

# Reactis V2013

Released August 14, 2013



# New Simulink Support

- ▶ Initial support for R2013a
- ▶ Support for .slx Format
  - ▶ Introduced in R2012a to replace .mdl format
  - ▶ XML-based format
- ▶ Support Simulink *configuration set reference* concept

# Multiple Condition Coverage (MCC)

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## No Short-Circuiting

A	B	C	Decision
F	F	F	F
F	F	T	F
F	T	F	F
F	T	T	F
T	F	F	F
T	F	T	F
T	T	F	F
T	T	T	T

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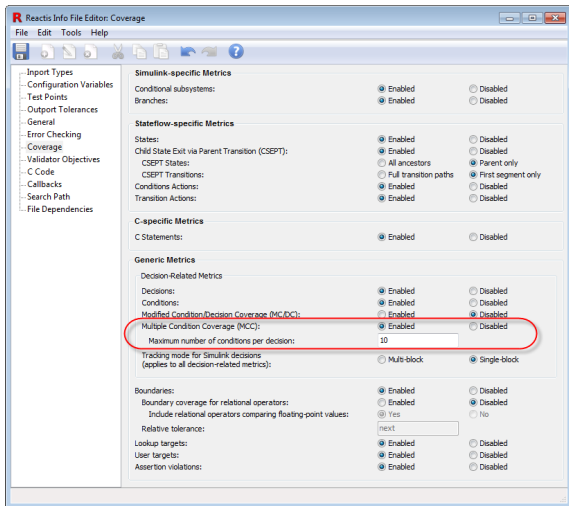
## No Short-Circuiting

A	B	C	Decision
F	F	F	F
F	F	T	F
F	T	F	F
F	T	T	F
T	F	F	F
T	F	T	F
T	T	F	F
T	T	T	T

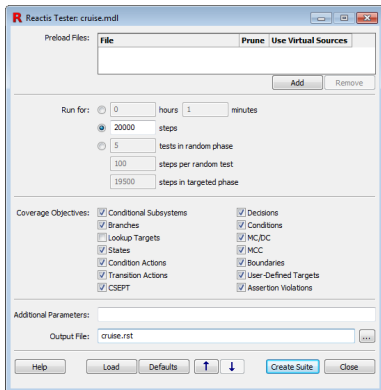
## Short-Circuiting

A	B	C	Decision
F	x	x	F
T	F	x	F
T	T	F	F
T	T	T	T

# MCC Now Supported by Reactis

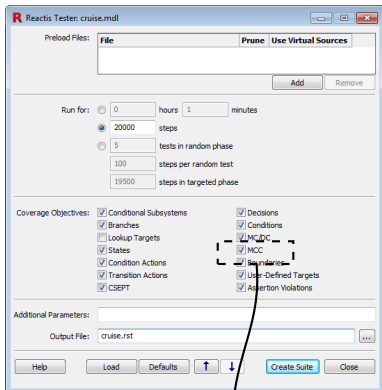


# MCC Support in Reactis Tester



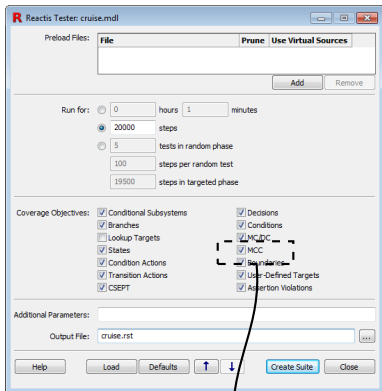


# MCC Support in Reactis Tester

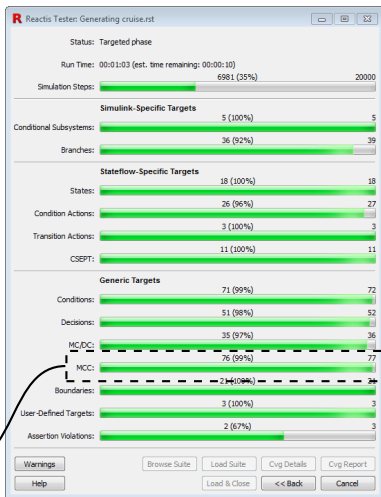


Tester attempts to cover MCC targets

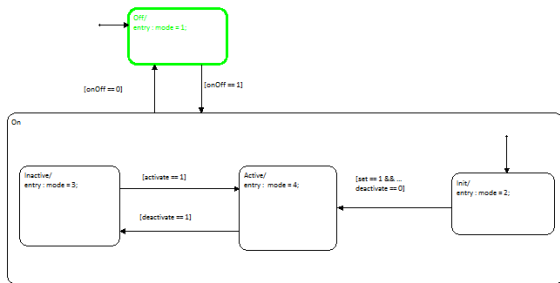
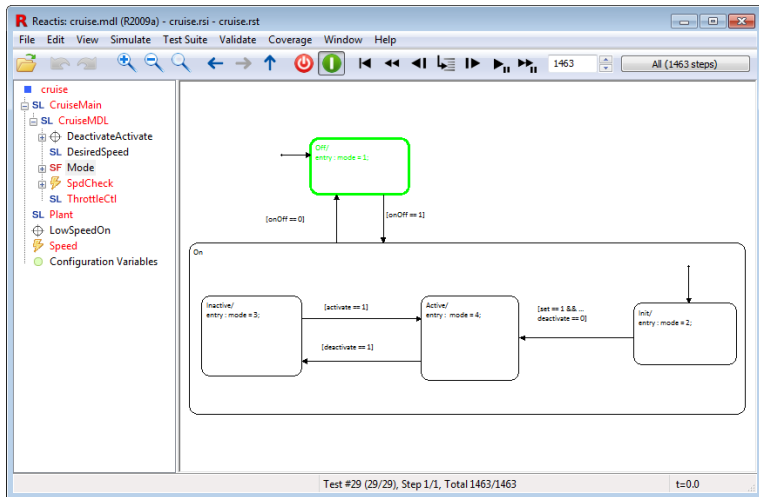
# MCC Support in Reactis Tester



Tester attempts to cover MCC targets



# Tracking MCC in Simulator



Test #29 (29/29), Step 1/1, Total 1463/1463

t=0.0

# Tracking MCC in Simulator

The screenshot displays the Reactis simulator window for a file named 'cruise.mdl (R2009a)'. The interface includes a menu bar (File, Edit, View, Simulate, Test Suite, Validate, Coverage, Window, Help), a toolbar with navigation and simulation controls, and a progress indicator showing '1463' steps out of 'All (1463 steps)'. On the left, a project tree lists components: 'cruise', 'SL CruiseMain', 'SL CruiseMDL', 'DeactivateActivate', 'SL DesiredSpeed', 'SF Mode', 'SpdCheck', 'SL ThrottleCtl', 'SL Plant', 'LowSpeedOn', 'Speed', and 'Configuration Variables'. The main workspace shows a state machine diagram with a central state labeled 'Decision with MCC targets'. This state has an 'On' label and is connected to other states: 'init/entry: mode = 2;' (with a transition labeled '[set = 1 S.S. ... deactivate = 0]'), 'inactive/entry: mod...' (with a transition labeled 'mode = 0;'), and a state above it labeled 'Off/entry: mode = 1;' (with transitions labeled '[onOff = 0]' and '[onOff = 1]'). The status bar at the bottom indicates 'Test #29 (29/29), Step 1/1, Total 1463/1463' and 't=0.0'.

# Tracking MCC in Simulator

The screenshot displays the Reactis simulator window for a file named 'cruise.mdl (R2009a)'. The interface includes a menu bar (File, Edit, View, Simulate, Test Suite, Validate, Coverage, Window, Help) and a toolbar with various simulation controls. A progress bar at the top right shows '1463' and 'All (1463 steps)'. On the left, a project tree lists components: 'cruise', 'SL CruiseMain', 'SL CruiseMDL', 'DeactivateActivate', 'SL DesiredSpeed', 'SF Mode', 'SpdCheck', 'SL ThrottleCtl', 'SL Plant', 'LowSpeedOn', 'Speed', and 'Configuration Variables'. The main workspace shows a state machine diagram with a central state 'Decision with MCC targets'. This state has an outgoing transition labeled 'mode = 1' to a state 'On' (highlighted with a green border) which contains 'Off; entry : mode = 1;'. The 'On' state has a return transition labeled '[onOff == 1]'. The 'Decision with MCC targets' state also has a self-loop transition labeled 'mode = 0;'. A transition labeled '[set == 1 && ... deactivate == 0]' leads from the 'Decision with MCC targets' state to another state containing 'init; entry : mode = 2;'. A 'Toggle Breakpoint' button is visible, with a 'View Coverage Details' button below it. The status bar at the bottom indicates 'Test #29 (29/29), Step 1/1, Total 1463/1463' and 't=0.0'.

# Tracking MCC in Simulator

The screenshot displays the Reactis simulator interface. The main window shows a state machine diagram with a state labeled "Decision with MCC targets". A green box highlights the state's entry condition: "On/entry : mode = 1;". A transition labeled "[onOff == 1]" leads from this state to another state with the entry condition "init/entry : mode = 2;". A "Toggle Breakpoint" button is visible, with a "View Coverage Details" button below it. The status bar at the bottom indicates "Test #29 (29/29), Step 1/1, Total 1463/1463" and "t=0.0".

The "Coverage Details" window is open, showing the following table:

Decision		Condition	Condition		MC/DC		MC/DC	
True	False		True	False	True	False	True	False
1/30	1/4	set==1.0 deactivate==0.0	1/20	1/4	TT: 1/30	Fx: 1/4	TT: 1/30	TF: 1/20

# Tracking MCC in Simulator

Reactive Systems, Inc. - R Coverage Details

Decision	Decision	Condition	Condition	Condition	MC/DC	MC/DC
True	False		True	False	True	False
1/30	1/4	set==1.0	1/20	1/4	TT: 1/30	Fx: 1/4
		deactivate==0.0	1/30	1/20	TT: 1/30	TF: 1/20

OH/entry : mode = 1;

Reactive Systems, Inc. - R Coverage Details

Click on column headers to enable filters

set==1.0	deactivate==0.0	Decision	Covered
False	x	False	1/4
True	False	False	1/20
True	True	True	1/30

Decision with MCC targets

Toggle Breakpoint  
View Coverage Details

Test #29 (29/29), Step 1/1, Total 1463/1463 t=0.0

# Tracking MCC in Simulator

The image displays a simulator interface with two 'Coverage Details' windows and a 'Decision with MCC targets' block. The left window shows a table with columns for Decision, Condition, and MC/DC. The right window shows a table with columns for Decision and Covered, with filters applied. The decision block in the background has a callout box pointing to a specific row in the right window.

**Row for each MCC target**

Decision	Condition	Condition	Condition	MC/DC	MC/DC
True	False	True	False	True	False
1/30	1/4	set==1.0	1/20	1/4	TT: 1/30
		deactivate==0.0	1/30	1/20	Fx: 1/4
				TT: 1/30	TF: 1/20

**Decision with MCC targets**

set==1.0	deactivate==0.0	Decision	Covered
False	x	False	1/4
True	False	False	1/20
True	True	True	1/30

OH/ entry : mode = 1;

Toggle Breakpoint  
View Coverage Details

Test #29 (29/29), Step 1/1, Total 1463/1463 t=0.0



# MCC Filtering

Decision MCC

Click on column headers to enable filters Clear Filter

set==1.0	deactivate==0.0	Decision	Covered
False	x	False	1/4
True	False	False	1/20
True	True	True	1/30

Help Close

# MCC Filtering

*Click column header*

The image shows two side-by-side screenshots of a software window titled "Coverage Details". The window has a tab labeled "Decision" and "MCC". Below the tab, there is a text prompt "Click on column headers to enable filters" and a "Clear Filter" button. The main area contains a table with columns for filters and data.

**Left Screenshot:** The table has columns "set==1.0", "deactivate==0.0", "Decision", and "Covered". The data rows are:

set==1.0	deactivate==0.0	Decision	Covered
False	x	False	1/4
True	False	False	1/20
True	True	True	1/30

**Right Screenshot:** The table has columns "set==1.0", "deactivate==0.0", "T: Decision", and "Covered". The data rows are:

set==1.0	deactivate==0.0	T: Decision	Covered
True	True	True	1/30

A yellow callout box with blue text says "Only display rows with *True* in column". An arrow points from this box to the "T: Decision" column header in the right screenshot. Another arrow points from the "Decision" column header in the left screenshot to the "T: Decision" column header in the right screenshot. The right screenshot also has a "Close" button at the bottom right.

# MCC Filtering

*Click column header*

R Coverage Details

Decision MCC

Click on column headers to enable filters

Clear Filter

set==1.0	deactivate==0.0	Decision	Covered
False	x	False	1/4
True	False	False	1/20
True	True	True	1/30

Help

Close

Only display rows with *True* in column

*Click column header again*

R Coverage Details

Decision MCC

Click on column headers to enable filters

Clear Filter

set==1.0	deactivate==0.0	F: Decision	Covered
False	x	False	1/4
True	False	False	1/20

Help

Only display rows with *False* in column

# MCC Considerations

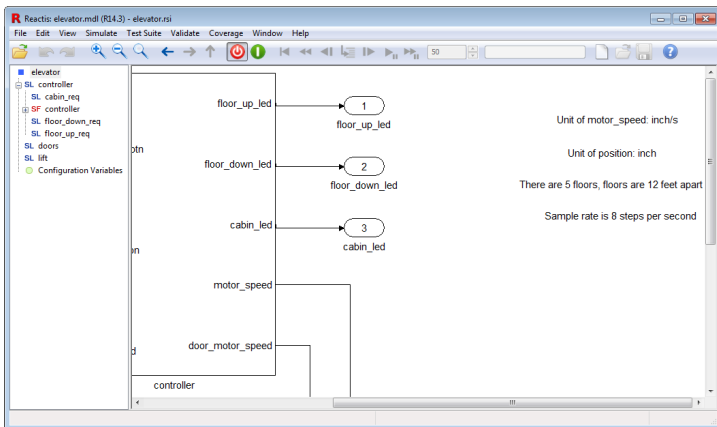
- ▶ Decision with  $n$  conditions has  $2^n$  MCC targets.
- ▶ When short-circuiting is enabled, many fewer MCC targets. Number is between MC/DC ( $n+1$ ) and  $2^n$ .
- ▶ Even if 100% MCC is not goal, MCC coverage details can be helpful in obtaining MC/DC.
- ▶ In model-specific settings (*Edit* → *Coverage...*), can set upper-bound on number of conditions in a decision; if exceeded MCC will not be tracked.

# Text Search Enhancement

Text search now searches Simulink annotations

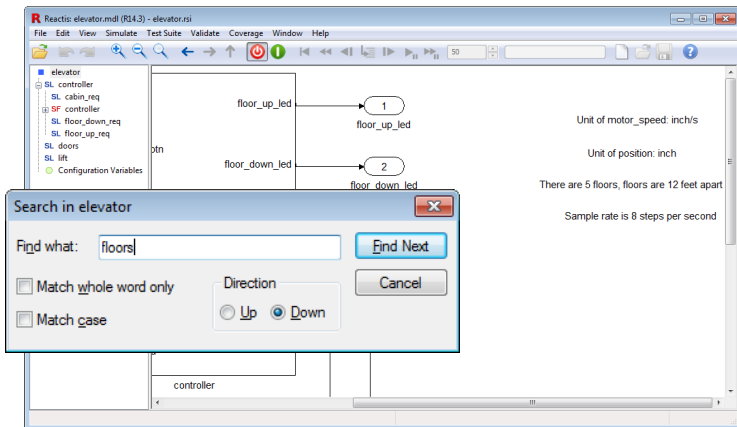
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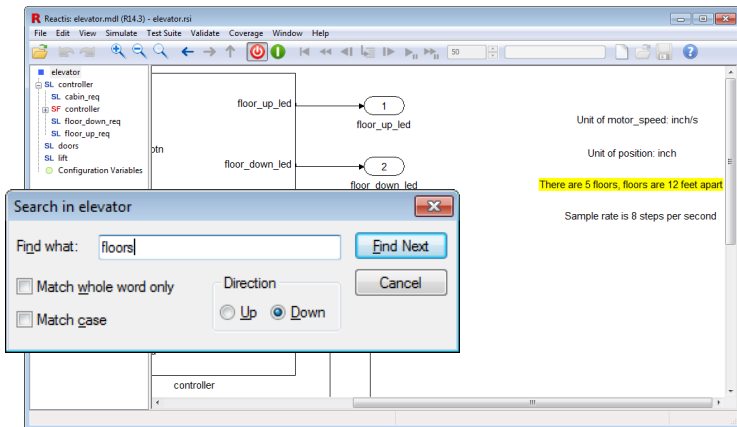
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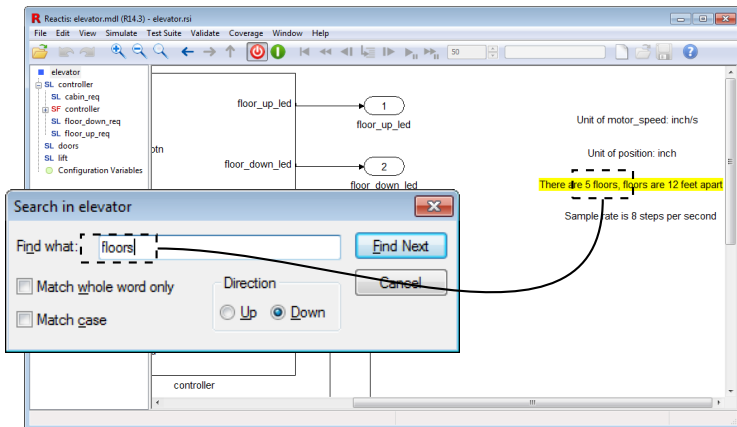
Text search now searches Simulink annotations



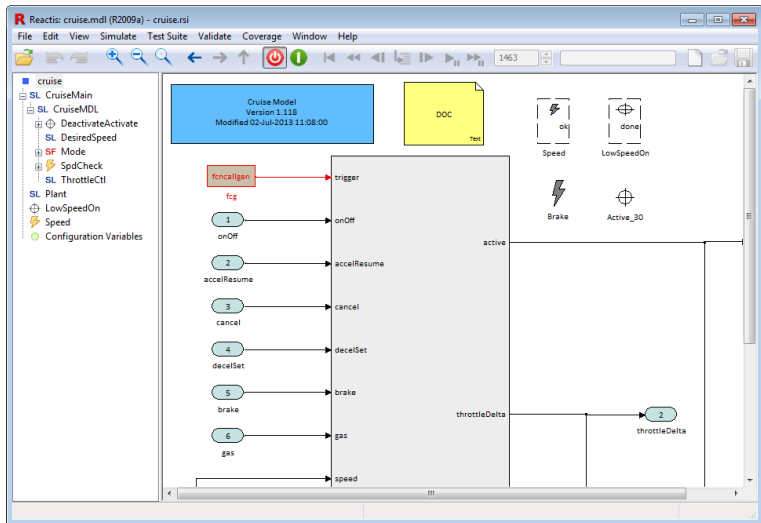


# Text Search Enhancement

Text search now searches Simulink annotations



# Display Simulink Block Colors



# Display Model Info and Doc Block Content

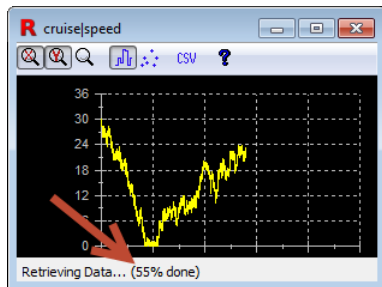
## Display contents of Model Info and Doc blocks

The screenshot displays the Reactis software interface for a model named "cruise.mdl (R2009a) - cruise.rsi". The main window shows a block diagram of the "Cruise Model" (Version 1.113, Modified 10-Apr-2013 15:34:52). The diagram includes a "trigger" block connected to "fncallgen", "fcg", "onOff", "accelResume", "cancel", and "decelSet" blocks. A "DOC" block is also present. A "DOC block" dialog box is open, displaying the following text:

This model implements a cruise control to demonstrate the different capabilities offered by Reactis to test and validate models. Chapter 3 of the Reactis User's Guide describes how to use Reactis with this model.

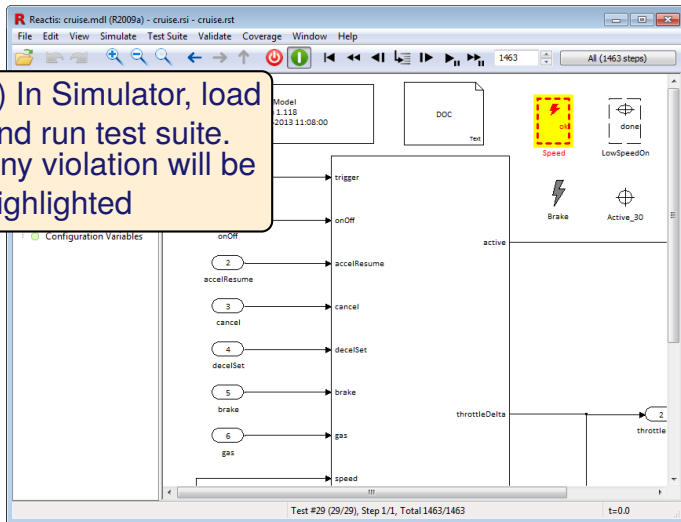
The interface also shows a left-hand navigation pane with a tree view containing "cruise", "SL CruiseMain", "SL Plant", "LowSpeedOn", "Speed", and "Configuration Variables".

# Show Progress when Opening Scope



# Run-to-Violation

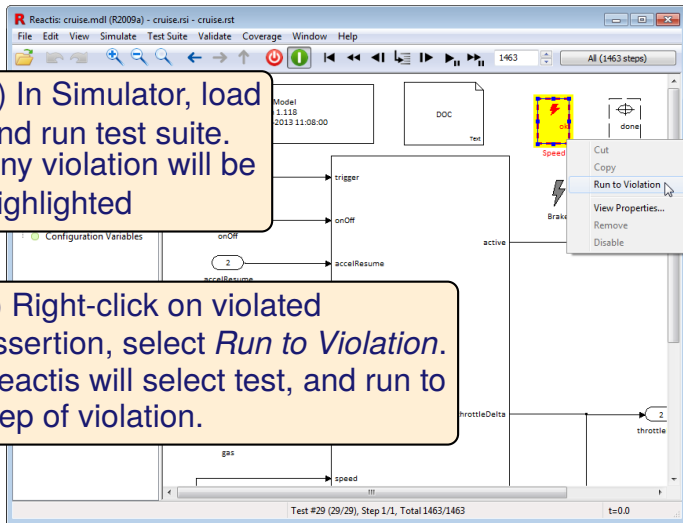
1) In Simulator, load and run test suite. Any violation will be highlighted



# Run-to-Violation

1) In Simulator, load and run test suite. Any violation will be highlighted

2) Right-click on violated assertion, select *Run to Violation*. Reactis will select test, and run to step of violation.



# Lookup Table Enhancements

- ▶ Enhancements to N-d lookup tables, Pre Lookup, Interpolation
  - ▶ Track coverage
  - ▶ Support more type combinations
- ▶ In coverage reporting, show breakpoint values

	<code>[-inf, c1]</code>	<code>[c1, c2]</code>	<code>[c2, c3]</code>	<code>[c3, +inf]</code>
<code>[-inf, r1]</code>	1/4	2/3	5/1	1/6
<code>[r1, r2]</code>	1/5	2/2	3/11	2/1
<code>[r2, +inf]</code>	1/1	1/3	1/2	1/7

Old

	<code>u2 &lt; 1.0</code>	<code>u2 &gt;= 1.0</code>	<code>u2 &gt;= 10.0</code>	<code>u2 &gt;= 100.0</code>
<code>u1 &lt; 1.0</code>	1/4	2/3	5/1	1/6
<code>u1 &gt;= 1.0</code>	1/5	2/2	3/11	2/1
<code>u1 &gt;= 10.0</code>	1/1	1/3	1/2	1/7

New

- ▶ Tester gets better coverage for lookup tables

# API Functions to Export Coverage Reports

- ▶ *rsTesterWithReport* produces a coverage report after a Tester run
- ▶ *rsSimRunSuiteWithReport* produces a coverage report after running a test suite in Simulator