We have developed an electronic design automation tool for designing embedded systems called HEPSYCODE. The tool is built upon Eclipse Ecore metamodels and utilizes Sirius features. The metamodel is designed to model algorithms, functionalities, and applications of embedded systems as a process network. This is the HEPSY metamodel:

<?xml version="1.0" encoding="UTF-8"?>

<ecore:EPackage xmi:version="2.0" xmlns:xmi="http://www.omg.org/XMI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xmlns:ecore="http://www.eclipse.org/emf/2002/Ecore" name="hepsy" nsURI="org.univaq.hepsy" nsPrefix="hml">

<eClassifiers xsi:type="ecore:EClass" name="BehaviorSpecification" eSuperTypes="#//NamedElement">

<eStructuralFeatures xsi:type="ecore:EReference" name="nodes" upperBound="-1"

eType="#//Node" containment="true"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="Node" abstract="true" eSuperTypes="#//NamedElement">

<eStructuralFeatures xsi:type="ecore:EReference" name="nChannels" upperBound="-1"

eType="#//Channel" containment="true"/>

<eStructuralFeatures xsi:type="ecore:EReference" name="ports" upperBound="-1"

eType="#//Port" containment="true"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="Channel" eSuperTypes="#//NamedElement">

<eStructuralFeatures xsi:type="ecore:EReference" name="nFrom" lowerBound="1" eType="#//Node"/>

<eStructuralFeatures xsi:type="ecore:EReference" name="nTo" lowerBound="1" eType="#//Node"/>

<eStructuralFeatures xsi:type="ecore:EReference" name="pFrom" lowerBound="1" eType="#//Port"/>

<eStructuralFeatures xsi:type="ecore:EReference" name="pTo" lowerBound="1" eType="#//Port"/>

<eStructuralFeatures xsi:type="ecore:EAttribute" name="queueSize" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EInt"/>

<eStructuralFeatures xsi:type="ecore:EAttribute" name="timeout" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EInt"/>

<eStructuralFeatures xsi:type="ecore:EAttribute" name="rendezVous" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EBoolean"/>

<eStructuralFeatures xsi:type="ecore:EAttribute" name="direction" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EString"/>

<eStructuralFeatures xsi:type="ecore:EReference" name="message" eType="#//Message"

containment="true"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="NamedElement">

<eStructuralFeatures xsi:type="ecore:EAttribute" name="name" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EString"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="StructuredNode" eSuperTypes="#//Node">

<eStructuralFeatures xsi:type="ecore:EReference" name="processes" upperBound="-1"

eType="#//Process" containment="true"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="Port" eSuperTypes="#//NamedElement">

<eStructuralFeatures xsi:type="ecore:EReference" name="pChannels" upperBound="-1"

eType="#//Channel" containment="true"/>

<eStructuralFeatures xsi:type="ecore:EReference" name="portExtension" eType="#//Process"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="Process" eSuperTypes="#//Node">

<eStructuralFeatures xsi:type="ecore:EReference" name="processExtension" eType="#//Port"/>

<eStructuralFeatures xsi:type="ecore:EAttribute" name="priority" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EInt"

defaultValueLiteral="1"/>

<eStructuralFeatures xsi:type="ecore:EAttribute" name="criticality" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EInt"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="Display" eSuperTypes="#//Node"/>

<eClassifiers xsi:type="ecore:EClass" name="Stimulus" eSuperTypes="#//Node"/>

<eClassifiers xsi:type="ecore:EClass" name="Message" eSuperTypes="#//NamedElement">

<eStructuralFeatures xsi:type="ecore:EReference" name="entry" upperBound="-1"

eType="#//Entry" containment="true"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EClass" name="Entry" eSuperTypes="#//NamedElement">

<eStructuralFeatures xsi:type="ecore:EAttribute" name="type" lowerBound="1" eType="ecore:EDataType http://www.eclipse.org/emf/2002/Ecore#//EString"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EEnum" name="DataType">

<eLiterals name="sc\_bit"/>

<eLiterals name="sc\_logic" value="1"/>

<eLiterals name="sc\_int" value="2"/>

<eLiterals name="sc\_uint" value="3"/>

<eLiterals name="sc\_bigint" value="4"/>

<eLiterals name="sc\_biguint" value="5"/>

<eLiterals name="sc\_bv" value="6"/>

<eLiterals name="sc\_lv" value="7"/>

<eLiterals name="sc\_fixed" value="8"/>

<eLiterals name="sc\_ufixed" value="9"/>

<eLiterals name="sc\_fix" value="10"/>

<eLiterals name="sc\_ufix" value="11"/>

</eClassifiers>

<eClassifiers xsi:type="ecore:EEnum" name="Direction">

<eLiterals name="Unidirectional"/>

<eLiterals name="Bidirectional" value="1"/>

</eClassifiers>

</ecore:EPackage>

This is an example model based on HEPSY metamodel:

<?xml version="1.0" encoding="UTF-8"?>

<hml:BehaviorSpecification xmi:version="2.0" xmlns:xmi="http://www.omg.org/XMI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:hml="org.univaq.hepsy" name="">

<nodes xsi:type="hml:Stimulus" name="Stimulus">

<ports name="stim\_system\_out\_port">

<pChannels name="stim\_system\_channel" pFrom="//@nodes.0/@ports.0" pTo="//@nodes.2/@ports.0" queueSize="8" rendezVous="true">

<message name="stim\_system\_payload">

<entry name="stim\_01" type="sc\_uint"/>

</message>

</pChannels>

</ports>

</nodes>

<nodes xsi:type="hml:Display" name="Display">

<ports name="system\_display\_in\_port">

<pChannels pFrom="//@nodes.1/@ports.0"/>

<pChannels pFrom="//@nodes.1/@ports.0" pTo="//@nodes.2/@ports.1"/>

</ports>

</nodes>

<nodes xsi:type="hml:StructuredNode" name="DigitalCam">

<nChannels name="ccdpp\_cntrl\_channel" nFrom="//@nodes.2/@processes.0" nTo="//@nodes.2/@processes.1" queueSize="16" rendezVous="true">

<message name="ccdpp\_cntrl\_payload">

<entry name="img\_01" type="sc\_uint"/>

</message>

</nChannels>

<nChannels name="cntrl\_codec\_channel" nFrom="//@nodes.2/@processes.1" nTo="//@nodes.2/@processes.2" queueSize="8" rendezVous="true">

<message name="cntrl\_codec\_payload">

<entry name="img\_01\_08" type="sc\_uint"/>

</message>

</nChannels>

<nChannels name="codec\_cntrl\_channel" nFrom="//@nodes.2/@processes.2" nTo="//@nodes.2/@processes.1" queueSize="16" rendezVous="true">

<message name="codec\_cntrl\_payload">

<entry name="img\_01\_08" type="sc\_uint"/>

</message>

</nChannels>

<nChannels name="cntrl\_uat\_channel" nFrom="//@nodes.2/@processes.1" nTo="//@nodes.2/@processes.3" queueSize="8" rendezVous="true">

<message name="cntrl\_uat\_payload">

<entry name="img\_out" type="sc\_uint"/>

</message>

</nChannels>

<ports name="stim\_system\_in\_port" portExtension="//@nodes.2/@processes.0"/>

<ports name="system\_display\_out\_port"/>

<processes name="ccdpp"/>

<processes name="cntrl"/>

<processes name="codec"/>

<processes name="uat" processExtension="//@nodes.2/@ports.1"/>

</nodes>

</hml:BehaviorSpecification>

This is a XES trace file representing the modeling step done when we created the example model based on HEPSY metamodel:

event BehaviorSpecification nodes ADD

event Stimulus name SET

event BehaviorSpecification nodes ADD

event Display name SET

event BehaviorSpecification nodes ADD

event StructuredNode name SET

event StructuredNode name SET

event StructuredNode ports ADD

event StructuredNode ports ADD

event Stimulus ports ADD

event Display ports ADD

event Port pChannels ADD

event Channel pFrom SET

event Channel pTo SET

event Port pChannels ADD

event Channel pFrom SET

event Channel pTo SET

event StructuredNode processes ADD

event Process name SET

event Port portExtension SET

event StructuredNode processes ADD

event Process name SET

event StructuredNode nChannels ADD

event Channel nFrom SET

event Channel nTo SET

event StructuredNode processes ADD

event Process name SET

event StructuredNode nChannels ADD

event Channel nFrom SET

event Channel nTo SET

event StructuredNode nChannels ADD

event Channel nFrom SET

event Channel nTo SET

event StructuredNode processes ADD

event Process name SET

event StructuredNode nChannels ADD

event Channel nFrom SET

event Channel nTo SET

event Port portExtension SET

event Process processExtension SET

event BehaviorSpecification name SET

event BehaviorSpecification name SET

event Port name SET

event Channel pTo SET

event Process processExtension SET

event StructuredNode ports REMOVE

event StructuredNode ports ADD

event Port pChannels ADD

event Channel pFrom SET

event Channel pTo SET

event Process processExtension SET

event Port name SET

event Port name SET

event Channel name SET

event Channel name SET

event Channel queueSize SET

event Channel rendezVous SET

event Channel rendezVous SET

event Channel rendezVous SET

event Channel message SET

event Message name SET

event Message entry ADD

event Entry name SET

event Entry type SET

event Channel name SET

event Channel queueSize SET

event Channel rendezVous SET

event Channel message SET

event Message name SET

event Message entry ADD

event Entry name SET

event Entry type SET

event Entry type SET

event Channel name SET

event Channel queueSize SET

event Channel rendezVous SET

event Channel message SET

event Message name SET

event Message entry ADD

event Entry name SET

event Entry type SET

event Entry type SET

event Channel name SET

event Channel rendezVous SET

event Channel queueSize SET

event Channel message SET

event Message name SET

event Message entry ADD

event Entry name SET

event Entry type SET

event Entry type SET

event Channel name SET

event Channel queueSize SET

event Channel rendezVous SET

event Channel message SET

event Message name SET

event Message entry ADD

event Entry name SET

event Entry type SET

event Port name SET

event Port name SET

event Port name SET

event Port name SET

event Port name SET

Generate the full XES trace file from the following HEPSY model, where the model represents another embedded application:

<HEPSYCODE\_MODEL>