Prolog, SQL, Distributed/Federated Databases, Compiler, Interpreter, Yang/Netconf, REST

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