Footprinter: Round-trip Engineering via Scenario and State based Models

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INTRODUCTION

❖ In model-driven software development of distributed systems-
 ➢ Scenario based models, such as High-level Message Sequence Charts (HMSC), highlight inter-process communication and are closer to system requirements
 ➢ State based models, such as Finite State Machines (FSMs), highlight intra-process behaviour and are suitable for code generation.

❖ Obtaining a state based requirements model involves relatively more manual effort, as compared to the scenario based model and is hence, error prone.

❖ We exploit the distinct strengths of the two modelling styles within a round-trip engineering validation methodology-
 1. Test cases containing traceability information, linking test case events to requirements, are derived from a scenario based requirements model (HMSC).
 2. Implementation code (C++) is generated automatically from a state based requirements model (Statecharts) via Rhapsody tool.
 3. The implementation code derived in (2) is tested against the test cases obtained from (1). Execution sequences from unsuccessful test cases are traced back to the original requirements using traceability information to aid debugging.

OVERVIEW
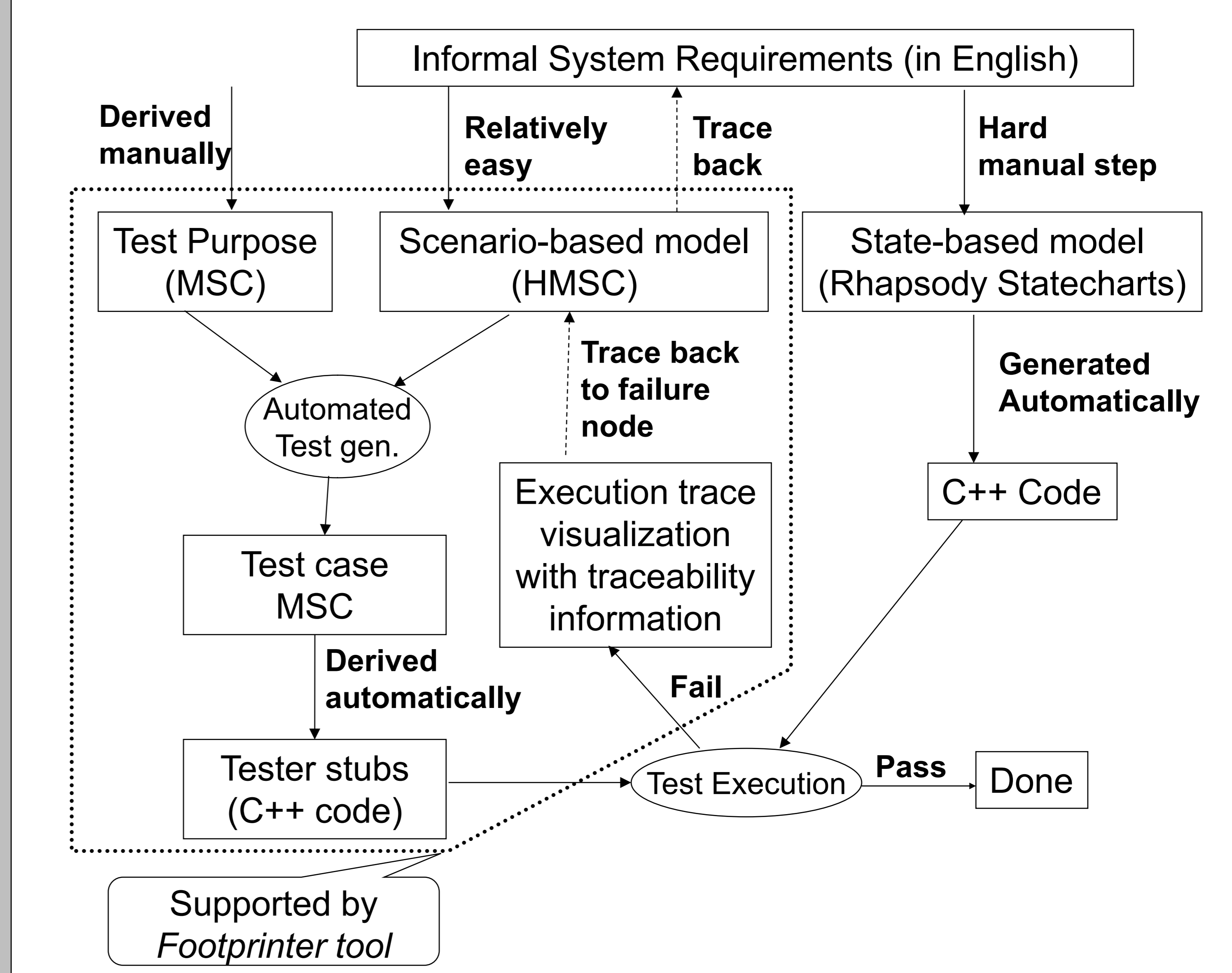
Footprinter: TOOL ARCHITECTURE

❖ Comprises of four main components:
1. **Eclipse based graphical editor** to input- (i) scenario based requirements model as an HMSC, and (ii) a test-purpose as an MSC.
2. **Test generation engine** implemented in XSB logic programming system. Generates test cases in the form of MSCs from a HMSC model, guided by a user provided test-purpose (MSC).
3. **Test stub generator**. Generates tester code (C++) from a test case MSC for testing an implementation.
4. **Test case / Test execution trace visualizer as MSC** using Mscgen and Eclipse. Traceability information is also displayed.
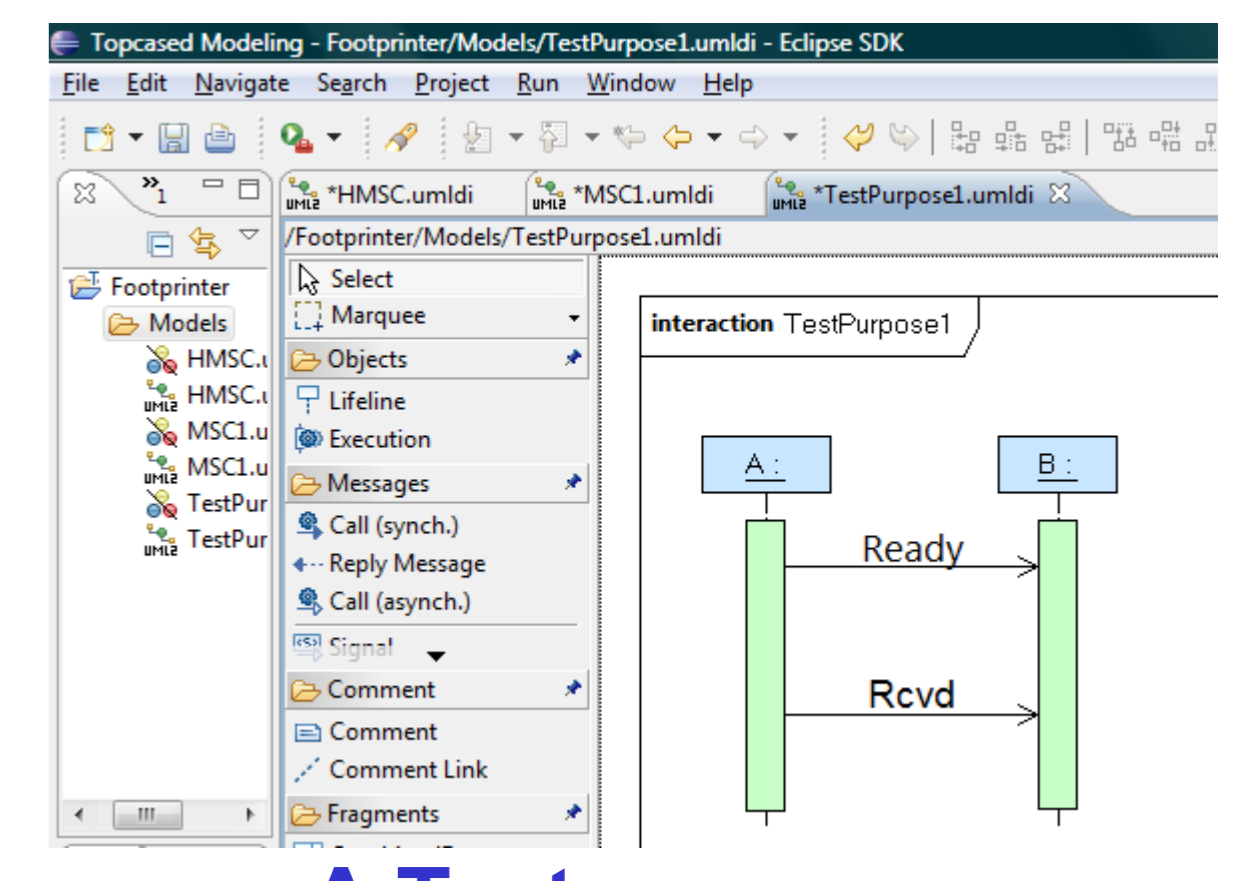
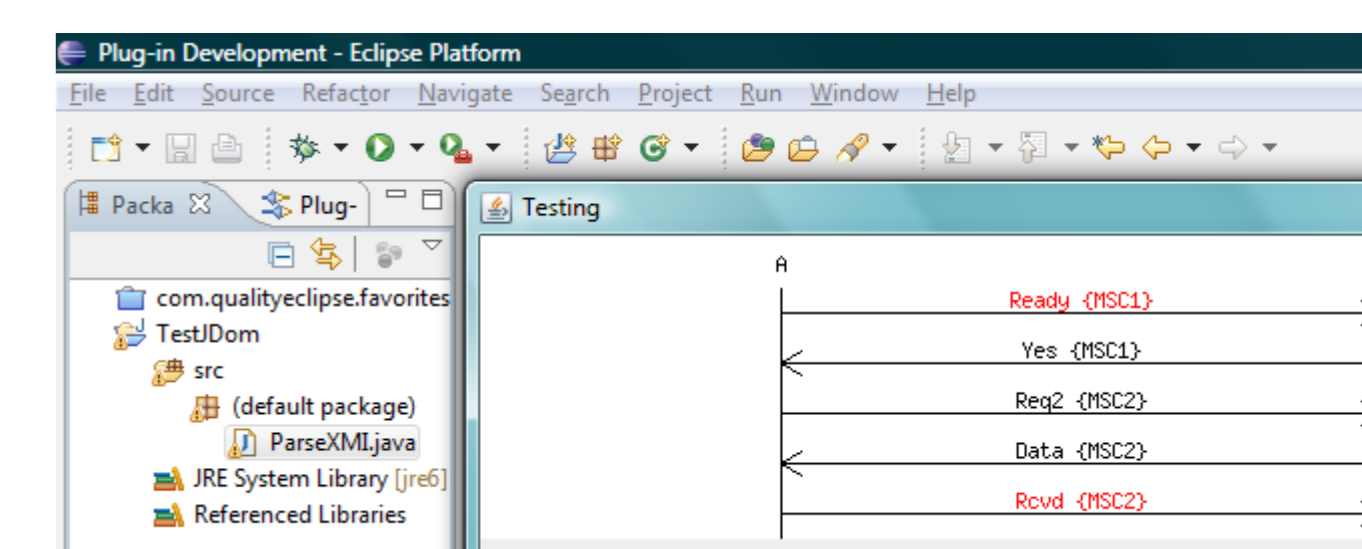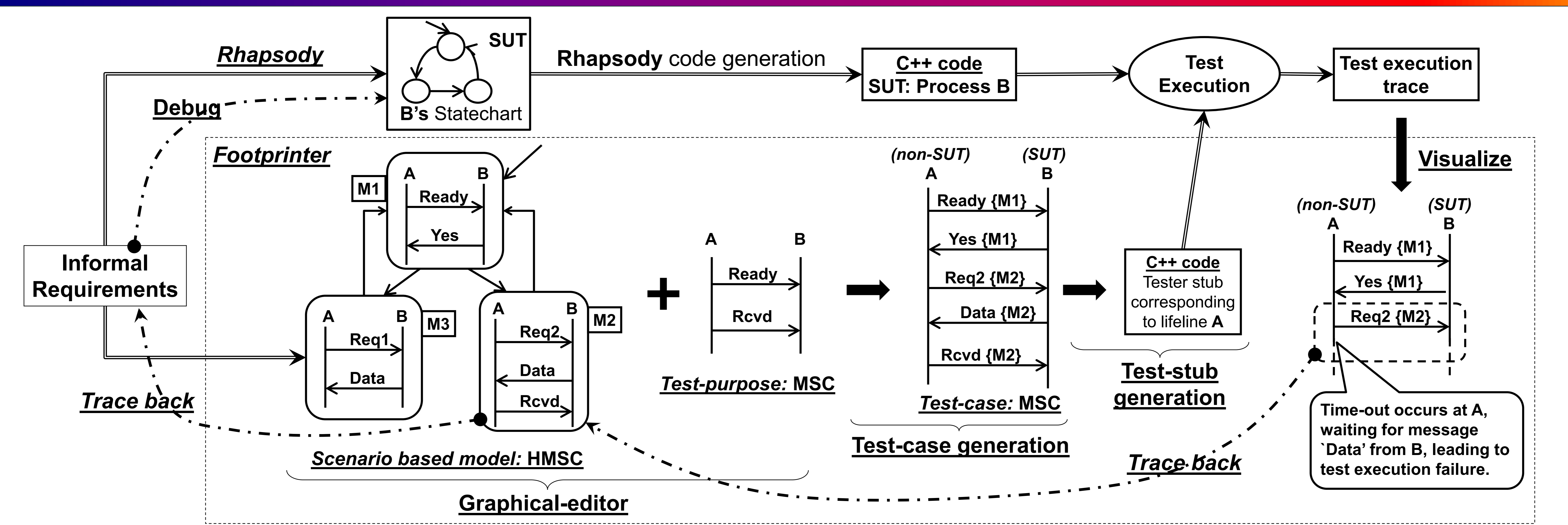### SCREENSHOTS
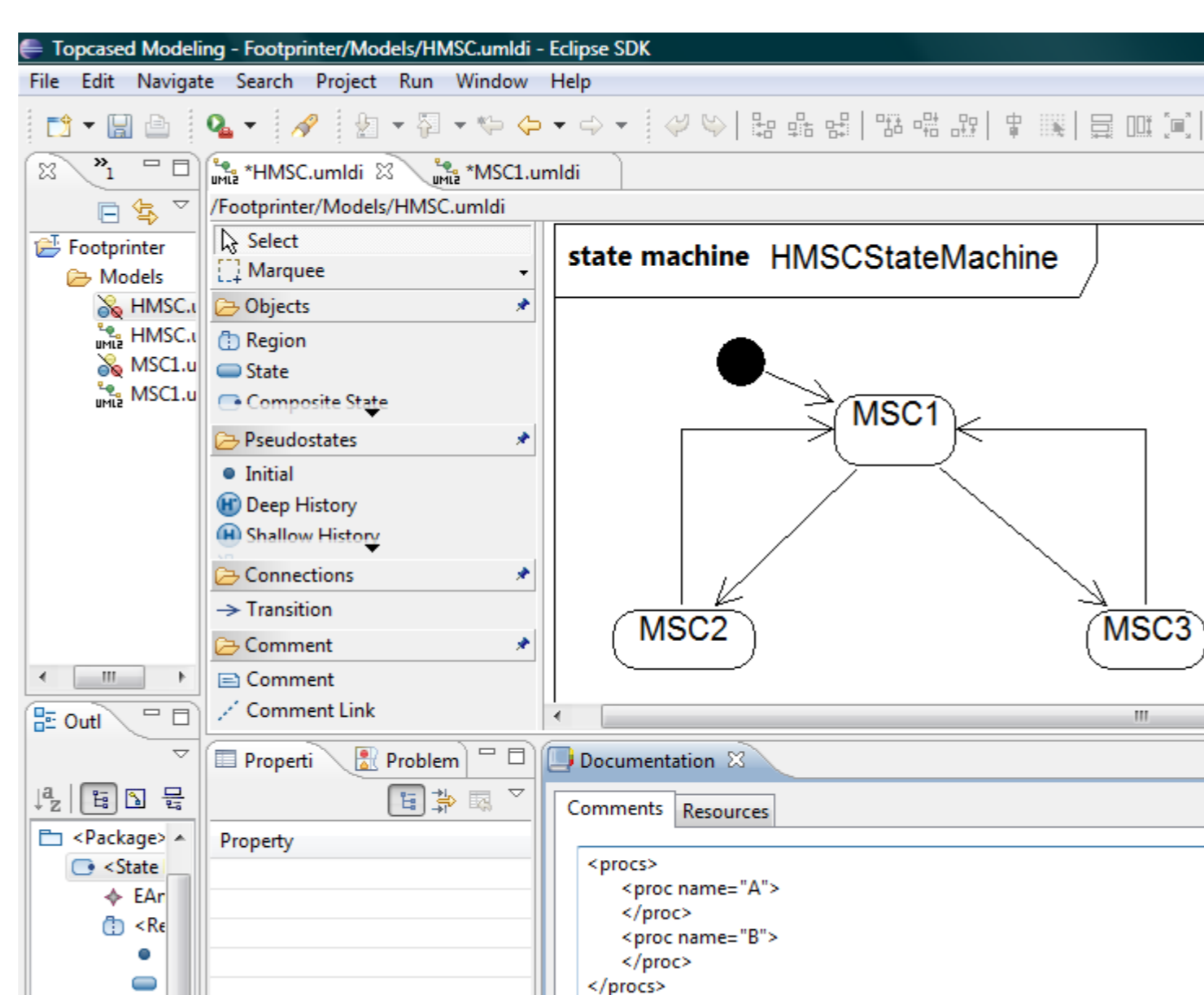
HMSC graph: H1
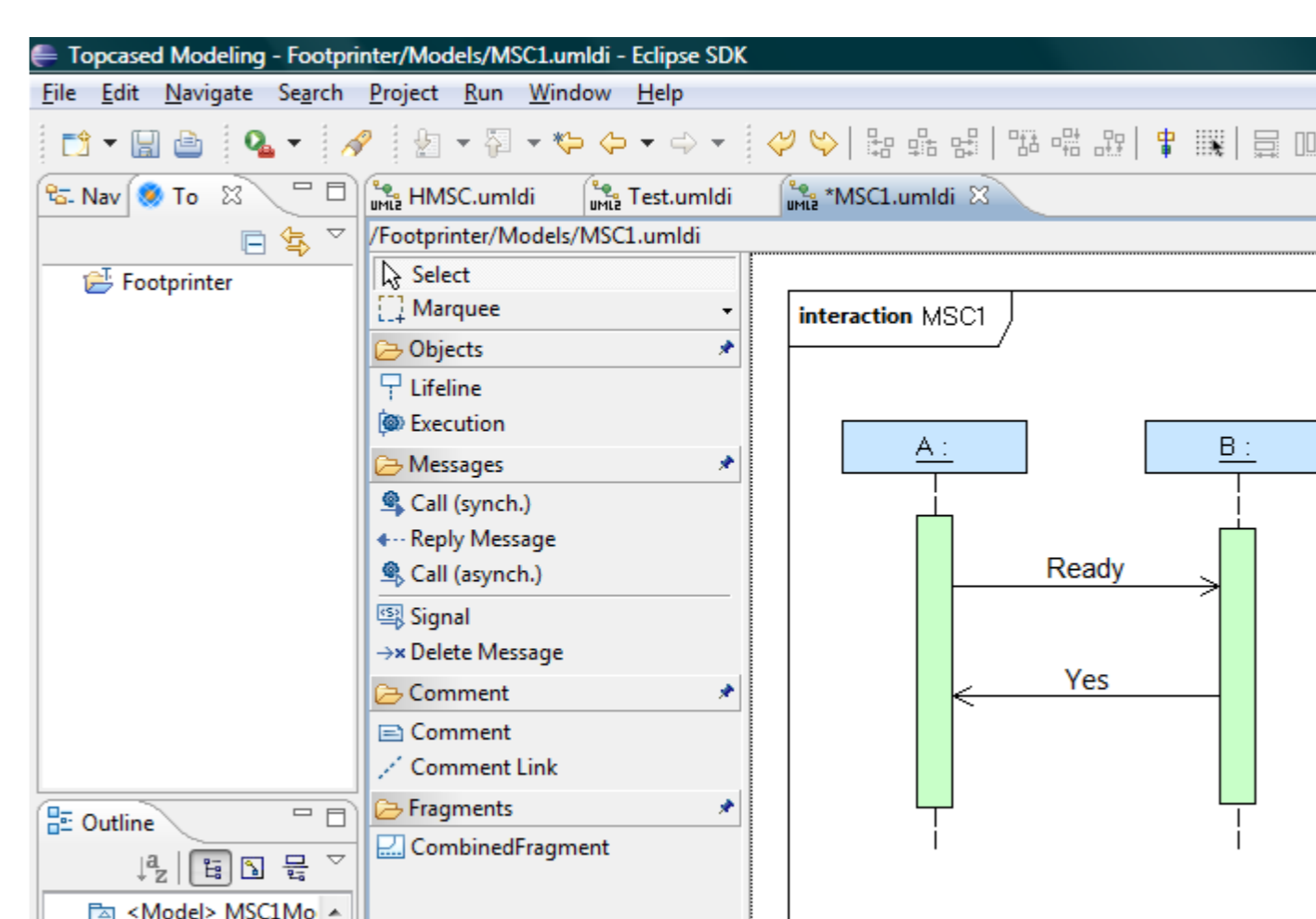
MSC1 from HMSC H1

A Test-purpose

Test-case: Visualized using Mscgen

ILLUSTRATION

REFERENCES

1. *Footprinter: Roundtrip Engineering via Scenario and State based Models.* Ankit Goel, Bikram Sengupta and Abhik Roychoudhury, *ACM International Conference on Software Engineering (ICSE) 2009,* Short paper.