

# 4th Dimension 2003: A Technical Overview



**4D** T E C H N O L O G Y W H I T E P A P E R

## AUDIENCE

This white paper is designed to give IT and enterprise technical professionals a comprehensive, technical overview of 4th Dimension 2003. Issues such as flexibility, scalability, connectivity, and integration will be covered, with a special emphasis on 4th Dimension 2003's support for Web services technology.

## 4TH DIMENSION 2003 - A BRIEF OVERVIEW

4th Dimension 2003 is a powerful tool for creating professional database and Web applications. Its integrated architecture combines an embedded RDBMS, Web server, and unified programming language making it possible to develop, test, and deploy applications in standalone, client-server, 3-tier, or widely distributed n-tier configurations with little or no reprogramming. With built-in support for Web services (as both a client and a server) and a variety of industry-standard connectivity tools and technologies (including ODBC, XML, FastCGI, and SOAP), 4th Dimension 2003 is the complete data management solution for any business.

## REVOLUTIONIZING TECHNOLOGY

The past two decades have witnessed a revolution in how businesses work with information. Computers promised to streamline business operations, eliminate paper, and improve the efficiency of large businesses and corporations.

Early business applications provided rudimentary tools for automating familiar tasks; the word processor replaced the typewriter, and the spreadsheet replaced the paper ledger. For the most part, these applications have remained virtually unchanged since their debut over twenty years ago.

However, the database, arguably the most influential of all business applications, has undergone the most changes over the same time period—and not always for the better. As businesses began to adopt databases to house their critical information, databases grew in complexity, while taking on more of the day-to-day tasks of

modern business. For the businesses that bought into the idea of automation, they quickly realized that integrating new technologies into their existing applications often required major redevelopment efforts, adding to an already expensive endeavor.

When the world embraced the Web, businesses were forced to extend their technology offerings to establish a Web presence. Many different tools and technologies (often from different vendors) were required to produce solutions that were both usable and cost-efficient, but this simply added to the maze of options that was already too costly. No single tool was able to accomplish all of a business's needs. This led to the creation of systems that were and continue to be hard to develop, debug, deploy, and maintain. Business owners and IT managers are fed up with the lack of power and flexibility in low-end solutions, and frustrated with the difficulty and exorbitant costs of high-end SQL based solutions. Fortunately, there is an answer to this need.

Originally released in the US in 1987, the 4th Dimension family of products provides users with a rich, robust environment for creating affordable, high-quality database solutions. 4th Dimension fills the gap between low-end file managers and high-end SQL based database servers by providing all the tools and technologies necessary to create real-world business solutions (Figure 1).

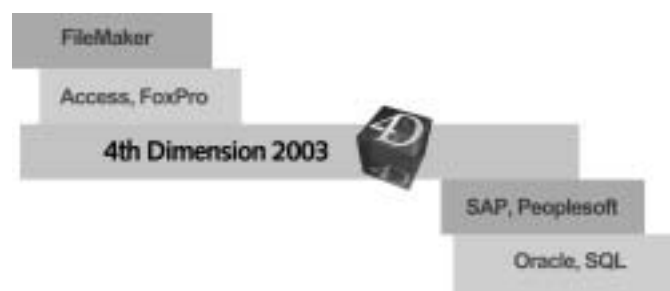


Figure 1: Filling the Gap between Low-End File Managers and High-End SQL Based Database Servers

# 4th Dimension 2003: A Technical Overview

Today's information applications must be able to be many things to many different people. They can no longer exist in a closed environment, accessible to only a handful of users. Businesses have added requirements to their databases to be able to serve Web users, communicate with other applications and databases, and be developed by teams of people simultaneously.

Over the past decade, we've witnessed the emergence and wide acceptance of Web applications. Web applications are commonly composed of three layers: the Web server, the application server, and the database server.

Using 4th Dimension, these conceptual layers can be implemented as an integrated program on one machine or as distinct programs on different machines. Additional machines can be added at each layer for scalability, testing, and fault tolerance. In practice, a single Web application can run on anything from a single machine to hundreds of machines in a distributed environment. Selecting the appropriate design within this continuum is a challenge for project sponsors, management, and technical staff. System architectures are more difficult to change than system features so selecting the wrong architecture is a substantial project risk. Nobody wants to pick a tool or strategy that becomes a costly deadend when application requirements or loads expand. On the other hand, overbuying threatens budgets and deployment schedules. According to the Gartner Group (*Research Note SPA-14-2716, August 2001*),

*"[T]here is a great disconnect between the appropriate and the actual in the application server deployment practices of mainstream enterprises. From 1998 through 2000, this disconnect collectively has cost enterprises more than \$1 billion in overpayments for never-to-be-used capacity. From 2001 through 2003, it may cost them an additional \$2 billion."*

More features and greater flexibility in deployment typically comes at the cost of longer learning curves and higher maintenance costs. In contrast, simplicity in learning, developing, deploying, and maintaining applications typically comes at the cost of limited features and performance options. 4th Dimension is distinguished by a high degree of flexibility coupled with a low degree of complexity (*Figure 2*).

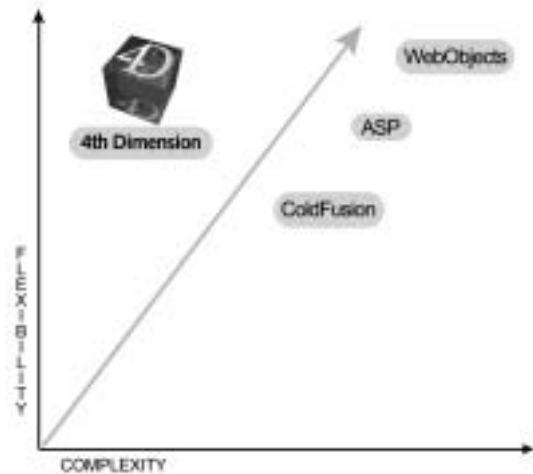


Figure 2: 4th Dimension combines a high degree of flexibility with a low degree of complexity.

## SIMPLE AND ELEGANT

4th Dimension's unified language can be applied to the RDBMS, Web server, Web services, and traditional client-server environments, as well as in client applications to large enterprise databases such as Oracle. This seamless integration simplifies application development and maintenance, lowering development time and lifetime costs. In fact, in a recent Ventera study, 4th Dimension was the only Web application environment studied that earned a perfect score for development time (*Table 1, page 3*). The same 4th Dimension system can be deployed as a single-user, multi-process application, a client-server application, or a widely distributed application (*Figure 3*). Because multi-user development and deployment is a core concept in the 4th Dimension environment, switching between single-user and client-server is typically as easy as relaunching the program. Web applications share the same language, RDBMS, data, and business logic as other environments, reducing rework and eliminating inconsistencies.



Figure 3: The same 4th Dimension system can be deployed as a single-user, multi-process application, a client/server application, or a widely distributed application.

	Database Integration	Web Server Integration	Customization	Time to Develop	Reusability
4D Application Server	5	5	5	5	3
Cold Fusion	5	5	2	4	2
Active Server Pages	5	1	2	3	3
Live Wire	5	1	2	3	1
Weblogic (Java Based)	5	5	5	1	5
Jrun (Java Based)	5	5	5	1	5
One-to-One	3	5	5	1	3

Table 1: Ventera Study Results

#### FLEXIBLE

4th Dimension also supports application designs that combine multiple programs and services. Integration is essential in modern IT infrastructures as organizations commonly have multiple existing systems and development groups. Rather than writing – and re-writing – all corporate services on a single platform, the trend is increasingly to implement heterogeneous systems with homogeneous communications infrastructures. Over the years, the standards for distributed and object-oriented component network architectures have matured. Today, 4th Dimension supports a wide range of contemporary standards, including ODBC, a native HTTP server, FastCGI, XML, and SOAP (Figure 4). True to 4th Dimension's overall philosophy of providing flexibility without needless complexity, these tools can be deployed almost anywhere within the 4th Dimension environment.

	4th Dimension	4D Client	4D Server
Embedded RDBMS	√	√	√
ODBC Client	√	√	√
ODBC Server			√
Web Server	√	√	√
Web Services Server (SOAP)	√	√	√
Web Services Client (SOAP)	√	√	√
FastCGI	√	√	√
Native TCP/IP	√	√	√

Figure 4: 4th Dimension supports a wide range of contemporary standards.

#### SCALABILITY

4th Dimension's embedded tools lend themselves to scaling and load balancing. Applications (including Web applications) can initially be deployed entirely within a single-user copy of 4th Dimension by using the integrated RDBMS, application server, and Web server (Figure 5, page 4). This configuration can typically handle the needs of a workgroup without additional software. Not only is this an inexpensive solution, but it is also extremely convenient for developers to test their solution at their home offices or on their laptops without the need for complex hardware configurations that are expensive and difficult to configure. As demand on the system increases, the system can be moved to 4D Server to separate the database from the application and Web server functions. This step typically requires zero recoding. Multiple copies of 4D Client can then act as application and Web servers to increase performance and to support load balancing. Finally, external systems can be integrated for the RDBMS, application server, and Web server layers, as required.

4th Dimension's integrated architecture not only supports the partitioning of code between the application server and the database server, but it also supports code that can be partitioned across an application server. This is convenient for setting up an application server for specific tasks, such as a report server.

*"From day one PowerSchool has used 4th Dimension extensively, and we consider it a uniquely powerful tool for both development and deployment that has given us a tremen-*



Similarly, using 4th Dimension's SOAP Server, any client that supports SOAP (C#, Java, Visual Basic, AppleScript, and of course 4th Dimension) will be able to call 4th Dimension methods by using the same code they would to access any other Web service. 4th Dimension automatically generates and maintains the WSDL file based on your method's parameters and return values. By adopting SOAP, 4th Dimension has made it seamless to decouple your business logic from the interface and make it available to a new range of customers and applications.

**SECURITY**

Security on the Web is at the top of any IT manager's list of concerns. There has been considerable publicity about companies who have had their Web server's security breached by malicious users. 4D is also serious about security, and takes great pride in knowing that several high-profile customers such as the US Army <<http://www.army.mil>> agree by having chosen 4D WebSTAR as its Web server after a well-publicized attack on the previous server solution. The 4th Dimension environment provides a variety of tools to secure and protect data within the database, the local network, and over the Internet. With 4th Dimension's Web platform, all communication (between all three tiers) can be transmitted securely using the standard, 128-bit SSL protocol. Furthermore, sensitive data such as medical information, credit card numbers, and financial transactions can be stored using the same strong encryption system, safely protected by a system that does not possess the same exposure as most other database engines.

**4TH DIMENSION'S DEVELOPMENT PARADIGM**

Database application development is a multi-disciplinary job, potentially involving programmers, writers, graphic designers, and usability engineers. The 4th Dimension environment supports an elegant way of partitioning data, presentation logic, business logic, and graphic design, bringing substantial efficiencies to all phases of system development.

The client-server version of 4th Dimension can allow each client access to the Design environment, allowing multiple developers to make changes to the system simultaneously. Changes to the structure are automatically reflected immediately on each client's workstation, dramatically streamlining the development cycle.

For production systems, or systems where the developer is working on a remote development version of the structure, 4th Dimension employs a unique solution to the issue of updating remote structures. By separating

the program code (forms, methods, business logic, database structure) from the actual data into separate physical files, a development team can distribute a new structure – including reports, forms, methods, custom Web APIs, and other resources – to one or more installation sites without installer scripts, data export, or other special work. To update a site, one must only quit 4th Dimension or 4D Server, replace the existing structure file with the updated version, and relaunch 4th Dimension or 4D Server. With 4D Server, only the updated resources are automatically pushed out to all clients (for caching purposes) upon connecting to the data server, avoiding the necessity of manually configuring individual clients with each update.

**COSTS**

Having the best architecture is immaterial if the costs to develop and maintain the application far outweigh the business benefits. A recent study by Ventera shows that 4th Dimension had the fastest implementation of all the products tested (*Table 1, page 3*). According to the study:

*"The 4D Product Line provides end-to-end software including a Database, Web Server, Application Server, and Integrated Development Environment (IDE). You can produce an entire Web site without purchasing any additional software. I also found the ability to change from a single-user application to a client/server application and from a client/server application to a Web-based application very interesting. I cannot think of any other tool that enables a developer to do this."*

These results are even more amazing when one considers that some of the other products analyzed cost more than twenty times the cost of 4th Dimension.

Similarly, initial development costs count for nothing if the product is difficult and costly to maintain. A recent Aberdeen Group study (May 2001) show that solutions deployed with 4th Dimension's Web architecture cost about 70% less than the industry average throughout the lifetime of the project (*Table 2*).

Product	Costs
4 <sup>th</sup> Dimension 6.7	34,853
Industry average	101,036

*Table 2: Aberdeen Group Results*

## **CONCLUSION**

4th Dimension's application development architecture was designed to maximize the benefits of rapid development while simultaneously avoiding the hazards of complexity and overbuilding. 4th Dimension's rapid development features allow organizations to deliver and maintain systems at roughly 70% less than the industry average. Standards-based connectivity and integration technologies amplify 4th Dimension's abilities by supporting widely distributed architectures and best-of-class programs in each application layer. All of these features contribute to 4th Dimension as an agile, powerful, and remarkably adaptable product family that deserves consideration for your application development needs.