

# User Guide

All material contained herein is considered proprietary information owned by No Magic, Inc. and is not to be shared, copied, or reproduced by any means. All information copyright 2010-2021 by No Magic, Inc. All Rights Reserved.

## Getting started

- Introduction to Cameo Simulation Toolkit
- Key features
- Simulation project template

## Model simulation

- Elements simulation
  - Behavior
    - Activity
    - State Machine
    - Interaction
  - Class
  - Diagram
  - Instance Specification
  - Table
- Simulating a Simulation Configuration
- Subset property

## Simulation Configuration and UI modeling

- SimulationConfig stereotype
- Simulation log
- Simulation time and simulation clock
  - Built-in clock
  - Internal simulation clock
  - Model-based clock
- Automatic start of active objects
- UI modeling diagram simulation
- ImageSwitcher and ActiveImage
  - Representing object states
  - Representing enumeration values
- Time series chart
  - Specifying time axis' range in a Time series chart
  - Exporting plots data
    - Exporting plots data to a CSV file
    - Exporting plots data to an instance model
  - Saving plot results to the model
  - Representing data from a CSV file in a line chart
- Timeline chart
- Histogram
- Nested UI Configuration stereotype
  - Representing parts of a simulation context
  - Representing parts using existing UI Configurations
- Reusable UI Mockup
- CSV export
- Nested property selection for configurations
- Attached files supported
- Web Server for Cameo Simulation Toolkit
  - Auto-generating web project homepage
  - Auto-generating HTML files
  - Generating an HTML table from a UI table, Time series chart, and CSV export configuration
  - Control panel for Web UI
  - Image switching in web user interface
  - Plotting on the web user interface

## Animation

- Active, visited, and last visited elements
- Customizing animation colors
- Auto Open Diagrams option
- Animation speed option
- Opening a diagram of an executing behavior

## Simulation debugging

- Understanding simulation sessions
- Debug process simulation
- Simulation console
  - Console pane
  - Simulation information
  - Simulation log file
  - Console log's filter options
  - Printing constraint failures in the console
- Runtime Value Monitoring
  - Context, runtime object, and runtime value
  - Variables pane
  - The Time series chart
  - Creating values and objects in the variables pane
  - Creating runtime objects from Classifiers
  - Creating runtime objects from Instance Specifications
  - Automatic initialization of context and runtime objects
  - Carrying values using connectors
  - Checking values against feature types
  - Exporting runtime objects to InstanceSpecifications
  - Recording Verification status of runtime values
- Updating default values
- Breakpoints
  - Adding breakpoints
  - Removing breakpoints
- Disabling updates in Simulation panes

## Validation and verification

### State Machine simulation

- Supported elements
- Adapting models for State Machine simulation
  - Defining Triggers on Transitions
  - Using Guards on Transitions
  - Behaviors on Entry, Exit, and Do Activities of a State
  - Signal properties mapping to Behavior parameters
  - State activation semantics
  - Completion Events and Transitions
  - Deferred Events
- Running a State Machine simulation
- State Machine duration simulation
- Sample projects
  - The test\_regions.mdzip sample
  - The test\_timers.mdzip sample
  - The test\_guard.mdzip sample

### Activity simulation

- Activity simulation engine
- Creating a model for Activity simulation
- Executing Activities
- Activity duration simulation
- Duration analysis
  - Duration analysis on visited elements
  - Duration analysis on executed traces
- Running a Call Action simulation without a target pin
- Activity Partition execution and allocated Behavior
- Execution of incomplete or dummy models
  - Dummy tokens of Actions through Output Pins

### Interaction simulation

- Supported elements in interaction simulation
  - Lifeline
  - Message
  - CallEvent
  - Duration constraint
  - Time constraint
  - State invariant
  - Test case verdict
  - Combined fragment
- Creating a model for interaction simulation
- Executing an interaction model
- Recording simulation as a Sequence diagram

### Use Case simulation

### Parametric evaluator

- Specifying the language for the expression
- Automatic and manual initialization of objects/values
- Value binding
  - Primitive value binding
  - Object binding
  - Binding in a complex aggregate structure
  - Many-to-one binding calculations
- Evaluating expressions
  - Mathematical equation
  - Logical expression
- Evaluation with causality
- Constraints on parts
- Dynamic constraint
- Parametric animation
- Manual value updates using the Parametric Evaluator
- Communicating with evaluators through simulation console
- Exchanging values between Cameo Simulation Toolkit and the Parametric Evaluator
  - Exchanging values between slot and mathematical environment
  - Exporting runtime values to Parametric Evaluator
- Built-in Math
  - Evaluating strings from command input
  - Variables
  - Values
  - Constants
  - Operators
  - Functions
- Integration with external Evaluators
  - Integration with MATLAB
    - Using MATLAB on 32-bit and 64-bit Microsoft Windows
    - Using MATLAB on Mac OS 10.6 (Snow Leopard)
    - Using MATLAB on 32-bit and 64-bit Linux
  - Integration with Maple
  - Integration with Mathematica
  - Integration with OpenModelica
- Trade study with Cameo Simulation Toolkit
  - Alternative block
  - Trade study pattern block
- Monte Carlo simulation
- Sample project

## Simulation of SysML models

- FMI 2.0 co-simulation
- Supported SysML elements
  - Accept Change Structural Feature Event Action
  - Adjunct property
  - Binding Connector
  - Block
  - Association Block
  - BoundReference
  - Change Structural Feature Event
  - Classifier Behavior property
  - Constraint Block
  - Flow property
  - Full Port
  - Invocation on nested Port Action
  - Nested Connector end
  - Probability
  - Proxy Port
  - Trigger on nested Port
  - Value type
- Requirements traceability from the Variables pane
  - Requirement refined by a constraint block
  - Requirement satisfied by a property
  - Requirement and test case traceability
  - Extraction of Constraints from Text Based Requirements
- Non-normative extensions

## Action languages

- Supported scripting languages
- Reading enumeration literal value
- References to elements with HTML
- Value access and references by tags
- Importing external libraries
- ALH APIs
  - Getting a structural feature value
  - Specifying a structural feature value

- Calling a specific Behavior
- Calling a specific operation
- Creating a run-time object
- Creating a signal instance
- Sending a signal instance to a specific target object
- Getting a token value
- Getting the current state of a run-time object
- Getting the last signal instance from a run-time object
- Evaluating an expression
- Creating an ArrayList in Java
- Checking the State of an object
- Adding a value to an object
- Removing a value of an object
- Getting a context
- Accessing current simulation time
- Accessing the simulation time unit
- Adding a value to a global variable
- Getting a value from a global variable
- Removing a defined global variable
- Checking an existing global variable
- Checking a visited State
- Getting the caller of a script
- Getting a tag value