Analysis Package White Paper

ADM Task Force

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White Paper Overview

This white paper is geared at creating a dialog and encouraging collaboration that will ultimately determine the need, approach and structure of an RFP calling for an Architecture-Driven Modernization Analysis Package.

Background

- ADM Task Force created a Roadmap [1] of standards
- Two of these standards serve as foundation for remaining standards
  - Knowledge Discovery Meta-Model (KDM)
  - Abstract Syntax Tree Meta-Model (ASTM)
- Analysis Package builds upon KDM and ASTM to obtain a depth of understanding that goes beyond that which may be found in KDM and ASTM

[1] See http://adm.omg.org/ADMTF%20Roadmap.pdf

Analysis Package Overview

- Extends and enriches meta-data in KDM and ASTM
- Provides means to represent and exchange significantly more substantive knowledge about existing systems beyond that captured in KDM and ASTM
- Accomplished by allowing for representation of semantic and behavioral meta-data collected and represented by KDM, ASTM and other sources

Analysis Package Objectives

- Define meta-data that represents semantic behavioral knowledge about a system to facilitate various ADM scenarios
- Provide meta-model that facilitates interchange of this knowledge among tools adhering to Analysis Package standard
- Allow for ability to build composite analysis in subsequent iterations of the Analysis Package

Key Principal of Analysis Package

Analysis Package defines an interchange format for semantic and behavioral meta-data, but does not dictate means of analysis employed by vendors that would result in collection and exchange of this meta-data.

Requirements

- Define uniform set of static and dynamic semantic analysis meta-models that are compatible with KDM and ASMT
- Adjust KDM and ASTM meta-models as needed to enable composite analysis of meta-data within those meta-models
- Represent meta-data that is a result of further semantic interpretation of meta-data that resides in the KDM or ASTM
- Represent meta-data that is drawn from other sources such as meta-data drawn from business rules meta-model
- Represent dynamically derived properties of systems

Sample / Representative Analysis Categories

Axiomatic Analysis	Ability to represent and facilitate the interchange of meta-data that defines the meaning of the program such that a well-formed program is a logical proposition (a specification) that states some property about the input and output. These properties are typically expressed as predicate logic (or predicate calculus).
Constraint Analysis	Ability to represent and facilitate the interchange of meta-data that determines variables, return types of function, derived types of expressions and the scope of variables.
Data Flow Analysis	Ability to represent and facilitate the interchange of meta-data that describes how language constructs create, use or de-allocate data. This refers to definition-use (DU) or use-definition (UD) chain meta-data.
Control Flow Analysis	Ability to represent and facilitate the interchange of meta-data that describes the control paths along logical decision points, jump points, and branch points.
Denotational Analysis	Ability to represent and facilitate the interchange of meta-data that reflects meaning of the program, defined as a mathematical function from the input data to the output data, whereby two differently coded versions of the same program have nonetheless the same denotational semantics.

Analysis Package Considerations

- Given ADM refactoring and transformation scenarios, system-wide analysis is an important aspect of Analysis Package
- Mapping Analysis Package to ADM scenarios will ensure that it maps to reality
- Analysis Package deployment will (likely) need to be phased in over time

Composite Analysis

- Analysis Package contains concept of building analysis initially derived from the KDM, ASTM and other sources using a “composite” approach
- For example:
  - Initial analysis may allow a particular range of program logic to be associated with a specific set of program data
  - Subsequent meta-data may map that data to other logic in a system based on discovery of data elements that are a synonym of that original program data
  - Third layer of analysis may map collective set of business logic to a business rule as defined in a business process model
- Analysis Package interchange format would allow various tools to create composites of meta-data analysis approach

ADM Usage of Analysis Package – ADM Scenario Support

- Isolate, modularize and consolidate selected functional program logic into components or services
- Create a comprehensive view of logic within a system that relies on or otherwise modifies related business data
- Isolate and refactor logic related to a specific function
- Rationalize cross-system data definitions to a common set of attributes (to prepare for database migration)
- Isolate and refactor logic that accesses hierarchical data structures into relational data structures
- Identify and eliminate functional redundancies across a system or systems (to support consolidation)

Relationship Between Analysis Package and Other ADM Standards

- Metrics Package - Analysis Package provides metrics that summarize and quantify behavioral or other characteristics
- Visualization Package enables viewing of data and procedural flows and related semantics as represented in Analysis Package meta-model
- Refactoring Package leverages Analysis Package meta-data to streamline and facilitate refactoring process
- Transformation Package relies on Analysis Package to provide semantic and behavioral meta-data to transform existing systems to model-driven architectures

Discussion Factors to Consider

- Should analysis package provide consistent way to supplement KDM and GASTM models with results of generalized analysis?
- Should analysis package provide consistent way to supplement SASTM models with results of generalized analysis?
- Should results of analysis be stored as extensions to KDM, GASTM or SASTM model?
- Should results of analysis be stored in separate models which refer to underlying KDM, GASTM or SASTM models?

Discussion Factors to Consider

- Should analysis meta-model be free of usage context? (i.e. focus on underlying computational dependencies such as control flow or data flow?)
- Should analysis meta-model include features needed to apply results in context of specific projects? (i.e. standard way to capture conclusions or change requirements that result from automated, tool-assisted or manual analysis?)
- Should it be possible to use an analysis model to generate a *pro forma* project plan and estimate?
- What should Analysis Package do to support or synchronize with Software Assurance (yet to be defined)?

In Summary

- Analysis Package will be further considered within ADM Roadmap priorities along with its relationship to other ADM packages
- Once general requirements for Analysis Package can be agreed upon by ADM Task Force, a team will be assembled and priorities set to create an RFP