

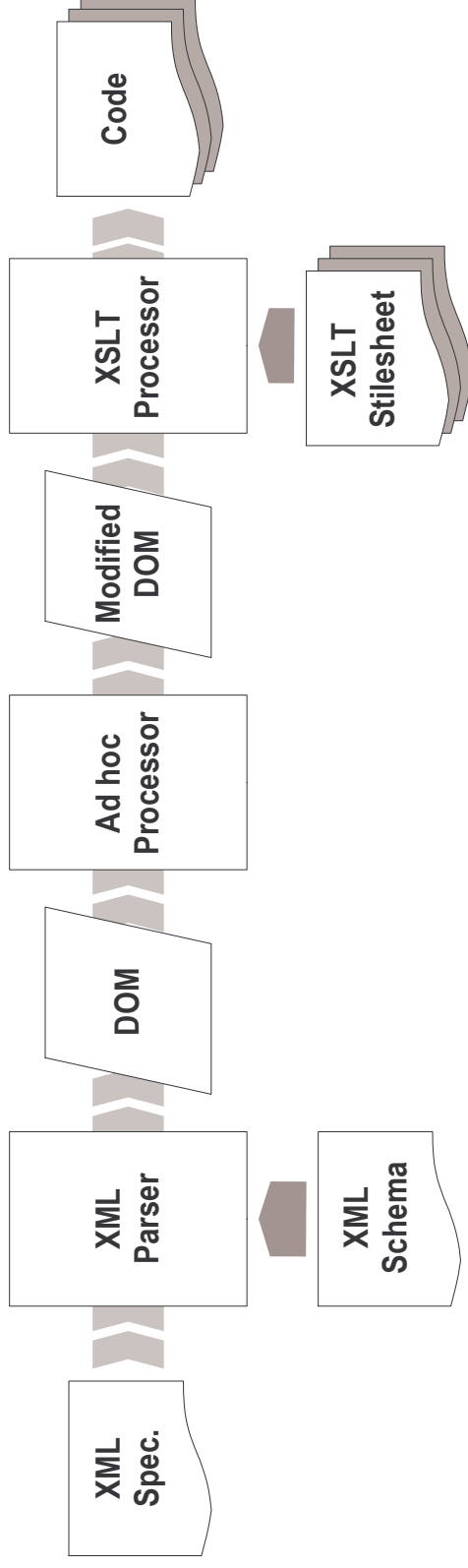
***GeneSim:
a code generator
for models of dynamic systems***

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AICA Conference, Cesena September 2006**

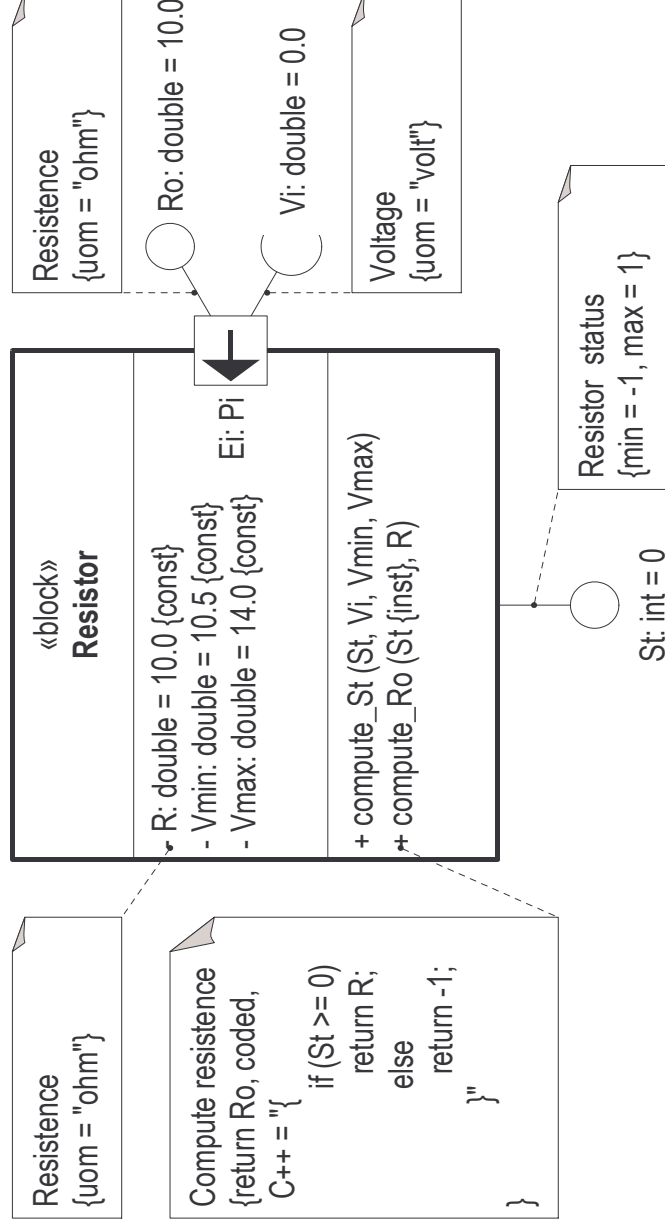
- **An open source project**
 - Started as a personal project
 - Carried out with student participation
- **No funds and low effort**
 - Sourceforge (hosting and services)
 - Dept. Informatica, University of Pisa (facilities)
- **To provide an environment to**
 - Model complex systems (physical ones, but not only)
 - Generate simulators (continuous, but not only)
 - Integrate simulators in custom applications
 - Directly run simulations (for test or analysis, for instance)

- SysML specification model
 - Defined rules to specify dynamic systems using SysML
 - XML schema for system specifications
- Code generator
 - Reads the XML and generates a library of classes
 - Library provides support for configuration and data logging
 - Library can be compiled or integrated in custom code
- Test tool
 - Simulators compiled as dynamic link libraries (.dll, .so, ...)
 - Common library interface for custom system interfaces
 - The test tool generates system interface, runs simulations

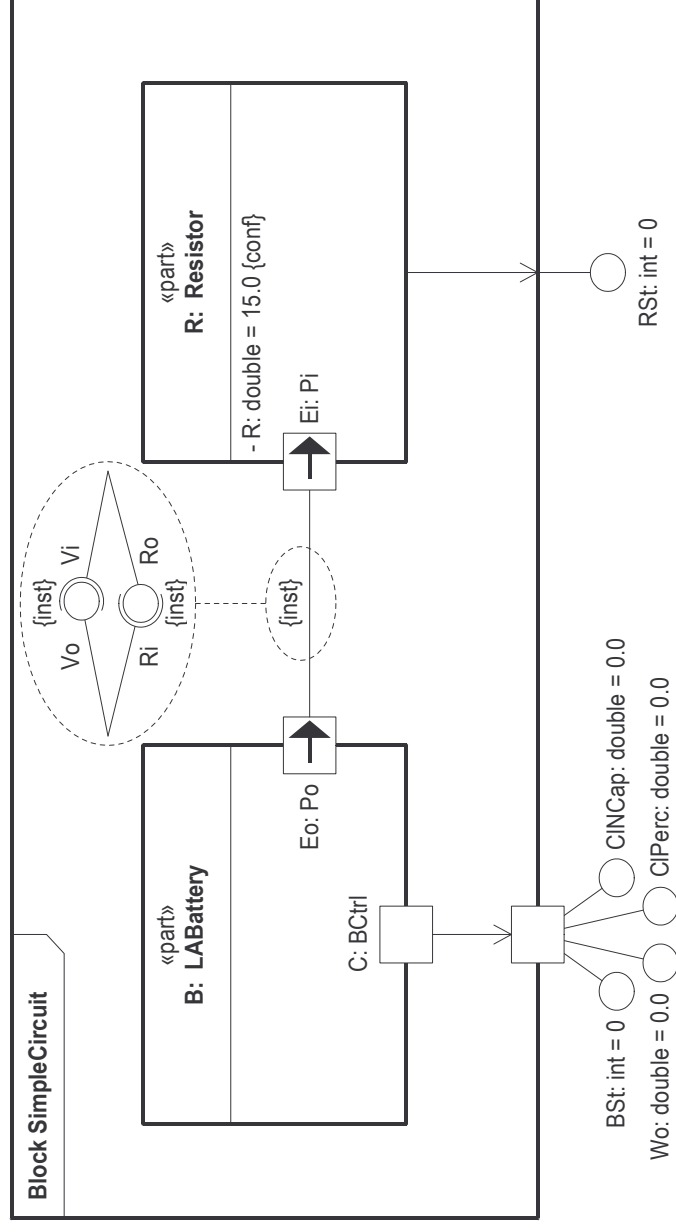
- Steps of the code generation process
 - Syntax check (Xerces, DOM parser)
 - Validation, errors & warnings about system composition
 - Analysis, dependences and cycles
 - Transformation in a language independent structure
 - Code generation (Xalan, XSLT processor)



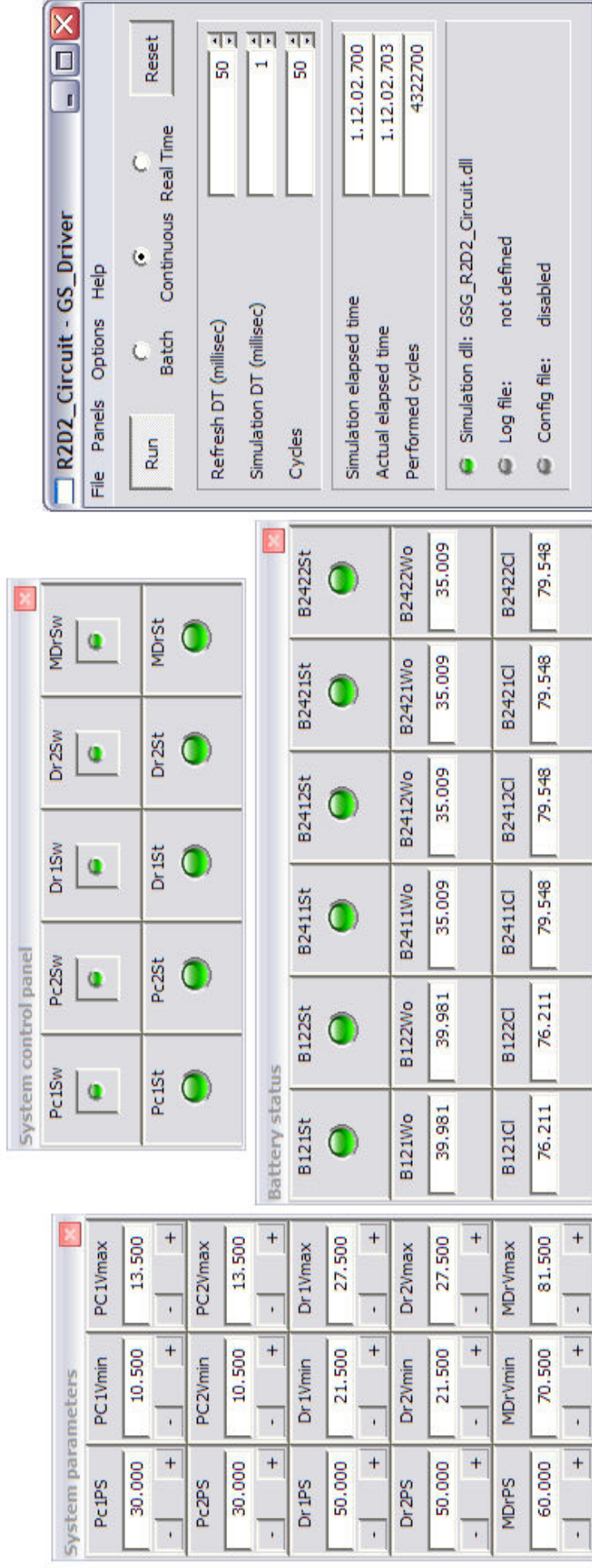
- A simple system specified as a SysML block (a class)
- A state that comprehends an interface
- A set of functions to update the state
- Support for constraints like unit of measure and range



- An assembly specified by composition of parts
- Parts are instances of blocks
- Parts interact by way of connections
- Block interface is defined by delegation of parts interface



- A robot electrical circuit
- 5 main systems
- 6 lead acid batteries



The screenshot displays the Genesim simulation interface for a robot circuit. It is divided into three main windows:

- System parameters:** A table of parameters for various systems, including current (PS) and voltage (V) minimum and maximum values.
- System control panel:** A grid of 12 buttons for controlling different systems (Pc, Dr, MDr) and their states (1St, 2St, Wo, Sw).
- Battery status:** A table showing the status of 12 lead acid batteries (B121St to B2422St), including their current state (e.g., 39.981, 76.211) and voltage (e.g., 79.548, 35.009).

At the bottom of the interface, the **R2D2_Circuit - GS_Driver** window is visible, showing simulation settings:

- Run: Batch: Continuous: Real Time:
- Refresh DT (millisec): 50
- Simulation DT (millisec): 1
- Cycles: 50
- Simulation elapsed time: 1.12.02.700
- Actual elapsed time: 1.12.02.703
- Performed cycles: 4322700
- Simulation dll: GSG_R2D2_Circuit.dll
- Log file: not defined
- Config file: disabled

- **Improvements and new functionalities**
 - **Model:** structured data types and ports
 - **function definitions (MathML, SysML parametrics)**
- **Tools:**
 - **drawing tool**
 - **porting to other platforms**
 - **integrated IDE**
- **Code:**
 - **improve realtime support**
 - **optimizations for discrete simulation**
 - **support to other languages**
- **Test on more complex real case studies**
- **Try to find sponsors**