

# CellDesigner2.0 and Hardware Accelerated Simulator



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- CellDesigner2.0

- New feature

- Future plan

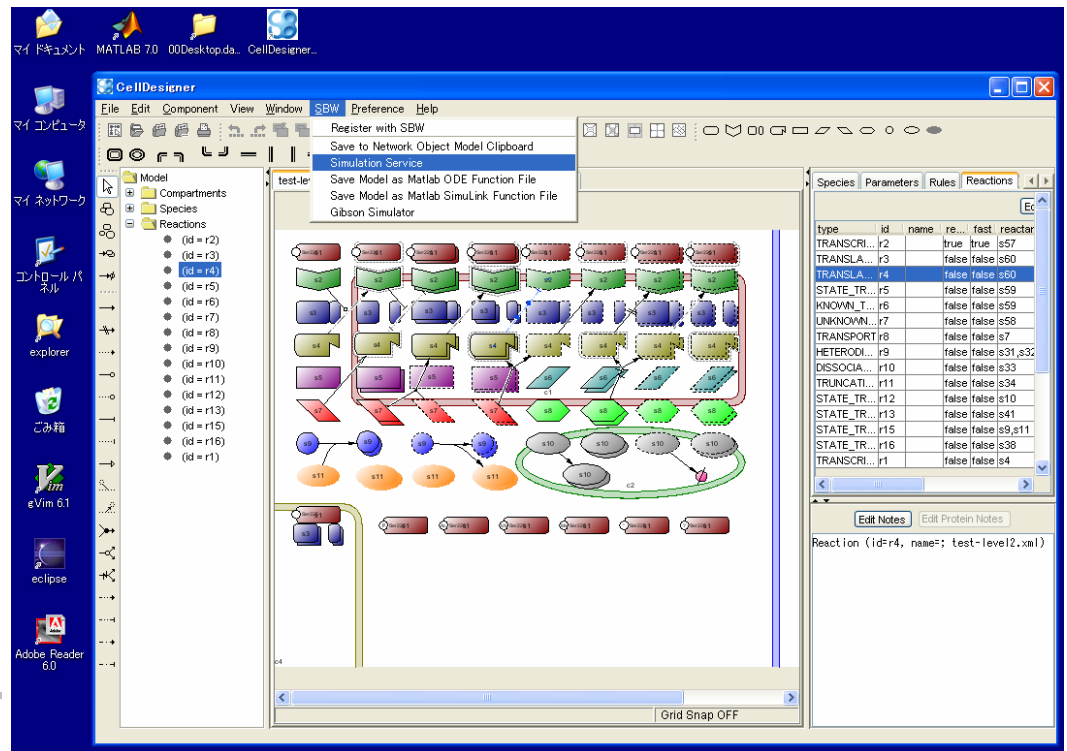
- Hardware Accelerated Simulator

- Current status

- Future plan

Motivation: Supply a visual designer with standardized technology for every computing platform

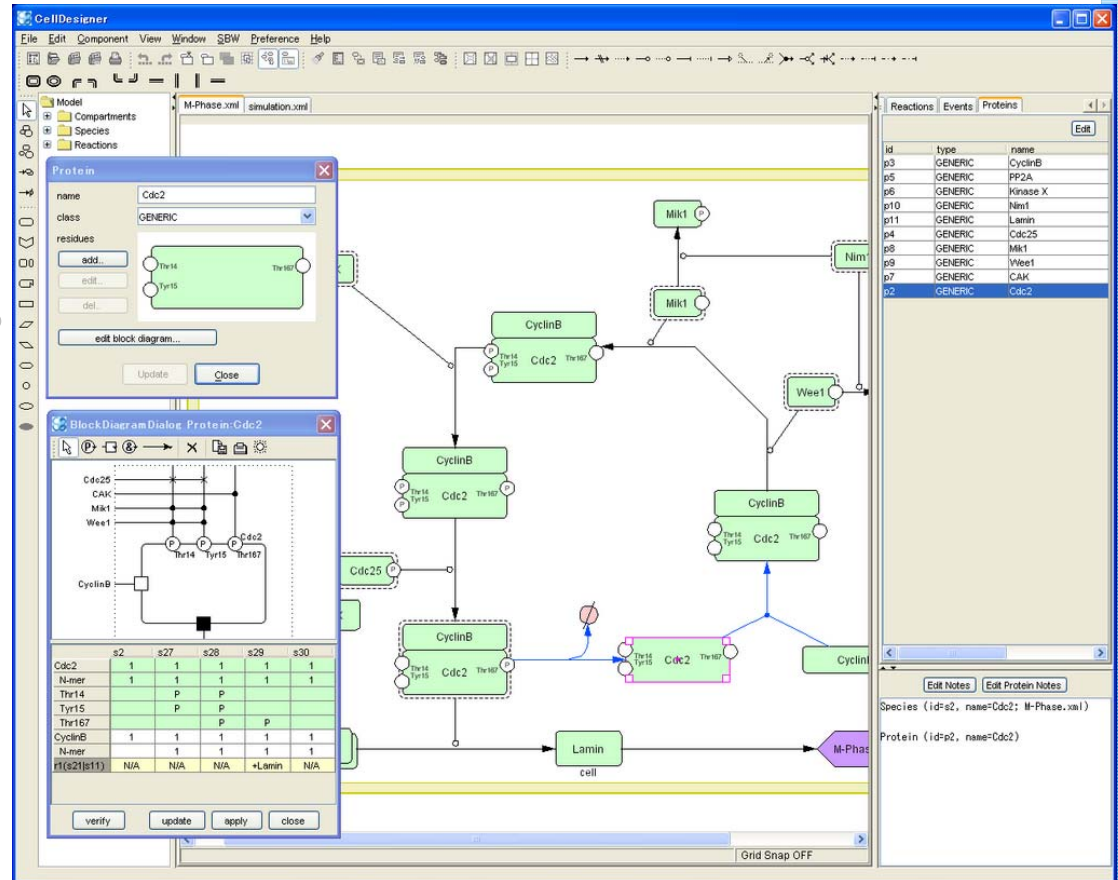
- Process network diagram editor
- Representation of biochemical semantics
- Detailed description of state transition of protein
- **SBML compliant**
- **Read/Write SBML Level-1/Level-2 document**
- **Integration with SBW-enabled simulation modules**



# CellDesigner2.0



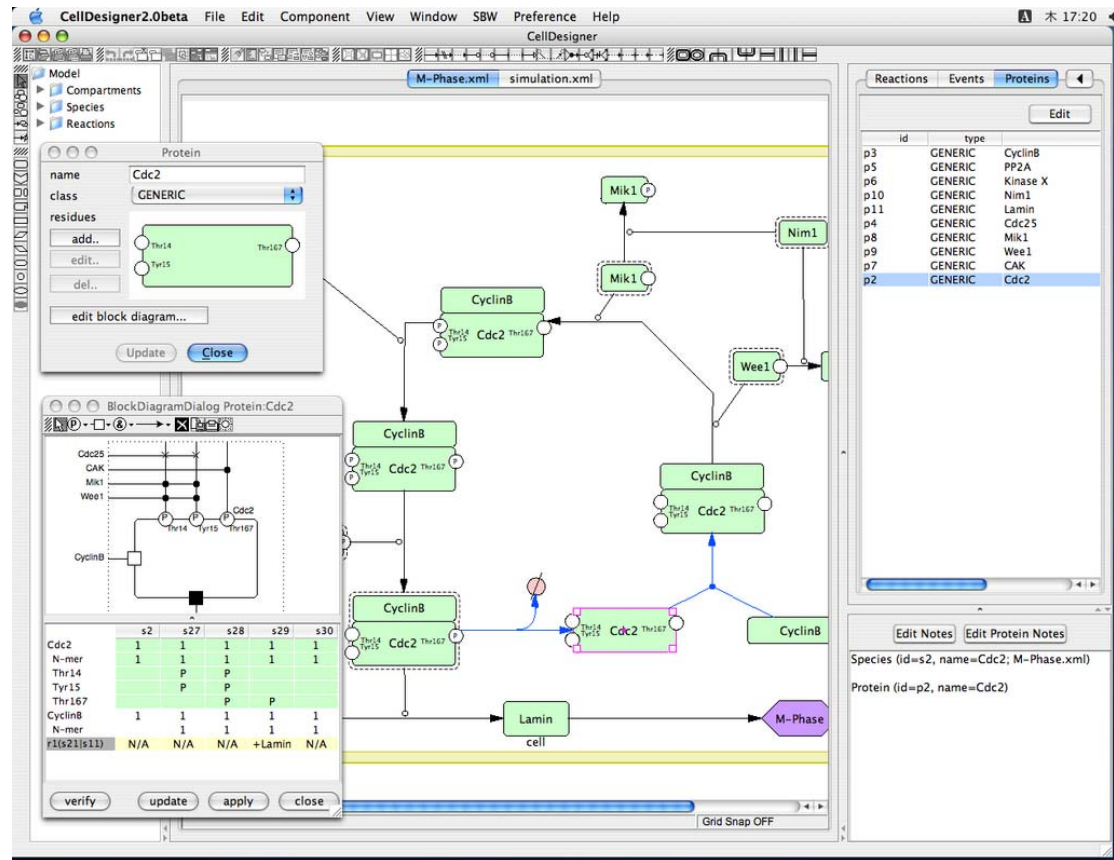
- **SBML Level-2 compliant**
- Block diagram
- Coloring feature
- Store model/species information inside `<notes>` tag
- Easy to edit reaction equations
- Export Lists to CSV
- Export pathway in PNG format



# Supported Environment

- CellDesigner is implemented in Java, so that it runs on many platforms which supports JRE (Java Runtime Environment).

- Windows (2000, XP)
- MacOS X (10.3.x)
- Linux
  - RedHat 7.3
- FreeBSD
  - 4.10-RELEASE
  - 5.2.1-RELEASE



CellDesigner is freely available from <http://systems-biology.org>

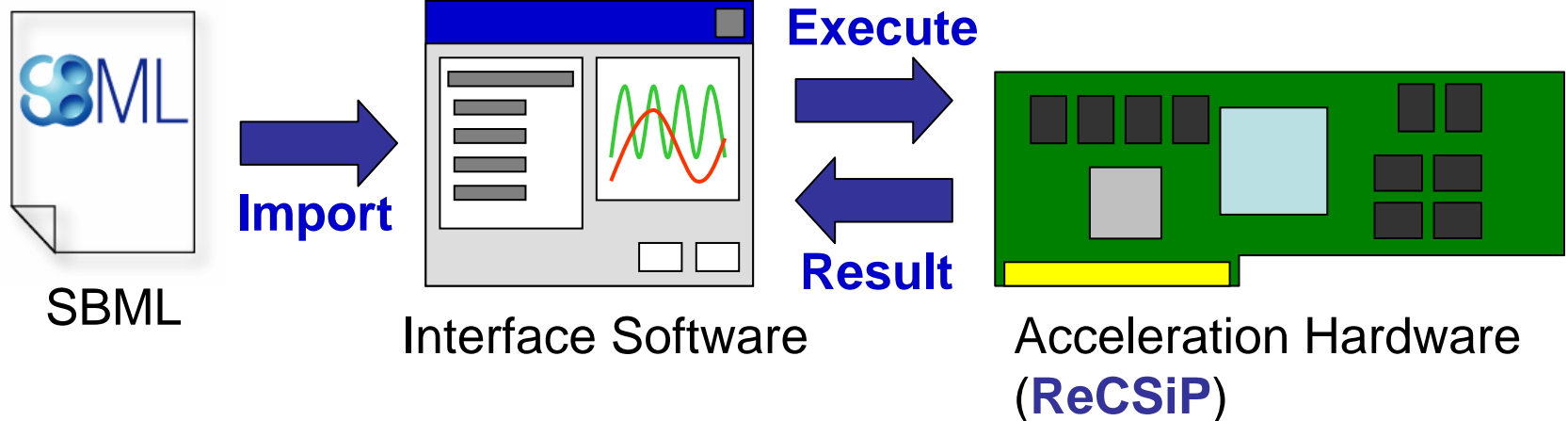


# Hardware Accelerated Simulator



## Project goal

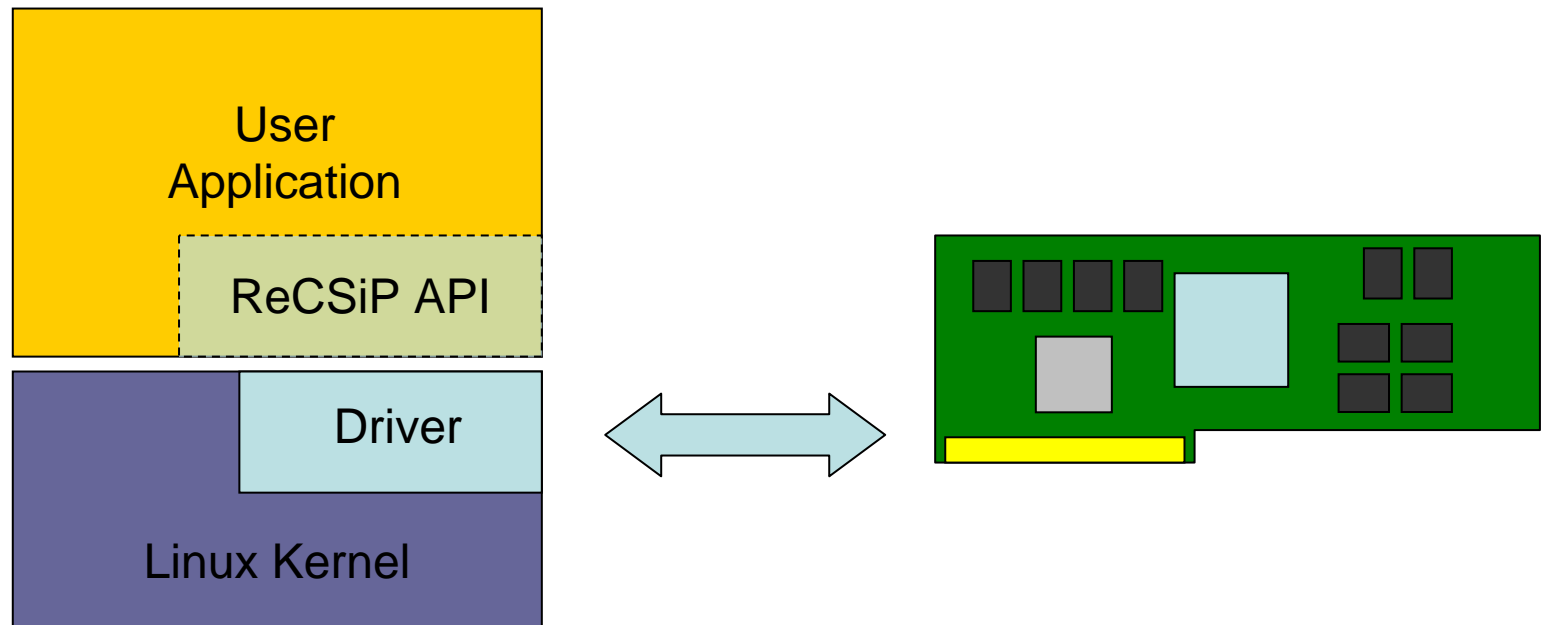
- Accelerate ODE-based / Stochastic simulation using FPGA (Field Programmable Gate Array)
- Use SBML as model representing language



# ReCSiP: The Accelerator



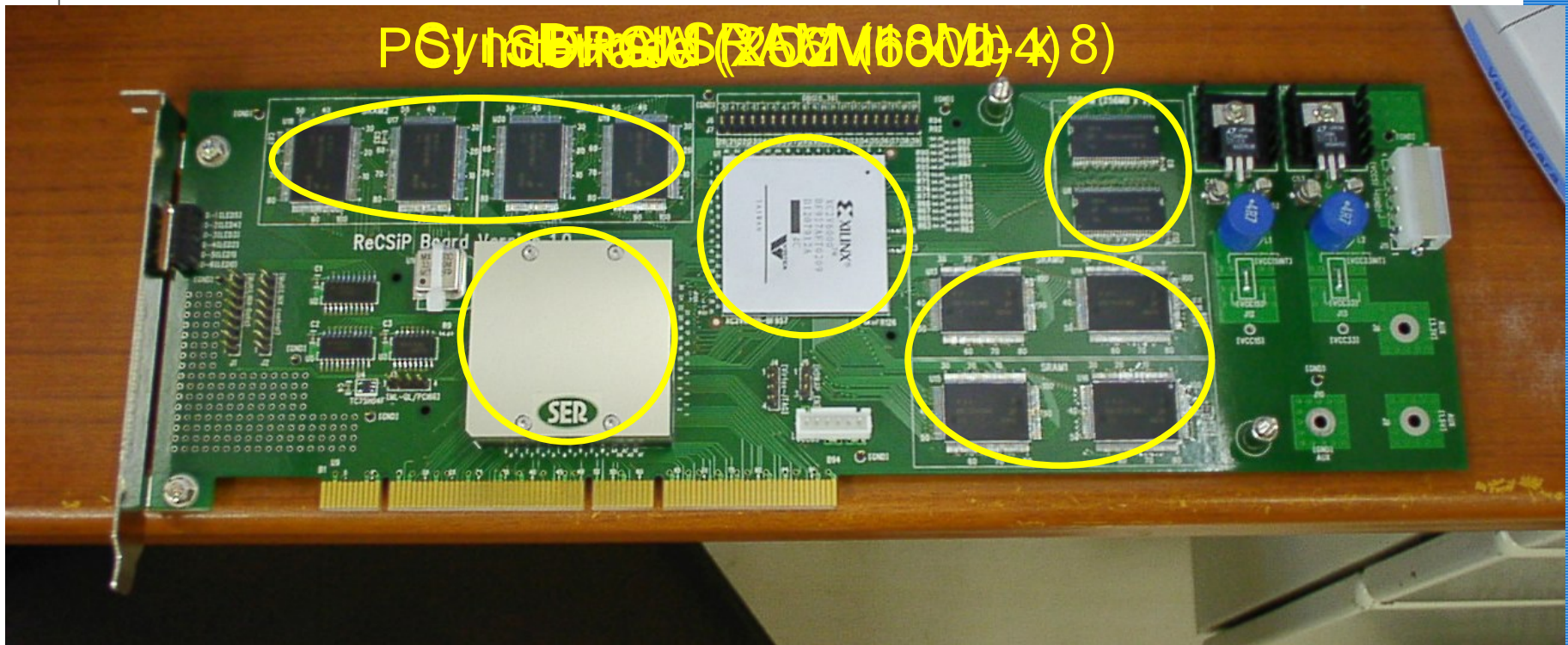
- Reconfigurable Cell Simulation Platform
- Offloading the time-consuming process onto FPGA
  - Software: the Driver and API
  - Hardware: a board with FPGA and RAMs



# ReCSiP Board

- A 64bit/66MHz PCI Card with
  - ➔ Xilinx's XC2V6000
  - ➔ Fast SSRAMs and SDRAMs

PSync DRAMs (256M (68M) 4) 8)





## ● ODE-based simulation

### ➔ Michaelis-Menten

Execution Environment	Execution Performance
Pentium3 1.13GHz	10.15M reaction/sec.
<b>ReCSiP</b>	182~295M reaction/sec. <b>18~29 times faster!</b>

## ● Stochastic simulation

### ➔ Gillespie (First Reaction Method)

Execution Environment	Execution Performance
AthlonXP 2800+	1.9M reaction/sec.
<b>ReCSiP</b>	200.3M reaction/sec. <b>104 times faster!</b>

# Members & Future Plan



## ▶ ReCSiP

- ▶ ReCSiP2 and rate law functions controller
- ▶ Rate law functions defined in SBML
- ▶ Basic mathematical functions defined in SBML
- ▶ Next Reaction Method
- ▶ Bus controller



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## ▶ SBML-related software

- ▶ Translate SBML to ReCSiP pathway memory structure
- ▶ Device Driver for MacOS X

▶ Comments from the biologist who is waiting for the release of SBML+ReCSiP