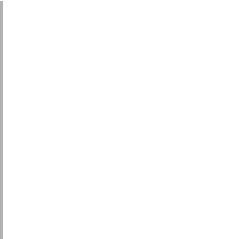




## .getmore - The Test Case Generator

Eclipse Testing Day 2010  
Darmstadt, 08.09.2010



Florian Prester  
sepp.med gmbh

# Agenda

- - Introduction
    - What is sepp.med?
    - What is MBT?
  - .mzT – model centric testing
    - A best-practice approach 4 MBT
    - Tooling chain
  - .getmore
    - Architecture
    - Features
  - Projects
    - Scientific Projects
    - Industrial Projects
  - Discussion



- Medium-sized IT Service Provider
  - 30 years industrial experience
  - Our services
    - Development
    - QA & Test
    - Consulting
    - Training Provider
  - Expertise: complex and safety critical systems



## Our Domains



### ■ Safety critical and regulated environment

- Medical
- Pharmacy
- Automotive
- Automation & Systems



### ■ Complexity

- Workflows & business processes
- Distributed development
- Products / systems with many subcomponents
- Product families, system engineering
- Testing Facilities



# What is model based testing?



Using a „model“ for testing!

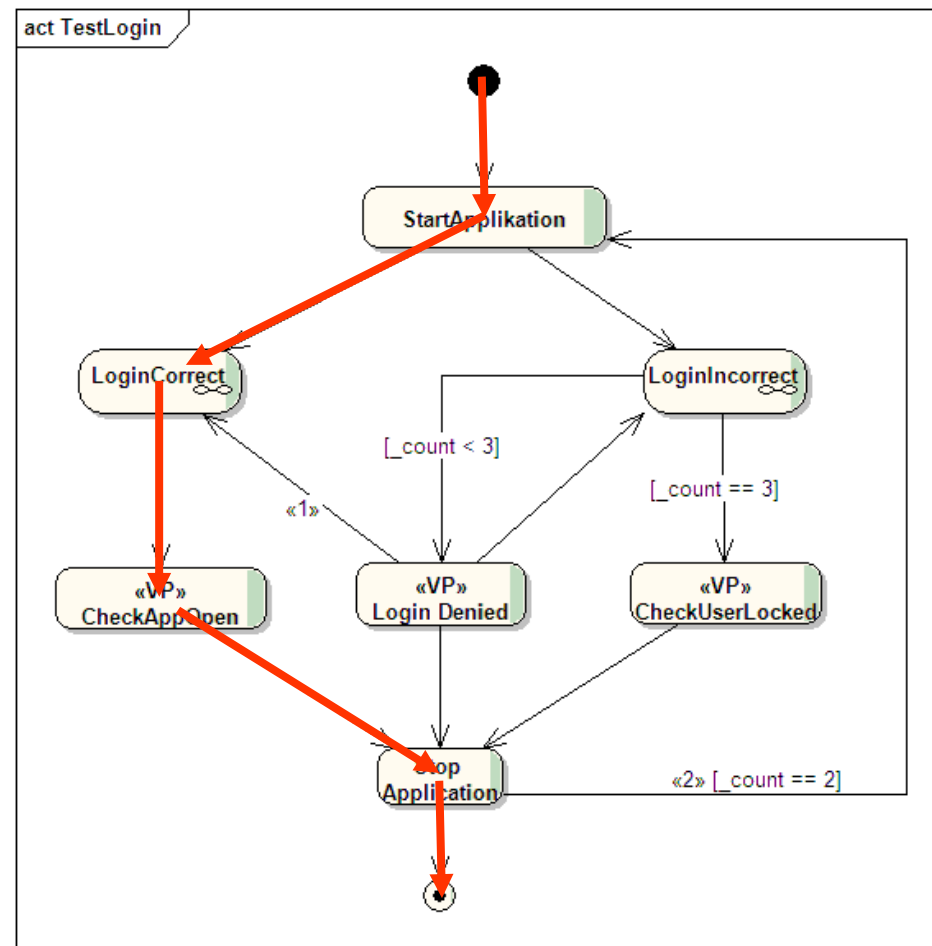
A model describing the System under Test!

What is a Test Case?

A valid path through the Graph!

How do I get the path?

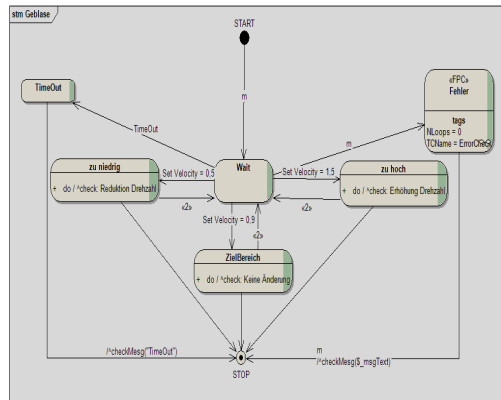
Using different Strategies!



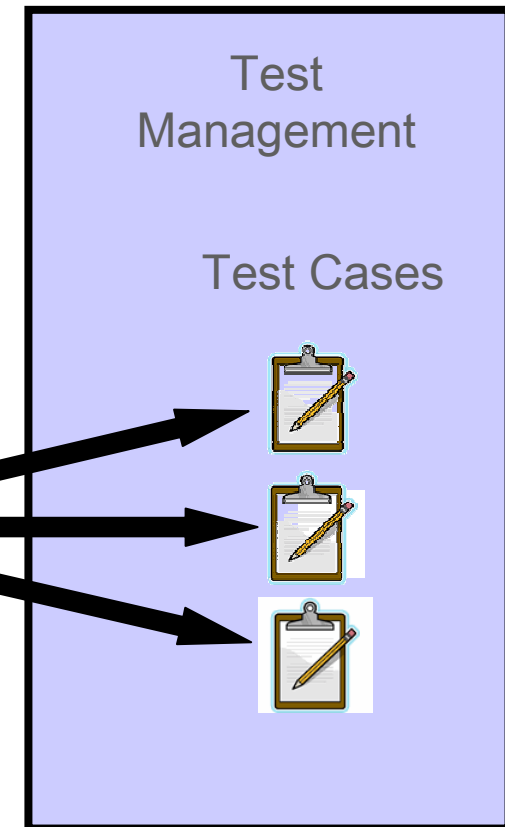
# Main MBT-Workflow



## Editor

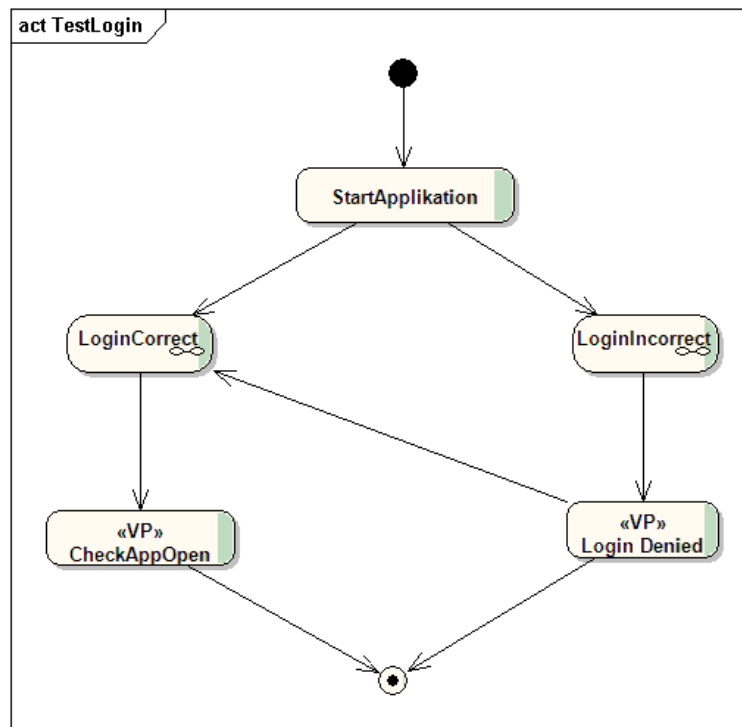


## Generator



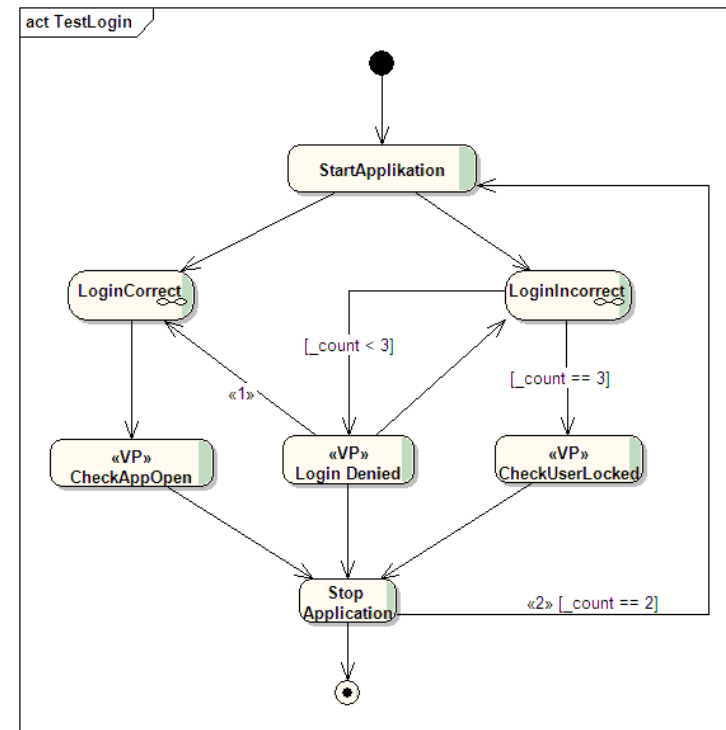
# What is a .mzT – Model?

## Design - Model



Limited to functionality

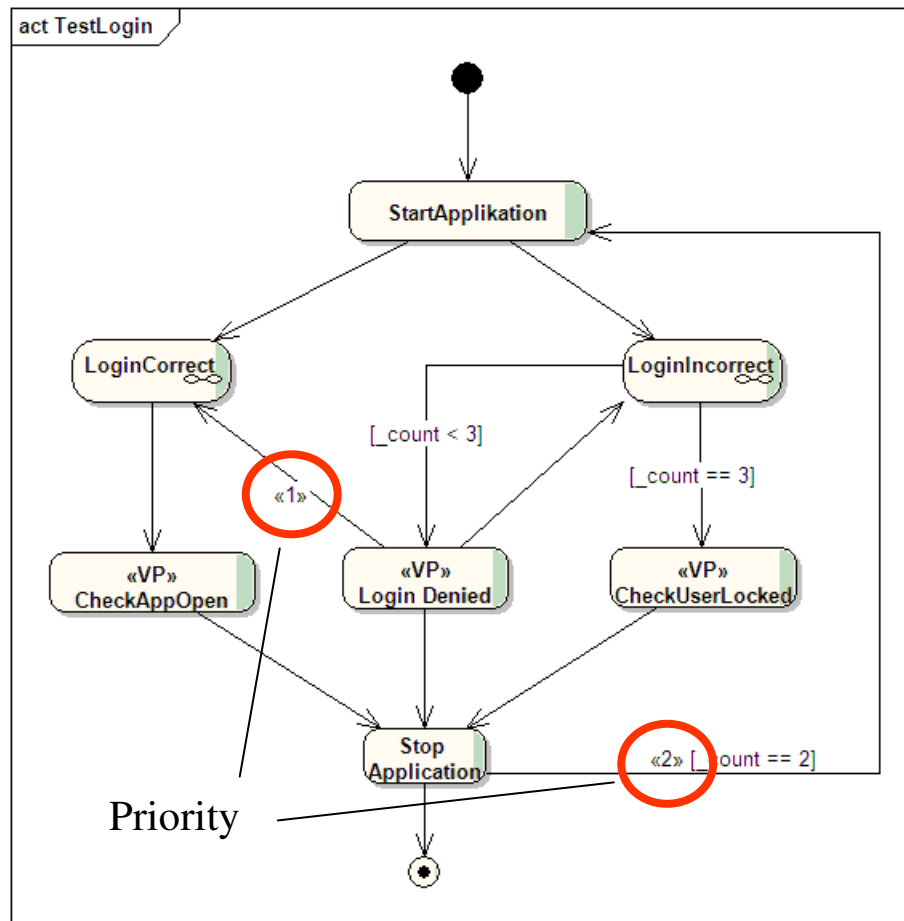
## .mzT- Model



„All“ possibilities of interaction  
plus  
Test Management Information



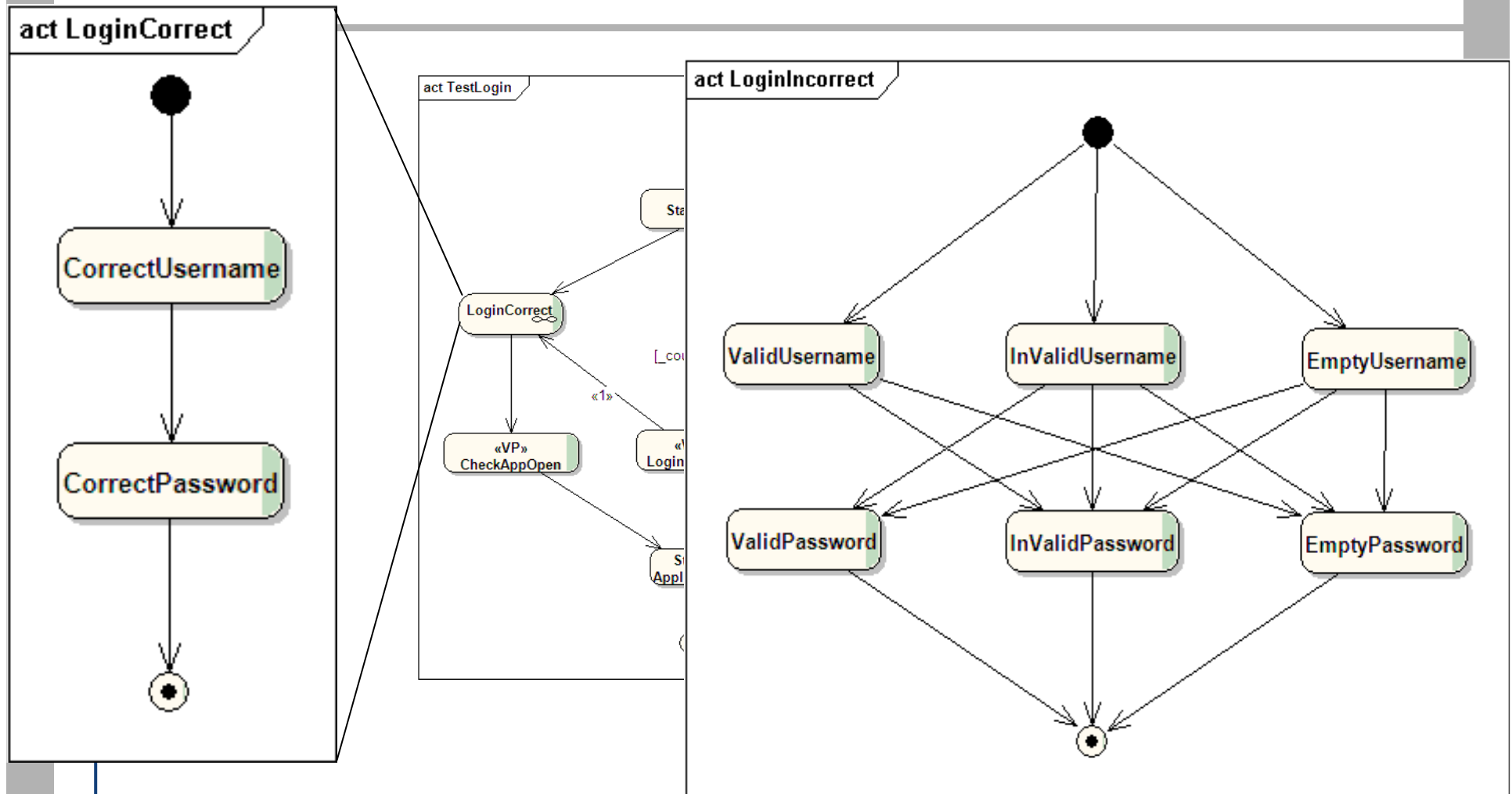
# .mzT – Model: (Test Management-) Information



- Test Step
- Verification Point
- Expected Result
- Priorities
- Hierarchical Models
- Different Strategies for Sub Diagrams
- Test Data
- Requirements



# .mzT – Model: hierarchical Model



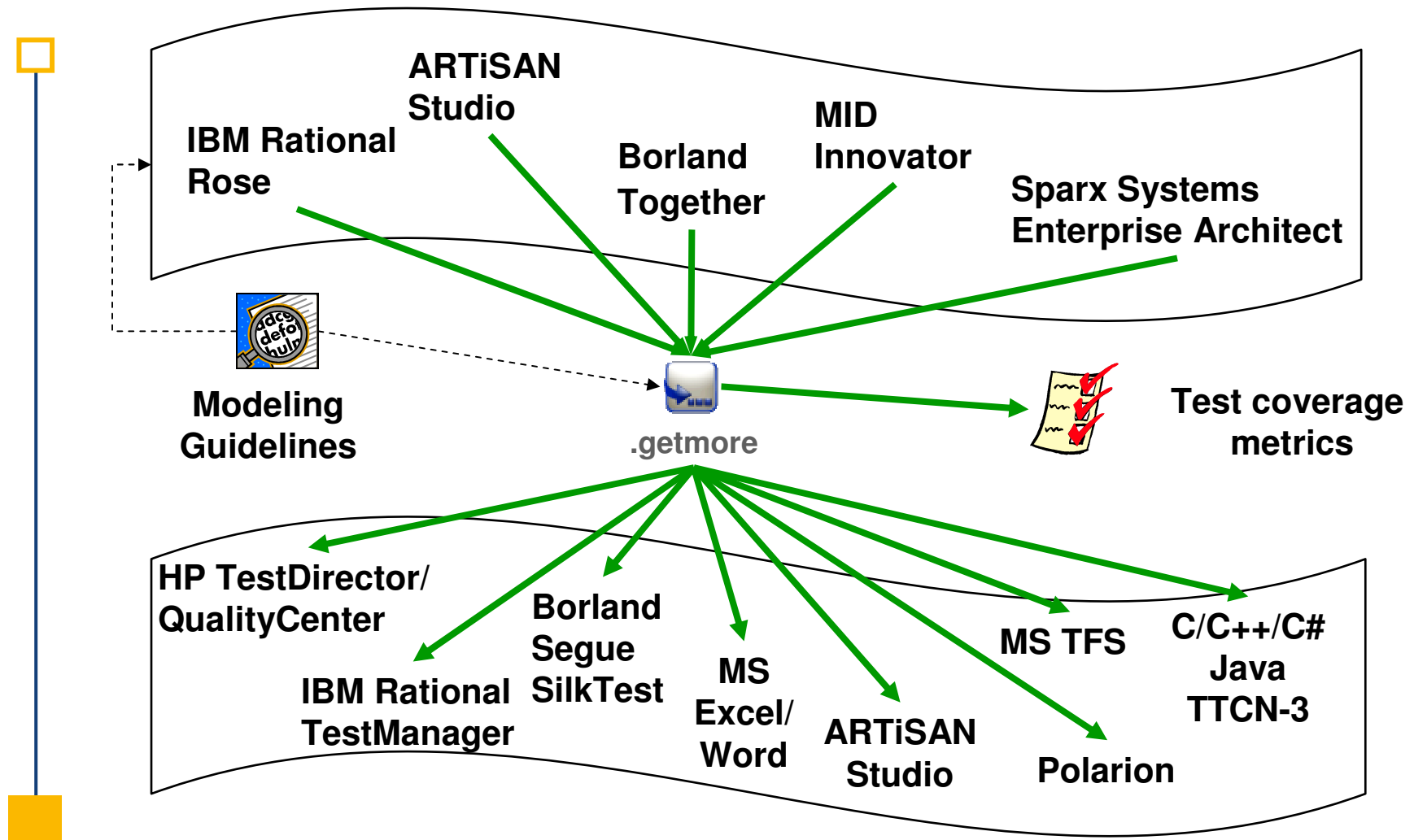
## „What is model centric testing used for?“



- Systematic test case creation/design/generation
- Review of requirements and Inspection of completeness and Testability
- Reduction of efforts
  - Concentrating on one model – generate Test Cases
  - Test results are “built-in“
  - Maintenance of models is much more efficient than single test cases
  - Review of Models is much more efficient
  - Choosing test cases depending on test target



# Available Tool Chains



## .getmore: Facts

- Model editor independent
  - Various strategies
  - Various test execution languages
  - Various metrics
  - Python for internal logic engine (e.g. Guard Conditions)
  - Eclipse based (RCP/PlugIn)
  - supporting
    - Each phase of development
    - Process conformance
    - Requirements, times, costs metrics

## .getmore: Facts

- Strategy types
  - Coverage strategies
  - Guided strategies
  - Random
  - Filter
- Hierarchically Models
- Configuration:
  - Loop delimiter
  - Test Case Length
  - Guard Conditions
  - TM Information

## .getmore: Strategies

- ■ Full Path Coverage
- Full Function Coverage
- Full Test Step / Verification Point Coverage
- Full Transition Coverage
- Full Node Coverage
- Feature / Requirements Coverage
- Named Path / Guided Path
- Random
- Best-N Test Cases (Filter)
- ...



# An Example: Testing a Website



CREDIT SUISSE

Schriftgröße:   EN | DE | FR | IT

Schweiz Land wählen | Kontakt Suchen:

Privatkunden  
Unternehmen & Institutionen  
Investment Banking  
Asset Management  
Karriere  
Wir über uns

→ Login Direct Net  
→ Marktdaten & Research

Eine Bank,  
die mitfiebert

→ **Ein Land. Ein Team. Eine Bank.**  
2010-05-17 Die Credit Suisse hat zahlreiche Aktivitäten im Vorfeld der Fussball-WM lanciert.

→ **Die Stars von Morgen**  
2010-05-16 U17-Nationaltrainer Heinz Moser über die Chancen seines Teams an der EM-Endrunde

→ **Online Forum**  
2010-05-27 Stephan Lichtsteiner beantwortet kurz vor seiner Abreise nach Südafrika Fragen der Fans.

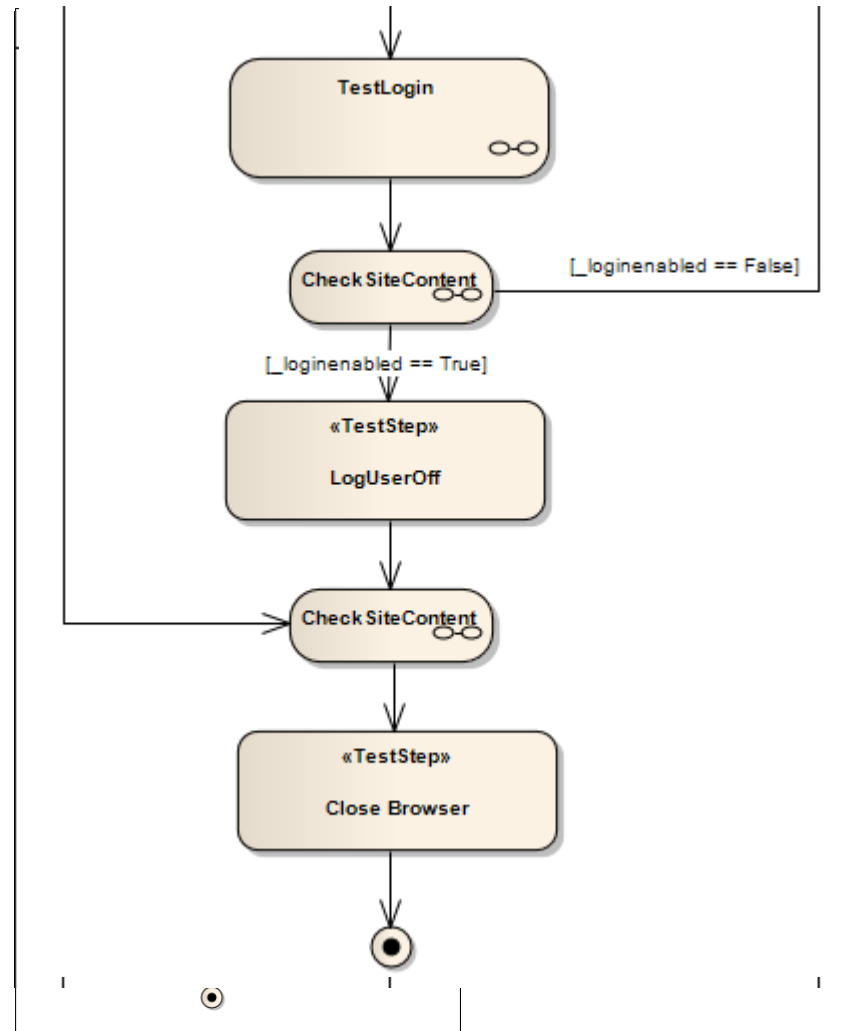
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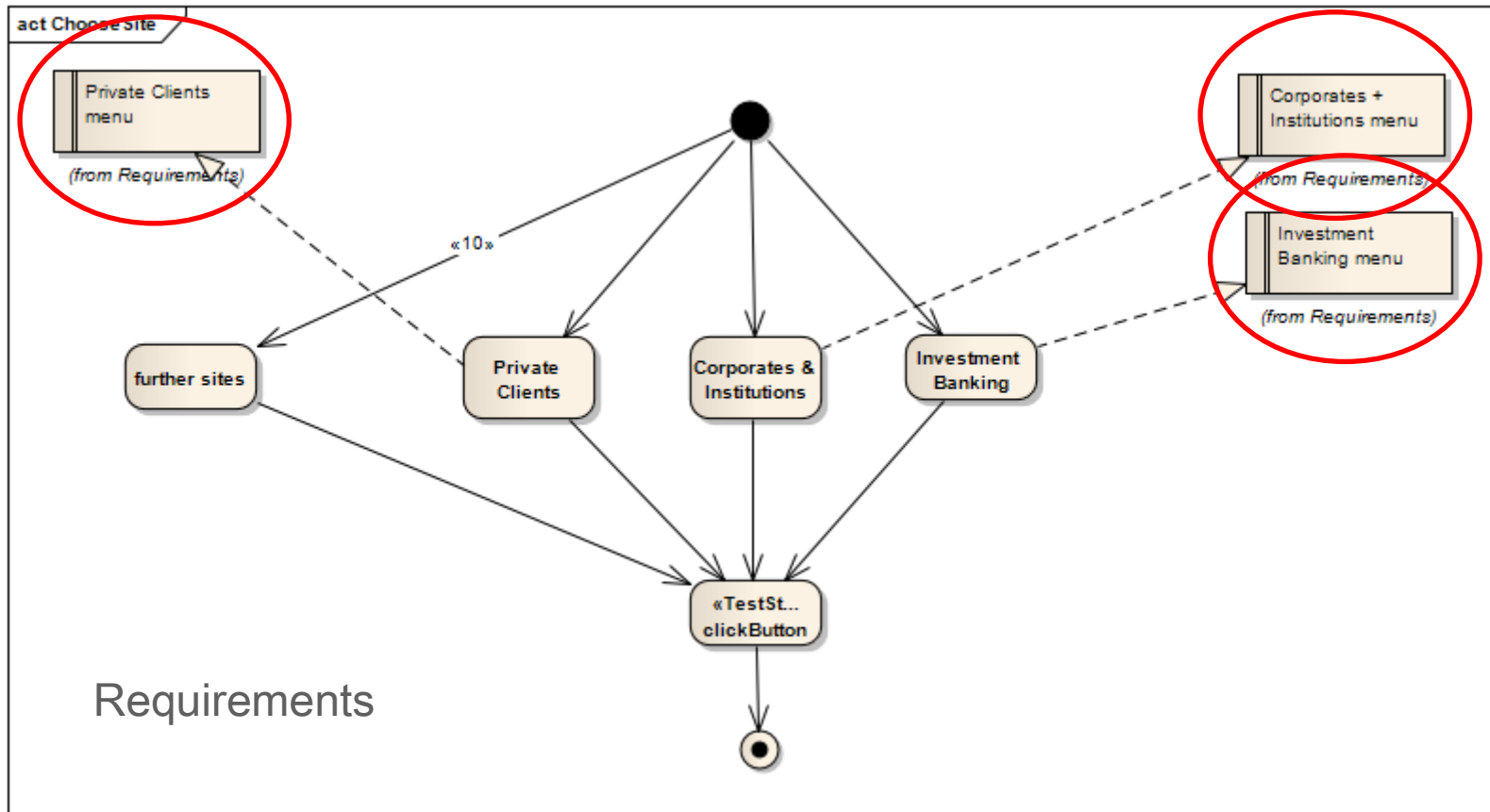


# Model

- Workflow:
  - Open Start Page
  - Choose Site
  - Test login
  - Log off
  - Close Browser







# Test Execution Information

**Action : openStartPage**

General Effect Require Constraints Links Scenario Files

Name: openStartPage

Stereotype: TestStep  Abstract

Author: ChristophN Status: Proposed

Scope: Public Complexity: Easy

Alias: Language: <none>

Keywords:

Phase: 1.0 Version: 1.0

Notes:

open webpage: \${\_referrer} with webbrowser: \${\_browser}

OK Abbrechen Übernehmen Hilfe

**Action : openStartPage**

General Effect Require Constraints Links Scenario Files

Scenario: Code Type: Alternate

`tf.openSite('${_browser}','${_referrer}');`

Scenarios: New Save Delete

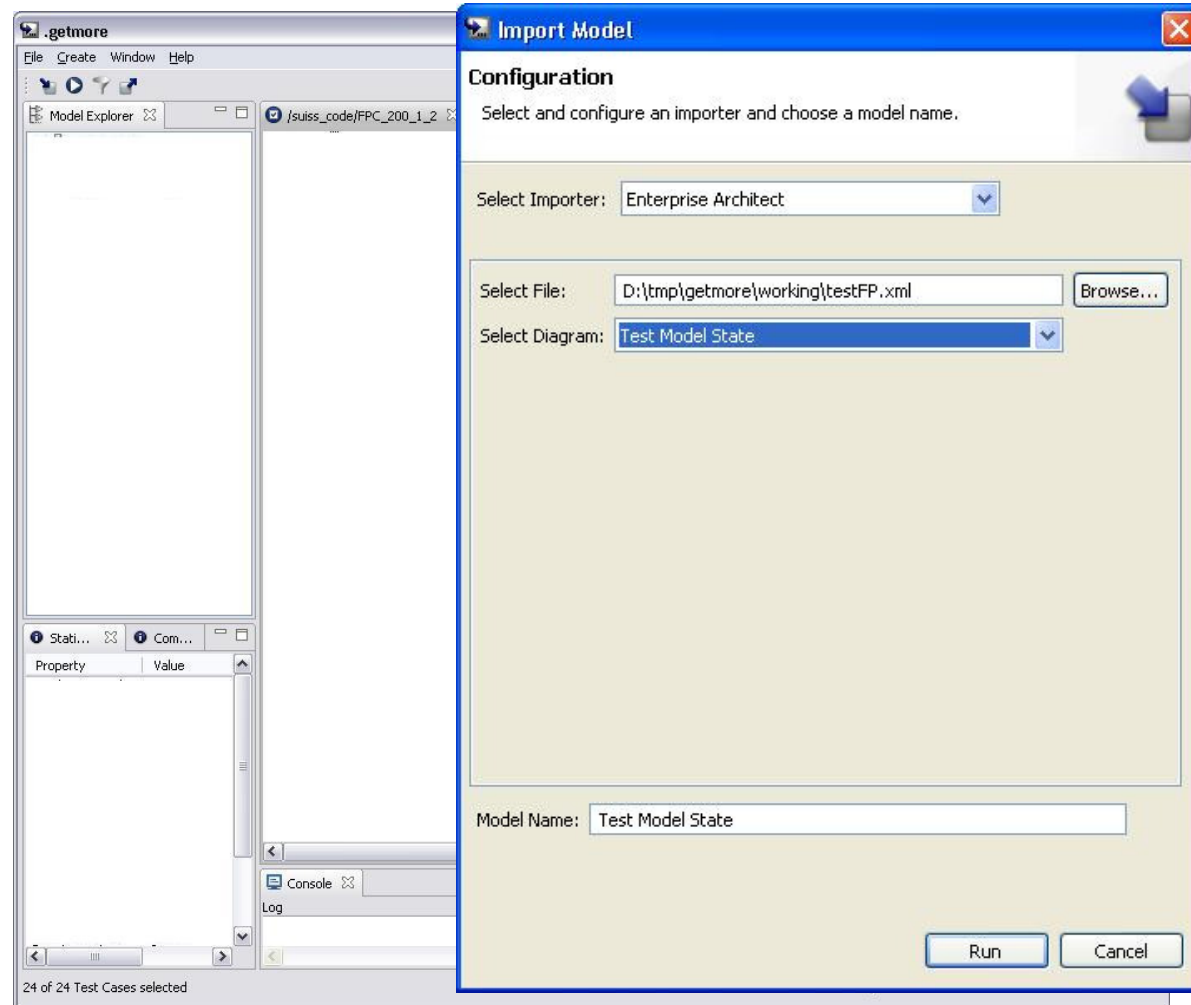
Name	Type
Code	Alternate

OK Abbrechen Übernehmen Hilfe



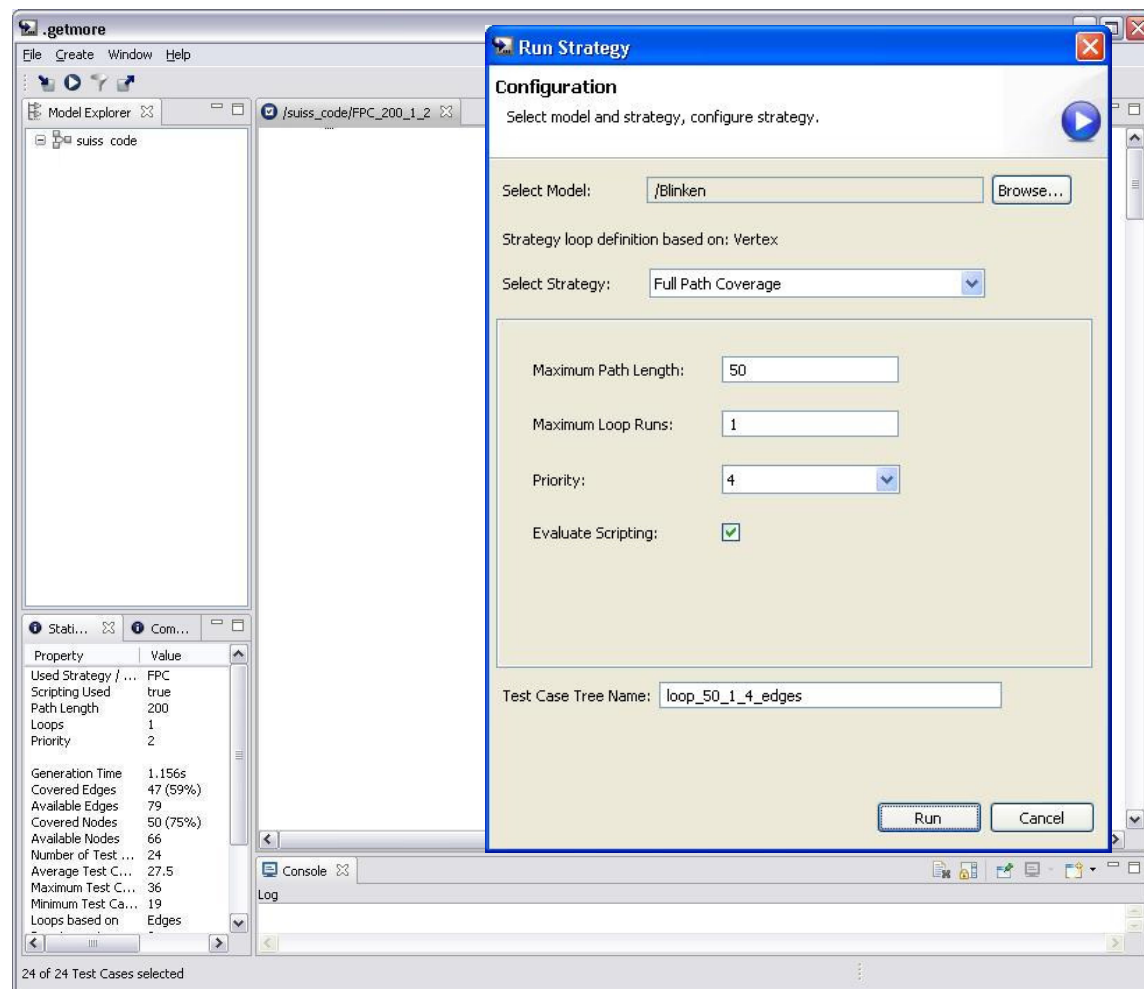
# Generation Workflow

- Import
- Generate
- Test Case Tree
- Filter
- Test Case Tree
- Export
- Execute



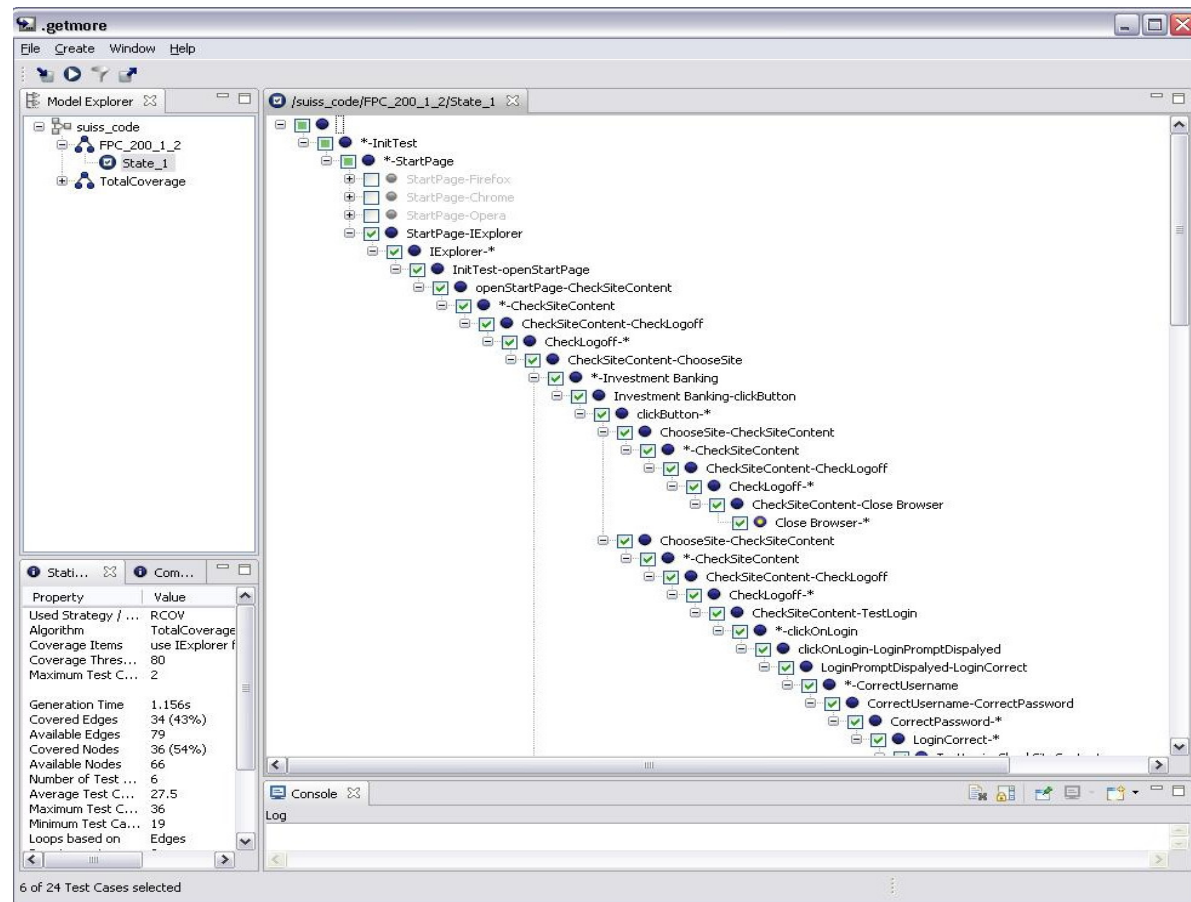
# Generation Workflow

Import  
Generate  
Test Case Tree  
Filter  
Test Case Tree  
Export  
Execute



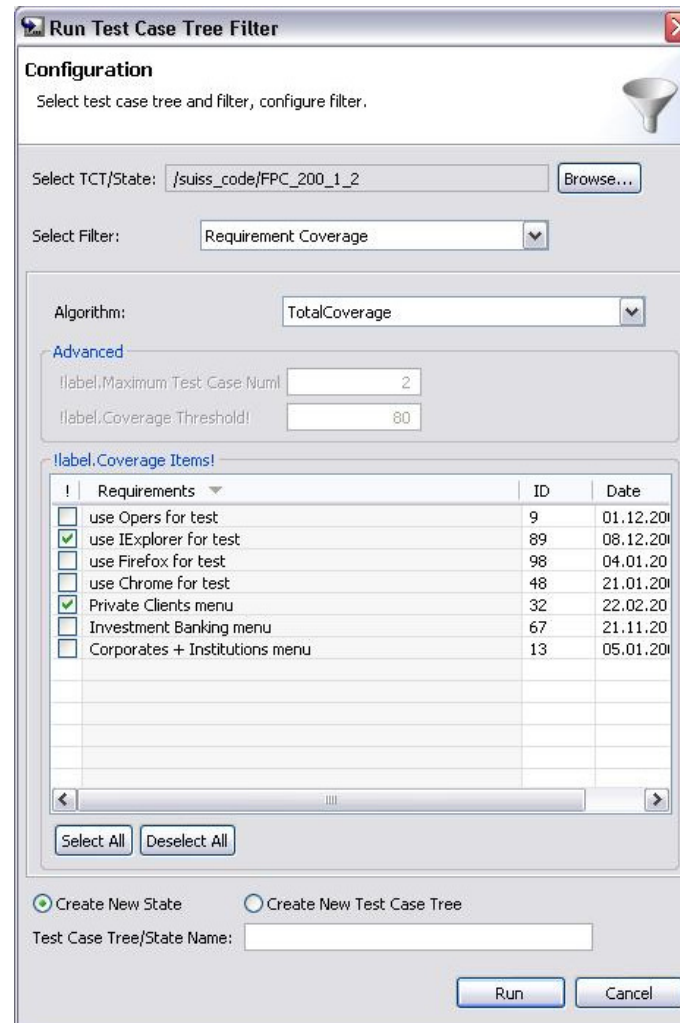
# Generation Workflow

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- Execute



# Generation Workflow

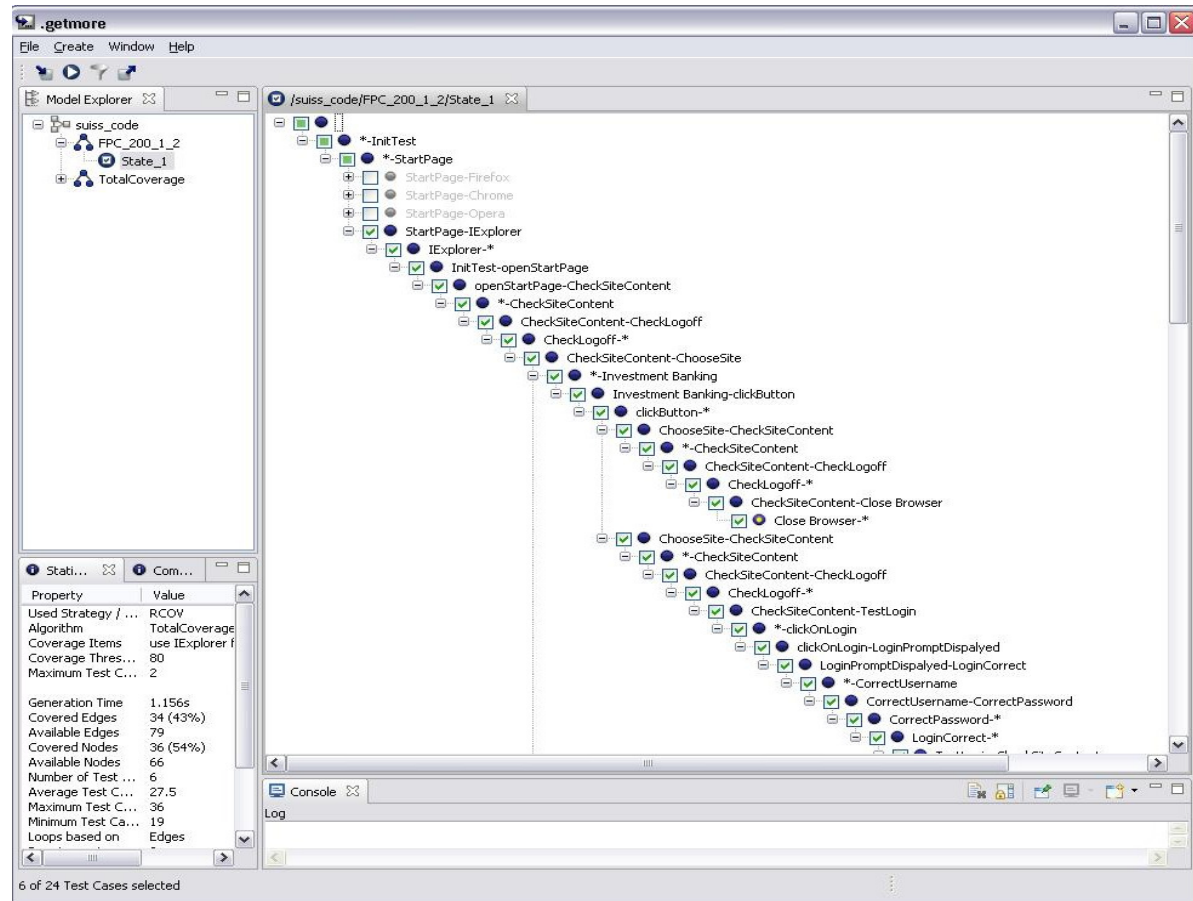
- Import
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- Filter
- Test Case Tree
- Export
- Execute



# Generation Workflow



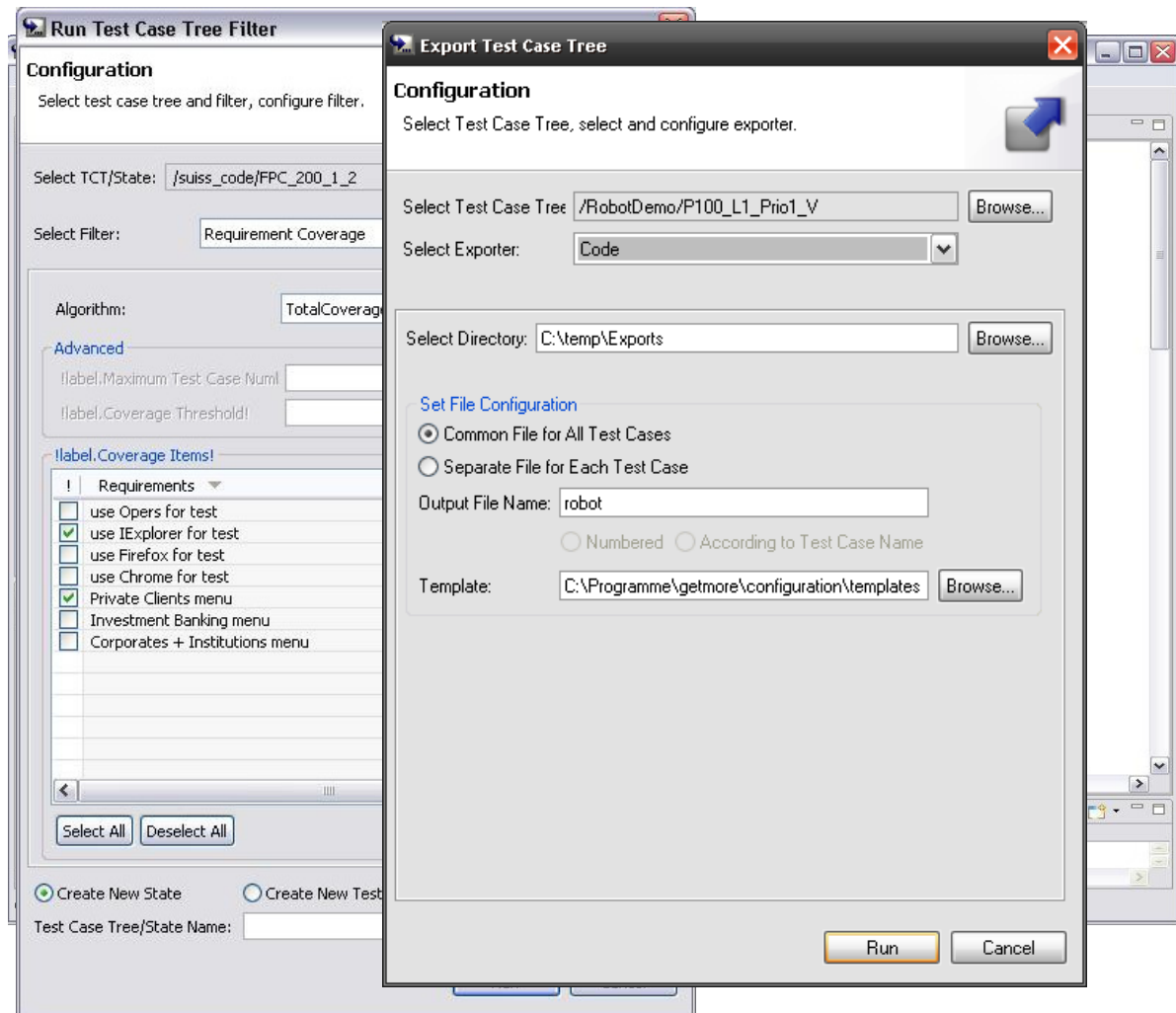
Import  
Generate  
Test Case Tree  
Filter  
Test Case Tree  
Export  
Execute





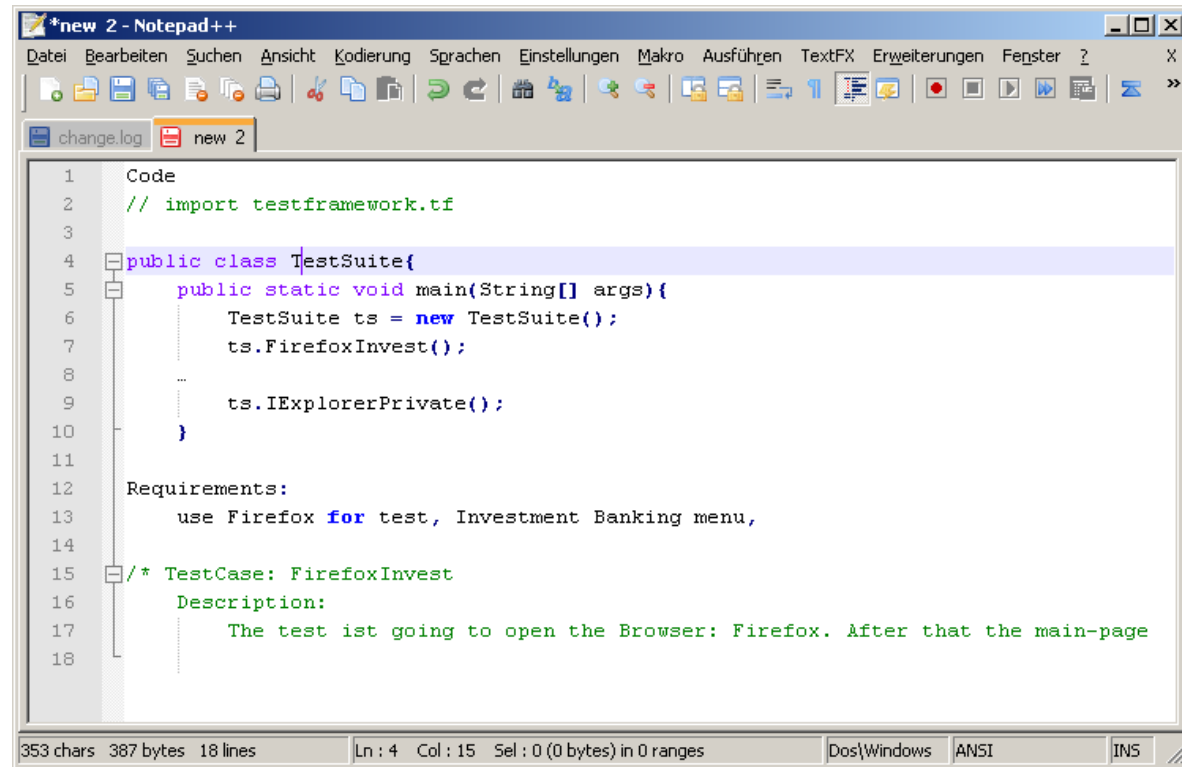
# Generation Workflow

- Import
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- Filter
- Test Case Tree
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- Execute





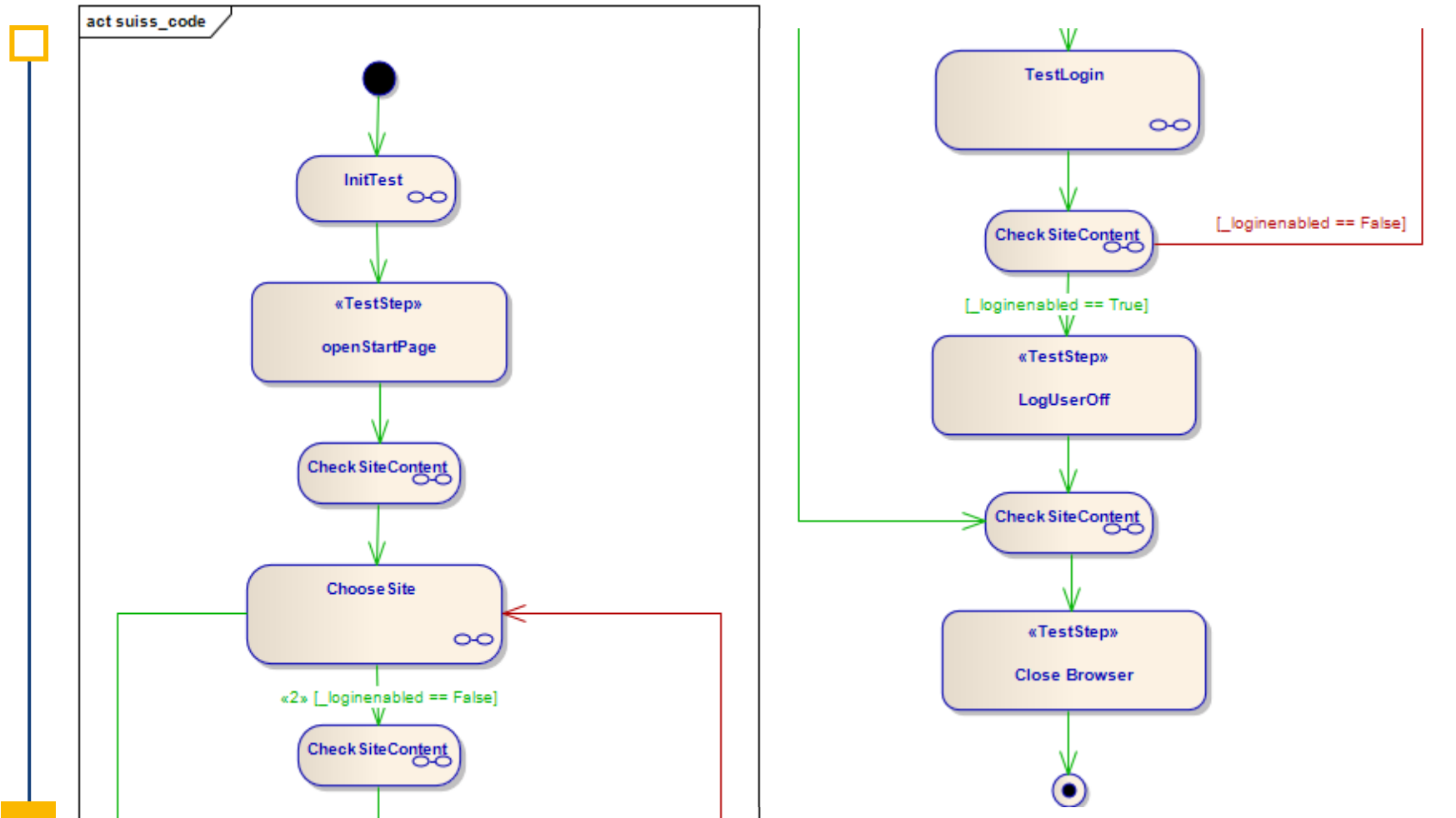
- Import
- Generate
- Test Case Tree
- Filter
- Test Case Tree
- Export
- Execute



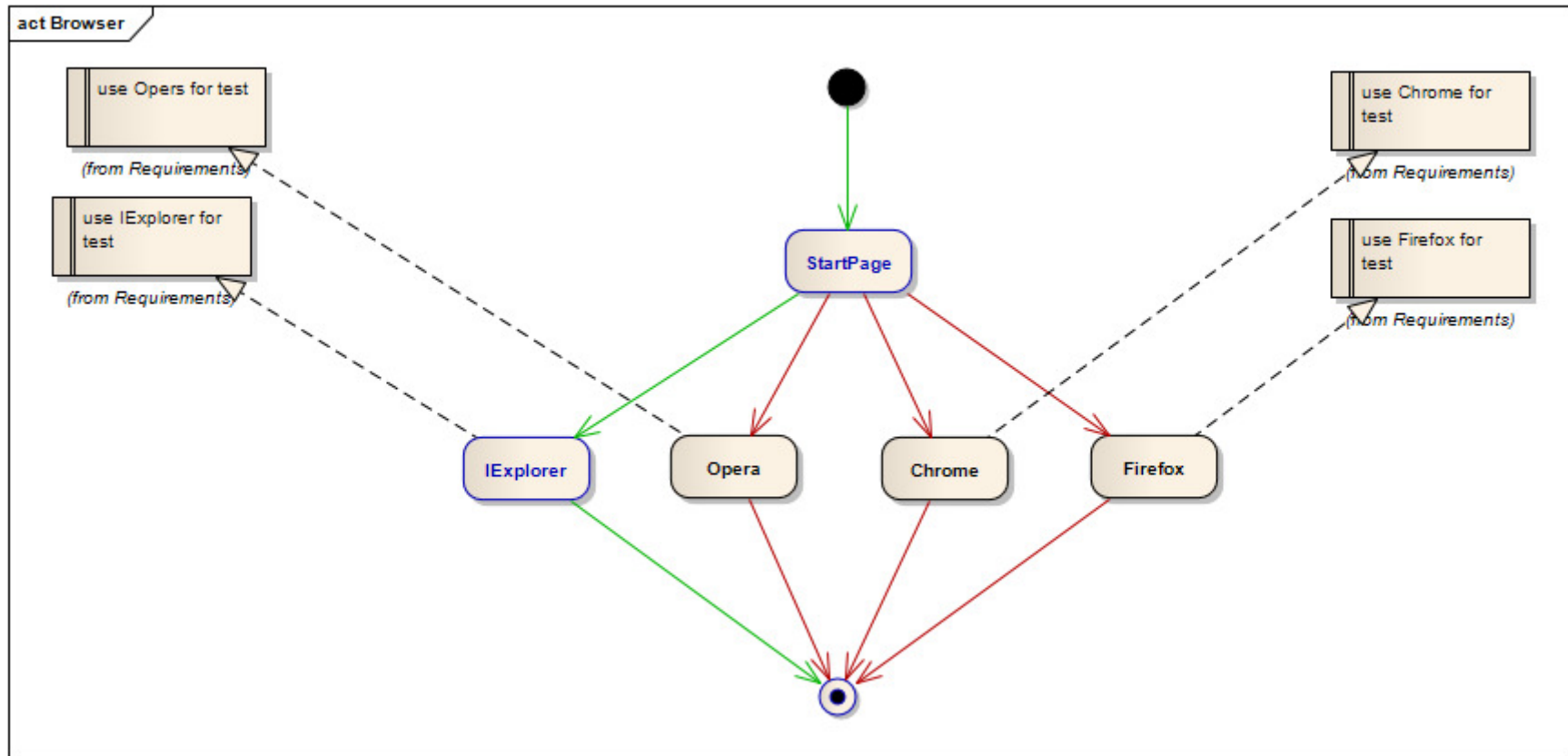
```
1 Code
2 // import testframework.tf
3
4 public class TestSuite{
5     public static void main(String[] args){
6         TestSuite ts = new TestSuite();
7         ts.FirefoxInvest();
8         ...
9         ts.IExplorerPrivate();
10    }
11
12    Requirements:
13        use Firefox for test, Investment Banking menu,
14
15    /* TestCase: FirefoxInvest
16       Description:
17        The test ist going to open the Browser: Firefox. After that the main-page
18    */
```



# Visualization

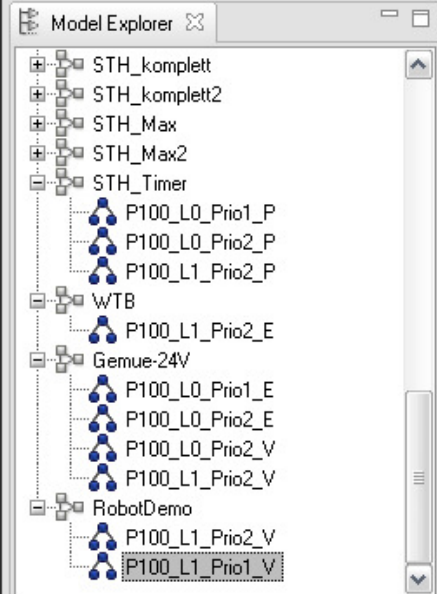


# Visualization



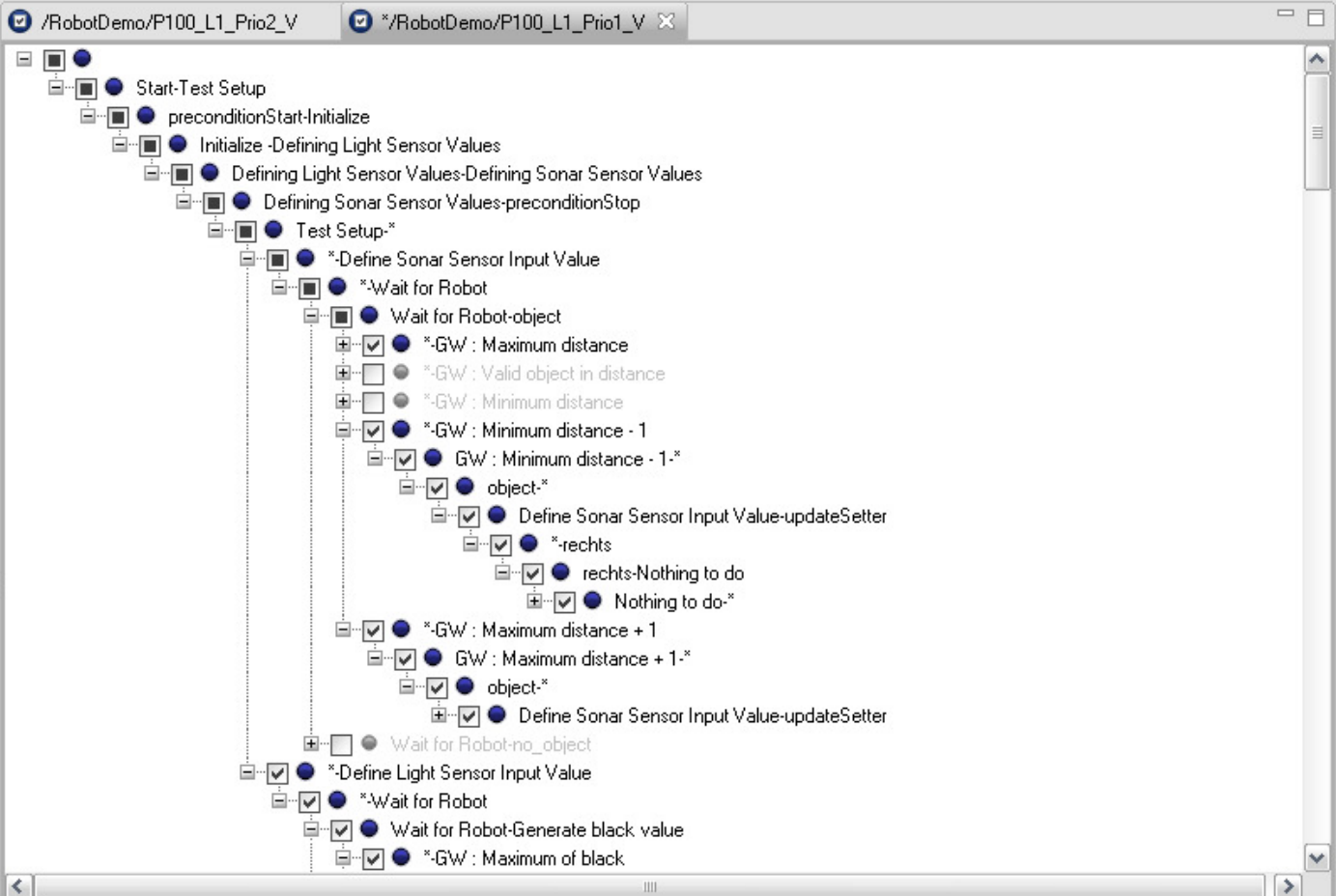
## Results / Export Formats

- ■ Text → manual test execution
- Automatic execution (per Template)
  - C, C++, Java,...
  - Perl, Python
  - TTCN-3
- Models
  - Sequence diagrams
- Test Management
  - TestDirector, TestManager, QualityCenter, EXAM 2.0
  - .....



Test Case Tree Info

Property	Value
Strategy	Full Path Coverage
Scripting Used	true
Path Length	100
Path Segment R...	1
Priority	1
Available Edges	93
Covered Edges	85 (91.4%)
Not covered Edges	8
Available Vertices	73
Covered Vertices	71 (97.26%)
Not covered Verti...	2
Loops based on	Vertex
Number of Test C...	21
Average Test Ca...	24.9
Maximum Test C...	28
Generation Time	0.781s



Console

```
Log
INFO : Strategy finished in 0.781 seconds.
INFO : 21 Test Cases generated!
INFO : Average Test Case length: 24.9
INFO : Code-Exporter: export started
INFO : Export successful.
```

## Scientific Projects

- ■ TestNGMed
  - [www.testngmed.org](http://www.testngmed.org)
  - Medical HL7 Scenarios
- GETTEMO
  - [www.gettemo.de](http://www.gettemo.de)
  - Test Information Visualization
  - Graph layout/ Model Verification/ Markov Engine / Simulation
- EMOTE
  - Embedded industries
  - Source Code Coverage <-> Test Coverage



## Industrial Projects

- ■ TestNGMost
  - Automotive Industries
  - TTCN-3
- CETES
  - [www.cetes.eu](http://www.cetes.eu)
  - Embedded Industries
  - Eclipse based Tool Suite
- MID Innovator 4 Testing
  - SOA & Business Workflows
  - BPMN
- On-the-fly-Testing



- ■ Community:
  - [www.modellzentriertestesten.de](http://www.modellzentriertestesten.de)
  - [www.xing.com/net/mbt](http://www.xing.com/net/mbt)
  
- Conquest 2010, Dresden
  - Tutorial: .mzT
  - 20.9.2010 (nachmittags)
  
- Expert Symposium
  - March, 17th 2011 in Herzogenaurach
  - [www.expertensymposium.de](http://www.expertensymposium.de)



Thank you for your attention,

any questions?



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