AADL Compliance Test Suite
Status Report

Julien Delange, Jérôme Hugues, Alexey Khoroshilov

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AADLv2 Test Suite Goals

- to ensure single interpretation of the specification
- to improve quality of the tools and of the specification
- to make limitations of the tools explicit
- to improve interoperability between the tools

Test Suite Organization

- src/ - collection of test models
- requirements/ - requirements tree
- tools/ - infrastructure scripts
- aadl-qa.pl - CLI

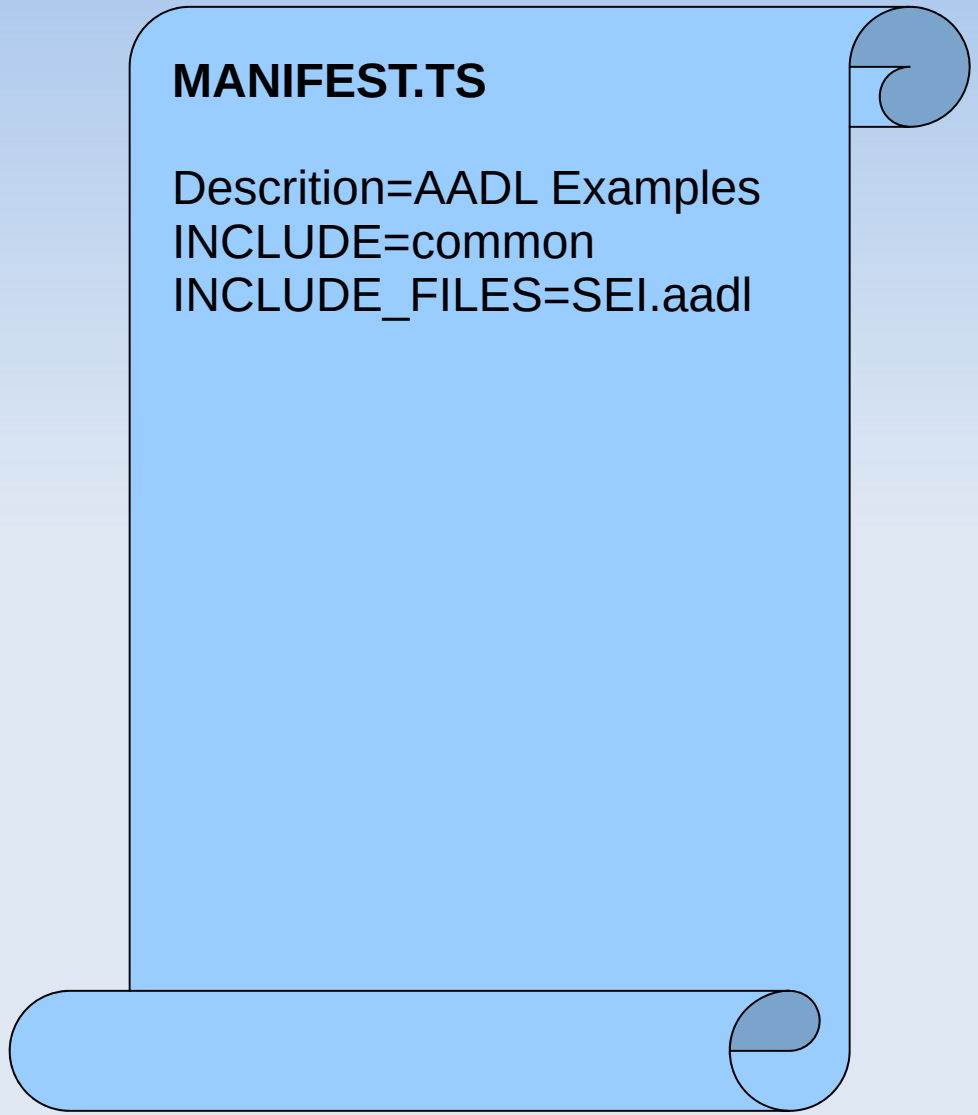
src/ - Collection of Test Models

src/ is a hierarchy of test suites:

- test_suite_1/
- test_suite_2/
  - test_suite_2_1/
  - test_suite_2_2/
  - test_suite_2_3/
- test_suite_3/

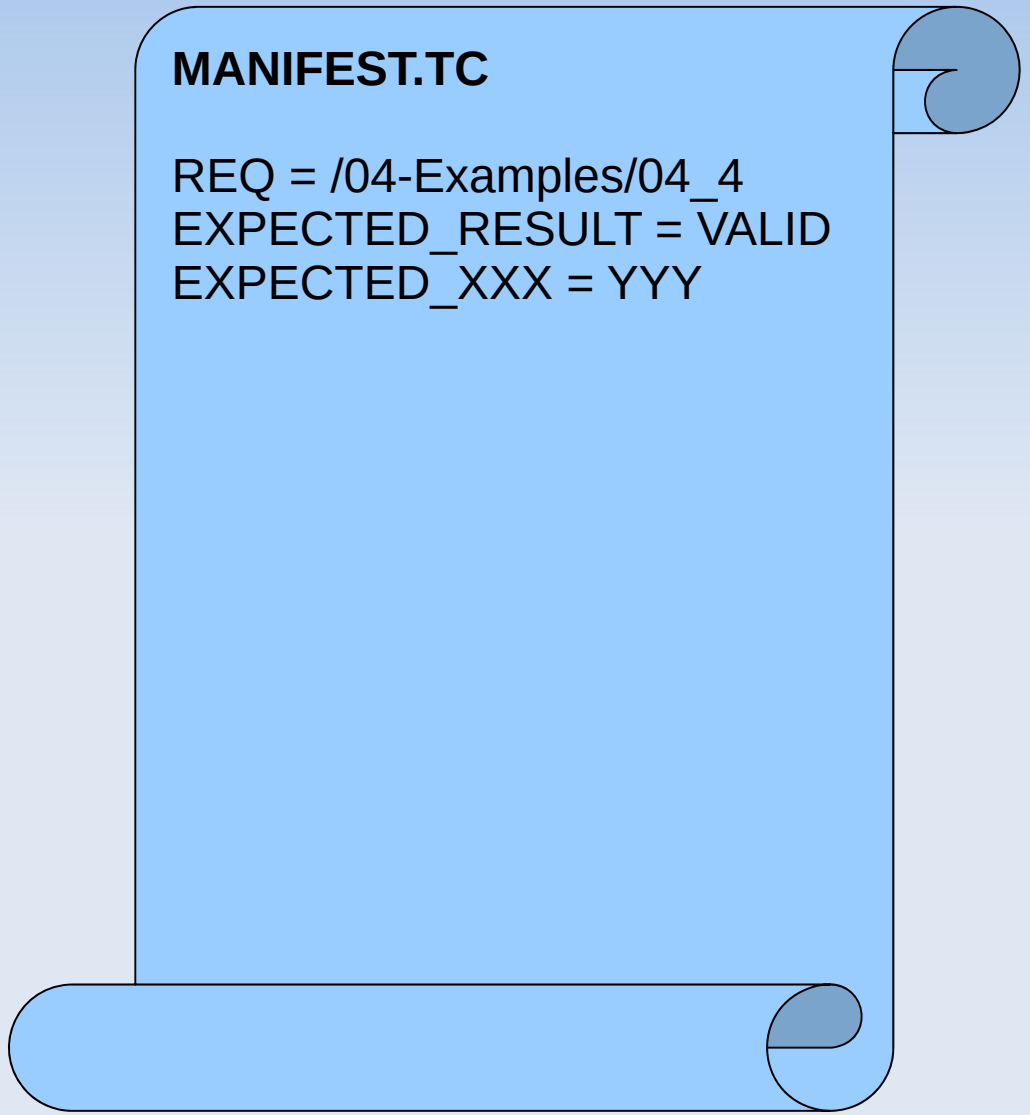
Test Suite

- test_suite_1/
  - MANIFEST.TS
- test_suite_2/
  - MANIFEST.TS
  - test_suite_2_1/
    - MANIFEST.TS
  - test_suite_2_2/
    - MANIFEST.TS
  - test_suite_2_3/
    - MANIFEST.TS



Test Case

- test_case/
  - MANIFEST.TC
  - anyfile1.aadl
  - anyfile2.aadl



Tool Adapter

- tools/manager/ToolAdapter.pm
- tools/manager/OcarinaAdapter.pm

```
package OcarinaAdapter;
our @ISA = qw(ToolAdapter); # Inherit ToolAdapter
sub do_run {
  my ($self,$test_case) = @_;
  my %result = ();
  my $code = system("ocarina -aadlv2 $self->{'aadlfiles'}
                                    >$test_case->{'LOGDIR'}/log.txt
   2>&1");
  $result{'RESULT'} = ($code eq 0) ? "VALID" : "INVALID";
  $result{'LOG'} = `cat $test_case->{'LOGDIR'}/log.txt`;
  return \%result;
}
```

Verdict

MANIFEST.TC

REQ = /04-Examples/04_4
EXPECTED_RESULT = VALID
EXPECTED_XXX1_OPT = YYY
EXPECTED_XXX2_MATCH=REGEXP

RESULT MAP

RESULT = VALID
XXX1 = YYY1
XXX2 = YYY2
XXX3 = YYY3

PASS

FAIL

Results Report

Report for Ocarina run 20120415-231241

Test Info

Tests Started At	15-Apr-2012 23:12:41
Tests Finished At	15-Apr-2012 23:12:41
Operating System	Ubuntu 11.10

Tests executed

Ocarina		
/AADL-CTS/01-Syntax	Failures: 1	Passed: 10
/AADL-CTS/02-Semantic	Success	Passed: 2
/AADL-CTS/04-Examples	Success	Passed: 4

Ocarina:/AADL-CTS/01-Syntax

Problem Summary

Click on lines in the table to see the details about each problem.

Test Name	Severity	Failure
/package_spec/01-no-pri-no	failed	RESULT is 'INVALID' instead of 'VALID'

Messages from the test:

```
01-no-pri-no.aadl:7:07: parsing Defining_Identifier, identifier 'package_specx' is expected, found token ';'
01-no-pri-no.aadl:7:07: parsing AADL_Declaration, unexpected identifier 'package_spec'
Cannot parse AADL specifications
```

Reference to the specification: /Requirements/01-Syntax/package_spec/01-no-pri-no

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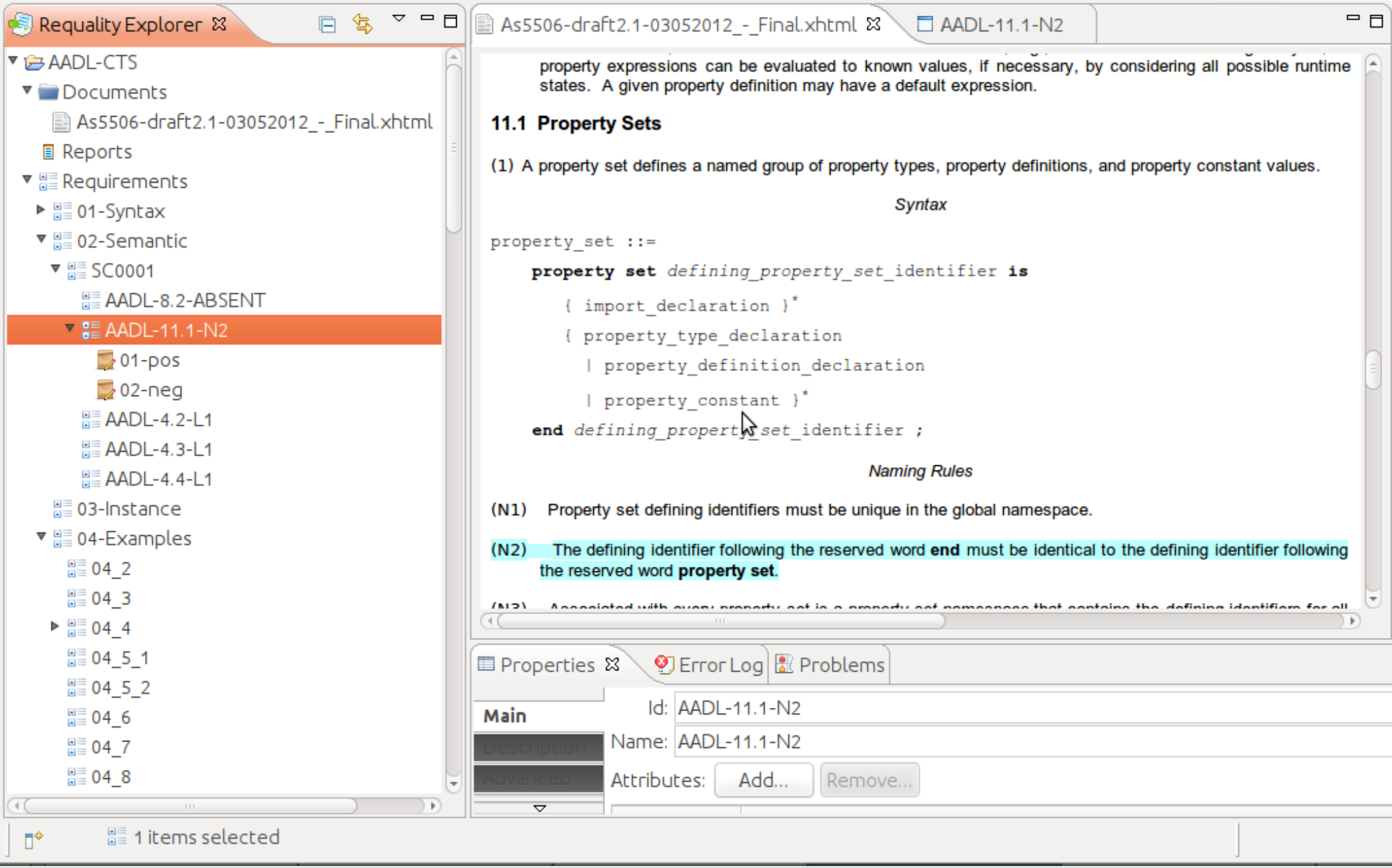
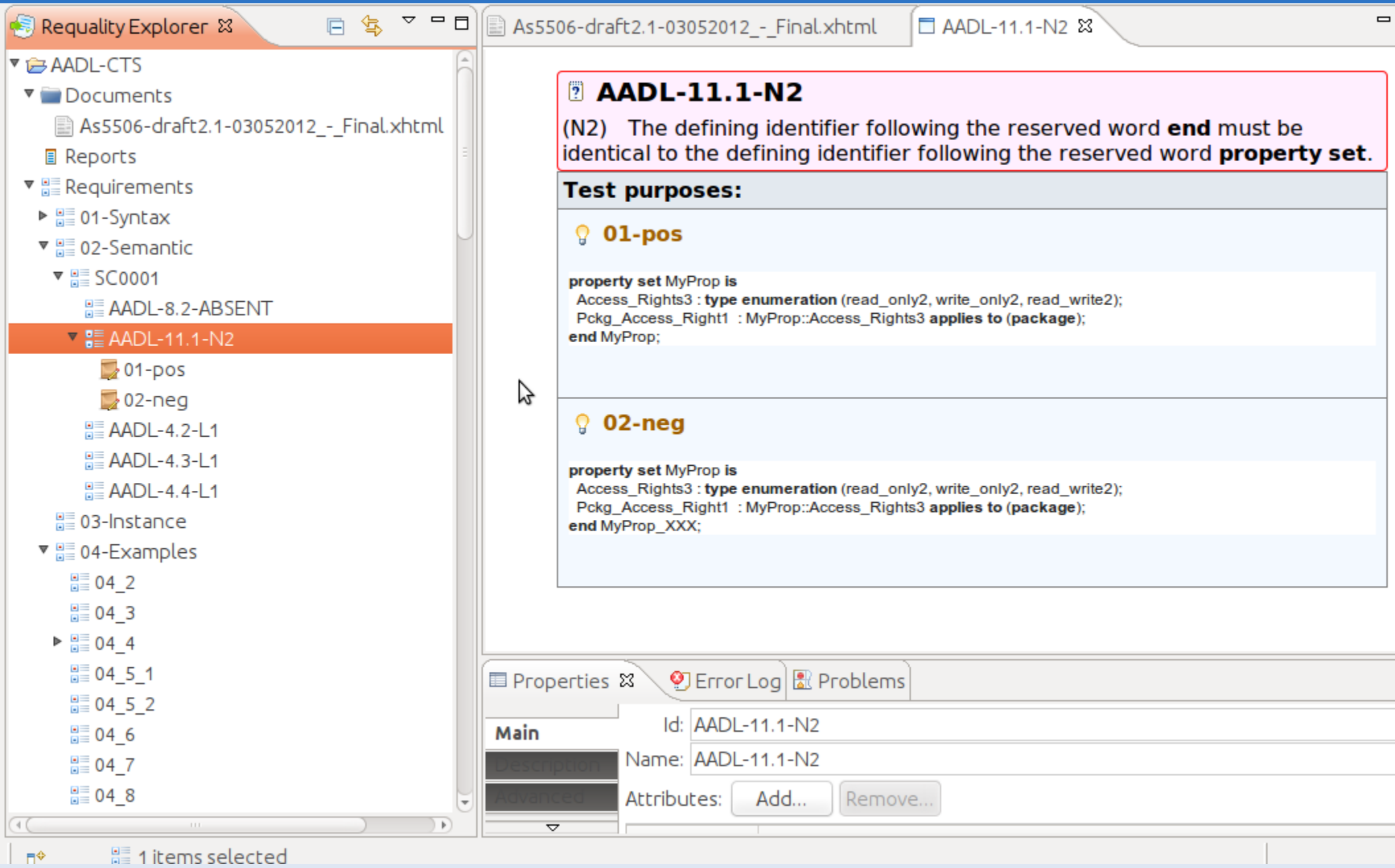
requirements/ - Requirements tree

- 01-Syntax
  - nonterminals
    - positive&negative test purposes
- 02-Semantic
  - Subrequirements of Naming, Legality and other rules
    - positive&negative test purposes
- 03-Instance
  - *empty*|
- 04-Examples
  - Examples from the specification

Requirements Tree



Test Purposes



Generated Staff

- gensrc/ -- similar to src/
  but generated from requirements/
- journals/ – plain logs of all runs
- reports/ – result reports

aadl-qa.pl

- `aadl-qa.pl gensrc`
  - `requirements/ → gensrc/`
- `aadl-qa.pl run <tool_1> <tool_2>`
  - `run all the tests`
- `aadl-qa.pl clean`
  - `remove all generated staff`
- `aadl-qa.pl --help`
  - `help message`

Reference to the Specification

Report for Ocarina run 20120415-235155

Test Info

Tests Started At	15-Apr-2012 23:51:55
Tests Finished At	15-Apr-2012 23:51:57
Operating System	Ubuntu 11.10

Tests executed

Ocarina		
/AADL-CTS	Failures: 1	Passed: 17

Ocarina:/AADL-CTS

Problem Summary

Click on lines in the table to see the details about each problem.

Test Name	Severity	Failure
/04-Examples/04_2/Aircraft_Cockpit_4_2	failed	RESULT is 'INVALID' instead of 'VALID'

Messages from the test:

```
Aircraft_Cockpit_4_2.aadl:17:48: Avionics::DataTypes::AirData (identifier) is not visible
Cannot analyze AADL specifications
```

Reference to the specification: /Requirements/04-Examples/04_2/Aircraft_Cockpit_4_2

(10) When a component implementation is declared as an extension of another component implementation and it is declared in both the public and private section of a package, then the **extends** is specified with t public section and the extension may include prototype bindings. The component implementation in the private section is considered to complete the declaration in the public section, i.e., its name can interpreted as reference to the defining name of the component implementation declaration in the public portion.

(11) An `import_declaration` specifies which packages and property sets can be named in qualified references to items in other packages or property sets. Packages can initially be declared w `import_declaration` without classifiers to set up an initial collection of package with use restrictions on other packages.

(12) An `alias_declaration` introduces local identifiers as short names for long names. It does so for package names and for classifier type references qualified by a package name. The short name may dif from the identifier of the long name to avoid name conflicts.

(13) Property associations declared in the properties section of a package are associated with the package represented by the declaration. Packages with separate public and private package declarations can ha different property values for the same property.

Processing Requirements and Permissions

(14) A method of implementation is permitted to enforce that the with declaration in a package not be changed to enforce the use restrictions between packages when classifiers are added to the package.

Examples

```
package Aircraft::Cockpit
public
   with Avionics::DataTypes, Safety_Properties;
   AirData renames data Avionics::DataTypes::AirData;
   system MFD
   features
      Airdata: in data port AirData;
   properties
      Safety_Properties::Safety_Criticality => high;
   end MFD;
end Aircraft::Cockpit;
```

Information

```
Ocarina failed: RESULT is 'INVALID' instead of 'VALID'
Aircraft_Cockpit_4_2.aadl:17:48: Avionics::DataTypes::AirData (identifier) is not visible
Cannot analyze AADL specifications
```

4.3 Component Types

(1) A component type specifies the external interface of a component that its implementations satisfy. It contains declarations that represent features of a component and property associations. Features of component are ports, feature groups, required access to externally provided data, subprogram, and bus components, and parameter declarations for the specification of the data values that flow into and out subprograms. The ports and feature groups of a component can be connected to compatible ports or subprograms of other components through connections to represent control and data interaction betwe

Source Code

```
property set Safety_Properties is
  CLevels : type enumeration (low,medium,high);
  Safety_Criticality : Safety_Properties::CLevels applies to (system);
end Safety_Properties;

package Avionics::DataTypes
public
  data AirData
  end AirData;
end Avionics::DataTypes;

package Aircraft::Cockpit
public
   with Avionics::DataTypes, Safety_Properties;
   AirData renames data Avionics::DataTypes::AirData;
   system MFD
   features
      Airdata: in data port AirData;
   properties
      Safety_Properties::Safety_Criticality => high;
```

```
package TypeExample
public
system File_System
features
   -- access to a data component
   root: requires data access FileS
end File_System;

process Application
features
   -- a data out port
   result: out data port App::result_type;
   home: requires data access FileSystem::Directory.hashed;
end Application;

thread Calculate
prototypes
  -- A data type to be used as type for the input and result port
  data_type: data;
features
   input: in data port data_type;
   result: out data port data_type;
end Calculate;

thread Compute_Distance extends Calculate (data_type => data App::Distance)
end Compute_Distance;
end TypeExample;
```

Information

```
Ocarina failed: RESULT is 'INVALID' instead of 'VALID'
TypeExample_4_3.aadl:40:08: input (port spec) points to data_type (entity reference), which is not of an adequate kind
TypeExample_4_3.aadl:40:08: input (port spec) does not point to anything or to something unreachable
TypeExample_4_3.aadl:41:08: result (port spec) points to data_type (entity reference), which is not of an adequate kind
TypeExample_4_3.aadl:41:08: result (port spec) does not point to anything or to something unreachable
Cannot analyze AADL specifications
```

Test Suite Structure

- Syntax Tests
  - Positive
  - Negative
- Semantic Tests
  - Positive
  - Negative
- Instance Builder Tests
- Misc
  - Examples from the spec
  - Sample models

Conclusions

- Prove of Concept is available
- AADL-QA Open Source Project on TuxFamily.org
  - Infrastructure scripts - GPLv3
  - AADL models – various sources
- Prerequisites:
  - perl + YAML
  - JRE

Open Questions

- Syntax/Semantic Tests
  - Error message/location checks
- Instance Builder Tests
  - Query language
  - Dump of instance

Thank you!

Alexey Khoroshilov
khoroshilov@ispras.ru