

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

<i>Axiomatic Analysis</i>	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).
<i>Constraint Analysis</i>	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.
<i>Data Flow Analysis</i>	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.
<i>Control Flow Analysis</i>	Ability to represent and facilitate the interchange of meta-data that describes the control paths along logical decision points, jump points, and branch points.
<i>Denotational Analysis</i>	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