

Radically Simplifying Distributed Enterprise Development Using Delphi 4

*How Delphi 4 increases development throughput
and makes enterprises more competitive.*

*An INPRISE Corporation White Paper
June 1998*

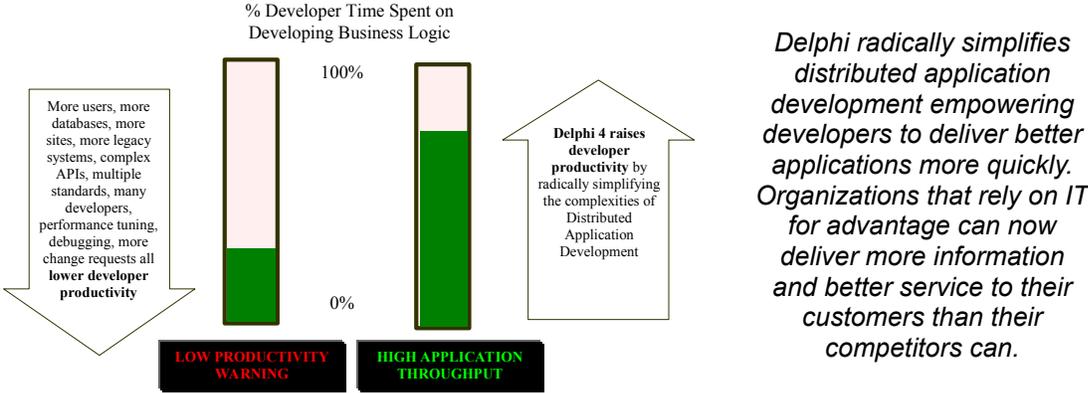
Executive Summary

As businesses are evolving in the 1990s and beyond, companies are using Information Technology strategically to acquire customers, deliver better service, and reduce costs. As access to the Internet and corporate networks grow, IT infrastructures are evolving as the primary mechanism for customer communication.

The IT department is now at the heart of the corporation's drive for competitiveness: creating Web-based applications; Intranets, Extranets and Decision Support applications; and delivering more information to more users and customers than ever before. The IT department must now be prepared to respond rapidly to customer needs with a flexible and robust application infrastructure that works well in a networked world.

Distributed (or multi-tier) applications deliver a new level of flexibility for IT departments and developers, enabling them to separate business application components from user interfaces and data, resulting in easier to manage applications that are quicker to build and deploy.

However, developing distributed applications has not been easy. The developer must conquer a multitude of complex new middleware standards and protocols: COM, CORBA, HTTP, SQL, Windows 98, IIOP, the list goes on. Without help, more time is spent on systems programming rather than solving business logic.



More distributed development projects succeed with Delphi, because only Delphi radically simplifies distributed application development by combining seamless integration to middleware standards with high productivity tools that accelerate application development.

The latest release, Delphi 4, introduces more innovations for distributed application development:

- One step COM and CORBA support.**
- Full interoperability with distributed Java applications**
- Advanced distributed data management**
- Support for Microsoft Transaction Server and Oracle 8.**
- Advanced development productivity tools**

With Delphi 4, organizations can rapidly deliver the most successful enterprise applications that support all major standards, enabling users to access any data, any place at any time in a fast, robust, secure and manageable environment.

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Why Businesses need Distributed Enterprise Applications

INPRISE delivers a comprehensive approach to Enterprise development, adding high levels of productivity, performance, and scalability to the development of robust, secure and high-availability enterprise solutions.

Delphi has become a preferred tool for developing distributed Enterprise applications. This success stems from INPRISE's **understanding** of the changing **needs** of IT organizations and the individual pressures placed on everyone within corporate IT: from the IT Director through to the Project Leader and Developer.

This paper explores the reasons why organizations are moving towards distributed computing architectures, the critical success factors behind implementing distributed solutions, and why organizations using Delphi and the INPRISE range of Enterprise tools succeed where others fail. Particular attention is paid to the new features in Delphi 4 that are focussed on distributed application development for the Enterprise.

IT under Pressure!

Historically, IT departments have been the boiler room of the organization, running the **enterprise systems** that make the organization function efficiently: Accounting systems, HR systems, Customer Service systems and Support systems. Typically, demand for information has come from internal management needing information to make better decisions in a competitive environment.

Organizations now see information as a critical part of their strategy:

Information to differentiate from competing offerings (such as the advanced tracking offered by delivery companies).

Information to open new markets and new revenue opportunities (for example, selling products and services across the Web or to distinct vertical markets).

Information to cut business costs and maintain or increase service levels (as with online self-service technical support).

The demand for information has thrust the IT department into the vanguard of the enterprise's business strategy. The ability of the IT department to deliver vital information applications and solutions can make the difference between corporate success and failure. The Enterprise is relying on the enterprise applications the IT department delivers.

Companies are now using information as a competitive weapon. This makes the IT department critical to corporate success.

Handling the pressure with distributed applications

To cope with these new demands, the IT department must be **flexible** and able to **respond rapidly** to the requests for new or enhanced applications. This means having a resource infrastructure that can:

Unify data and information from legacy enterprise systems wherever they may reside, at any time.

Deliver high-availability 7x24 information applications that are fast, fault-tolerant and secure.

Make these applications easy to maintain, modify and deploy: ensuring that business application logic is maintained in globally available components, independent of user-interface, or platform logic.

Deliver solutions quickly using high-productivity tools. Make the design of these solutions quick-to-modify for rapid response to new customer information requirements.

Insulate the Enterprise against potential changes in industry component, communications, networking and operating system standards, where possible, bridging standards to ensure maximum flexibility.

Deploy applications that work seamlessly with the Internet and Web, and can scale to respond to unpredictable usage levels.

Deliver more quality applications per developer than competitive IT departments.

Seamlessly Integrating Distributed Solutions

Fulfilling these tough requirements means moving on from distinct mainframe/desktop systems and from simple two-tier client/server applications to a **multi-tier**, or distributed enterprise application architecture.

In a distributed system, parts of an application may be split over any number of servers. Different parts of the applications may be upgraded without effecting other parts of the system. Such applications are easy maintain and run very effectively in a **networked environment**.

The enabling technologies for distributed application development are:

Intelligent middleware. Middleware is the glue that ties together distributed applications. It can include technology such as TP Monitors, Object Request Brokers, and Database Engines. These connect disparate systems and isolate business logic in a robust, high-performance, fault-tolerant manner.

High-productivity development tools. Development tools need to integrate seamlessly with the chosen middleware and use, create and modify enterprise components. These tools should raise the developer above the complexities of the middleware and platform dependent APIs, to focus on the business aspects of applications.

Traditionally the technical gap between the middleware and development tool has been broad, leaving the developer to sort out the intricacies of **combining different technologies**. In many cases developers find that the middleware is very complex to integrate and the high-productivity visual components they are familiar with cannot be used for distributed development. The only

option is to start over and learn a whole new tool set, making these expert developers novices again.

Delphi tightly **integrates** development tools and middleware so that developers can continue to use their **existing skills** and tools when developing distributed applications. This radical simplification of distributed application development means that organizations can immediately harness the benefits of distributed development in a proven and productive manner.

Distributed solutions can help IT departments effectively manage increasing demands for information. Delphi 4 radically simplifies distributed application development.

The Delphi Pedigree

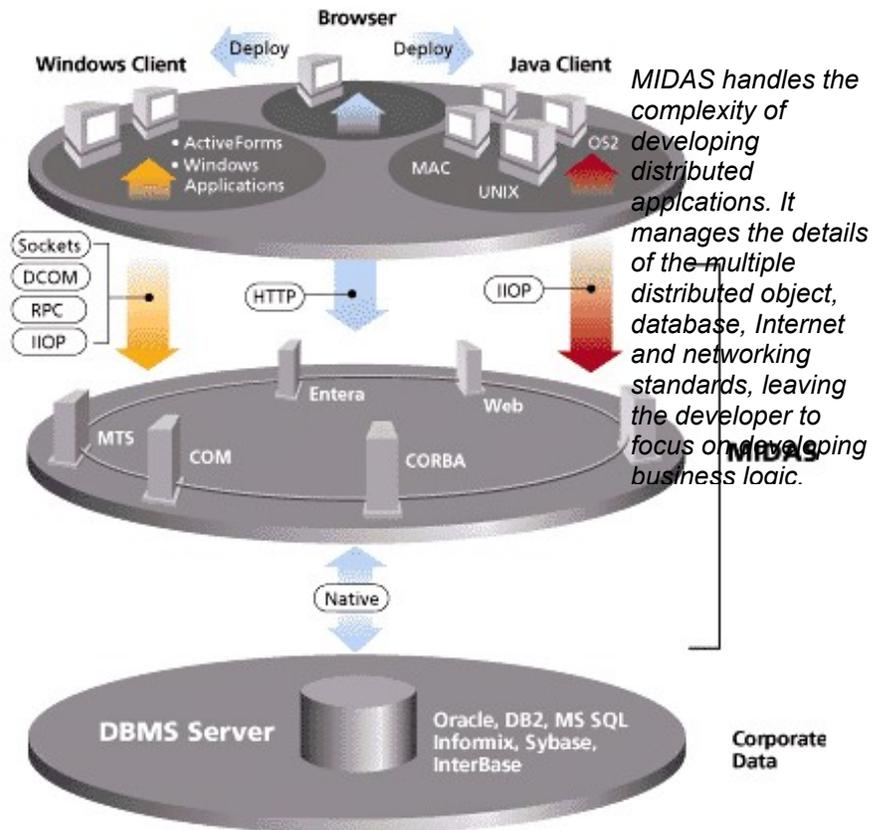
Delphi includes a wide range of facilities for delivering distributed applications:

MIDAS. MIDAS is a robust collection of services for delivering distributed applications that are seamlessly integrated into Delphi. MIDAS ensures intelligent central management of business logic, and efficient processing of enterprise-wide transactions.

The Delphi Integrated Development Environment (IDE). Delphi exclusively combines a high-performance compiler for true native code, project management and team development support, visual two-way tools and advanced debugging capabilities for developing client applications, server applications and enterprise components.

The Delphi Visual Component Library (VCL). The extensive VCL provides hundreds of pre-built components for User Interfaces, Data Access, Data Manipulation, Data Analysis, Data Presentation and Internet Development.

The Borland Database Engine (BDE) and Tools. The BDE is a high performance database engine with native connectivity to a wide range of database servers, along with numerous tools for Database Management.



Delphi 4 reduces enterprise development complexity without compromising control

Delphi's strengths are often praised for the way that they guide developers to elegant and well architected applications. Delphi's integrated suite of **wizards** and tools automate repetitive tasks and make complex jobs easier. Any automation resolves to **source code**, leaving no barriers or black boxes so the developer has total control over all aspects of the applications. This combination of automation and control makes Delphi particularly suitable for managing the complexities of distributed enterprise application development, succeeding where older tools such as Visual Basic and PowerBuilder fall short.

Some of the unique innovations in Delphi 4 include:

- One step COM and CORBA support.**
- Full interoperability with distributed Java applications.**
- Advanced distributed Data Management.**
- Support for Microsoft Transaction Server and Oracle 8.**
- Advanced development productivity tools.**

Delphi is the tool of choice for developing first-class distributed enterprise applications. Delphi 4 adds new capabilities to make applications stronger and enterprise development teams more productive.

How Delphi 4 delivers the most successful enterprise applications

Delphi 4 supports all distributed computing standards, protecting the enterprise from the volatility of the computing industry.

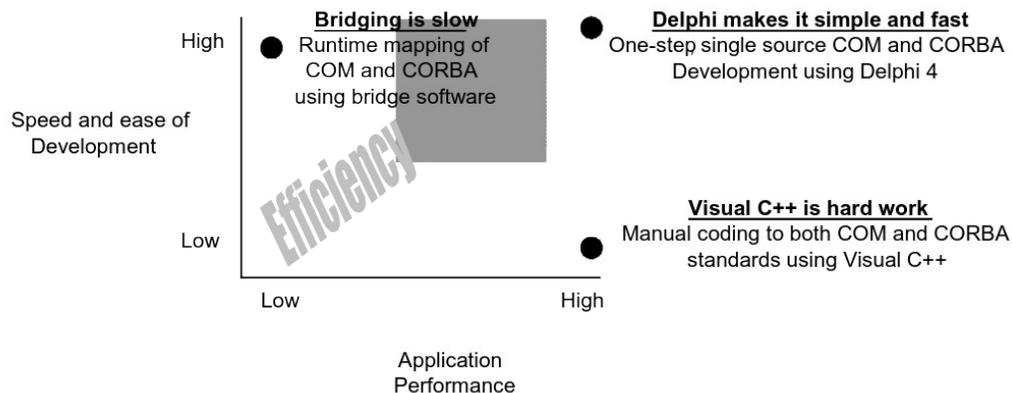
"We expect most organizations will realize the impracticality of trying to converge on a single technical architecture, and will recognize that a mixture of technical architectures will be the norm through 2000 and beyond."

The META Group

INRPISE fosters a **non-partisan** approach towards systems standards, focussing energies on developing technologies that enable developers and organizations to succeed in a world where **multiple standards** will continue to exist. Whether it's Windows or UNIX, Microsoft or Netscape, COM or CORBA, INRPISE technology bridges the differences so that enterprises can focus on making their **customers** successful rather than gambling on the success of a particular standard or technology vendor.

Delphi 4 delivers one-step, simultaneous COM and CORBA

CORBA or COM? Which will become the predominant standard? The answer is neither and both. While COM and CORBA shield the developer from the underlying complexities of different platforms, databases and legacy applications, Delphi protects the developer and IT department from the differences in COM and CORBA.



Developers not using Delphi can support both COM and CORBA, but the resulting solutions are far from perfect.

Until now, simultaneously supporting COM and CORBA has meant compromising application performance for ease of development. A *bridge* is a one option for CORBA-enabling COM objects that have not been written using Delphi. However, any component that has been developed using Delphi 4 can instantly become a **native** COM or CORBA component from a single set of source code. This means that any component code changes will always be in synch. If the component is deployed using Delphi's MIDAS technology, then the **same instance** of the component can

behave both as COM and a CORBA component simultaneously. This level integration is unmatched by any other tool.

Since making objects COM and CORBA compliant involves a significant understanding of how the low-level protocols operate, Delphi uses wizards to automate the whole process so that little learning and coding is required.

Delphi's one-step COM and CORBA support means that applications can support multiple standards. Developers can focus on developing business logic rather than becoming entangled with the intricacies of distributed object APIs and protocols.

Delphi 4 delivers the best Java interoperability

Now that any Delphi 4 object can be a CORBA object, **Java** applications can interact at a call-level with any Delphi component, and vice versa. However, managing advanced database transactions via low call-level interface would require a great deal of application development on both the client and the servers. Delphi's MIDAS **Remote Data Broker** technology adds powerful distributed database functionality to applications so that developers don't have to start from scratch. Using the new Java interfaces to MIDAS, Java and Delphi developers can instantly share database information in a distributed environment. MIDAS is a component of the Inprise AppServer, which will ship later in 1998.

Full Java support for MIDAS means that Delphi developers can rapidly create distributed database applications that are instantly interoperable with Java applications, bridging the gaps between NT, Unix and Internet applications.

Delphi 4 can collect and deliver any data, at any time, anywhere

Rapidly accessing, packaging, processing and updating information is a key requirement of many of today's applications. The complexities of managing *distributed* data require a unique collection of integrated technologies.

The fastest native connections to any database

Delivering universal access to all of the data sources within an enterprise requires a complex combination of networking and database drivers. There is a tendency for database drivers (such as ODBC) to support only a subset of functions on the database server. While Delphi 4 fully supports access to databases using ODBC, it also provides its own suite of **performance-tuned native drivers** to provide the highest speed access possible from a database using the database's full range of features. Delphi currently supports native connectivity to Oracle, DB2, Informix, Sybase, InterBase, and MS SQL Server, as well as dBase, Paradox, Access and FoxPro. Delphi also delivers native connectivity to the AS/400.

Delphi is the fastest way to data, wherever it lies.

Delphi 4 delivers first-class decision support components to intelligently display more information

Delphi includes **Business Insight**, highly sophisticated data-aware decision support components (such as graphs, grids and pivots) proven to save weeks of work when building first-class database applications. Every component can automatically function without change, regardless of the data format or source. This means that user interfaces do not need to be redesigned if the data source changes. Moreover, the same components can be used for developing local, two-tier and distributed applications.

Delphi's Business Insight components enable organizations to build sophisticated information-based business applications that deliver more information to users without making the user interface more complex. This enables more productive end-users to make better decisions.

Delphi 4 takes the pain out of managing distributed data

Orchestrating the movement of data between the distributed parts of an application means tackling a number of potentially complex issues. Delphi handles these complexities with powerful innovations in distributed data management:

Thin-client database support. Full-featured, lightweight database clients can be deployed without the large DLLs that usually accompany them. This makes deploying and updating database applications over a network quick and efficient. This benefit is particularly useful in combination with Delphi's ActiveForm technology that can deploy fully featured database clients as ActiveX controls embedded within Web pages.

Briefcase mobile data model. A live network connection cannot always be guaranteed for today's distributed applications. For example, a sales person may need to calculate and enter a quote on a laptop at a customer site, or an executive may wish to use a decision support application whilst on an airplane. Delphi takes care of the complexities of updating the database with the remote data, so the developer can add the *briefcase* functionality for no extra effort.

Delphi's database support has been designed for distributed application development. Developers can immediately deliver lightweight, fully featured thin-client and remote data applications.

Delphi dramatically increases distributed database application performance and scalability

Maintaining complex data relationships and database integrity across a distributed application requires treating data in a whole new way. The client part of the application needs to function without repeatedly having to grab more data from the server, or continually validating data integrity with a remote source. Using intelligent data packaging, Delphi dramatically increases the performance and scalability of distributed database applications. These innovations include:

Constraint Propagation. Constraints set on the database server can be automatically embedded in the client application for immediate client-side data validation.

New Nested Tables. Tables can include any type of field data, even other tables. This means that many-to-one relationships can be maintained and distributed

in a single table. Nested tables can be interpreted by all of Delphi's database controls without any extra coding.

New Deferred Blobs. How and when large data types (e.g. multimedia data) are transferred can now be rule-based, giving the developer total control over vital performance aspects of an application.

New Maintained Aggregates. Explicit information about a set of data such as averages and sums can be distributed along with the data. This saves the developer from having to develop the code to recalculate and reformat information about the data.

Delphi intelligently packages data, speeding application development, performance and communication, and reducing network traffic.

Delphi provides the best support for developing distributed applications using Oracle 8's Object Relational capabilities

Delphi delivers the best support possible for *all* database servers. **Oracle 8** introduces new features that are particularly useful in distributed applications. The flexibility of the **Delphi architecture** means that Delphi developers can immediately use all of the new Oracle 8 features. In many cases the benefits of Oracle will be inherited automatically, since MIDAS and the Delphi components **will automatically respond** to the new Oracle data types. (For example, Delphi's new grid component can display nested tables). The new Oracle 8 supported features include:

Abstract Data Types. Any type of data can now be stored in a database. Developers can work at a higher level, saving time and reducing complexity because intuitive information types such as invoices and purchases orders can now be stored and queried as collections of data, rather than low-level text and numbers.

Nested Tables. Repeating groups of information can now be stored in the same table, making it easier to distribute related information.

Delphi also provides full support for the new Variable Length Arrays (VARRAYs), Object Pointers (REFs) and External File References (BFILEs)

Delphi 4 is the best tool to unlock the new Object Relational power of Oracle 8.

Delphi 4 delivers the most robust, scaleable, secure and high-performance enterprise solutions

If the information delivered by an application is critical to sustaining an organization's service-levels, or perhaps vital for taking orders on the Web, then any downtime can result in loss of customers and revenue. Delphi and MIDAS address these concerns with services that deliver the robustness, scalability and security required today.

Delphi applications can now 'expect the unexpected' with fail-over and load balancing.

A distributed application must scale to **handle peaks in demand** (for example, in response to a rush of orders from the Web site). It must also be **resilient** to hardware and network failures.

Delphi provides full support for application **load balancing** and **fail-over**. If an application slows due to overuse, then it can make use of other processing resources to handle the load. If one part of the application is not available due to system failure, then the application can fail-over and continue processing at a different location.

Fail-over and load balancing makes Delphi applications robust and scaleable and reduces downtime..

Delphi's delivers comprehensive support for transaction services and security

Distributing application components adds to the complexity of managing transactions and security. When developing a distributed application, the developer must be sure that the different application components and databases are always left in a stable state. A single **transaction** (say credit card billing) may require a number of sub-transactions (debiting one account and crediting another). If any part of a transaction fails then other elements of the transaction must be **rolled back** to leave the system in a stable state.

The developer must also ensure that all parts of the application are **secure**, but that the security measures do not over-burden the end-users. Even though the information delivered by an application might come from a number of different systems, the user should only be required to login once.

Delphi provides full support for **transaction management** and **user authentication** across distributed systems by providing seamless support for middleware such as the Microsoft Transaction Server.

Support for transaction services and user authentication adds application strength without overburdening the developer or end-user.

Delphi 4 provides the best support for the Microsoft Transaction Server (MTS)

Microsoft has recently delivered the **Microsoft Transaction Server (MTS)** providing transaction services, security and resource pooling for distributed COM applications.

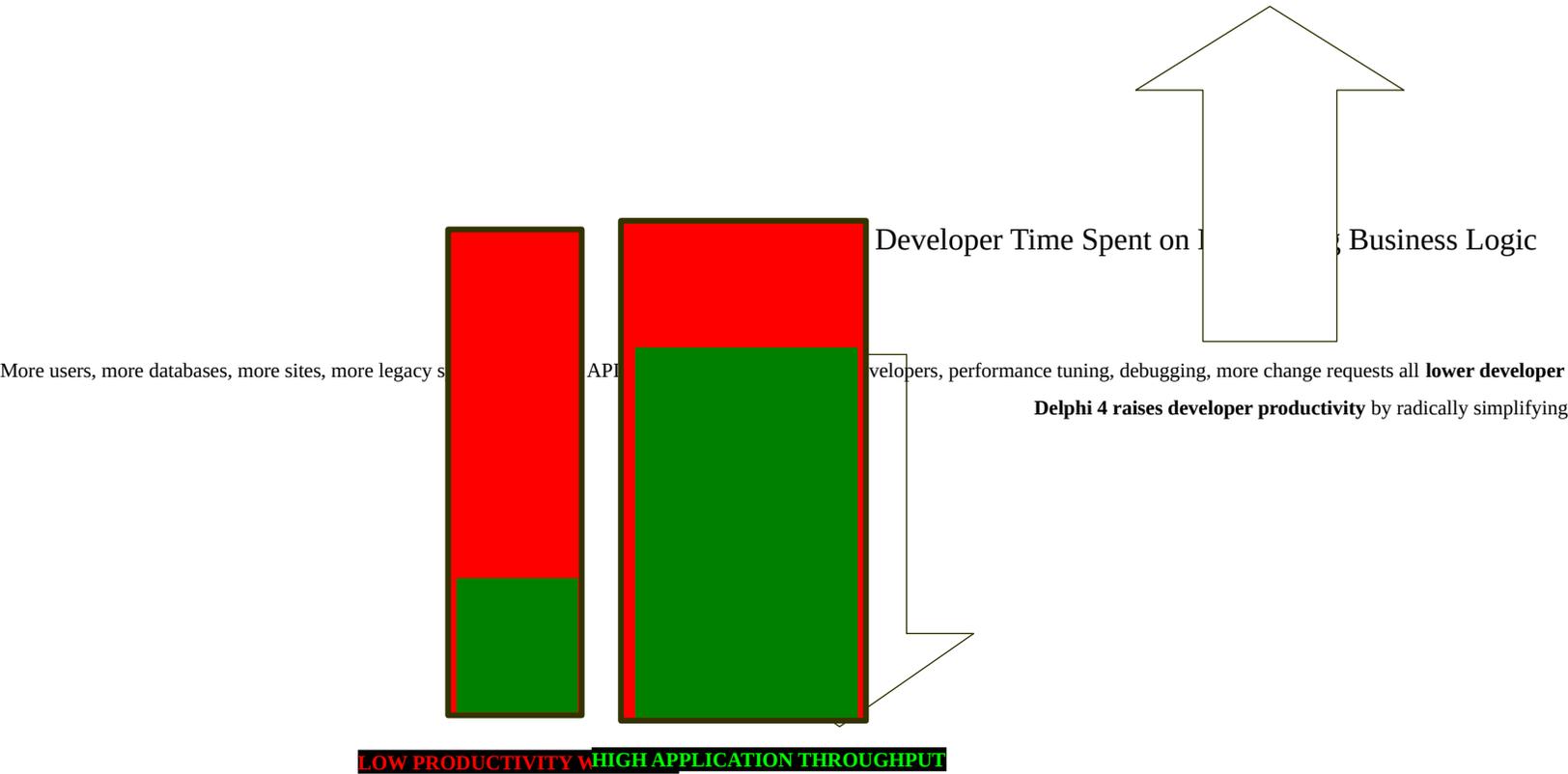
Developers wanting to take full advantage of MTS must conform to yet another set of protocols and procedures. Delphi eases this burden of developing applications that use the full power of MTS. The Borland Database Engine now works seamlessly with MTS and with the **Delphi MTS Deployment Wizard**, components can be deployed to MTS in a single step.

Only Delphi provides the MTS-enabled Borland Database Engine, along with one-step MTS deployment, making it quick and easy to deploy robust and secure MTS-based applications.

Delphi 4 raises organizational productivity ensuring that enterprise applications are quick to build, deploy, manage and maintain

The Standish Group estimates that only 30% of a developer's time is typically focussed on developing logic that is specific to a particular organization. The remaining time is spent on unraveling the complexities of systems and standards and learning new technologies.

By simplifying complex tasks and automating repetitive activities, Delphi frees the development organization to focus a much greater percentage of their time on delivering application functionality that is unique and valuable to the enterprise.



Organizations are more productive when using Delphi because they can spend more time on writing code that adds value to the business and less time on tasks with a less tangible return on investment.

Delphi code is inherently reusable

Delphi ships with the VCL, an elegantly designed **framework of reusable components** (Sun liked the design so much, they adopted it for Java beans). Delphi encourages reuse, so whenever new business logic has been created, it can easily be packaged as a component and shared amongst other applications and developers.

Delphi actively promotes code reuse through components, making applications robust, quick to build and easy to modify.

Delphi automates tedious development tasks

While Delphi uses wizards and advanced code generation tools to automate repetitive coding tasks, it never takes over. **Two-way tools** mean that everything resolves to source code, giving developers total control over each step of the application.

- A new Ergonomic User Interface makes using Delphi more productive for both beginners and expert developers.**
- An AppBrowser makes moving through code as easy as surfing the Net, by intelligently hyperlinking related code.**
- A new Advanced Project Manager means that developers spend more time programming and less time administering projects.**
- A new CodeExplorer gives an at-a-glance application architecture view and makes it easy for developers to grasp onto and keep control of the design and implementation of even the most complex projects.**
- A new Class Completion Wizard that makes it easy for new developers to build classes and reduces tedious repetitive coding for experienced developers.**

New Action Lists separate user interface elements from application logic, resulting in reduced complexity and lines of code along with increased reusability and application stability.

The new developer productivity features in Delphi 4 automate repetitive development tasks, so that developers can focus on the important jobs

Delphi makes using new technologies easy

Since it's easy to build Delphi components, the Delphi developers are able to support **new technologies** within Delphi very quickly. Whatever the operating system, component model, networking protocol, internet server, database server, application server or transaction model, Delphi supports it with high level plug-in components and wizards. This makes developers using Delphi the **first to market** with first-class applications built on new technologies. Delphi simplifies the development of all of the following (and more):

New Windows 98 Logo Compliant User Interfaces
Windows NT Services
ODBC and SQL
COM, CORBA and ActiveX
ISAPI and NSAPI
UDP, TCP, SMTP, POP3, NNTP, HTTP, FTP, and HTML.
MTS

Delphi developers are the first to deliver top-quality applications that support the latest standards.

Delphi applications are more robust and easier to debug

The fact that Delphi is written in Delphi and over one million copies of Delphi are being used in real-world projects means that Delphi's tools, functions and components are **thoroughly tried and tested**. Delphi also includes a number of advanced features that shorten the time spent debugging applications:

Full multi-threaded and remote debugging support, vital for testing and debugging distributed applications.

Advanced data-watch and application breakpoints that give fine control over application execution.

A host of different debugging views to uncover hard to find bugs.

Delphi innovates to reduce the time spent debugging applications and delivers special technology for debugging distributed code.

Summary

IT Departments are responding to the increasing demand for maintainable enterprise applications by delivering multi-tier or distributed solutions. Moving to a distributed application architecture can be very complex, especially for the software developer.

Delphi 4 eases developers into distributed application development by radically simplifying the complex tasks of building COM and CORBA components, interfacing to multiple databases and legacy applications and by managing application security and scalability.

As a result, development **teams using Delphi are more successful** because they spend more time on developing business logic rather than system code. This means more applications for the enterprise and better service to customers.

Delphi reduces the complexity of developing distributed applications, increasing development throughput and corporate competitiveness.