Technology Audit

No Magic
MagicDraw UML

Abstract

MagicDraw UML is No Magic’s modelling tool for designing software application architecture using the Unified Modelling Language (UML). It provides a number of advanced features, such as helping to understand existing applications by reverse engineering code into models, and generating Business Process Execution Language (BPEL)-compliant code from Business Process Management Notation (BPMN) business process models. Modelling is essential for large and/or complex Object Oriented (OO) Design and OO Programming, and UML is the de facto standard visual modelling language. MagicDraw, currently in version 10.5, is a mature product that has many time-saving features, such as drill-down diagrams and visual difference highlighting for comparing model versions. MagicDraw can synchronise model and code and supports code generation in the major programming languages; it has collaborative team work support; and it supports the UML 2.0 standard. However, it is not a complete Model Driven Architecture (MDA) tool despite providing MDA model transformations: these apply to static UML models and not to dynamic models. Nevertheless, the widespread use and growth of UML modelling creates an opportunity for No Magic. There is a free Community Edition with limited functionality that can be downloaded from the company’s Web site, which provides an opportunity to evaluate the product.

KEY FINDINGS

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<th>Product Strength</th>
<th>Product Weakness</th>
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<td>Rapid model construction with intuitive interface and easy to use facilities.</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Automatic model and code synchronisation, with code generation.</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Supports BPMN models and BPEL code generation.</td>
<td>✔</td>
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<tr>
<td>Visual model differencing.</td>
<td>✔</td>
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<td>UML 2.0 Superstructure support.</td>
<td>✔</td>
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<tr>
<td>Many Integrated Development Environment plug-ins, such as Eclipse.</td>
<td>✔</td>
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<tr>
<td>Editions cater for open source community to enterprise teams.</td>
<td>✔</td>
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<tr>
<td>Constitutes only a part of a complete MDA – lacks dynamic modelling capabilities.</td>
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LOOK AHEAD

The next major release will feature tighter integration with Eclipse, to be followed with new capabilities such as: model decomposition into multiple pieces; role-based perspectives; user interface changes; and usability improvements.
FUNCTIONALITY

Product Analysis

In the last couple of decade's software development has adopted the programming paradigm Object Oriented Design (OOD) and Object Oriented Programming (OOP), to the point that any new language is expected to be object oriented, and many older languages are being upgraded with this paradigm. During this period, modelling also became more widespread and the originators of the three most popular modelling languages of the day agreed to combine their efforts into a unified standard: the Unified Modelling Language (UML) – now owned by the Object Management Group (OMG). Now, with the growth of OOP, the need for modelling also grew, as object orientation adds some complexity to the language in order to benefit from the improved reliability and ability to scale up to large projects. Thus UML became the natural modelling language for the new generation of programmers.

Modelling is therefore an essential step in the design of software for anything but the simplest of applications. It is valuable at three main phases of the application lifecycle: during the business case and requirements gathering, UML helps to model Use Cases, which explain how the application will be used and abstracted to the highest level with ‘actors’ and their ‘roles’ providing a storyline of usage. During design, logical models are used to help create the architecture, highlighting key aspects and hiding detail. Finally, during implementation, deeper-level designs of actual classes help programmers to understand how classes interact and provide a blueprint for the application construction.

Although modelling concepts have advanced beyond UML, for example, with Model Driven Architecture (MDA) which is also overseen by the OMG, the need for basic UML still exists. Whilst MDA is in an early adopter stage, UML has a widespread use and far more practicing users than any other modelling activity. Furthermore, UML is also the modelling language within MDA, so for most modelling activities today, UML is an essential language.

Therefore, UML has a significant market to support and No Magic specialises in meeting that challenge and ensuring that it meets the most exacting UML demands. Although No Magic does not offer a complete MDA, it offers some advanced features of a MDA: it supports the latest UML 2.0 standard and its flagship product, MagicDraw UML Enterprise Edition can offer auto-synchronisation between model and code, as well as model transformations for static UML diagrams. The product is also implemented in a number of MDA tools through an OEM arrangement.

The recently released MagicDraw UML 10.5 delivers full support of the latest UML 2.0 metamodel implementation:

- According to No Magic the first (and to date only) tool on the market with the latest public UML 2.0 Superstructure specification support.
- The support of UML 2.0 metamodel covers all four compliance levels and corresponds to Level3 (L3).

The product’s adherence to open standards – for example, MagicDraw models are stored in the latest OMG XMI 2.1 standard – means that its models can be interchanged with other development tools supporting the OMG standards.

MagicDraw offers a fast way to create an application’s architecture. It has teamwork support and is designed for business analysts, software analysts, programmers, QA engineers, and documentation writers. The tool has full round-trip support for Java 2 Enterprise Edition, C++, C#.NET, CORBA IDL programming languages, XML Schema, Web Services Definition Language (WSDL), as well as database schema modelling, database Data Definition Language (DDL) generation, and reverse engineering facilities.

In addition to the process modelling capabilities of UML, MagicDraw also provides Business Process Management Notation (BPMN) business process modelling support (the OMG recently became the owner of BPMN). MagicDraw is ideal for both business and IT professionals. By using a single tool to develop and manage business models and IT models, business systems are better aligned with business strategies, redundant efforts are eliminated, and model interchange is no longer a problem.
Product Operation

MagicDraw UML key features are as follows:

**Intuitive interface:** There is quick access to the most common operations, making learning to use the product easy: all major commands are reachable through a single click, so users can focus on modelling, and mouse operations are customisable so the one-click method can be chosen from standard menus, context menus, shortcuts, or toolbars. MagicDraw requires fewer steps to complete tasks than typically found in other tools, according to the vendor.

**Diagram Features:** This includes: on-diagram editing; automatic completion of attributes, operations, and parameter types; pick lists for types and names; and Smart Manipulators feature for rapid diagram creation and editing. MagicDraw’s automatic UML semantics checking facilitates the creation of valid models.

**Reverse-engineering:** Derives models from existing source code in seconds. UML models can be generated from Java, C#.NET, C++, CORBA IDL, EJB 2.0, DDL, CIL (MSIL), WSDL, and XML Schema source code. Also, the automatic generation of sequence diagrams from Java source code creates a more detailed view of the system.

**Model visualisation:** MagicDraw’s automatic generation of static structure, package dependency, and hierarchy diagrams allows multiple views of the same model. The tool automatically generates the hierarchy diagram in a few seconds, compared to the hours required to do the same work manually.

**Parallel development:** Using MagicDraw’s Teamwork Server, multiple developers can work simultaneously on the same model. This accelerates team collaboration whilst providing simple configuration management, controlled access to all artefacts, and remote access to models. MagicDraw’s locking mechanism is highly granular allowing a single element to be locked; this approach manages modelling and avoids version conflicts.

**Source code generation:** MagicDraw UML generates code for Java, Enterprise Java Beans, C#.NET, C++, CORBA IDL, DDL, WSDL, and XML Schema. The tool will integrate with the most popular Integrated Development Environments (IDEs), including Eclipse, IBM WSAD and RAD, Borland JBuilder, IntelliJ IDEA, NetBeans, and Sun Java Studio, eliminating the need for a native MagicDraw IDE. This approach stops wasting of valuable time on learning a new IDE or adding the additional cost of changing an existing IDE. Whether MagicDraw is being used as a standalone application or integrated with an IDE, the option for round-trip engineering keeps the model and code synchronised. Since MagicDraw can generate code, it is often the tool of choice for integrating or OEM embedding in third-party MDA tools, for example, IO Software ArcStyler, AndroMDA, and other MDA tools.

**Automatic report generation:** MagicDraw’s automatic report generation engine produces comprehensive, professional requirements, software design documentation, and other types of reports in HTML, PDF, and RTF formats. MagicDraw UML generates standard artefacts that match the software development process. The embedded Jython scripting language allows reports to be easily customised to fit a company’s internal standards.

**Extends UML 2.0 capabilities:** MagicDraw can be easily customised through the use of UML Profiles without additional coding. Custom diagrams allow users to extend standard UML to fit their specific problem domain and/or software development process. The toolbar can also be customised for stereotyped element creation.

**Modelling domain transformations:** With MagicDraw model transformations, users can quickly go back and forth from one modelling domain to another. MagicDraw UML allows model transformations both ways: from a MDA Platform Independent Model (PIM) to a Platform Specific Model (PSM) and from PSM to PIM. With model transformations it is possible to produce many specific models, such as XML Schema, DDL, or a customised specific model from a generic one. These features are possible for static UML models (which use class, sequence, and entity diagrams for example), whereas dynamic models (that use method calls and algorithms) belong to full MDA tools.

**Fast model navigation:** MagicDraw’s hyperlinks link any model element to elements in other diagrams, different models, and files or documents outside of the model. The navigation is also customisable. The Content Diagram is recommended for creating an overview of the content of the project diagrams in a single location, with drill-down using the navigation links.

The RAM footprint for MagicDraw is directly proportional to project size, although 512MB is recommended for medium size projects and 1GB for large projects. The built-in decomposition feature allows the splitting of a project into several pieces. MagicDraw Teamwork Server supports up to 100 concurrent users.
Fault tolerance features are built into the product: in case of corrupted file load or model corruption, MagicDraw loads as much information as possible. Teamwork Server stores every model version in separate files, and it is possible to revert to a previous model version at any time.

The open Application Programming Interface (API) allows access to all metamodel classes, adding/removing/querying diagram presentation elements, changing their properties, creating new diagram types by extending existing UML diagrams, inserting actions into menus, toolbars, or context menus, saving/loading projects, writing custom Jython or Java plug-ins, and creating new model transformations.

**Product Emphasis**

The no programming aspect of the product widens the scope of user roles that can exploit the tool. For example, business analysts can be engaged in the requirements gathering stage and during design changes, using the models as the basis for understanding – the continual auto-synchronisation of model with code also ensures that models are always up-to-date.

The Enterprise Edition has a visual model differencing feature that displays the changes made between two different versions of a model – uniquely: according to No Magic. Retention of model versions and visual differencing make it easy to roll-back models for a manager to keep up-to-date with changes and for QA to investigate problems.

The latest Enterprise edition also provides BPMN business process modelling support, so that MagicDraw has become a single tool for business users and IT users. Thus it can create BPMN diagrams and export the models into Business Process Execution Language (BPEL 1.1)-compliant code.

**DEPLOYMENT**

The client-side part of MagicDraw is currently a Swing-based Java application. The March 2006 release will integrate as a true plug-in into Eclipse, running under the Eclipse Java Virtual Machine. MagicDraw Teamwork Server is also a Java application; it uses the Java RMI protocol for communication between server and client. If floating licenses are used, Floating License Server software also needs to be deployed, it can run on the same or a different machine as Teamwork Server (however, both of these can be used separately, i.e. Teamwork Server does not require Floating License Server and vice versa).

The MagicDraw Client and Teamwork Server are platform independent allowing development teams running different operating systems to freely collaborate their designs. The system administrator or anyone with basic networking knowledge can manage and administer the MagicDraw Teamwork server. For using MagicDraw, only basic computer skills are required.

The average time for product implementation is one to four days for MagicDraw with MagicDraw Teamwork Server. A single client application setup time is about 15 minutes. There are no resource overheads for maintaining the client-side and up to four man-hours per month is sufficient for MagicDraw Teamwork Server.

There is no training mandatory for UML architects, although classroom sessions are recommended for beginners. No Magic Professional Services offers various training classes on a customer’s site: MagicDraw for Analysts, MagicDraw for Architects, and MagicDraw for Developers. Each course is slightly customised to allow the laboratory time to allow for a real working product to be produced, thus allowing maximum Return On Investment (ROI) for the customer: approximately 40% of a course is hands-on laboratory training. According to No Magic, most companies find that the time spent in a week-long staff training course is made up with the ROI gained within 30 days following the training.

No Magic provides free ongoing technical support, with response in 24 hours. Support is available by e-mail, and telephone support is provided during normal European, U.S., and Asian operating hours. Support is available in English worldwide, and in English and Spanish from the U.S.

The solution is available on any Java-based platform – Windows, Mac OS X, UNIX, Linux, and Solaris etc. Legacy integration is possible through No Magic’s partnership with Trinity Millennium Group, Inc. (TMGi), which specialises in: Applications Understanding, Documentation and Management through Knowledge Mining and Knowledge Engineering, Business Rule Harvesting/Redeployment, and Enterprise Portfolio Modernisation.
MagicDraw integrates with TMGi products as follows. The TMGi-SAT engine extrapolates all of the data necessary to automatically populate the UML diagrams of the application Structural View and Implementation View, namely, the ‘Class Diagrams’, ‘Object Diagrams’, and ‘Component Diagrams’. TMGi exports this information to MagicDraw UML. TMGi-eUML technology automatically extracts from the output of TMGi-SAT three of the fourteen UML standard diagrams: Class Diagrams, Object Diagrams, and Component Diagrams. Use Case Diagrams are also achievable with minimal manual input. All output from this technology are integrated via XML into MagicDraw UML, so all data, variable, and term elements are captured and populated into the MagicDraw tool along with their respective attributes.

The editions of MagicDraw are as follows:

**MagicDraw Reader**: For those who do not have a copy of MagicDraw, the free-of-charge Reader edition is useful for sharing ideas expressed in UML with partners, colleagues, or clients, and includes printing and image export capabilities.

**MagicDraw Community edition**: Free Community Edition for developers working on non-commercial projects. It has a minimal set of features enabled and only allows full functionality for class diagrams; other diagrams are read only. Ideal for creating static structure models when XMI output is needed. Printing and image export capabilities are enabled.

**MagicDraw Personal edition**: Contains all of MagicDraw’s UML diagramming capabilities, including full UML 2.0 support and extensibility, basic reporting functionality, and image export. All model elements can be accessed via MagicDraw’s Open API. It has everything necessary to draw, edit, and publish UML 2.0 models, and is available only in a standalone version, that is not designed for use with the MagicDraw Teamwork Server. The price is US$149, and is available for free to universities for non-commercial purpose.

**MagicDraw Standard edition**: Includes all of the Personal Edition’s features and adds UML extensions for Web application modelling, content, and robustness diagrams, model analysis and facilitation features, customisable and extendable patterns, integrations with most popular IDEs, and a set of predefined model templates and UML profiles. This edition is available in standalone, floating, and mobile license versions and is fully compatible with the MagicDraw Teamwork Server. It is ideally suited for all analysts and architects who need various model extensions and modelling facilitations; prices start from US$499.

**MagicDraw Professional editions**: Built on the Standard Edition’s capabilities and is available in one of three programming language specific versions: Java, C++, and C#.NET. In addition to the Standard Edition’s features, the Professional Edition adds code generation and reverse engineering functionality. Depending on the language version selected, the user will receive:

- Java version – Code engineering for Java, Java bytecode; integration with Java IDEs.
- C++ version – Code engineering for C++.

This edition is ideal for generating code out of an existing model or creating a UML model from an existing project. The price starts from US$899.

**MagicDraw Enterprise edition**: The flagship edition combines all three versions of the Professional Edition into a comprehensive state-of-the-art UML 2.0 programming solution, and adds code engineering and diagramming functionality in CORBA IDL, EJB, WSDL, and XML schema. For working with database structures, the Enterprise Edition provides code engineering and diagramming, as well as structure retrieval via JDBC. There are also possible static UML model transformations from PIM to PSM and from PSM to PIM. Another advanced feature includes BPMN business process modelling support. The price of the MagicDraw Enterprise Edition standalone version is US$1,599; the price of Enterprise Edition Mobile is US$1,799; and Enterprise Edition Floating costs US$2,549.

**MagicDraw Teamwork Server**: The Teamwork Server is a piece of the software that allows more than one developer to work with the same model. The UML model is stored in the Teamwork Server repository and every developer working with either the Standard, Professional, or Enterprise edition of MagicDraw may lock a part of the model and work on that part individually. Later, changes may be committed to the server and shared with the team. The server works much like the source code version control system. Teamwork Server is sold separately from the clients, so in addition to the server a customer will need to purchase MagicDraw UML client licenses (a minimum of 2 licenses are needed). The price of the Teamwork Server depends on the number of simultaneous connections to the server, for example, for five connections the price starts at US$1495.
RConverter: This is a Rational Rose plug-in that exports models and diagrams into MagicDraw's XMI file format. It was specifically designed for large model file migration from IBM Rational Rose; price starts at US$5,000.

PRODUCT STRATEGY

No Magic targets the horizontal market for IT architects, developers, database engineers, software, and business analysts. The target markets for UML solutions are wide, as they are used by virtually any size of organisation: consultants, small software shops, and large international enterprises. No Magic's target market is any company IT department as well as business analysts, consultants, and business users who are contractors of the software.

No Magic is a market veteran and its product has undergone multiple iterations of improvements. The popularity of UML is growing each year, and No Magic is seeing its revenue growth surpassing the market growth rate. The company aims to be among the top three players in the next few years.

The value for companies in using modelling for validating their designs, preparing software documentation, or requirements, amount to a number of benefits:

The requirements and system architecture are validated before a single line of the code gets written – so much less rework is needed. According to No Magic, savings here can be both in work hours (up to 50%) and in time-to-market, which may shorten the duration of application development lifecycle by 30%-40%. The documentation can be produced automatically; this saves up to 40% of the document writer's time. The code-generation functionality and IDE integration facilities increase developer productivity by up to 20%. The reverse engineering allows a system's design to be learned quickly, and in some cases (for example, where there is no technical documentation and the team is new to the existing system and its design principles) the learning process could be shortened by 2-3 times.

The route to market is mostly directly via its sales force or electronically (via e-shop), with about one fifth of the sales conducted through VARs. The key business partnerships that support the product are: ComponentSource, H.I.C. (Japan), SOS Developers, Software House International, Interactive Objects, Adaptive, Trinity Millennium Group, E2E, and several other major OEM and bundle offerings to be announced. The key technology partnerships that support the product: Sun (Java), Interactive Objects (ArcStyler product), Borland, AndroMDA, E2E, IrQA, Eclipse, Adaptive, and ProActivity (pending).

The license cost is perpetual. License cost with no classroom-based training is about 90% of the total cost, other cost being installation and training (if users are experienced with other modelling solutions). For a new user, training cost could be up to 35% of the total cost. Product renewals (Software Assurance) could be obtained for an annual cost of about 25%-30% of the original license cost: it covers all versions and product updates and patches. Customer support is available for free. MagicDraw is priced significantly less than its two main competitors (IBM and Borland).

The product release cycle is usually three to four releases per year. Currently in release 10.5, plans for future releases include: Version 11.0 due March 2006, will add tight integration with Eclipse. Version 11.5 due May 2006, will add model decomposition into multiple pieces; role-based perspectives, UI changes, and usability improvements.

COMPANY PROFILE

No Magic, Inc. is a privately-owned company headquartered in Allen, Texas, (United States). It has two development centres in Kaunas (Lithuania) and Bangkok (Thailand). Other locations include Arizona and Canada. No Magic started as a Professional Services company in 1995. Many projects were done for Ericsson, Texas Instruments, and other US companies. The product development began in 1997 and the first product, MagicDraw, hit the market in 1998. In the early years the product/services revenue mix was biased towards services, this has now reversed: in 2005 the product/service revenue split was 85%/15%. The product has won three Java Developer Journal awards (including Best Java Modelling Tool and Best Team Development Tool), as well as Software Development Magazine's Jolt Productivity Award.
The company has 85 employees: 60% of the staff is located in Europe, 30% in Asia, and 10% in North America. The staff split between R&D, S&M, Support & Services, and Administration is: 50%, 15%, 25%, and 10% respectively. No Magic expects staff to grow 20% over the next 12 months. No Magic plans to open a new European sales office in early 2006.

The company is not declaring revenue figures publicly but states that average revenue growth year over year since 1999 is 54% (compound annual growth rate). The geographical split of revenues by region is Europe 39%, North America 52%, and Asia and Rest of World 9% (2005 data).

Key clients include: JP MorganChase, AOL, Ford, Swiss Credit, Northrop, Boeing, ABN AMRO, VSA (Germany), DHL (United States); Department of the Interior (United States), Ericsson (US), and Omnitel (Lithuanian subsidiary of TeliaSonera), The last three are Professional Services Customers.

Most of these customers have implemented the solution at least at the departmental level, larger customers have implemented solutions at a regional level (North America for instance, and some customers are at the global level). No Magic’s customers are over 12,000 companies, with over 250,000 Users.

**SUMMARY**

MagicDraw provides UML 2.0 modelling of application architecture, with Teamwork features. It is designed for Business Analysts, Software Analysts, Programmers, QA Engineers, and Documentation Writers, and in particular facilitates analysis and design of object oriented systems and databases. Its code engineering mechanism supports full round-trip engineering for the most important development and database languages. A number of OEM deals testify to the strength of the product, with some leading MDA vendors incorporating MagicDraw into their products. It is fully compliant with the standards bodies, in particular the OMG’s latest UML 2.0 Superstructure and BPMN standards. Many features in the product are designed to speed up modelling, which makes it more likely to be adopted by developers – Butler Group believes this is an important consideration when selecting a tool, and believes that organisations looking to take up modelling should consider MagicDraw UML.
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