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# eclipse

POWERING THE ECLIPSE ECOSYSTEM

## MAGAZINE

**Europa**  
The Largest Open Source Software Release Ever

**GlobalTester**  
Tool for Testing Smart Cards

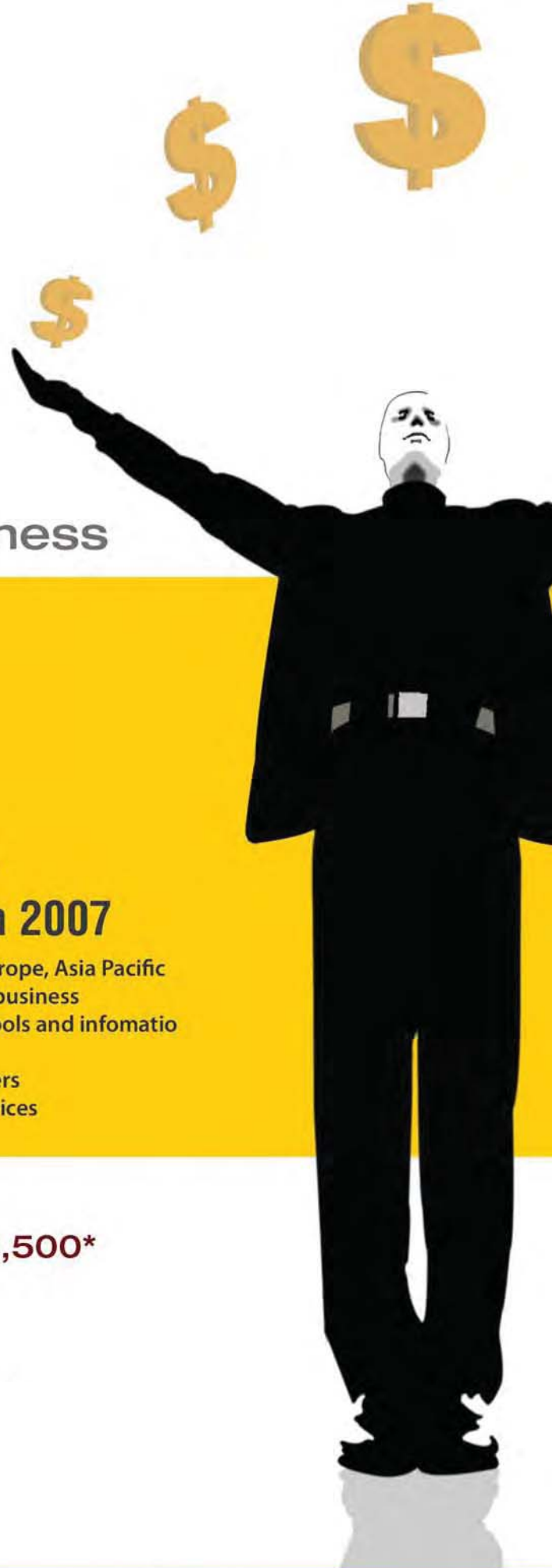
**JAX India 2007**  
Wowing the Crowd



# Modeling for Full Code Generation?

Modeling for Software Development in the Automotive Industry





## Where IT Aligns with Business

### Topics

- Enterprise SOA Architectures
- SOA Governance
- SOA Lifecycle
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## Dear Readers,

Dr. Juha-Pekka Tolvanen and Cord Giese say that most mainstream modeling languages, such as UML, focus on visualizing the code and therefore fail to provide a significant improvement in overall productivity when compared to coding in C, C++ or Java. Furthermore, the modeling tools that support these languages are constructed in such a way that the code generated from these models consistently requires manual completion. This further reduces the already modest productivity benefits afforded by this approach. The Cover Story this issue provides an alternative approach to modeling and code generation, called Domain-Specific Modeling (DSM), which allows for full code generation from higher abstraction models.

The month of June is a busy time for the Eclipse community. This is the month when the community makes available new releases of many of the Eclipse open source projects. Building on the success of the Callisto Release in June 2006, in June 2007 the Europa Release (Europa) featured a coordinated release of more than twenty Eclipse projects, made-up of millions of lines of code, involving hundreds of developers spread around the world. In fact, Europa may be the largest open source software release ever, says Ian Skerret. Read Ian's article know what is new in the Europa release.

Electronic passports (e-Passports) have caused national and international boards alike to set standards that guarantee the functionality of these travel documents all over the world. GlobalTester is a tool that carries out the required application tests. However, its usage is not restricted to the testing of e-Passports – it is an all-purpose tool for testing smart cards. Holger Funke tells you how to use GlobalTester in the third feature this issue.

Software and information technologies are playing key roles in enterprises, helping them grow on a constant basis as well as bringing prosperity to more and more people in the region. With domestic IT spending for enterprise software set to increase manifold in the next three to five years, these are exciting times for the Indian Enterprise IT community. It's time now to start looking "inwards" and use India's software intelligence to build efficient systems for Indian industry. To

keep track with the rapid developments and changes in the world of technology, you need the latest information. JAX India 2007, held in Bangalore from 28-31 May this year, was a first of its kind conference on Java, Eclipse, Enterprise Architectures, SOA, Web Services, Software Testing, Project Management, and many of the new and emerging technologies that are shaping the world of Enterprise IT. The conference saw a huge turn out from 50 different IT companies such as SAP, Wipro, Oracle, ThoughtWorks, Juniper, MindTree consulting, Robert Bosch, Honeywell, and BEA. The conference was sponsored by the likes of Borland's CodeGear, Oracle, BlueCoat, SAP, Telelogic, Sun, IBM, Parasoft, Compuware, Collabnet etc. Read everything they had to say in this issue. You'll also find QAs with the CodeGear team from Borland, Neelan Choksi of Spring framework fame, Mik Kersten. Also read what leading vendors had to say about SOA in the panel discussion.



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Editor-in-Chief, Eclipse Magazine

## FEATURES

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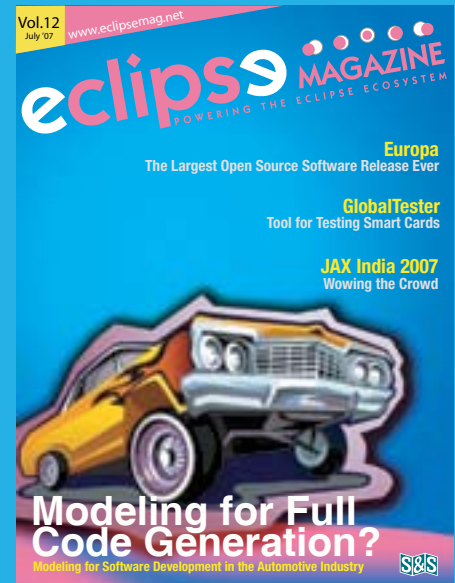
Domain-Specific Modeling raises the level of abstraction beyond programming by specifying the solution directly using domain concepts. The modeling language follows the domain abstractions and semantics, allowing developers to perceive themselves as working directly with domain concepts. In a number of cases the final products can be automatically generated from these high-level specifications with domain-specific code generators. This automation is possible because of domain-specificity: both the modeling language and code generators need fit the requirements of only a single narrow domain, often in just one company. This article shows the strength of model-based code generation from domain-specific languages by describing its use for developing a controller unit for windshield wipers.

*By J.P. Tolvanen, Cord Giese*

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*By Ian Skerret*



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Reporting the latest announcements from the community, Tracking new releases of developmental tools



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The introduction of electronic passports (e-Passports) has caused national and international boards alike to set standards that guarantee the functionality of these travel documents all over the world. GlobalTester is a tool that carries out the required application tests. However, its usage is not restricted to the testing of e-Passports – it can be used to test all kinds of smart cards.

*By Holger Funke*



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It is not often that you get the opportunity to attend a conference that offers a platform for knowledge transfer from North American and European experts to the Indian Enterprise IT community, besides presenting extensive networking opportunities to delegates, sponsors, and partners. JAX India 2007, held in Bangalore from 28-31 May this year, was a first of its kind conference on Java, Eclipse, Enterprise Architectures, SOA, Web Services, Software Testing, Project Management, and many of the new and emerging technologies that are shaping the world of Enterprise IT.

*By Eclipse Magazine*

## PREVIEW

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**eclipse** MAGAZINE  
POWERING THE ECLIPSE ECOSYSTEM

HELLO

Corona to Your Business Rescue

JFire ERP Framework

- Designing, developing, testing and managing business critical applications has become increasingly more complex. To manage this complexity, projects are typically divided into tasks and teams are assigned to execute them. But IT managers also need to ensure all these different teams and team members collaborate effectively as if they were a small team all working in the same room, in the same office, and on the same project. Edwin Shumacher tells you why Corona is the right tool to address this IT business problem.
- Imagine several companies want to trade arbitrary products in a decentralised network, and you have to write the software. Not an easy task, if specialised GUI for different sectors must be integrated into one application. If you plan to use the Eclipse Rich Client Platform, it's worth having a look at the ERP framework JFire, says Marco Schulze.

# What's New In the Ecosystem

## — Announcements —



### **Access Eclipse Discovery Portal for Custom Eclipse Downloads**

Innoopract, provider of the Yoxos Eclipse Distribution, now has a new portal to simplify the process for creating and downloading custom Eclipse downloads. The portal, Eclipse Discovery, will enable developers to choose from all 21 Europa projects plus hundreds of third-party add-ons to create a tailored software bundle as a single download. In addition, Eclipse, under Innoopract, has made available new standard download packages. Developers can now benefit from two new innovations in the way they find, evaluate and download their software from the huge range of available Eclipse projects and third-party add-ons:

- First, under Innoopract, Eclipse has responded to the requests by developers to reduce the complexity of assembling a bundle of Eclipse software by introducing four new software bundles called packages for four different user roles: Enterprise, Java, C and the base Eclipse SDK platform.
- With Eclipse Discovery ([www.yoxos.com/eclipsediscovery](http://www.yoxos.com/eclipsediscovery)) users are given a Web 2.0 interface to the largest library of Eclipse components or plug-ins available from which they can create customized download packages. The company says Eclipse Discovery lets users configure a customized integrated bundle of Eclipse plugins. The preparation of the single download automatically determines and includes all the necessary dependencies to other plug-ins so that the resulting Eclipse installation always works right from the beginning.

[\[MORE INFO\]](#)



### **MyEclipse 6.0 Adds Support for Eclipse 3.3/Europa**

Genuitec has made available MyEclipse Enterprise Workbench 6.0, Milestone 1. This first milestone release solidifies Genuitec's "always first" reputation by being the first commercial J2EE IDE available that supports the Eclipse 3.3 platform and Europa projects

MyEclipse 6.0 Supports Eclipse 3.3/Europa: "The Eclipse 3.3 platform/Europa release represents a significant milestone for Eclipse, unprecedented in the software industry," said Maher Masri, CEO of Genuitec. "Having 21 significant projects in the release train with the involvement of now 160- plus member companies solidifies Eclipse as the open source standard for software tools, RCP and beyond. We are excited to again be the first commercial Enterprise IDE product available for this new Eclipse platform, and look forward to continuing our trend of being the fastest IDE to adopt new technologies our customers demand."

The MyEclipse 6.0 GA release will be available in late July. The MyEclipse 6.0 milestone 1 release is available for download immediately. As a milestone release, 6.0 M1 is not intended for mission-critical application use. The Standard Edition annual subscription is priced at .95 USD and the Professional Edition annual subscription is priced at .95 USD. All subscriptions include unlimited access to Genuitec's world-class, direct-response online support.

[\[MORE INFO\]](#)

## — New Releases —



### **BEA Unveils WebLogic Server Tools for Eclipse 3.3**

BEA WebLogic Server Tools is a set of free plugins for the Eclipse 3.3 "Europa" designed to help develop, deploy and debug applications for BEA WebLogic Server. Key Features include:

- Supports versions 10.0, 9.x and 8.1 of BEA WebLogic Server.

- Utilizes WLS-proprietary "split-source" deployment facility to dramatically increase iterative development performance for large applications.
- Includes tools for using WebLogic J2EE Libraries from Eclipse projects.

[\[MORE INFO\]](#)



## Apollo for Eclipse 2.0.1

Apollo for Eclipse is the first commercial UML modeling tool that is based on open source technology developed by the Eclipse Graphical Modeling Framework (GMF) project.

The fully synchronized roundtrip engineering employs the latest releases of UML 2.1 and Java 5 to provide an instant visualization of any existing Java code through UML class diagrams, and likewise propagate changes to the UML model throughout the code.

The tool fully integrates into the Eclipse environment, which makes it easy for developers to view code as models, and vice versa.

In short, Apollo for Eclipse is primarily aimed at software developers who want to flexibly combine the advantages of visual modeling using UML (Unified Modeling Language) with programming in Java.

[\[MORE INFO\]](#)



## Q for Eclipse

Q is an Apache Maven plugin for Eclipse that will let you use Maven from the Eclipse IDE. This plugin better integrates the development and building processes by bringing Maven into the Integrated Development Environment (IDE). The plugin is licensed under Eclipse Public License. Features include:

- running Maven goals from the IDE
- dependency managing using the Maven POM, with automatic download of dependencies
- dependency graphing
- direct import of Maven 2 projects
- wizard for creation of new projects using the archetype mechanism

[\[MORE INFO\]](#)



## ObjectAid UML Designer

The ObjectAid UML Designer is optimized for the quick and easy creation of UML class diagrams from existing Java source code and

libraries. Code exploration is supported by seamless integration into the Eclipse IDE and many ease-of-use features.

- Create new class diagrams with a wizard.
- Drag and drop Java types from the Package Explorer, the Type Hierarchy and the Search View.
- All relationships are reverse engineered automatically. Associations are also determined from generic collections or can be added manually for non-generic collections. Two unidirectional associations can be merged into one bidirectional association.
- Inspect javadoc and source code for any type in your diagram in the Javadoc and Declaration Views.
- Build your diagram incrementally by adding new types that have a relationship with a type already in the diagram. Generalized, realized, associated and nested types can be added to the diagram from the context menu of a type or field.
- When you refactor your source code, all your diagrams are updated automatically.

[\[MORE INFO\]](#)



## Eclipse CDT For Windows

The Eclipse IDE (which is cross-platform and designed to have plug-ins written for) has a good C++ module called CDT (C/C++ Development Toolkit). Recently version 4.0 was released in tandem with the Europa release of Eclipse. It has been massively improved and gives much better Windows support.

In a quick note from “Gary’s Bit Patterns” blog, “Now the lead developer of CDT, Doug Schaefer, has started a new project called CDT For Windows which aims to make it obscenely simple to install and run Eclipse+CDT on Windows. Check out his post announcing this here. This is a great step forward and I hope this works out well.”

[\[MORE INFO\]](#)



## Agile Enterprise Architecture Plugin

This is an EPF-Composer generated Plugin Process used for defining how to go about doing “Enterprise Architecture” in

# What's New In the Ecosystem

an Agile way. Use this process web to establish or refine your Enterprise Architecture practice Operational Process. You can download the Library and tailor and modify it to suit your own company's way of working. The Plug-in is based upon sound fundamentals from TOGAF and Agile software development practices, such as SCRUM and Agile Modelling, etc. It will be enhanced and refined over time.

[\[MORE INFO\]](#)



## SFTP Plug-in for Eclipse 0.0.3

SFTP Plug-in for Eclipse adds SFTP support to Eclipse. Currently, it provides an SFTP client and SFTP Team provider. The SFTP Team provider allows you to synchronize files and directories between the workspace and a remote location. This new release will refer to proxy and SSH 2 settings on Eclipse Platform 3.3, and fixes some bugs in copying files and drag & drop in the Site Explorer.

[\[MORE INFO\]](#)



## oXygen XML Editor Adds Support for Eclipse 3.3

oXygen XML editor provides support for all XML related technologies and more. The list of key features contains XSLT (1.0 and 2.0) and XQuery editor, debugger, profiler, support for all schema languages, including Relax NG, ISO Schematron and embedded Schematron rules, etc. The latest version of oXygen XML Editor, version 8.2 was updated to support the new Eclipse 3.3.

[\[MORE INFO\]](#)



## Eclipse Web Tools Platform 2.0

The Eclipse Web Tools Platform (WTP) Project provides APIs for J2EE and Web-centric application development. It includes both source and graphical editors for a variety of languages, wizards and built-in applications to simplify Web Service development, and tools and APIs to support deploying, running, and testing apps.

Eclipse Web Tools Platform 2.0 is available for immediate download and can also be installed as part of Europa. This major update delivers its key goals of improved quality, adopter readiness, harmony with other Eclipse projects, and many new features for end users. Eclipse developers will be particularly pleased with the debut of major features and/or specification updates to EJB3 JPA, JSP 2.0, JSF 1.2, Axis2 Web Services, Tomcat support, and source editing. This release also introduces Java EE 5 project support.

[\[MORE INFO\]](#)



## eUML2 Free Edition for Eclipse 3.3 Released

The 3.0.0 version of eUML2 Free Edition for Eclipse Europa is now available on the <http://www.soyatec.com/update/europa> update site, an offline installation bundle is available as well. This release has been tested on Windows XP, Windows Vista, Linux and MacOX. The eUML2 Studio Edition for Eclipse Europa will come out next week. For the users from China, the mirroring site is up to date in simplified Chinese <http://www.soyatec.cn>. The products can be installed via <http://www.soyatec.cn/update/europa>.

[\[MORE INFO\]](#)



## Tiny Eclipse 3.3 Rolled Out

Tiny Eclipse is distribution for web and dynamic languages development, such as JSP, PHP, Ruby, TCL and Web Services. It has following features: Small download size, You can choose the features you want to install, and a Cross-platform GUI installer (current only for Win32 and Linux GTK x86). Included Plugins:

- Data Tools(DTP)
- Web Tools(WTP)
- PHP Development Tools(PDT)
- Dynamic Languages Toolkit for Ruby and TCL Developers(DLTK)

[\[MORE INFO\]](#)



## Modeling for Full Code Generation? Modeling for Software Development in the Automotive Industry

By J.P.Tolvanen, Ph.D. (MetaCase), Cord Giese (Delta Software)

Domain-Specific Modeling raises the level of abstraction beyond programming by specifying the solution directly using domain concepts. The modeling language follows the domain abstractions and semantics, allowing developers to perceive themselves as working directly with domain concepts. In a number of cases the final products can be automatically generated from these high-level specifications with domain-specific code generators. This automation is possible because of domain-specificity: both the modeling language and code generators need fit the requirements of only a single narrow domain, often in just one company. This article shows the strength of model-based code generation from domain-specific languages by describing its use for developing a controller unit for windshield wipers.

Since the introduction of Assembler, higher abstraction levels of programming languages have led to better productivity in software development. The improvements in raising abstraction – and therefore productivity – by newer programming languages, however, are relatively modest.

Currently, a programming language's contribution to productivity seems focused on providing libraries and frameworks, while over the last 20 years the mechanism for raising abstraction has shifted from programming to modeling languages.

Most mainstream modeling languages, such as UML, focus

# Feature Modeling for Full Code Generation?

on visualizing the code and therefore fail to provide a significant improvement in overall productivity when compared to coding in C, C++ or Java. Furthermore, the modeling tools that support these languages are constructed in such a way that the code generated from these models consistently requires manual completion. This further reduces the already modest productivity benefits afforded by this approach.

In this article, we provide an alternative approach to modeling and code generation, called Domain-Specific Modeling (DSM), which allows for full code generation from higher abstraction models. A key element of its success is the focus of the models on the application domain, rather than abstractions of software construction mechanisms. Since it is possible to include the rules of the problem domain into the language as constraints, the opportunity to specify illegal or unwanted design models can be eliminated. In nearly every case where companies apply this approach on top of a platform or framework, they can automatically generate complete final products from the high-level specification models. This is possible because both the modeling language and the code generator are designed to fit only one problem domain and its implementation space. Since the experienced developers in a company specify the languages and code generators (see Figure 1) the resulting code is better than most application developers write by hand.

## A Sample Case: Windshield Wiper Control System

To demonstrate the strength of DSM, we present a brief example of an automotive software development project: a controller unit for windshield wipers. We focus on the language definition and generator creation and thus to the expert developer's role.

In our example, the microcontroller is an AVR 128 8-Bit RISC

processor with 128 KB data flash and 4 KB SRAM. The software running on this controller consists of the PURE operating system, a generic hardware abstraction layer, and several C++ classes that are to be generated. Beyond the microcontroller, this system comprises a combination switch, an ignition key, one wiper motor for each wiper, an optional rotary switch and several optional sensors (rain sensor, door open sensor, hood open sensor, outside temperature sensor, speed sensor). The system shall support one or two front wiper arms, and one optional rear wiper arm. The front wipers are to be installed at three possible positions (left, center, right).

PURE is a small object-oriented operating system configurable for various AVR microcontrollers.

By using a domain-specific language and an accompanying framework, it becomes possible to rapidly and reliably implement these features without having to code each manually. Next we introduce domain-specific modeling (DSM) by describing how the modeling language and generator are defined for our wiper control system.

Our environment and controller allows us to implement the software in C++. The concepts described here can also be applied to C.

## Defining the Domain-specific Modeling Language

Complete code generation from models is not possible if the modeling language does not specify the problem domain adequately.

Therefore, we start by defining the modeling language for the particular domain. This means identifying the domain concepts and rules relevant for specifying windshield wiper control and its various features. The domain concepts for the language can be found from the basic system architecture and from the different services it may provide. These services

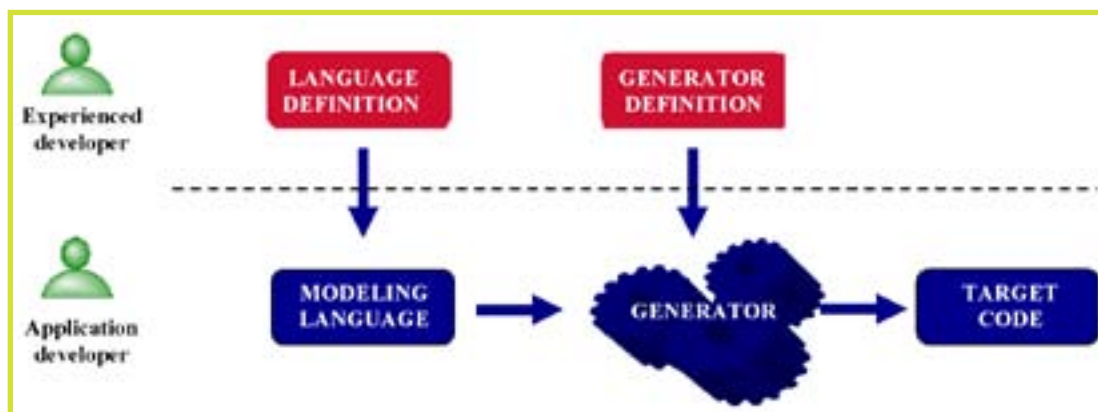


Figure 1. Creating and using modeling languages and generators

are comparable to use cases from classical object-oriented analysis. For example, the service “Ignition off” could lead to the response “Finish wiping”, an optional feature standing for the function that the moving wiper returns to its start position if the ignition is turned off. In detail, the event list comprises preconditions, requirements, in/out states, and constraints for the listed events.

Generally, these major domain concepts are mapped to modeling language objects, while others are captured as object properties, connections, sub-models or links to models in other languages. For example, the domain concept wiper is presented in the language as a modeling object. Additional attributes can be added to the modeling concepts to satisfy the specification and code generation needs. In our sample case, for example, the sensor can be selected to be a speed or a temperature sensor.

### Specify Rules For Model Consistency And Correctness

In addition to pure modeling concepts we can also detect related

rules. These rules constrain the use of the language and enforce the correctness of models. For instance, in a wiper control system speed adaptation can be connected only via a bus to the main system. The type of bus (LIN, MOST, CAN) can be chosen from the list of possible bus types while connecting the speed adaptation to the main system. A further rule can specify that a speed sensor may have only one connection to a bus. Another example from our sample case is the restriction that there has to be one or two wiper arms at the windshield. In the case of a single wiper arm scenario, the rules require that it must be installed in the center position. While in the dual wiper configuration, the arms could be installed in either the left and center positions, or in the left and right positions. In the modeling language a wiper has position information that can be selected by creating the respective element (see Figure 2).

The language is formalized by defining its metamodel. The form of the metamodel is dependent on the DSM tool used, but at a minimum

it should allow the user to define the concepts of the language, their properties, legal connections between elements of the language, model hierarchy structures and correctness rules. In all but the smallest cases, support for reuse and various model integration approaches is also essential. In this case we have used MetaCase’s MetaEdit+ tool which allows language specification and automatically provides advanced modeling tool support based on the defined metamodel.

### Finalize the Language With a Notation

Having defined the abstract syntax of the language we finalized it by providing a visual representation for it, usually in the form of a diagram, but occasionally

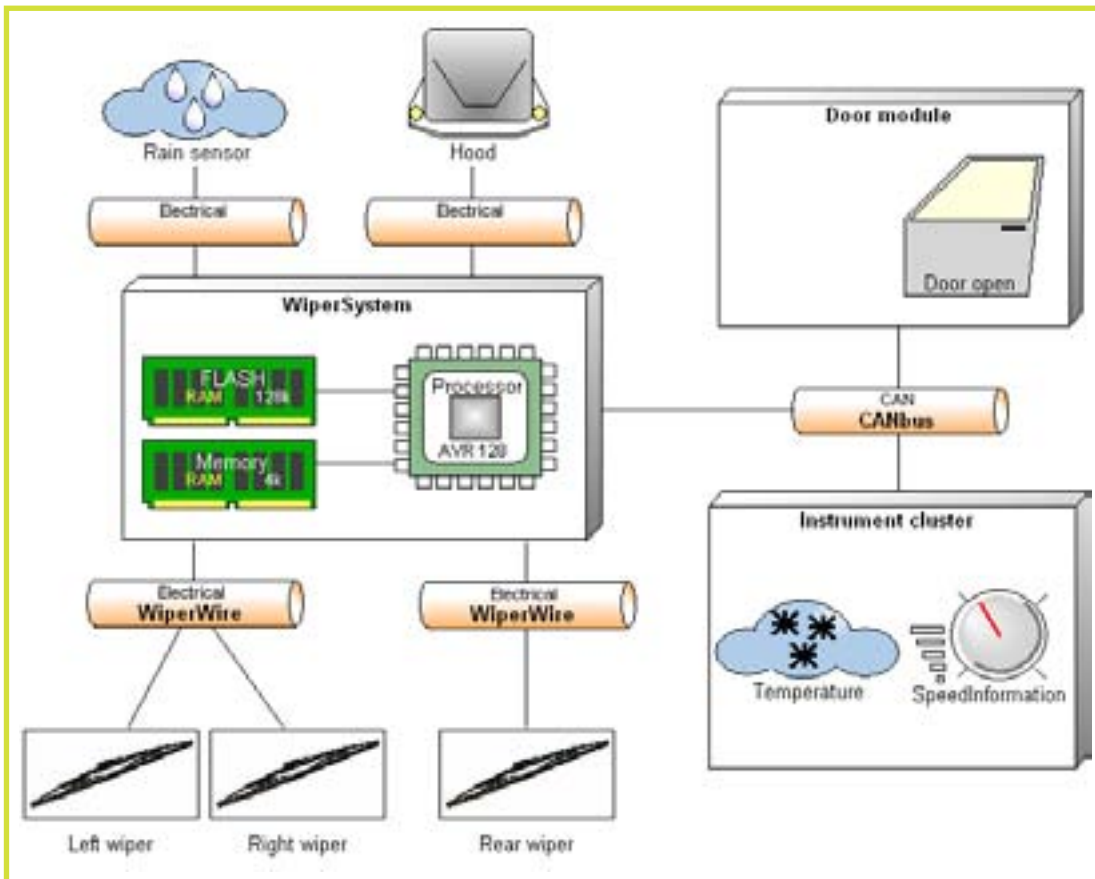


Figure 2. Model of a concrete windshield wiper control system

```
if ( ! info.directionPortB ) {  
    //if wiper change position or freezing protection  
    //are doing nothing:  
    if ( info.changePosition || info.icePosition ) {  
    }  
    else {  
        motor->moveEngineOneStep( portBLeft );  
        info.currentPositionPortB decrementB ;  
    }  
    if ( info.currentPositionPortB == startPosPortB ) {  
    }  
}
```

**Figure 3. Extract of code pattern definition comprising two slots and six blocks**

as a matrix, a table, or in plain text. A good modeling language uses a notation that closely reflects the actual problem domain so that the models become easier to read, understand, check and maintain. Using UML-style rectangles for all the different concepts is analogous to trying to understand a foreign language where the only letter is A, with 20 slight variations of inflection! For our sample language we have taken the notation from the real product appearance, such as a wiper, or formed the intuitively known symbols for different sensors (like rain or speed).

Figure 2 below illustrates a design using the constructed modeling language: the architecture with modules, their content and different communication buses used. With the expert created modeling language in place, other developers design the specific features by adding elements to the model. The modeling language guides in making correct designs and checks that the required information is given making full code generation possible. For example, while adding the connection to specific wipers their position information is needed and verified (one left, one right and a rear wiper). The language can also be defined to minimize the modeling work required. If a single wiper configuration is being designed, the model would automatically know that the wiper is expected to be in the central position.

The modeling language definition was not as straightforward as described here. First we constructed part of the modeling language and then immediately tested it by modeling sample applications. If the result was not satisfying (e.g. allowed for the creation of illegal designs), we made the necessary corrections to the metamodel. Here tools can dramatically help us.

MetaEdit+ made this language testing part agile: we were able to quickly test and learn what the language looks like in practice, and how easily it was to create and reuse models. This minimizes the risk of making a poor language, or a good language created for the wrong task. Tool support for language creation also greatly assists in finding good mappings for code generation.

### Implementing the Domain-Specific Code Generator

A code generator specifies how information is extracted from the models and transformed into code. This process depends on the modeling language as the models created form the input to the generator. A domain framework and other available libraries can make this task easier by raising the level of abstraction on the code side. In the simplest cases, each modeling symbol produces certain fixed code, including the values entered into the symbol as arguments. The generator can also generate different code depending on the values in the symbol, the relationships it has with other symbols, or other information in the model.

In our windshield wiper example we began the implementation work by programming a specific prototype. From a certain level of complexity such a prototype is needed to implement a generator because it yields the necessary fragments of source code, enriched by task-related knowledge and experience. Based on this prototype, we divided the source code modules into generic and non-generic modules. While the latter were to be generated, the generic modules formed the hardware abstraction layer. In fact, this layer raised the level of abstraction of the other source code modules.

To implement the generator for the remaining modules we used the generator development tool HyperSenses. It provides an interactive, model-based approach to define code generators. Here, HyperSenses was coupled with MetaEdit+ by importing the appropriate metamodel and model data. For the generator's development, the metamodel was imported into HyperSenses, as it provides a definition of the variable elements for code generation. Based on this automatically derived metamodel, so-called code patterns were defined: a fragment of prototypical source code is tagged with "slots" and "blocks". In the source code, slots mark variation points that are to be filled with concrete values at generation time, e.g. a class name. Blocks define larger pieces of code that are to be generated as a whole or not at all. This decision depends on the status "filled" of contained slots as well as on specified conditions. Additionally, blocks may be nested, providing for expressing even complex dependencies between several pieces of code (see Figure 3). Slots and block conditions are defined via expressions that refer to items from the metamodel. This way the former specific source code fragments become parameterized and neutralized fragments of target code: code patterns.

Code patterns may be connected to hierarchies, according to the structure of the metamodel. In detail, one code pattern comprises one or more implementations, e.g. for different target

languages. One hierarchy of code pattern implementations is named “rendering”, because it renders the model data with target code. There is one rendering defined for each code module to be generated. Together with the metamodel, they form the domain-specific generator – without the necessity to manually write the code generator. Even if a domain-specific generator has to be implemented only once for a selected domain, we have to take this matter into account: In the end it depends on the number of variants to be generated if these efforts are worthwhile. Decreasing these efforts results in enhancing the usage area of our DSM approach.

To produce the target code for the specified concrete model the code generator is applied. On a technical level, this is performed by importing the model from MetaEdit+ into HyperSenses, followed by applying the appropriate renderings. Please note that the model already is the configuration for the code generator. No additional work is required; a single button press generates the working target code.

### Conclusion

We have demonstrated here how generators and modeling languages can offer automation and improve quality by already enforcing rules the design stage. In our windshield wiper example we only addressed static variations but DSM can also be applied for dynamic variations. For example, a different order of wiping modes or an alternative processing of sensor data could also be specified with a dedicated modeling language addressing behavioral aspects of software systems. Code generators could then read the data, as in the above example, to produce the code.

Domain-specific modeling only makes sense in combination with domain-specific code generation. Domain-specific models are technically included in the development cycle, becoming first-class development artifacts. In addition to the productivity gains achieved through automation, the generated code is also expected to be of a better quality than handwritten code: there are fewer bugs, and, moreover, they are easier to detect. Depending on the number of generated product variants, the efforts invested in the development of the domain-specific language and the domain-specific code generator become worthwhile. This break-even point is reached even earlier, if a comprehensive tool support for these tasks is available.

### Dr. Juha-Pekka Tolvanen

Dr. Juha-Pekka Tolvanen (email: [jpt@metacase.com](mailto:jpt@metacase.com)) is CEO of MetaCase. He has acted as a consultant world-wide for modeling language development and has written numerous articles on the subject. For more information, see: [www.metacase.com/jpt.html](http://www.metacase.com/jpt.html).



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round  
the year...

**SDA**INDIA  
YOUR RIGHT TO INFORMATION TECHNOLOGY



# GlobalTester Tool for Testing Smart Cards

By Holger Funke

The introduction of electronic passports (e-Passports) has caused national and international boards alike to set standards that guarantee the functionality of these travel documents all over the world. GlobalTester is a tool that carries out the required application tests. However, its usage is not restricted to the testing of e-Passports – it can be used to test all kinds of smart cards.

Shortly after European Union decided to introduce e-Passports on a worldwide scale, it was recognized that comprehensive tests were indispensable to guarantee the functionality of these documents. The International Civil Aviation Organization (ICAO) and the Federal Office for Information Security (BSI) in Germany specified comprehensive test suites comprising of several hundred test cases. HJP Consulting GmbH (Paderborn, Germany) [1], in turn, provided a tool that converts these test cases into software. This tool, called GlobalTester [2], is based on

open-source components and allows the generation as well as the testing of test cases. It is freely available under the respective GPL. All that is required to use GlobalTester is a standard PC running Eclipse and a PC/SC-compatible card reader that allows card communication.

### Operating Modes of Smart Cards

To gain a better understanding of the GlobalTester, it may be helpful to have a closer look at the functionality of smart cards at first. Smart cards can be classified in different ways.

On the one hand, one can distinguish between memory cards and processor cards. On the other hand, there are contact cards that differ from contactless cards. With regard to GlobalTester especially the so-called processor cards, that comprise a wider range of functions, are of great interest. Yet, as far as the testing is concerned the outward-interface is of no importance, because the testing takes place on the application level where both types perform identically.

Processor cards have an individual microprocessor which allows access to the stored data. Normally, there is no direct access to the data. In other words, the microprocessor protects the data stored on the card from unauthorised access, by means of cryptographical methods. Therefore, the cards require a separate operating system which provides the actual functions specific to this system as well as cryptographical methods. The above mentioned e-Passport represents such a processor card with a contactless interface.

Primarily, smart cards are designed to store data. Compared to other storage media, they have the advantage that the access to the data can be subject to certain conditions. The structure of the file management system is object-oriented, i. e. all information about a file is stored within this file. In order to access a file, the respective file must be selected first. The file header contains management data (structure, configuration, access conditions) and a pointer referring to the file body which comprises the actual data.

The configuration of the file system is specified by ISO 7816-4. There are two different categories of files, namely

## The Most Frequent Status Words

Smart cards indicate their status by means of a so called status word. This word consists of two bytes. While the first byte indicates the respective status class, the second one includes further details on the status. After receiving a command, the return code 9000 indicates a positive status of chip cards. Sharp tongues may suggest that the most common error with smart cards may be “Out of memory” – alluding to the Commodore 64. This is not the case, though. The following list registers the most important return codes:

- 6282: End of file reached before having read all the bytes requested
- 6882: Secure Messaging is not supported
- 6900: Forbidden command
- 6982: Security conditions not fulfilled
- 6985: Use conditions not fulfilled
- 6988: Incorrect Secure-Messaging-Data-Objects
- 6A82: File not found
- 9000: Command executed successfully

dedicated files (DF) and elementary files (EF). The root directory, that is selected after initialising the card, is called master file (MF). The data are addressed via the so-called file identifier (FID) which comprises two bytes and allows the selection of directories and files alike. The MF, for example,

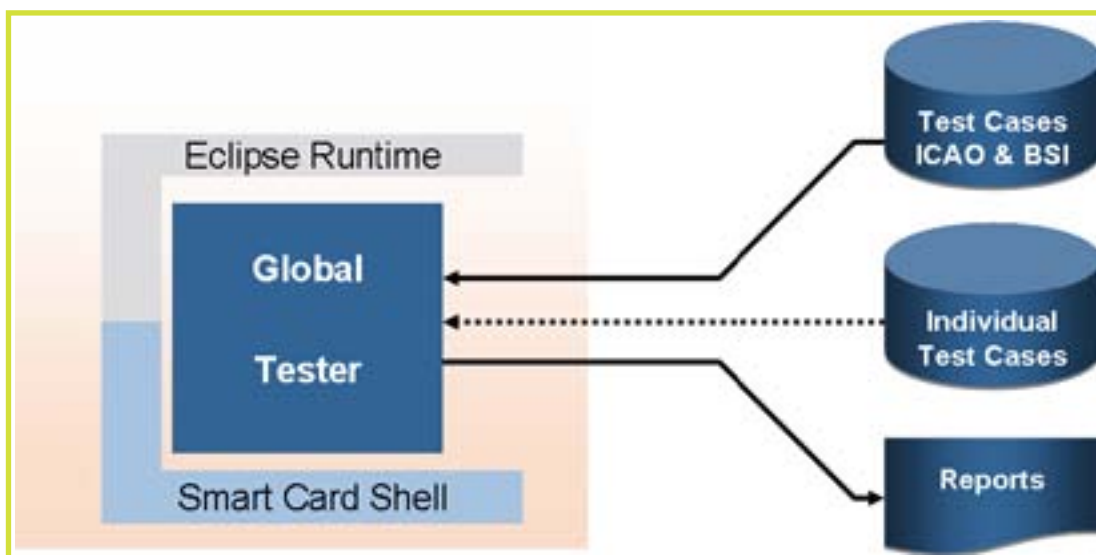


Figure. 1:  
The Architecture of the  
GlobalTester

# Feature Tool for Testing Smart Cards

goes with the FID '3F00'. The application identifier (AID), again, is composed of two data elements. The first element is the so-called registered identifier (RID), being followed by the proprietary application identifier extension (PIX). In combination, these two elements provide a unique ID for the respective application.

In order to allow interaction between smart card and terminal, appropriate means of communication must be provided. Communication is always activated by the terminal, whereas the card only reacts accordingly (master-slave-principle). A command consists of a header and a body. The header, again, comprises four parts, namely class (CLA), instruction (INS) and the parameters 1 and 2 (P1 and P2). While the CLA-byte identifies the application and the corresponding, specific instruction set, the INS-byte encodes the actual command. P1 and P2 are designed to give more detailed information on the applied command or choose by means of various switches between different options of the command.

The body's structure may vary, or it may even be empty. The body comprises the length of the data field, which is

## Listing 1

```
// Create card object
card = new Card();

// send command to card: Select Application
resp = sendPlain(new ByteString("00 A4 04 0C 07 A0 00 00 02 47 10
                                01", HEX));

// throw Assert if status word is not 9000
assertStatusWord(new Array("9000"), card.SW.toString(HEX));

// send command to card: Get Challenge of 8 Bytes
challenge = sendPlain(new ByteString("00 84 00 00 08", HEX));

// throw Assert if length of challenge is not 8
assert(challenge.length == 8);
```

sent to the card (LC), the actual data field and the length of the expected response (LE). If the LE-byte equals 0, the terminal will receive the maximum number of data available for the respective command. In connection with smart cards, a command is called Application Protocol Data Unit (APDU).

The website of Wolfgang Rankl [4], whose publication on smart cards set a benchmark, provides further comprehensive information on smart cards.

## Tests with Smart Cards

When testing smart cards, on the one hand it is important to check the functions the card is supposed to fulfil. These positive cases are meant to verify the guaranteed performance of the smart card. On the other hand, the negative cases are equally important. Therefore, error conditions should be constructed and

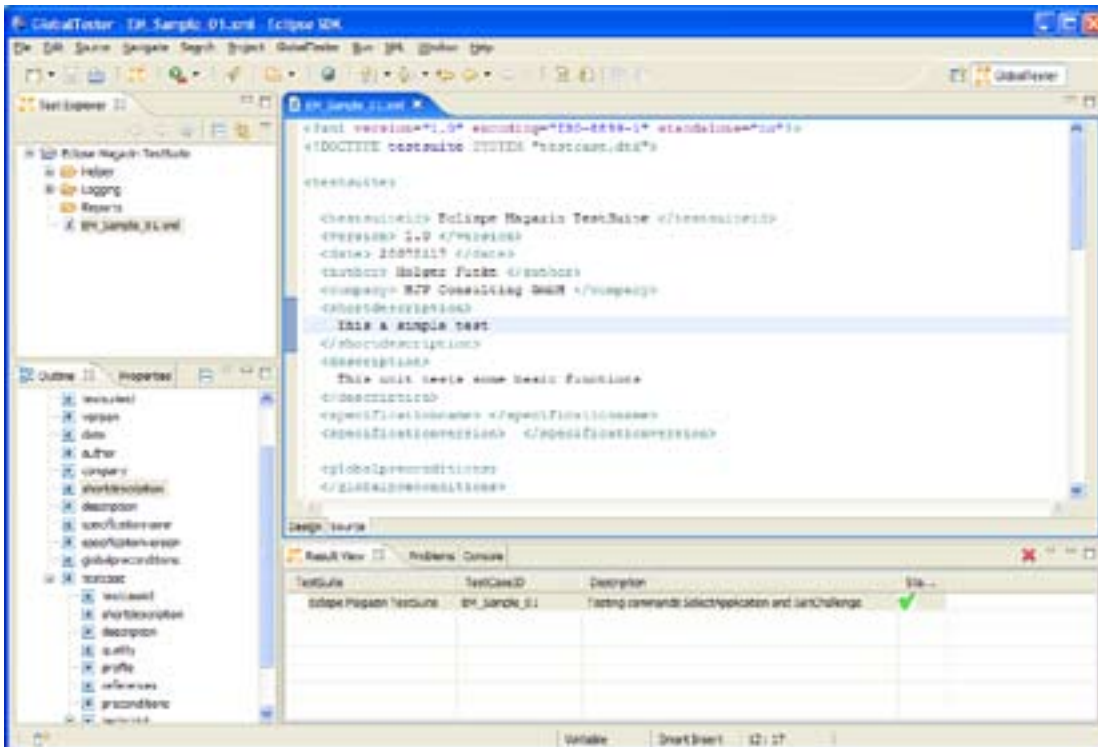


Fig. 2: Default Screen of the GlobalTester

the performance of the card in such an error case should be analysed. Thus, the card's characteristics under extreme conditions can be examined. For example, it can be analysed how a card will react if the application tries to read beyond the end of file. Another scenario worth examining is: How will a chip work if the application tries to access a file that does not exist? After constructing these error conditions tests should be carried out to ensure that the smart card's status corresponds to the appropriate error status defined in the specification. The box entitled 'The most frequent status words' provides a selection of possible states of a smart card.

The testing of undefined commands also proves to be very interesting. For this purpose, the performance of a card is being checked by means of a simple loop that runs through all possible commands that can be sent to a card. In doing so, possible undefined commands can be detected. As can be learned from the list of status words, a smart card responds with "6900" to an unknown command. If the card delivers a status word that has not been specified, this must be examined in more detail.

This is where GlobalTester can be applied – it allows the user to easily write scripts, which, in turn, automatically run tests that can be applied to various cards.

## Architecture of the GlobalTester-Plug-in

For the developers of the GlobalTester it was of great importance and value to use already existing and – if possible – free components. With regard to an adequate runtime environment, Eclipse proved to be best suited since it provides numerous important functions that do not have to be implemented. The Eclipse editor, for instance, makes it quite easy to describe the respective tests. Besides, CVS is of great use in terms of version management. On the one hand it manages all the tests, and on the other hand it files the corresponding results. Furthermore, Eclipse offers a project called Web Tool Platform (WTP) which allows the generation and editing of XML-files.

The freely available Smart Card Shell, part of the Open Smart Card Development Platform (OpenSCDP) [4], is another significant component of the GlobalTester. This

shell employs an open card framework and thus enables communication with the PC/SC-card reader. All of the objects mentioned are based on the Global Platform (as the name of the plug-in implies).

The Rhino Engine is another essential unit of the GlobalTester. This engine, being part of the Mozilla Firefox as well as of the new Java-version 6, is used for the scripting of the test cases. Thanks to the Rhino Engine it is possible to execute JavaScript directly from Java. Thus, the user can apply the easy to learn JavaScript to describe and implement the test cases.

Figure 1 provides a schematic survey of the

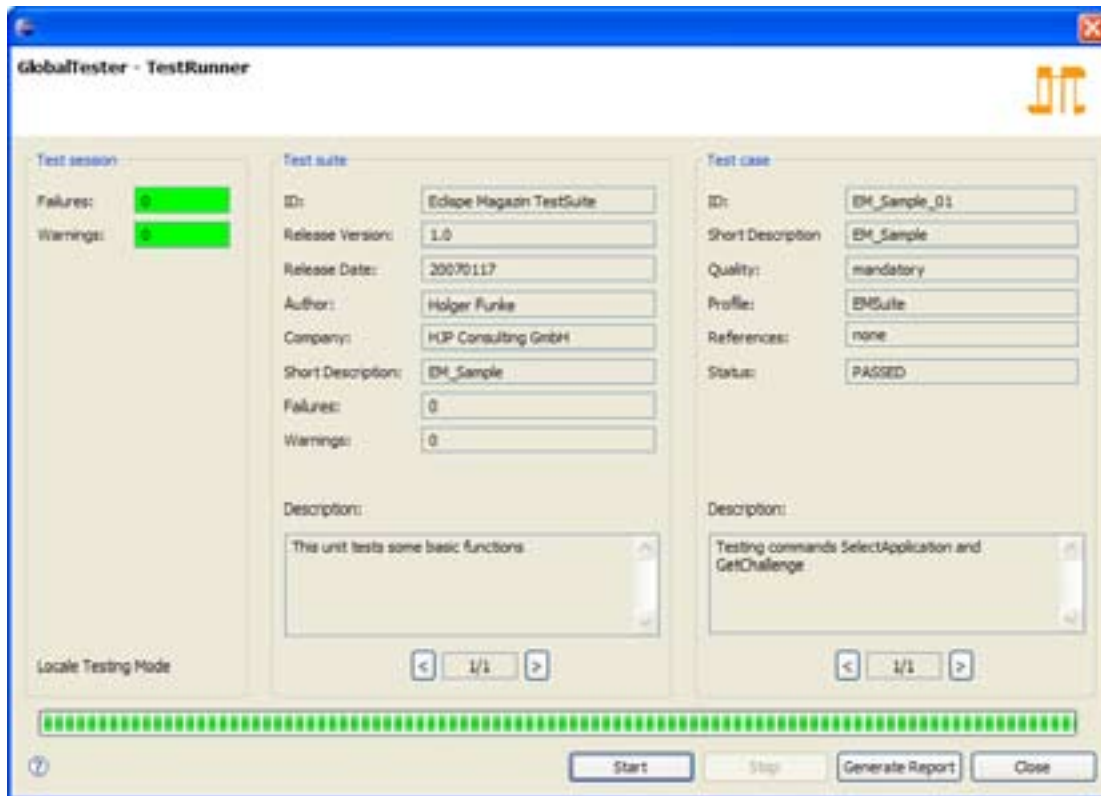


Fig. 3: Running a Test Case with the GlobalTester

## Feature Tool for Testing Smart Cards

most important components of the GlobalTester. Further open-source components to be mentioned are JDOM, which allows the parsing of test cases, and the Bouncy Castle API, which supplies all the necessary cryptographic functions.

### Operating Mode

All the test cases are structured within a XML-file. This file comprises the actual test script as well as administrative information on the author and the date, a brief description and an unambiguous test case title. Additionally, there are details concerning the underlying test reference and the global parameters that apply to the test. Variables which are to be valid throughout a complete test session can be defined by means of these parameters. The actual test script is a XML-tag containing code written in JavaScript. This code is executed by the GlobalTester, and the results or error cases respectively are displayed and recorded. At the end of a test session, a specific Eclipse view presents the results. Figure 2 shows a default screen of the GlobalTester. On the left hand side, there is the Explorer displaying all the test cases, whereas the main window shows the XML-structure of a single test case. Test results are presented in the section below.

All information deriving from a test session is recorded in a log-file. The user obtains detailed information on the errors and the respective test cases they occurred in. In addition, the user can generate a test report. Since this report is an XML-file, it can be displayed in a browser (using corresponding stylesheets).

Listing 1 provides an example of a simple test script. In this case, a card object is being generated first. As a first command, the required application on the card object is selected. The successful execution of this command is then checked. After receiving a command, every smart card delivers a status word, e. g. "9000" to indicate a faultless execution. The command *Select Application* enables the user to employ all the functions provided by the application. In the above mentioned case the command *Get challenge* is issued

to deliver a random sequence of 8 bytes. Following this, the test queries whether exactly 8 bytes of data were delivered. If not, this fact is recorded and is evaluated by GlobalTester later on. Figure 3 gives an example of a dialogue during a test run. It includes information about the tests to be made as well as the corresponding results.

### Conclusion and Forecast

GlobalTester is a tool that allows the user to test all kinds of smart cards. At first, it was designed to test e-Passports only, but it turned out to be an all-purpose tool for testing smart cards. For instance, this platform could be used to implement tests for the future health cards.

In the near future, there will be extensions of the GlobalTester as a versatile test environment. It is planned, for instance, to add a debugger which allows the execution of test scripts command by command. The current version of GlobalTester has a wizard that supports the user when generating new test cases. This wizard will be upgraded for future versions to provide the user with a highly productive and user-friendly test tool.

### Resources & References

- [1] <http://www.hjp-consulting.com>
- [2] <http://www.globaltester.org>
- [3] <http://www.wrinkl.de>
- [4] <http://www.openscdp.org>

### Holger Funke

Holger Funke works as a system analyst at HJP Consulting GmbH in Paderborn, Germany. He has several years experience in software engineering. He is in charge of the development of GlobalTester and has already supported the introduction of e-Passports in various countries. He can be reached at: [holger.funke@hjp-consulting.com](mailto:holger.funke@hjp-consulting.com).



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# Europa

# The Largest Open Source Software Release Ever



By Ian Skerret

For the past four years, the month of June has been busy time for the Eclipse community. This is the month when the community makes available new releases of many of the Eclipse open source projects. Building on the success of the Callisto Release in June 2006, in June 2007 the Europa Release (Europa) will feature a coordinated release of more than twenty Eclipse projects, made-up of millions of lines of code, involving hundreds of developers spread around the world. In fact, Europa may be the largest open source software release ever.

**A** coordinated release strategy has become an important part of the Eclipse community. Many organizations and individuals have come to rely upon a variety of Eclipse projects to help build their own software solutions. No longer do people just use the base Software Development Kit (SDK) and Java development tools (JDT), they also include other projects like Web Tools Platform (WTP), Business

Intelligence and Reporting Tools (BIRT), Eclipse Modeling Framework (EMF), Mylar, and more. Therefore, to make use of a new SDK release, it is important that the other projects are updated to work with the new SDK release.

This strategy also allows for a high degree of predictability and transparency to occur within the Eclipse community. For the last four years, the Eclipse Platform project has planned and

release a new version of their project at the end of June. Users and adopters of Eclipse can now plan their upgrades with a high degree of certainty.

## The Road to Europa

The path to coordinating 20 plus projects to release on the same day is remarkably straightforward. The first step is that for every project, the committers are still responsible for the feature content of their release. There is no top-down management structure that dictates what the projects include in their release. The second step is that the projects actually practice releasing. Starting as early as January, all the projects make available milestone releases on a coordinated schedule. This allows them to determine any cross-project dependencies early in the cycle. Finally, the Eclipse architecture, based on Equinox and the OSGi standard, makes it feasible to develop technology in a distributed fashion but define the interdependencies and APIs that are required to have integration across the different teams.

### Complete List of Projects in the Europa Release

- AspectJ Development Tools 1.5 (AJDT)
- BI and Reporting Tools 2.2 (BIRT)
- Buckminster 1.0
- CDT 4.0
- Corona 1.0
- Dynamic Languages Toolkit 1.0
- DSDP Device Debug 0.9
- DSDP Target Management 2.0
- Data Tools Platform 1.5 (DTP)
- Eclipse Communication Framework 1.0 (ECF)
- Eclipse Project 3.3
- Dash (Eclipse Monkey)
- EMF 2.3
- EMFT (QTV) 1.1
- EMFT (JET)
- GEF
- GMF 2.0
- Model Development Tools 1.0 (MDT)
- Mylar 2.0
- STP 1.0
- TPTP 4.4
- WTP 2.0

## What is New in the Europa Release

There is a LOT of new functionality being made available in Europa. Some of the projects participating in the simultaneous release are celebrating their 1.0 release—including Buckminster, Corona, Dynamic Languages Toolkit (DLTK), Eclipse Communication Framework (ECF), Model Development Tools (MDT), and SOA Tools Platform (STP)—while some of the more mature projects are adding additional functionality. Each project publishes a “New and Noteworthy” document that details the new features in their release.

## New Collaboration Functionality

There are three projects being released with Europa that make it easier to add collaboration functionality to your applications.

The Eclipse Communication Framework (ECF) provides a set of APIs and services that implement various communication protocols, ex TCP/IP, Jabber, SIP, IRC, and more. ECF makes it easier to integrate collaboration functionality—like chat, presence, and file transfer—into your application.

Corona is a new Eclipse project that adds collaboration functionality to your Eclipse tool chain. It establishes a collaboration event model that is used to propagate events across multiple Eclipse workbench instances.

Mylar adds a task-focused user interface to the Eclipse workbench. It automatically manages a “degree of interest” in application resources for a specific task and filters the views in the workbench to show only those resources germane to the task. Tight integration with task repositories—including bug trackers like Bugzilla, JIRA or Trac—make it easy for developers to collaborate on tasks.

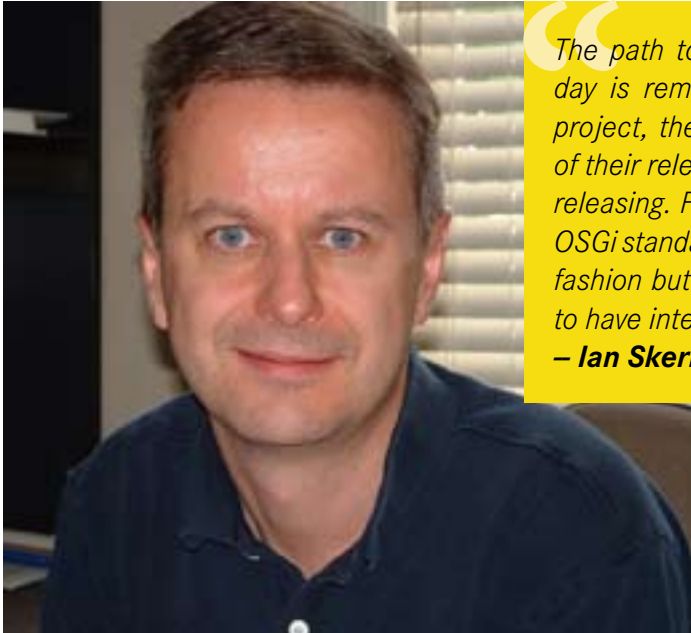
## Tools for SOA

The SOA Tools Project (STP) will make their 1.0 release available as part of Europa. STP is focused on providing tools for Service Component Architecture (SCA) development. The 1.0 release supports the creation of JAX-WS based services and the composition of services via a BPMN and BPEL tools.

## New Tools for Embedded Developers

The Europa release adds significantly new functionality for embedded developers.

The C/C++ Development Tools (CDT) 4.0 release introduces a new project creation wizard that simplifies the selection of the tool chain, improved editing and cross-referencing support, and more. Support for the MinGW tool chain also makes it easier to



*The path to coordinating 20 plus projects to release on the same day is remarkably straightforward. The first step is that for every project, the committers are still responsible for the feature content of their release. The second step is that the projects actually practice releasing. Finally, the Eclipse architecture, based on Equinox and the OSGi standard, makes it feasible to develop technology in a distributed fashion but define the interdependencies and APIs that are required to have integration across the different teams.*

**– Ian Skerret, Director of Marketing, Eclipse Foundation**

use CDT for Windows development.

The Device Software Development Platform Target Management (DSDP-TM) provides data models and frameworks to configure and manage remote systems, their connections, and their services. This is valuable for developers that are targeting systems that are different from their development platform.

### Tools for Dynamic Languages

The new Dynamic Language Toolkit (DLTK) project provides a framework for building IDEs for dynamic languages. The 1.0 release of the project will feature support for TCL, Python and Ruby, but is also extensible to allow others to add support for their own dynamic languages. DLTK tightly integrates with Mylar and JDT to provide a complete programming environment for developers using dynamic languages.

### First Class Support for Windows Vista

A new completely native implementation of the Standard Widget Toolkit (SWT) is now available for Windows Vista and Windows Presentation Framework (WPF). With native WPF support, Eclipse and Eclipse Rich Client Platform (RCP) applications are among the first to run as native applications on Windows Vista.

### Modeling Projects

Europa builds on Callisto's modeling legacy by including even more modeling functionality.

The Eclipse Modeling Framework (EMF) provides critical infrastructure and code generation support for building tools and other applications. EMF is extensively used by other Eclipse projects, and by numerous open source and commercial software ventures.

The EMF Query, Transaction, and Validation functionality—making their first releases as part of Europa—enhance the functionality of EMF by providing support for executing queries against EMF models, transaction behaviour (with ACID properties), and validation to ensure integrity of application data based on EMF models.

JET is an important component of Model Driven Development (MDD). The goal of MDD is to describe a software system using abstract models, and then refine and transform these models—using JET—into code. Such transformations accelerate the MDD process, and result in better code quality. The transformations can capture the “best practices” of experts, and can ensure that a project consistently employs these practices.

Using the Graphical Editing Framework (GEF), developers can quickly build rich graphical editors for their applications. The Eclipse Graphical Modeling Framework (GMF) provides a generative component and runtime infrastructure for developing graphical editors based on EMF and GEF.

The Model Development Tools (MDT) provides an implementation of industry standard metamodels, along with exemplary tools for developing models based on those metamodels. The list of metamodels currently includes an implementation of RDF(S)/OWL, the Ontology Definition Metamodel (ODM), the Object Constraint Language (OCL), UML2, and XSD.

### New Features for Java development tools (JDT)

With the Europa Release, the Eclipse project brings even

## The Largest Open Source Software Release Ever **Feature**

more value to their industry leading Java development tools. Hyperlink stepping streamlines the debugging process by empowering developers to determine how the debugger steps through code. Further enhancements to the Java debugger let the developer browse object references and find instances of classes on runtime environments that support it (currently only available with Java 6). The Java editor is now smarter, supporting great features like content assist that can propose unresolved names found in other parts of

the code, scripted refactoring, the ability to refactor without having to save, more quick assists, new formatter options, and enhanced static analysis.

### **Time to Start Exploring**

The Europa Release introduces a wealth of new features and functionality for building and deploying software. Now is a great time to explore some of the newer Eclipse projects and see how they can help you build your application.

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## JAX India 2007 Wows the Crowd

By Eclipse Magazine

It is not often that you get the opportunity to attend a conference that offers a platform for knowledge transfer from North American and European experts to the Indian Enterprise IT community, besides presenting extensive networking opportunities to delegates, sponsors, and partners. JAX India 2007, held in Bangalore from 28-31 May this year, was a first of its kind conference on Java, Eclipse, Enterprise Architectures, SOA, Web Services, Software Testing, Project Management, and many of the new and emerging technologies that are shaping the world of Enterprise IT.

Software and information technologies are playing key roles in enterprises, helping them grow on a constant basis as well as bringing prosperity to more and more people in the region. With domestic IT spending for enterprise software set to increase manifold in the next three to five years, these are exciting times for the Indian Enterprise IT community. It's time now to start looking "inwards" and use India's software intelligence to build efficient systems for Indian industry. To keep track with the rapid developments and changes in the world of technology, you need the latest information. And that

is exactly what we at S&S Media do—provide you with the latest and most relevant information on all kinds of technologies, to help you stay productive.

JAX is the numero uno conference for IT professionals in Europe, attracting well over 2,500 attendees each year. After having successfully organised JAX in Europe for seven years, S&S Media brought this event to Bangalore, India this year. With one full day of Power Workshops (28 May 2007) and three days (29-31 May 2007) of main conference, [JAX India 2007](#) featured over seventy sessions that look ahead



and identify trends, as well as best practices that impart valuable knowledge for your projects.

The first Indian edition of JAX saw extensive pre-event awareness building on a scale that is difficult to find in India. The conference attracted over 700 CIOs, CTOs, Management, System Analysts, Development Managers, IT Managers, Project Managers, Project Leaders, Software Architects, Software Developers, Software Testers, Database Administrators, and Web Developers from all over India, and also from various countries in Europe and South East Asia.

JAX India 2007 brought together some of the world's most renowned speakers, presenting relevant topics in the areas of Enterprise Java, Service Oriented Architecture (SOA), Enterprise Architecture, Eclipse, Open Source, Web 2.0, Agile, and more. The conference not only provided an excellent opportunity to gather colossal amounts of information -- from the sessions, from personal discussions with speakers and peers -- but also the opportunity to forge new business contacts. Delegates enjoyed the academic setting at the Indian Institute of Science (IISc) and dived into four full days packed with technical information.

The conference was instrumental in ameliorating the quality of the attendees' daily projects and in revving the productivity of their businesses. The participants, speakers, sponsors and exhibitors all found it a great place to be in as it showcased several interesting presentations, wealth of information and tons of networking opportunities.

"I have never seen such a wonderfully organised event at least for many years. All the sessions and speakers are appropriate and up to point. Never did I feel that my four days here were spent without learning," said an attendee from SAP.

Attendees were treated to over 70 top-notch sessions, delivered by experts hand picked by SDA India from across the globe, such as Craig Russell, Craig McClanahan, Neal Ford, Thilo Frostcher, Mik Kersten, Neelan Choksi, Tobias Israel, David Intersimone, Leigh Costin, and Shelby Sanders.

Most sessions at the conference were "house full" and some sessions were repeated based on popular demand.

SOA emerged as a talking point at JAX India 2007. In his session on SOA being the future of distributed computing, Neal Ford provided an overview of what most people agree is the definition of SOA. Ford's session took a pragmatic look at SOA from a developer perspective, including such (never talked about) topics like transports, granularity, versioning services, transformations, and whether you should be doing this or not. The meat of the talk, however, enunciated on how to implement SOA, including the evolution from current stovepipes all the way to SOA nirvana. The session also showcased some common implementation pitfalls. SOA can work if you ignore the hype and focus on the real meat: building loosely coupled message-based applications. Neal not only explained technology in a way that captivated the audience attendance, but also threw in good doses of humor into his talk. A nice way to get a point across!

There are perpetual wars over which programming framework reigns supreme. Yet at the end of the day, technology is just a tool to be used to get the job done, and different problems are best addressed with different tools. The success or failure of a project more often depends not on the tools used, but whose hands they're in. Bryan Chan, who discussed the various strengths and weaknesses of three popular platforms—Java, Ruby, and PHP—triggered many a heated debate among



members of the audience.

Another sold out speaker at the event was Craig Russell who with his knowledge on Java Persistence and O/R Mapping delved into the rationale behind object relational mapping in the Java application development space. He also demystified concepts such as impedance mismatch, domain object modeling, byte-code enhancement, container based persistence, pojo persistence, inversion of control, native query, and drop into SQL. Tobias Israel, with his sessions on Web Services transactions with WS-Transaction and Web-Service specifications had to do an encore for the audience. The sessions on Eclipse also drew in the crowd.

The Service Oriented Architecture (SOA) market in India is expected to grow at a Compounded Annual Growth Rate (CAGR) of 49 per cent from 2006-2009, making it the fastest growing market in the region, according to Springboard Research. While the average Indian IT professional's SOA learning curve is low, the biggest hurdle to deployment is often met at the level of executive buy-in, where "business results" take importance over "cutting-edge".

It has become very clear that in order to be competitive, Indian enterprises can no longer tolerate the delays and costs associated with tightly coupled information systems that obstruct the ability to change and stay competitive. SOAs help companies better accommodate change by providing them the flexibility to better utilise IT resources. More specifically, they offer an architectural approach to designing and managing computing environments built upon loosely coupled, reusable and standards-based services that can shift in accordance with changing business needs.

On the closing day of JAX India 2007, in a "first-of-its-kind" industry panel discussion, the best minds from the industry got together to shed light on exactly the topics that help ease executive buy-in for SOA and push the pedal on enterprise deployments. The panel, moderated by Professor PCP Bhatt, comprised of Venkat Srinivas Seshasai from SAP, IBM's Naveen Gupta, Venkat Ravipati of Oracle, Devashish from Sun, and Raghu from HP. The SOA panel deliberated on the importance of SOA and the changes it will bring into the technology industry. While a major part of the audience was engrossed in the SOA deliberations the attendees' also threw up some hard-hitting questions for the panelists. All in good fun, of course! Read more about the panel discussion on [Page 28](#).

"This is the first of its kind conference in India for IT professionals likeme wanting to stay on the cutting edge of technological changes in the enterprise arena. I can testify that this experience has been unique and will also help me apply some of the new techniques in my daily work," said an attendee from Robert Bosch. Delegate Aby Verghese summed up the mood of the attendees. "JAX India 2007 has provided a decision maker like me a great vendor-neutral platform where I can evaluate products, solutions, and services from a range of vendors."

JAX India 2007 saw a huge turn out from 50 different IT companies such as SAP, Wipro, Oracle, ThoughtWorks, Juniper, MindTree consulting, Robert Bosch, Honeywell, and BEA. The conference was sponsored by the likes of Borland's CodeGear, Oracle, BlueCoat, SAP, Telelogic, Sun, IBM, Parasoft, Compuware, Collabnet etc. With the success of our first India initiative, S&S Media (publishers of SDA India Magazine and



## CodeGear for the Developer

### QA with David Intersimone – Chief Evangelist, VP Developer Relations & Shelby Sanders – Development Tools Architect

1. CodeGear came into existence after several attempts to sell the unit from Borland failed. Do you think a negative publicity might have harm the company more than doing any good?

**David Intersimone:** Since the announcement in February, we have been focussing on developing tools for developers and teams of developers. We are still generating our products and revenues and we are a profitable business inside of Borland. In future, someday we will be an independent company. In the meantime, we are building products, we are busy with the customers, and we are at this conference. As far as business is concerned, it is going smoothly. We are bringing solutions, capabilities for our customers and they are buying us and keeping us profitable. Our goal is to become independent and in the meantime we are running our business independently. We have our CEO, our own VP of finance, sales team. We have our own R&D; we share certain things like HR, finance, and legal with Borland.

**Shelby Sanders:** I think it has really started to work. We have seen people buying tools and showing interest in our products. Productivity gains as teams get smaller and we are moving on, regardless of anything and restructuring. We are delivering tools and people are getting value for it. We are focussing on it.

2. It has been just a few months since CodeGear was spunoff from Borland. Do you see CodeGear achieving the specific purpose of being spunoff? Has there been any difficulty so far?

**David Intersimone:** We think of our self as a business unit, a group within Borland. People thought we are part of Borland but we are developing our own identity. We are traveling around the world to promote the new brand. We are independent but our financial results are still declared by Borland. Someday we will be truly independent.

**Shelby Sanders:** I think being independent is really good. It's not necessarily a challenge but function to separate two different kinds of personalities. There are certain synergies between them but different market as a whole. A lot of technical stuff lined up but businesses are different. We can do our own processes, tools and ALM development, new languages and new markets as well.

3. CodeGear was formed with the intention of helping with the management of codes. What opportunities do you see in managed codes and how do you define managed codes?

**David Intersimone:** Where we focus on in the whole ALM space including designing, architecting, coding, casting,



**Shelby Sanders**  
Development Tools Architect,  
CodeGear



**David Intersimone**  
Chief Evangelist,  
VP Developer Relations

testing, debugging, recoding, native codes, managed codes, dynamic codes, as well as in many organisations there are business analysts, IT operations. But in our terms, we have tools for developers, development teams, and individuals. We can branch out and have a lot of customers. We are moving things.

**Shelby Sanders:** we are not holding on to anything because they are different technologies altogether. Maturity levels within the community are important but there are certain drawbacks too and we have to balance that with our tooling

and we have seen that our tools have their own niche, as it is different market. It still has to be user stories, development, project team, IT management and governance.

4. What new products can we see in dynamic scripting languages, graphical application development and multimedia application development? Are there projects underway in any of these technologies?

**David Intersimone:** There are two technologies that we shipped earlier this year. Delphi for PHP that brought rapid action and component based development programming for Version 5 of the PHP language. We also support Ajax file. So using Java, XML, Asynchronous language, as part of that we support Javascript, Ajax, technologies as well.

**Shelby Sanders:** Long-term roadmap is to develop into a dynamic language tool. Now it's mostly a Ruby language and

that is clearly on way to improvement and that is our core play in the RoR space. Beyond that there are Microsoft Flex,

5. JBuilder is built on top of Eclipse. Can we see more products being developed using open source technologies. How is CodeGear's faith on Open Source?

**David Intersimone:** It's really leveraging open source. So instead of building everything ourselves, which we did in previous versions of Jbuilder, we are now going to licence some of those pieces. We are more using open source. There was a whole bunch of open source. I think by using the whole ecosystem, plugging architecture, you get to make better architecture. Open collaboration and open design. Solid pack and helps a lot. We are adding multiple packages. Open source communities are in really good pace. Open source- we are contributors and that's where our core ruby challenger comes.

6. Can you explain why Ruby suddenly seems to be the programming language 'flavour of the month'? Is there something special about the Ruby language itself or has it simply benefited from the effective publicity surrounding the Ruby On Rails web development framework?

**David Intersimone:** While I wouldn't say it is just publicity. The big thing is I look at it as Rails has exposed language features of ruby; it really shows you how to build Meta programming and stuffs like that. It just has certain language features that really enables you to build smart features that allows you to and rails is one of the those tools that takes advantage of that. There are other languages that are coming you to but Ruby remains more efficient. I wouldn't call it de jure kind of kind of think, but it so happens that Ruby is extremely good. It already makes sense to use but no body leveraged that before. It took ten years to gain this strength because the productivity gains, the simplicity gains from doing that is not transitional.





## Spring Framework is Successful Because It Solves the Problem

### QA with Neelan Choksi, Vice President of Interface21

#### 1. You have just got USD10 million in funding. How does that help in taking the business forward?

We have been cash positive and profitable since beginning and the funding is designed to help take our existing business further and grow dramatically. We will take the funding and grow more and improve our sales and marketing on one side and on other side the difficulty of being self-funded is it has problems on product development and service delivery side and the funding will allow us to put an increased focus on product development and we hope that this is the only round of funding that we ever have. It is going to take us to build the Spring portfolio and the other entire dozen portfolio that we have on hand or are planning.

#### 2. Very few opensource projects achieve critical mass, and even fewer drive fundamental product innovations. Interface 21 has been one of major successes in recent times? Why do think did Interface 21 achieve that success?

It has to do with fundamentally solving the problem. If you look at the Spring framework, it was addressing Java and enterprise Java problems that existed during the time and when you solve problems that people want you to solve, open source really makes sense here. Open source is a vehicle to take that solution to the masses. I think that's what drives the company and its business. We are not reinventing the wheel. We don't have an O/R Mapping solution either.

#### 3. What are you talking on at the JAX India 2007 conference?

The two talks that I am giving are the business talks, which is quite unusual in JAX India. One is the open source business and it delves on what is going to happen if open source remains the same way as it is. The other topic is "You really can't buy a community." The idea is to build a community and once you build a community, that where you translate it into revenues.

#### 4. All over the Internet and blogs, there are rumours that Interface 21 is on the acquisition block and Oracle is one of the potential buyers? How true is this?

That news is not true at all. I always appreciate rumors about acquisition as it shows you are still relevant. In January

2007 there was news that IBM will buy us. There is always the possibility of a company that is doing good to get acquired. Getting funds to the tune of USD 10 million is an important milestone and you can at least put a full stop to rumors for a little while. We are excited about doing our business as an independent software company. We think that that we add a lot of value as an independent software company. Our goal is to remain independent and grow our business and do what we have been doing for the last 2.5 years.



Neelan Choksi  
Vice President, Interface21

#### 5. Now that you have funding in place? What challenges lie ahead for you in expansion?

Anytime how you grow -- and we have grown organically -- it is pretty sure that we are growing pretty rapidly. We always have to be careful about change management in those types of situation. My job is to do two things. To worry internally that we have to do things continuously that we have been doing since inception. Plus adding some more to making our business better and greater.

On the external side, open source is a great thing. Thousands of people have idolised open source. At the end of the day we are a business and raising funds really adds to business and credit. Any action that we do will be viewed by people as 'Oh God! These guys have gone off and turned off a venture backed company into a profit making company.' Hopefully we will do and provide great solution and services along the way.

#### 6. What are the actual benefits of Aspect Oriented Programming (AOP) and why should developers jump on the bandwagon if they haven't already done so?

Aspect Oriented Programming (AOP) is really a revolutionary way of looking at modularisation of programmes. Abilities to separate out different pieces to modularise different things together. This is the really the key to aspect oriented programming.

## 7. What do you think will overtake or supercede Java, if at all, it arrives?

There are a lot of talks on domain languages, ruby on rails, groovy and all of these languages. What we are hoping to learn from these is there are problems. Take the good things from Ruby on Rails, groovy and other domain languages and apply them to Java. There is lot of investment that has gone into Java from corporations. So, my take is that we need to take these learning and make Java better. I hope nothing supercedes Java. In Spring 2.0 we added support for Roby on Rails, Groovy and couple of other domain specific languages. We are hedging our bets and we also have Spring.net version of Spring as well.

## 8. Do you foresee a time when all software would be free or companies making their proprietary software free or open source?

I don't think enterprise software is or should be free. What basically we are saying is license fee should not support open source software. They support for maintenance and supporting fee, training, consulting and others. We should monetise open source this way and it is becoming more like Software as a Service. I strictly believe that once you support your customers, you need to give them good service. You don't have to pay me if I don't provide you proper services. I think that model of monetising with customer satisfaction is absolutely critical for success of any model. I don't see any software going free, but only the model of monetising will change.





## Mik Kersten Speaks on Mylar (Mylyn)

Every once in a while, certain college projects turn out into niche properties. Google and Sun Microsystems are indications of that. One such project called Mylar, developed by Canadian Mik Kersten is now being talked with awe across the Eclipse community and generated a lot of interest.

The credit for the success of Mylar, now known as Mylyn, goes to Kersten. Mylar is the task-focused UI for Eclipse. For those who are not aware of Mylyn, Kersten explains, "Today's enterprise applications and frameworks are composed of millions of lines of code. What the state-of-the-art IDEs have done is made all of that code instantly accessible. But when used on large systems, views and searches of the system will often contain thousands of elements. The result of this information overload is that developers often spend more time repetitively scrolling, searching, and navigating code than they do programming. The key intuition behind Mylar (Mylyn) is that for any bug that we need to fix or feature we add, we only care about a subset of the system."

If you have been working with Mylyn, you will notice slimming and streamlining of the User Interface (UI). What Mylyn does is provide a new task-focused UI that makes this subset explicit by automatically managing task context on the user's behalf. With a single click, users indicate the task that they are working on; at which point all of their programming activity for the task will start to form its context. Views of the systems are filtered to show only the elements within the task context, instead of being overloaded with thousands of elements. Changes are automatically grouped by task, and a test suite for the task is automatically generated.

Kersten's goal on the outset was to get rid of the scroll bars in structure views, and he has largely been successful at doing that. To do it effectively he had to bring the various kinds of tasks that one worked with into Eclipse. "We always use Mylar bootstrapped so we did all of the integration bits that made us and our early adopters more productive, such as adding offline editing and change

notification for tasks." As a result, around Mylar 0.7, he says, he lost all dependence on the web browser and email inbox for tracking tasks, and got to work entirely in Eclipse where one is most productive.

Another benefit of Mylyn is it also makes multi-tasking easy by allowing users to instantly recall the context of previous tasks. For example, in the case where a bug is reopened, collaboration is facilitated with the ability to share task contexts. The end result is that developers can focus on their programming activity instead of repeatedly searching for information and manually re-creating their context.

"Our design philosophy is that less is more, and so we have taken away experimental views, simplified menus, and most importantly reduced the number of clicks for the common workflows. The result is that most of what's new is centered on single view called the Task List. Beyond that, Mylyn integrates and reuses all of the existing facilities in Eclipse to focus you on task context," says Kersten.

Kersten also says the next big shift in software development is about to happen with Mylyn. "What I see happening is that the knowledge currently trapped in individual developers' heads will become much easier to share and recall, making it easier

for distributed teams to interact and for newcomers to come up to speed. Consider what's happening in Mylar's Bugzilla repository on eclipse.org. Every significant bug that we resolve has a task context attached. If a bug is reopened a couple months later, you instantly see the code and APIs that were changed when it was last worked on, and immediately recall what was going on because your memory of that problem has been externalised. If we didn't complete a bug, but some user needs the solution, they can easily pick up where we left off. That's why we require that a task context be attached along with every patch that we apply. We get dozens of patches monthly and they have been critical to evolving Mylar. Having that expertise shared makes patches dramatically easier to review."

Working on Mylyn has had its own effect on Kersten. He did learn a lesson



**Mik Kersten**  
Eclipse Mylar Leader

## Feature JAX India 2007 Wows the Crowd



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or two about the open source community while working on the Mylyn project during his PhD. He says the key lesson is the enormous value of managing the bug reports that define how a constantly changing user community needs a new tool to work. "A huge challenge with Mylyn was that nobody had done anything quite like what we were doing, so we had to grow the UI in a very organic and agile way. We resolved almost 2000 bug reports. The dozens of comments on some of these bug reports embody the feedback and wisdom of hundreds of developers needing Mylar to support their work process."

Part of the reason why Mylyn has such advanced task management facilities is the amount of tasks that the Mylyn developers have to manage. The integrated support for task context really helps tighten the feedback loop between the user community and the developers. For every bug that the developers fix, they attach the task context, and that in turn helps share the committers' knowledge with users, making it easier for them to contribute. This has also been

a key enabler for Kersten getting the Mylar integration to the point where it is today. "We have applied hundreds of patches from contributors and integrators wanting to make Mylar work better for them. Constantly making efforts to lower the barrier to contribution has been critical in making a project with so few committers support so many users," Kersten pitches in.

Another lesson he learned was a bit of a surprise to him. eclipse.org has an IP review process that, if not managed carefully by a project, can slow contributions, especially when those contributions involve new library dependencies. However, with Borland's recent announcement that JBuilder 7 bundles and builds on Mylyn, Kersten has just witnessed the benefit of this process. Along with the Eclipse Public License, this process makes it easy for companies to build on innovations and integrate them with their products, such as issue trackers and tool suites. "We are excited about it because it moves us along our goal of getting the benefits of Mylyn's task-focused UI to all Eclipse users."





## SOA: Next Wave in Architecture

There are certain things that arrive to change the face of architecture. There are some like Service Oriented Architecture (SOA). There is no one widely agreed upon definition of SOA other than its literal translation that it is an architecture that relies on service-orientation as its fundamental design principle. Wikipedia says resources on a network in an SOA environment are made available as independent services that can be accessed without knowledge of their underlying platform implementation. These concepts can be applied to business, software and other types of producer/consumer systems.

However the main drivers for SOA adoption are that it links computational resources and promotes their reuse. Enterprise architects believe that SOA can help businesses respond more quickly and cost-effectively to changing market conditions. This style of architecture promotes reuse at the macro service level rather than micro level objects. It can also simplify interconnection to - and usage of - existing IT assets.

In some respects, SOA can be considered an architectural evolution rather than a revolution and captures many of the best practices of previous software architectures. In communications systems, for example, there has been little development of solutions that use truly static bindings to talk to other equipment in the network. By formally embracing a SOA approach, such systems are better positioned to stress the importance of well-defined, highly inter-operable interfaces.

Some have questioned whether SOA is just a revival of modular programming of the 1970s or the event-oriented design of the 1980s or even interface/component-based design in the 1990s. SOA promotes the goal of separating consumers or users from the service implementations. Services can therefore be run on various distributed platforms and be accessed across networks. This can also maximise reuse of services.



## Highlights of SOA India 2007

- Strong selection of industry experts from North America, Europe, Asia Pacific
- Over 30 intense, power packed sessions on aligning IT with business
- Cutting-edge content guaranteed to provide you with the tools and information you need to implement a company wide SOA solution
- Real-world business advice from Enterprise IT decision makers
- First-hand information about new vendor products and services
- Same JAX quality re-suited to a tech business audience

At JAX India 2007, SDA India held an **Industry Panel Discussion** where speakers from companies as varied as SAP, Oracle, IBM, HP, Sun Microsystems, deliberated on the business use and consumer case of adopting the SOA and discussed topics that helped ease executive buy-in for SOA and push the pedal on enterprise deployments. The topics discussed include:

- Best Practices in identifying a SOA initiative
- Making a case for “SOA Driving Business Results”
- Looking at the flip side: new risks that tag along with the benefits
- SOA strategies, IT governance and SOA security
- SOA plans and initiatives for the Indian market

Raghu from HP said that IT and business are in two different silos and if SOA has to really succeed, the it should take a unified view and look of the business and technology so that by design or default one can build





appropriate solutions. “We need a unified view to look at business and technology so that by design or default we can build proper solutions,” he said. There are multiple complexities that come in first from lot of existing and legacy business processes. He aid that if SOA needs to be pushed, it should have a business technology portfolio that includes business technology optimisation and adaptive infrastructure so that it provides good information to enable better business decisions. This results in lower risk to the enterprise with better control of infrastructure while reducing the cost of IT while delivering more to the business. He said, “SOA should support certain basic features with which one can guarantee certain benefits and improves performance.

Venkata Ravipati, director of product management of Oracle Fusion Middleware, says that most businesses operate in silos and have different databases. In this scenario offering a right solution or service to customers becomes difficult and this is where SOA comes into picture. Todays main challenges in business cropsup from stove-piped monolithic applications that are inflexible, inefficient and hard to maintain- a contribution of the legacy applications. Now if one needs to provide efficient services without the hassles of legacy applications, the best way is go SOA. SOA helps in building applications that can change easily. Earlier applications were built to last. He says SOA increases IT response and alignment to businesses, helps in making business processes more agile, automate end-to-end processes and improve visibility and increase IT efficiency while reducing integration and maintenance costs due to its flexible nature. Despite all its good features, SOA has its own share of trouble One obvious and common challenge faced is managing services metadata. SOA-based environments can include many services that exchange

messages to perform tasks. Depending on the design, a single application may generate millions of messages. Managing and providing information on how services interact is a complicated task.

Another challenge is providing appropriate levels of security. Security model built into an application may no longer be appropriate when the capabilities of the application are exposed as services that can be used by other applications. That is, application-managed security is not the right model for securing services. A number of new technologies and standards are emerging to provide more appropriate models for security in SOA. However these problems are just basic when compared to the actual benefits that SOA offers.

The panel discussion met with overwhelming response from C-level executives, business process managers, IT directors, IT managers, IT architects, Network and Infrastructure specialists, looking for the latest information, trends, and solutions available for deployments that can yield substantial business returns. SOA India 2007 is in direct response to this need for information. SOA India 2007 is in direct response to this need. SOA India 2007 is the first of its kind conference on SOA, SaaS, BPM, MDM, Agile, BPEL, BI, Enterprise 2.0, for the Indian Enterprise IT community of CIOs, CTOs, Management, IT Directors, IT Managers, IT Architects, Network and Infrastructure Specialists, Project Managers, Project Leaders, and Software Architects. If you are responsible for business optimisation, designing, developing and/or implementing your organisation’s IT strategy this conference will equip you with the tools and information you need to implement a company wide SOA solution that deploys agile, manageable and secure technology. The two-day conference (22-23 November, 2007) will be held at the Indian Institute of Science, Bangalore, India. We look forward to seeing you there!





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