Eclipse Scheduling and Network Delay Analysis Plugin

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1 Introduction

This report describes the design and implementation of an Eclipse plug-in for the purpose of designing real-time systems based on the ARINC 653 standard for integrated modular avionics and ARINC 664 for network connections. The plug-in defines a meta-model for a system which can be used by several algorithms to analytically ensure schedulability stability and an upper bound on the network delay for frames sent over a network. The plug-in also has a comprehensive validation suite which prevents users from creating structurally invalid configurations along with a graphical editor for the network definition which greatly helps to describe and debug network configurations.

This document contains hyperlinks to online resources. View it on a computer to follow the links for more information.

2 Eclipse Modeling

The Eclipse Modeling Framework is a tool for designing and manipulating models in Eclipse with many facilities for code generation and persistent data manipulation. It is important to be familiar with this framework in order to understand this project. The most important features used are:

1. **Ecore tools** : A graphical meta-model editor
2. **OCLinEcore** : A modified version of the Object Constraint Language used to define structural constraints for an instance of a meta-model
3. **Code Generation** : A large part of the code in the plug-in was generated by Ecore.
4. **Sirius** : A framework for creating graphical DSLs based on Ecore models

These tools are Eclipse plug-ins which must be installed first before modifying the plugin.

3 Meta Model

The classes in the Ecore meta-model are described in this section along with the OCLinEcore validation steps that are applied.

For reference, the full meta-model is displayed first and the individual components after.

4 Implementation

This section describes Java code and Eclipse specific implementation details of the plug in.

5 Example

This section shows an example model created using the plug-in. I describe how to create it and how to analyze it.

6 Installation

6.1 From Source

6.2 From JARs

7 Future Work

This section describes what future work needs to be done to improve the project and the steps required to start that work.