AberdeenGroup

# 4D Embedded Database Cost of Ownership Study

## An Executive White Paper

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# 4D Embedded Database Cost of Ownership Study

**Executive Summary**

This Aberdeen *Executive White Paper* examines the cost of ownership of 4D, Inc.'s 4D version 6.7 embedded database versus an industry average for embedded databases. It focuses specifically on embedded databases for small to medium businesses (SMBs) and workgroups and departments within larger businesses — a set of users that Aberdeen calls "Low IT" users. There are three components to this *White Paper:*

1. A *"visible cost of ownership"* (VCO) study estimating cost of ownership for 4D v6.7 and for an industry average — including Progress Software's Progress V9.1, Oracle8i, Microsoft SQL Server 7.0, and Pervasive Software's Pervasive database — using the same cost of ownership criteria as in previous Aberdeen studies.
2. An examination of real users' *actual total cost of ownership* (TCO) over the last two years, based on user data from earlier TCO case studies; and
3. A set of *criteria* that is useful in assessing databases for the Low IT market.

Aberdeen diverges from the traditional approach to TCO assessment because we find that traditional TCO estimates do not fully capture users' real-world experiences. It is frequently impossible to calculate a value or values for intangible components in the cost equation, such as the risks associated with the timely delivery of next-generation technology or providing a smooth transition for mission-critical applications. The interdependencies of a solution with the rest of an enterprise's IT infrastructure cause wide variations in estimates among customers. And our studies have convinced us that "postmortem" TCO estimates can differ widely from TCO forecasts.

Therefore, to make TCO more realistic for users, Aberdeen splits it into two parts:

- *VCO:* indicating how a customer is likely to perceive cost of ownership before the sales process starts using the traditional models and pricing information; and
- *Postmortem TCO:* doing user case studies.

Aberdeen then places TCO within the context of all the key criteria for an informed buying decision: cost of ownership; generic technical criteria (e.g., performance, robustness, and flexibility/openness); and Low-IT-specific criteria (e.g., ease-of-use and maintenance costs/resources).

Aberdeen's overall findings include the following:

- A significant difference in VCO and postmortem TCO exists between 4D Software's 4D v6.7 and the industry average;

- 4D also differentiates itself with regard to other criteria key to many Low IT implementations (e.g., ease-of-use and less need for maintenance resources); and
- These findings are likely to remain true over the next 12 to 18 months as past trends in database pricing continue.

Aberdeen also finds that:

- Administrative and maintenance costs continue to increase in importance as a buying-decision factor, and proactive, "designed-in" database maintenance is key to many successful Low IT implementations; and
- Low IT users have unique database requirements, such as "near-lights-out" administration and minimal training costs, which, in many cases, enterprise databases cannot meet adequately.

**VCO: A More Realistic TCO**

This section of the *White Paper* presents the methodology of the VCO study (including caveats), the results, as well as Aberdeen's conclusions.

**The Methodology of the Study**

The aim of the study was to capture a typical application-embeddable database customer's VCO: the likely estimate of TCO of a customer for an application-embeddable database *before* contacting the salesperson and negotiating for discounts. In this study, customers represent 10- to 100-person SMBs or workgroups/departments within larger enterprises. A typical application-embeddable database would run in an Intel/NT-based server platform and 10- to 100-client PC environment. The study compared the performance of 4D Software's 4D v6.7 against an industry average determined by analyzing several leading application-embeddable databases.

Aberdeen identifies the following costs as major components of an application-embeddable database's VCO:

- *Database license* — the software license for the server platform and clients;
- *Customization tools* — the cost for a copy of the developer tool kit when the application license does not include these tools;
- *Internal maintenance costs* — dedicated time from a database administrator/developer, at an annual salary of $73,000 to $80,000 (or approximately $315 per day);
- *Training costs* — the expenses of training the customer in how to use, update, and maintain the database. Aberdeen uses the supplier's fee (if available) or costs of comparable third-party training; and


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- *Annual support service costs* — a fee that the supplier or independent software vendor (ISV) charges to provide telephone-based and field service support for its application, possibly including software upgrades.

Note that VCO does not include client hardware and networking infrastructure support, "customization" costs to fit the database to an unusual set of customer requirements, or productivity losses from training and installation, because Aberdeen research shows that in most Low IT situations these additional costs are insignificant. Also note that companies offer a special (typically discounted) fee for Internet access from clients to server; Aberdeen therefore considers that case separately from those for 10- to 100-user systems.

To gather the data for this study, Aberdeen used publicly available pricing information and past Aberdeen customer research.

**The Results**

Table 1 shows the full results of the VCO study. A summary of the results follows:

- In all configurations, under conservative assumptions, 4D Software's 4D v6.7 shows marked superiority in VCO over the industry average. The VCO ratio runs from *1.64:1 to 2.89:1* in 4D's favor;
- 4D v6.7's superiority is most marked in *deployment and support costs* — areas that past Aberdeen research has shown are a major and increasing component of TCO in most implementations for all sizes of an organization;
- For 50 or more clients, *Internet access* packages offer significant and increasing savings versus simple per-client licenses;
- 4D development tools beat the industry average in price across all configurations under conservative assumptions, reflecting 4D's traditional emphasis on supporting partners in both the Windows and Macintosh developer communities.

Given these results, Aberdeen concludes that:

- 4D v6.7 has a clear superiority in VCO with respect to the industry average performance of embedded databases.
- This superiority is primarily (but not entirely) due to 4D's ability to achieve "install and forget it" deployment and "near-lights-out" administration in many cases. Users cite the emphasis in 4D v6.7 on increasing data stability and thus minimizing management overhead.
- This superiority is likely not just to continue, but possibly to increase.


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## Table 1: Five-Year Comparative VCO

| | 10 Clients | 25 Clients | 50 Clients | 100 Clients | Internet |
|---|---|---|---|---|---|
| **Server and Client Licenses** | | | | | |
| 4D v6.7 | $1,898 | $3,644 | $10,641 | $20,636 | $998 |
| Industry Average | $2,165 | $6,947 | $34,693 | $68,554 | $6,812 |
| **Development Tools (one copy)** | | | | | |
| 4D v6.7 | $799 | $799 | $1,590 | $2,389 | $1,698 |
| Industry Average | $1,965 | $1,965 | $3,090 | $9,960 | $2,827 |
| **Deployment** | | | | | |
| 4D v6.7 | $1,800 | $3,500 | $10,000 | $19,000 | $900 |
| Industry Average | $6,007 | $8,180 | $52,981 | $104,773 | $8,882 |
| **DBA Cost** | | | | | |
| 4D v6.7 | $12,500 | $14,465 | $26,666 | $38,399 | $26,666 |
| Industry Average | $13,833 | $16,007 | $57,333 | $61,173 | $47,813 |
| **Training** | | | | | |
| 4D v6.7 | $250 | $250 | $500 | $500 | $500 |
| Industry Average | $5,613 | $5,613 | $7,363 | $7,513 | $7,388 |
| **Three Upgrades over Five Years** | | | | | |
| 4D v6.7 | $1,708 | $3,280 | $9,577 | $18,572 | $898 |
| Industry Average | $829 | $2,678 | $1,330 | $2,330 | $1,872 |
| **Support Cost** | | | | | |
| 4D v6.7 | $3,095 | $3,095 | $3,095 | $3,095 | $3,095 |
| Industry Average | $5,957 | $7,023 | $22,732 | $41,492 | $25,442 |
| **4D v6.7: Total Cost** | **$22,050** | **$29,033** | **$62,060** | **$102,591** | **$34,755** |
| **Industry Average: Total Cost** | **$36,369** | **$48,413** | **$179,522** | **$295,795** | **$101,036** |

**Source: Aberdeen Group, February 2001**


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IT organizations seeking to minimize key application lifecycle costs should note that technology-savvy corporations are trying to pare maintenance and software-development costs (especially in workgroup and departmental applications) through automation and productivity-enhancing software that is driven by embedded databases. Thus, user organizations need to be aware of the likely costs associated with ownership and deployment of an embedded database and include those costs in any calculation of the costs of key applications.

**Cost of Ownership in the Real World**

This section uses four brief case studies to compare 4D Software's 4D embedded database to Aberdeen's Low IT user VCO estimates with actual user experience. Our findings from these case studies and previous studies include the following:

- Criteria other than VCO are also primary factors in the buying decision. These include reliability, ease of maintenance and administration, and a common application look-and-feel across platforms.
- In both small and fast-growing enterprises, minimal database downtime is a critical factor, and "zero administration" is highly desirable.
- A Low-IT-tuned VCO performs reasonably well in anticipating TCO in the real world.
- If anything, the superiority of 4D in VCO is even more marked in real-world TCO, because slight decreases in categories of database costs further enlarge the differential as the size of the database installation increases.
- Low IT users have unique needs — such as speed in performing small office accounting tasks and minimal administration/training costs — that allow solutions targeting those needs to deliver better TCO and support for critical business functions in many cases.

*Case Study 1: 4D and 'Custom Developer'*

This case study involves "Custom Developer," a U.S.-based consultant and provider of customized database and network solutions. Custom Developer markets its services both to Windows and to Macintosh user environments. For its own back-office environment, Custom Developer uses a combination of 4D v6.5 and 4D v6.7, the latter deployed to enhance client billing, project tracking, and technical support. The company has used Microsoft SQL Server as well. All internal applications run on Windows NT and Windows 2000 operating systems. Most applications are enabled for the Web as well as for client/server to allow consultants to access information while traveling or at customer sites.

In line with Aberdeen findings, the key factors in Custom Developer's choice of embedded databases included reliability, administration cost, and ease of


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deployment and training. In developing new applications for its users and, ultimately, new services for its customers, Custom Developer also requires user interfaces that look and feel the same, no matter what platform is being used.

For both 4D v6.5 and 4D v6.7, Custom Developer reported an administration and maintenance experience that amounted to "install and forget." Uptime across all systems averages 95% or higher. For a 10-client environment, one hour per week is all that is required to ensure data stability. Deploying 4D requires roughly an hour for back-end installation — using a homemade installation program — and about the same for client installation. In Custom Developer's deployment experience, that gave 4D a 20:1 deployment-cost advantage over Microsoft SQL Server.

Training for users requires roughly a week for a major release of the database, and a day each for minor release. No separate database administrator (DBA) training is required. In fact, the IS manager assigned as the 4D DBA also performs network administration and application development across all databases. User support averages approximately 10 hours per week.

Custom Developer reports seeing continuous improvement in development functionality from 4D v6.0 through 4D v6.7, with the Web features in v6.7 alone regarded as worth the price of the entire upgrade.

*Case Study 2: 4D and 'Systems Provider'*

This case study describes the experience of "Systems Provider," a designer, developer, and operator of Internet-based knowledge sharing systems used by government and private laboratories, as well as by midsize and large businesses. Customer systems run in both Macintosh and Windows environments, typically on TCP/IP networks, with ColdFusion used to enable Web applications to access research and other large databases. Systems Provider develops solutions in both client/server and stand-alone versions — the latter being favored particularly by researchers who wish to work on problems on their laptop computers while away from their laboratories.

Systems Provider deploys Microsoft SQL Server 7 in extremely data-intensive applications, such as searching government databases with millions of records, but the company uses 4D v6.5 and v6.7 in every aspect of client/server and Web development. Although 4D might trail SQL Server in terms of raw speed, Systems Provider reported that 4D delivered far superior TCO in the categories of administration, support, deployment, and customization.

To administer 4D within its own 14 development centers, with one copy of the database at each center, Systems Provider required the equivalent of two full-time DBAs. Because it hires at the DBA level with the expectation that new hires will reach developer status quickly, efficient training is an important consideration for


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Systems Provider. With 4D, no separate DBA training was required, and training in development required approximately one week per developer.

While Systems Provider considered the startup costs of 4D and SQL Server to be roughly equivalent per server, it found that the cost of expansion through Web extension software is far lower with 4D. Systems Provider also reported minimal customization costs with 4D in comparison to other embedded relational database management system (RDBMS) products, as all developers could work from a single server. Easy and inexpensive customization proved important in cross-platform development, a staple of Systems Provider's business. Systems Provider found Web development with 4D v6.7 to be faster and easier than expected, thanks to a "non-contextual" architecture that allows client/server, source, and Web applications to coexist on the same system.

Deployment of 4D follows a push process that allowed Systems Provider to remotely provide the same application to a number of customer sites, providing a major installation advantage over SQL Server. Upgrading from 4D v6.5 to 4D v6.7 required only the running of a single conversion routine.

*Case Study 3: 4D and 'Nationwide Contractor'*

In this case study, 4D was used by a large general contractor that builds hospitals and office buildings throughout the United States. For this 300-employee company, successful business operations depend on reliable computer networking between headquarters, regional offices, and numerous project sites.

One of the first in its field to deploy computers at job sites, "Nationwide Contractor" uses a single wide area network to link all of its sites and offices. At first, the company relied heavily on frame relay for communications, but it recently shifted to digital subscriber line (DSL) or fractional T1 lines. It uses Macintosh desktop models as client devices, with Macintosh G3s and G4s as servers, along with Sun servers that run e-mail, Web-based calendar, and the Oracle back-office financial application.

For its job sites, Nationwide Contractor uses 4D-based applications that it first developed in 1989. The largest and most complex of these handles all job site accounting, payroll, and billing. A second application synchronizes onsite financial information with the company's back-office systems in near real time. By using these applications, managers can know actual costs at any given time and make accurate projections and use resources efficiently.

While supporting complex applications that solved important business problems, 4D also provided cost benefits over alternative embedded databases, according to Nationwide Contractor. Once the original server license was paid for, the company found that its recurring costs were minimal, because onsite DBA was required. Two engineers work as 4D programmers, one full-time and the other ap-


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proximately one day per week, adding new functionality and integrating the 4D applications with the Oracle system. Both engineers were initially trained in 4D over the course of several days.

In migrating from 4D v6.5 to v6.7, Nationwide Contractor reported improvements in scalability and performance — important changes because its project databases have grown to the point where some contain millions of records. 4D now provides 100% automated backup on multiple levels. Deployment required two to three weeks overall, with most of that time spent testing the application and optimizing for specific user scenarios. Upgrading to v6.7 took Nationwide Contractor roughly half the time required to upgrade from 4D v6.0 to v6.5.

*Case Study 4: 4D and 'Healthcare ISV'*

A fourth case study involves "Healthcare ISV," which develops, publishes, and sells veterinary practice management software used in clinics and small hospitals. The software handles basic bookkeeping and medical record keeping. Healthcare ISV's staff of eight full-time and six part-time employees provides telephone support, on-site installation, and training for approximately 700 installed sites throughout the United States. To do so, it uses an externally hosted Web site and an in-house sales and technical support database. New versions ship every 8 to 12 months via CD, with an automated setup process burned in.

Healthcare ISV runs one copy of 4D Server v6.5 on a Windows PC to support all of its in-house activity, with 4D Web extension software to support laptop users. To manage medical records at the clinic or hospital site, customers typically install Healthcare ISV's software and 4D Server on one computer and 4D Client on a second machine.

Because its support staff is small and its customers are not highly technical, Healthcare ISV considers it critical to keep database administration, software maintenance, user and customer support, and training costs to a minimum. Furthermore, the company's business plan is to have its programmers program, rather than become dedicated DBAs.

With 4D v6.5, the company reported that in-house administration required approximately one hour per week, while it spent less than 10 hours per week maintaining its 700 customer sites. Most of that time was spent using 4D tools to fix damaged or corrupted data. Maintenance costs remained minimal, with only one system crash reported. Customization consists of making adjustments in-house, burning those adjustments onto a CD, and then having customers run installations from the CDs. During software deployment, 4D handles all structural functions within the data file, and Healthcare ISV's product detects the update and adjusts record content. The deployment process requires no more than 30 minutes.


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Though no specific DBA training is required, Healthcare ISV developers typically attend an annual 4D conference for two to five days to learn new skills and acquire the latest product information.

**Case Study Results**
From these case studies as well as other user-based research, Aberdeen concludes the following:

- Our assessment that 4D has near-zero deployment, maintenance, upgrade, and training costs agrees with the experience of many users in organizations with small DBA teams that bear multiple responsibilities for administration and development. Likewise, other TCO costs for 4D agree in general with Aberdeen VCO estimates.
- Support for Web applications and common functionality across multiple operating systems are both important considerations for service-based companies, particularly in IT-related industries. In software development scenarios, cross-platform functionality significantly reduces VCO related to customization. 4D appears to address these issues directly in the latest versions of the 4D database.
- 4D's VCO superiority relates directly to its focus on critical success factors for Low IT users. Specifically, 4D.SQL focuses on "zero administration" and ease-of-use; as a result, users report zero deployment, maintenance, upgrade, and training costs.

**Beyond TCO: Other Key Buying Criteria for Embedded Users**
This section describes the Aberdeen criteria beyond TCO for embedded databases and how 4D meets the criteria.

For the last six years, Aberdeen has advised enterprise-database buyers to use scalability, open flexibility, robustness, and programmer productivity as overall buying criteria. For buyers of embedded databases, Aberdeen recommends a similar set of criteria but with a different emphasis. Low-IT embedded database buyers should consider the following overall criteria aside from TCO:

- *Performance* in common Low IT tasks — such as back-office, Internet, and sales database transaction processing. Though scalability remains an issue in some cases, most users handle it by linking to enterprise databases.
- *Administrative ease-of-use* — which not only drastically reduces Low IT TCO, but also allows a wider range of end-users to access key SMB and departmental data, because they need no administrative skills.


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- *Minimal downtime* — meaning that the operations of the embedded database should be invisible to the user (excessive downtime is the most visible and bottom-line-affecting flaw in an embedded database).
- *Flexibility* — which for Low IT implementations typically means both the ability to connect to enterprise and supplier databases as well as the ability to easily upgrade to a new version of the embedded database.

*Performance*
For most Low IT users, data processing involves small to midsize online transaction processing (OLTP)-type updates or "mixed" query and update processing. As a relational database, 4D excels in OLTP. 4D v6.7 includes indexing improvements that can speed decision support; database engine speed improvements that apply to updates as well as queries; and Web multimedia features such as SSL/XML support and Binary Large Object (BLOB) support for Web application performance.

*Administrative Ease-of-Use*
It is clear from user reports that 4D is outstanding in this area. 4D or bundled third-party tools effectively handle the administrative details that tend to trip up other embedded databases, such as the need to periodically reorganize the database to avoid degrading performance, automate online backup and recovery, and expand the database as it nears capacity. Features for deployment and administration clearly aim at automating common administrative tasks. Easy-to-follow user interfaces mean that 4D and its ISVs receive relatively few support questions.

*Minimal Downtime*
Again, user reports indicate that 4D rarely requires downtime, although users can employ optional downtime in order to fine-tune the database to ensure optimal functioning.

*Flexibility*
4D's open database connectivity (ODBC) support means that it can access all popular back-end enterprise databases and a range of other databases. 4D runs not only on NT but also on Mac OS 9. 4D has announced plans to support Mac OS X. User reports show that 4D upgrades simply involve upgrading the surrounding database, with no user database expertise required.


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**Aberdeen Conclusions**

Buyers of embedded databases should note the following key conclusions from Aberdeen's ongoing research into the market for Low IT databases:

- Because administrative costs are a major and increasing component of overall TCO and databases vary widely in administrative costs, performing a realistic TCO analysis before purchasing any software or hardware can make a huge difference in lifecycle costs. Buyers can determine a realistic TCO by estimating VCO and then factoring in real-world user experience.
- 4D Software's 4D v6.7 offers clearly superior TCO to the industry average, primarily because of 4D's far lower administrative costs, but also due to lower deployment costs and a less expensive suite of development tools.
- Buyers should also consider performance, downtime, ease-of-use, and flexibility. In each case, 4D v6.7 adds significant value.
- The cost savings from low administrative overhead are increasing as database administrator costs increase. Buyers should also note that low database administrative costs allow IT professionals to focus on higher return on investment projects as well as businesses with little or no IT in order to implement and support key applications.
- Internet access licenses offer an excellent way to save money.

Aberdeen recommends that buyers of embedded databases consider VCO, real-world TCO experience, and Aberdeen's overall buying criteria when selecting a supplier. Buyers should also consider the supplier's focus on Low IT users' needs. In all of these areas, 4D Software's 4D v6.7 has a strong story, one that users should investigate further.


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**Aberdeen Group is a computer and communications research and consulting organization closely monitoring enterprise-user needs, technological changes and market developments.**

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