



**The Software
Engineering Institute**

AADL Meta Model & XML/XMI

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SAE



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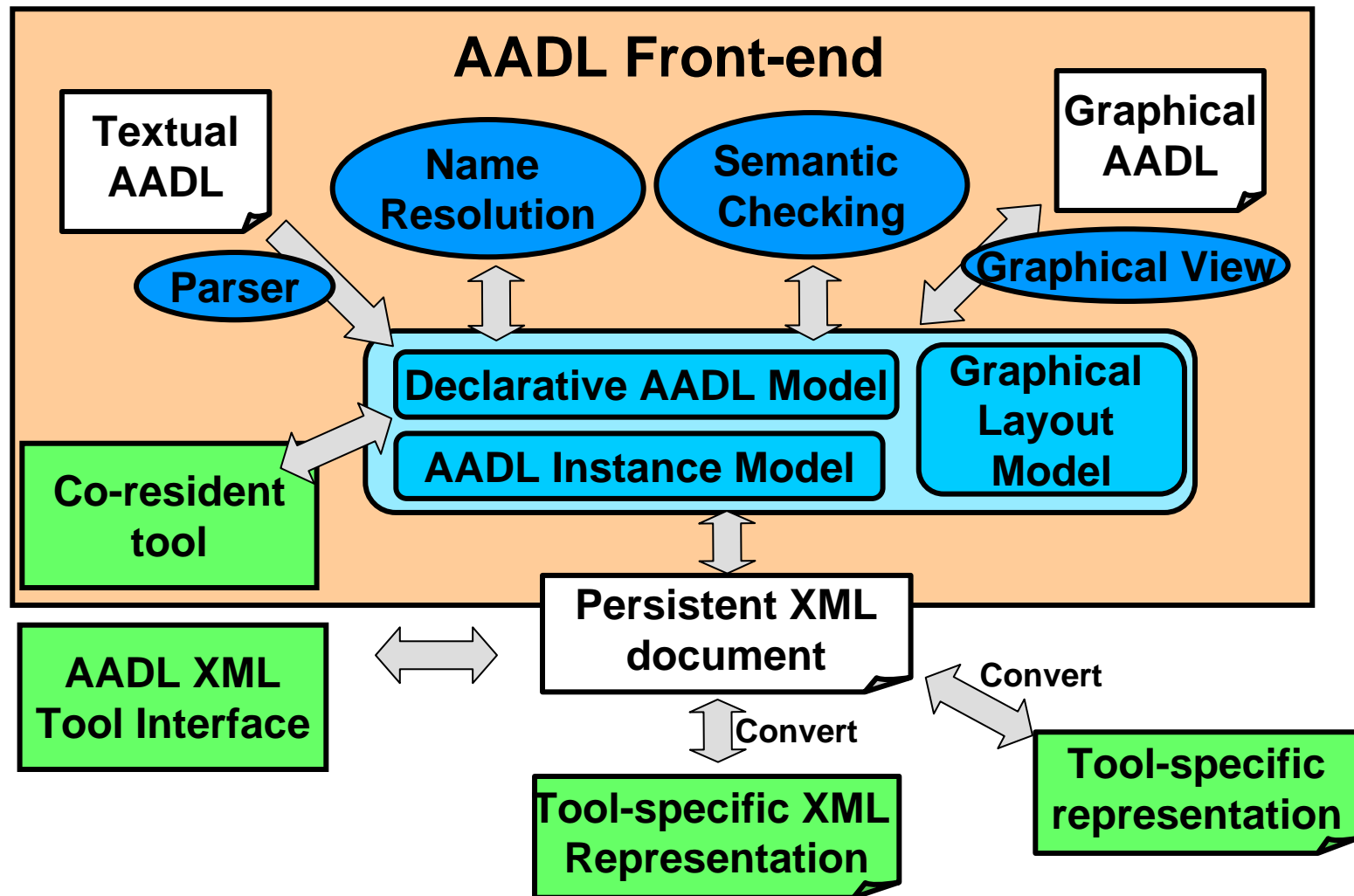
Outline

- Meta Modeling Approach
- Declarative AADL Model
- AADL Instance Model





XMI/XML Based Tool Interoperability





AADL Meta Model

- Defined in Eclipse Modeling Framework (EMF)
 - Collection of meta model packages with graphical views
 - Separate from, but close to UML profile of AADL
- XML as persistent storage
 - XMI specification from Ecore meta model
 - Generated XML schema
- In-core AADL model
 - Generated methods for AADL model manipulation
 - Edit history, deep copy, object editor, graphical editor
 - Methods to support
 - AADL extends hierarchy
 - feature “inheritance”
 - property value “inheritance”





AADL Meta Model Packages

- Core: defines the concepts of component type, implementation, subcomponent, AADL packages and modes.
- Component: defines the concrete classes for the different categories of components, including the constraints on their containment.
- Feature: defines the features of component types.
- Connection: defines the connections between component features.
- Flow: defines flow related elements of the AADL.
- Property: defines the elements for associating property values and for introducing new property types and properties via property sets.





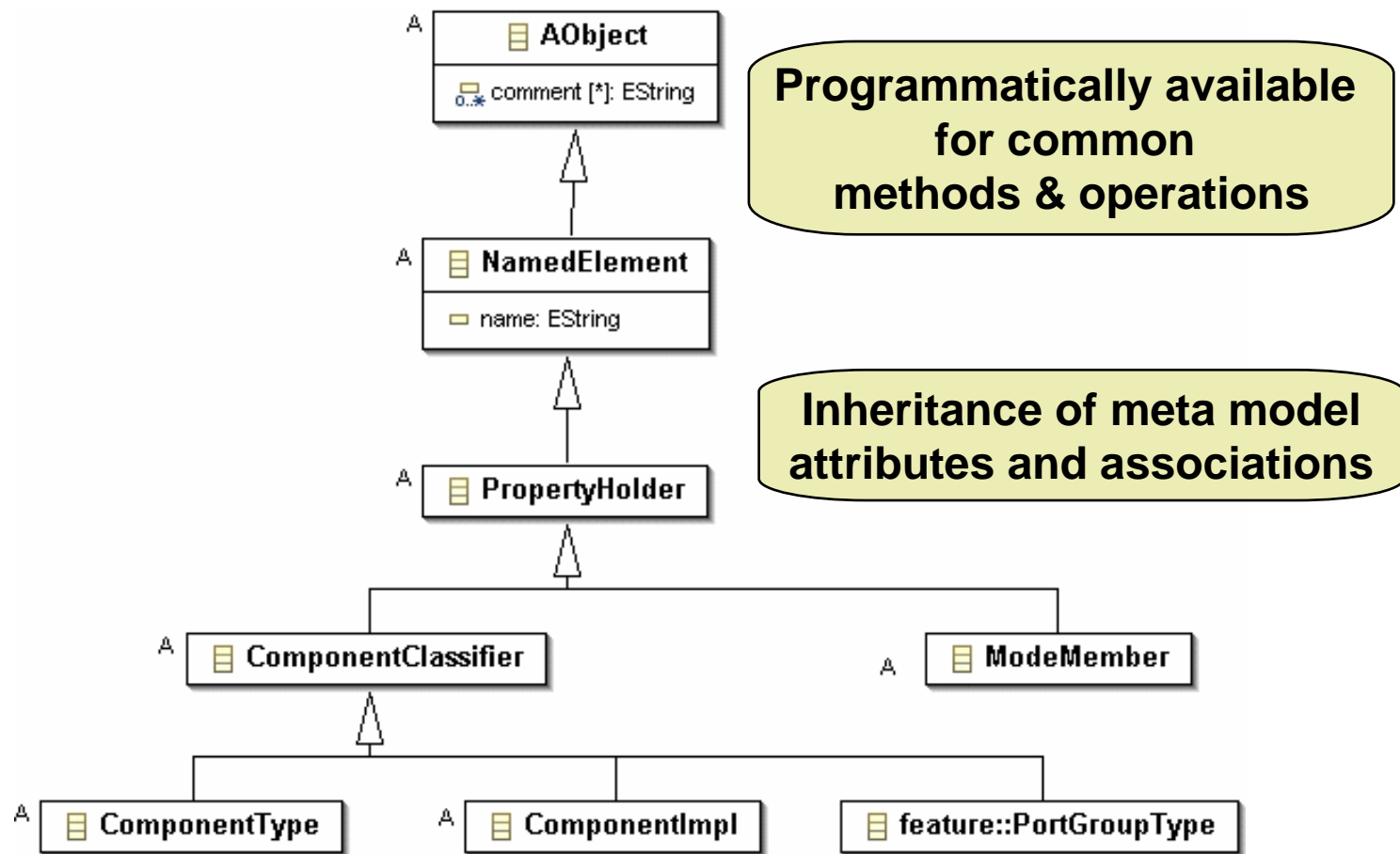
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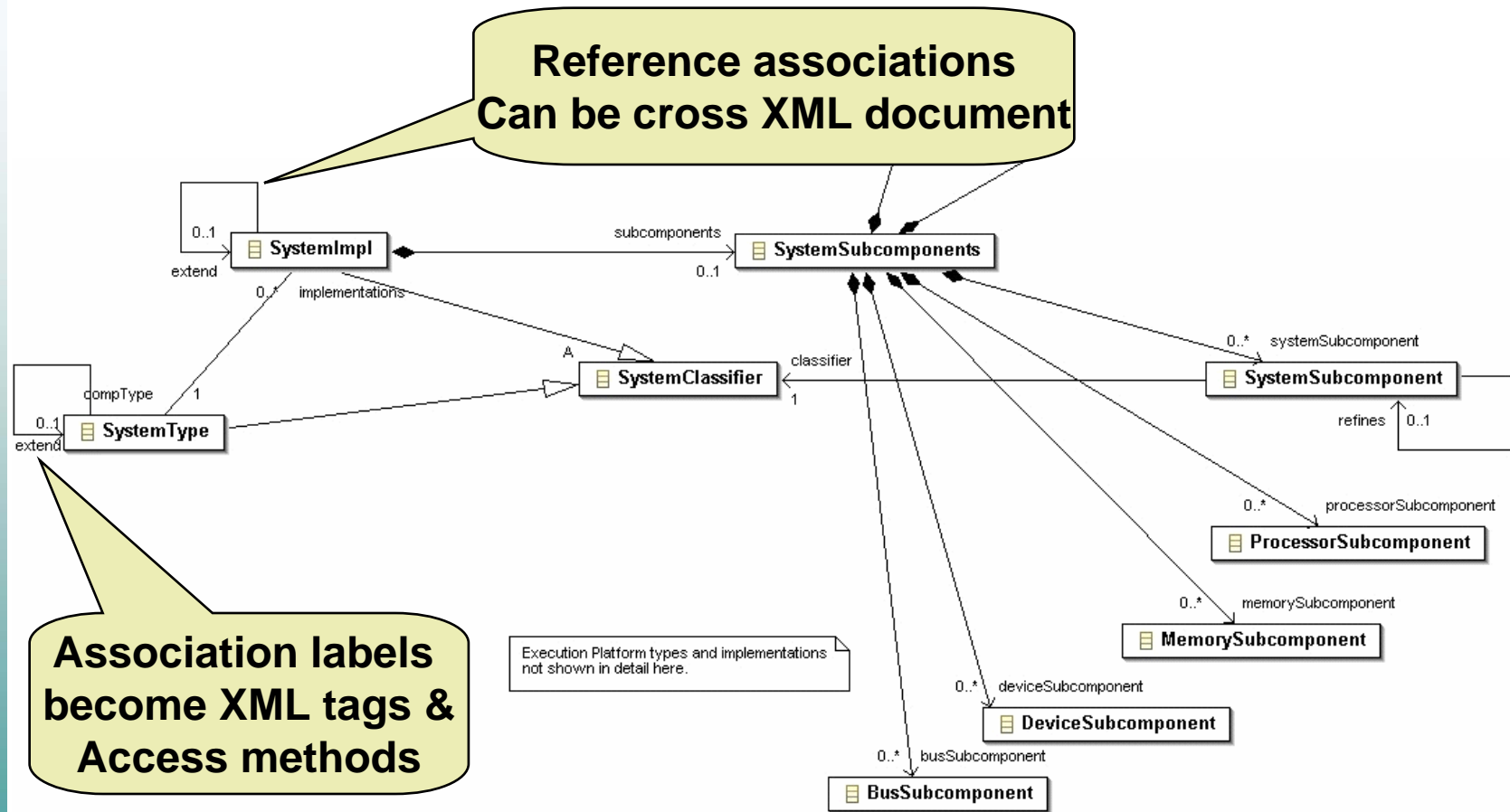


AADL Meta Model Class Hierarchy





AADL Meta Model Fragment





AADL Text Example

```
package edu::cmu::sei::XMIEExample
public
  system GPS
  features
    init: in event port;
    signal: out data port GPS_Signal;
  end GPS;
  system implementation GPS.basic
  end GPS.Basic;
  data GPS_Signal
  end GPS_Signal;
end edu::cmu::sei::XMIEExample;
```





AADL XML Example

```
<?xml version="1.0" encoding="UTF-8"?>
<core:AadlSpec xmi:version="2.0" .....>
  <aadlPackage name="edu::cmu::sei::XMIEExample">
    <aadlPublic>
      <systemType name="GPS">
        <features>
          <eventPort name="init"/>
          <dataPort name="signal" direction="out"
dataClassifier="//aadlPackage[@name=edu::cmu::sei::XMIEExample]/aadl
Public/dataType[@name=GPS_Signal]"/>
        </features>
      </systemType>
      <systemImpl name="GPS.basic"
compType="//aadlPackage[@name=edu::cmu::sei::XMIEExample]/aadlPu
blic/systemType[@name=GPS]"/>
      <dataType name="GPS_Signal"/>
    </aadlPublic>
  </aadlPackage>
</core:AadlSpec>
```





AADL Inheritance

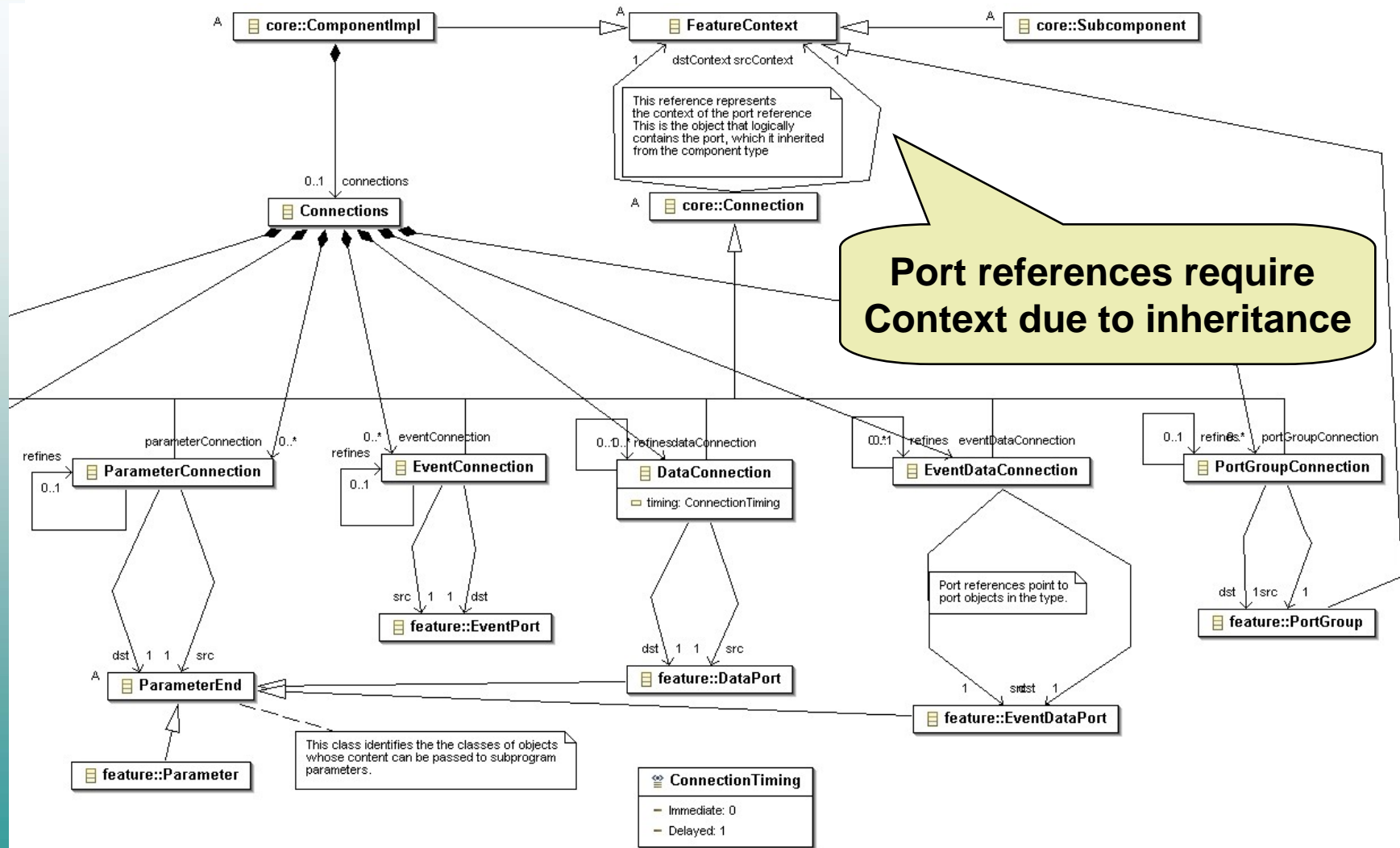
- Inheritance of component type features
 - By type extensions
 - By implementations
 - By subcomponents
- Inheritance of component implementation elements
 - By implementation extensions
 - By subcomponents
- Inheritance of property values
 - By type extensions
 - By implementations
 - By subcomponents
 - By contained components
 - By instance model

**AADL inheritance
handled by methods**



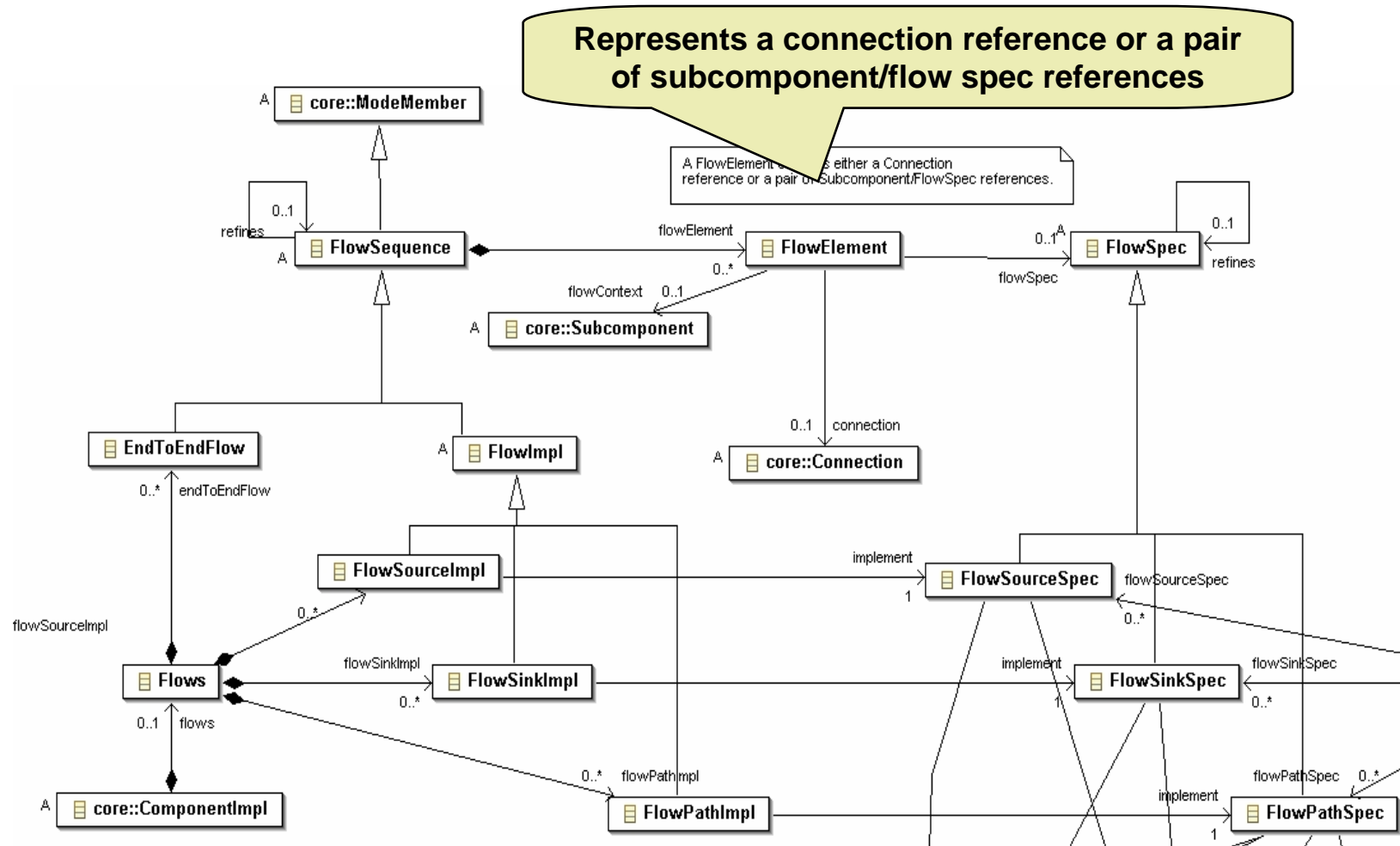


AADL Inheritance



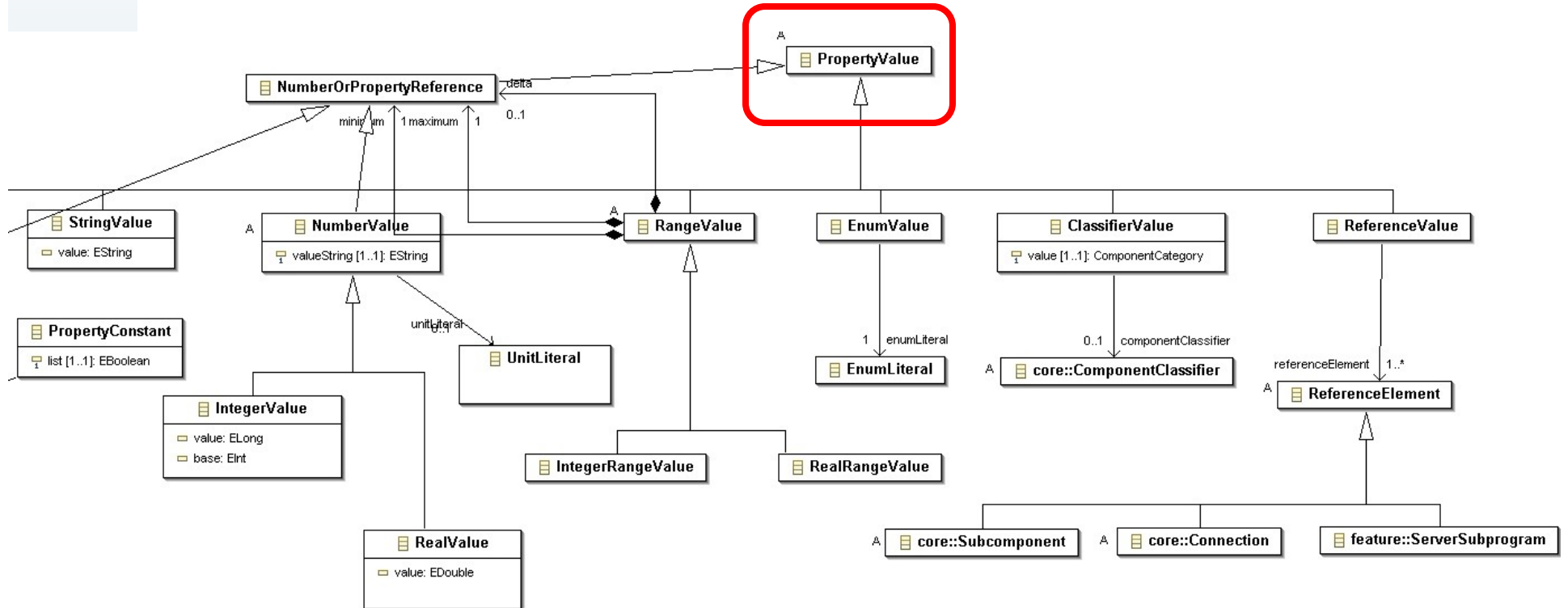


Flow Sequence Meta Model





Property Values As Objects





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AADL Instance Model Objectives

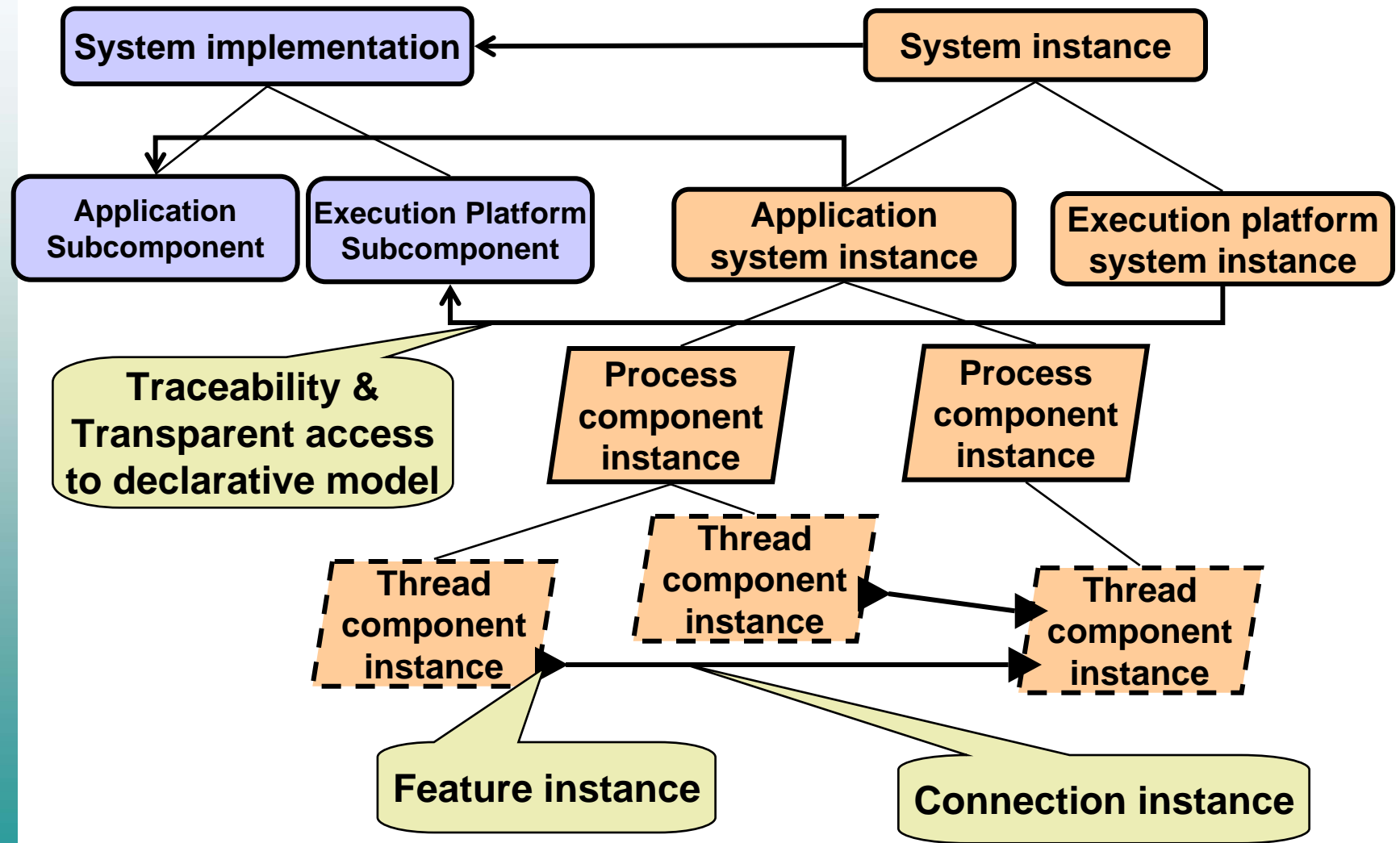
- Derivable from declarative AADL model
 - System implementation as root
 - Application & execution platform as subcomponents
 - Traceability to declarative model
- Self-contained compact system model
 - Compact representation
 - Separately loadable XML document
 - Semantic connections
 - Profile of locally cached property values
- Modal system instances
 - Legal mode combinations for system operation modes
 - System operation mode specific property values
- Recording of instance analysis results

**OSATE creates
instance models**



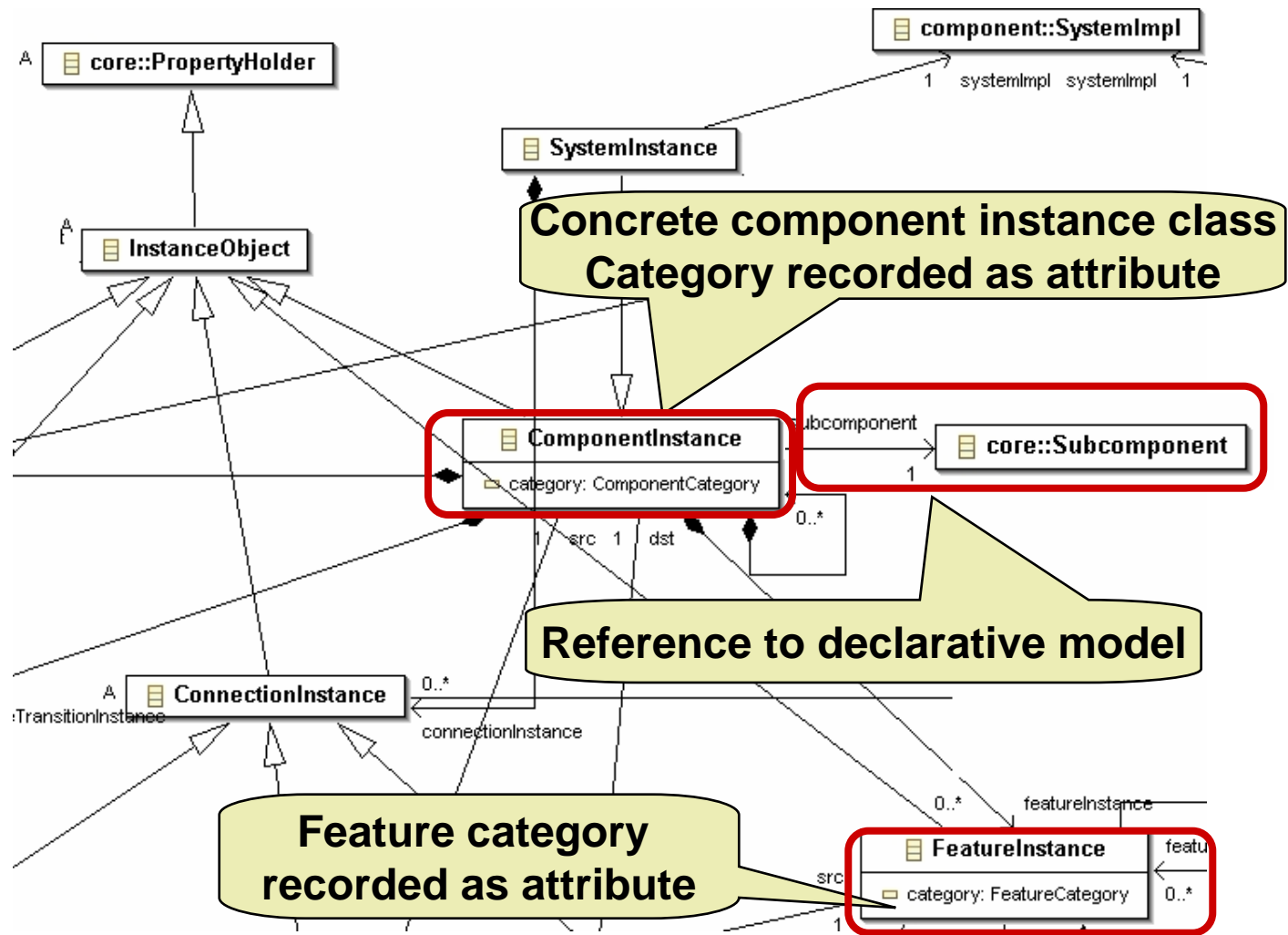


AADL Instance Model



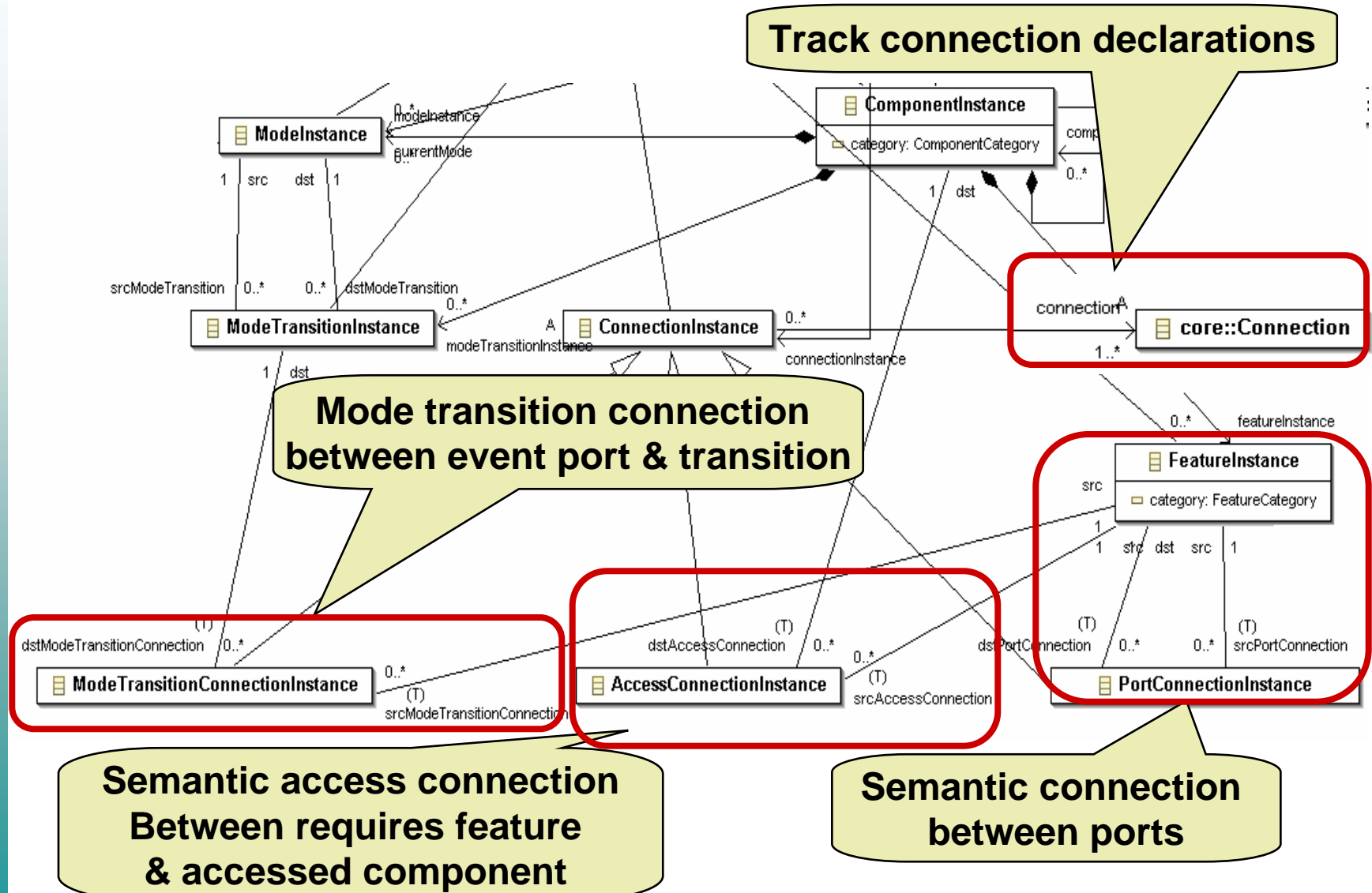


Instance Meta Model

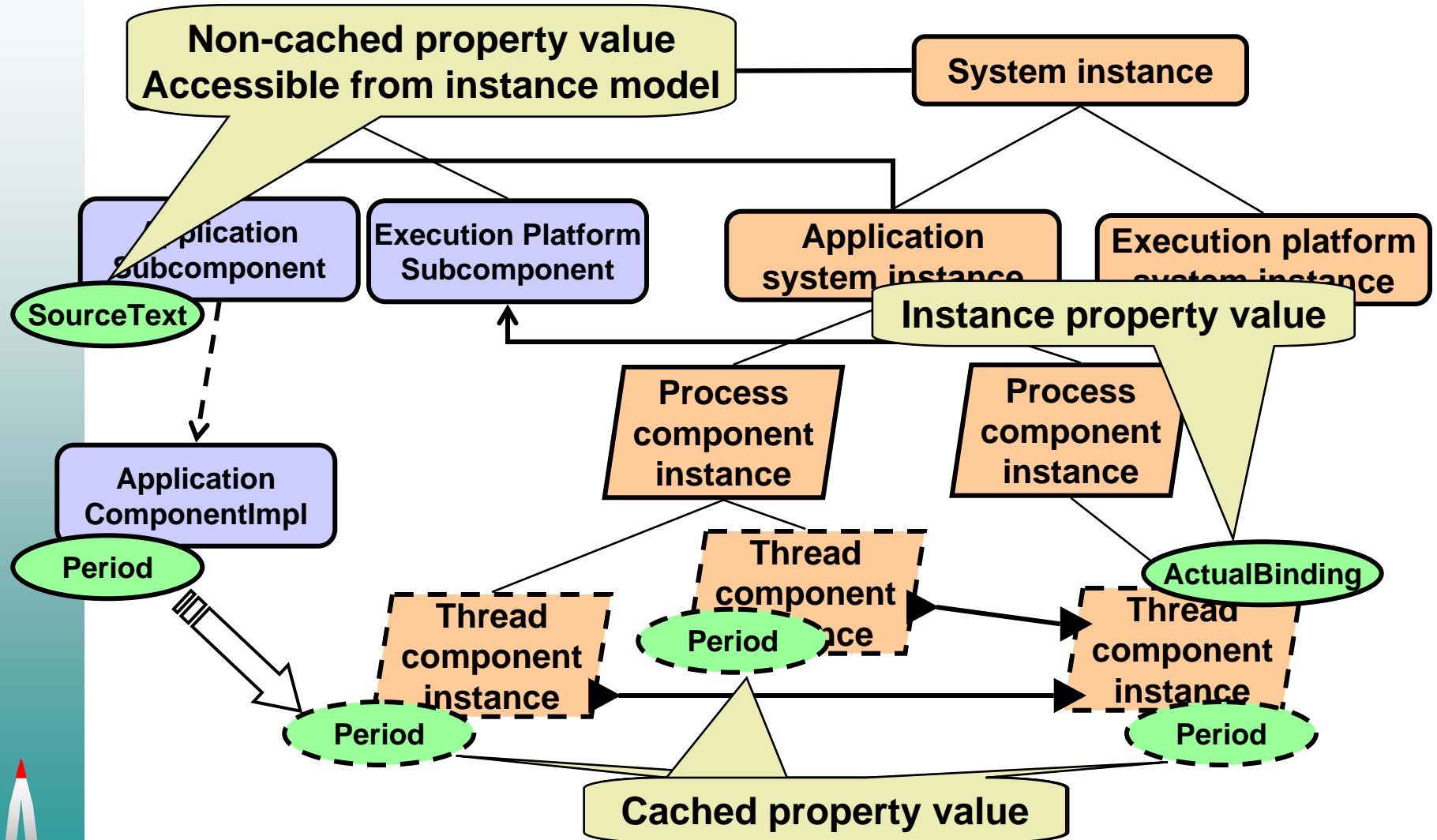




Semantic Connections

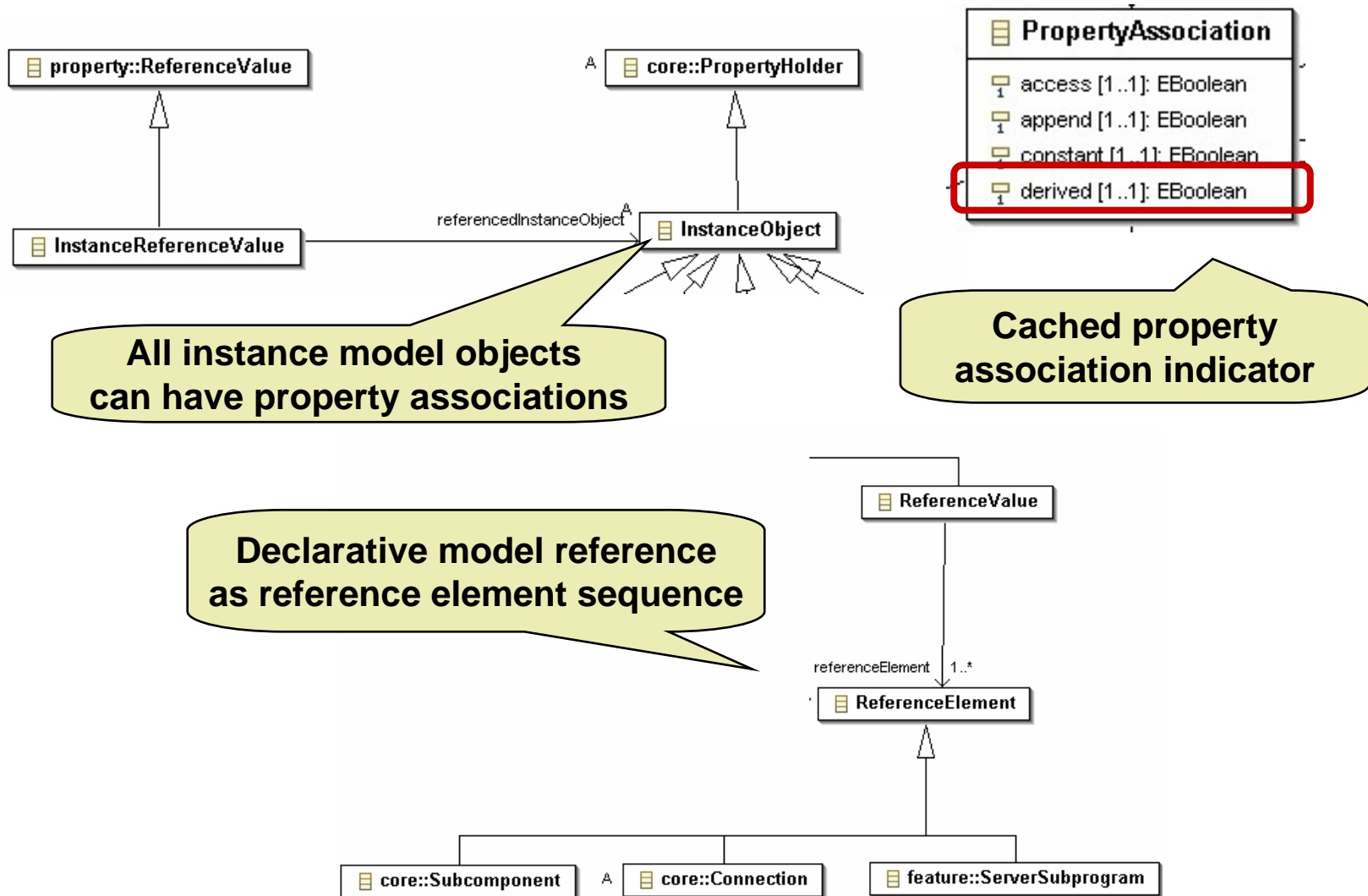


AADL Properties & Instance Model



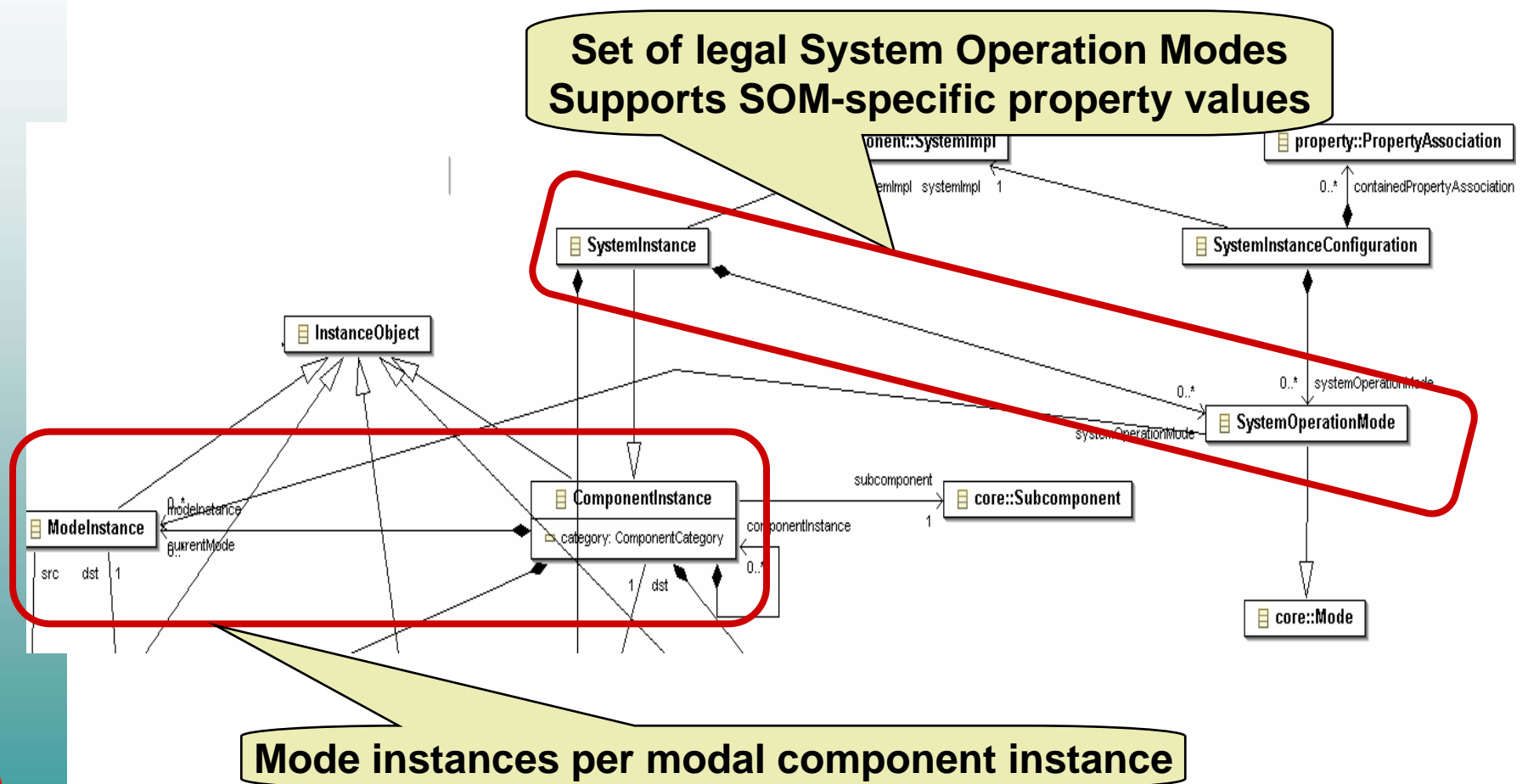


Instance Property Values



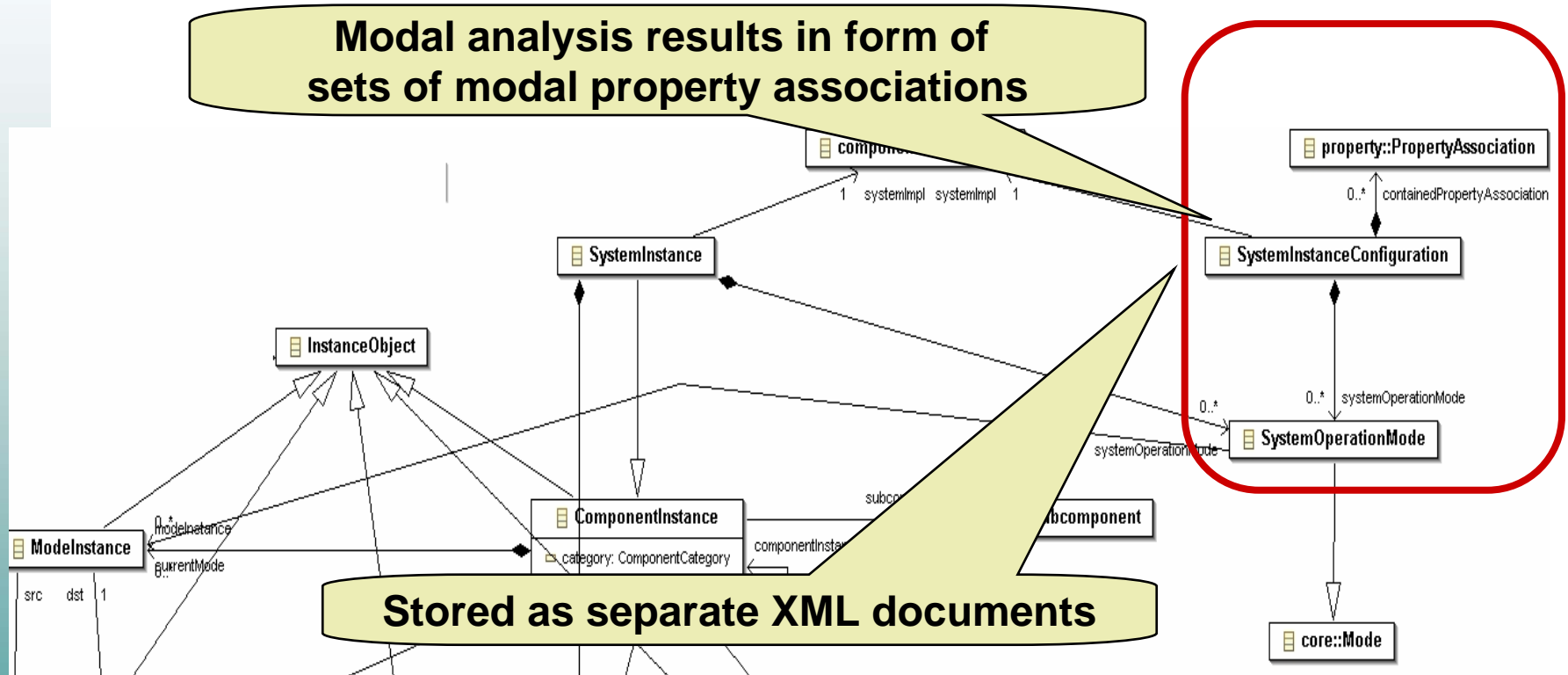


Modal & Configurable System Instances





Modal Analysis Result Sets





Summary

- AADL Meta Model specified in Ecore
- Modular, extensible meta model specification
- XML Schema & XMI specification generated from meta model
- Declarative model & instance model
- Self-contained instance models

