AberdeenGroup

# Embedded Infrastructure Cost-of-Ownership Study: 2001 Update

## An Executive White Paper

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# Embedded Infrastructure Cost-of-Ownership Study: 2001 Update

**Executive Summary**

This Aberdeen *Executive White Paper* compares the cost of ownership of the following embedded infrastructure solutions: Progress OpenEdge (Progress Workgroup RDBMS (relational database management system) V9.1c and Progress AppServer V9.1c) versus Microsoft SQL Server 2000 and Microsoft Application Server and Progress OpenEdge (Progress Enterprise RDBMS V9.1c and Progress AppServer V9.1c) versus Oracle9i and Oracle9iAS Release 1. This report updates and extends the 1998, 1999, and 2000 Aberdeen surveys on embedded databases. For reference, all changes in methodology since the 1999 survey are listed in the Appendix. Aberdeen findings include the following:

- *The lowest "visible" cost of ownership (VCO) for workgroup embedded infrastructure belongs to Progress OpenEdge when compared to the Microsoft embedded-infrastructure solution over a five-year period.* Aberdeen defines VCO as the cost of ownership that the IS (Information Systems) buyer may reasonably anticipate before buying a product, based on its history and not including sales discounts. Aberdeen estimates that the Progress VCO over five years is, on average, at least 40% less expensive than Microsoft's VCO. Although initial costs were higher for Progress in small workgroup environments, ongoing fees and anticipated database administrator (DBA) costs were both lower. In the embedded-database portion of overall embedded-infrastructure costs, Progress Workgroup Server has increased its margin of leadership over Microsoft in 2000 due to increases in Microsoft prices and decreased Progress deployment costs in a Web-based environment.
- *The lowest VCO for enterprise embedded infrastructure belongs to Progress OpenEdge*. Aberdeen estimates that the Progress VCO over five years is, on average, one-third as expensive as Oracle's VCO. Initial costs were lower for Progress OpenEdge, and ongoing fees and anticipated DBA costs were clearly lower. Progress Enterprise RDBMS's margin of VCO superiority is much greater than in 2000 primarily because Progress' deployment costs are lower in a Web-based environment.
- *Supplier technology continues to offset rising people costs.* Increases in administrator salaries slowed, while new pricing initiatives and new product functionality did not drive license costs significantly higher. Addition of an application server to an embedded database did add new administration costs. On the other hand, interviewees agreed that addition of an application server and Web development tool decreased development costs compared to the costs of a Java development environment without an application server. Moreover, addition of Web infrastructure expanded the range of end-users that the application supported.

- *Robust, reliable technology and cost-effectiveness are two compelling criteria for choosing database technology.*
- *Managing and maintaining the embedded infrastructure is the largest expense of the long-term cost of embedded infrastructure.* However, its importance can vary widely with application type. For example, in some workgroup situations, administrative costs may account for a majority of total VCO.

These findings are likely to continue over the next year. While new versions are likely to supersede today's databases in many customer sites, initial indications are that these new versions will reinforce present trends by driving down administrative costs for all suppliers without changing their present relative ranking.

**Aberdeen's Embedded Infrastructure Model**

Recent Aberdeen research shows that users of packaged or in-house applications are increasingly employing not only an embedded database but also other embedded infrastructure as the "framework" on which the application is built and on which it runs. This embedded infrastructure typically includes the following:

- Database;
- Second-tier Web server;
- Second-tier application server, typically including load balancing and server-side programming capabilities; and
- Database and application-server management tools, sometimes separate, sometimes integrated.

Because the Web server cost is typically negligible, and the management tools are typically included with the database and application server, the Aberdeen model focuses on embedded database and embedded application server costs.

Embedded infrastructure may also contain data-integration, enterprise-portal, Web-services, and similar capabilities. Aberdeen has chosen to omit these in its calculation of VCO as they are not widely prevalent in user implementations surveyed.

Unlike its embedded-database model, Aberdeen's embedded-infrastructure model assumes that a 50-user application runs on two servers and a 100-user application on four servers. In order to compare with previous embedded-database VCO numbers, the embedded-database VCO numbers are averaged over the two/four servers, yielding a per-server VCO.

**Project Scope**

This *White Paper* outlines Aberdeen's qualitative research findings, which are based on interviews with large user organizations that have deployed one or more of the databases and on suppliers' published prices. This updated report includes


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a sampling of previous respondents to the Aberdeen embedded-database survey in order to verify changes in costs over time. The objective of this document is to aid user organizations' initial planning by providing an understanding of the approximate total cost for deploying embedded infrastructure — including a database engine and application server — as part of an application. Aberdeen examines 10- and 25-user configurations for workgroup embedded infrastructure on Windows 2000, and 50- and 100-user configurations for enterprise embedded infrastructure on Unix. The costs cited in this study should be used only as an initial set of guidelines, because actual costs incurred by any user organization may differ based on each implementation's unique characteristics.

Aberdeen's research shows that the VCO for implementing a basic 25-concurrent-user Progress workgroup embedded infrastructure and maintaining it for five years is approximately $71,100 — not including hardware and operating system costs — while the VCO for implementing and maintaining a basic 25-concurrent-user Microsoft embedded infrastructure is approximately $119,730. The VCO for implementing a 100-user Progress enterprise embedded infrastructure and maintaining it for five years is approximately $251,500, whereas the VCO for implementing and maintaining a 100-user Oracle embedded infrastructure is approximately $737,581.

IT (Information Technology) organizations need to be aware of the real costs associated with ownership and deployment of an application — including hidden costs like database maintenance — and weigh those figures against the lifespan of the application and its value to the enterprise. Thus, at any level in the organization, Aberdeen has found that the cost of ownership can be an important factor in both the evaluation process and the purchasing decision. Interviews with users (IT departments and DBAs) continue to confirm that, aside from any specific requirements such as row-level locking, scalability, low cost of ownership, and reliability are the features most often required in embedded infrastructure.

**What Was Included in Each System**

In calculating the VCO of an embedded infrastructure, Aberdeen included the following:

- *Database and application server license*: Four database products are examined in this research update — Progress Software's Progress Workgroup RDBMS V9.1 and Microsoft SQL Server 2000 running on an Intel/Windows 2000-based server platform, and Progress Enterprise RDBMS V9.1 and Oracle's Oracle9i (enterprise edition) running on Unix platforms. Three application server products are examined — Progress AppServer V9.1, Microsoft Application Server, and OracleiAS 9i Release 1. These versions were chosen because meaningful data was available at the time of the research for this study. Figures are presented for 10- and


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25-user implementations for the workgroup servers and 50- and 100-user implementations for the enterprise servers, and Aberdeen has added Internet-access implementations for connecting unlimited clients through the Internet.

- *Development tools*: This includes the cost of a single copy of a selected developer tool kit needed to maintain and modify the application. All development tools chosen supported both the database and the application server.
- *Deployment*: Aberdeen averaged the fees charged by the independent software vendor (ISV) or an independent professional services firm to deploy the embedded infrastructure and application with the likely cost for sophisticated customers to perform deployment. Because application servers allow more rapid, more comprehensive deployment across the Web, the research indicated significant differences in customer-deployment costs between the embedded-infrastructure solutions.
- *DBA and application-server administration costs*: To determine the efforts spent by the internal staff in deploying and maintaining the system, Aberdeen calculated that each implementation required some amount of dedicated time from internal systems professionals, each of which costs $2,000 per week — or $290 to $400 per day — depending on the skill level of the individual. That cost is based on the cost of hiring a database administrator/developer, calculated at an annual salary of $73,000 to $80,000 or approximately $315 per day — no increase from 2000, because of the downturn in demand for database professionals in 2001.
- *Training costs*: This number reflects the cost of training developers how to use, update, and maintain the database and application server. The cost reflects the time spent training developers/administrators how to troubleshoot the application, become familiar with the features and benefits, and generate and interpret reports. One to two weeks of training is generally sufficient, depending on the complexity of the embedded infrastructure. However, users should note that, in some cases, Oracle administrators require an Oracle 12-week training course. Courses were selected from those available from the suppliers or from third-party training organizations.
- *Upgrades*: The supplier charges for an upgraded version of the database and, typically, of the application server. Based on present trends, Aberdeen conservatively estimates three upgrades over five years. Upgrades can be purchased separately or included with maintenance contracts.


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- *Support/license maintenance costs*: This fee is charged by the supplier or ISV — typically based on a percentage of the software license cost — to provide telephone-based and field service support for its application.

**Costs Not Included**

The focus of this research was to determine the *incremental* costs of deploying and maintaining an embedded database as part of an application. As a result, several expenses incurred by an organization have been omitted in our calculations, including the following:

- *Hardware and operating system acquisition and support costs*: Aberdeen estimates that users will spend approximately $10,000 for a typical high-end PC server (averaging dual-processor and quad configurations) with a Windows 2000 or Unix license bundled. If users do not have these servers available, IS buyers should add these costs to the VCO. Because desktop support is almost invariably already part of the budget, it is not included in the cost of ownership, nor is the cost for the client hardware itself.
- *Networking infrastructure*: Most organizations already have local area networks (LANs) in place if they are deploying a database application. As a result, networking equipment and costs such as wiring a building are not included.
- *Integration and server-consolidation cost savings*: Databases used at the enterprise level are not typically shared among applications. Application servers, however, are beginning to be shared between applications, allowing reduction of per-application-copy license, training, and administrative costs. Likewise, new application-server and database functionality allows two "consolidated" servers to do the job of four servers in servicing 100 end-users. Because this integration and server consolidation technology is not yet widely implemented among surveyed users, it is not considered here.
- "*Soft costs*": This figure includes the penalties associated with a database or application server not having a particular feature — thus reducing its effectiveness — and also includes the costs associated with redesigning business processes to take advantage of the database-enabled application. No costs associated with business process reengineering or the purchase of additional products is included in this cost analysis. Soft costs vary considerably based on the type of application being deployed and the environment in which it is deployed and, therefore, are not included in this study.
- *Productivity loss*: This cost is a calculation of lost productivity based on the time spent in training and in getting the developers and administra-


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tors up-to-speed with the software. Productivity loss should be determined on a case-by-case basis, depending on the skills of the administrators or developers and, therefore, is not included in this study.

**Methodology**

To gather the data for this study, Aberdeen used the suppliers' published prices — derived from Web sites or printed material — for their software and professional services rates. Discounts were included only where offered as standard — research shows that in some cases, additional discounts are provided. Aberdeen re-contacted several users to get a real-world validation of costs associated with implementing each of the databases. In addition, telephone interviews were conducted with each supplier's customers to determine, "postmortem," their history of administrative and other database costs. Customers surveyed are solicited from the suppliers and from Aberdeen's own list of users.

It is important to note that the survey does not take into account the different features and functionality of the various applications built around the database engine nor those of the database engine itself. A comparison of these elements is beyond the scope of this research project. Suppliers should be contacted directly for the exact capabilities of their products.

**Comparison-Research Results**

The following tables list updated VCO figures for the four embedded-infrastructure solutions, based on supplier-provided information and Aberdeen research. All calculations are rounded to the nearest dollar. Table 1 outlines the total cost of deployment and five-year lifetime costs for Progress Software's OpenEdge embedded-infrastructure solution and compares its VCO to the VCO of Microsoft's solution. This table also identifies the VCO of these solutions' embedded database, and Table 2 shows the comparable embedded-database VCOs for 2000. Likewise, Table 3 outlines the total cost of deployment and five-year lifetime costs for Progress Software's OpenEdge and Progress Enterprise RDBMS V9.1, comparing its VCO to the VCO of Oracle's embedded-infrastructure solution and Oracle9i RDBMS. Table 4 shows the comparable embedded-database VCOs for 2000.

All costs are listed as a total cost for the five-year period, whether they are actually one-time costs (e.g., database licenses, monitoring tools, and server hardware and systems software) or costs that accumulate over five years (e.g., internal maintenance costs). Note that Aberdeen quotes costs for a typical basic deployment, but deployment costs can be much greater in particular situations.

The following tables and figures outline the costs associated with 10, 25, 50, and 100 users over the five-year span. They assume that one-time costs are accrued upfront, that upgrades are purchased three times over the course of the five-year


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period, and that maintenance costs accrue every year — increasing with the user count. Annual maintenance costs were assumed not to increase over time.

**Table 1: Microsoft and Progress Workgroup RDBMS and Infrastructure Five-Year VCO**

| | 10 Clients | 25 Clients |
|---|---|---|
| **Database License** | | |
| Progress V9.1 | $2,500 | $6,250 |
| Microsoft SQL Server 2000 | $2,249 | $11,099 |
| **Application Server License** | | |
| Progress AppServer V9.1 | $2,100 | $5,250 |
| Microsoft Application Server | $0 | $0 |
| **Development Tools (One Copy)** | | |
| Progress ProVision Plus V9.1 | $4,500 | $4,500 |
| Microsoft Visual Studio Enterprise Edition | $1,619 | $1,619 |
| **Deployment** | | |
| Progress OpenEdge | $8,200 | $11,300 |
| Microsoft — includes $1,000 application server deployment | $9,000 | $11,000 |
| **DBA Cost** | | |
| Progress V9.1 | $13,000 | $18,500 |
| Microsoft SQL Server 2000 | $25,000 | $35,000 |
| **Application Server Administration Cost** | | |
| Progress AppServer V9.1 | $12,000 | $17,500 |
| Microsoft Application Server | $15,000 | $23,000 |
| **Training** | | |
| Progress OpenEdge | $2,000 | $2,000 |
| Microsoft | $5,330 | $5,330 |
| **Three Upgrades over Five Years** | | |
| Progress — included with support | $0 | $0 |
| Microsoft SQL Server 2000 | $8,997 | $16,647 |
| **Support/Maintenance** | | |
| Progress | $2,600 | $5,800 |
| Microsoft SQL Server 2000 — 20 incidents/year | $15,675 | $15,675 |
| **Visible Cost of Database Ownership** | | |
| **Progress V9.1 RDBMS** | **$32,800** | **$48,350** |
| **Microsoft SQL Server 2000** | **$69,870** | **$96,730** |
| **Visible Cost of Infrastructure Ownership** | | |
| **Progress OpenEdge** | **$46,900** | **$71,100** |
| **Microsoft** | **$82,870** | **$119,730** |

**Source: Aberdeen Group, December 2001**


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## Table 2: Microsoft SQL Server 2000 and Progress Workgroup RDBMS V9.1 Five-Year VCO (2000)

| | 10 Clients | 25 Clients | Internet |
|---|---|---|---|
| **Server and Clients Licenses** | | | |
| Progress V9.1 RDBMS | $3,250 | $7,250 | $6,250 |
| Microsoft SQL Server 2000 | $2,249 | $11,099 | $11,099 |
| **Development Tools (One Copy)** | | | |
| Progress Provision Plus V9.1 | $3,980 | $3,980 | $4,400 |
| Microsoft Visual Studio Enterprise Edition | $1,619 | $1,619 | $1,619 |
| **Deployment** | | | |
| Progress V9.1 | $9,120 | $12,540 | $11,400 |
| Microsoft SQL Server 2000 | $8,000 | $11,000 | $10,000 |
| **DBA Cost** | | | |
| Progress V9.1 RDBMS | $14,250 | $20,520 | $14,250 |
| Microsoft SQL Server 2000 | $25,000 | $25,000 | $25,000 |
| **Training** | | | |
| Progress V9.1 RDBMS | $6,384 | $6,384 | $7,980 |
| Microsoft SQL Server 2000 | $5,330 | $5,330 | $5,330 |
| **Three Upgrades over Five Years** | | | |
| Progress V9.1 RDBMS (included with support) | $0 | $0 | $0 |
| Microsoft SQL Server 2000 | $1,498 | $5,549 | $4,999 |
| **Support/License Maintenance** | | | |
| Progress V9.1 RDBMS | $2,600 | $5,800 | $6,000 |
| Microsoft SQL Server 2000 (60 incidents) | $10,170 | $10,170 | $10,170 |
| **Visible Cost of Database Ownership** | | | |
| **Progress V9.1 RDBMS** | **$39,584** | **$56,474** | **$50,280** |
| **Microsoft SQL Server 2000** | **$53,866** | **$69,767** | **$68,217** |

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## Table 3: Oracle9i and Oracle9iAS and Progress Enterprise RDBMS and Infrastructure Five-Year VCO

| | 50 Clients | 100 Clients |
|---|---|---|
| **Database License** | | |
| Progress V9.1 Enterprise RDBMS | $36,500 | $73,000 |
| Oracle9i Enterprise Edition | $80,000 | $160,000 |
| **Application Server License** | | |
| Progress AppServer V9.1 | $10,500 | $21,000 |
| Oracle9iAS Release 1 | $40,000 | $80,000 |
| **Development Tools (one copy on Microsoft Windows)** | | |
| Progress ProVision Plus V9.1 | $4,500 | $4,500 |
| Oracle JDeveloper (included in Oracle9iAS) | $0 | $0 |
| **Deployment** | | |
| Progress OpenEdge | $16,000 | $21,000 |
| Oracle (includes $4,000 for application server deployment) | $28,000 | $33,000 |
| **DBA Cost** | | |
| Progress V9.1 Enterprise RDBMS | $18,500 | $18,500 |
| Oracle9i Enterprise Edition | $135,000 | $140,000 |
| **Application Server Administration Cost** | | |
| Progress AppServer V9.1 | $17,500 | $17,500 |
| Oracle9iAS Release 1 | $50,000 | $50,000 |
| **Training** | | |
| Progress | $2,000 | $2,000 |
| Oracle | $10,581 | $10,581 |
| **Three Upgrades over Five Years** | | |
| Progress (included with support) | $0 | $0 |
| Oracle | $90,000 | $180,000 |
| **Support/Maintenance** | | |
| Progress | $37,000 | $94,000 |
| Oracle | $42,000 | $84,000 |
| **Visible Cost of Database Ownership** | | |
| **Progress V9.1 Enterprise RDBMS** | **$114,500** | **$213,000** |
| **Oracle9i Enterprise Edition** | **$381,581** | **$603,581** |
| **Visible Cost of Infrastructure Ownership** | | |
| **Progress OpenEdge** | **$142,500** | **$251,500** |
| **Oracle** | **$475,581** | **$737,581** |

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**Table 4: Oracle8i and Progress V9.1 Enterprise Editions, Five-Year VCO (2000)**

| | 50 Clients | 100 Clients | Internet |
|---|---|---|---|
| **Server and Clients Licenses** | | | |
| Progress V9.1 Enterprise RDBMS | $36,750 | $72,000 | $8,900 |
| Oracle8i Enterprise Edition | $63,333 | $126,666 | $7,410 |
| **Development Tools (one copy)** | | | |
| Progress V9.1 Enterprise RDBMS | $3,980 | $3,980 | $4,400 |
| Oracle8i Enterprise Edition | $4,995 | $4,995 | $4,995 |
| **Deployment** | | | |
| Progress V9.1 Enterprise RDBMS | $62,843 | $123,120 | $15,129 |
| Oracle8i Enterprise Edition | $94,999 | $189,999 | $13,328 |
| **DBA Cost** | | | |
| Progress V9.1 Enterprise RDBMS | $14,250 | $20,520 | $14,250 |
| Oracle8i Enterprise Edition | $155,000 | $160,000 | $150,000 |
| **Training** | | | |
| Progress V9.1 Enterprise RDBMS | $6,384 | $6,834 | $11,400 |
| Oracle8i Enterprise Edition | $10,581 | $10,581 | $11,115 |
| **Three Upgrades over Five Years** | | | |
| Progress V9.1 RDBMS (included with support) | $0 | $0 | $0 |
| Oracle8i (included with support) | $0 | $0 | $0 |
| **Support/License Maintenance** | | | |
| Progress V9.1 Enterprise RDBMS | $29,400 | $57,600 | $8,120 |
| Oracle8i Enterprise Edition (Silver) | $33,696 | $61,776 | $80,496 |
| **Visible Cost of Database Ownership** | | | |
| **Progress V9.1 Enterprise RDBMS** | **$153,607** | **$284,054** | **$62,199** |
| **Oracle8i Enterprise Edition** | **$362,604** | **$554,017** | **$267,344** |

**Source: Aberdeen Group, January 2001**

### Additional Aberdeen Key Research Findings

Buyers of embedded infrastructure should note the following additional conclusions from Aberdeen's ongoing research into the embedded infrastructure market:

- Because administrative costs are a major component of overall VCO, and embedded databases and application servers vary widely in administrative costs, performing a realistic analysis of likely administrator costs before purchasing any software or hardware can make a huge difference in lifecycle costs.


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- Buyers should consider performance/scalability, application downtime stemming from the database or robustness due to the application server, ability to integrate application servers and administration across applications and databases, and rapid-development support. In each case, Progress OpenEdge has significant strengths.
- Buyers should also consider the possibility of using an ASP (application service provider) to maintain the application using the embedded database. Aberdeen qualitative research shows that an ASP can achieve significant cost savings, especially in administrative costs, for any of the embedded infrastructures examined in this *White Paper*. These cost savings would not significantly change the differences in VCO between the infrastructures.
- Embedded-database VCO continues to decrease, often due to greater supplier and user effectiveness in automating key administrative functions. However, it remains true that tuning a database for optimal functioning is often well worth the added cost.
- Buyers should also note that low database administrative costs allow IT professionals to focus on higher ROI (return on investment) projects and also allow businesses with little or no IT resources to implement and support key applications.

Aberdeen recommends that buyers of workgroup and enterprise embedded infrastructure consider VCO, real-world TCO experience, and Aberdeen's overall buying criteria in selecting a supplier. Buyers should also consider the supplier's focus on embedded infrastructure users' needs in both the application server and database areas and support for the ASP model. In all of these areas, Progress Software's OpenEdge infrastructure solution has strong pluses that are worth a closer look.

**Projected Effects of Recent Announcements and Future Releases**

Upcoming announcements are unlikely to significantly alter Aberdeen's ranking of embedded-infrastructure VCOs. While the full effect of Oracle9i's improvements has yet to be felt by its installed base, users continue to report the need to devote greater administrator resources to the database. Oracle9iAS Releases 1 and 2 are likely to have a greater impact on Oracle infrastructure costs than database improvements, but even if Oracle drove application-server costs to zero, Oracle would still have a greater VCO than Progress or Microsoft. Microsoft's .NET initiative, the major potential Microsoft effect on VCO, will not be implemented by users for at least the next six to nine months.


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# Appendix

**Changes in Methodology**

Over the past four years, Aberdeen has performed extensive research on estimating cost of ownership. Our key findings relating to databases include the following:

- Estimates of cost of ownership done before implementation can miss the mark by a wide margin. Users report that actual costs can vary widely from even the most fine-grained estimates based on license fees and user-supplied estimates of "typical development and maintenance costs." The two likeliest reasons include cutting a deal with the supplier that reduces acquisition costs and misestimating administrative or maintenance costs.
- Cost of ownership can vary widely, from the average, depending on the type of environment. Typical reasons for this variation among databases are embedded versus custom use and workgroup versus enterprise environments.
- Increasingly, other factors such as quantifiable and intangible benefits, risks, and "negative benefits" — e.g., avoidance of loss of customers — should be taken into account in the buying decision. For example, in some Internet situations, the user's main cost is not running the database but advertising on portals. Moreover, the user's top buying criterion may be not cost but speed-to-upgrade, so that the user's Web site or portal can stay ahead of competitors seeking to steal customers.
- Costs without context are not as useful to users. In other words, if an IS buyer cannot compare the *average* situation on which the cost-of-ownership estimate is based to the user's own situation, a TCO study is less useful than a case study.

Therefore, Aberdeen continues to update its cost-of-ownership methodology to provide more benefit to users and to avoid tarring suppliers unfairly with a "bad in all situations" brush. Over the last two years, Aberdeen has made the following changes:

- In most cases, license fees are now based on published prices available via the Web or in supplier publications. Aberdeen finds that suppliers are moving away from street prices and negotiated discounts toward a common pricing scheme available over the Web. Administrative cost estimates are based on both qualitative user "ex post" research and Aberdeen's estimates of how new releases will vary from historical precedent. Users should take special care to note the differences between their administrative situations and those in case studies.


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- In most cases, Aberdeen's estimates now focus on a particular type of environment — embedded/workgroup, for example, or custom/enterprise. Estimates for this type of environment should not be taken to apply to other, quite different environments.
- Aberdeen now tries to note additional factors — potential benefits and/or criteria — that it believes the user should consider in the buying decision.
- Where possible, Aberdeen now describes a case study in the research so that the IS buyer can compare the case study concretely to the user's own situation, and so that Aberdeen can compare users' past actual TCO to Aberdeen's projected cost of ownership.

Aberdeen calls its cost-of-ownership estimate "visible cost of ownership" (VCO). VCO aims to give IS buyers a way of estimating the cost of ownership that the user might reasonably expect before the sales process starts. The IS buyer can then modify this estimate according to the deals that suppliers offer as well as the user's own experience of using and administering these environments.

This study extends Aberdeen's VCO assessments from hardware and databases to "embedded infrastructure." The key difference in methodology is that its surveys of infrastructure solutions now assume multiple copies of an application on multiple servers running multiple copies of the infrastructure. Initial research indicates that the IS buyer should supplement this VCO estimate with an assessment of the cost savings involved in sharing the application server among multiple applications, and in running an application on fewer servers.

**Additional Caveats and Considerations**

This *White Paper* focuses on embedded infrastructure, which includes both workgroup and enterprise situations where the main purpose of the infrastructure is to support an application. Thus, ISV-supplied embedded infrastructure is included in this area. Based on past research, Aberdeen suggests that this area of focus is both narrow enough to ensure that variations in costs are not too wide and general enough to provide useful information for a broad range of IS buyers.

Note also that the embedded-database area includes some, but not all, of the "Low-IT User" area investigated in previous Aberdeen VCO research. Therefore, readers should not try to apply conclusions from one study to the other.

Readers should also note the following assumptions:

- Server hardware and operating system costs are identical across suppliers and at all levels of clients. It should be noted that interviewees indicate significant differences in hardware required for their applications — in particular, that Progress requires less hardware power than Oracle for a comparable application. However, these effects


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vary widely with the type of application, and do not affect the overall VCO rankings in this study.

Development tools assumed were Progress Provision Plus for Progress Internet development, Microsoft Visual Studio Enterprise Edition for Microsoft Internet development, and Oracle JDeveloper for Oracle Internet development.

**To provide us with your feedback on this research, please go to www.aberdeen.com/feedback.**

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