AADL v3 Roadmap Sept 2017

Peter Feiler

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

This material is based upon work funded and supported by the Department of Defense under Contract No. FA8702-15-D-0002 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

DM17-0702

Overall Strategy

AADL V2.2

- publication of AADL V2.2 standard document: any moment now
- Release of OSATE 2.2.3 implements all of AADL V2.2 (Sept 2017)
  - Major new capability since OSATE 2.2.2: reach down into feature groups
- New AADL V2.2 errata: https://github.com/saeaadl/aadlv2.2
- OSATE issue reports: https://github.com/osate

AADL V3

- Working slides & documents
- Prototype implementation
- AADL V3 Issues: https://github.com/saeaadl/aadlv3
- Discussion/working document area: https://github.com/saeaadl/aadlv3/wiki and committee area at www.sae.org

AADL V3 Strategy

AADL V3 New Concepts

- Interface, configuration, binding

Rework/cleanup of existing concepts

- Arrays
- Type system
- Flow improvements
- Unused concepts (e.g., public/private package, feature group type, prototype)
- Feedback from users: how and in what form?

Draft standard document: Peter & Jerome will work on it in Pittsburgh in early Dec 2017

- New document structure
- New document format
  - Will use Markdown
  - SAE editors will still work with Word => PDF with hyperlinks

V3 Prototyping

Separate from OSATE v2.2 release stream

- New file extension aadlv3

Prototyping schedule and priorities

- End user need
- Validation of new concepts

Lutz started prototyping of configuration concept

Meta model changes

- Meta model for instance has not changed much from V1 to V2
  - Is not expected to change much for V3
- Meta model for declarative model
  - Current Meta model size/complexity
  - Too much enforcement by Meta model/grammar syntax
    - Validation and Quickfix correction

OSATE Infrastructure Cleanup

- V1 legacy code (e.g., AObject, Location, aadl/aaxl files)
- Error reporting/diagnostics
- Result reporting for analyses
- Command/action
- Consolidation of public API libraries

In progress

Roadmap – Active

Compositional Interfaces (Peter*, Alexey, Jerome, Bren)

- Interface composition, Feature group improvements, Interface properties
- Revisited: nothing new, draft text
- Action:

Configuration and Choice points (Peter*, Brian)

- Freezing of design space and parameterized configurations
- Implementation selection for subcomponents, properties, bindings, relation to extends/prototypes
- Revised:
  - Configuration specification, configuration composition, parameterized configurations
  - Inclusion of array dimensions as configuration items
- Action:

Roadmap – Active

General binding concept

- Binding type, binding point, binding instances (single target, alternative targets), Binding constraints, resources
- Revised: Resources and resource types, Non-resource binding types, Multiplicity handling, binding of connections to platform flows, binding of features to platform layer
- Open issues: Binding & Arrays

Array support revisited (Peter, Brendan)

- Exposure of index dimensions/sizes in interface via feature arrays
- Connection declarations with embedded index specification
- Configuration of dimension sizes
- Action:

Roadmap - Candidates

Nested processors, Virtual memory, platforms (Peter, Alexey, Denis, Jerome)

- settled

Virtual platform modeling

- Connections between virtual bus, virtual processor, virtual memory
- Virtual process/memory via virtual bus?
- Mixture of virtual and physical?
- Virtual platform flows

“Hardware” & virtual platform flows

- Flows between platform components
- Flow specs on hardware components
- Target of connection, virtual bus bindings

Virtual devices (Bren)

- What is the problem we are addressing:
  - Device as VHDL and SW device drivers
  - Device as part of the system architecture & part of functional architecture

Roadmap - Candidates

Unification of type systems and expression languages (Peter, Lutz*, Brian)

- Data types, property types, constraint language variable types
- Lists & sets for properties: Set with unique element semantics?
- Union of types: collapse entry point properties (3-to-1)
- *Removal of classifier/reference in expression part (typed expressions)*
- Handling of units: part of value, association via property

Property sublanguage

- Properties presented as separate sublanguage from core AADL
- Integration of proposed Units system (ISO, SysML)
- Nested naming of property sets and possibility of inheritance

Property value: Single assignment, statically scoped default with override

Specify required properties with classifier rather than applies to of definition

- Stereotype concept

New Revision Candidates

Flow trees and graphs

Flow categories: sampling, message based

- Sampling flows including up/down sampling semantics and appropriate queuing

Generic ports and other feature categories

- Ports without sampling, message (sampling/queuing) distinction
  - Note: down sampling may imply multi-element buffer
- Physical features
- Observable features

Alignment of spec sheet and blue print with component type and implementation

- Currently implementations represent both a variant and a realization
  - Component implementation present in both public and private package section
- Variant characteristics to choose variant
- Realization to expand instantiation

More Candidates

Interrupt handler (Jerome)

Data aggregation via protocol

Data mapping via new binding/mapping concept

Clean up directionality of access features (Peter) [Errata]

- Need for Access_Right?

Categories on connections: make them optional or leave out? [errata]

Abstract feature as generic feature only

- Not refinable into other feature category

Abstract as generic component only

- Not refinable into other component category

Usefulness of public/private package sections (Bren, Jerome)

AADL_Project propertyset & project structure (Jerome, Pierre)

Multiple (Mode) state machines aka state variables (Peter, Alex, Bren*, Jerome, Brian)

- Modes, BA states, EM states, hybrid annex, interacting state machines