Data-Driven Workgroup Tools:

Enabling Rapid Application Development for Higher ROI

White Paper

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Executive Summary

This study examines the increasing need for Information Technology (IT) departments to:

- Create software more rapidly and cost-effectively;
- Maintain the resulting applications with lower total cost of ownership (TCO), and;
- Upgrade the applications more quickly to respond to customer demands and changing business environments.

Infostructure Associates assesses the ability of FileMaker® database software to meet these IT requirements. FileMaker Pro is an encapsulated design and development environment that allows for low cost and rapid development and deployment of applications. As a result, FileMaker Pro is not only ideal for departmental/workgroups requirements, but also can act as a complement to enterprise platforms such as Oracle and Microsoft SQL Server.

Our research indicates that FileMaker yields a reduction in time-to-delivery of 25% or more compared to common alternative databases/development tools. In a three-year TCO analysis, FileMaker yields an average reduction of 50%, compared to these alternative tools. This study includes:

- Key database platform criteria for IT professionals
- An in-depth TCO analysis
- Case studies of user experiences in business

The Challenge for IT Professionals

Productivity Pressures

Today's IT professional continues to face pressure to improve productivity. Rapidly developing an application results not only in cost savings but also in an increased competitive advantage. Database programming often accounts for 35-40% of an application's development and deployment lifecycle (See Table 1) and is the largest category of costs in many of today's TCO analyses. A good database that is well-integrated, with a powerful development tool can help shrink development time while cutting database administration costs.

Supporting Department Needs

Subject matter experts can be the primary beneficiaries of these productivity-enhancing applications. They typically operate in smaller groups for greater speed, at the workgroup, department, or local-office level. These experts require tools that allow them to "spiral" in on a final solution, with rapid, incremental improvements to user-friendly, powerful applications. What they produce may be tactical, as opposed to the equally necessary enterprise applications that are supported by platforms such as IBM WebSphere Studio and Oracle; but their cumulative effect can be strategic.

Misuse of Enterprise Application Tools

While organizations often have a well-planned strategy for long-term IT projects, in many cases the application needs of subject matter experts and their workgroups go overlooked. In other cases, enterprise tools are used to develop workgroup solutions. However, many of these tools

are ill suited to reducing development time and costs. In particular, using an enterprise database (a typical choice in development projects) can cost 10 times greater than if an appropriate workgroup tool were used (based on a three-year TCO) and can take 70% longer to deploy. Additionally, due to costs and development timeframes, using an enterprise database can prevent a business-critical application from being implemented altogether.

Companies often try to save costs by standardizing on one database platform, reasoning that supporting multiple databases increases costs. In reality, Infostructure Associates research shows that supporting only a single enterprise database platform for projects of all sizes and needs is costly and requires ongoing administrative and development efforts.

Therefore it is imperative for organizations to have an ongoing strategy to support tactical, non-production projects in addition to their existing long-term IT project strategy. By having a strategy in place, the IT department will be less likely to use a reactive approach when addressing the workgroup's needs. In addition, instead of using tools meant for enterprise applications, a more appropriate tool can be employed that can rapidly develop a solution and leverage and integrate with existing enterprise systems.

Choices of Strategy to Meet the Challenge

Technology staff typically choose one of these platforms to support solution development:

1. An enterprise (high-end, large, transactional) platform including an enterprise database, in addition to a Java or Visual Studio development toolset and extensive infrastructure software.
2. A basic (low-end, data-access/storage) data management tool plus a basic development tool.
3. A workgroup (midrange) data-driven tool such as FileMaker Pro.

Enterprise Platforms

An enterprise platform is especially appropriate in high-transaction rate environments involving complex analytics, such as business intelligence systems using a data warehouse. A workgroup data-driven tool is suitable where high production environments are not involved, but some scalability is required, or when IT resources are limited. Compared to these enterprise platforms, FileMaker offers an exceptionally developer- and user-friendly data-modeling environment and programming interface, as well as advanced security access controls – all encapsulated in one environment. Our studies also show that FileMaker database solutions require far less administrative effort and expertise.

Basic Data Management Tools

A basic tool is best for cases in which a small software project will not be required to scale or be needed over the long term. In particular, FileMaker Pro is often compared to a basic tool such as Microsoft Access, or an enterprise database such as Oracle. FileMaker has long been effective at improving the productivity and capabilities of Microsoft Access users. Its user interface features allow the ex-Access user to more easily build database solutions without requiring advanced

programming knowledge. It is clearly more scalable than Access. FileMaker Pro allows for five concurrent users and when FileMaker Server is employed, it can accommodate up to 250 concurrent users. Users will see a decline in performance after 20 concurrent connections to an Access database. Access does not have a server product similar to FileMaker.

Spiral vs. Waterfall Development Methodologies

The workgroup advantage is even more marked when users apply newer rapid development methodologies such as "spiral" development. In the past, "waterfall" development methodologies involved splitting the development process into stages (e.g., design, code, test) that developers performed in sequence, much as a waterfall pours from rock to rock. As a result, development typically marched rigidly from stage to stage, with little ability to add features during what could be a years-long process. The spiral development methodology "spirals in towards" a production-ready application — that is, it emphasizes an iterative approach. This rapid methodology allows for "staging ahead" by creating production-ready prototypes of various parts of the solution, and "staging back" to incorporate changes in the application's specification. Workgroup data-driven tools, such as FileMaker, support the spiral methodology by speeding database solution design while allowing developers to specify a set of information and immediately have end users begin accessing the data and evaluating the way the information is presented (see Table 1). This gives developers actionable feedback that can be quickly implemented in the solution.

Data-Driven Tool Requirements to Meet the IT Challenge

Over the past twenty years, the SMB (small-to-medium-sized business) and large enterprise workgroup/department markets have encouraged database and infrastructure software vendors to produce products that are especially suited to meet the IT challenge. These markets have added to the following platform criteria — scalability, open flexibility, robustness, and programmer productivity — their own unique needs:

- Database and application *performance* and *scalability* in common workgroup tasks (e.g., collaboration).
- *Security*. This includes the ability to integrate with IT standards such as Active Directory or Open Directory and control database access on a granular level.
- Administrative and end-user *ease of use*, with *minimal downtime*. This not only includes "near-lights-out" administration (requiring little if any administrative resources) but also the ability for non-technical knowledge workers to deliver, modify or use the database solution.
- *Flexibility*. This includes ease of upgrade of the development platform and connectivity to a wide range of data sources (especially enterprise databases).
- Support for *rapid development* of applications using a database development tool.

Typically, the data-driven tools that meet these requirements include at least a database and well-integrated development tool. As a result, data-driven tools are increasingly adept at cutting costs and speeding time-to-delivery in larger-scale projects, as well. A significant part of this trend involves enterprises answering business critical application needs that are not shared by the overall business, but which affect productivity throughout the organization. These applications are required to scale to large enterprise size, and integrate with existing legacy systems.

Analysis of FileMaker Technology

This study assesses FileMaker software — an application development environment that can deliver significant cost-cutting and time-to-market benefits in many situations. The latest release of the FileMaker product line includes FileMaker Pro 8.5 (for database application development and deployment), FileMaker Pro 8.5 Advanced (for building more customized databases), FileMaker Server 8 (for high-performance server architectures), FileMaker Server 8 Advanced (for web publishing and connectivity options), and FileMaker Mobile 8 (for handheld access).

An important characteristic of FileMaker technology is its ability to scale both down (to the desktop, laptop, and handheld) and up very large cross-functional workgroups. Thus, FileMaker does well at meeting the SMB and enterprise workgroup criteria cited above:

Performance and Scalability

FileMaker Pro's process/project management and real-time data-sharing capabilities makes it an ideal tool for workgroup collaboration. It easily scales to 250 concurrent users with FileMaker Server. Database templates are included in the product and support quick deployment of customized information management solutions. FileMaker Pro's highly customizable database design allows decision-making to be made by the individual worker and workgroup because of the ease with which they can receive and analyze key data, even as requirements change. In addition, it allows for feeding data across the organization more easily, because it is in a format accessible across workgroups and corporate databases.

As mentioned previously, FileMaker solutions scale better and offer more powerful and flexible database-design features than the usual workgroup alternatives such as Microsoft Access or Excel.

Security

The security in FileMaker software is built to be easily understood by the average user, while also being robust enough to integrate with IT standards such as Active Directory or Open Directory. Users are able to integrate FileMaker into a highly structured environment without circumventing the IT professional's role. Configuring security can be as straightforward as selecting a quick-pick option or as granular as selecting specific fields and records accessible to an individual user. The IT department can also lock down parts of a database that should not be modified, while allowing users to create new reports and modify non-critical portions of the solution.

Data is secured in FileMaker solutions through several methods. Accounts are internally stored and passwords are stored as a salted one-way hash so they cannot be retrieved. Temporary files created on the client machine are encrypted, and FileMaker Server provides an optional 128-bit SSL encryption for all data passing over the network to the clients. Thus, when IT provides a properly configured FileMaker Server, clients should no longer need physical access to the database files.

Ease of Use and Minimal Downtime
Administrators can deploy FileMaker Server in minutes, with plug-and-play client desktop connectivity, and automate administrative tasks such as scheduled live backups. IT professionals indicate that properly configured, FileMaker Server demonstrates very high reliability and therefore requires minimal administration. Additionally, if given appropriate permissions by the IT department, FileMaker solutions can be administered part-time, by non-technical business personnel – further reducing the burden on IT personnel.

Flexibility
Support for industry standards for data interchange—such as ODBC, JDBC and XML—give FileMaker solutions the flexibility to integrate well with existing workgroup and enterprise systems (e.g., Microsoft Excel, IBM WebSphere Studio, Microsoft SQL Server and Oracle). FileMaker solutions can export and import data from all known enterprise systems.

Rapid Application Development
FileMaker Pro's customizable user interface supports the rapid development of solutions. It is ideally suited for today's fast-paced business environments, where IT administrators are often asked to quickly add new functionality to applications. For example, FileMaker Pro's support for database design is done by a point and click scripting language. Many basic and intermediate solutions can be built with no advanced programming knowledge. As a result, FileMaker Pro is very effective in cases where organizations need a functional prototype in a short period of time. This approach, plus FileMaker Pro's transactional programming support and Visual Programming Environment, can yield up to a 50% improvement in speed-to-market, as shown in Table 1 (page 8).

Additional FileMaker Features for IT
Other FileMaker software features of interest to IT professionals include:

- *Web support* — Using the Instant Web Publishing feature, parts of a database solution can be published to the web with multimedia graphics and video. With the support of XML and XSLT in FileMaker Server Advanced, developers can create custom data-driven web applications. FileMaker also supports development in PHP and .NET.

- *Cross-platform support* — FileMaker supports both Windows and Mac OS. Developers can create solutions in Windows and deploy them on a Mac without any modification. FileMaker is also a Universal Application and runs up to 91% faster on Intel-based Macs. FileMaker Mobile supports PalmOS and Pocket PC handhelds.

- *Microsoft compatibility* — FileMaker offers strong support for applications based on Microsoft Office. Users can drag and drop Excel files directly into FileMaker Pro to create searchable databases that can be easily shared and centrally backed-up. Data can also be saved as an Excel file in one click.

- *Certified consultants* – FileMaker offers a large, worldwide development and training community to help the IT professional build solutions as well as complete advanced products with complex requirements.

Table 1: The Programmer-Productivity Effects of Today's Techniques

Below is a chart outlining the percentage of time dedicated to the stages of application development and deployment using the traditional generic development lifecycle. The "generic" lifecycle is an old-style waterfall development of a medium-scale project (ten developers) in which 25% of the elapsed time is spent on design, 45% on development, 20% on testing, and 10% on deployment. The figures for other techniques (a combination of both technologies and methodologies) reflect the percentages of the total generic development lifecycle. For example, object-oriented programming that took 30% design, 30% coding, 20% testing, and 10% deployment would take 90% of the time of a generic methodology, or 10% less total time. FileMaker Pro supports both the Visual Programming Environment and the spiral development methodology.

Technique	Design	Coding	Testing	Deployment	Likely Max. Time Saved
Generic development lifecycle	25%	45%	20%	10%	(n.a)
Object-oriented programming	30-35%	25-35%	20%	10%	10%-20%
Higher-level coding - transactional (4GL)	10%-20%	10%-30%	10%-15%	10%	40%-60%
- Visual Programming Environment (VPE)	**10%-20%**	**20%-40%**	**15%**	**10%**	**30%-50%**
- Standards-based	20%-25%	35%-40%	15%-20%	10%	10%-20%
Reusability	20%-25%	35%-45%	15%-20%	10%	5%-15%
Open-source programming	25%	25%-35%	10%-20%	10%	20%-30%
Agile/extreme/spiral programming	**10%-30%**	**25%-35%**	**10%-25%**	**10%**	**10%-30%**

Source: Infostructure Associates

TCO Study

Infostructure Associates found that FileMaker demonstrates a clear advantage in TCO and ROI over Microsoft, Oracle, and MySQL platforms in a wide variety of situations. Research suggests that this advantage yields a reduction in three-year TCO of approximately 65%, on average. In fact, an Oracle solution can cost up to five times as much as a FileMaker deployment. Other advantages of the FileMaker platform include:

Low Administration Advantage

The advantage in using FileMaker solutions is especially marked in larger-scale and mass-deployment architectures. In these architectures, administrative costs dominate over time, and FileMaker Pro's ability to deliver more robust solutions with lower administrative resources makes it especially attractive.

Speed-to-Market Advantage

Our research shows that speed-to-market is now leading the list of key advantages of a variety of new technologies—ahead of cost savings—for the first time in at least a decade. Users testify that a data-driven tool that can support rapid development and modification in data-intensive applications is the major determinant of speed-to-market.

Proprietary Solution Development Advantage

We are seeing a fundamental shift in effective strategies for achieving competitive advantage via IT. Previously, in-house-developed or outsourced packaged applications would be sufficient for creating a competitive advantage, and consequently would be easy for competitors to duplicate. New strategies and standards now enable organizations to generate revenue from proprietary data. To take advantage of this opportunity, solutions need to be created rapidly. FileMaker tools allow for this type of development – and at a fraction of the cost compared to enterprise systems. The competitive advantage gained by putting together previously unexamined proprietary-information relationships is also long-term, because competitors cannot easily duplicate this information.

TCO Results

Infostructure Associates' research findings are based on interviews with SMBs and departments/divisions using "embedded infrastructure" (i.e., platforms with databases) to create new applications, as well as independent software vendors (ISVs) servicing the SMB market; extensive research into the programmer-productivity characteristics of various types of development tools; and case studies of recent users of both a 3GL and a higher-level development platform. The aim of the study is to provide an understanding of the costs and benefits of higher-level development toolsets and better frameworks. Actual costs incurred by any organization may vary; hence, costs cited in this study should be used only as guidelines. Further details of the methodology of the Infostructure Associates TCO/ROI study are available at http://www.filemaker.com/tco_method.

Table 2 shows estimated three-year TCO for the Oracle and MySQL Java development platforms, the Microsoft C# development platform, and the FileMaker development platform, in the 25-, 50-, and 20x50-user (20 servers, each supporting 50 clients for a total of 1,000 clients) cases.

Table 2: Microsoft, Oracle, MySQL, and FileMaker 3-Year TCO

	25 Clients	50 Clients	1000 Clients
Database License Acquisition Costs			
FileMaker Development Solution (includes 10 FMPA copies)	$7,875	$13,550	$201,380
Microsoft SQL Server 2005 Enterprise Edition	$13,969	$28,506	$570,120
Oracle Database Standard Edition 10g	$15,000	$30,000	$600,000
MySQL	$0	$0	$0
Development Environment (ten copies)			
FileMaker Development Solution (included above)	$0	$0	$0
Microsoft Visual Studio .NET 2003 Professional Edition	$7,990	$7,990	$7,990
Oracle Internet Developer Suite (Java)	$50,000	$50,000	$50,000
MySQL (used with IBM WebSphere Studio App. Dev.)	$80,000	$80,000	$80,000
Development Cost (10 Programmers)			
FileMaker Development Solution	$400,000	$400,000	$400,000
Microsoft Visual Studio .NET 2003 Professional Edition	$900,000	$900,000	$900,000
Oracle Internet Developer Suite (Java)	$1,035,000	$1,035,000	$1,035,000
MySQL (Java)	$1,035,000	$1,035,000	$1,035,000
Two Application Upgrades (new releases)			
FileMaker Development Solution	$80,000	$80,000	$80,000
Microsoft Visual Studio .NET 2003 Enterprise Architect	$180,000	$180,000	$180,000
Oracle Internet Developer Suite (Java)	$207,000	$207,000	$207,000
MySQL	$207,000	$207,000	$207,000
Deployment Cost			
FileMaker Development Solution	$6,300	$11,000	$16,000
Microsoft	$5,500	$11,000	$16,500
Oracle	$43,499	$94,999	$189,998
MySQL	$15,000	$20,000	$25,000
DBA Cost			
FileMaker Development Solution	$6,000	$10,000	$23,000
Microsoft SQL Server 2000	$17,000	$33,000	$240,000
Oracle Database Standard Edition 10g	$150,000	$150,000	$3,000,000
MySQL	$20,000	$40,000	$500,000

	25 Clients	50 Clients	1000 Clients
Development Toolset Training			
FileMaker Development Solution	$10,000	$10,000	$10,000
Microsoft Visual Studio .NET 2003 Professional Edition	$64,000	$64,000	$64,000
Oracle Internet Developer Suite (Java)	$32,000	$32,000	$32,000
IBM WebSphere Studio Application Developer	$32,000	$32,000	$32,000
Two Platform Upgrades over Three Years			
FileMaker Development Solution	$4,435	$13,100	$124,000
Microsoft	$5,549	$5,549	$5,549
Oracle	$1,500	$3,000	$30,000
MySQL	$0	$0	$0
Support/Maintenance			
FileMaker Development Solution	$3,600	$6,600	$26,400
Microsoft	$6,000	$12,000	$48,000
Oracle	$700	$1,400	$5,600
MySQL Network Silver	$5,985	$11,970	$47,880
Total Cost of Development Platform Ownership			
FileMaker Development Solution	**$518,210**	**$544,250**	**$880,780**
Microsoft	**$1,200,008**	**$1,242,045**	**$2,032,159**
Oracle	**$1,534,699**	**$1,603,399**	**$5,149,598**
MySQL	**$1,394,885**	**$1,421,980**	**$1,926,840**

Source: Infostructure Associates. December 2005.

Case Studies

The following sections describe the results users have experience with the FileMaker development platform.

Case Study: Police Department in Mid-West Metropolitan City

Situation

This case study describes a FileMaker Pro implementation for a city police department. The solution provides an extensive array of canned police reporting and querying capabilities, including activity logs, parking ticket records, profiling reports, warrants, complaints, as well as crime analysis and prevention features and control of targets at a firing range.

The solution, presently on FileMaker Pro 7 and being upgraded to 8, runs on a Mac/Windows network with 3 servers, and supports 500 users by handling 120,000 police reports. The department chose FileMaker after trying and rejecting in-house and third-party-developed Oracle-based solutions created by 5 Oracle programmers at a cost of approximately $2.4 million that "never gave the same answer twice." The solution has been created mostly by one subject matter expert untrained in classical IT development, while performing his other responsibilities.

Benefits
The business benefits of the solution have been extraordinary. The department estimates that 12 data-entry personnel have been eliminated, because police can now enter their own reports rapidly and easily. The satisfaction of the public has increased, because rapid transmission of suspect information allows patrolling police to avoid halting innocent people. At the same time, apprehension of suspects has increased dramatically, since the solution can send pictures of suspects to squad cars in real time. The department has found a 35% increase in police productivity from the solution, which "saves a patrol sergeant per year" ($125,000 per year). The department anticipates that FileMaker Pro 8's support for "auto-complete" will improve productivity further by reducing repetitive typing. Overall benefits are estimated at $10 million per year.

Administration of the entire solution takes 2-3 hours per week, and can be performed remotely. Training for FileMaker development involves supervision and guidance for only one week. Service and support is needed approximately once a year, because the department answers most questions by accessing and independent online FileMaker community. FileMaker Pro also allows the department to create changes to the solution rapidly, deploy them in 24 hours, and upgrade to the latest version in four days. Flexibility and scalability were also cited as attributes of FileMaker that greatly benefited the department.

The police department summed up their impressions by saying "FileMaker is a tool that allow you to change your business landscape."

Case Study: Schawk, Inc.

International provider of digital imaging prepress solutions

Situation
This case study describes the experiences of Schawk, Inc., a leading global digital imaging and brand consulting firm focusing on design and pre-press for packaging. The application—SchawkLink—supported by FileMaker Pro is a job management system that captures scheduling of orders and time sheets, measures operating costs, handles shipping charges – in effect, a "mini-ERP system." The application handles approximately 2,000 end users out of 4,500 in the company – the remaining users will to be added to the system over the next few years. There are approximately 25 application installations at the business' 40+ sites, running FileMaker on Windows 2003 servers in an 80% Macintosh and 20% Windows client environment. Citrix is used to access the system remotely.

The application was first created in 2001, after a multi-million-dollar effort to create an industry solution using a consulting firm failed. By contrast, using FileMaker software, Schawk took 4 months and $100,000 to build a prototype, then a year to roll out the application, using 3-5 programmers at a cost of $400,000. Since then, the application has had 2-3 upgrade releases per year, involving internal non-technical developers and one outside consultant, for a cost that the company estimates at $200,000 per year.

Administration involves automated backup twice a day at each business site, with corporate personnel monitoring it centrally – resulting in very low administrative costs. Three part-time people (the equivalent of 1½ full-time people) act as support, mostly answering questions on the application's functionality. The developers are self-taught and attend ongoing training, including the FileMaker Developer Conference. The training budget for the department is $5,000 per year.

Benefits

A key business benefit of using FileMaker Pro to create the application was to aid unification of business sites, including those involved in the major merger that occurred recently, by creating a "standard language" and a common process flow across the merged entities. In point of fact, "the process in which we employed FileMaker facilitated unification better than anything else that we currently had in place." Moreover, the application improved collaboration between personnel during the design and pre-press processes – and "collaboration is a big part of our business." By eliminating the need for paper-based time sheets, the application has saved the company $200,000-$300,000 per year, and the resulting information is more accurate.

Before FileMaker Pro there was no company-wide purchasing system. As a result, Schawk is able track and control spending and, even more importantly, maintain data that helps them in their Sarbanes-Oxley (SOX) compliance efforts.

A key reason for the usefulness of FileMaker Pro is that "developers can prototype and create a solution much faster than in other technologies." FileMaker, by letting developers and end users jointly prototype screens for a new feature immediately, eliminates multiple layers of process between the developer and the end user seeking the feature.

FileMaker Pro is highly flexible – using FileMaker plug-ins, it can interface with the company's data warehouse. Moreover, "we are impressed that we have been able to take it as far as we have, because FileMaker is deep and rich." Developers often find that by drilling down into its details, they will find the functionality they need for a complex implementation. The company notes that "if you've got a problem to solve, don't know how to do it initially, and have creative people, FileMaker is the tool to do it, with the best user interface for the job."

Overall, Schawk summarized their impressions, "We are very happy with FileMaker technology and the success we've had with it – we have even brought the CIO over to understanding its value to enterprise IT."

Conclusions

A critical success factor for today's proactive strategists is the ability to leverage subject matter experts, who can utilize corporate information more effectively to satisfy customers or redesign business processes for higher margins. FileMaker Pro has shown itself very effective at offering a user-friendly tool that allows developers to rapidly and incrementally improve their solutions. Used standalone or as a complement to enterprise platforms, FileMaker solutions continue to meet the core data requirements of the workgroup including: performance and scalability, security, flexibility, ease-of-use with minimal downtime, and rapid application development.

As a result, our case studies show that not only does the use of FileMaker tools have a greater positive impact than before (compared to other solutions), but also it is being used in a much wider range of key business applications. Our data and user interviews prove the point: FileMaker yields greater productivity while lowering costs, with an average of half the TCO of typical development platforms and at least a 25% improvement in speed-to-market.

A Selection of FileMaker Customers

- Adobe
- Banc One
- E! Entertainment
- Harvard University Press
- Industrial Light & Magic
- Novell
- Whirlpool
- Standard & Poors
- The Sherwin-Williams Co.
- United Airlines
- USA Today

About Infostructure Associates

Infostructure Associates aims to provide thought leadership and sound advice to both vendors and users of information technology. This document is the result of sponsored research performed by Infostructure Associates. Infostructure Associates believes that its findings are objective and represent the best analysis available at the time of publication.

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Appendix

Model for Costs –There is no allocation in the TCO model for costs associated with failure or outage (including planned or unplanned), security, disaster preparedness and recovery, hardware, floorspace/server room space, electricity, testing infrastructure and expenses, or QA testing. These are highly variable between scenarios; therefore organizations generally prefer to calculate these costs on their own.

Database License Costs – Included in the 25, 50 and 1,000 client scenarios for the FileMaker Developer Solution are 10 licenses of FileMaker Pro Advanced. In the 1,000-client scenario, 20 licenses of FileMaker Server Advanced were factored into the database license acquisition costs.

For the 50-client Oracle development scenario, the 2-processor unit of Oracle Database Standard Edition 10g was used, and for 50x20 it is 50 2-processor units. In previous studies, Oracle was found to be processor-heavy, and therefore organizations would opt for the 2-processor version of Standard Edition. Because the mass-deployment model requires multiple copies of the database, Enterprise Edition is not used in this study.

Development Costs –The assumption is that each scenario uses the same number of programmers to implement an application; what differs is the time to completion of development. The cost is based on the estimated time to complete a project and not necessarily an annual developer salary.

Deployment Costs are calculated by multiplying the number of weeks for a deployment (based on interviews with IT professionals) times the salary of an administrator times the number of deployments/upgrades in the TCO time period.

DBA Costs – Interviews have consistently shown that users employ one administrator for every four copies of Oracle. This equates to 13 administrators times 3 years at an administrator's salary per year. MySQL, according to interviews, does not provide the administrative features of other comparable databases and would require 2-3 administrators.