

# **DARPA Public Release Summary for Software Tools**

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## SysML/AADL Translator

This software tool translates system architectural models specified in a subset of the SysML modeling language to and from models specified in a subset of the AADL modeling language. SysML is an open standard published by the Object Management Group (OMG) for the specification of system architectures. AADL (Architectural Analysis and Design Language) is an open standard published by the Society of Automotive Engineers (SAE) for the specification of system architectures.

The translator is written in the Java programming language and is packaged as a plug-in for the Eclipse development environment containing Java source code, executable byte code, and supporting XML files. It can be installed by copying the plug-in into the Eclipse development environment. The translator is used within the OSATE (Open Source Architectural Tool Environment) that runs within Eclipse. Once installed, new menu items are provide to the OSATE use to import a SysML model as an AADL model and to export an AADL model as a SysML model. Users can modify and extend the translator by modifying the Java source code and recompiling the plug-in.

Also included are example SysML and AADL models that can be used to exercise and test the translator. These example models are for an avionics system and are similar to those that can be found in textbooks and previously published reports. Aside from being rewritten in SysML and AADL, they do not contain any information not already available to the public.

#### Lute Structural Checker

This software tool checks user-defined structural specifications of AADL models. Specifications are written in the Lute language which is based on REAL (Requirements Enforcement Analysis Language). The Lute tool checks these specifications relative to a given AADL model.

The Lute structural checker is written in the Java programming language and is packaged as a plug-in for the Eclipse development environment containing Java source code and executable byte code. It can be installed by copying the plug-in into the Eclipse development environment. Lute is used within the OSATE (Open Source Architectural Tool Environment) plug-in that runs within Eclipse. Once installed, new menu items are added to the OSATE plug-in. These items allow the user to run either built-in Lute specifications that have been provided for the Avionics System models provided with the SysML/AADL translator plug-in, or user-defined Lute specifications.

## **Compositional Verification Tool**

This software tool can be used to verify behavioral properties of system architectural models specified in a subset of the AADL modeling language. Properties to be verified are added to the model using a variant of PSL (property specification language) and are specified as assumptions and guarantees about the system model. The tool translates the augmented AADL model into the input language of the KIND model checker, runs KIND on the resulting code, and presents the verification results (validity or counter-examples) back to the user in the form of an Excel spreadsheet.

The tool is written in the Java programming language and is packaged as a plug-in for the Eclipse development environment containing Java source code, executable byte code, and supporting XML files. The tool is used within the OSATE (Open Source Architectural Tool Environment) plug-in that runs within Eclipse. When installed, a new menu item is added to OSATE. Users can activate this menu item by selecting a system implementation from an AAXL file and selecting the 'Verify with Kind' menu item.

The Avionics System example models included as part of the SysML/AADL Translator Plug-in can be used with this tool. In particular, the Flight Control System implementation in FCS.aaxl2 has assumptions and guarantees that can be verified.

#### Files

The software is implemented in the following files:

com.rockwellcollins.atc.meta.lute\_1.0.0.jar (Lute Structural Checker) com.rockwellcollins.atc.meta.modelcheck\_1.0.0.jar (Compositional Verification Tool) com.rockwellcollins.atc.meta.sysml2aadl\_1.0.0.jar (SysML/AADL Translator) com.rockwellcollins.atc.meta\_1.0.0.jar (General infrastructure for all three tools)