Computergestützte Modellierung und Simulation
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IDP: Implementation of an Interpreter for IfcPL

For realizing data exchange in the context of planning and realization of large infrastructure projects, a comprehensive neutral data model capable to present both semantic as well as geometric aspects is necessary. Right now LandXML is the most dominating standard for the interchange of alignment data. Building Smart, a non-profit organization that is well known for their Industry Foundation Classes (IFC), that provide a full-grown and standardized product model for the design and engineering of buildings started also to develop an IFC based alignment model. Besides this the also the Open Geospatial Consortium started to develop an alignment model called InfraGML.

The Chair of Compuational Modeling and Simulation developed a tool for viewing alignment models called TUM Open Infra Platform (https://www.cms.bgu.tum.de/de/forschung/projekte/31-forschung/projekte/397-tum-open-infra-platform). TUM Open Infra Platform is an application for viewing, validating and converting infrastructure models. In the current version, it is able to display LandXML files and convert them into the by the CMS chair proposed IfcAlignment model and vice versa.

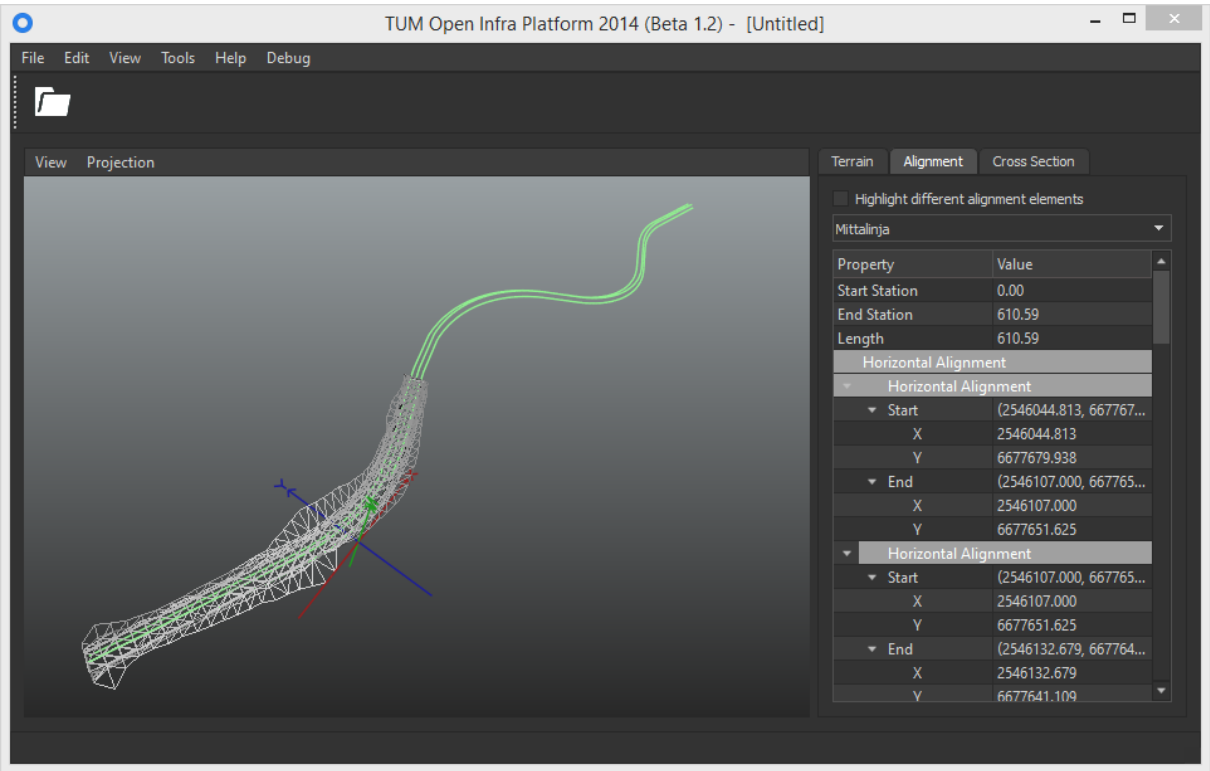

Figure 1: TUM Open Infra Platform

Several important features are missing in the TUM Open Infra Platform. The goal of this project is to extend the TUM Open Infra Platform. There are many different tasks that this project offers.

The TUM Open Infra Platform supports different alignment data models like LandXML and IfcAlignment.

A neutral standard for an alignment data model should support a rich set of curve types in order to be accepted internationally, in particular it should be aware of region specific facts. This is a typical problem of all of the described alignment model standards. But even if a rich set of curves is included, it is often not clear which parameters should be used in order to describe a certain curve type. For instance instead of storing the start or end curvature of a clothoid, the start or end radius respectively could also be used. This burdens the developer of a standard to incorporate a minimal, but sufficient set of parameters or to integrate redundant data, as exemplarily done in the LandXML specification of the spiral type.

Due to the reasons described above an inversion of control in the design of an alignment model standard should be considered in this IDP. The main idea in the inversion of control approach is not to store parameters and their values solely, but to additionally exchange functions to interpret these values in order to visualize or analyze curves. Thereby, the computational algorithm for a curve itself is described in a neutral data standard – using the so-called IFCPL language – and interchanged between different applications.

For executing IFCPL programs an interpreter is needed that processes the IFCPL code. To validate this approach, an IFCPL interpreter has to be prototypically implemented during this IDP. This environment should be provided in the form of a shared library so it can be directly used by other applications such as parametric CAD tools.

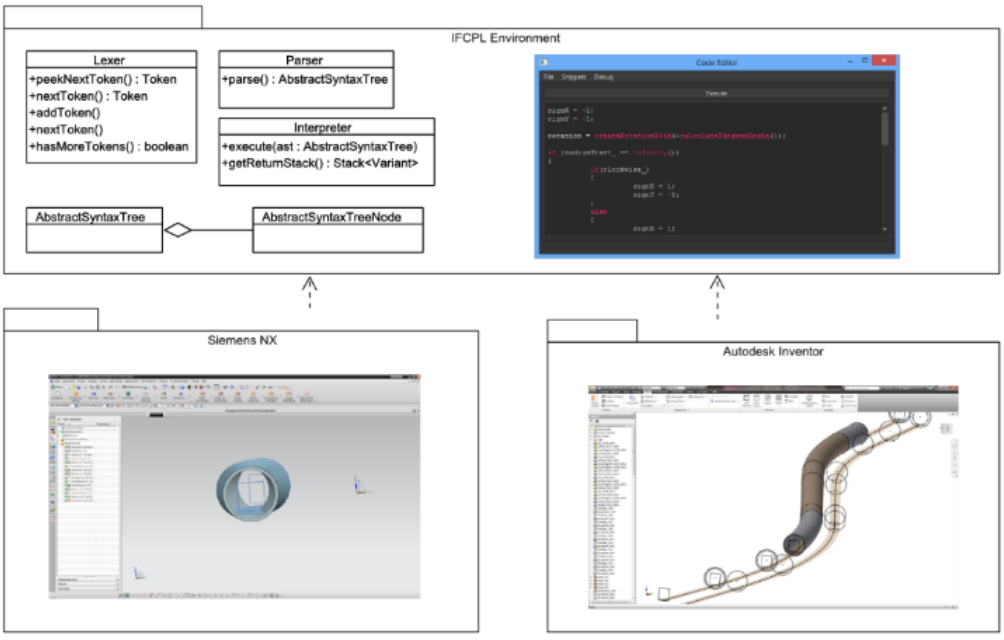

Figure 4. Overview of the IFCPL Environment including the integration of the IFCPL interpreter into Siemens NX and Autodesk Inventor.

Tasks

- Get familiar with road construction
- Get familiar with flex, bison, CMake
- Implement an IfcPL interpreter