Finite State Machines

Analysis/Synthesis

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Facilities

- Representations
 - Editors
 - Load & store
- Analyses
 - Reachability set
 - Reduction
- Simulation
 - Execution trace
 - Interactive animation

Formats

- Descriptions
 - Equations
 - Tables
 - Graphs
- Types
 - Mealy
 - Moore
 - General
- Representations
 - Coded
 - literal

Descriptions

• Equations

foo.eqn

• Tables

foo.tbr

• Graphs

foo.sg

Installation

• Set an environment variable:

export SOFTDIR=/tools

• Modify your PATH:

export PATH=\$SOFTDIR/bin:\$PATH

- Customize: platform
- Create your own working directory
- Set this directory as your current directory
- Run the application: **fsm**

🗙 untitled	untitled 📃 🗖						
Command	File	Machine	Options	Compile	Tools	Debug	Help
	Name		u	ntitled			
	Туре		n	nealy			
	Representat		ion li	teral			
	Description		n	one			

Equations (1)

• Load an example

td3.eqn.tcl

Load an existing equational description . 🗆 × Shortcut Mask Show .* Help SR1.eqn.tcl 0K jan99.eqn.tcl File td3.eqn.tcl Cancel td8.eqn.tcl browser td9.eqn.tcl Rescan 5 files $\Box > \nabla$ /home/andre/SOFT/FSM/EXAMPLES/ Path: File: td3.eqn.tcl *.eqn.tcl Mask:

Select an equational description

Equation (2)

- The description is now ready for
 - Modifications
 - Analyses
 - Simulations

🗙 td3: mealy (1 * 1)							
Command	File	Machine	Options	Compile	Tools	Debug	Help
	Name		te	13			
	Туре		m	nealy			
	Representation		tion li	teral			
	Dr	escription	е	quation			
Equations 7	extens	sion/tools/F	SM/EXAN	4PLES/td3.	eqn.tcl'	loaded.	

Main panel after td3 loading

Equations (3)

• Edition



Equation (4)



A « readable » format (td3.eqn)

Equation (5)

🔀 Code Preview Window	×
<pre># fsm-v2.10 (2.10 February 2, 2000) # Creator: STATE-GRAPH-EDITOR 2.10 # Host: darkstar.agrimont.fr # Date: Fri Feb 4 06:47:55 MET 2000 # Author: andre</pre>	
# This file is a blif representation of state graph created from file 'previewco de'	
.model td3	
. inputs X0 . outputs Z0 . latch YOP YO 0 . latch Y1P Y1 0 . latch Y2P Y2 0 . latch Y3P Y3 0 . latch Y4P Y4 0	
.names XO YOP 1 1	
.names YO Y1P 1 1	∇
Close	

Blif representation of the machine (td3.blif)

Equation (6)

🗙 XEVE: Esterel Verification Environment 📃 📃					
<u>Files</u> <u>Signals</u> <u>V</u> erification	n <u>O</u> ptions	<u>?</u>	🔄 Beginner's Mode		
File Selection					
Working Directory: /exten	sion/tools/F	SM/EXAMPLES	3		
FSM File td3.blif Relation File					
Verification Selection					
🔶 СНЕСК О	UTPUTS		Auntra 1		
💠 REDUCE			Арру		
Signal Selection					
INPUTS		_	OUTPUTS		
		Ø			

Xeve main panel (fsm analysis)

Equation (7)

🗙 Fsm Minimisation Results		_ 🗆 ×					
Execution complete							
Result generated in fc2 file "td3.fc2". You can explore the FSM graphically invoking Atg (Draw Automaton Button bellow)							
FSM Sizes							
Reachable States 11	Minimised States	5					
DRAW AUTOMATON	Dismiss						

Result of the xeve's reduction (bi-simulation)

Equation (8)

Exploring the reduced machine



Graph (1)



An example of graphic representation (td3_0)

Graph (2)

🔀 Esterel sim		. 🗆 ×					
module td3_0							
Commands Fonts Windows Info							
Pure Inputs	Pure Outputs	Valued Outputs					
≣ x0	z0 q0 q1 q2 q3 q4 q5 q6 q7 q8	c_a_InitSignal -*-					
tick reset							

Xes's main simulation panel for td3_0

Graph (3)



Graph (4)



Tabular representation during animation

Graph (5)



Graphical representation during animation

Graph (6)

Xes's main panel during animation for communicating fsm's

Graph (7)

Graphical representation during animation

Graph (8)

Tabular representation during animation