

UML Modeling of Finite State Machines and Molecular Machines

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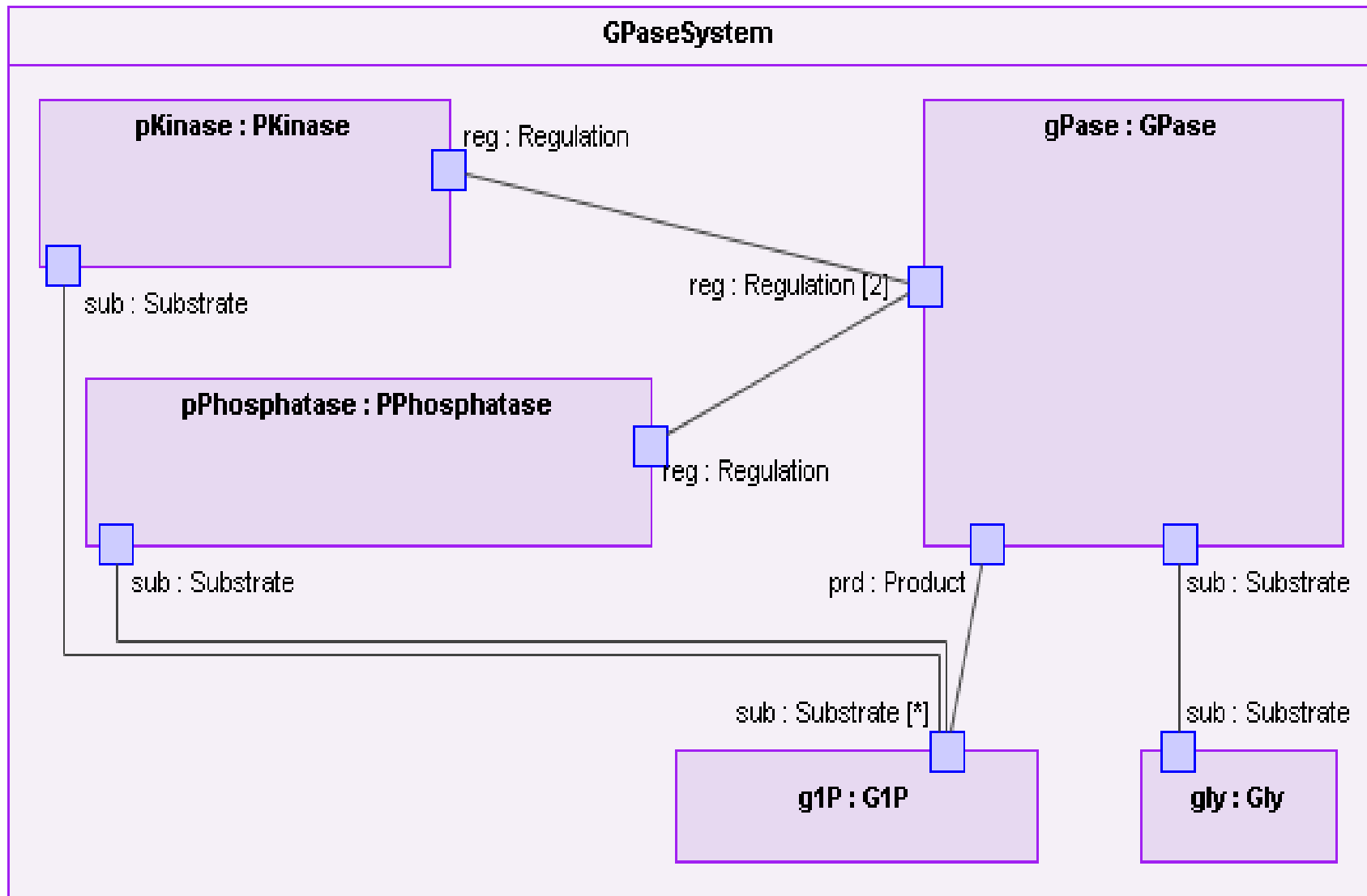
Xholon

- A tool that executes models of systems.
 - Including event-driven applications
 - Including models of complex systems
 - Systems can be of arbitrary size
 - Embedded systems, controllers
 - Agent-based, swarms, etc.
- Goal of Xholon
 - To be able to model and execute a broad range of event-driven and complex systems.

Xholon Modeling Constructs

- The basic Xholon modeling constructs are aligned with UML 2 and SysML constructs.
 - SysML is designed for Systems Engineering modeling, UML for software modeling.
- These constructs include - classes, composite structure, parts, ports, connectors, state machines.
- Active objects are agents, each with its own independent behavior.

Composite Structure, Ports



UML 2 Xholon Models

- My paper shows the creation of models of biological systems (at the molecular level) using a UML tool (MagicDraw)
- Models of enzyme regulation
- These models are transformed into an XML and Java format, and
- Subsequently executed using the Xholon tool

Progression of models

- This paper explores several different versions of a simple biological system, using UML 2 composite structure.
 - **Models 1 & 2:** message passing, state machines for behavior, symbolic
 - **Model 3:** molecular machine (direct access to each others internals), partly symbolic
 - **Model 4:** molecular machine, non-symbolic
 - **Model 5:** integration into a larger existing system
 - **Model 6:** a Lego blocks model

Model 5

