

Bulletin

Worldwide Analysis, Modeling, and Design Tools Forecast and Analysis, 2002–2006

Analyst: Rikki Kirzner

IDC Opinion

What does the future hold for the analysis, modeling, and design (AMD) tools market, and what characteristics will vendors need to be successful in the future?

The AMD tools market seems finally to have managed to transition from the old computer-aided software engineering (CASE) tools market to something more dynamic and better suited to address the needs of developers for the rapidly changing business and technology requirements. The AMD tools market will achieve positive growth over the next several years for a variety of reasons. The market will be driven primarily by the need to get applications to market quickly; the growing interest and use of a new breed of tools; and the growing interest in developers using Unified Modeling Language (UML), modeling and business rules methodologies Java, and component adapters to construct applications or help automate the process of creating applications.

To be successful, vendors must focus on providing tools that will help developers get applications to market more quickly and at lower costs.

Some of the requirements vendors will need to address include:

- Adding new features to AMD tools to accelerate the next stage of Web services (These tools are needed if Web services are to evolve from integration tools to software as services, particularly as services contracting with other services.)
- Including enhancements that allow developers to separate business logic and business process from system-level code, where the business logic can be easily identified and extracted
- Extending tools to easily integrate/work with those of existing leading AMD vendors or integrating modeling and design into their development tools, if they intend to provide developers with the ability to launch the next stage of Web services

In This Bulletin

Synopsis

This bulletin includes data regarding worldwide AMD tools market revenue and leading vendor performance and profiles for 2001 through 2006. It identifies the characteristics that vendors will need to be successful in the future. This document also examines AMD tools market revenue segmented by four geographic regions and 11 platform environments.

Along with the five-year revenue forecast, this bulletin discusses trends in the AMD tools market that evolved during the latter half of 2001. It also reports on the performance of the overall AMD tools market in 2001.

AMD tools market revenue declined 12.4%, from \$682.5 million to \$598.1 million, from 2000 to 2001. IDC expects a small recovery in 2002, primarily due to the introduction of a new class of tools that are easier to use and can be used to teach developers how to work with AMD tools.

AMD tools market revenue declined 12.4%, from \$682.5 million to \$598.1 million, from 2000 to 2001. IDC expects a small recovery in 2002, primarily due to the introduction of a new class of tools that are easier to use and can be used to teach developers how to work with AMD tools.

Declining AMD tools revenue throughout 2001 is attributable to many factors. The primary factor was the economic recession at the end of 2001 and the steep learning curve required to use these tools successfully. However, the events of 2001 in all probability may also produce an increased interest in the benefits that this market can provide to companies looking at controlling developer costs and

Quoting IDC Information and Data: *Internal Documents and Presentations*—Quoting individual sentences and paragraphs for use in your company's internal communications does not require permission from IDC. The use of large portions or the reproduction of any IDC document in its entirety does require prior written approval and may involve some financial consideration. *External Publication*—Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2002 IDC. **Reproduction is forbidden unless authorized.**

For additional copies please contact Cheryl Toffel, 508-935-4389.

Check us out on the World Wide Web!

<http://www.idc.com>
Printed on recycled materials. ♻️

increasing developer productivity and in helping companies move toward a more visual and/or automated approach to software development.

Companies should continue to work with their favorite AMD tools with the assurance that the leading industry vendors are continuing to provide more capability, features, and functionality in products with better, more intuitive interfaces.

Companies should continue to work with their favorite AMD tools with the assurance that the leading industry vendors are continuing to provide (at an aggressive rate) more capability, features, and functionality in products with better, more intuitive interfaces. An increasing number of vendors, including Microsoft, are partnering with leading AMD vendors such as Rational to bring the benefits of UML and AMD to their existing developer tool suites. The leading AMD tools vendors are strong and will be able to continue to deliver what developers require from visual development tools and rapid application development (RAD) tools.

Methodology

IDC's industry analysts have been measuring and forecasting IT markets for more than 30 years. IDC's software industry analysts have been delivering analysis and prognostications for packaged software markets for more than 25 years.

The actual strategy incorporates information from four different but interrelated sources as follows:

- **IDC's Software Census interviews.** IDC interviews all significant market participants to determine product revenue, revenue demographics, pricing, and other relevant information.
- **Product briefings, press releases, and other publicly available information.** IDC's software analysts meet with hundreds of software vendors each year. These briefings provide an opportunity to review current and future product strategies, revenue, shipments, customer bases, target markets, and other key product information.
- **Vendor financial statements and related filings.** Although many software vendors are privately held and choose to limit financial disclosures, information from publicly held companies provides a significant benchmark for assessing informal market estimates from private companies. IDC maintains an extensive library of financial and corporate information focused on the IT industry. We further maintain detailed revenue-by-product-area models on more than 1,100 worldwide vendors.
- **IDC demand-side research.** This research includes thousands of interviews annually and provides a powerful fourth perspective for assessing competitive performance. IDC's user strategy databases offer a compelling and consistent time-series view of industry trends and developments. Direct conversations with technology buyers provide an invaluable complement to the broader survey-based results.

The data presented herein represents IDC's best estimates based on the preceding data sources as well as reported and observed activity

by vendor and further modeling of data that we believe to be true to fill in any information gaps.

In addition, please note the following:

- The information contained in this bulletin was derived from the IDC Software Market Forecaster database as of May 2002.
- All numbers in this document may not be exact due to rounding.
- For more information on IDC's software definitions, see *IDC's Software Taxonomy, 2002* (IDC #26508, February 2002).

Analysis, Modeling, Design, and Construction Tools Definition

AMD tools support formalized methodologies (either object oriented or nonobject) that assist in generating application requirements, data definitions, and programming specifications. Object-oriented analysis, modeling, design, and construction tools provide automated support of one or more object-oriented methodologies and of some or all software-development life-cycle phases, including the ability to construct applications from domains and/or components if that ability is fully integrated and sold with the methodology.

These tools may also support some level of automated code generation. Analysis, modeling, design, and construction tools sometimes provide automated support of one or more object-oriented methodologies. They also provide support for various software-development life-cycle phases, including the ability to construct applications from components if that ability is fully integrated and sold with the methodology.

UML is an enabling technology that allows the analysis, design, and implementation steps to be accomplished in an interactive way, with one step feeding another and with the ability to leverage the process at any stage for the purposes of prototyping a solution. This is in contrast to tools and methodologies that support an approach in which all modeling is performed in a rigorous, thorough, and complete way before any instance of that model is generated. Despite growing acceptance of UML for analysis and design, it is still premature to assert that UML-based tools have reached mainstream adoption. They represent a development paradigm significantly different from what most organizations are familiar with in terms of creating applications.

The following are representative vendors and products in this market:

- Rational Software (Rose)
- Oracle (Designer)
- Computer Associates (ERwin)

Situation Overview

Analysis, Modeling, and Design Market Trends

The momentum to create more business-critical Web applications within shorter time frames and for less cost continues to cause businesses to look for new ways to produce applications in less time with more reusable components, code, and processes.

The rapid pace of change and the economic downturn are causing companies to search for ways to create more efficient and flexible computing environments that are better suited to achieving corporate goals for producing applications in shorter time periods to meet business objectives and growth.

The rapid pace of change and the economic downturn are causing companies to search for ways to create more efficient and flexible computing environments that are better suited to achieving corporate goals for producing applications in shorter time periods to meet business objectives and growth.

Throughout 2001, IDC observed the emergence of a variety of products utilizing a new approach to application development. The companies that own these products provided combinations of tools that allowed developers to create applications using business rules engines and/or UML modeling methodologies. These solutions are designed to work within an application framework that provides various levels of automation in the creation of applications.

Some AMD tools provide a business process-centric approach as well as the use of system-level components that have been created by the tools vendor along with APIs and application components that can be deployed in a manner that is independent of the underlying infrastructure.

Some AMD tools provide a business process-centric approach as well as the use of system-level components that have been created by the tools vendor along with application programming interfaces (APIs) and application components that can be deployed in a manner that is independent of the underlying infrastructure. Business processes and business components are designed to be logically and physically developed and deployed in a loosely coupled or decoupled manner. With these types of AMD tools, developers spend the majority of their development efforts working on creating sophisticated business logic specifically suited to solving business problems rather than worrying about system-level drivers, APIs, and issues of interoperability. System-level components that handle system functions and APIs to everything from database to middleware access are created and maintained in component form by the vendor. These system and API components are automatically invoked by an application server/engine when the application is created and deployed. The API/system-level driver components are optimized, performance tuned, and debugged. Application server engines take care of the system-level plumbing automatically, handling the technical details through the framework servers. Therefore, additional enhancements, required modifications, or changes in the business logic can be modeled and added easily without having to make extensive modifications to the system infrastructure.

AMD tools are designed to help business analysts and/or developers define the business processes, the required tasks that have to be performed, and the business rules and task assignments within the organization. The software developer can work on defining the data model and the business logic and may also mine the current IT infrastructure to find reusable business components.

To design the application, business analysts generally work from the top down and software engineers generally work from the bottom up.

Business managers can change the process model before it is deployed for optimal performance of the business application and correct any problems with the flow of business logic before the system is compiled into either a runtime system or code. System engineers may create new components or exchange old components for newer versions whenever a new runtime version of the system is required without touching or modifying the business logic of the application.

The advantages of some of the high-end AMD tools are that developers do not have to decide on the particular database, operating environment, or component models until deployment time. This type of development makes the application flexible enough to be easily deployed across any environment. Crucial decisions can be made later on in the design process and changed at any point prior to physical deployment.

An application designed in this manner has the added advantage of being able to accommodate one or more best-of-breed technology choices. It is easily ported to other hardware platforms as well. Furthermore, the developer's ability to reuse the logic and business rules, along with most of the tested and proven code of the application by developers, systems integrators, or value-added retailers, increases profitability and decreases time to market significantly.

Additionally, development is faster with AMD tools because there is a server technology and development system that makes it easy to generate applications directly from business rules and/or object-oriented or component models. The resulting applications can be developed quickly and are easier to maintain or modify than using traditional 3GL coding approaches. AMD tools are designed to help companies respond to changing economic and competitive climates within a few months or less instead of a year or more.

Unfortunately, in the past, no consistent approach was taken by the handful of tools vendors that have introduced various classes and categories of AMD tools and tool suites that provide these capabilities. Most vendors that started out with one set of products at the beginning of 2000 and 2001 had fundamentally changed their tools or positioning by the end of 2001, been acquired, or gone out of business. There are genuine success stories, and some companies created significant mission-critical applications using these products. However, the success of AMD tools has been spotty. And there are variations of these products that are significantly different enough to add further confusion as to what this new modeling approach will ultimately look like. However, this situation is changing.

The promise of this approach is still compelling and will significantly impact AMD trends throughout the coming years. A new breed of AMD tools has appeared that is designed to be used by conventional programmers. These tools automatically generate UML code and diagrams for the programmer and can help the programmer learn how to use models and diagrams to create business application logic. New standards from the Object Management Group (OMG) such as Model Driven Architecture and products from leading AMD companies such as

Rational Software's Rational User Process are helping to ease the complexity of these tools.

To date, success with AMD tools has been mixed. The reason for this lies partially in our assertion that analysis and design methodologies are very different. Use of AMD tools and UML requires a level of discipline and coordination that translates into a significant amount of up-front planning and specification before even one line of code is written. This has time-to-market implications that most of today's businesses will not tolerate. The irony is that if AMD tools are used correctly, application development can actually be significantly shorter.

Trends for 2002

The end of the economic recession and a new breed of easier-to-use AMD tools are expected to produce 3.5% growth for the AMD tools market throughout 2002.

The end of the economic recession and a new breed of easier-to-use AMD tools are expected to produce 3.5% growth for the AMD tools market throughout 2002. The gradual growth in this market is due in part to the budget restrictions for newer technology and continued work on the part of AMD vendors to integrate technology from consolidation and acquisition activity that occurred throughout 2001. It is also due to the reluctance of companies to move to newer AMD tools despite the new features and functionality that were added to existing tool suites by leading vendors. While the economy is still in economic recovery, many companies will continue to use C++ and Java without investing significantly in new tools until late 2002.

Performance of Leading Vendors in 2001

Of the top 5 AMD tools vendors, Rational Software maintained a commanding lead over its nearest competitor in 2001. Rational's share of the AMD tools market in 2001 was 30.7%, with revenue of \$183.6 million.

The leading AMD tools vendors in 2001 were Rational Software, Oracle, Computer Associates, TogetherSoft, and Telelogic AB. Of the top 5 AMD tools vendors, Rational Software maintained a commanding lead over its nearest competitor (see Table 1) in 2001. Rational's share of the AMD tools market in 2001 was 30.7%, with revenue of \$183.6 million. While Rational lost 7.9% over its revenue in 2000, its nearest competitor, Oracle, had only an 8.3% market share. Oracle's AMD tools revenue were down in 2001, dropping from \$62.2 million in 2000 to \$49.6 million in 2001.

Table 1
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue by Vendor, 1999–2001 (\$M)

	1999	2000	2001	2001 Share (%)	2000–2001 Growth (%)
Rational	133.0	199.3	183.6	30.7	-7.9
Oracle Corp.	68.7	62.2	49.6	8.3	-20.3
Computer Associates Int'l. Inc.	167.0	94.0	48.0	8.0	-48.9
TogetherSoft	6.0	8.7	45.0	7.5	417.2
Telelogic AB	27.6	35.0	29.3	4.9	-16.3
Sybase Inc.	30.4	35.8	29.0	4.8	-19.0
Aonix	17.9	18.0	17.6	2.9	-2.2

Table 1
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue
by Vendor, 1999–2001 (\$M)

	1999	2000	2001	2001 Share (%)	2000–2001 Growth (%)
Visible Systems Corp.	13.1	12.8	12.5	2.1	-2.3
Proforma Corp.	6.8	11.0	10.8	1.8	-1.8
Embarcadero Technologies	18.9	4.1	10.6	1.8	158.5
IBM	15.0	8.0	8.0	1.3	0.0
Popkin Software & Systems	14.0	12.8	7.2	1.2	-43.8
Siemens AG	10.5	7.3	6.4	1.1	-12.3
Hitachi Ltd.	8.1	7.4	6.3	1.1	-14.9
Sapiens USA Inc.	10.0	7.0	5.4	0.9	-22.9
Allen Systems Group Inc.	4.7	4.2	4.1	0.7	-2.4
Interactive Software Engineering	4.2	4.2	4.1	0.7	-2.4
Project Technology Inc.	3.5	4.0	3.9	0.7	-2.5
Softeam	3.5	3.8	3.7	0.6	-2.6
IntelliCorp Inc.	7.6	5.0	2.8	0.5	-44.0
Fujitsu Ltd.	3.8	2.9	2.7	0.5	-6.9
Ptech	2.2	0.5	2.7	0.5	440.0
Enterprise Software Systems Inc.	1.4	1.2	1.2	0.2	0.0
Hewlett-Packard Co.	1.8	1.4	1.2	0.2	-14.3
Reich Technologies	1.0	1.2	1.1	0.2	-8.3
Softlab	3.0	1.2	1.0	0.2	-16.7
Iconix Software Engineering	1.2	0.5	0.5	0.1	0.0
Quest Software	–	–	0.5	0.1	NA
Critical Path	2.5	3.1	–	–	-100.0
Level 8 Systems	2.8	3.4	–	–	-100.0
Princeton Softech Inc.	9.0	10.0	–	–	-100.0
RogueWave Software Inc.	1.5	–	–	–	NA
Subtotal	600.5	569.9	499.0	83.4	-12.4
Other	142.0	112.5	99.1	16.6	-11.9
Total	742.5	682.5	598.1	100.0	-12.4

Messages in the Data:

- Rational, Oracle, and CA are the leading vendors in the AMDC tools market, with Rational continuing to dominate due to the breadth and depth of its tool suites.
- Rational is expected to continue to gain market share in the coming year with its easier-to-use, more comprehensive XDE product.

Source: IDC, 2002

Future Outlook

Analysis, Modeling, and Design Tools Market Forecast and Assumptions

The worldwide market for AMD tools will stay flat, growing slowly from \$598 million in 2001 to \$1.1 billion by 2006 and experiencing a modest 13.7% CAGR during that period.

The worldwide market for AMD tools will stay flat, growing slowly from \$598 million in 2001 to \$1.1 billion by 2006 and experiencing a 13.7% compound annual growth rate (CAGR) during that period (see Table 2). The market had been growing slowly for the past several years prior to this decrease, but it is an evolving and growing market subject to changing technologies and trends. This market contains compelling tools that will be used by those companies creating Web services. Consequently, it will continue to be viable in years to come, with slow but steady growth throughout the forecast period. Interest in UML and AMD methodologies and tools is growing, and therefore revenue growth is expected to increase.

Table 2
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue by Region and Operating Environment, 2000–2006 (\$M)

	2000	2001	2002	2003	2004	2005	2006	2001 Share (%)	2001–2006 CAGR (%)	2006 Share (%)
Geographic region										
North America	374.4	328.8	340.3	386.0	451.3	538.5	624.0	54.9	13.7	54.9
Western Europe	225.6	186.0	192.5	218.4	255.3	304.6	353.0	31.1	13.7	31.1
Asia/Pacific	63.4	69.3	71.7	81.3	95.1	113.4	131.5	11.6	13.7	11.6
ROW	19.1	14.2	14.6	16.6	19.4	23.2	26.9	2.4	13.6	2.4
Total	682.5	598.1	619.2	702.3	821.1	979.7	1,135.3	100.0	13.7	100.0
Operating environment										
Mainframe	73.3	55.7	57.7	65.4	76.5	91.3	105.8	9.3	13.7	9.3
OS/400	10.9	7.2	7.5	8.5	9.9	11.8	13.7	1.2	13.7	1.2
Unix	173.2	153.9	159.3	180.7	211.2	252.1	292.1	25.7	13.7	25.7
Linux/other open source	0.1	8.0	8.3	9.4	11.0	13.1	15.2	1.4	13.7	1.4
Other host/server	8.1	8.1	8.4	9.5	11.2	13.3	15.4	1.4	13.7	1.4
Windows 32 and 64	403.4	356.7	369.3	418.9	489.7	584.3	677.1	59.6	13.7	59.6
JVM/platform independent	–	–	–	–	–	–	–	–	NA	–
Mobile and embedded	–	–	–	–	–	–	–	–	NA	–
Other single user	13.4	8.4	8.7	9.9	11.6	13.8	16.0	1.4	13.8	1.4
Total	682.5	598.1	619.2	702.3	821.1	979.7	1,135.3	100.0	13.7	100.0
Growth (%)	NA	-12.4	3.5	13.4	16.9	19.3	15.9			

Key Assumptions:

- Worldwide revenue in the AMD tools market will be directly influenced by the adoption of UML and modeling methodologies in the coming years as a way to create applications more cost effectively and rapidly.
- The forecast for AMD tools will be adversely affected by continued economy downturns and by further acquisitions and mergers in this market.
- The forecast for AMD tools will be positively affected and accelerated by the use of AMDC tools to develop Web services.

Messages in the Data:

- North America will continue to be the predominant consumer of AMD tools.
- The Windows platform will be the most popular platform of choice for AMD tools throughout the forecast period.

Source: IDC, 2002

Vendor Profile: Rational Software

Rational Rose is the workhorse of the Rational Software family in the AMD market and has been the defacto standard for AMD for many years. Many developers in large corporations use Rational Rose to create virtual models for the software systems they plan to build because UML provides a method for describing business processes in a form that helps both developers and users understand what has to be accomplished. Rational Rose has been able to standardize a way to develop and document every stage of application development from the initial business requirements and application design to the specific classes and components used in the source code. It allows developers, business architects, and business analysts to create the high-level models that describe the various routines of an application while providing a high level of abstraction and depiction of its complex interactions.

Rational Rose has become a vital technology in the new model-driven development approach to software development. Using graphical notation, developers create flowcharts or diagrams that describe the steps required to complete an action. Processes are broken down into clean, logical sequences, making the diagrams excellent tools for describing business problems and facilitating application coding. Rational Rose is essentially a standard notation and set of rules for creating diagrams that specify the design of object-based applications. The diagrams depict the structural and behavioral aspects of the system under analysis. The component and deployment diagrams depict the configuration of the technology components that represent the infrastructure for the application. The class diagram provides the structural view of the system by identifying the object classes involved in the system, their interactions with one another, the properties that must be known about each, and the types of operations that each can perform. The class model provides a more static view of the system.

The system's dynamic aspect is depicted primarily through a series of use-case diagrams that represent the expected behavior of the system under specific circumstances. Each use case can be supported by a variety of diagrams that provide further insight into the details of the behavior. These diagrams include the object interaction, sequence, activity, and state-change diagrams. However, most UML diagramming standards are not good enough to ensure that a business is properly modeled and that application designs correctly specify what needs to be built. A process must exist as a guide to define how to use the diagrams properly. Rational has created such a process to guide developers through the steps of using UML to create applications.

However, UML is a difficult language to learn, and Rose has been a difficult product to use, unless developers were already familiar with AMD development and using UML. To attract more developers to its product lines and to help developers want to learn UML, the company introduced a new, easier-to-use development environment.

Rational XDE Professional is a new breed of development tool specifically engineered for designing, communicating, and documenting software development. Rational created this tool to be an extended development environment (XDE) blending the capabilities of industry-leading integrated development environments (IDEs) from Microsoft, Macromedia, and IBM with Rational's design and modeling technology, customizable design patterns, and template-based code generation. An XDE can be used to both simplify and accelerate Java, Java2 Enterprise Edition (J2EE), Java2 Micro Edition (J2ME), Microsoft .NET, IBM's Eclipse IDE, and UML development. Rational XDE Professional has been created to eliminate the gap between design and development in Java and Microsoft Visual Studio .NET IDEs. Developers can code and design directly in their favorite IDE without switching between different, loosely integrated tools.

Since design tools and development tools have been distinctly different and not usually interoperable, the time it took developers to learn how to effectively use the different commands, interfaces, and development approaches created delays in developing applications. The difficulty in moving between different tools created an artificial barrier between different levels of developers. As a result, developers with different skill sets had to perform different tasks using different tools. This fragmented the development teams and made complex development projects that much more difficult and costly.

Rational XDE Professional's capabilities help accelerate development projects by enabling developers to model and leverage design patterns to specify structure and interactions as well as validating whole or selected elements for compliance to UML language-specific guidelines. It has a customizable pattern engine that can help developers jump-start projects by providing over 80 patterns, including "Gang of Four" patterns. Rational lets developers generate large portions of their applications through automatic pattern expansion, code templates, and Rational Development Accelerators. The product can reverse-engineer existing applications into a rich, visual model that helps developers and system architects understand and modify the system at any level of abstraction or detail required.

The Pattern Application wizard guides developers through the process of applying a pattern. The Pattern Explorer can find, create, edit, and apply patterns, and the Pattern Import/Export wizards use the reusable asset specification as well as generating HTML-based pattern documentation. The pattern engine and pattern wizard let developers create their own pattern from existing code or models so that it can be applied anywhere. This capability minimizes or eliminates the need for rewriting the same code. Code templates can also be imported directly into any model and included as part of the patterns.

Rational XDE automatically generates the UML representation of developers' code and includes UML visualization, code templates, and automatic and on-demand round-trip synchronization of code and models. These elements are structured so that developers who do not know UML can code the way they know how and Rational XDE will create the UML representation of the models automatically.

The models can then be used to document tasks and the details of complex projects through visualization. There is both forward- and reverse-engineering capability so that developers can use the tool to learn UML while writing code and architects can model and still see how and what code is generated. Thus, the tool can be used to develop highly rigorous processes; durable, long-lived models; or lightweight processes and disposable models. It supports creation of highly scalable applications ranging from system architecture to Web applications. Since there is synchronization of systems model and code, developers can see, understand, refine, and debug the solution that is being developed without being encumbered by the tool that is being used.

Rational Strengths

Rational tools are integrated with many of the best-of-breed tools from other vendors. Therefore, developers can easily move between the tools they like to use and the tools from Rational Software, making the development experience much more powerful. Rational XDE is integrated with Macromedia Dreamweaver, IBM WebSphere Studio Application Developer, IBM WebSphere Studio Workbench, and Microsoft Visual Studio .NET as well as the entire family of Rational configuration management software tools. It combines design and development into a seamless, tightly integrated experience. All the tools follow the same menus, gestures, and usage metaphors and have the same look and feel. In addition, they can share the same editor and debugger.

Rational has created a new tool that can actually improve the way developers work with its modeling capability. It presents a single design-to-code experience. Users can define patterns and code templates to automate repetitive coding tasks. The tool also provides cross-model references and versioning up to the class and diagram levels. Anyone who has worked on a large, complex model understands how easy it is to become confused or lost when trying to examine or find specific model diagrams. Developers can view and manipulate model elements and their containment hierarchy using the Model Explorer. Developers can use the tool to partition the representation of their architectures into multiple models, simultaneously creating intermodel views and relationships.

Rational Weaknesses

Rational still has to overcome the perceptions that it sells a very expensive solution for business architects. Rational's other weaknesses aren't necessarily of its own doing. AMD is still negatively associated with CASE and the failures and cost overruns of old CASE projects. UML is difficult for many developers to use and does not often produce a finished product without some additional system coding in a 3GL. This fact continues to plague many companies considering using Rational and may discourage them from considering using an AMD product. The existing skepticism that XDE can't do what it is advertised to do will discourage developers from trying to use it on their own.

Vendor Profile: Oracle

At the core of Oracle's tools strategy is the Oracle9i Developer Suite. Oracle launched its Oracle9i JDeveloper toolkit in December 2001 with the goals of offering a more integrated environment for developers working with emerging technologies such as Web services and XML as well as improving the development and performance of Java programs. This integrated suite uses an Oracle database as a centralized repository for all development activities. Oracle9i JDeveloper supports J2EE best practices that help programmers write code that runs more efficiently. Oracle9i JDeveloper has been created to combine coding with tasks such as modeling, profiling, sourcing, and SQL development in a single integrated development environment. This integrated suite uses an Oracle database as a centralized repository for all development activities.

The suite supports four different approaches to application development:

- **Modeling.** The suite provides support for UML-based class and activity modeling, code generators that can create business components, and the code required for implementing workflow and messaging mechanisms. JDeveloper includes integrated support for UML diagrams. Developers can quickly create activity or class diagrams and can use the UML facilities to tighten up application and Web services designs.
- **Declarative programming.** The suite's 4GL environment allows the development of components for use in JSPs and servlets as well as the ability to leverage skills founded in forms-based paradigms.
- **Components.** Developer supplies useful tools for programmers creating Enterprise JavaBeans (EJBs). The tools help experienced developers reverse-engineer database tables into Container Managed Persistence (CMP) Entity Beans and allow developers to test EJBs within the IDE. Oracle also includes business intelligence (BI) components that leverage the online application processing (OLAP) services in Oracle9i and UI components that Oracle asserts are device independent.
- **Coding.** Using an IDE, the Oracle Developer environment is pure Java and provides an open API for adding development tool products and capabilities. Oracle has improved the object relational mapping in JDeveloper. Now Java programs created with the tool can exchange data more smoothly with a database. The product also adds built-in profiling for measuring execution speed and a specialized debugger that scans code for errors.

Designed for supporting Web services, Oracle9i JDeveloper allows developers to write complex programs that communicate over IP using standards such as XML, Web Service Description Language (WSDL), Simple Object Access Protocol (SOAP), and Universal Description, Discovery, Integration (UDDI). The IDE includes a Web Services Publishing wizard that helps developers create deployment descriptors as well as the WSDL necessary to publish Web services.

JDeveloper includes tools that will help developers precisely locate performance issues. Three built-in profiling tools can help programmers examine execution, memory, and event optimizations, which should increase the overall performance of Web services and J2EE applications. The tool suite contains built-in support for source control supplied within the JDeveloper IDE. Although Oracle supplies its own source-management tool and supports other solutions, such as Rational's ClearCase and the ubiquitous Concurrent Versioning System (CVS), the company provides Java Database Connectivity (JDBC) support for its own database as well as support for third-party JDBC drivers and the JDBC-ODBC bridge.

Oracle9i JDeveloper was designed so developers could deploy applications only to Oracle9i Application Server and Apache SOAP Server with the default options presented in the IDE. The toolset is designed primarily to build applications to be deployed on the Oracle9i Application Server.

Oracle's tools are offered in the form of a product suite. Customers can obtain the offerings separately, but since Oracle is moving forward with a message centered on a total, complete, highly simplified suite of products, it is expected that most users will choose (or be "encouraged") to adopt Oracle's application development offerings in total.

Oracle Strengths

IDC research has shown that companies are less likely to obtain development tools from start-up companies or companies whose tools provide proprietary lock-in to a specific technology. Although Oracle's applications must be deployed to its own servers or to Apache servers, companies do not perceive Oracle's tools to be in the proprietary category. The tool suite is competitively priced to attract developers to use it. Oracle believes that its new features and integrated capabilities will convince developers to migrate to Oracle9i JDeveloper.

Oracle's overall product strategy is focused on providing a total overall solution of fully integrated tools with Oracle supplying almost all of the functionality. However, Oracle has also begun to work through partner vendors to integrate some of their best-of-breed tools into the JDeveloper product suite. This move should help overcome the perception of Oracle as a provider of exclusively proprietary tools. There is merit to this strategy in terms of lowering the time, money, effort, and pain associated with integrating disparate, albeit best-of-breed, products, but IDC believes it will be most attractive to existing Oracle customers only because, in spite of its claim that any portion of the suite can be swapped out for another vendor's best-of-breed solution, Oracle only guarantees response time, availability, interoperability, and so forth when its own database is part of the suite.

With Oracle offering essentially "free" tools, developers tend to be more willing to try them. This strategy could result in increased adoption and leverage for Oracle's other products, but, as a

connected result, it may give Oracle an indication of why development organizations resist buying them. The model for distributing tools is changing, and Oracle is a major driving force behind this change. Tools are no longer the moneymaker — products that support deployment and implementation (application servers, databases, and applications in the case of Oracle) bring in the revenue once they are built and deployed. Independent tool vendors are merging or being acquired, and this changing model is a major cause of that activity.

Oracle Weaknesses

A negative aspect of JDeveloper is that the rich integrated functionality of the IDE makes it difficult for less-experienced developers to use the product.

Oracle is not known predominantly as a tool vendor, and its entrenchment in the database market makes it a vendor of tools aimed at supporting for the most part its database (and its application server that is also closely linked with its database).

Oracle's tools product offerings are less than fully comprehensive given the evolution taking place toward a distributed, component-based, business rules-centric approach to development and deployment. Oracle's product strategy increases the perception that the company's tools are for Oracle customers only and that it is, therefore, less focused on providing best-of-breed solutions.

Market Characteristics in the Future

By Geographic Region

North America dominated the AMD tools market in 2001, accounting for \$328.8 million, or 55%, of the overall worldwide market.

North America dominated the AMD tools market in 2001, accounting for \$328.8 million, or 55%, of the overall worldwide market (see Figure 1). Western Europe accounted for 31%, or \$186 million, in 2001.

By Operating Environment

Two operating environments — Unix and Windows — accounted for just over 85% of the AMD tools market in 2001.

Two operating environments — Unix and Windows — accounted for just over 85% of the AMD tools market in 2001 (see Figure 2). Windows dominated this market, accounting for \$356.7 million, or 59.6%, of the market in 2001. Unix accounted for \$153.9 million, or 25.7%, of the 2001 AMD tools market.

The Outlook Through 2006

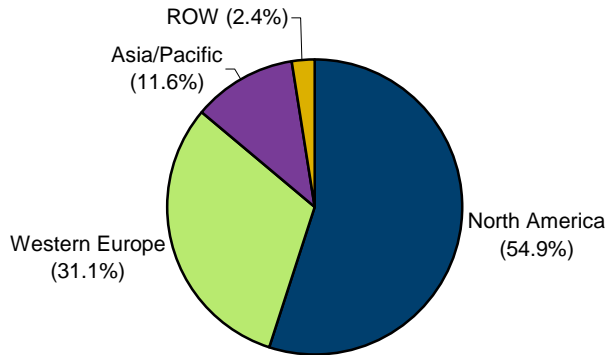
By Market Segment

The total worldwide revenue of the AMD tools market is forecast to show a very small but positive gain in 2002 over 2001 and grow, albeit slowly, from \$598.1 million in 2001 to \$1.13 billion by 2006.

The total worldwide revenue of the AMD tools market is forecast to show a very small but positive gain in 2002 over 2001 and grow, albeit slowly, from \$598.1 million in 2001 to \$1.13 billion by 2006. Slow growth through the first half of the forecast period will be due to the launch of new products and the gradual migration of companies to newer AMD tools as companies begin to evaluate how to implement Web services using UML and analysis modeling and

design methodologies in parallel with the gradual emergence of Web services infrastructure and tools. Over the five-year forecast period, the market is expected to experience a CAGR of 13.7%.

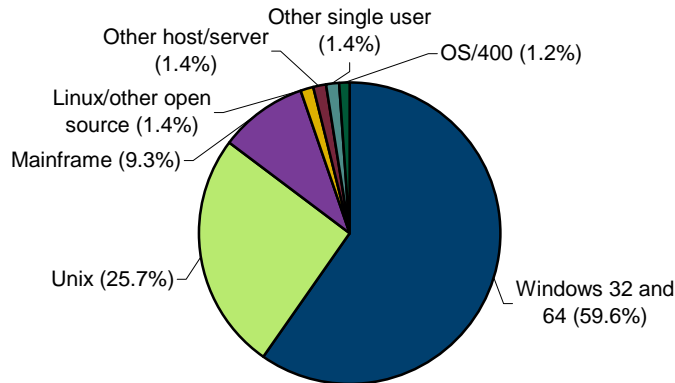
Figure 1
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue Share by Region, 2001



Total = \$598.1M

Source: IDC, 2002

Figure 2
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue Share by Operating Environment, 2001



Total = \$598.1M

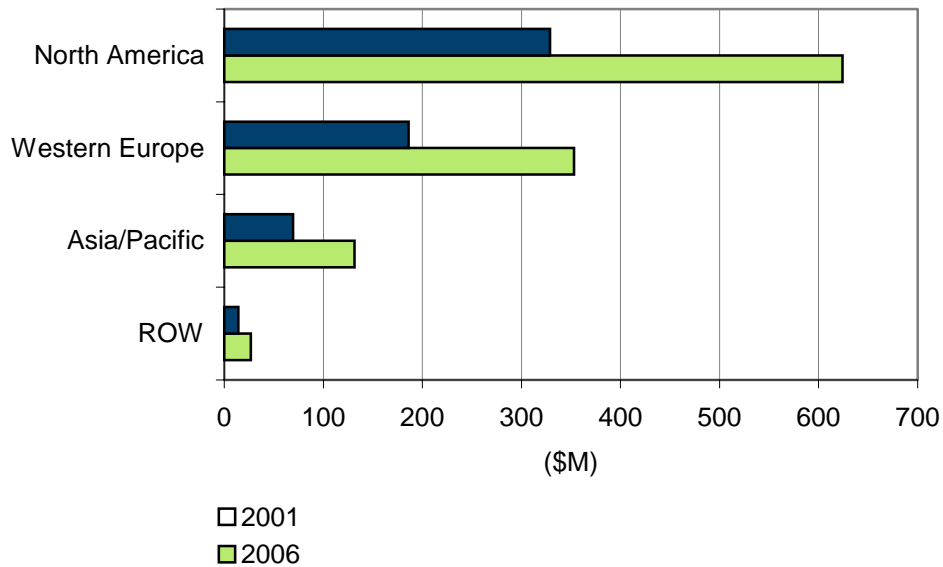
Source: IDC, 2002

By Geographic Region

North America will increase its share of the AMD tools market from \$328.8 million in 2001 to \$624 million in 2006.

North America will increase its share of the AMD tools market from \$328.8 million in 2001 to \$624 million in 2006. Revenue in North America will increase at a CAGR of 13.7%. Western Europe revenue will increase from \$186 million in 2001 to \$353 million in 2006. Asia/Pacific is forecast to grow from \$69.3 million to \$131 million for that same forecast period (see Figure 3).

Figure 3
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue by Region, 2001 and 2006



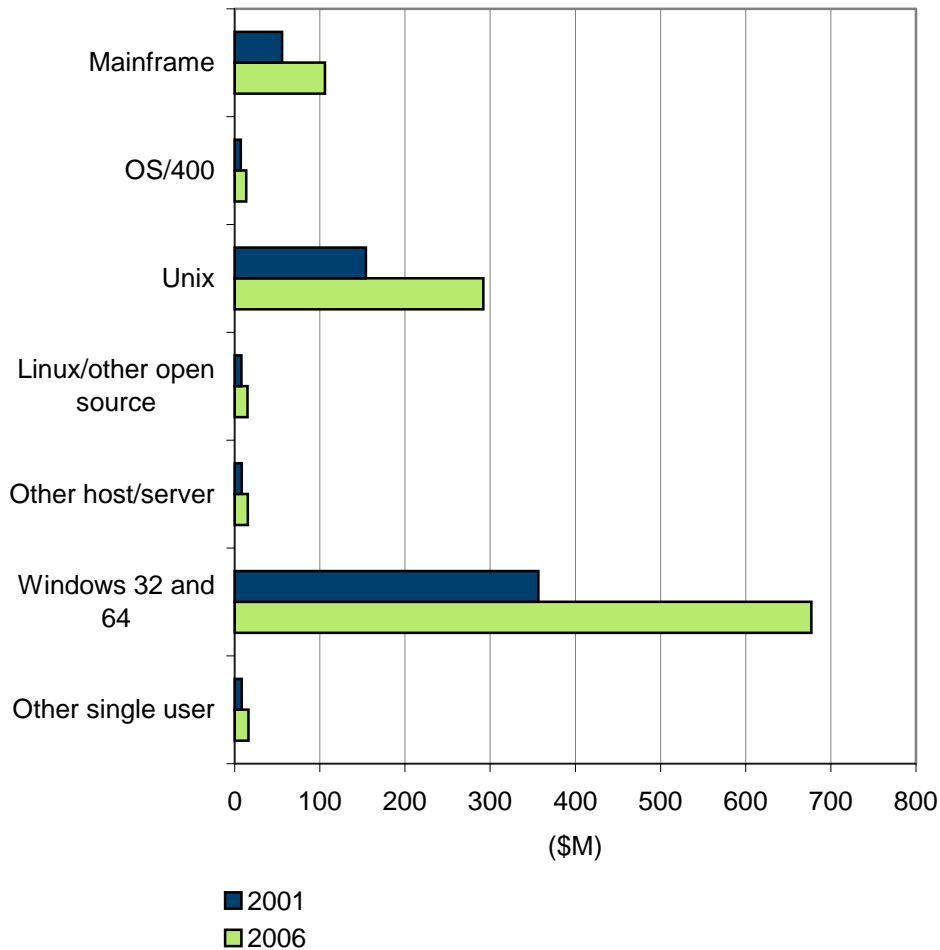
Source: IDC, 2002

By Operating Environment

The Windows platform dominates the AMD tools market and is forecast to grow from \$356.7 million in 2001 to \$677.1 million in 2006.

The Windows platform dominates the AMD tools market and is forecast to grow from \$356.7 million in 2001 to \$677.1 million in 2006 (see Figure 4). Unix will rise from \$153.9 million in 2001 to \$292.1 million in 2006. Linux will not be a platform choice for AMD tools.

Figure 4
Worldwide Analysis, Model, Design, and Construction Tools Software Revenue
by Operating Environment, 2001 and 2006



Source: IDC, 2002

Revenue Growth Enhancers

The following factors will tend to support continued positive growth in the AMD tools market:

The promise of UML, AMD, and application automation tools as a way to effectively address companies' abilities to get applications to market faster will continue to draw developers to consider using these tools.

- Time-to-market pressures will only increase over the next several years as life cycles of applications continue to get shorter and companies show an increasing interest in developing Web services. The promise of UML, AMD, and application automation tools as a way to effectively address companies' abilities to get applications to market faster will continue to draw developers to consider using these tools.
- AMD tools help developers create and modify applications faster while enforcing a top-down/bottom-up methodology that helps control and/or reduce development costs.

UML is continuing to establish itself as a true standard for modeling and is the methodological foundation for most of the AMD tools on the market today.

- Businesses are adopting Java, UML, and RAD tool solutions as a way to off-load some of the business logic design from programmers and allow business analysts and business architects to participate in the application design and creation process.
- UML is continuing to establish itself as a true standard for modeling and is the methodological foundation for most of the AMD tools on the market today. Increasing acceptance of UML and the modeling paradigm it supports by organizations will enhance opportunities for AMD tool vendors over the forecast period.

Revenue Growth Inhibitors

The following factors will tend to discourage growth in the AMD tools market:

The real disappointment in this market was the poor performance of the leading ebusiness application automation vendors that had emerged with the potential of being the successful providers of a new breed of tools in this market.

Many developers and end users are still hesitant to adopt the AMD paradigm for software development and deployment. Continued caution could negatively impact both revenue in the AMD tools market and the overall growth rate.

- The implosion of the dot-coms has had a negative effect on all technology sectors, slowing the consumption of tools and the rapid growth of corporations depending on the success of these start-ups to fuel their own growth.
- The economic downturn in the stock market had a negative impact on revenue growth throughout the technology sector.
- The real disappointment in this market was the poor performance of the leading ebusiness application automation vendors that had emerged with the potential of being the successful providers of a new breed of tools in this market. The failure of these new tools to gain significant mindshare among companies does not negate or diminish their value. But continued failure to gain market share and become profitable will further erode the growth of this market.
- Many developers and end users are still hesitant to adopt the AMD paradigm for software development and deployment. Continued caution could negatively impact both revenue in the AMD tools market and the overall growth rate.
- The unqualified success of Web services built around component-based development could have a negative effect on future application development because organizations might be more willing to lease or buy applications without having to develop them. If this succeeds, there will be a negative impact on AMD revenue.
- The complexity of AMD tools and methodologies, along with the fact that their use is difficult to correctly apply, is highly correlated with adoption rates. Failure on the part of AMD tools vendors to address this issue could have a negative impact on market growth in the years ahead.
- Change to new methodologies presents high risk to companies, often producing cost overruns, loss of productivity, delays in time to market, impact on profitability, and so on. AMD tools continue to present some unique problems that may discourage

companies from adopting these tools, which may negatively impact the market.

Impacts Influencing Forecast Assumptions and Vendors

A strong or early economic recovery will accelerate the desire of companies to increase their IT budgets and resume development projects that could positively spur growth in the AMD tools market.

A strong or early economic recovery will accelerate the desire of companies to increase their IT budgets and resume development projects that could positively spur growth in the AMD tools market. This situation would result in IDC revising its forecast for market growth upward from the revenue reported in this bulletin.

An early end to the depressed economy would spur consumer spending, increasing the demand on companies to provide better solutions to meet customer demand. This type of scenario would change the forecast to one that is more positive. It would also increase the revenue of the strongest tool vendors.

Positive economic growth opens up opportunities for young companies to prosper and gain a reasonable share of the market revenue.

A continued economic decline will further erode the forecast for growth in this market, as IT companies will cut staff and budgets further to ride out the economic conditions.

A continued economic decline will further erode the forecast for growth in this market, as IT companies will cut staff and budgets further to ride out the economic conditions.

Further weakening of the market will cause vendors to lay off more staff and could cause weaker or newer companies to fold. This will further erode the vendor revenue. This scenario will negatively impact market revenue and further erode market growth.

To survive and be in a strong position once the economy turns around, vendors need to continue developing the tools that companies will require to help them regain market share and a competitive edge.

Essential Guidance

To survive and be in a strong position once the economy turns around, vendors need to continue developing the tools that companies will require to help them regain market share and a competitive edge. Early indications are pointing to development tools as the market that will lead the way out of the recession.

Vendors must be able to provide tools that help companies achieve these goals to be in the best position to capitalize on the opportunities presented once companies begin to search for the tools that will help them improve their ROIs.

Companies emerging from this economic downturn will want to increase programmer productivity and decrease the cost of development. Companies will not want to staff up until profits are up and the financial outlook is more positive. Vendors must be able to provide tools that help companies achieve these goals to be in the best position to capitalize on the opportunities presented once companies begin to search for the tools that will help them improve their ROIs.

Tool vendors must deemphasize free tools and focus on encouraging sales of their tools to small and midsize businesses to ensure sufficient revenue streams to achieve profitability.

Learn More

Related Research

- *Advances in Technology Ease Development Tasks* (IDC #27176, May 2002)
- *Worldwide Analysis, Modeling, and Design Tools Forecast, 2002–2006* (IDC #27176, February 2002)
- *Tal Accelerates Time to Market and Reduces Costs Using Model-Driven Architectures* (IDC #26080, December 2001)
- *Revised Application Design and Construction Tools Market Forecast and Analysis Summary, 2001–2005* (IDC #25901, November 2001)
- *Deciphering the Mysteries of Modeling and UML* (IDC #25528, September 2001)
- *Fourth-Generation Languages and Rapid Application Development Tools Market Forecast and Analysis, 2001–2005* (IDC #24800, June 2001)
- *eBusiness Application Automation: Evolution of New Development Methodologies and Tools* (IDC #23672, January 2001)
- *Application Design and Construction Tools Market Forecast and Analysis, 2000–2004* (IDC #22438, June 2000)

Document #: 27248

Publication Date: June 2002

Published Under Services: Application Construction Tools;
Application Design and Construction Tools
