

A Visualization Engine for DSL Models

Introduction

We are a tools developer team at Oticon A/S. We design and develop software tools that are used by the rest of the organization. Our tools are based on our proprietary Domain Specific Language (DSL), which we define using EMF. Our DSL, and the tools we develop to handle this DSL, have the purpose of supporting the digital development and configuration of IC platforms. Tool support is extensive in-house and extends all the way from algorithm development to the release and use of applications and products by hearing care professionals.

Currently all our models are handwritten using XML. The users and developers of these models have noticed that finding errors in these models is a very cumbersome process. Developing these complex XML models is an error prone process and can be very frustrating for our customers. Supporting our customers in this process is exceptionally hard when we need to understand the customers' model and identify possible design errors. Therefore, we see a need to visualize our DSL models. Some well defined graphical representation and the ability to traverse the models would help us to understand the underlying model better.

Objective

The project proposal is to design and implement a visualization engine for our DSL based models. The visualization engine must satisfy the following criteria:

1. Visualize the modeling elements
2. Organize these elements on the screen
3. Deal with the complexity of the model

Scope

It is up to the student to expand the scope of this project. Here we provide a set of minimal requirements:

1. A visualization of a selected set of the modeling elements
2. The interpretation of the dynamics in the model (how the modeling elements interact with each other)
3. A documented design of the extendable visualization framework
4. An algorithm to organize the elements on the screen. The student may come up with a new algorithm for laying out the elements or reuse existing frameworks. See more <http://www.informatik.uni-kiel.de/rtsys/kieler/>
5. The visualization can be interactive: some sort of zoom in/out functionality can be implemented.

Example

The DSL is used to describe structural, functional, connector systems that contribute to the complexity in the model. A classic simple model is shown in Figure 1.

The simple model below consists of a structural module called "xnm" with 3 input arguments (v1, v2, v3) and 5 output arguments (min, avg, product, const, through).

Furthermore, the internal structure of “xdm” is implemented using connector elements like “P” depicted below. The inputs and outputs may need to be conditioned using functional modules such as “xdm_1”, “xdm_2”, “xdm_3”.

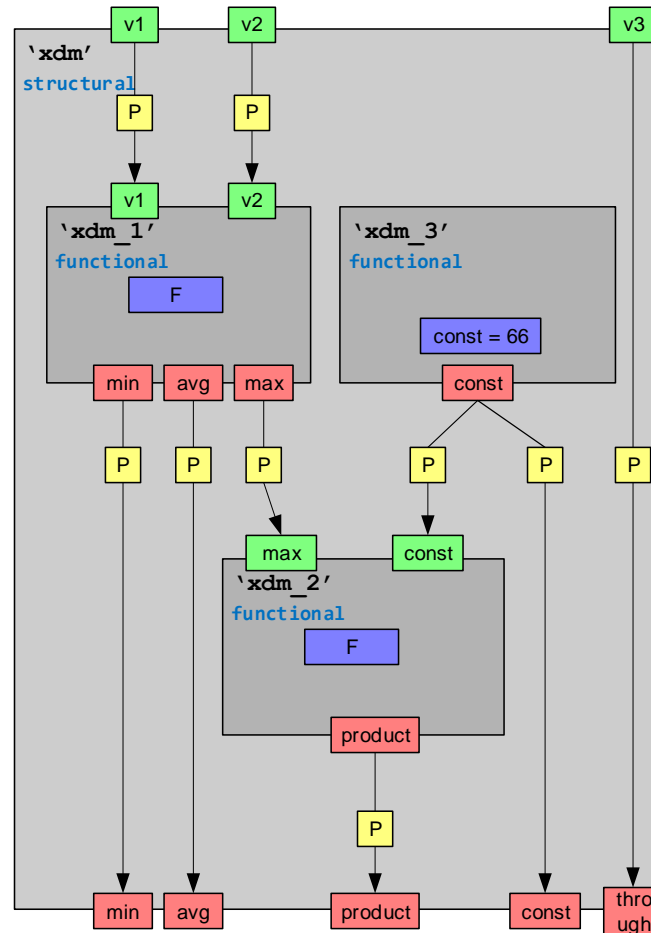


Figure 1 Example of a simple model

This figure has been drawn manually and requires maintenance each time the model changes. The figure itself plays an important role in communicating the design of such a model.

We hope that as an outcome of this student project we will eventually be able to dynamically create such visualizations for more complex models.