SBOL 2.0: Vision and Structure

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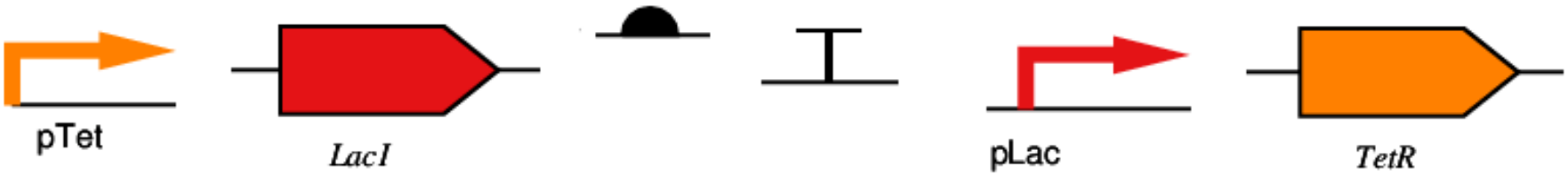
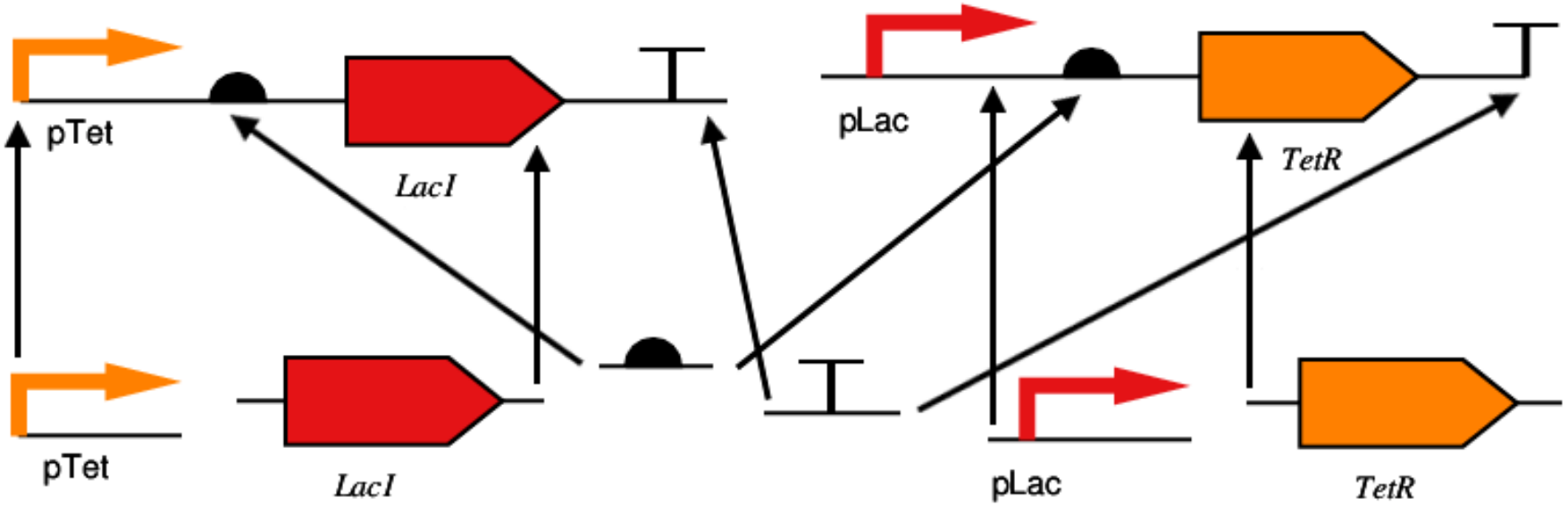
SBOL Workshop 10: UC Berkeley

Current Capabilities of SBOL 1.0



- Specification of DNA components

Current Capabilities of SBOL 1.0

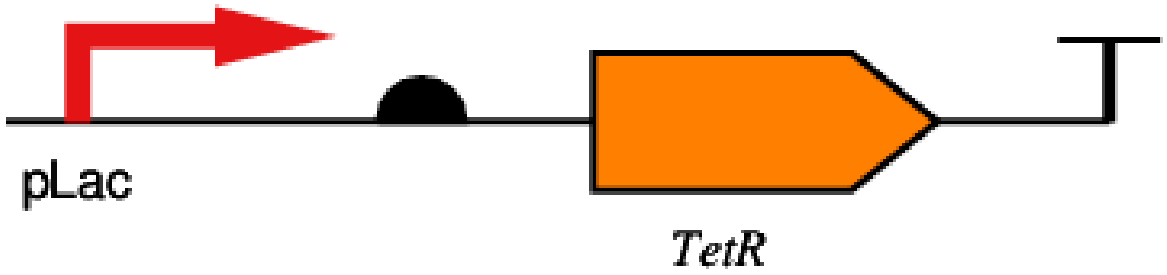


- Specification of DNA components
- Hierarchical composition of DNA components

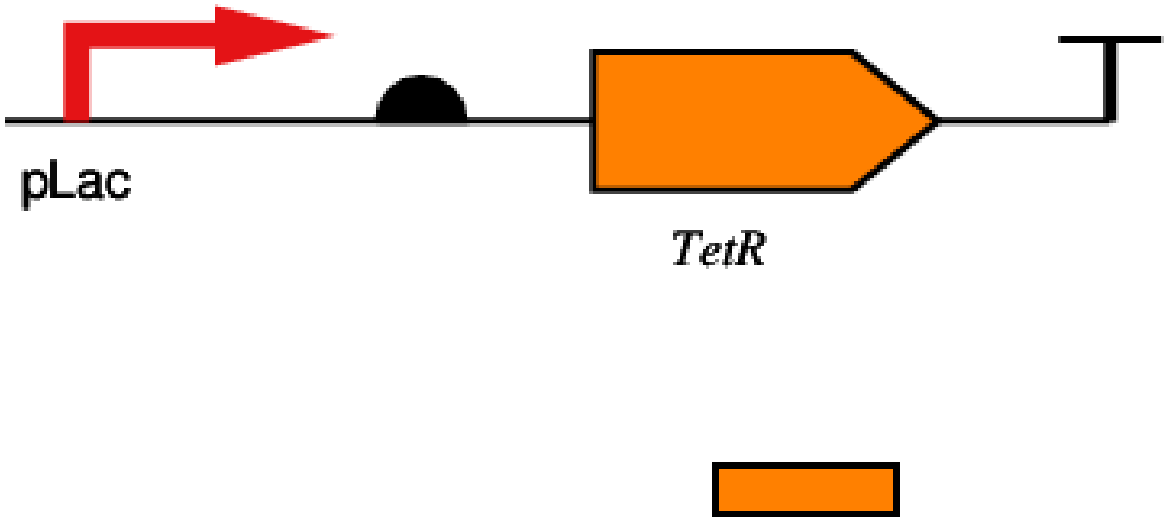
Goals for SBOL 2.0

- Increase the range of biological structure and function that we may specify.
- Provide an extensible basis for composition of functional modules with structural components and other functional modules.

Increasing Structural Range

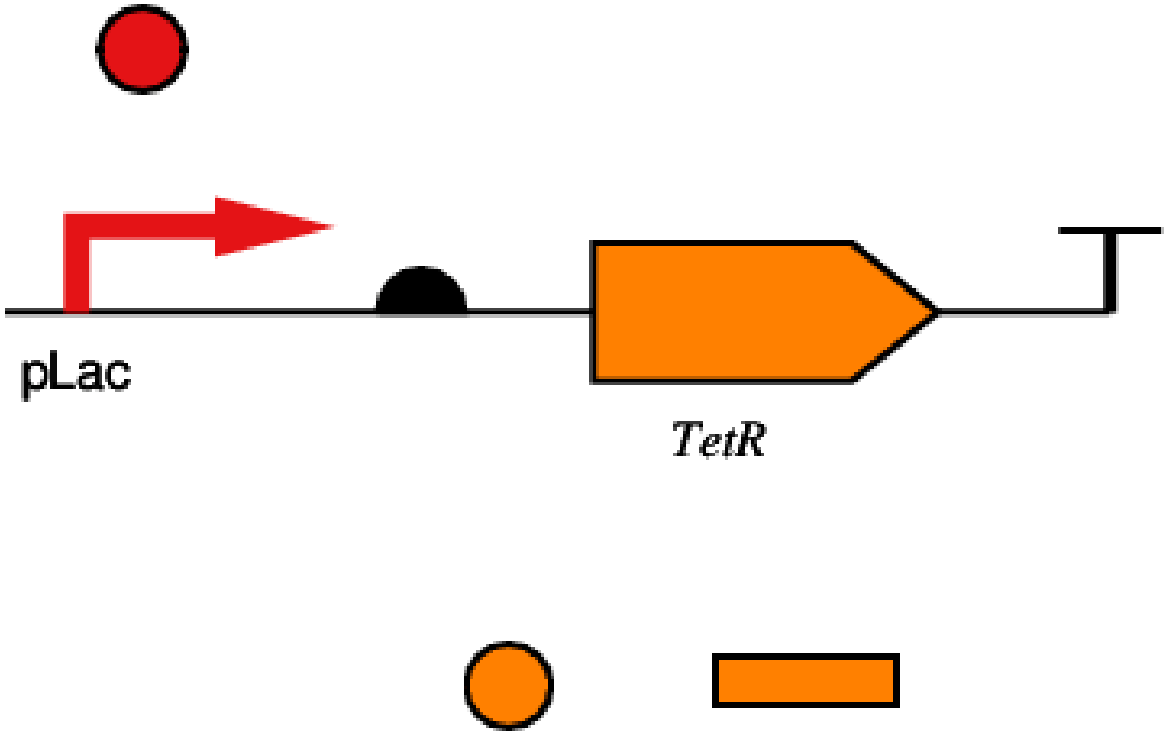


Increasing Structural Range



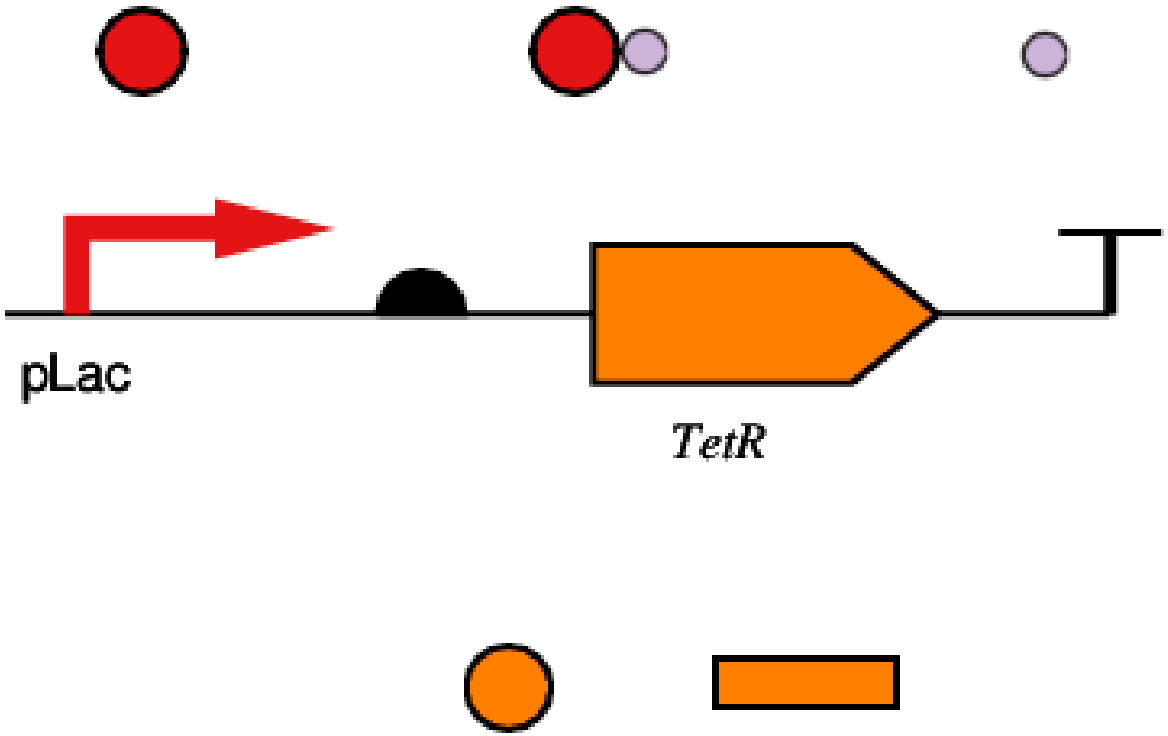
- RNA components (mRNA, tRNA, siRNA)

Increasing Structural Range



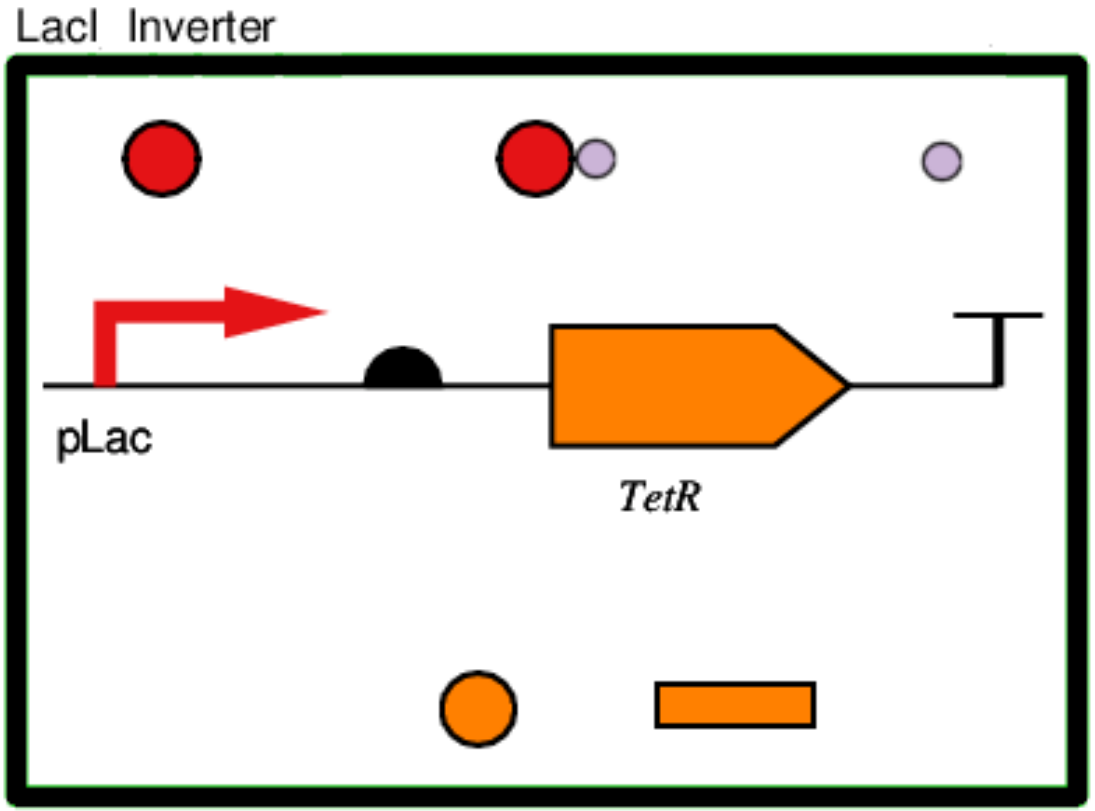
- RNA components
- Protein components (TFs, enzymes)

Increasing Structural Range



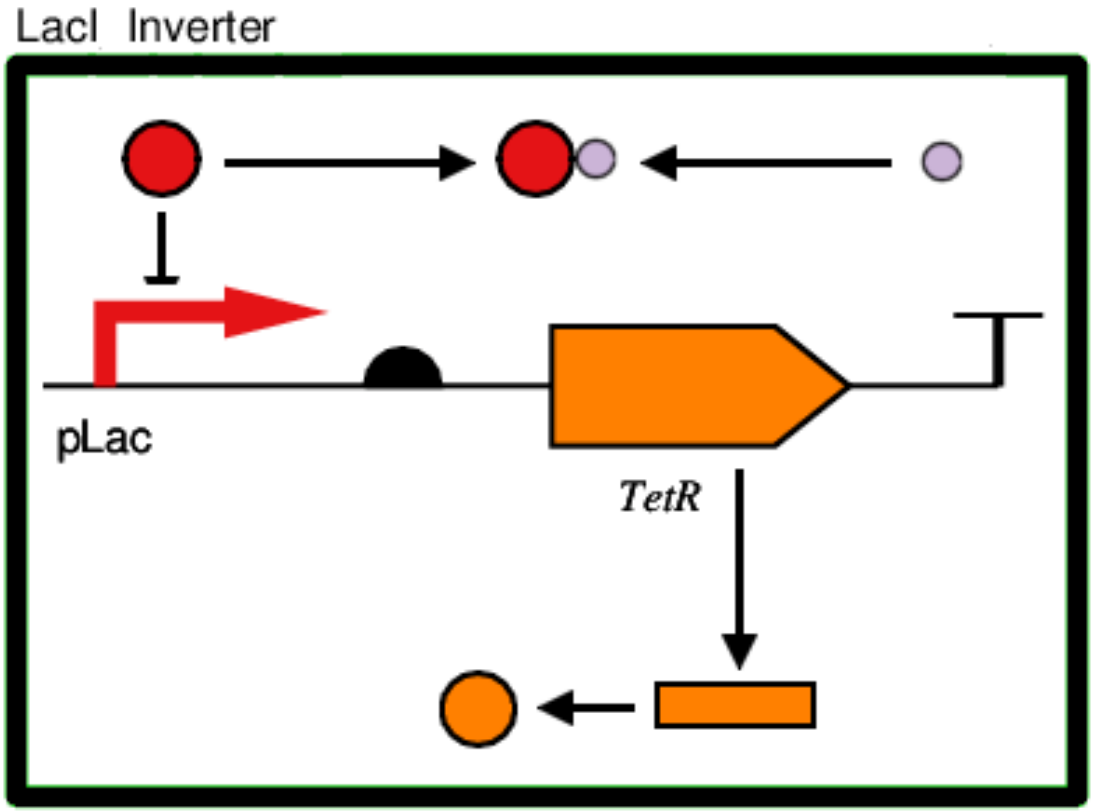
- RNA components
- Protein components
- Other Components (small molecules, complexes, light, pressure, pH, temp)

Increasing Functional Range



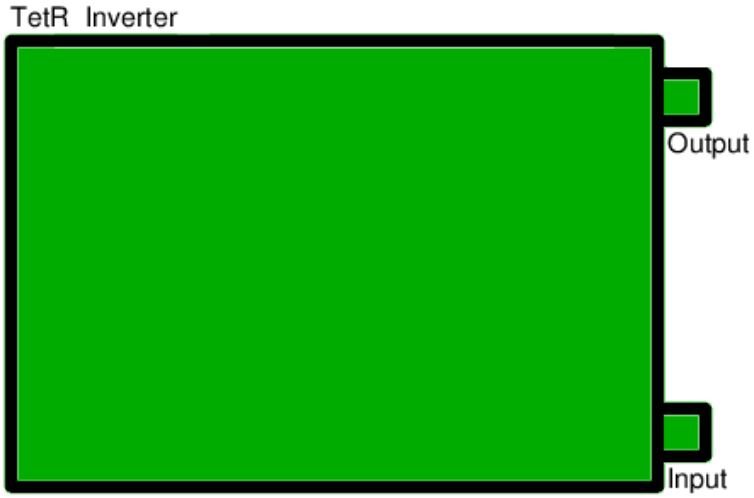
- Modules (logic gates, latches, oscillators, sensors, transducers, pathways, cascades)

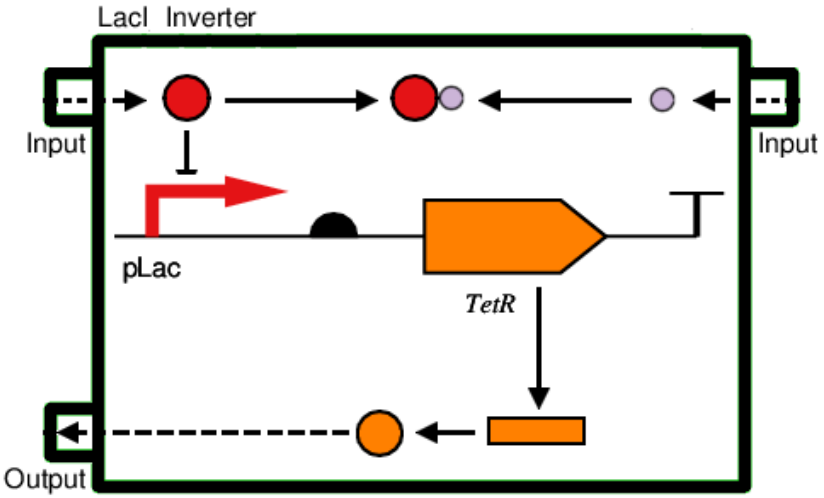
Increasing Functional Range



- Modules
- Interactions (activation, repression, complexation, transcription, translation, phosphorylation)

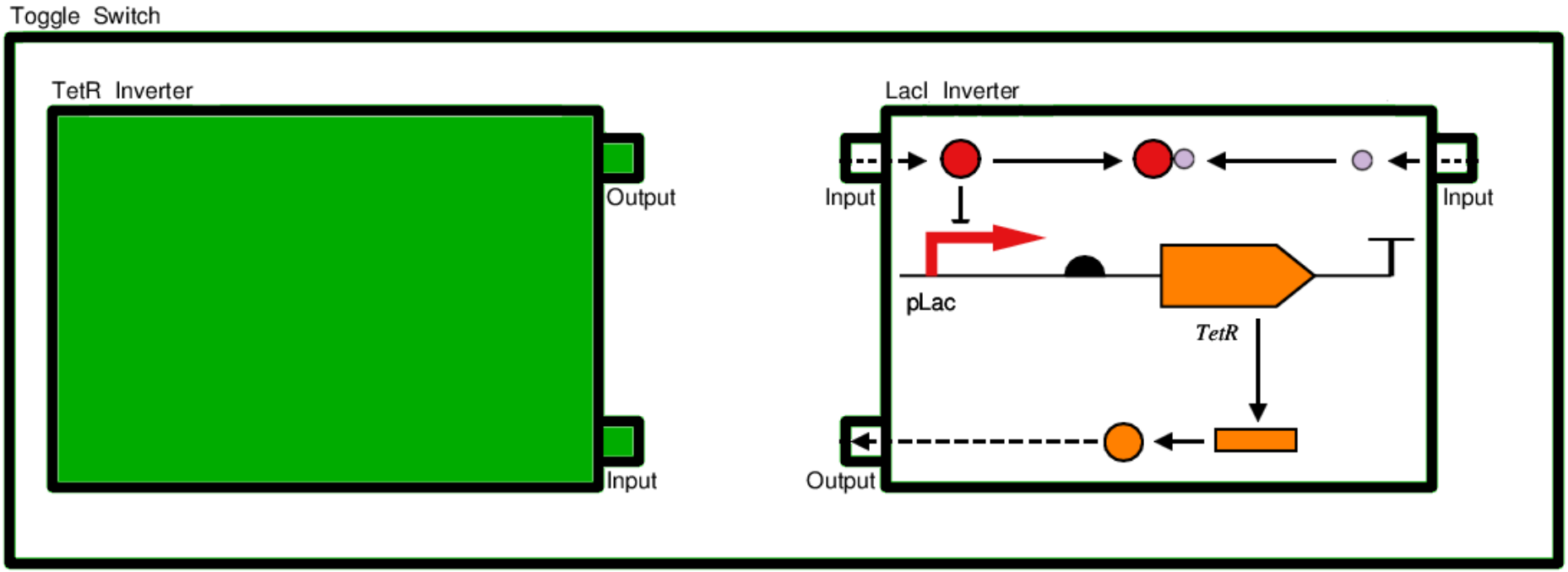
Basis for Composition





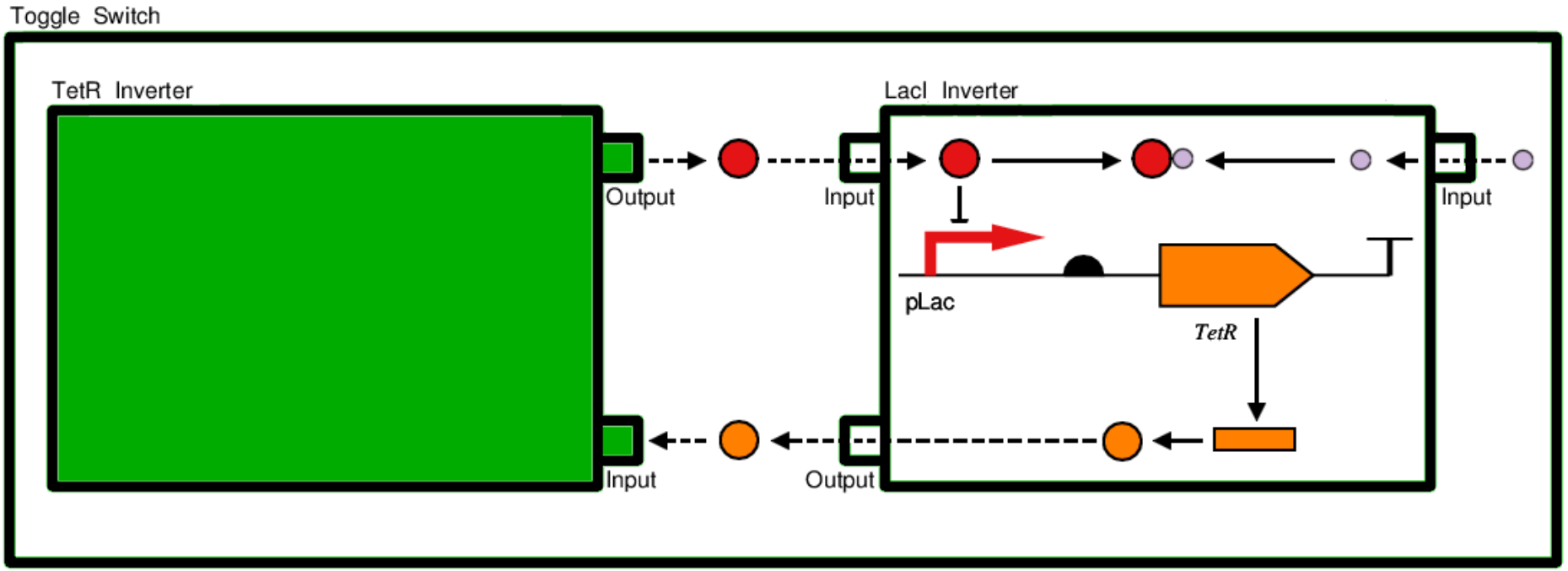
- Ports

Basis for Composition



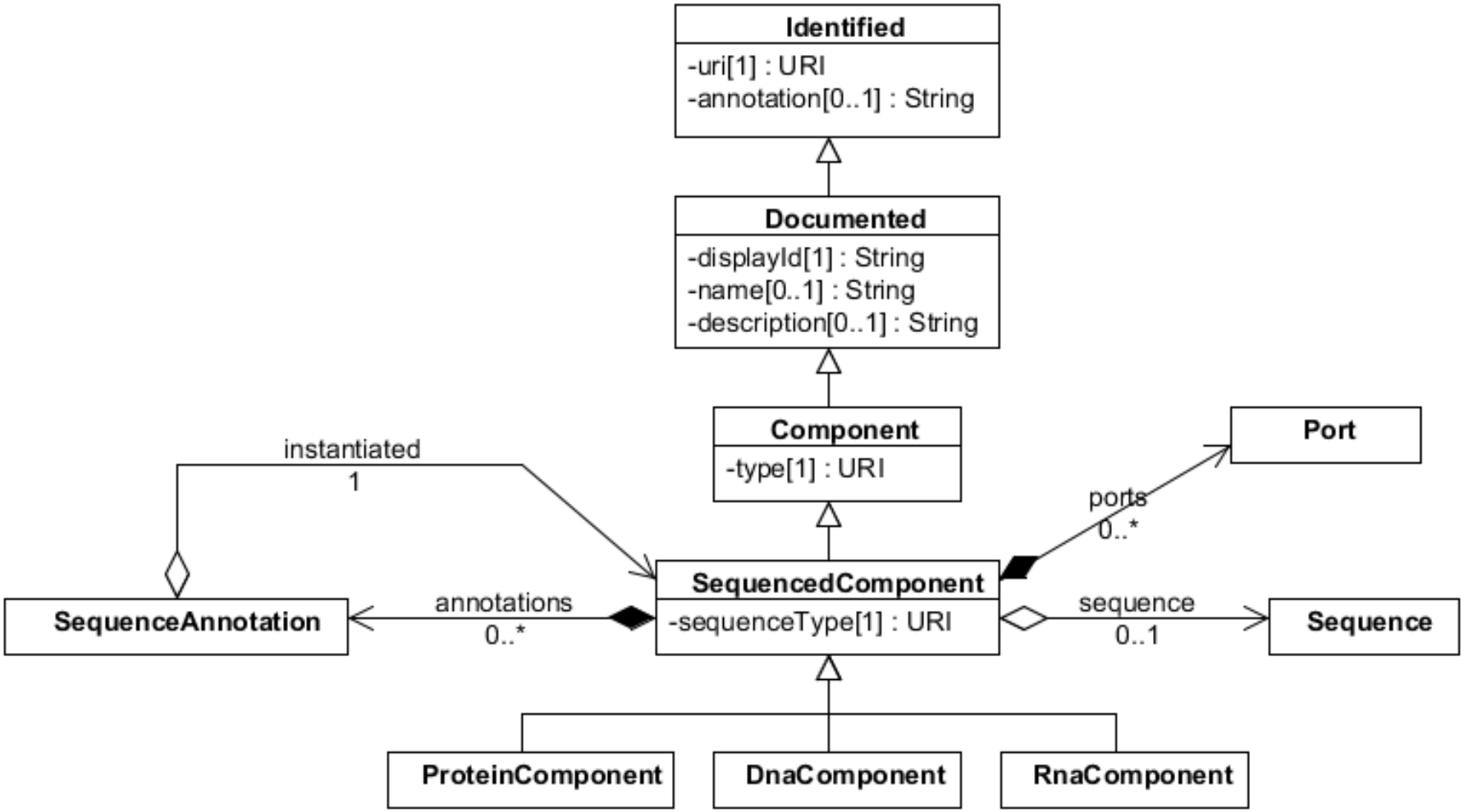
- Ports
- Instantiation

Basis for Functional Composition

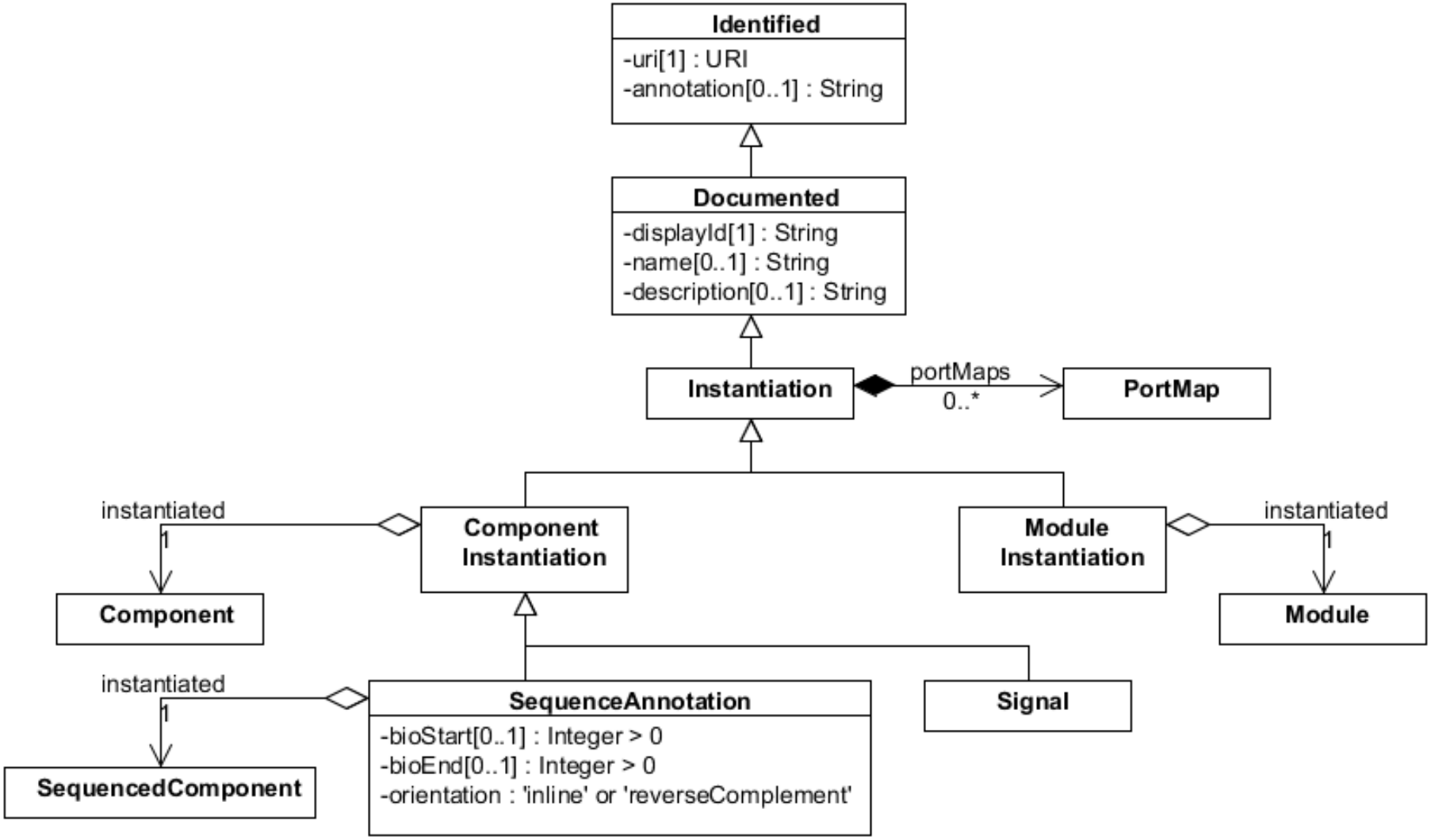


- Ports
- Instantiation
- Port Mapping and Mixed Hierarchy

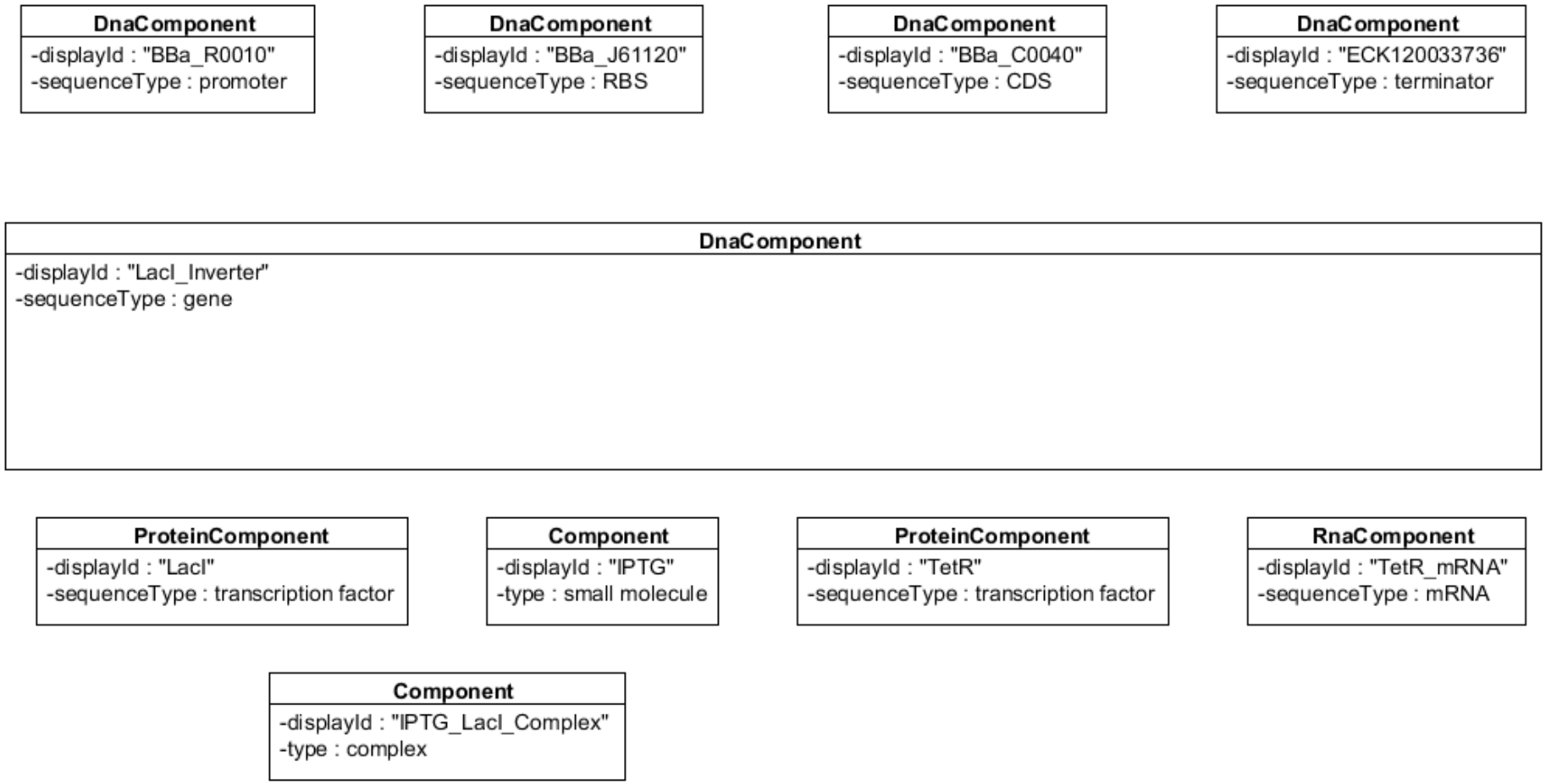
Data Model: Sequenced Component



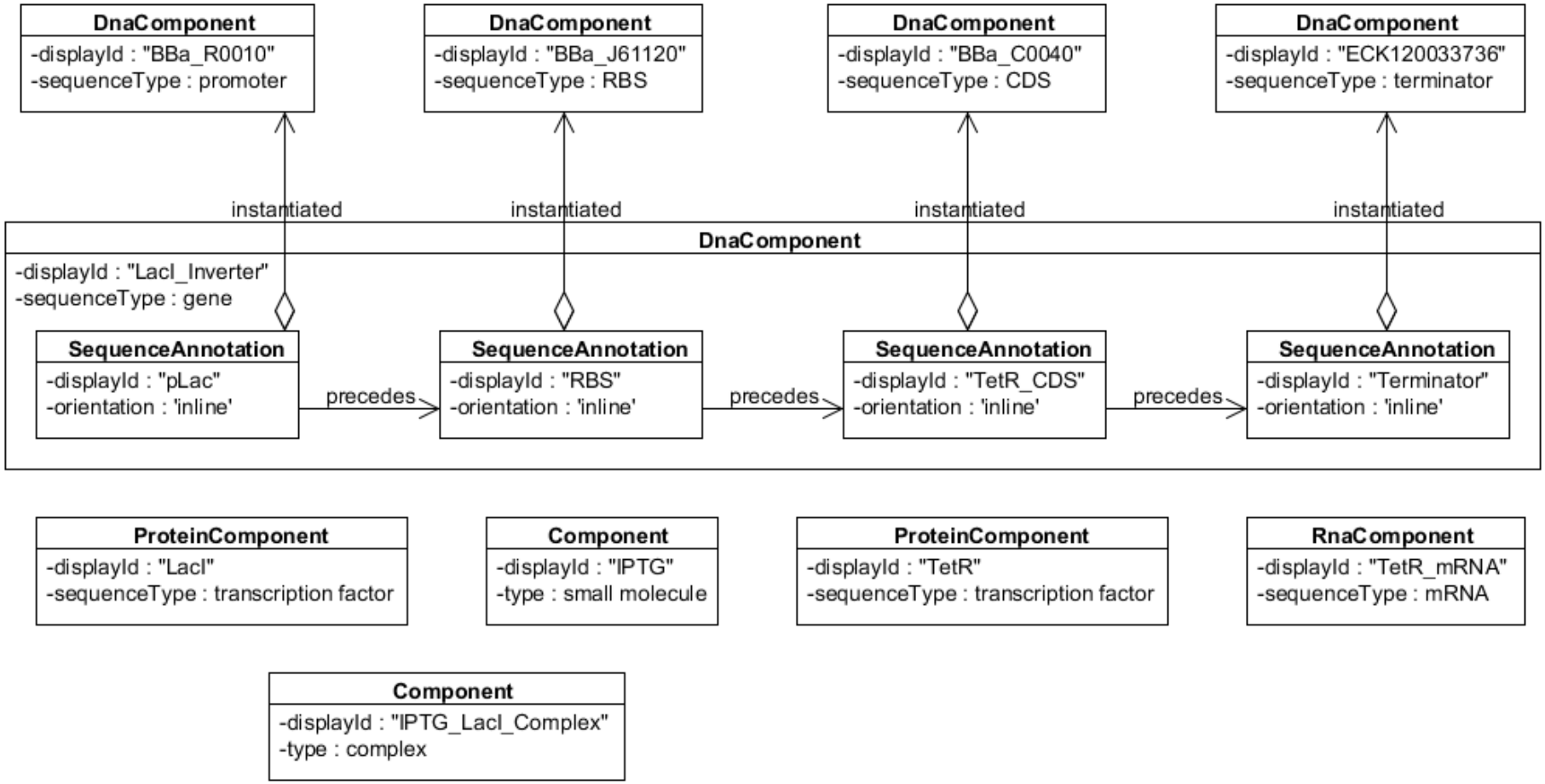
Data Model: Instantiation



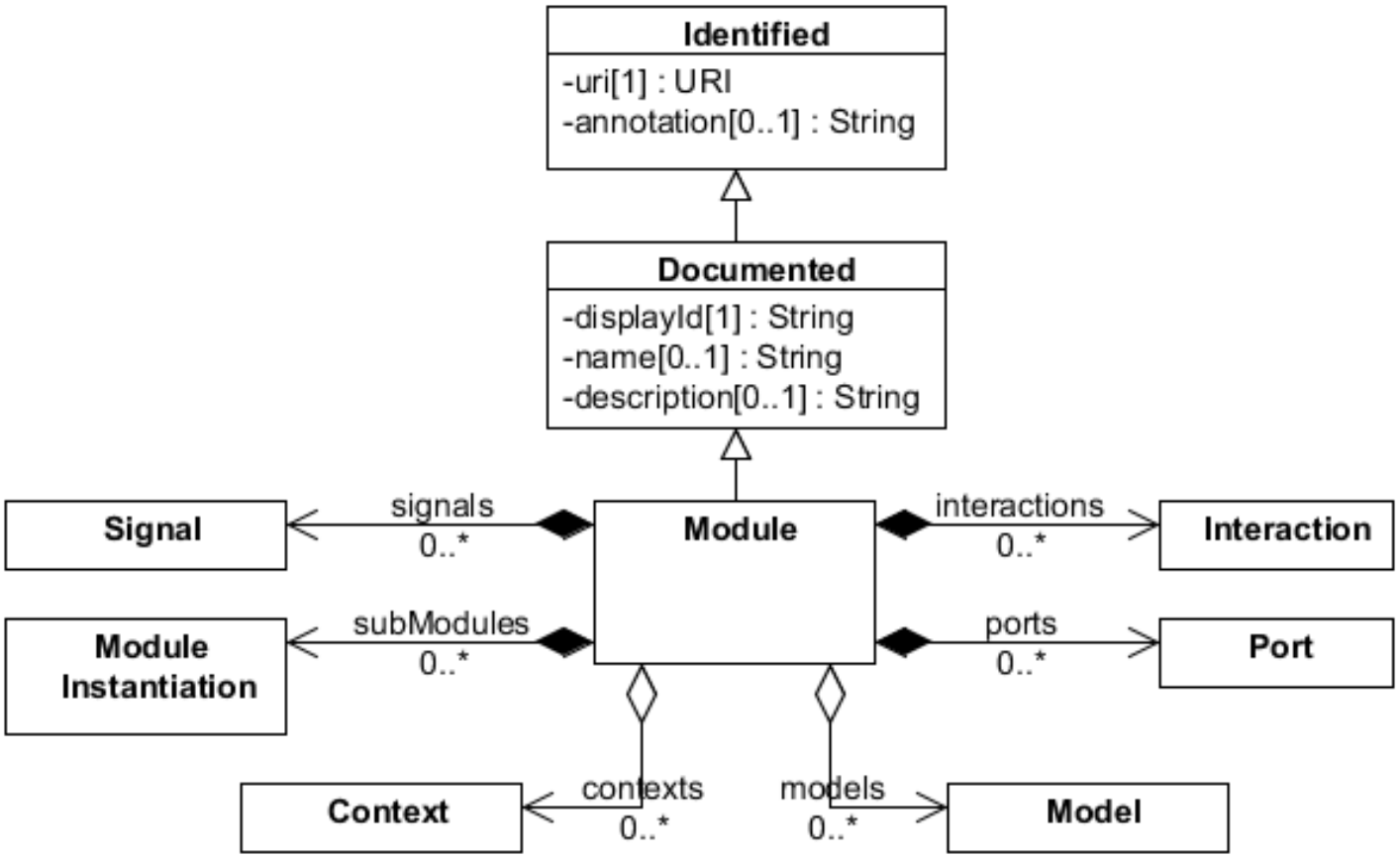
Example: Components



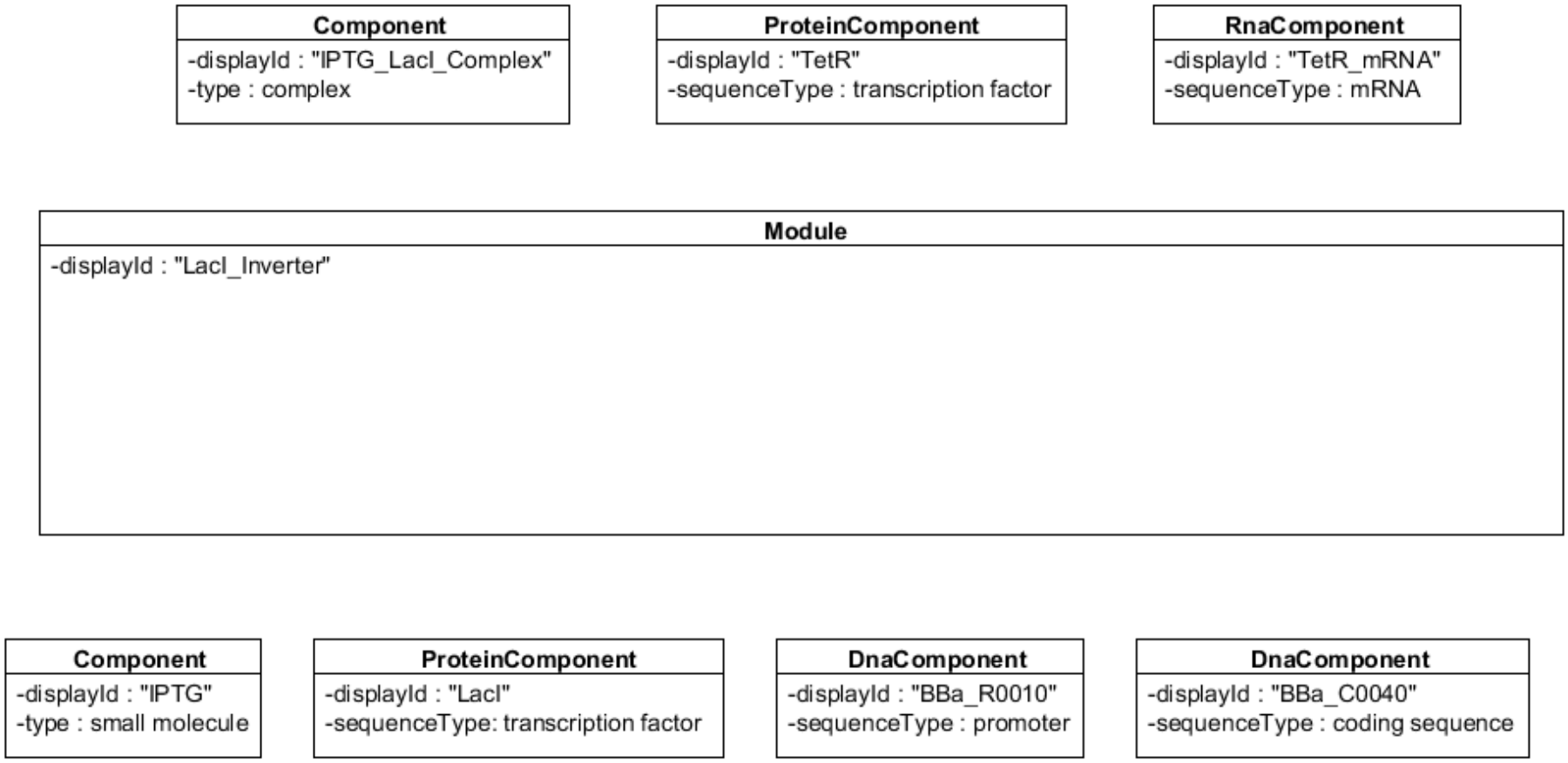
Example: Sequence Instantiation



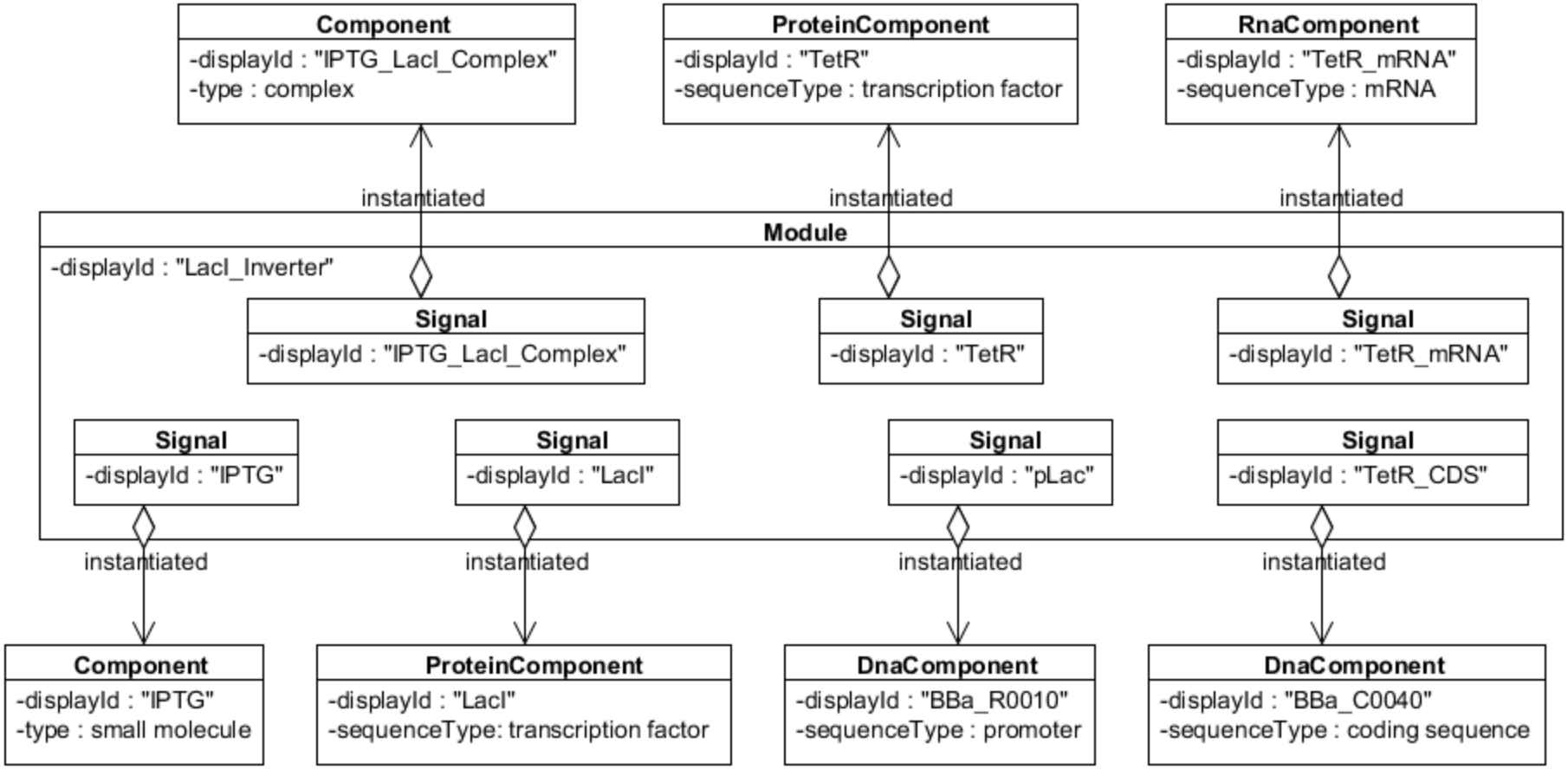
Data Model: Module



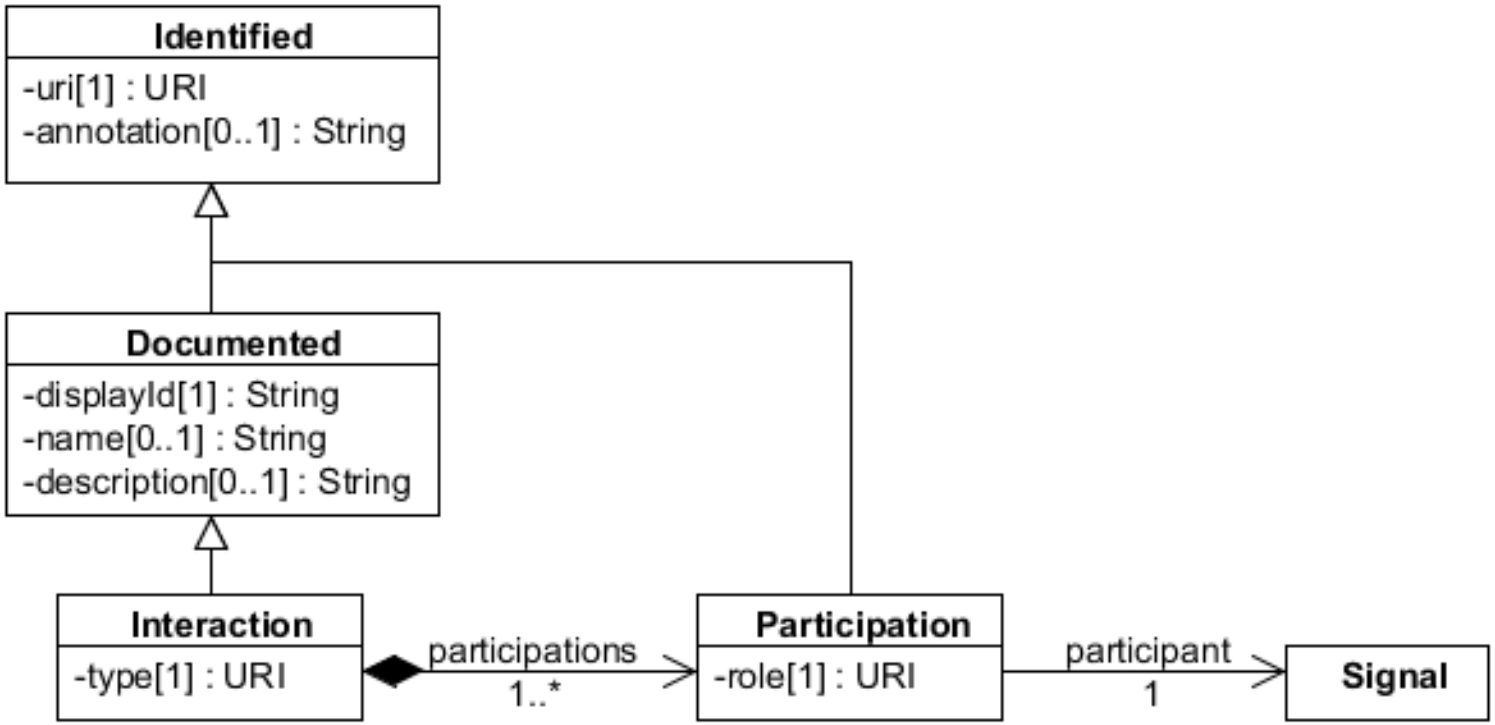
Example: Module



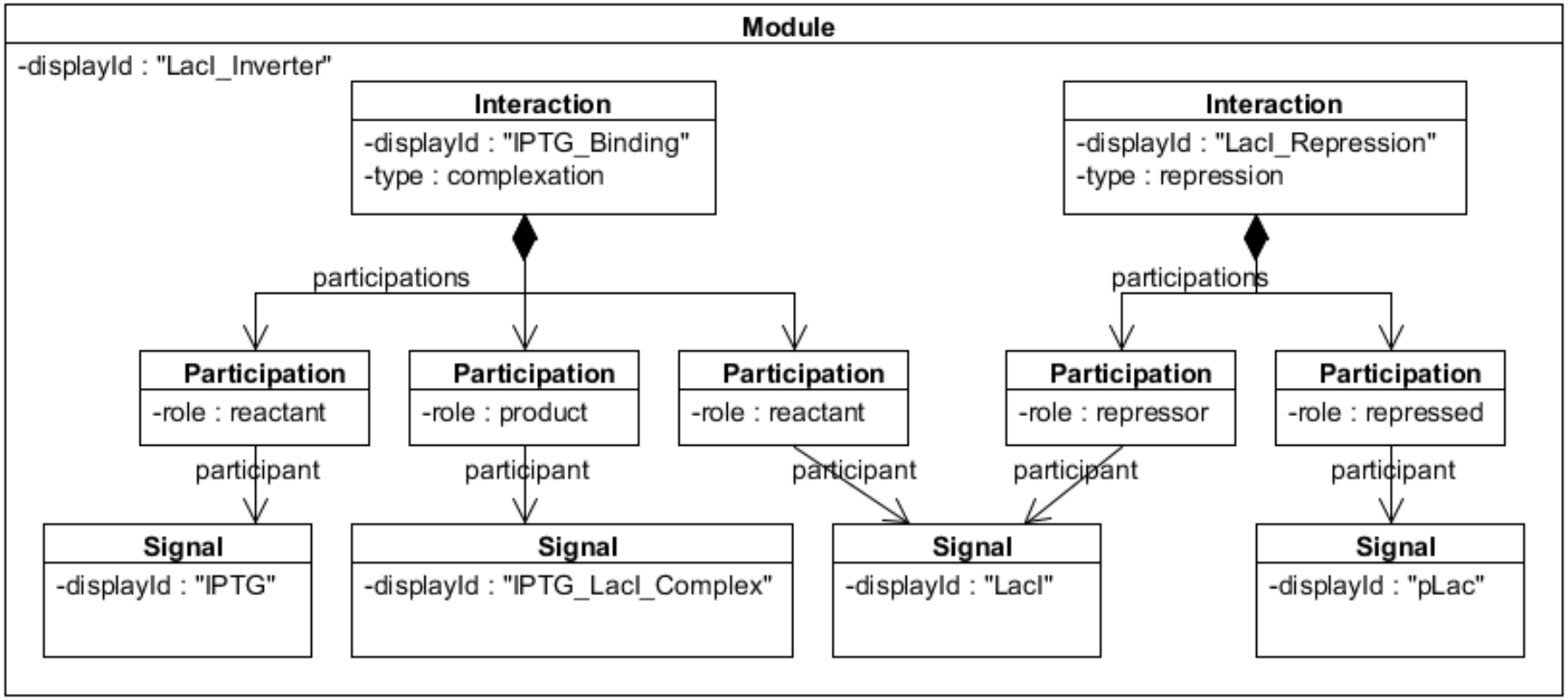
Example: Signal Instantiation



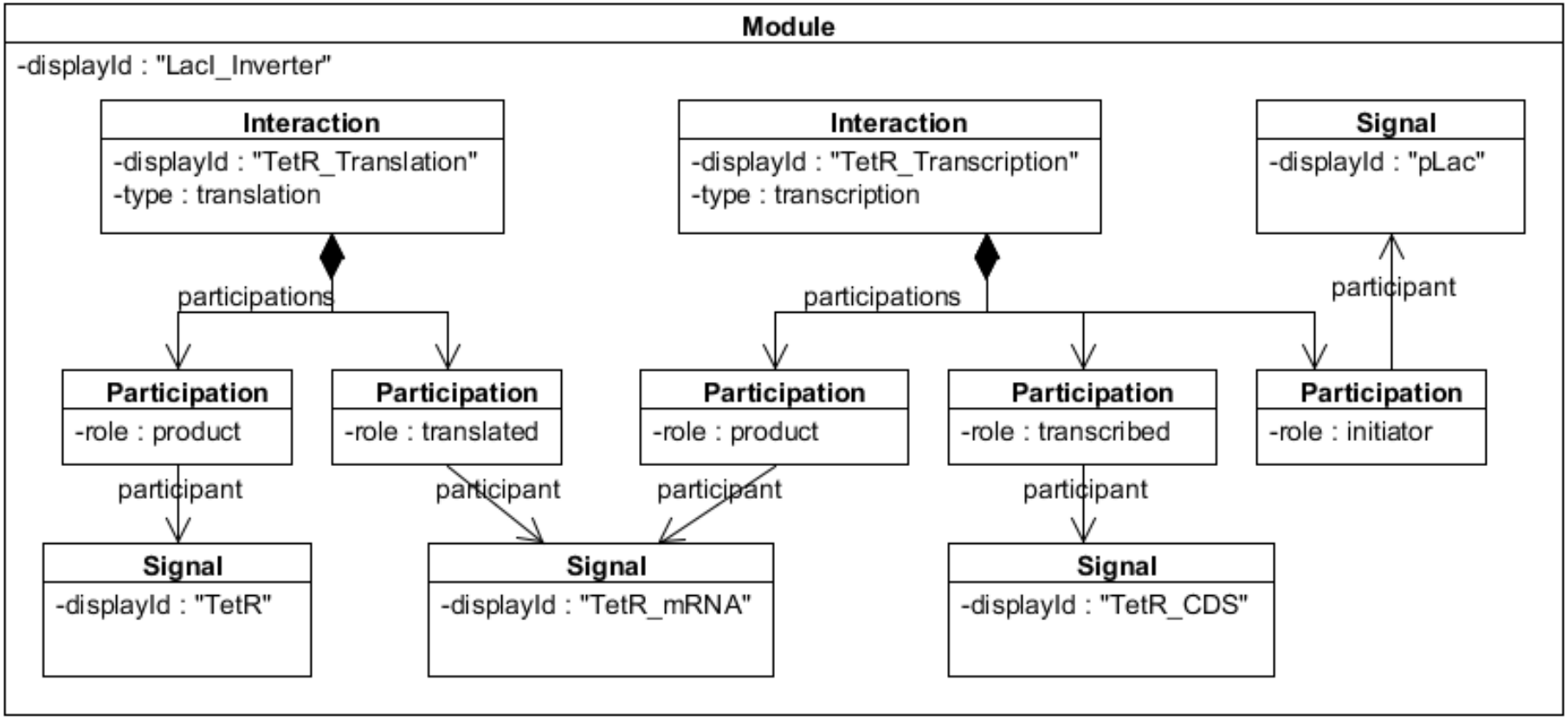
Data Model: Interactions



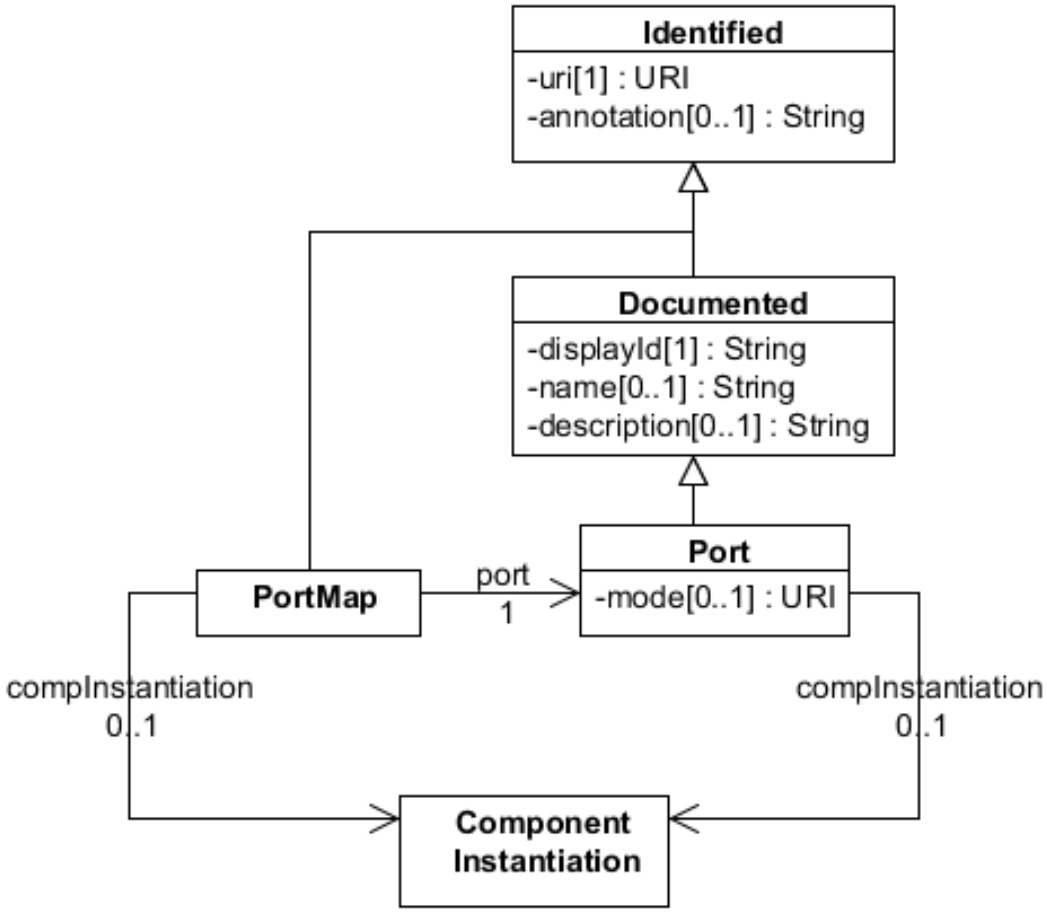
Example: Interactions



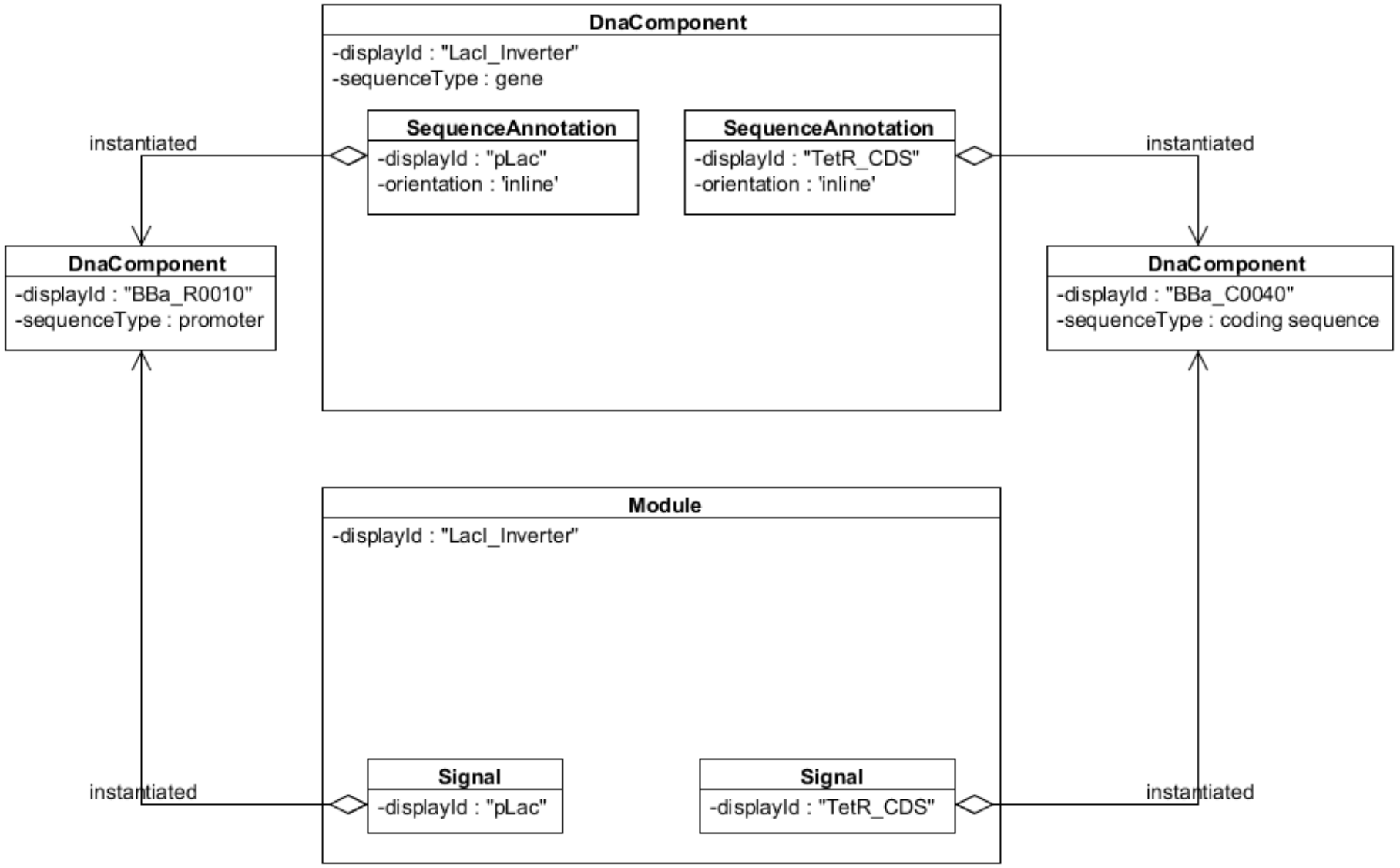
Example: Interactions



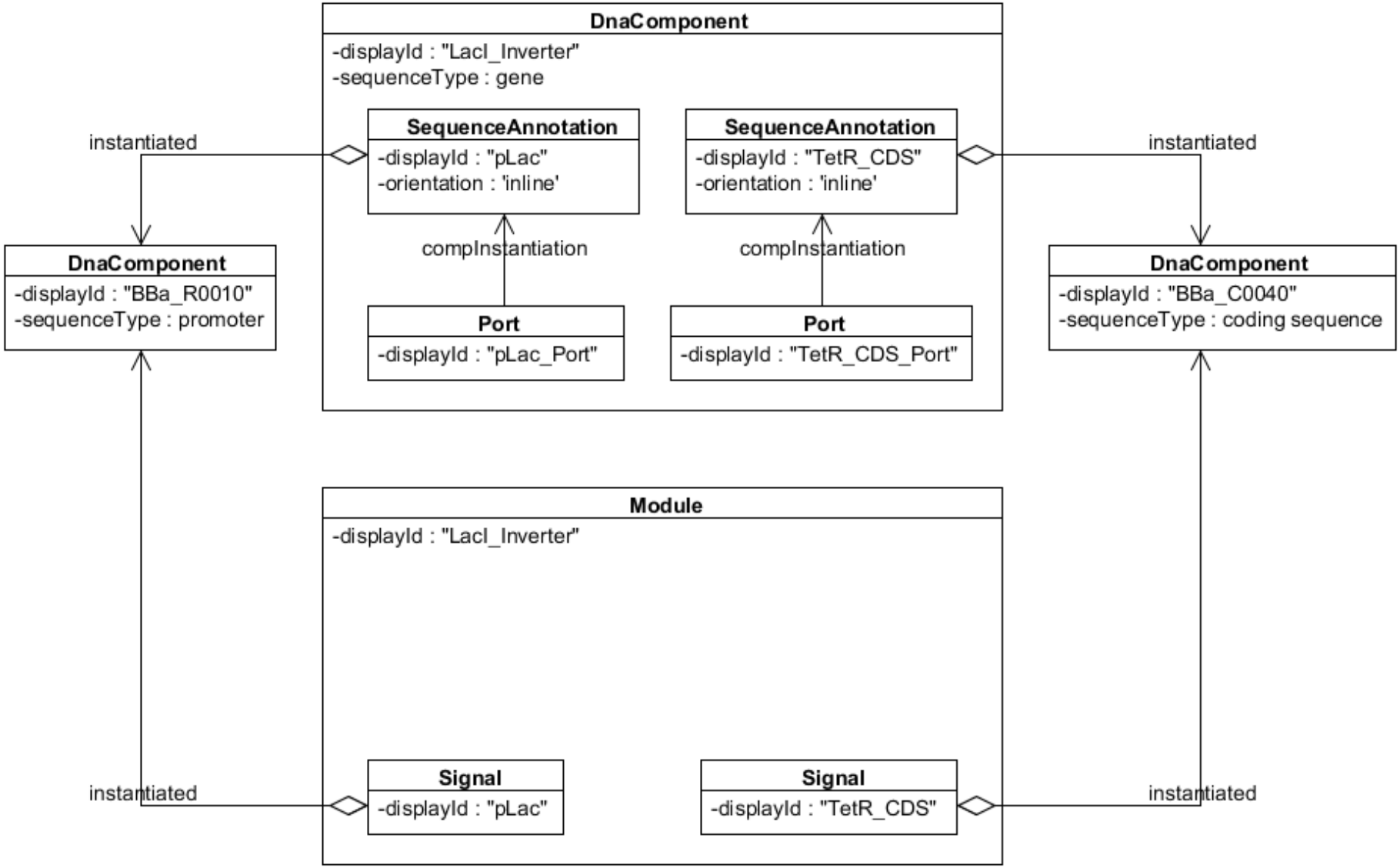
Data Model: Ports and PortMaps



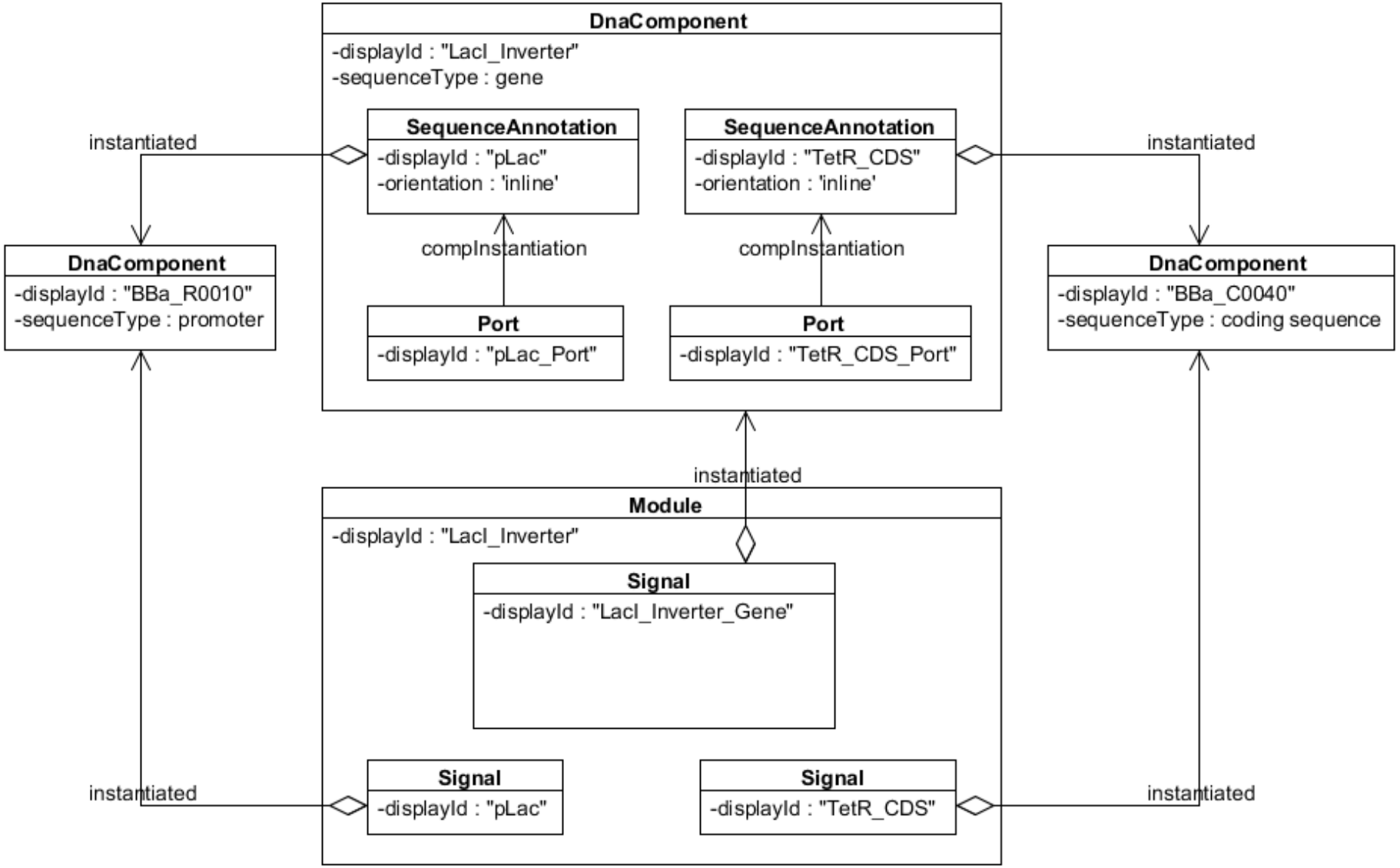
Composing Inverter Component with Module



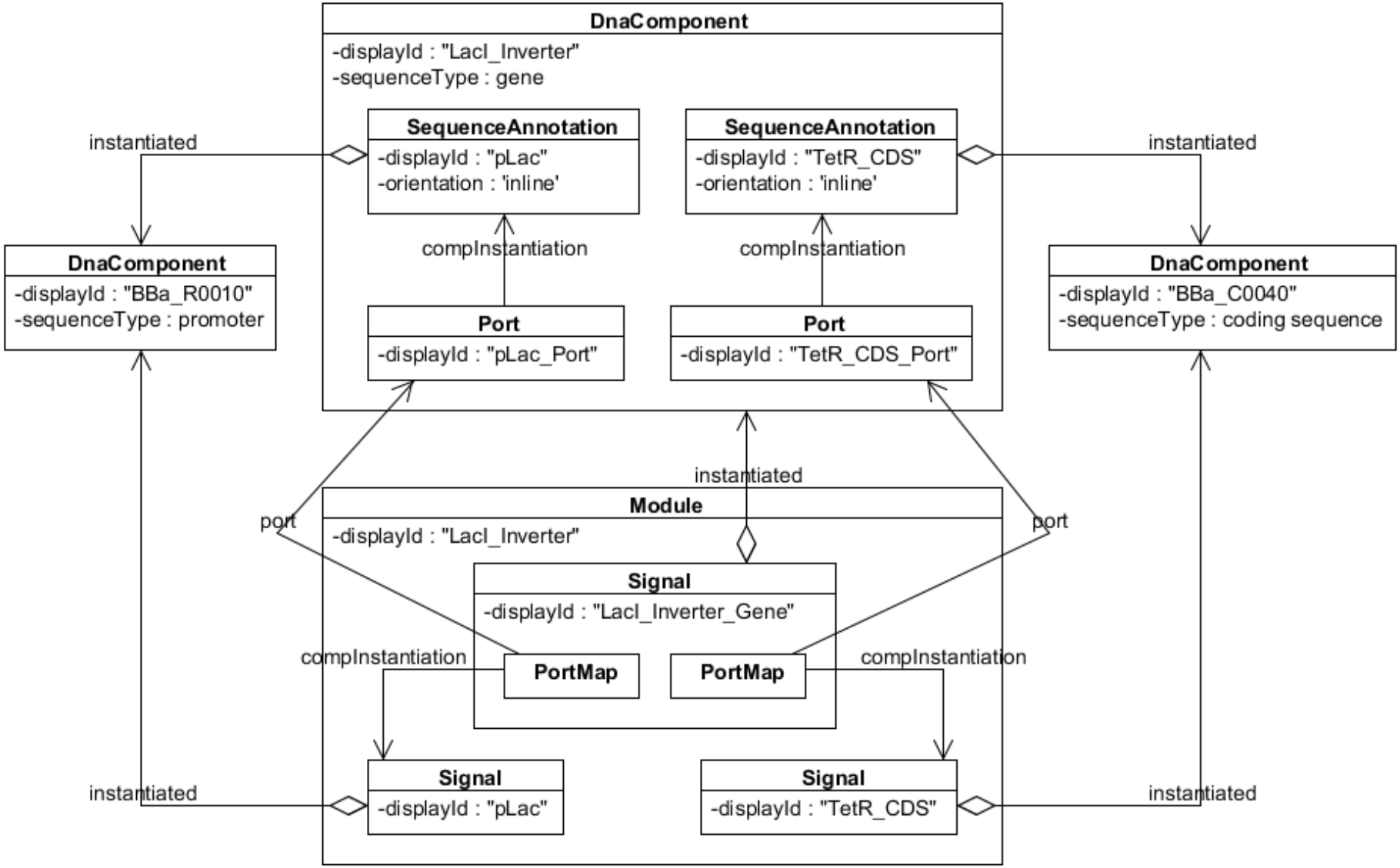
Example: Component Ports



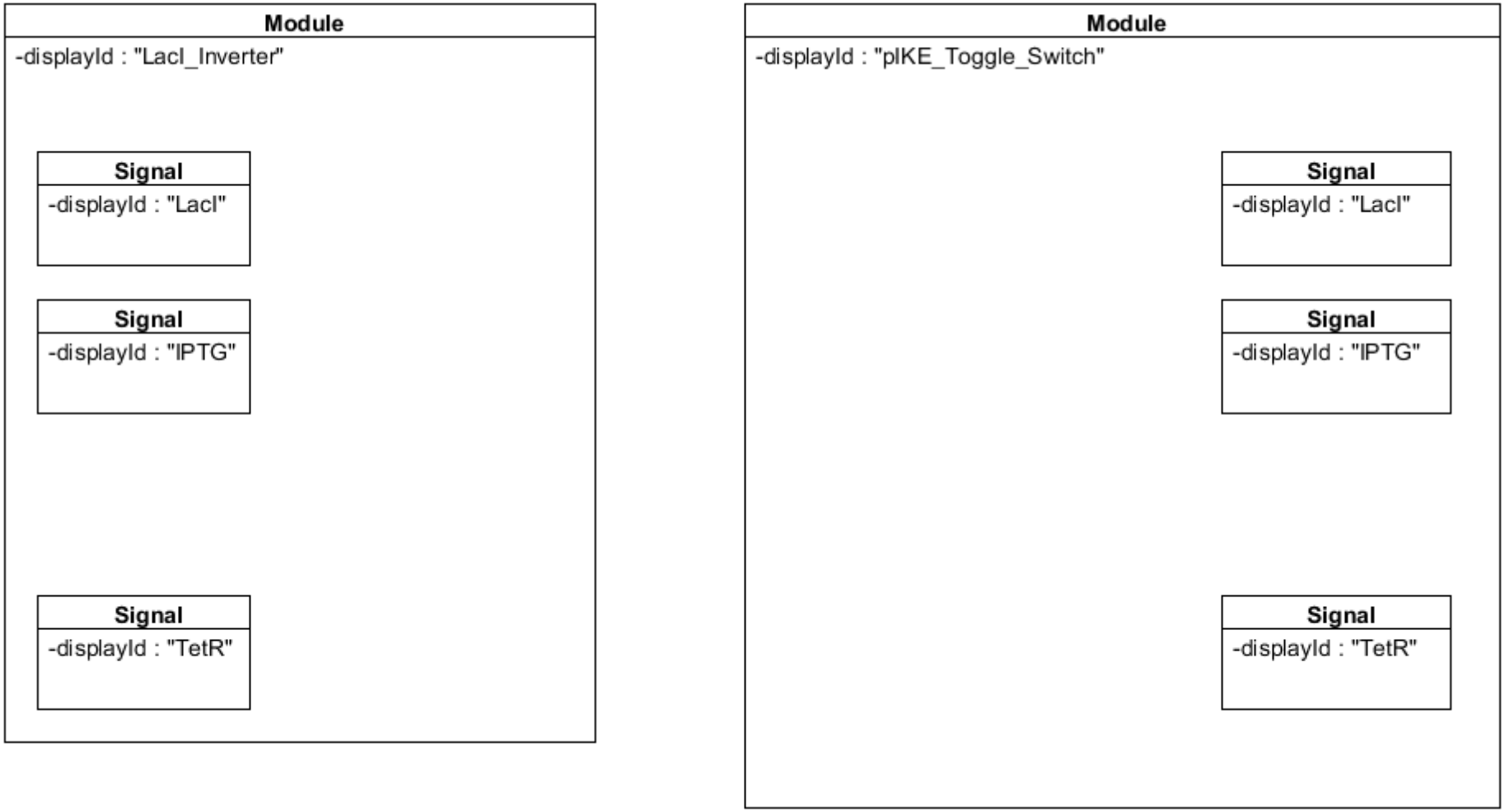
Example: Signal Instantiation



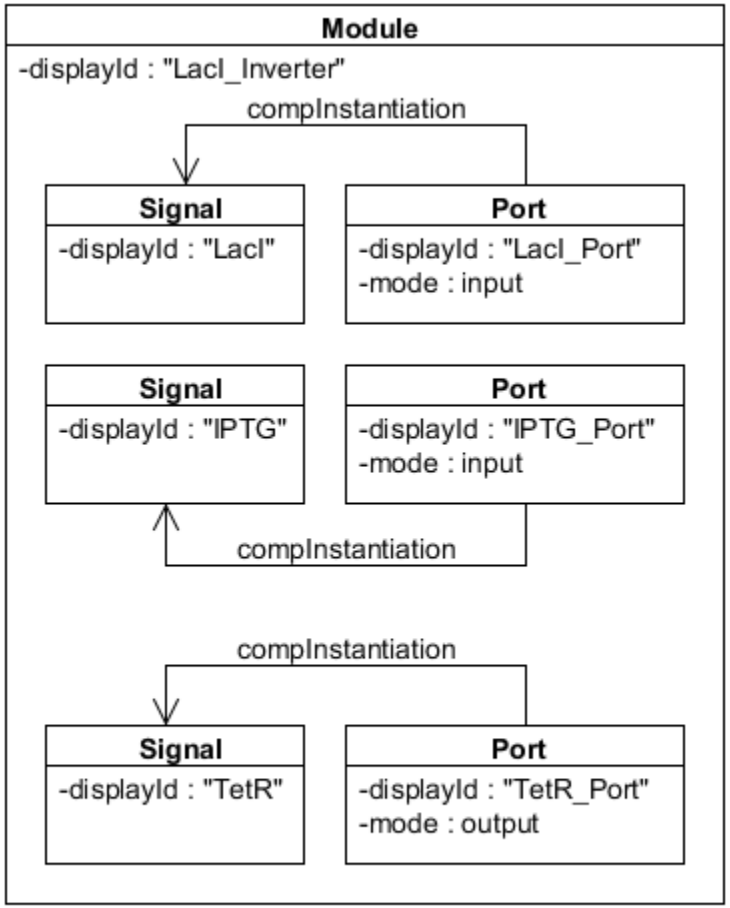
Example: Port Mapping

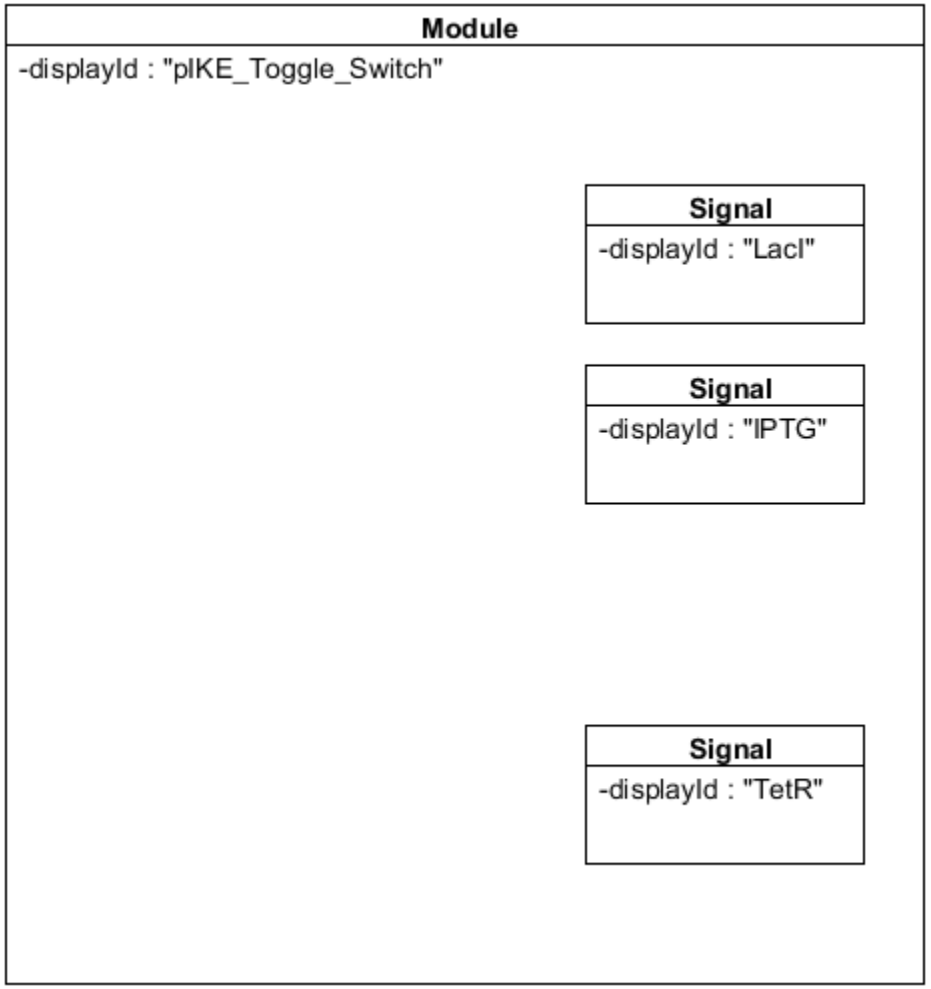


Composing Inverter Module with Toggle Module

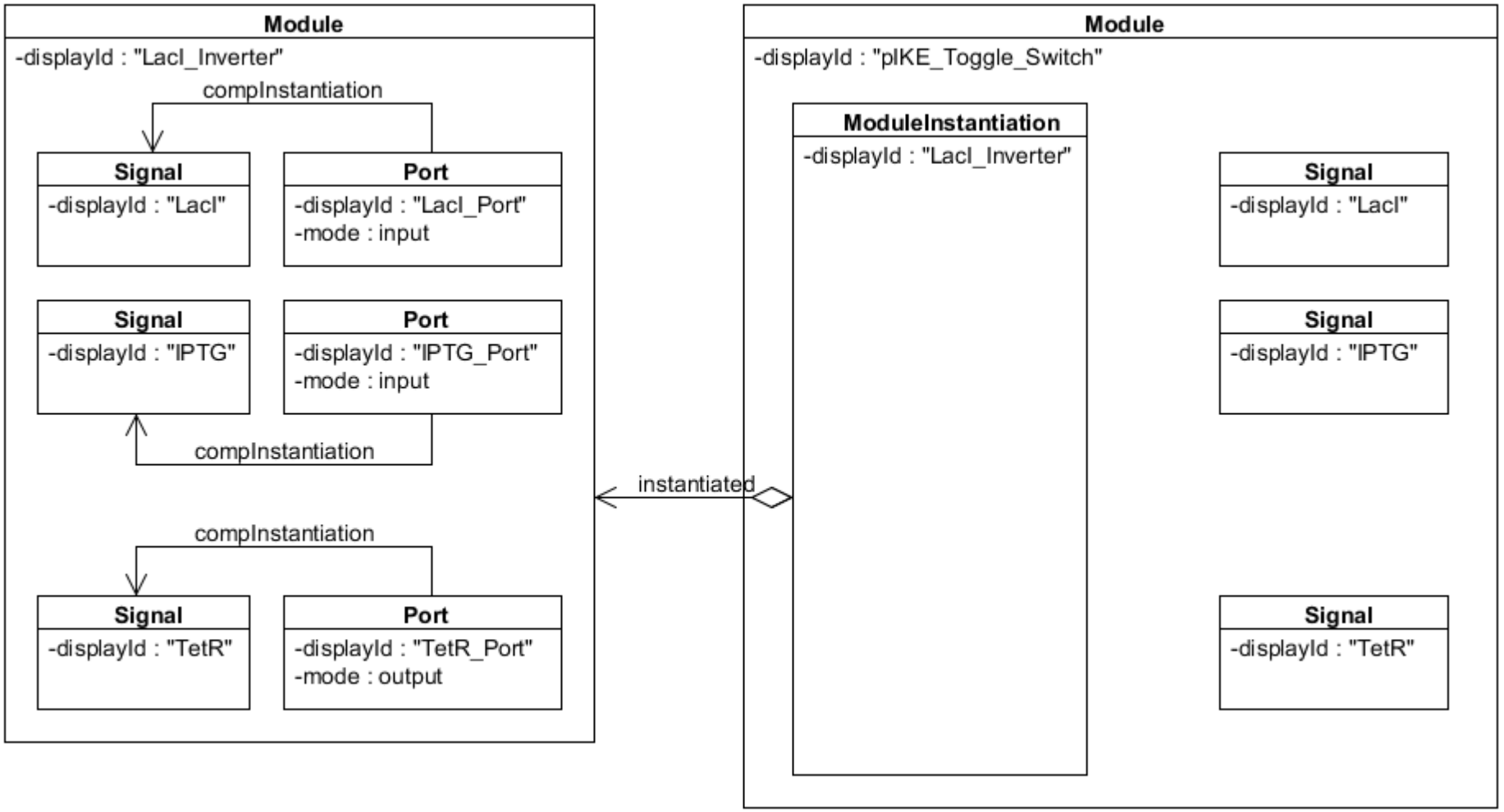


Example: Module Ports

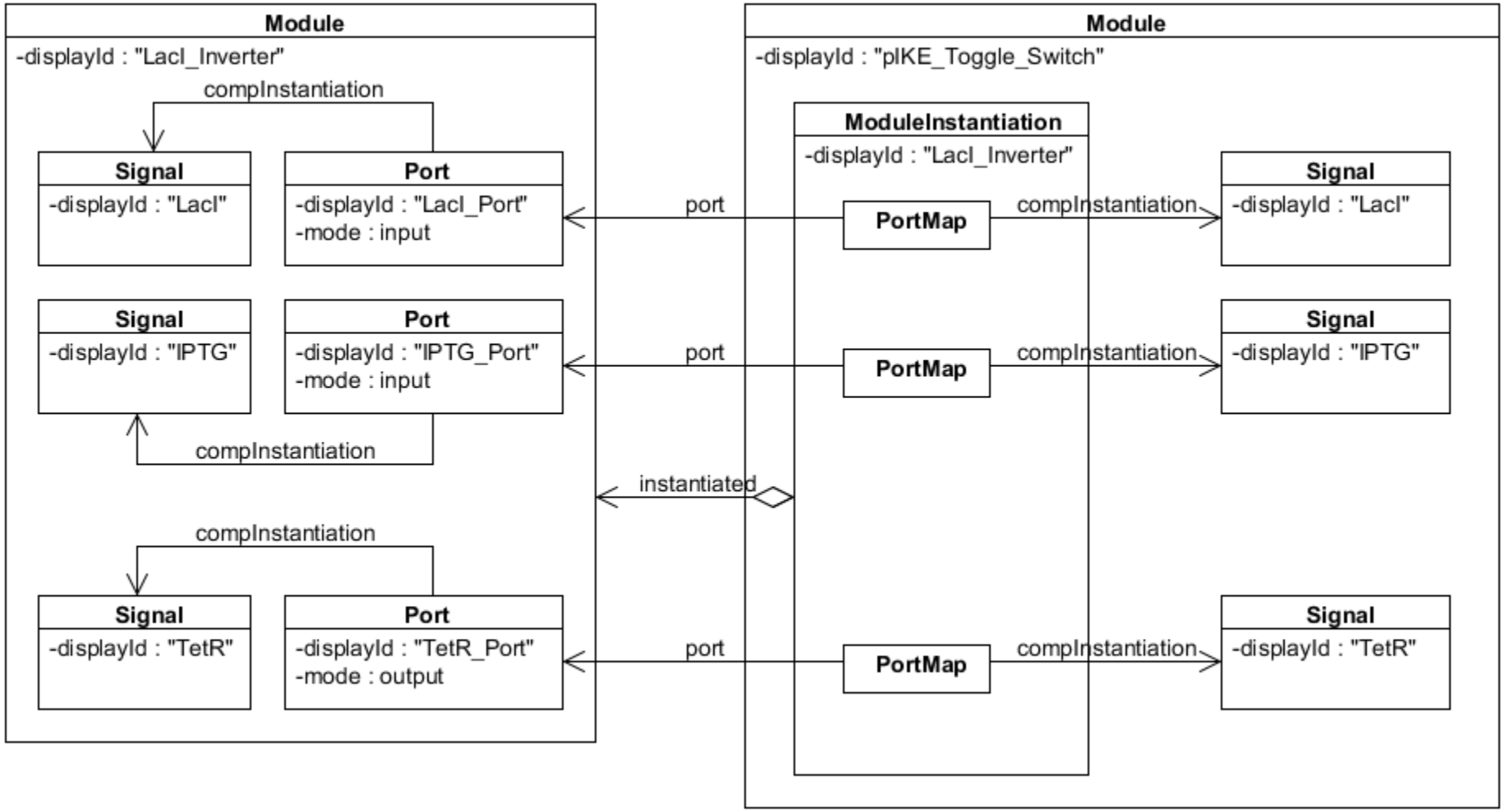




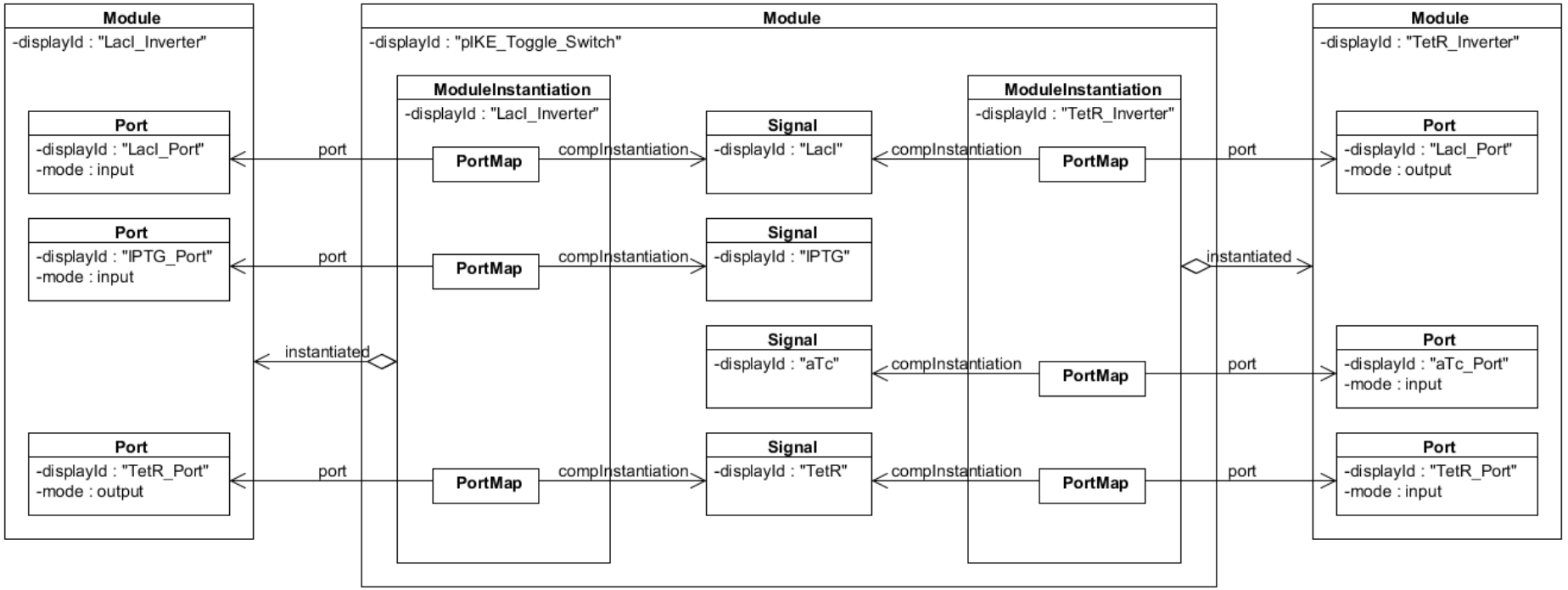
Example: Module Instantiation



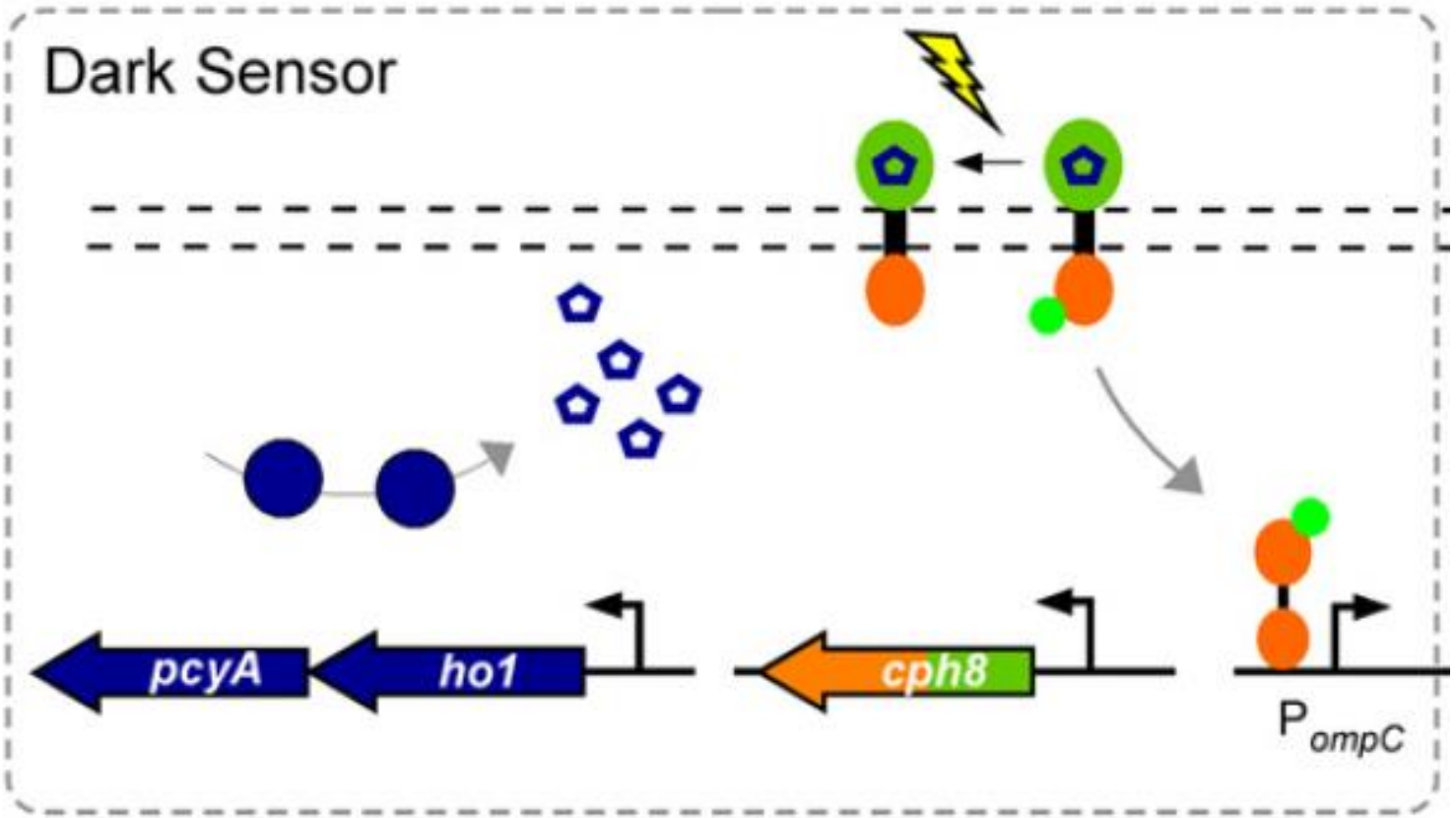
Example: Port Mapping



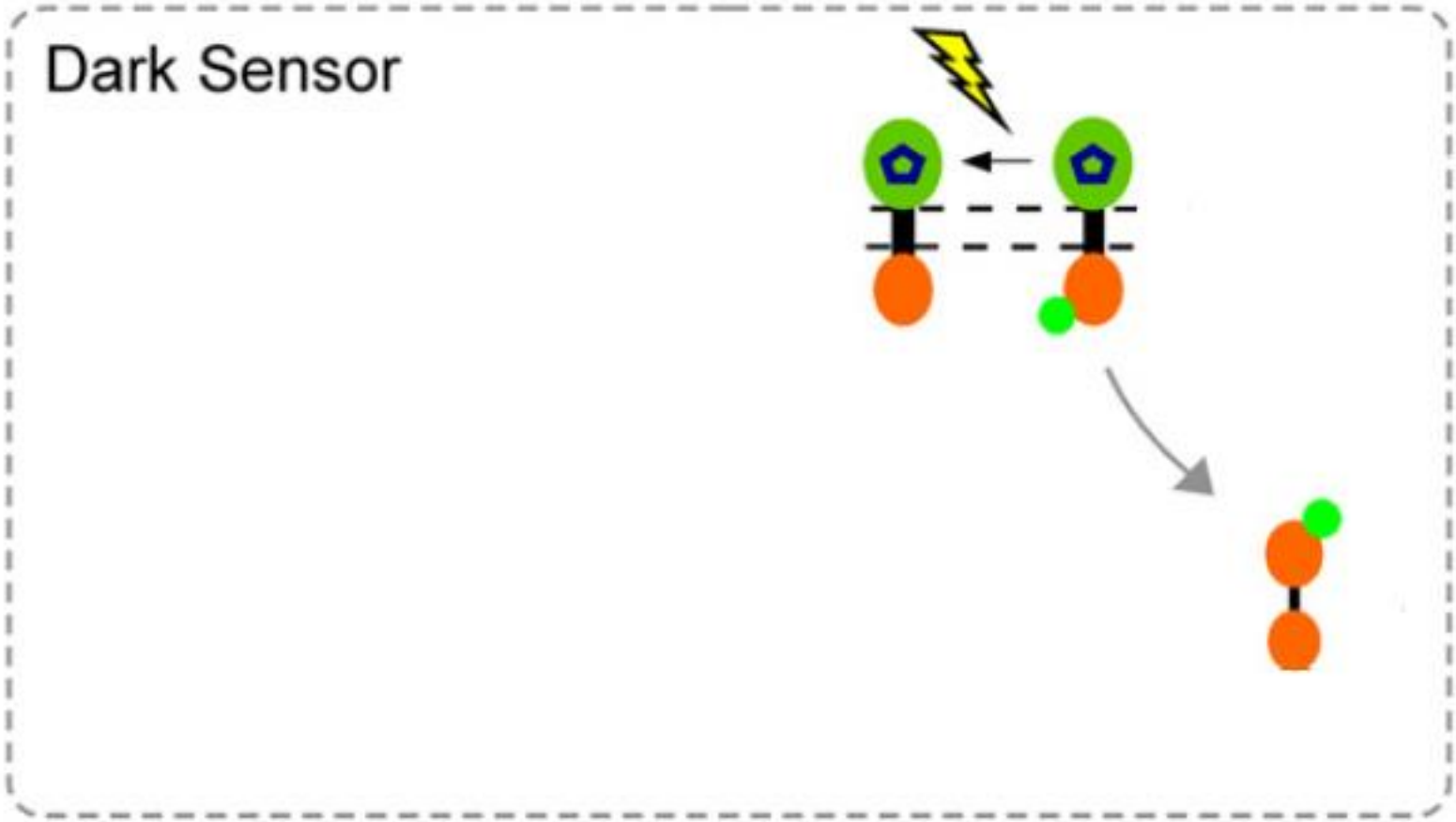
Toggle Module Composed



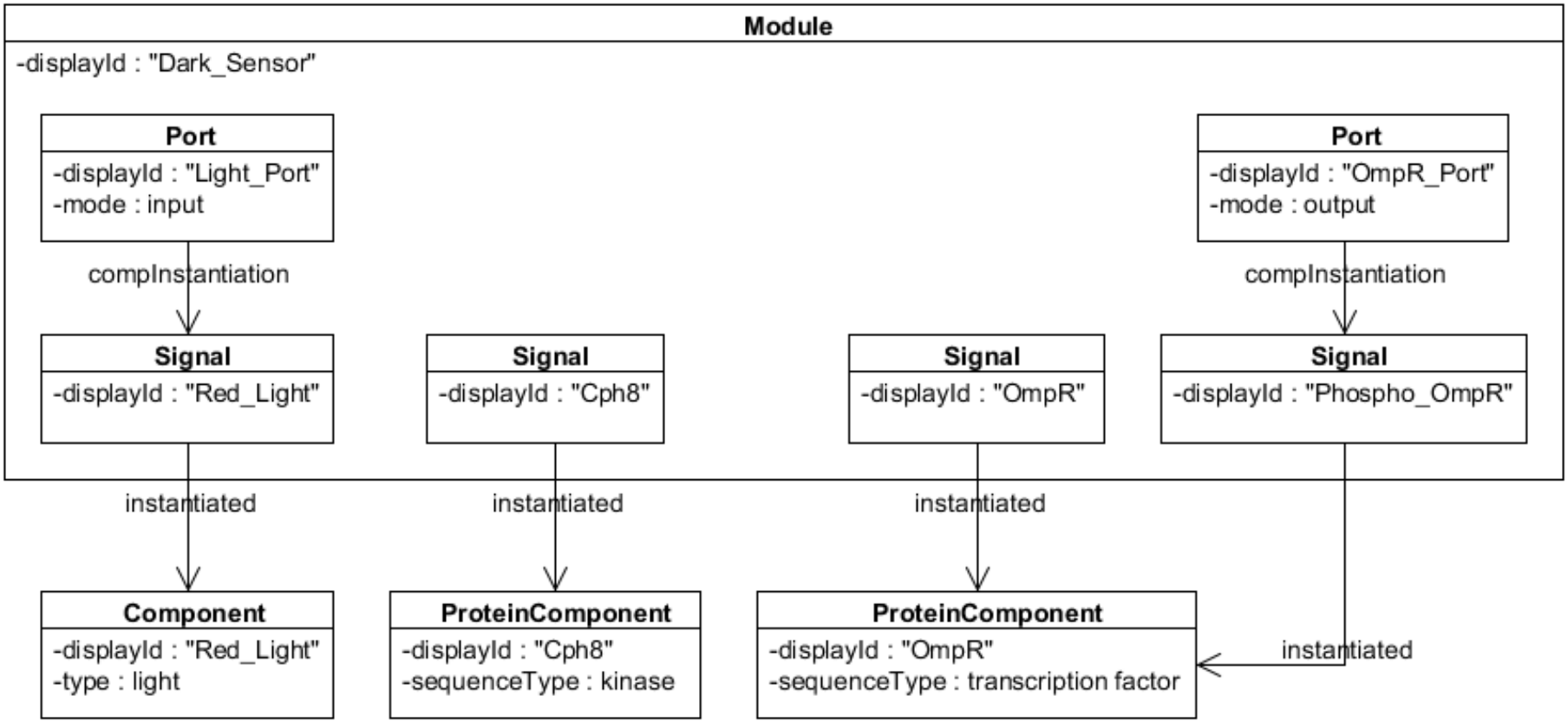
Dark Sensor (Tabor et al. 2009)



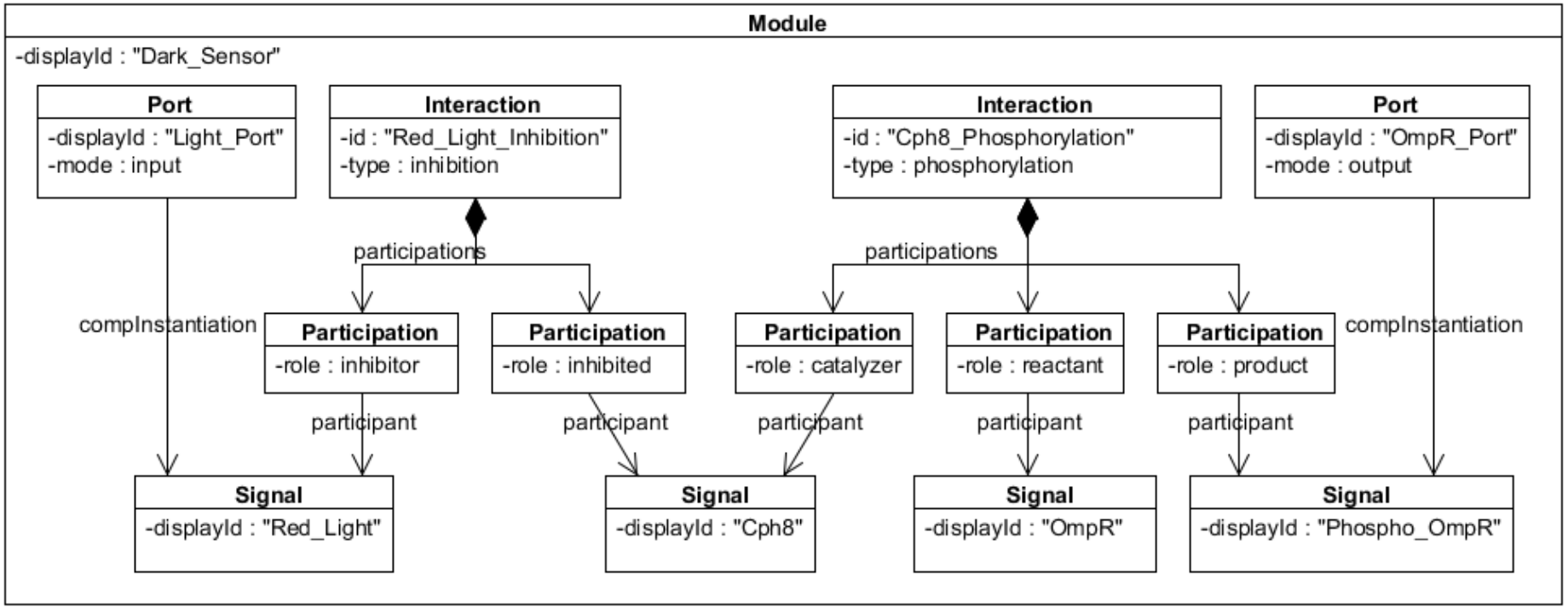
Dark Sensor (Tabor et al. 2009)



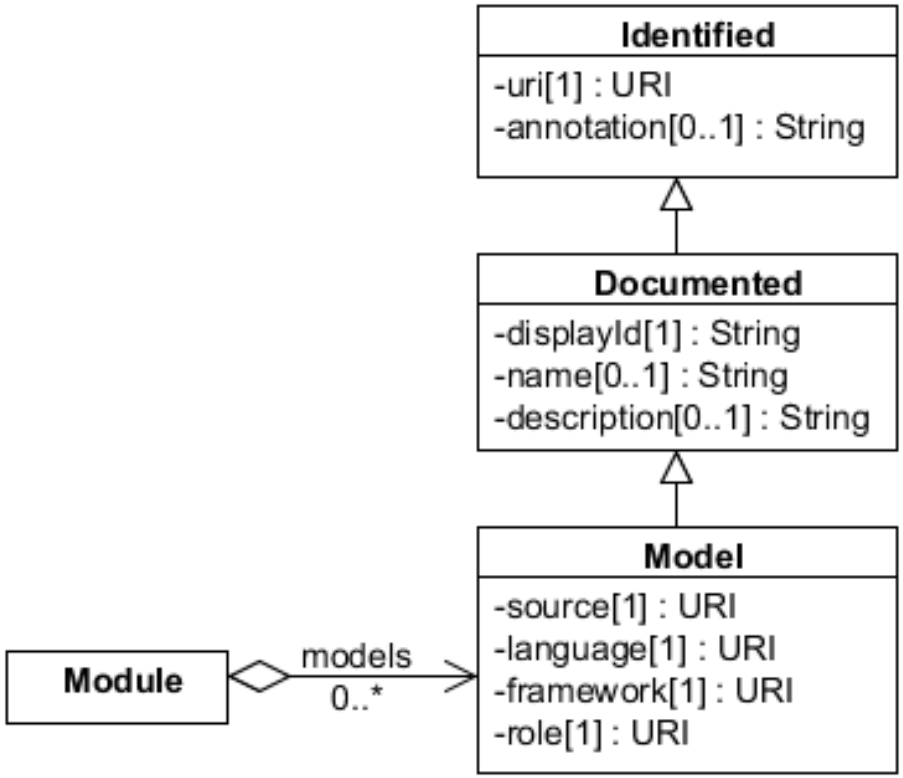
Dark Sensor: Instantiation



Dark Sensor: Interactions



Extension Status: Modeling

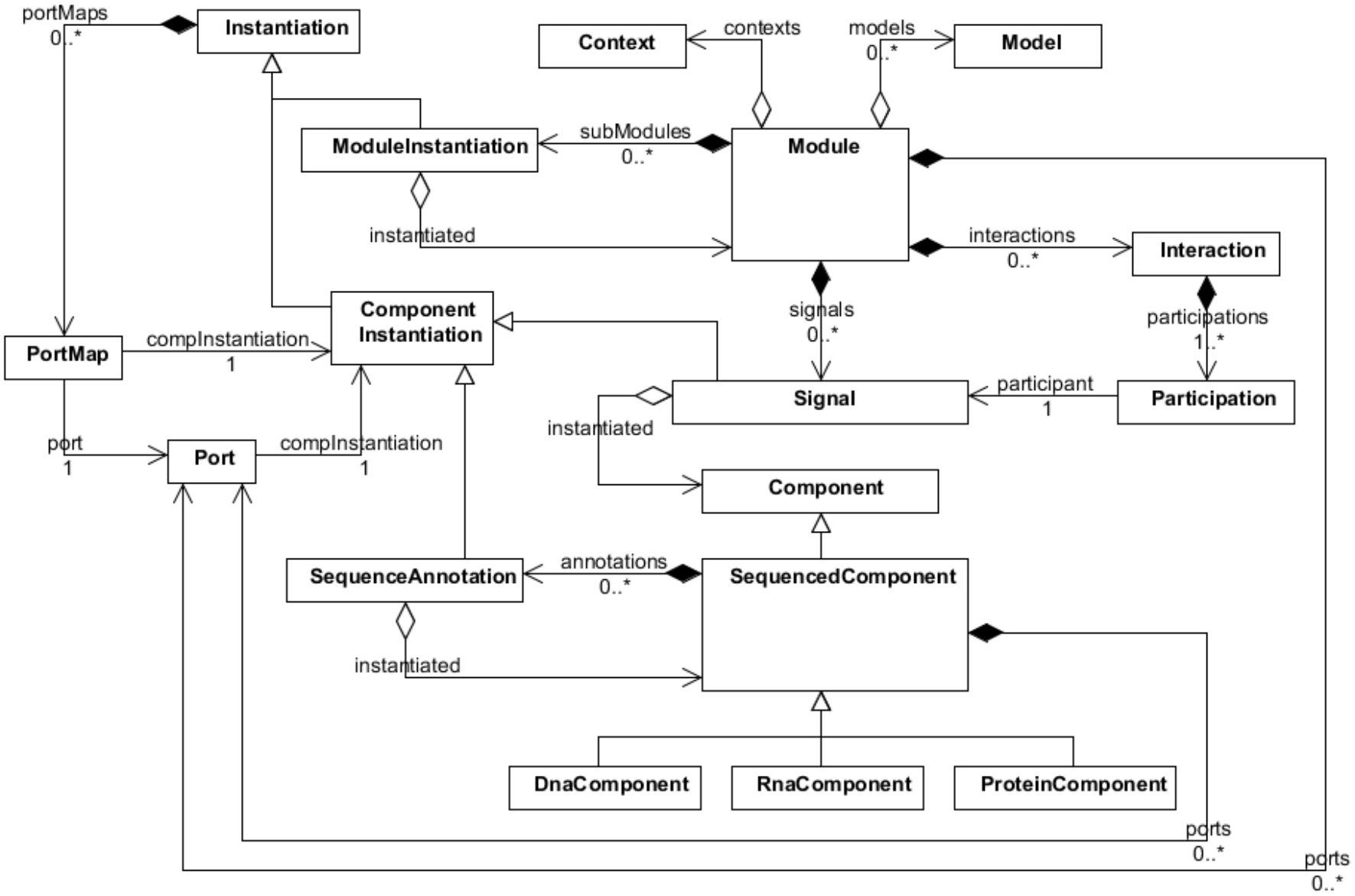


Extension Status: Context

Canonical EX: *Repressilator*

Measurement Device	Zeiss Axiovert 135TV microscope
Environment	The temperature of the samples was maintained at 30–32 °C by using Peltier devices (Melcor)
Container	coverslip and microscope slide
Medium	minimal media 1 ml of liquid 2% SeaPlaque low-melt agarose (FMC) in media 100 uM IPTG inducer antibiotic 20 g ml-1 kanamycin or 20 g ml -1 ampicillin) minimum initial cell density OD = 0.1
Host	*E. coli* lac- strain MC4100
Composition	Genome, Repressilator and Reporter plasmids

Summary UML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