An Overview of Overture and how tools for VDM are bootstrapped

Rodin User and Developer Workshop

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Southampton — July 16 2009

Outline

Introduction

- Vienna Development Method

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- Multi dialect (VDM-SL, VDM++ and VDM-RT).

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- VDM Tools

The Overture project

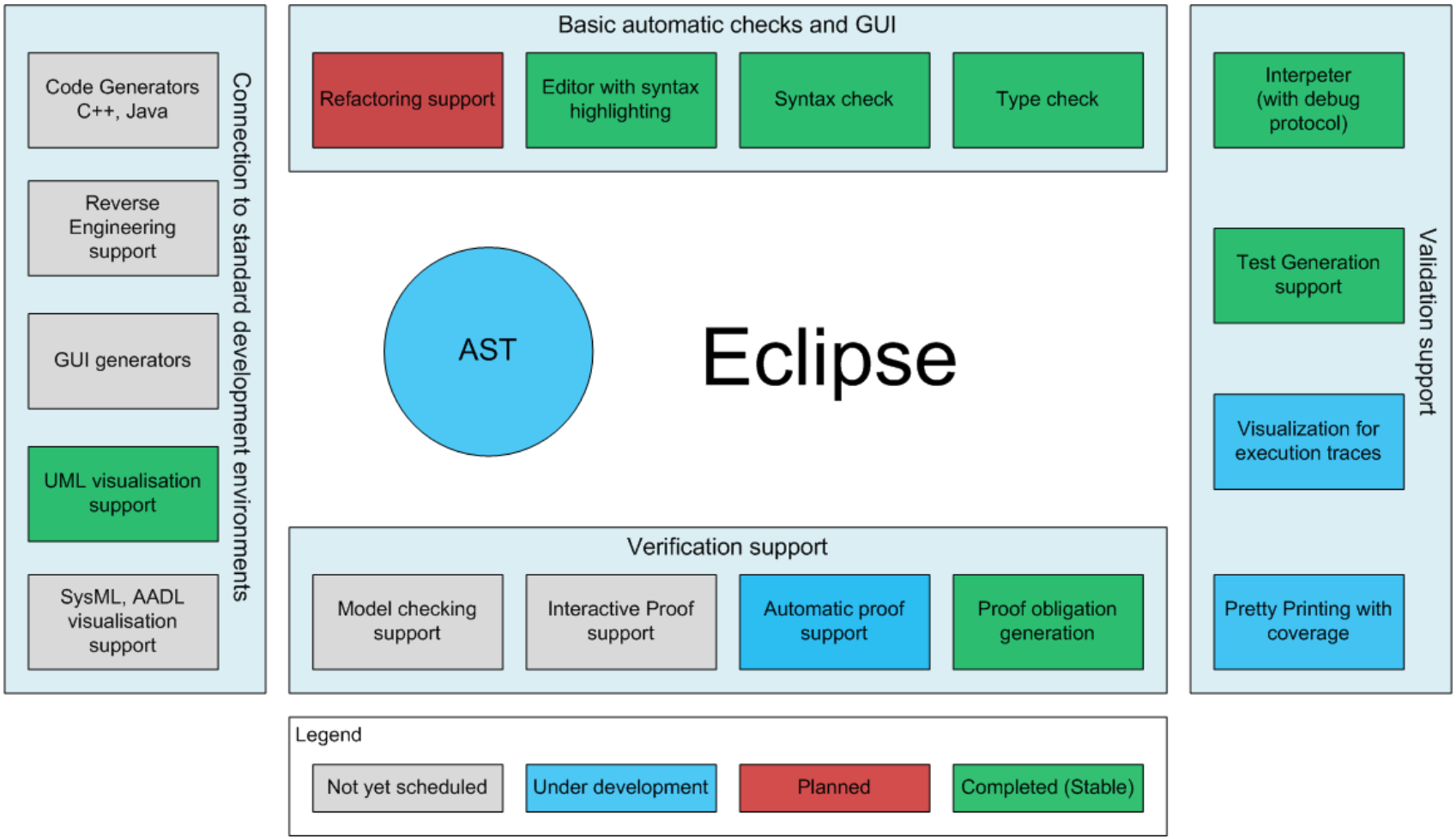
Mission

Overture's mission is twofold:

- to provide an industrial-strength tool that supports the use of precise abstract models in software development, and
- to foster an environment that allows researchers and other interested parties to experiment with modifications and extensions to the tool.

The Overture tools are being developed by volunteers, researchers and students.

Overview of the Overture Tools



Overture components

Basic automatic checks and GUI

- Refactoring support.
- Editor with syntax highlighting.
- Syntax check.
- Type check.

Connections to standard development environments

- Code Generators C++, Java.
- Reverse Engineering support.
- GUI generators.
- UML visualization support.
- SysML, AADL visualization support.

Components

Validation support

- Interpreter (with debug protocol).
- Test generation support.
- Visualization for execution traces.
- Pretty Printing with coverage.

Verification support

- Proof obligation generation.
- Model checking support.
- Interactive Proof support.
- Automatic proof support.

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Verification support

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- Interactive Proof support.
- Automatic proof support.

Connection to Rodin

The automatic proof support is current done in HOL but the GUI presentation of that will be difficult inside Eclipse. So an alternative connection to Rodin would be interesting if possible.

Outline

VDMJ

Features

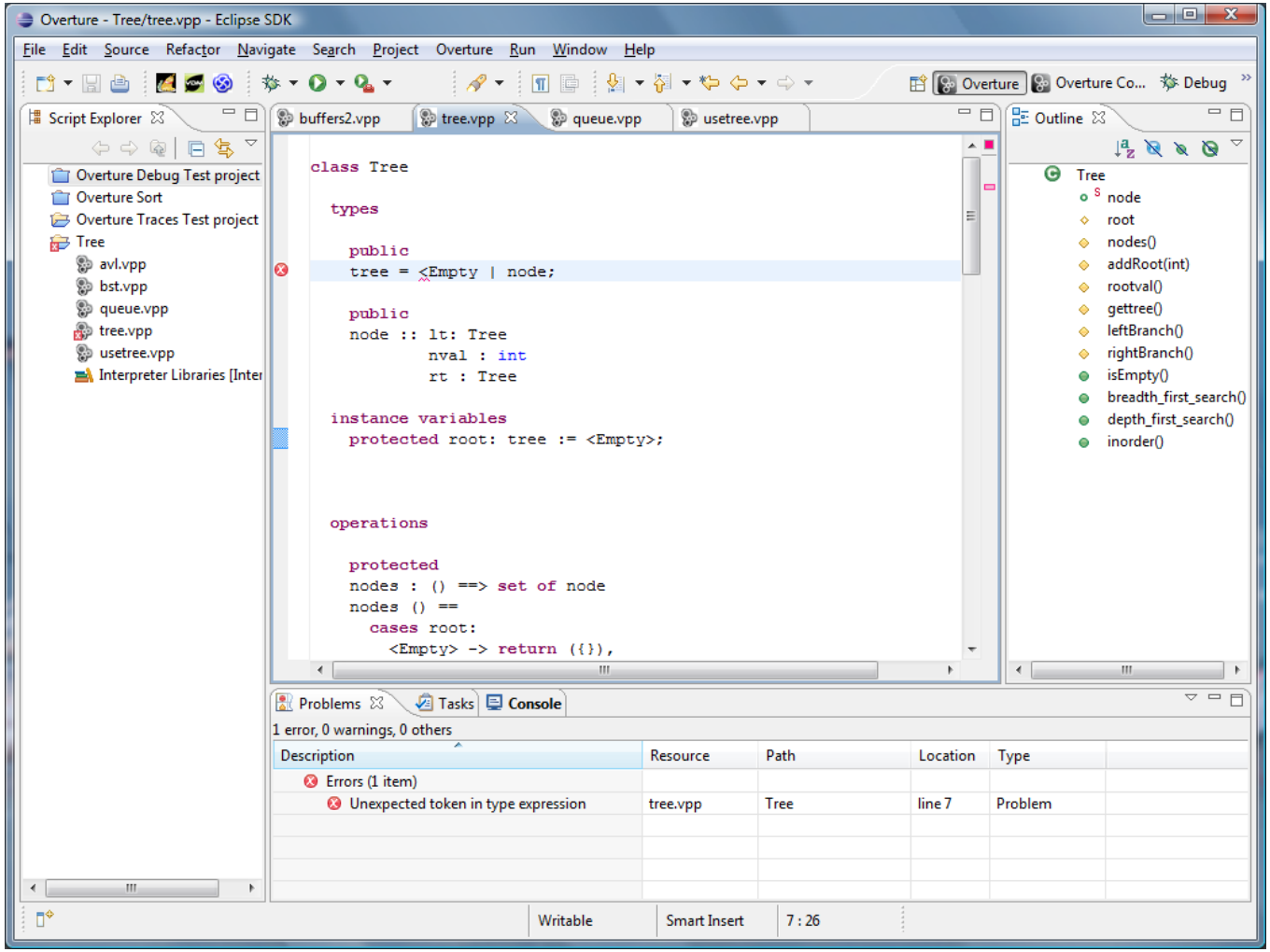
- Syntax check.
- Type check.
- Interpreter (with debug protocol).
- Pretty Printing with coverage (partly).
- Test generation support.
- Proof obligation generation.
- Multi dialect: VDM-SL, VDM++ and VDM-RT

Editor

Features

- Editor with syntax highlighting.
- Syntax check.
- Type check.
- UML visualization support.
- Interpreter.
- Test generation support.

Editor Main view



Demo

- Overture Debugger.

Outline

Bootstrapping

Compilers

"Bootstrapping is a term used in computer science to describe the techniques involved in **writing a compiler** *(. . .) in the* **target programming language** *which* **it is intended to compile**.*"*

From Wikipedia, the free encyclopedia

Bootstrapping

How is it done?

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- How to produce the first compiler for a new language?

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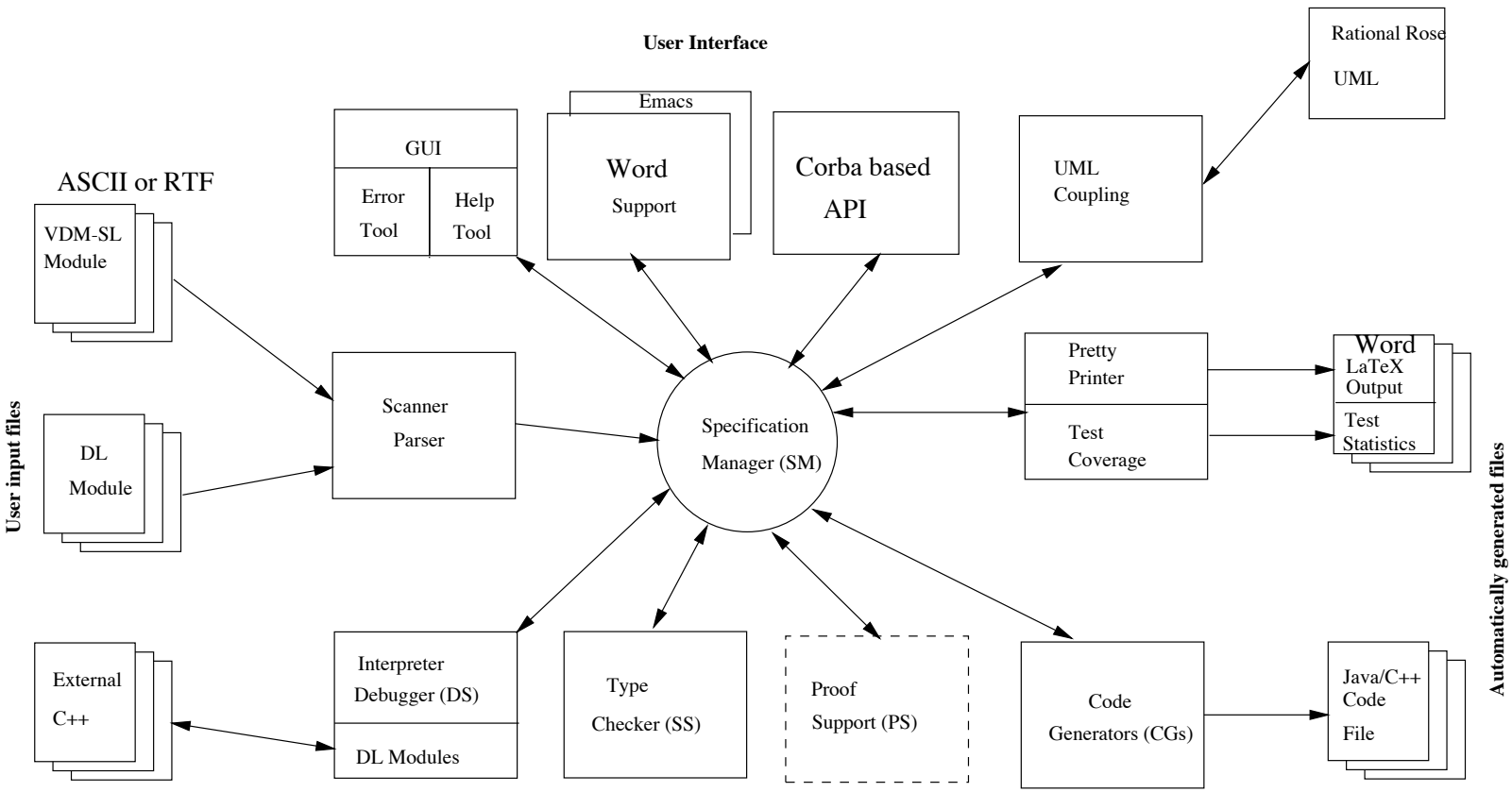
- How to produce the first compiler for a new language?

Niklaus Wirth — the first Pascal compiler

- Used a different language — first implementation was written in Fortan;
- Manually compiled the compiler — second implementation was written in Pascal and hand compiled.

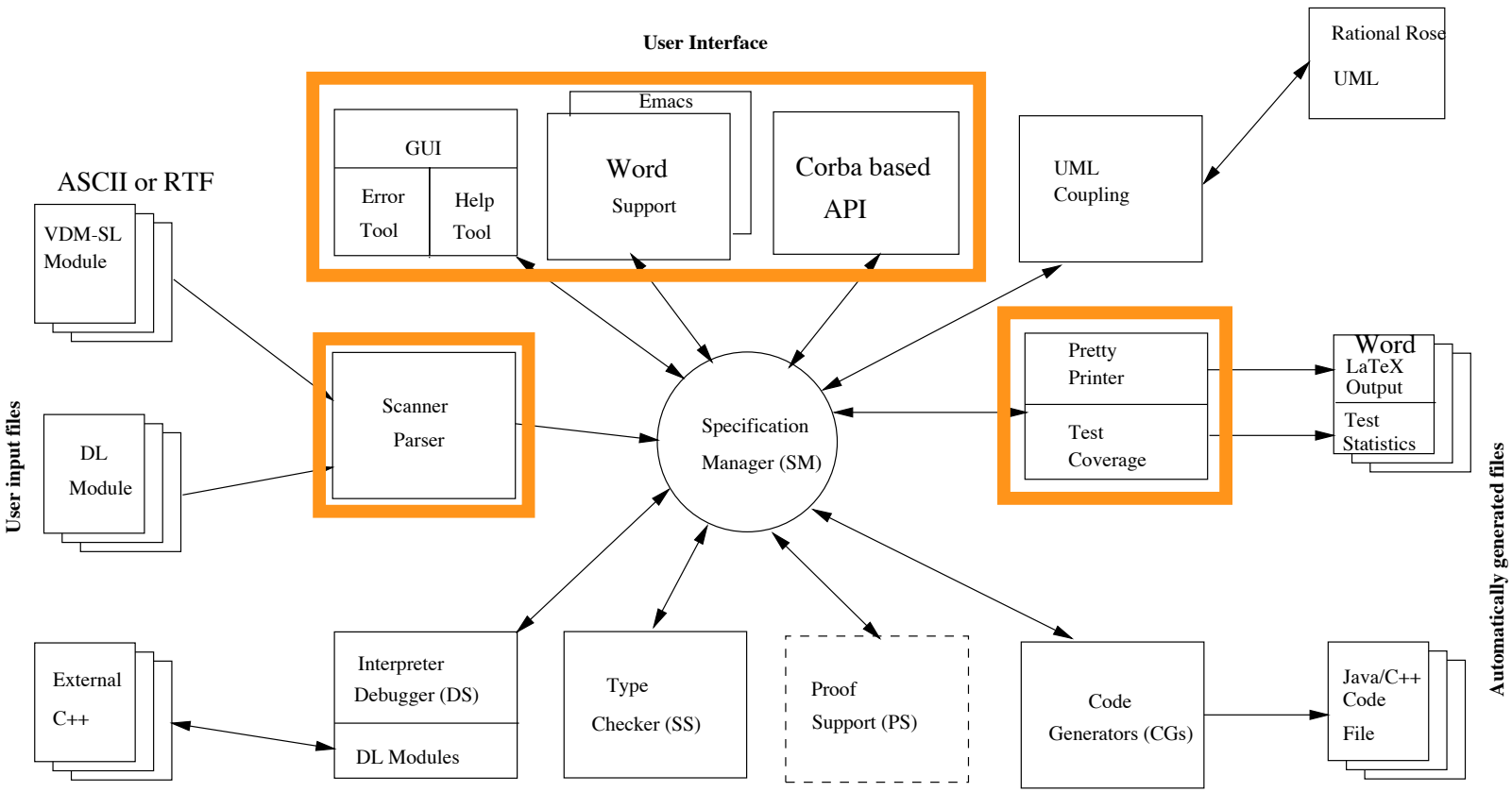
Architecture

Overview



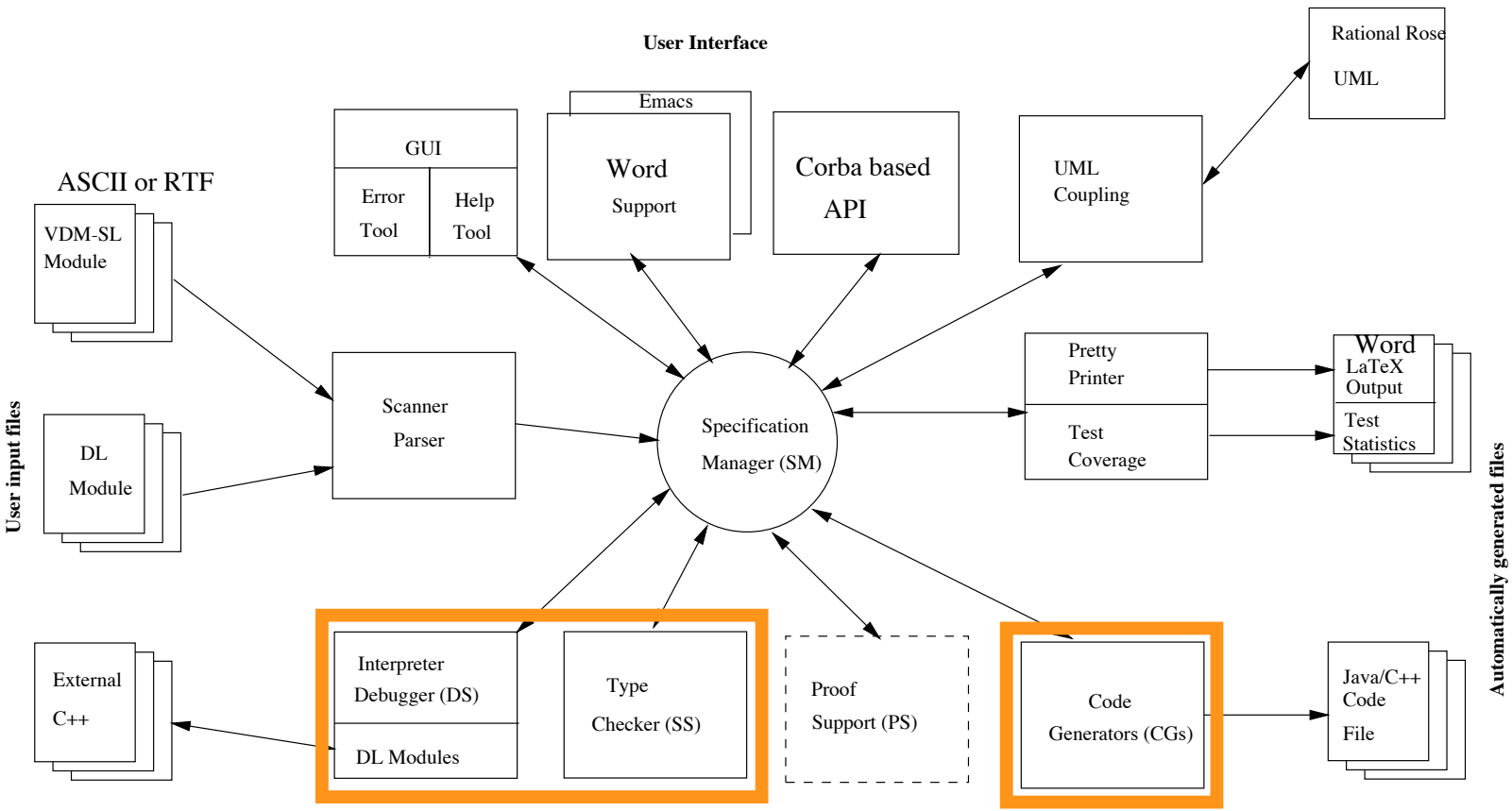
Architecture

Conventional development



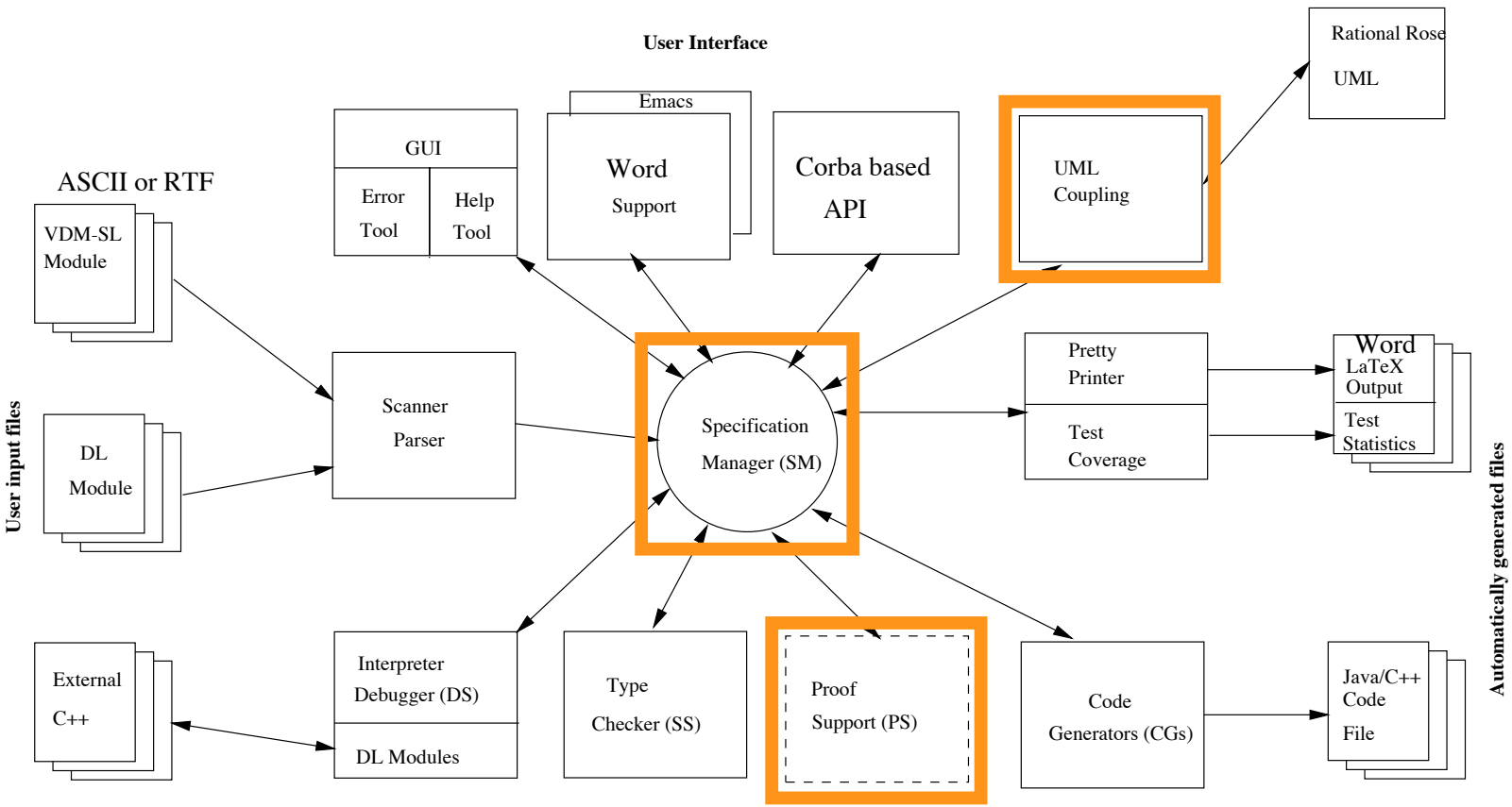
Architecture

Formally specified



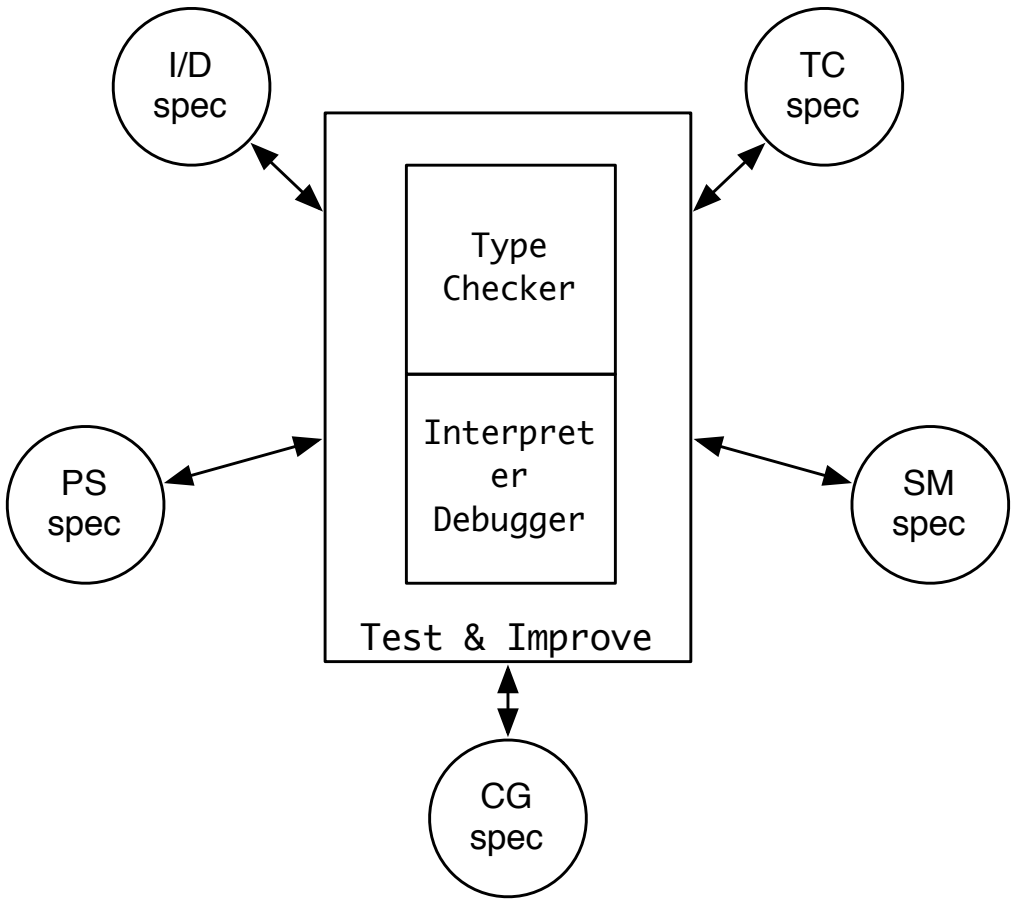
Architecture

Generated code



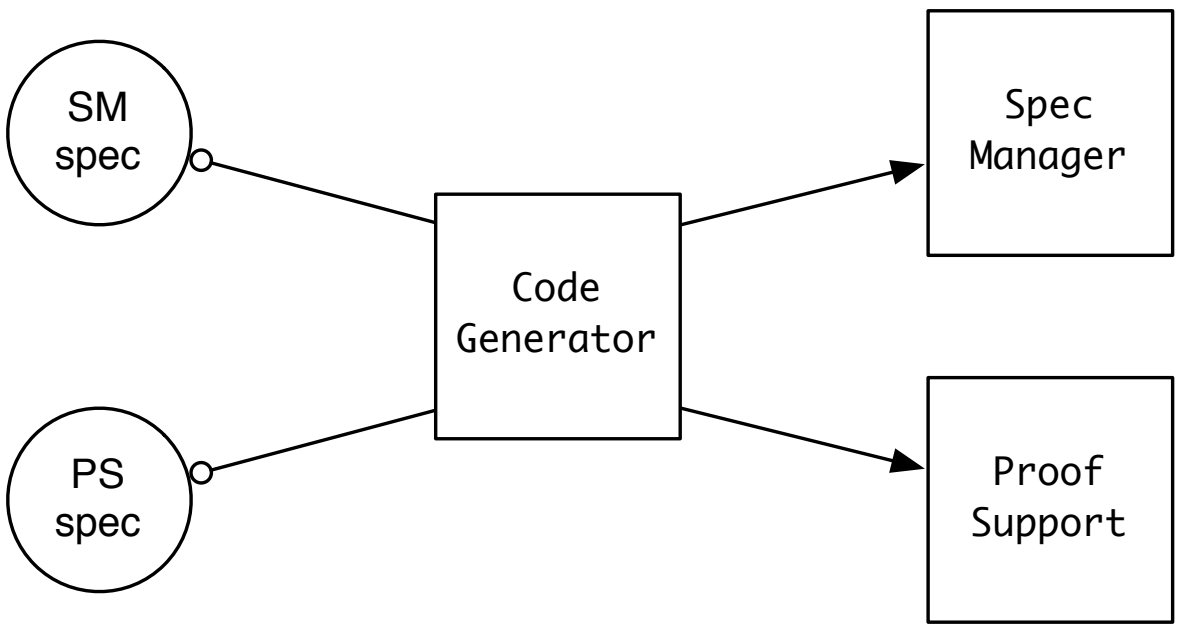
Bootstrapping

Test and improvement



Bootstrapping

Tool generation



Bootstrapping

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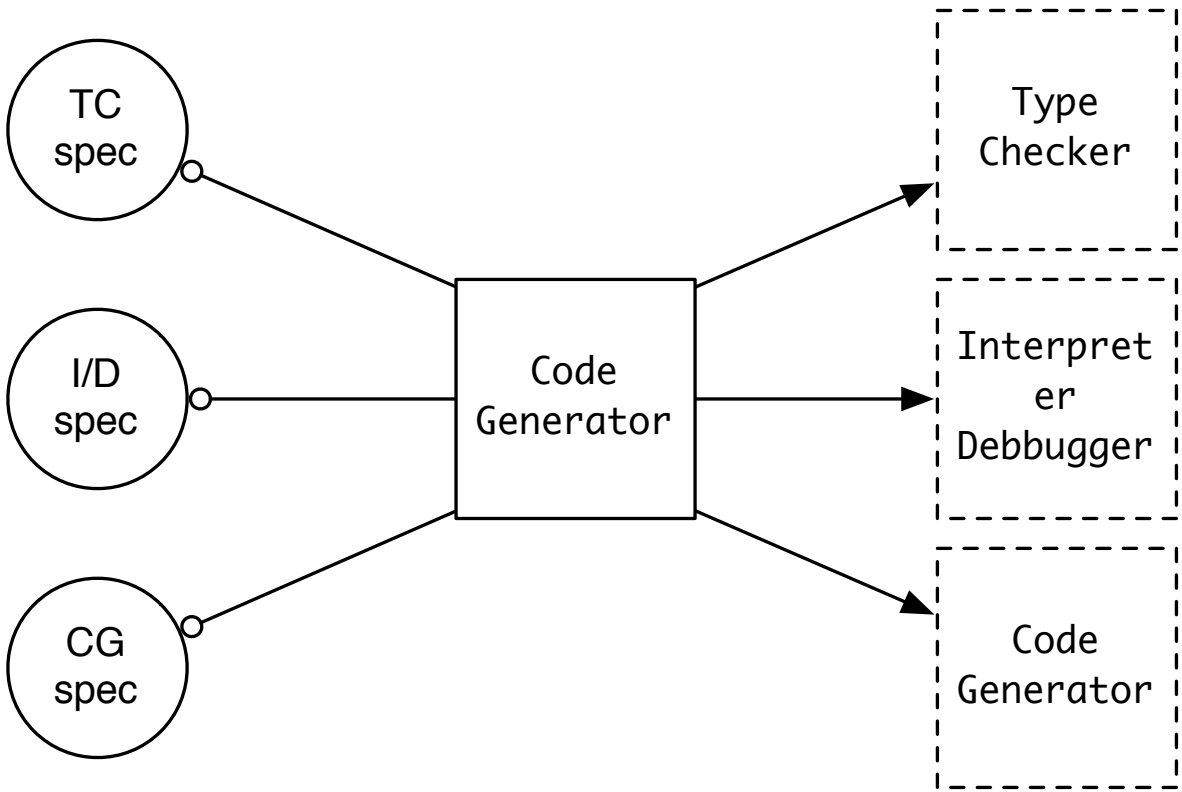

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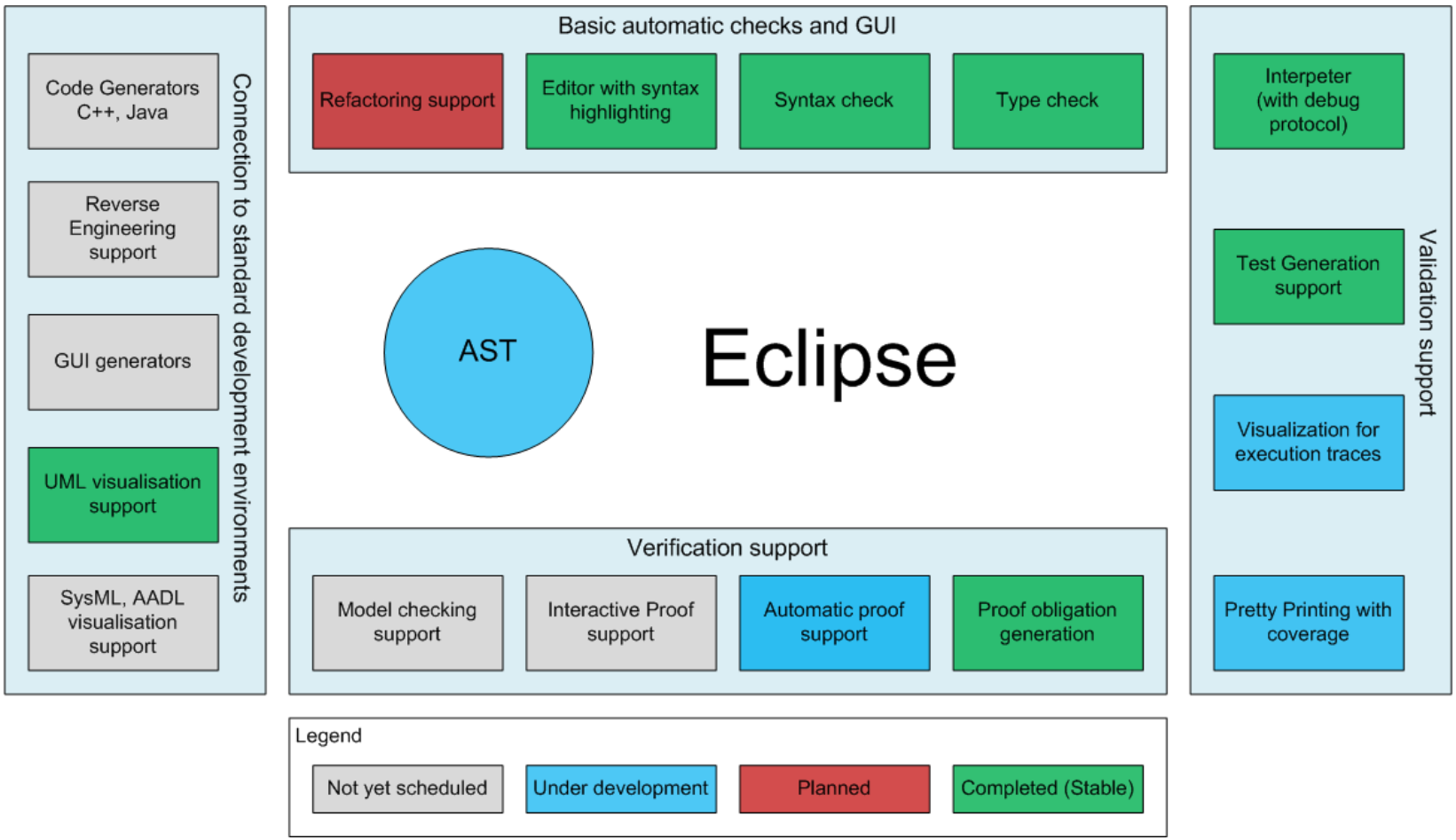

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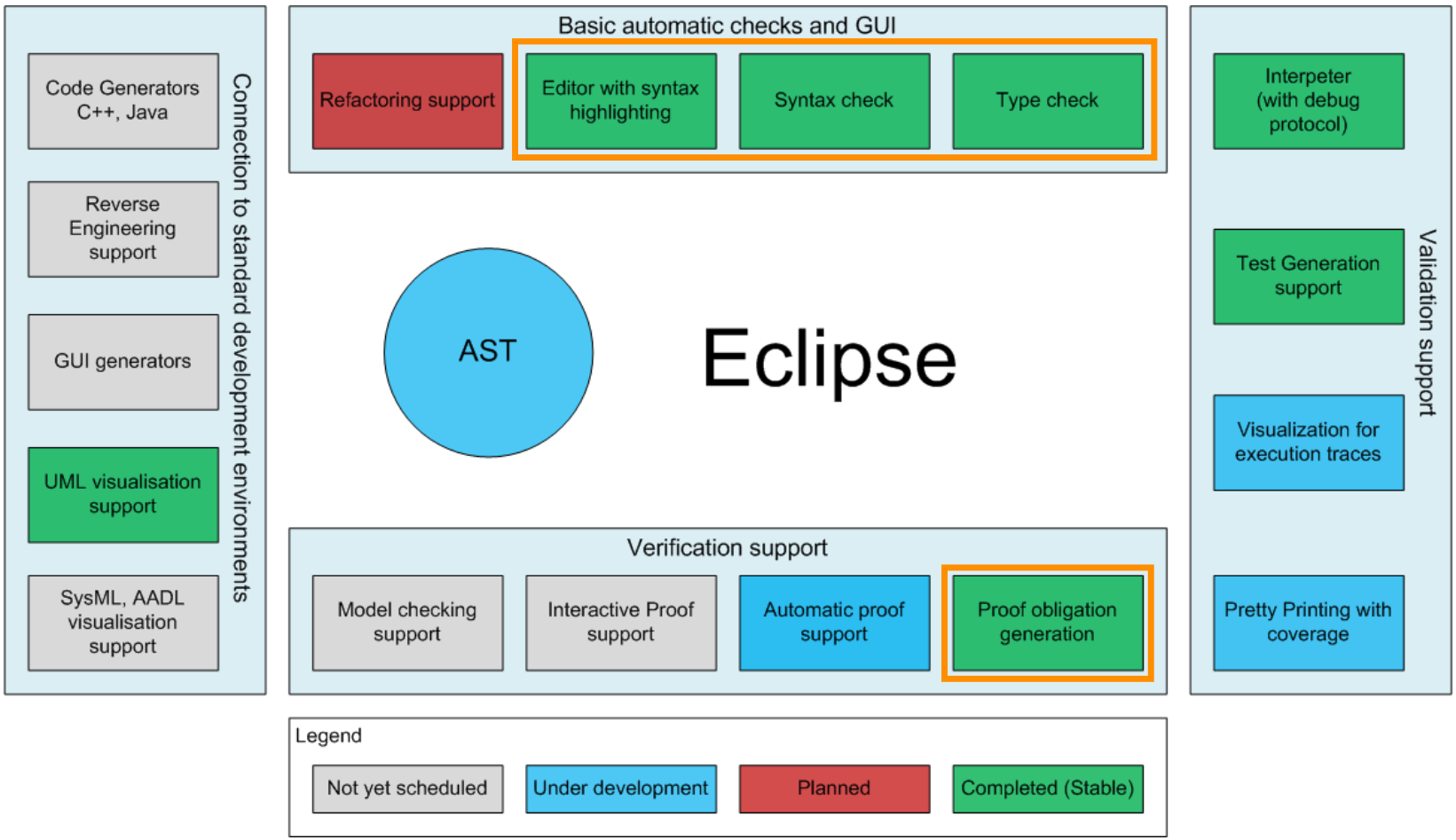

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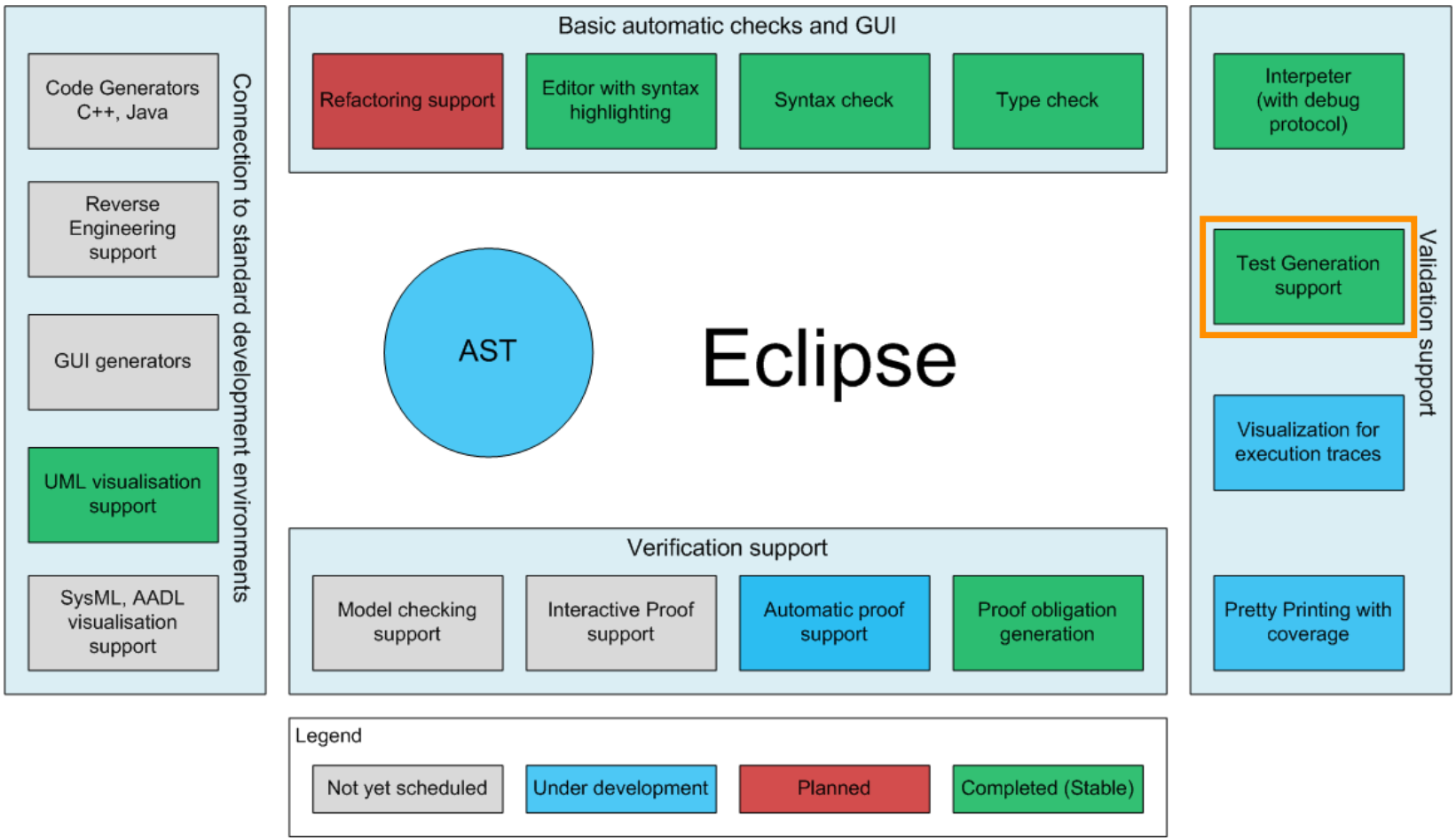

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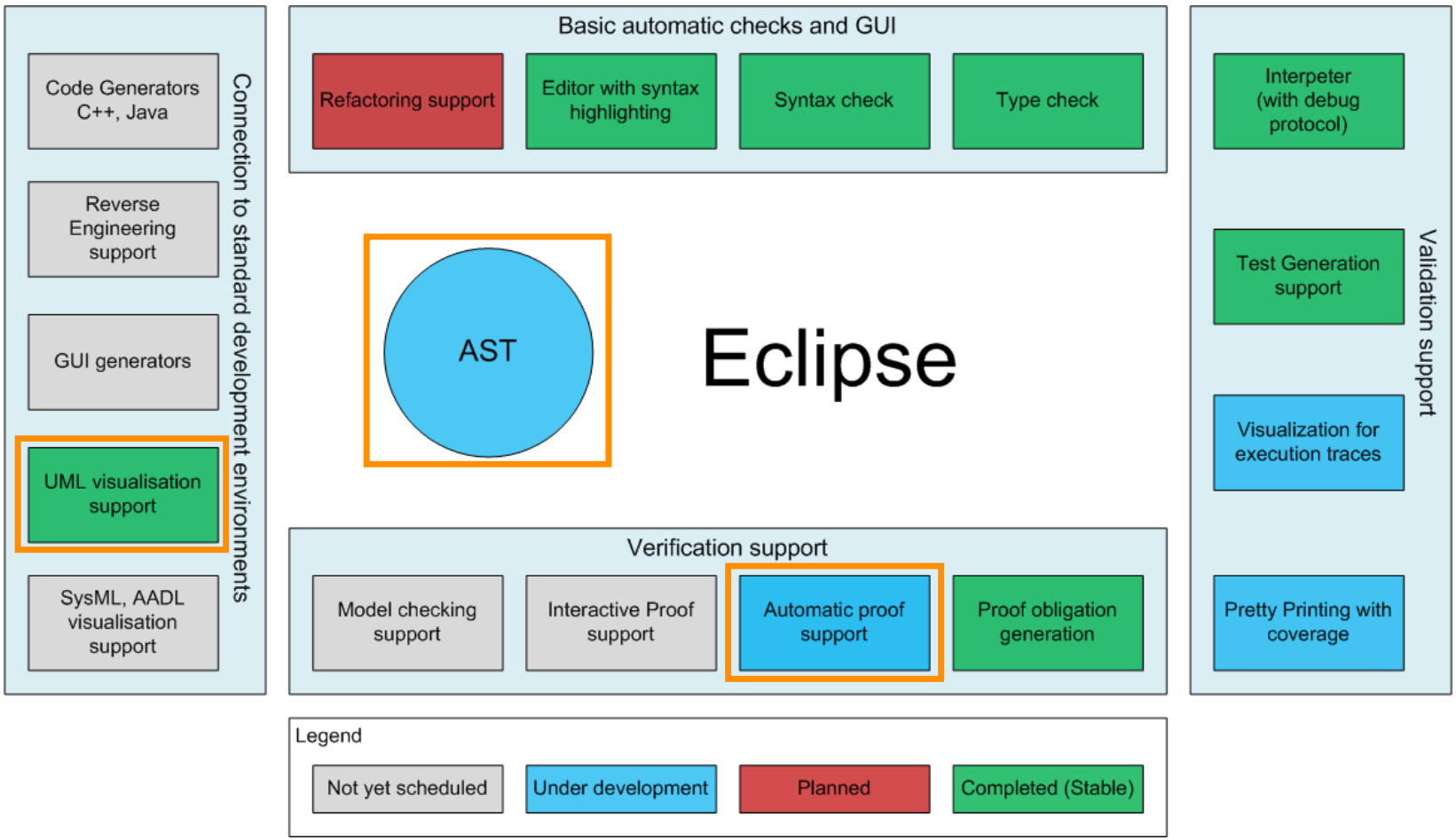
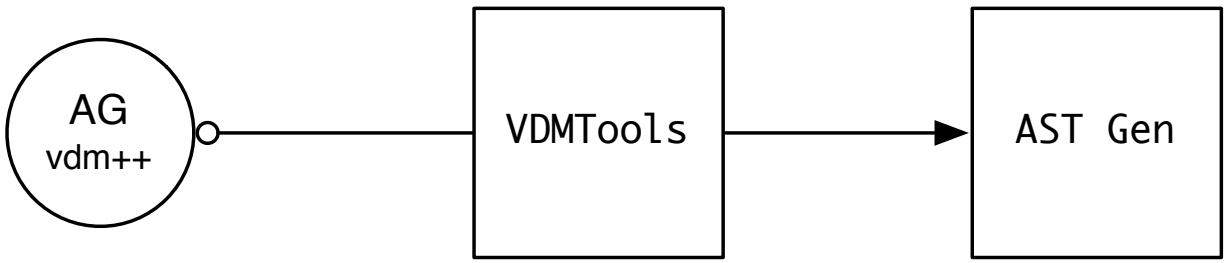


Bootstrapping

AST Generation



Bootstrapping

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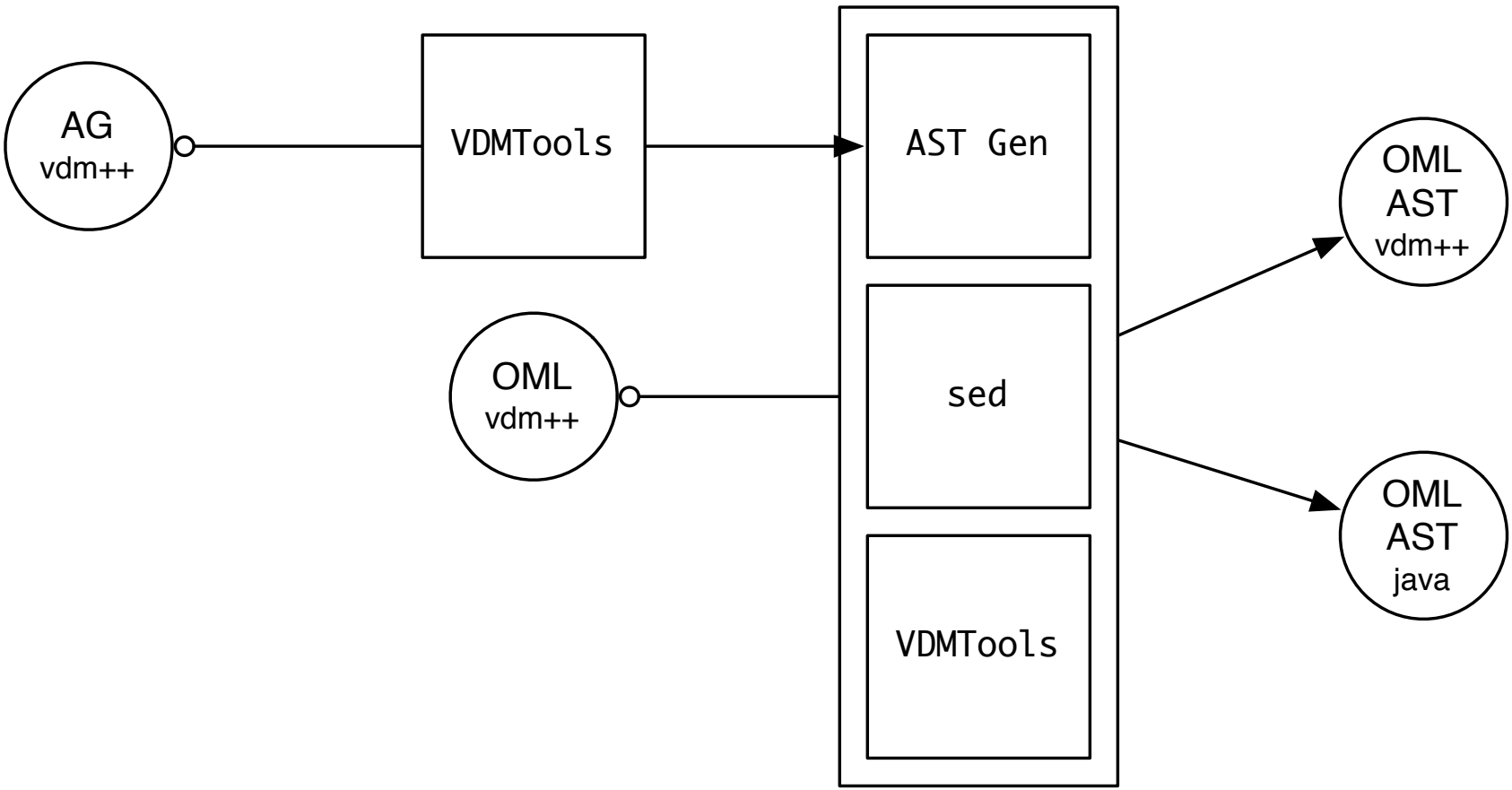
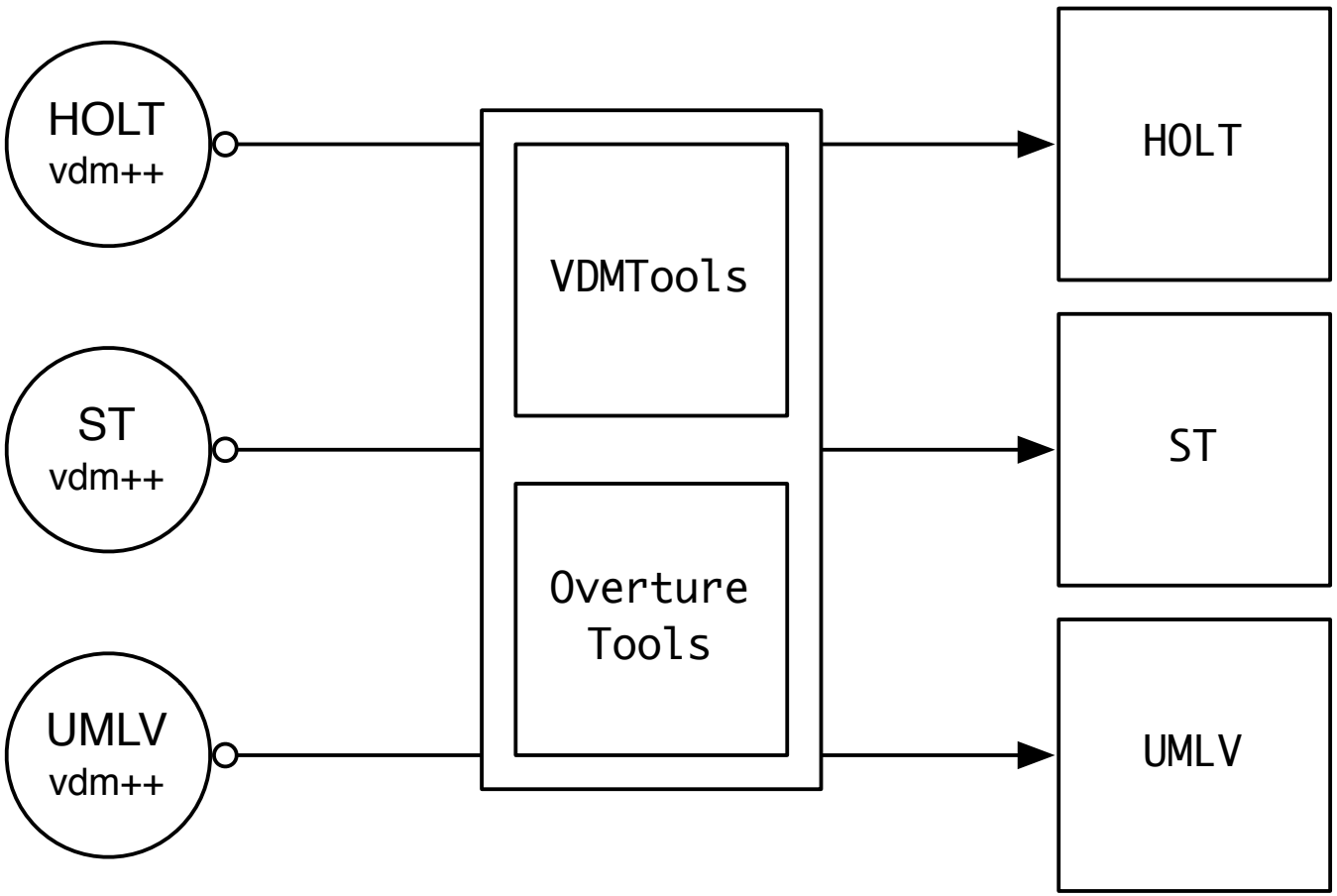


Bootstrapping

Component Generation



Thank you!

www.overturetool.org

Peter Gorm Larsen.
Ten Years of Historical Development: "Bootstrapping" VDMTools.
JUCS, 7(8):692–709, 2001.