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EH2745 Computer Applications in Power Systems

Assignment I

Overview

The purpose of Assignment I is to let you combine the software techniques we have studied during the first part of the course, and using these create an embryo of Energy Management System. The assignment combines Java programming, CIM-XML modelling and parsing, relational databases development and finally a minor part in power system analysis.

To solve the assignment you should work in groups of 2, although it is perfectly OK to work on your own.

Assignment

The assignment involves developing a Java application that fulfills at least the following requirements:

1. Can take the CIM-XML files (EQ & SSH) of the 5-bus system as input and parse required information about the power system. CIM classes and attributes required to parse are provided in Table 1. All equipment attributes are available in the EQ file except the operational parameters which are contained in the SSH file. Parse both files and collect the required information from the respective profiles.
2. Create a relational database and store the parsed information from the CIM XML files in the database.
3. Determine the admittance (Y) matrix of the five-bus system and present it as output.

The assignment is graded as **Pass** by a group that submits a Java program (in accordance with the requirements below) that fulfills the above requirements.

To **Pass with distinction** and gain bonus points for the exam, the quality of the solution should exceed those requirements. **Examples** of factors that determine the quality of the solution are:

- Adherence to good programming style
- Flexibility of the program to allow other input data e.g. parse edited CIM files and determine the Y matrix from those.
- Presentation of results, and interaction with the program in a GUI
- Further analysis of data, beyond the Y matrix determination.

Submission of solutions

The source code and screencast in which you present your solution shall be uploaded to the course page no later than **May 14th 2018 at 21:00**

In the screencast, both group members must present approximately 50% of the work. The screencast videos should not exceed 15 minutes and should contain commentary and explanation of the functions and classes in the code and its overall structure rather than going though it line by line.

References and plagiarism

Please note that when solving the assignments co-operation between students is allowed and even encouraged. However, the project groups are responsible for the content of their own program and plagiarism will result in an immediate failing of the assignment in addition to a written report to KTH's central disciplinary committee. This means that all groups should **write their own programs.** You are not allowed to use source code from other groups and you are not allowed to copy source code from the internet.

Table 1. CIM data to extract into SQL database

CIM objects	*Required data*
Base Voltage	- rdf:ID - nominal value
Substation	- rdf:ID - name - region_rdf:ID
Voltage Level	- rdf:ID - name - substation_rdf:ID - baseVoltage_rdf:ID
Generating Unit	- rdf:ID - name - maxP - minP - equipmentContainer_rdf:ID
Synchronous Machine	- rdf:ID - name - ratedS - P - Q - genUnit_rdf:ID - regControl_rdf:ID - equipmentContainer_rdf:ID - baseVoltage_ rdf:ID
Regulating Control	- rdf:ID - name - targetValue
Power Transformer	- rdf:ID - name - equipmentContainer_rdf:ID
Energy Consumer (Load)	- rdf:ID - name - P - Q - equipmentContainer_rdf:ID - baseVoltage_ rdf:ID
PowerTransformerEnd (Transformer Winding)	- rdf:ID - name - Transformer.r - Transformer.x - Transformer_rdf:ID - baseVoltage_ rdf:ID
Breaker	- rdf:ID - name - state - equipmentContainer_rdf:ID - baseVoltage_ rdf:ID
RatioTapChanger	- rdf:ID - name - step