MDA® Implementers' Workshop

Succeeding with Model Driven Systems

December 2-5, 2003 - Burlingame, CA USA

Tuesday, December 2, 2003

Tutorial Tracks

0900 - 1230 **Tutorial 1: *Understanding MDA***
Mike Rosen, CTO, M²VP

By now, we've all heard of MDA and seen the logos, but what does it all mean and how does it fit? This tutorial will provide an understanding of the basic concepts of MDA; separation of concerns, PIM's, PSM's, and transformations. We expand on this to discuss the full-lifecycle of MDA based development processes and understand the role of profiles and meta-models in the process. Then, we put this into context of the MDA Core technologies; MOF, UML, CWM, XMI and explain the underlying architecture of MDA, the interrelationship between the technologies, and the benefits this brings. We examine how tools fit into the total picture and how to evaluate tools against particular enterprise requirements. Finally, we finish the tutorial by going through a complete development example including a sample profile and meta-model, business model, PIM, PSM, finally generating code. All of this is presented in an objective, vendor neutral fashion, to provide a complete and unbiased understanding of MDA.

0900 – 1230 **Tutorial 2: *Brass Bubbles: An Overview of UML 2.0 (and MDA)***
John Hogg, IBM Software Group

The first major revision of the UML standard, UML 2.0, is being adopted and is scheduled for completion in 2004. This tutorial gives an overview of the most important features of UML 2.0 and the rationale behind them. Special emphasis is given to the new concepts that enable MDA, particularly for large-scale systems.

1030 – 1045 Morning Refreshments

1230 – 1315 Lunch

1330 – 1700 **Tutorial 3: *MDA Distilled***
Stephen J. Mellor, Vice-President, Project Technology

Model-driven architecture covers a multitude of sins from models, executable models, actions, metamodels, marks, marking models, mapping functions, languages, profiles, MOF, QVT, PIMs, PSMs and any other TLA you can think of, if you are so inclined. The keys to this technology are the ability to model systems at a high enough level of abstraction that decisions about implementation technologies can be deferred, and the ability to weave together such models—including models of implementation technologies and code—into a system only when the system is ready to be deployed. This tutorial will describe these fundamentals of MDA; what the basic technologies are; and how they fit together. Special attention will be paid to the question of which standards are already in place, and what still needs to be done to realize the vision that models can be assets.

1330 – 1700 **Tutorial 4:** ***Introduction to the Eclipse Modeling Framework***
Catherine Griffin, Software Engineer, IBM Hursley Development Laboratory

The Eclipse Modeling Framework (EMF) is a framework and code generation facility for implementing structured data models in Java. Models can be specified using UML class diagrams, XML schema documents, or annotated Java classes. EMF models can be serialized in XMI or other formats. EMF was originally based on the OMG MOF 1.4, and has been used for several years within IBM for tool development. This experience led to an optimized implementation (focused on tool integration rather than the original MOF focus of metadata repositories) that uses a subset of the modeling concepts in MOF 1.4. The EMF metamodel (Ecore) is now aligned with the EMOF subset of MOF 2.0. EMF is based on the Eclipse platform and is open-source under eclipse.org. This tutorial will introduce the Eclipse Modeling Framework in the context of developing a structured data model and an editor using the Eclipse Java development tools and plug-in development environment. Basic familiarity with the Java programming language will be required.

1530 – 1545 Afternoon Refreshments

Wednesday, December 3, 2003

Tutorial Tracks

0900 - 1200 **Tutorial 5:** ***Using Model Driven Architecture to Manage Metadata***
David Frankel, David Frankel Consulting

This tutorial provides an architectural overview of the MDA technologies that support model-driven metadata management. It explains the increasing importance and volume of metadata in today's enterprises as well as the fragmentation in how metadata is managed. It explains the OMG's Meta Object Facility (MOF) and XMI standards in some detail, and describes how they are related to UML and XML. It also covers Sun Microsystem's Java Metadata Interface (JMI) standard, which is closely related to MOF. The tutorial also examines why MDA must support multiple modeling languages and explains the fundamental role that MOF plays in folding languages other than UML into the MDA space.

0900 – 1200 **Tutorial 6:** ***Model-Driven Architecture Processes and Methodology from the Perspective of the Modeling Discipline***
Matthew K. Hettinger, President and Chief Architect, Mathet Consulting

The fundamental concepts behind Model-Driven Architecture have opened up the world of information technology modeling and business modeling to the wider world of modeling in terms of the "Modeling Discipline". This implicitly brings the concepts, processes, methodologies and frameworks recognized in this discipline to the world of information technology and business modeling. This tutorial makes these processes, methodologies and frameworks explicit and illustrates how they may be used to allow MDA to be developed and used to its fullest potential.

1030 – 1045 Morning Refreshments

1300 – 1800 ***Demonstration Area Open***

1200 – 1245 Lunch

1300 - 1305 ***Workshop Welcome***
Program Committee Chair: Fred Waskiewicz, Director of Standards, OMG

1305 – 1335 ***Sponsor Presentation – Kennedy Carter, Ltd.***

1335 – 1545 **Session 1: *MDA Foundations***
Chair: Jishnu Mukerji, Senior Systems Architect, Hewlett Packard

This session focuses on aspects of the basic foundations of MDA. The three papers in this session are about the model of MDA, the relation of MDA to enterprise architectures and the use of MDA in metadata integration. Use of an open source reference implementation as a means for making significant parts of the foundations of MDA readily available is also discussed.

1335 – 1405 **MDA Reference Model**
Wim Bast, Compuware - Tony Clark, King's College London - Allan Kennedy, Kennedy Carter Ltd. - Laurence Tratt, King's College London

In this presentation, we will be describing the latest work on the MDA Reference Model, which has been carried out by the authors and the OMG's Object & Reference Model Sub-Committee at large. Recent work on the MDA reference model has resulted in a small 'kernel' MDA model upon which we have begun to layer more advanced MDA concepts. The advantage of this layering approach is that each layer is relatively easy to understand, whilst also allowing changes in outer layers not to effect inner layers. We will also relate the work on the Reference Model to MDA in general, and explain the benefits that such a model gives to the MDA user population at large.

1405 – 1435 **MDA and the Zachman Framework**
Mike Rosen, CTO, M²VP

Enterprise Architectures are increasingly built around a supporting framework. The Zachman Framework is one of the most used in industry and government today. MDA is a different kind of architectural framework. So how do these fit together? This presentation will explain how MDA can be used to implement and complement the Zachman Framework for enterprise architecture.

1435 – 1445 – Afternoon Refreshments 1

1445 – 1515 **Model Driven Metadata Integration using MOF 2.0 and Eclipse**
Sridhar Iyengar, Distinguished Engineer, IBM

The year 2003 saw the arrival of the second generation of OMG Modeling Standards including MOF 2.0 and XMI for MOF 2.0. This session will take a peek at how these technologies are being integrated with the Eclipse open source modeling project - Eclipse Modeling Framework. The talk will conclude with some examples of how EMF, MOF and XMI are enabling standards based tools integration for J22E, Web Services, MDA and beyond.

1515 – 1545 **Q&A - Discussion**

1545 – 1615 Afternoon Refreshments 2

1615 – 1815 **Session 2: *MDA Methodologies and Processes***
Chair: Mike Rosen, CTO, M²VP

Models are an important part of software development and architecture. MDA provide standards for the definition and processing of models, but doesn't venture into how it fits with development methodologies and processes. This session presents three views on the topic, starting with the issues of integrating MDA into the development process and a formal method for describing the resultant process; then insight into how MDA can help with the management and specification of requirements, and finally a process for creating high level, executable models.

1615 – 1645 **MDA Process Adoption**
Payman Hodaie, Founder & CTO, Osellus Inc.

Adoption of MDA holds numerous challenges: to fully reap its benefits, the MDA approach should be supported in the development processes. Regardless of the maturity or nature of existing methodologies, the evolution towards proper support of MDA is crucial to ensure proper adoption. This presentation examines the challenges of putting MDA processes in place, with particular emphasis on the modification of existing processes to adopt MDA. The related issues of process management, enforcement, and evolution will also be discussed, and detailed examples of MDA-enabled process models will be presented.

1645 – 1715 **Unambiguous, Non-binding Requirements for MDA: Practical Strategies for Managing Requirements Artifacts**
David Hansz & David Fado, Software Architects, Number Six Software

MDA requires unambiguous and non-binding requirements as input. How can MDA work efficiently with traditional artifacts such as use cases, storyboards, and test cases? Critics regard MDA as holding an unrealistic view of requirements. However, in our experience MDA must use the same requirements best practices as any other software project, only with more rigor. UML 2.0 offers exciting options for integrating requirements artifacts in an MDA tool, making it possible to use models to automate requirements management and testing in MDA. This presentation reviews successes and failures of some of these strategies based on information management projects.

1715 – 1745 **Model Based Application Automation**
Eugene Wong, Chief Scientist, Versata, Inc.

The promise of MDA is to provide a dramatic increase of productivity during development, a high level of performance and scalability in deployment, and an ease of interconnection and maintenance not possible with any other approaches. We believe that to fulfill the promise, the model in MDA should be complete, layered, and directly executable with coarse-grained execution primitives. In a real sense, the model is the application. We illustrate these principles through the Versata Business Logic Suite, which uses a process based modeling paradigm and a run-time engine to execute large rules based transaction primitives and high-level archetype-mediated display primitives.

1745 – 1815 **Q&A - Discussion**

Thursday, December 4, 2003

0900 – 1130 **Session 3: *Case Studies - Building Real Systems & Applications Using MDA***
Chair: Fred Waskiewicz, Director of Standards, OMG

This is the first of two sessions providing attendees with examples of the opportunities that exist for using MDA and offering guidance based on experience on how to exploit those opportunities. The business and technical objectives of MDA are exemplified through three, real-world case studies and experience reports on MDA-based projects and tools.

0900 – 0930 **Designing an Integrated Justice Information Sharing (IJIS) Solution With Model Driven Architecture**
Arthur English, Architecture Director,
Global Justice & Public Safety Enterprise Transformation Services, Unisys Corporation

Justice agencies throughout the world recognize the importance of integrating their information systems in order to share mission-critical data and transactions at key decision points. Integrated systems improve the quality of information, and thereby the quality of decisions, by eliminating error-prone redundant data entry. This session will describe how UML and MDA were used to build an Integrated Justice Information Sharing (IJIS) solution that's designed to be implemented on different platform specific models such as Microsoft .NET and J2EE. We will explore the issues of methodology, model transformation, traceability, and generation capabilities that were used to build the IJIS solution.

0930 – 1000 **Retargeting CORBA to EJB with MDA: A Case Study**
David Zygmont, CEO, Metanology Corporation

This case study describes how a leading provider of Web-based cash management and business banking solutions for financial institutions used MDA to retarget an 8-year old CORBA product offering to EJB. The architecture of the CORBA application is detailed. The target EJB architecture is discussed focusing on preservation of and compatibility with the CORBA code base. The process of retargeting using MDA is explained. This includes: Reverse-engineering the CORBA IDL into a PSM; Programmatically modifying the CORBA PSM to a PIM; Transforming the resulting PIM to the desired EJB implementation.

1000 – 1030 Morning Refreshments

1000 – 1700 ***Demonstration Area Open***

1030 – 1100 **Using MDA to Manage a Coherent Global Payment Data Model**
Juanita Mercado, Lead Data Architect and Joseph M. Bugajski, Vice President of Global Interoperability
Visa International

Payment card data must accurately, succinctly and completely describe exchange of money for goods and services. To support continue growth, and to assure global interoperability of Visa payment products, Inovant and Visa architects are collaborating on a new data architecture. Its objective is to increase the information carrying capacity of Visa payment records, improve quality of service, and assure interoperability with our 21,000 Member banks. The new data architecture, called Visa Global Data Architecture, will employ MDA - UML, CWM and XMI, along with ISO standards. This presentation will describe the Visa Global Data Architecture, the critical role that interoperability plays in a payment network, and how OMG's standards helped build a data architecture that achieves Visa's goal of Universal Commerce - the capability to make payments anywhere, anytime, anyplace and anyway consumers, governments and business desire.

1100 – 1130 **Q&A - Discussion**

1130 – 1200 ***Sponsor Presentation – Kabira Technologies***

1200 – 1245 Lunch

1300 – 1500 **Session 4: *Transformations***
Chair: Allan Kennedy, Managing Director, Kennedy Carter Ltd

Standards-based model transformation is a key aspect to the MDA initiative. This session explores the performance aspects of PIM to PSM mappings; describes a framework that can be used to realize the MDA notions of Model Type Mappings, Model Instance Mappings, Markings Models, Templates, and Model Merging; and demonstrates how OMG's forthcoming QVT specification will specify, implement and integrate transformations as well as support exchange of transformations.

1300 – 1330 **Including CORBA Performance Details into MDA System Models**
Tom Verdickt, Bart Dhoedt, Frank Gielen and Piet Demeester
Department of Information Technology, Ghent University

Software Performance Engineering (SPE) proposes to consider the performance of a software system throughout the entire development cycle, starting at the architectural design stage, as opposed to the traditional "fix-it-later" approach. This research tries to integrate MDA and SPE by proposing a transformation from a PIM (or rather a high-level PSM) to a (lower-level) PSM of a distributed client-server system using CORBA as a middleware. The transformation inserts the architectural and functional changes of using the middleware, as well as the incurred overhead, allowing estimation of the performance impact of using CORBA as a middleware in the system.

1330 – 1400 **Composable Code Generation Applied to MDA**
Kirk Schloegel, Honeywell Labs

We present a new framework for generating code referred to as Composable Code Generation (CCG) and discuss its application to the Model-Driven Architecture (MDA) approach. CCG is the result of applying certain object-oriented programming (OOP) concepts to model-based code generation. The CCG framework can be used to realize the MDA notions of Model Type Mappings, Model Instance Mappings, Markings Models, Templates, and Model Merging. Advanced transformations requiring Additional Information and Patterns are also supported. In fact, many of these notions are fundamental to our approach. In this presentation, we will describe the CCG framework and discuss its application to MDA.

1400 – 1430 **QVT Technologies and Eclipse**
Tony Clark & Laurence Tratt, King's College London - Tracy Gardner & Catherine Griffin, IBM UK

In this presentation we will discuss some of the issues raised by the recent transformations work for the MOF QVT RFP, and our vision for a QVT implementation which is language neutral and accommodating of existing tools, transformations and legacy code. We will show how QVT can become a practical reality by presenting an open architecture and transformation engine prototyped with the open-source Eclipse tool at its heart.

1430 – 1500 **Q&A - Discussion**

1500 – 1530 Afternoon Refreshments

1530 – 1650 **Session 5: *Applications of UML 2.0 for Effective Modeling***
Chair: David Fado, Number Six Software

UML 2.0 provides the modeler with many new features to support making models more useful in the production of software. This panel will review some of these features with practical examples. The first paper will review some core UML 2 architectural concepts and show their application to software creation and reuse. The second paper will focus on some of the new behavior modeling features of UML 2 and explore how these can apply to model transformations.

1530 – 1600 **Applying UML 2.0 to Model-Driven Architecture**
John Hogg, IBM

MDA is a proven technique for creating better applications faster, and its greatest successes have been in the embedded domain. The coming UML 2.0 standard introduces new concepts for defining reusable architectures. They are easy to draw, but what do they really mean, and how do they really help the developer? This presentation starts with a brief description of the UML 2.0 architectural concepts. The main body of the presentation will show how they are actually applied to improve software creation and reuse and make the technology scalable. Topics will include build minimization, thread assignment, stubbing in automated testing and maximizing architectural reuse of components.

1600 – 1630 **Simplifying Complex Systems Behavior Modeling for MDA**
Janusz Dobrowolski, President and Chief Architect, StateSoft

Behavior modeling is recognized as the most difficult part of building the Complex Executable Model Driven Architecture. In current practice the behavior model is typically being built for a number of classes once a complexity becomes evident. Unfortunately, by that time the complexity becomes fully understood it often becomes overwhelming. To correct this problem we suggest building a behavior model for each class. The behavior models we recommend meet the criteria of Executable Specification. Explanation why this type of behavior modeling allows for independent iteration in the Logical and Physical Architectures is being offered. In addition a use of inheritance as a prime model transformation paradigm will be exploited.

1630 – 1650 **Q&A - Discussion**

1650 – 1700 Afternoon Refreshments

1700 – 1815 **Panel - *MDA: Hijacked by the Model Muddlers?***
Moderator: Stephen J. Mellor, Vice-President, Project Technology

Early papers on MDA seemed to suggest that models should be complete and executable. Of late, there is little trace of execution, and the MDA concept seems to be have been hijacked by those who want to muddle about with models, adding code later.

- Is this perception accurate? Or executable paranoia?
- Isn't model manipulation better anyway? Aren't 'executable models' a contradiction?
- Is the hiding of executable models a marketing trick? Are executable models hidden lest they frighten the horses?
- Is there room for executable models? Or is model muddling more munificent for the vendors?

Panelists: TBA

1830 – 2030 ***WORKSHOP RECEPTION*** ***hosted by***

KENNEDY CARTER Codagen Kabira™

Friday, December 5, 2003

0900 – 1100 **Session 6: *Case Studies - Building Real Systems & Applications Using MDA***
Chair: Fred Waskiewicz, Director of Standards, OMG

This is the second of two sessions providing attendees with examples of the opportunities that exist for using MDA and offering guidance based on experience on how to exploit those opportunities. The business and technical objectives of MDA are exemplified through three, real-world case studies and experience reports on MDA-based projects and tools.

0900 – 0930 **Model Driven Service Creation for eGovernment Services**
Olaf Kath, IKV++ Technologies AG, Marc Born, Fraunhofer FOKUS, Osamu Iwaki and Shingo Kamiya, NTT Data Corporation

The presentation shows an MDA compliant approach for the rapid definition and development of software systems based on UML, EDOC, MOF and enago OSP,a telecom specific target platform. This approach, called the MDSC Modeling Infrastructure, contains modeling and development tools and their interconnection. Each of these tools or modeling techniques supports a different phase or activity in the development process for a software system. The approach has been used for the development of applications in the e-Government domain.

0930 – 1000 **Developing and Analyzing Architectures for Large Real Time Systems from UML Diagrams**
Leonard Weinberg, Robert Cloutier, Andrew Winkler, Lockheed Martin Maritime Systems and Sensors

MDA code development from UML diagrams when successful will still face other hurdles before these computer programs are fielded. The computer infrastructure must be selected; code partitions must be declared and allocated to computers; and the operating system scheduling methodology must be decided. Until these architectural issues are resolved the systems engineer has neither a hardware design nor performance estimates for the system. The methods described support the design and help analyze the performance space for the target system.

1000 – 1030 **MDA Case Study: State of Wisconsin Unemployment Insurance Project**
Christopher C. Armstrong, Chief Science Officer, ATC Enterprises, Inc.

The State of Wisconsin, Department of Workforce Development, Unemployment Insurance (UI) Division is completely replacing its legacy platform for managing the disbursement of UI benefits. The Enhanced Automated Benefits Legal Enterprise Services project issued a request for proposal based on UML models and an MDA framework. The contract was awarded earlier in 2003 to a vendor with an existing package based on a J2EE platform. The package includes a UML-based reference model and leverages Rational Rose for capturing the software design. From the UML model, considerable levels of functional software are automatically generated. The speaker will provide an update on the status of this project and discuss how it is one of the first large-scale projects based on MDA.

1030 – 1100 **Q&A – Discussion**

1100 – 1115 Morning Refreshments

1115 – 1230 **Panel: *MDA Tools – Realizing the Vision***
Moderator: Mike Rosen, CTO, M²VP

The MDA vision will only be realized with tool support. Tools that will:

- provide modeling support of complex, enterprise-level and embedded systems
- assist in automated model transformation and code generation
- support flexible and dynamic configuration
- provide adequate documentation
- offer design verification and system validation capabilities.

This panel of tool vendors and systems integrators will assess current MDA tool capabilities as well as provide insight into future plans in meeting this vision.

Panelists: TBA

1230 – 1315 Lunch

1330 – 1615 **Session 7 – *MDA's Impact on Industry***
Chair: Michel Brassard, Founder & CTO, Codagen

This session explores MDA's impact on the IT industry as it continues to mature and evolve. This session will explore the convergence of MDA with Business Process Management in creating a new kind of IT; describe the concepts and process of defining Enterprise Architecture using MDA; describe a holistic approach to redefine business process and execution models and seamless traceability from business strategy elements down to technology components; and present the findings of a set of studies and projects aimed at the technical, organizational and commercial aspects of transforming government agencies to an interoperable-model driven component architecture.

1330 – 1400 **Software Industrialization and the New IT: A Perspective on MDA®**
David Frankel, David Frankel Consulting

MDA is part of a trend toward industrializing software development, deployment, and runtime management. The increasing demands that value chain driven business places on IT is driving this movement. Commoditization of IT infrastructures, pointed out by Nicholas Carr in the Harvard Business Review, is part of the industrialization picture. However, the convergence of MDA with Business Process Management will create a new kind of IT that Carr hasn't factored into the picture.

1400 – 1430 **Using MDA to Implement Enterprise Architecture**
Mike Rosen, CTO, M²VP

IT systems can no longer be developed in isolation, but must fit into a larger context that meets the goals of the overall business. EA defines that context and the rules and guidelines for conformance. Unfortunately, many development projects and organizations are unaccustomed to following the rules, stressing the new IT Architectural models being developed. But wait, here's MDA to the rescue! MDA provides a standards based approach to defining enterprise architecture. Additionally, MDA tools can provide a mechanism to automatically incorporate the architecture into the development process. This presentation will describe the concepts and process of defining Enterprise Architecture using MDA.

1430 – 1445 Afternoon Refreshments

1445 – 1515 **Business Transformation Utilizing Business Rule Technologies**
Donald Baisley, Consulting Engineer & Peter Cunningham, Director of Architecture, Global Financial Services, Unisys Corporation

Corporations are finding that they must embrace the notion of change within their core operating strategy in order to succeed in today's global economy. To embrace change, corporations must transform their silo focused business operations into agile, streamlined business processes leveraging efficient and flexible technology delivery solutions. This presentation describes a holistic approach to redefine business process and execution models, transition to a services based technology delivery model and establish seamless traceability from business strategy elements down to the definition of technology components which carry out automation of the business processes. This presentation includes a case study of a proof of concept that demonstrates using business rules in business language to drive generation of UML models leading to software service components.

1515 – 1545 **Extreme Architecture - Accelerating the Enterprise Application Development Process**
Bill Nadal, Enterprise Architect, Fireman's Fund Insurance Company

Enterprises are facing competing forces between the top-down approach for delivering a Unified Enterprise Architecture vision and the bottom-up architectural entropy occurring at the project implementation level. Time-to-market pressures, developer resistance and project management issues abound in delivering components. Component factory approaches are maturing and provide the roadmaps for building the foundational component architecture, but IT organizations are often ill equipped to transition to the new paradigm. This session will discuss how an MDA and XP approach, based on the enterprise architecture roadmaps, component blueprints, and a unified semantic model, can rapidly accelerate the adoption of MDA in step-wise increments that mature the capabilities of the IT culture.

1545 – 1615 **Q&A - Discussion**

1615 – 1620 ***Closing Remarks***

PROGRAM COMMITTEE

Chair: Fred Waskiewicz, Object Management Group

Allan Kennedy, Kennedy Carter Ltd
Cris Armstrong, ATC Enterprises, Inc.
David Fado, Number Six Software
Jishnu Mukerji, Hewlett-Packard
Kevin Loughry, Object Management Group
Marc Born, Fraunhofer FOKUS
Matt Hettinger, Mathet Consulting
Michael Miller, Rosetta Biosoftware
Michel Brassard, Codagen
Mike Rosen, M2VP Services
Steve Mellor, Project Technology, Inc.
Tracy Gardner, IBM