



## Case Study

### Baldor's System z "1%" Solution

#### Introduction

What percentage of your company's overall sales does it cost to run your information technology (IT) organization? Is it fifteen percent? Is it ten percent? Is it three percent?

Well, how would you like to get that number down to one percent (or less)? If lowering IT costs is one of your company's goals in this down economy, perhaps you should consider following the path of Fort Smith, Arkansas-based Baldor Electric.

***By standardizing on SAP on Linux on an IBM System z10 mainframe, and by migrating other applications to Linux on the mainframe, Baldor has driven down its IT costs as a percentage of the company's sales to ONE PERCENT! And, as it moves more applications from several large Sun servers to its z10, Baldor expects to even further lower its IT costs ...***

Baldor has proven that by standardizing its run-the-business applications on SAP — and by deploying those applications on IBM System z mainframes, it can:

- Significantly lower its systems management and maintenance costs;
- Significantly lower its power/cooling costs;
- Actually reduce complexity of their datacenter environment;
- Greatly improve systems availability/reliability/security; and,
- Greatly reduce the amount of floor space in its data center.

In this *Case Study*, *Clabby Analytics* (that's me) describes Baldor's business model, and examines how Baldor has aligned its information technologies to support that model. There are many lessons that CEOs/CIOs/CFOs and IT executives can learn from this case study — the most important of which is that *moving to a consolidated, virtualized, scale-up architecture can help significantly lower IT operational costs*. By driving down IT operational costs, IT executives can return money saved to their enterprises' bottom lines — or they can do as Baldor does and reinvest operational savings into expanding applications portfolios (leading to further business process streamlining), and/or to fund new innovation.

#### Background

Baldor is a worldwide manufacturer of electric motors, mechanical power transmission products, drives, and generators (for more general background - [www.baldor.com](http://www.baldor.com)). Until last year, Baldor's market niche was motors that produced fractional to 150 horsepower output. But last year, this \$800 million company purchased Dodge Reliance — a \$1.2 billion company — and expanded its market reach to encompass motors that now reach from fractional output to 15,000 horsepower.

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Over the past decade, a big part of Baldor's growth strategy has been to expand its market reach through the acquisition of companies in markets that are similar to or related to its own market. And Baldor has learned that one of the ways to quickly assimilate companies is to standardize business process flows and supporting information technology environments.

To these ends, Baldor has:

- Standardized its business processes by choosing to deploy a complete suite of SAP run-the-business applications (including finance, payroll, logistics, and many other integrated SAP applications).
- Standardized its IT environment by choosing to deploy its run-the-business SAP applications on an IBM z10 mainframe. This mainframe runs a large DB2 database, and is also capable of running z/OS, zVM, and Linux applications. Further, Baldor uses several x86-based servers to run certain suites of office applications and other Windows-based applications.

### *An In-depth Discussion with Mark Shackelford — Baldor's VP of Information Services*

Mark Shackelford, Baldor's Vice President of Information Services, is very proud of his company — and even more proud of his information systems environment. By moving away from a distributed systems model of computing to a centralized model, Mr. Shackelford has been able to improve the reliability, availability, and security of his information systems environment — while very significantly lowering management costs.

A closer look at Shackelford's background reveals that he has the perfect curriculum vitae for running a modern IT organization. As an undergraduate, he studied computer science at Arkansas Technology University; and after several years in IT operations, he returned to school to achieve graduate honors at nearby Webster University. As a result of obtaining technical and business degrees — combined with years of operational experience (including direct tutelage by the company's CEO) — Mr. Shackelford now has a deep understanding about how to match Baldor's business objectives with underlying, supporting information technologies. And because he has consistently demonstrated to his management that he can deliver needed IT services in an extremely cost-efficient manner, Shackelford's executive board has granted him a great deal of freedom and leeway to do what is necessary to enable Baldor to meet its business objectives in the most cost effective way possible.

### *Baldor's Former IT Environment*

For several years, Mr. Shackelford managed a distributed computing environment that included Unix and Windows servers — as well as three small mainframes. In this distributed computing environment, he found that he had to constantly add more servers, as well as more administrators and managers, in order to scale his computing environment. And, as acquisitions took place, he found that he kept inheriting more and more distributed servers as well as more and more people to manage those servers.

*This kind of situation is called a vicious circle or a virtuous circle. Vicious/virtuous circles are "a complex series of events that reinforces itself through a feedback loop that leads toward greater instability". By constantly adding more and more servers — and more and more people — Shackelford found himself in a classic vicious circle/virtuous circle situation. And this situation caused him to rethink Baldor's approach to computing.*

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As he reconsidered his IT strategy and deployment, Shackelford determined that consolidating many servers to fewer servers would enable him to use fewer people to manage more systems – thus helping bring his systems management costs under control. And he realized that by virtualizing his server environments, he could get higher utilization out of the systems that his company purchased.

*These two observations led Shackelford to reevaluate his systems environment: focusing on consolidating his many Unix servers into fewer, more easily managed server; and also focusing on virtualizing his servers in order to increase overall resource utilization (and thus, reap a better return on his IT investments [ROI]).*

At about this same time (2003), Shackelford became aware that his IBM mainframes were capable of running the Linux operating system. And he was also aware that SAP applications were capable of running on the Linux operating system. Because Baldor already had several mainframes in its systems mix – and because these mainframes had proven to be highly reliable and available (as well as extremely secure) – Shackelford began to explore the idea of hosting SAP applications on Linux on a mainframe. And as he dug deeper into Linux on the mainframe, he learned that:

- By migrating his existing Unix applications to Linux, he could greatly reduce his software costs (particularly his operating environment costs);
- By consolidating his Unix applications on Linux on a mainframe, he could eliminate numerous Unix servers (and corresponding human-related management costs); and,
- By setting up numerous virtual Linux servers on a mainframe, he could increase the utilization of his systems environment.

*In addition to lowering software costs, eliminating management costs, and increasing overall systems utilization, Shackelford also observed that he could also take advantage of other mainframe strengths in RAS (reliability, availability, and serviceability); in security; in reduced data center floor space; and in reduce energy consumption. As a result of all of these factors, a new Baldor IT strategy emerged – a centralized mainframe-based strategy.*

### *Baldor's Current Systems Environment*

Mr. Shackelford describes his current mainframe environment as a "very large DB2 application server environment". And what he means by this is that his mainframe hosts a large DB2 database environment that manages all of his company's critical data – and that numerous SAP applications operate with that database to help drive Baldor's financial, human resource, manufacturing, inventory, logistics, sales and distribution functions.

Part of the beauty of having standardized on SAP is that SAP's vast suite of integrated enterprise applications readily supports the efficient flow of business processes. In the old days, many enterprises used to build custom code to manage operations – and frequently this custom code did not operate well with other run-the-business programs. And, as a result, efficient business process flow was inhibited and manual processes were put in place to manage through the rough spots. Packaged SAP applications, however, are highly integrated – enabling SAP applications to easily cooperate with one-and-other – leading to efficient process flow across the board. Efficient, automated process flows lead to increase operational efficiency; they reduce

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human-related labor costs; and, accordingly, they directly and positively influence an enterprise's bottom line profitability.

Further, by standardizing on SAP applications, Baldor is able to more easily assimilate companies that it has acquired. SAP applications create a process flow model that newly acquired companies can follow. And by following this model, the operations of both companies can be more easily merged.

As for existing IT systems, Mr. Shackelford's organization currently operates a single z10 mainframe (which is backed up by tape); several large Sun enterprise servers (applications on these servers are being migrated to Linux on the mainframe – and these servers will soon be phased out); and a number of Windows x86 servers (it is necessary to keep these servers because Windows does not currently operate on a mainframe).

*At present, Baldor currently has 97 people managing its IT environment (all aspects, including database administrators, Windows Exchange/Office support staff, mainframe systems managers, help desk, etc.). But as more and more applications wend their way onto Baldor's z10 mainframe, Baldor expects to need fewer administrators to manage its older distributed systems environment. And, accordingly, Baldor expects its IT costs to decline even further (below one percent)!*

### *Other Observations*

"To be honest, I thought my platform costs would go up by centralizing on a mainframe" claimed Mr. Shackelford. "After all" he intimated, "mainframe hardware is costly, as are database and SAP applications software". But, after deploying a z10 mainframe, Shackelford expressed amazement regarding his mainframe operating costs as compared to his distributed systems environment operation costs. Some of his operational cost savings resulting from centralizing his computing on a mainframe include:

- Electric costs have dropped 40%;
- Air conditioning costs have been cut in half; and,
- Floor space requirements have dropped from 6,000 square feet to only 1,000 square feet.

Finally, it is interesting to note that Mr. Shackelford was able to sell his management on this approach because their corporate culture is very open to the idea of automating processes for greater efficiency in all aspects of their business. Had he been held to solely an initial, limited financial analysis of the move to consolidate Linux workloads on System z up front, he indicated he might not have been able to proceed because it was difficult to fully identify all the savings that Baldor Electric has been able to derive from making the switch.

*The lesson to be learned here is that mainframes total-cost-of-ownership should not be assessed by only looking at hardware and software acquisition costs. The total cost of operations including hard costs such as power/cooling and real estate/floor space — as well as less tangible saving resulting from System z10's stellar reliability and security (Baldor has had no systems failures since the IBM z10 was installed over a year ago) — need to also be weighed when looking at costs. Baldor has learned that these "external" savings really mount up — making mainframes an outstanding value.*

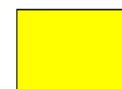
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Figure 1 (next page) shows some of the additional factors that should be weighed when assessing the total cost of ownership of a given systems environment. Note that many IT shops only compare total cost of acquisition (in yellow on Figure 1) when comparing distributed systems pricing to mainframe pricing. Baldor has found that all of the "other" factors such as security, availability, back-up, compliance, etc. – also factor into systems operational costs. And when weighing these other factors, mainframe costs look very attractive when compared to cost related to managing and securing distributed systems architectures.

**Figure 1: Mainframe Total Cost of Ownership – Other Factors**

## TCO: A Range of IT Cost Factors – Often Not Considered

- **Availability**
  - High availability
  - Hours of operation
- **Backup / Restore / Site Recovery**
  - Backup
  - Disaster Scenario
  - Restore
  - Effort for Complete Site Recovery
  - SAN effort
- **Infrastructure Cost**
  - Space
  - Power
  - Network Infrastructure
  - Storage Infrastructure
  - Initial Hardware Costs
  - Software Costs
  - Maintenance Costs
- **Additional development/implementation**
  - Investment for one platform – reproduction for others
- **Controlling and Accounting**
  - Analyzing the systems
  - Cost
- **Operations Effort**
  - Monitoring, Operating
  - Problem Determination
  - Server Management Tools
  - Integrated Server Management – Enterprise Wide
- **Security**
  - Authentication / Authorization
  - User Administration
  - Data Security
  - Server and OS Security
  - RACF vs. other solutions
- **Deployment and Support**
  - System Programming
    - Keeping consistent OS and SW Level
    - Database Effort
  - Middleware
    - SW Maintenance
    - SW Distribution (across firewall)
  - Application
    - Technology Upgrade
    - System Release change without interrupts
- **Operating Concept**
  - Development of an operating procedure
  - Feasibility of the developed procedure
  - Automation
- **Resource Utilization and Performance**
  - Mixed Workload / Batch
  - Resource Sharing
    - shared nothing vs. shared everything
  - Parallel Sysplex vs. Other Concepts
  - Response Time
  - Performance Management
  - Peak handling / scalability
- **Integration**
  - Integrated Functionality vs. Functionality to be implemented (possibly with 3rd party tools)
  - Balanced System
  - Integration of / into Standards
- **Further Availability Aspects**
  - Planned outages
  - Unplanned outages
  - Automated Take Over
  - Uninterrupted Take Over (especially for DB)
  - Workload Management across physical borders
  - Business continuity
  - Availability effects for other applications / projects
  - End User Service
  - End User Productivity
  - Virtualization
- **Skills and Resources**
  - Personnel Education
  - Availability of Resources



Routinely Assessed  
Cost Factors

Source: IBM Corporation — August, 2008

### *Mainframe Hypervisor Really Screams!*

As a final comment, Mr. Shackelford also observed that virtualization capabilities on an IBM system z are very sophisticated (IBM has been building virtualization facilities on mainframes for over forty years) – and are enabling him to achieve high performance level running SAP on Linux.

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The way that virtualized SAP applications interact with mainframe operating environments are through the use of hypervisor or "hipersocket" software. This layer of software acts as an intermediary between a virtualized application and the underlying operating system.

To quote Shackelford: "hipersockets really scream on System z. This is because virtualization is performed 'in memory'".

*In short, what Mr. Shackelford is saying is that he is more than happy with the performance that he is seeing from his applications that run on Linux on a mainframe.*

### *Summary Observations*

Several years ago, Baldor identified that its IT operations were part of a vicious circle – a situation where its IT buying pattern was forcing it to constantly add new servers and more and more manager in order to serve its growing computing requirements. Further, the company's IT buying pattern did not align well with its growth-through-acquisition strategy, nor its strategies to contain costs. Had its scale-by-adding-more-and-more-servers-and-managers IT buying pattern continued, Baldor would have faced a future where its computing costs would constantly spiral upward.

Instead of continuing down its distributed computing path, Baldor took action. The company evaluated SAP on Linux on a mainframe – and is thrilled that it did so. Baldor's IT environment is exceptionally well integrated (as a result of standardizing on SAP); its open and flexible (as a result of standardizing on Linux); and can easily scale (as a result of being deployed on an easy-to-virtualize IBM mainframe).

***But, more importantly, Baldor's IT costs are decreasing as a result of having moved from a distributed systems environment to a centralized, secure, scale-up mainframe architecture.***

Baldor is not the first time *Clabby Analytics* has seen an enterprise succeed using this Linux-on-a-mainframe model. Only a few months ago I wrote about a company that has taken an approach that is similar to Baldor – and that is seeing the same kind of results. Colacem, a Gubbio, Italy-based manufacturer of cement products, also has an overarching growth-through-acquisition strategy. Colacem has also standardized on Linux on a mainframe, and runs a complete suite of SAP applications that help to standardize process flows and make acquisitions go more smoothly. This case study can be found at:

[http://www.clabbyanalytics.com/uploads/Colacem\\_Case\\_Study\\_Final\\_Final.pdf](http://www.clabbyanalytics.com/uploads/Colacem_Case_Study_Final_Final.pdf)

Baldor is doing exactly what *Clabby Analytics* has been recommending for many years – it is moving generalized workloads to a centralized, secure, consolidated, scale-up environment: an IBM System z. And by doing this, Baldor has tremendously lowered its IT cost of operations – freeing up funds for additional innovation while not taxing the enterprise bottom line. If your enterprise is stuck in a distributed systems vicious circle, now (given the dire worldwide economic situation) may well be the time to consider moving to Linux on a mainframe.

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