SAP HANA on IBM Power

Business Powered to Win

INTRODUCTION

In today's world, the competitive landscape is contentious and ever-changing. The overall market is becoming primarily digital in nature and the race to establish and maintain market share requires constant innovation and responsiveness. Identifying and deploying functions and features that meet customer needs is a vital component of that presence.

SAP HANA is one of the most prevalent enterprise level software suites in use today. The comprehensive nature of the software translates into intricate code architecture and substantial resource demand from every aspect of the IT infrastructure on which it is deployed. Whether the system is deployed via the cloud or on customer premises, a constant effort to manage costs and performance is always present.

With so many organizations using SAP HANA, examining the impact on operations of different architectural options can provide an understanding of possible advantages in the rough-and-tumble marketplace. This understanding is not effectively stated as metrics around chip speed and bandwidth. Instead, the actual business experience must come into view.

> *"I do not care, really, about what the machines that run my IT are, it is just another tool to enable our business to compete. What I DO care about is if we can do what we need to do as an organization in the time that our customers demand. Do not talk to me about chips and bites(sic), it makes no sense to me when my eyes are set on market share and profitability. Tell me how we can be faster, safer, and more cost-effective."*
>
> CEO, Large Manufacturing Organization

Concrete savings and advantages need to be articulated in business terms, not bits and bytes. Talking about how fast something will move electrons does not address an executive's need to know how quickly a needed strategic report can be produced.

EXAMINING THE CHALLENGE

The strategy and challenges of crafting an organizational path that successfully navigates the chaos of the market to potential customers require an understanding of the different components that need to be incorporated along that journey.

The behavior of any specific IT platform solution that supports and enhances optimal customer experience and the rigors of digital business must include both technical and business considerations. Since the impact of platform selection on digital business performance is reflective and difficult to quantify, IBM asked Solitaire Interglobal Ltd.

(SIL) to provide an objective review of the IBM POWER Systems with Linux offerings for SAP HANA.

The focus of this study covered the examination and analysis of competitive experience on SAP HANA hosted on-premise platforms incorporating POWER8 and POWER9 architecture, running Linux. Competitive offerings in the field were also analyzed. These included x86 Linux offerings that used Skylake, Broadwell, and other pre-Broadwell systems.

SIL focused on the implementations of SAP HANA that were deployed in North America, and restricted the evaluation to those deployments that dealt only with that core application and the associated technology, since cost, timeline effects, and other aspects are difficult to isolate in broader-reaching enactments.

All data included in the study was supplied by customers, using their metric gathering mechanisms and accounting. No vendor benchmarks or projections are ever included in an SIL study, since the goal for such analysis is to examine real-life, operational behavior and expectations. The findings reported are reflections of the actual challenges and situations that customers are experiencing in the current market and operating environments today.

The study found that there are significant differentiators from the other available options (in the customer deployments of IBM SAP HANA. These core differences were found in the areas important to the reporting customers, such as:

- security and risk
- task completion timings
- the consistency of delivery
- overall server utilization
- reliability
- customer satisfaction
- implementation success

SIL is a non-biased industry analysis group, working with vendors of software, hardware, applications, etc., worldwide. The organization has been gathering data on market evolution and production behavior for over 40 years. All data represents *production* system behavior, reported by customers directly to SIL.

During this study, the primary behavioral characteristics of software and hardware were examined carefully, across a large group of customer systems. The data from the customer reports and the accompanying mass of real-world details is invaluable since it provides a realistic, rather than theoretical, understanding of how the use of different platforms can affect the customer.

KEY FINDINGS AND IMPACTS

The IBM POWER8 and POWER9 Linux architecture has substantial advantages in terms of TCO, performance, and risk compared to the other platform options on the market today. Part of that differentiation comes from the integration of operating system and purposeful design in the overall working of the platform.

One of the contributions is the demonstrated resistance of the platform to common security threat vectors. A combination of architectural, process, and focus-related attributes, the organizations that have deployed the IBM POWER Linux architecture for their SAP HANA initiative consistently report fewer successful security incursions than other solutions. This provides organizations with a significant foundational safeguard on which to build their specific security practice and posture.

This factor combines with the speed of the infrastructure, building on the integration of the OS and toolsets. The IBM POWER Linux offering has established the fastest deployment interval, most resilient computing platform record, and most cost-effective solution in the market today. This picture is one that addresses critical concerns for both the technical and business staff.

The relationship of the technical improvements is tightly coupled to the effects on business. Faster and consistent processing speed translates into very understandable results that can be evaluated against cost and risk. Some of these are:

- Expanded memory bandwidth that delivers up to 4.8 times faster reporting and month-end closings for SAP customers. This substantially lowers risk of missed dependencies and possible delays on operational schedules.
- Larger available memory pools for the application, which produces a significant efficiency in processing, including both the number of simultaneous running processes and the speed of their execution. The majority of this is due to the larger in-memory resources that are available. Customers are seeing orders of magnitude improvement in the dense activities for queries, updates, and other short latency transactions.
- The enhancement of maximum I/O bandwidth is changing the management practices of IT capacity management. More than 64% of the customers reporting on this are re-examining the planned loads for their applications and considering revamping to higher levels.
- Projected reported savings show a substantial advantage to the POWER architecture, easily offsetting pricing differentials for cost of acquisition.
- A comparison of quoted versus realized performance shows that the IBM POWER Linux architecture is delivering the expected performance, while the competition, in general, is not. This does not even take into account the fact that the expectations of delivered performance are being exceeded in over 74% of the IBM POWER HANA deployments reported in the study.

Every aspect of the infrastructure affects the overall performance. The business focus requires the translation of technical improvements to be recast in beneficial and adverse impact on the normal operations of the organization. Therefore, improvements that lower the time necessary to perform a system task demand fewer staff hours to perform them. When fewer staff hours are required to do the same things, then agility improves. A more secured foundation requires less firefighting and problem-solving, flowing into a more stable operational environment.

Each item, taken by itself is impressive. When collected into a picture of support for business, the IBM POWER architecture creates the power to win in the market.

Some highlights of the findings from the study can be seen below.

Quick Summary

Category	Commentary	Quick Byte
Time to Market	The optimizations built into the POWER platforms augment provisioning, testing, and other factors to produce agility that averages as little as *36.3%* of the setup time required by other platforms.	Get your systems up-and-running faster.
Flexibility	The reported, average resilience of these POWER implementations is as much as *6.5 times* of the other options, provided by a platform that can reconfigure to handle changing load demands.	More easily handle unexpected activity spikes.
Total Cost of Ownership	The expenditures for POWER implementations are lower by as much as 78% compared to those of other platforms.	Greatly reduce TCO compared to competitors.
Staff	Based on the detailed customer reports, deployment on POWER Linux requires less staffing to do the same amount of work. The overall staffing was a little as 67.32% of the operational staff time reported for other alternatives.	Do more with fewer staff resources.
Risk	A substantial reduction has been reported as much as *57.81% lower* than the rest of the studied platforms by customers all over North America.	Significantly reduce risks of security incursions, inadequate performance, and system failure mean happier customers and more revenue.
Reliability	The IBM POWER Linux platform has unavailability that can be as low as 1/6th as other options.	IBM POWER Linux provides a more reliable and consistent platform choice.
Customer Satisfaction	The reported executive satisfaction is higher by as much as 38.16% other architectures.	When the top executive knows that the solution is good, everyone is satisfied.
Security and Resiliency	IBM's commitment to addressing the Spectre, Meltdown, and other chip vulnerabilities is unmatched by any of the competitive organizations.	Deploy a base security platform that's more effective than the competition.

The shifting nature of business is getting more fluid. More rapid changes, active attacks, and a challenging risk management role, all combine to present dangers in addition to opportunities.

In the analysis that SIL has just completed, the original purpose was to examine the real-world impact on business based on platform architecture. For that purpose, significant architectures such as SAP HANA platforms running IBM POWER8 and POWER9 Linux, and other Linux products were compared.

The overall finding of the analysis was that the POWER8 and POWER9 offerings have introduced a strong differentiator for business in today's market, one that will provide a more agile, less expensive, and more secure operation.

The details behind these highlighted findings are discussed in more depth in the remainder of the paper. This more granular examination of the factors behind the summary illustrates the technical contributions made to the business.

SECURITY AND RISK

Risk within a deployment comes from many different areas, but the foremost of these is successful incursions into the systems and infrastructure of an organization. The prevention of that is the principal duty of the security personnel within a digital business.

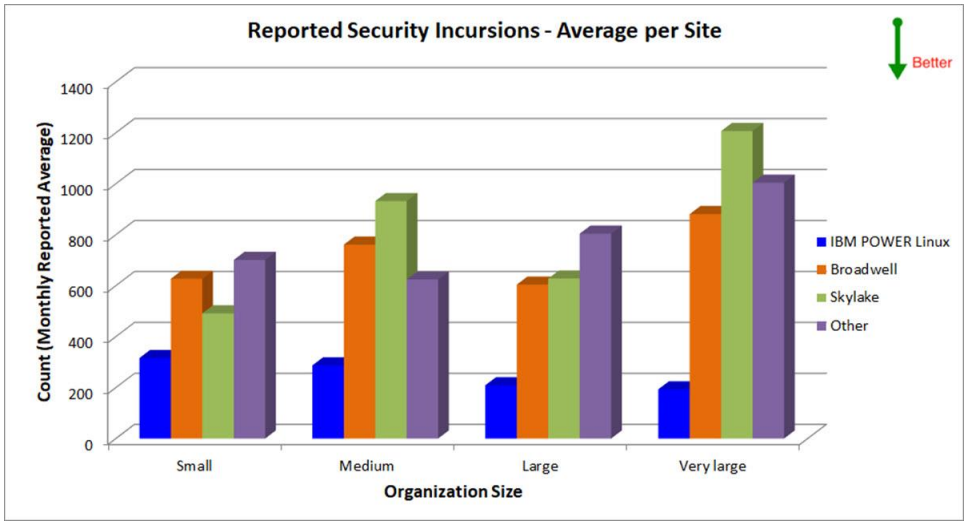
To these staff members, there is no acceptable loss. Every breach, every violation, every breaking of the protective shell is potentially catastrophic. With the number of attacks increasing on an hourly basis, organizations are frequently bombarded by unrelenting attempts to destroy, steal, and prevent others from using the commercial services.

In that battle, the baseline characteristics of the infrastructure play a prominent role. This is especially true when the underlying architecture of the technology is designed to make it difficult for hackers to succeed.

In addition to the base data analyzed during this study, over 4 million data points of detailed incursion activity and impact from the SIL's Global Security Watch (GSW) provided a foundation of expectable costs and exposure that are tied to security incursions, which is essential to understanding security and asset protection in today's marketplace.

In the collection and analysis of the study data, a number of characteristics were derived. These characteristics affect the overt capacity, efficiency, and reliability of the secured environment. Also examined was the synergy of security and business operations. The behavior represented has been projected and modeled into possible options for deployment. To build this understanding, more than sheer server performance is required, since ultimately security needs to protect, not hinder, the business process and operations. Although the capacity demand and throughput effects of the security systems are essential, their translation into business terms is more germane to today's market. The business perspective encompasses a myriad of factors, including reliability, degrees of security, staffing levels, total security cost (including recovery) and other effects. This ties directly into the decisions that IT managers, CTOs, and business leaders have to make daily.

The overall behavior reported by customers within the GSW shows interesting patterns of successful incursions, as can be seen in the following chart.



The fact that POWER8 and POWER9 Linux deployments show lower security incursions than any of the competitors in the study hinges on multiple factors. One of the main contributors lies in the differences in internal architectures. The x86 competitive environments are more vulnerable to firmware and hypervisor threat vectors, as previously referenced. Additionally, the assailable topology for incursion is more widespread in the x86 offering because of the lack of an integrated stack of OS, security, etc.

This mitigated risk situation helps cement the relationship between end customer and organization. The reduced security breach level translates into higher levels of trust and less negative impact on the business when other problems occur.

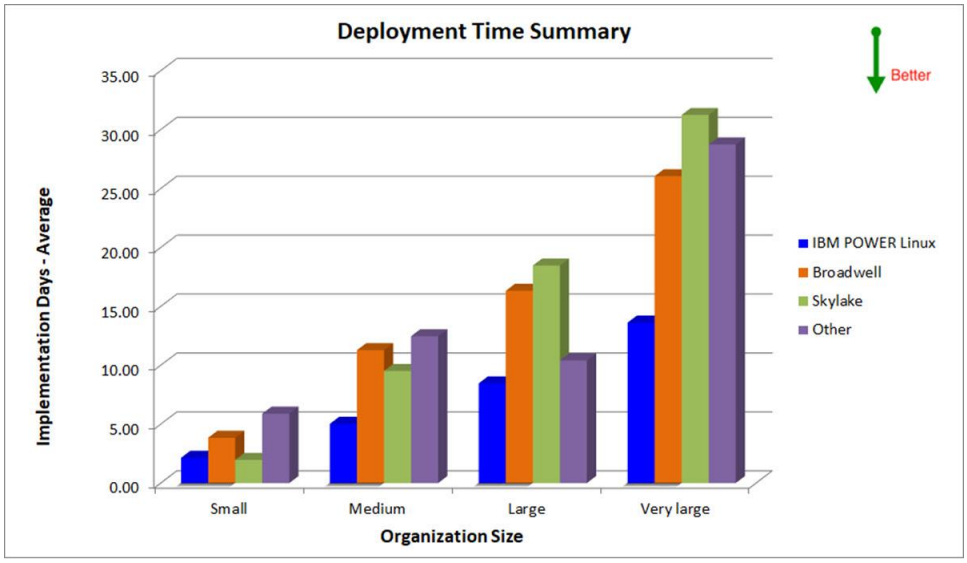
The metrics show that POWER architecture supports safer operations by more than *5.5 times*. That is a huge differentiator for the business. It speaks to risk at a very high level, with attendant potential exposure mitigation.

AGILITY AND FLEXIBILITY

Customers in today's business environment expect responsiveness. Whether that optimized reaction to needs or problems is driven by innovation or by market changes, failure to perform in this area puts a business at a significant disadvantage.

To understand the differentiation that a specific platform makes in this arena, the millions of experience points of the organizations reporting into SIL were analyzed and summarized in the chart below. This graph shows the average deployment time based on a normalized 200 function point[1] application. To avoid any confusion that continually updating tools provides, the analyzed deployments are restricted to those that were implemented in the last calendar year.

[1] *Function points identify the number of major processing sequences within an application. The standard has been substantiated by the International Function Point User Group (IFPUG) for many decades. This standard is typically used to rationalize comparisons across different code bases. (www.ifpug.org)*



There is a substantial differentiation when it comes to the amount of time that it takes for an organization to deploy a new version or new application based on the underlying architecture. The optimizations built into the POWER platforms augment provisioning, testing, and other factors to produce agility that averages as little as *36.3%* of those required by other platforms.

In the SAP HANA environment, this deployment time most frequently refers to the release of functional releases that provide incremental improvements to the analytical and transactional capabilities best served by in-memory architectures. Since the customer-reported roll-out plans for SAP HANA average a significantly higher number of such releases than other software platforms, the importance of this metric is even higher than usual.

This increase in agility is significant since most organizations will deploy tens if not hundreds of updates and releases during a calendar year. Any savings in time from initiation to deployment translates directly into reducing cost and increasing responsiveness to the customer. Since that metric has been shown to be one of the most important when working in cyberspace, this factor is worthy of note.

The demand by customers for flexibility in the digital world translates into contributions from both IT and business. On the business side, the term is applicable primarily to strategy and approach. The willingness for an organization to change direction and follow market or customer requests and demands is one of philosophy.

In addition to the operating principles that govern an organization's direction, business flexibility means modifying offerings and products so that they are always relevant to the customer base. None of those are tied explicitly to the IT platform that enables them.

The portion of flexibility that is contributed by physical and virtual platforms is that of broad-scale adjustability. As requirements for localized support are defined, the platform must be able to be efficiently reconfigured. If demand surges either seasonally or because of highly favorable market response, the platform should be able to service those demands.

The resilience of the implementation can be viewed as the ability to handle unexpected resource demand without overall platform failure. Extreme cases can be seen in

deployment crashes with concentrated denial of service attacks. The more resilient implementations rely on the capacity and elasticity of the operating system and hardware.

Resilience is a typical metric when evaluating hardware for purchase and operating systems for deployment. It refers to the ability of the platform solution to absorb unplanned workload on a temporary or short-term basis.

Each platform has its own resilience posture. Many of the x86 solutions are closely engineered to specific profiles of memory-computing-network resource demands. Any substantive variance in the combined profile results in system performance degradation and possible failure.

Systems with higher resilience can handle those peaks without significant response degradation or system outages. They are more able to push resources from one area to another to address demand, and their internal strategic architecture of queues, buffers, etc., are less restricted and rigid.

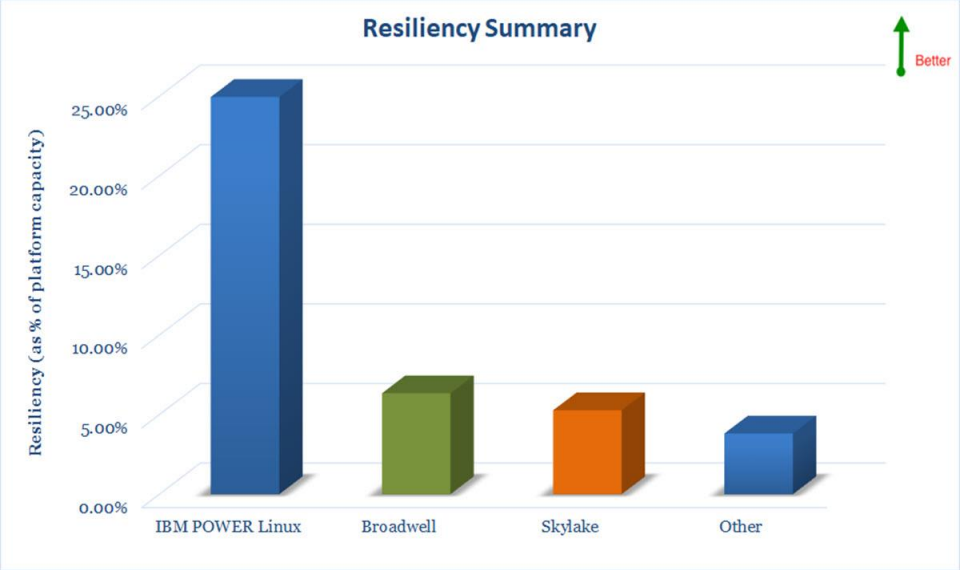
That is the type of resiliency that is provided by the IBM POWER platform, and it results in significant savings for the deploying organization. It reduces the over-engineering that typically accompanies capacity planning and lowers the overall TCO.

With that crucial metric in mind, the combined resilience rating of the platform groups is summarized in the following chart. The resilience rating itself is the result of recorded and reported breakpoints of scaling from the production implementations that are part of this study. The rating is expressed as a percentage of planned workload and represents the amount of queue build and stress that the dispatching algorithms, buffering mechanism, and other components can tolerate without negatively impacting overall operations.

If a system is sized for a given workload, and a peak occurs beyond that target, the POWER can handle a peak workload that is 25% greater than expected. This is more forgiving than the less resilient x86 platforms.

Since resiliency in operational performance is difficult to capture directly, SIL uses customer reports that represent the failure points of a particular platform and system. Planned demand, normal load for that platform, and any platform failure due to increasing resource consumption have been used to establish the threshold of resilience. Hence, if a particular system has been sized to run 1M transactions, consistently supports 0.87M, and has failed to perform to operational requirements at 1.3M transactions a multitude of times, the resiliency of the platform is considered to be 30%.

To account for mis-sizing, if the same platform was sized for 1M transactions, normally runs at 1.2M transactions, and fails at 1.3M transactions, the sizing is considered suspect. Instead of using 1M as the base, SIL uses 1.2M transactions as the foundation, and the resilience of the platform is measured as 8.33%.



There is a substantial difference between the resilience of the POWER8 and POWER9 Linux deployments and the remainder of the solutions. The reported, average resilience of these POWER implementations is as much as *6.5 times* of the other options. This translates into less over-engineering in the IT solution, which contributes to lower TCO, fewer outages, and less staff time.

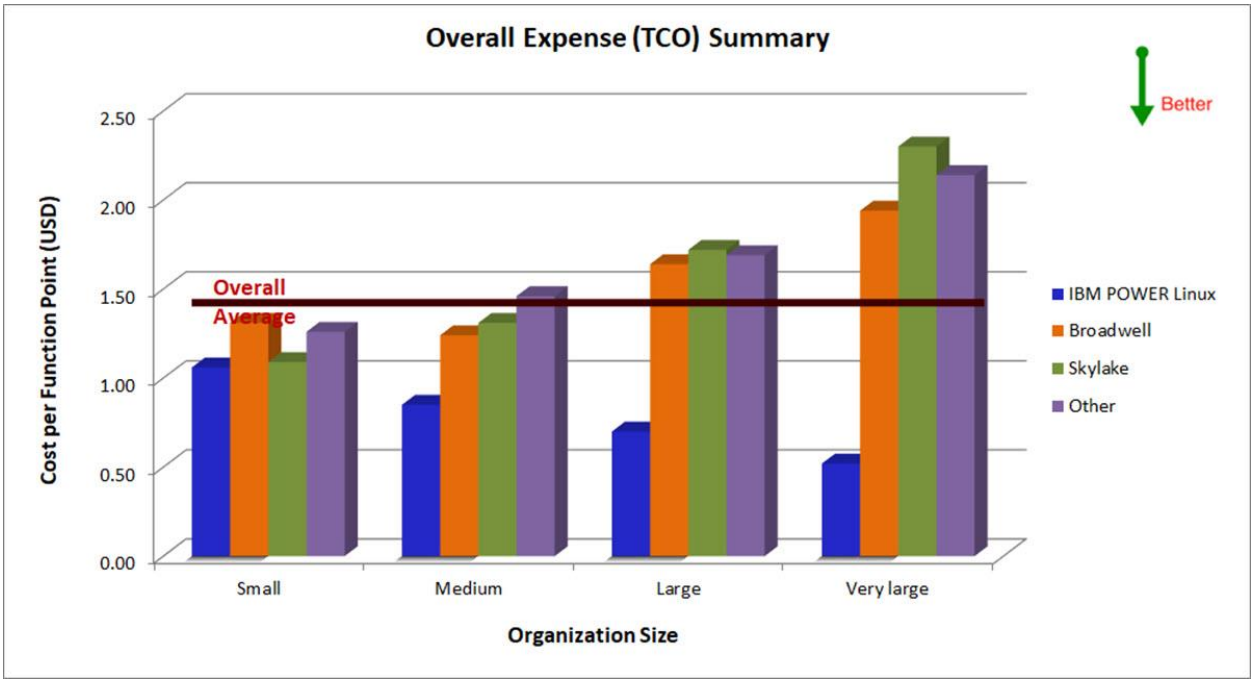
COST AND EXPENSE

Cost is a primary metric in business. Optimizing revenue while minimizing cost is the game that industries play on an ongoing basis. While there are many ways to examine cost and expense, the most portable metric when reviewing this portion of the financial profile among disparate companies is to use total cost of ownership TCO). This can be normalized using a standard workload unit such as function points, creating a method of comparison that works for a range of organizational sizes.

TOTAL COST OF OWNERSHIP

TCO provides one of the leading business-side metrics for operational efficiency. This high-level metric aggregates all of the expenses within the organization that contribute to any aspect of operations. Once again, the projects and their expenses have been normalized based on a standard basis. This enables large and small organizations to be more accurately compared.

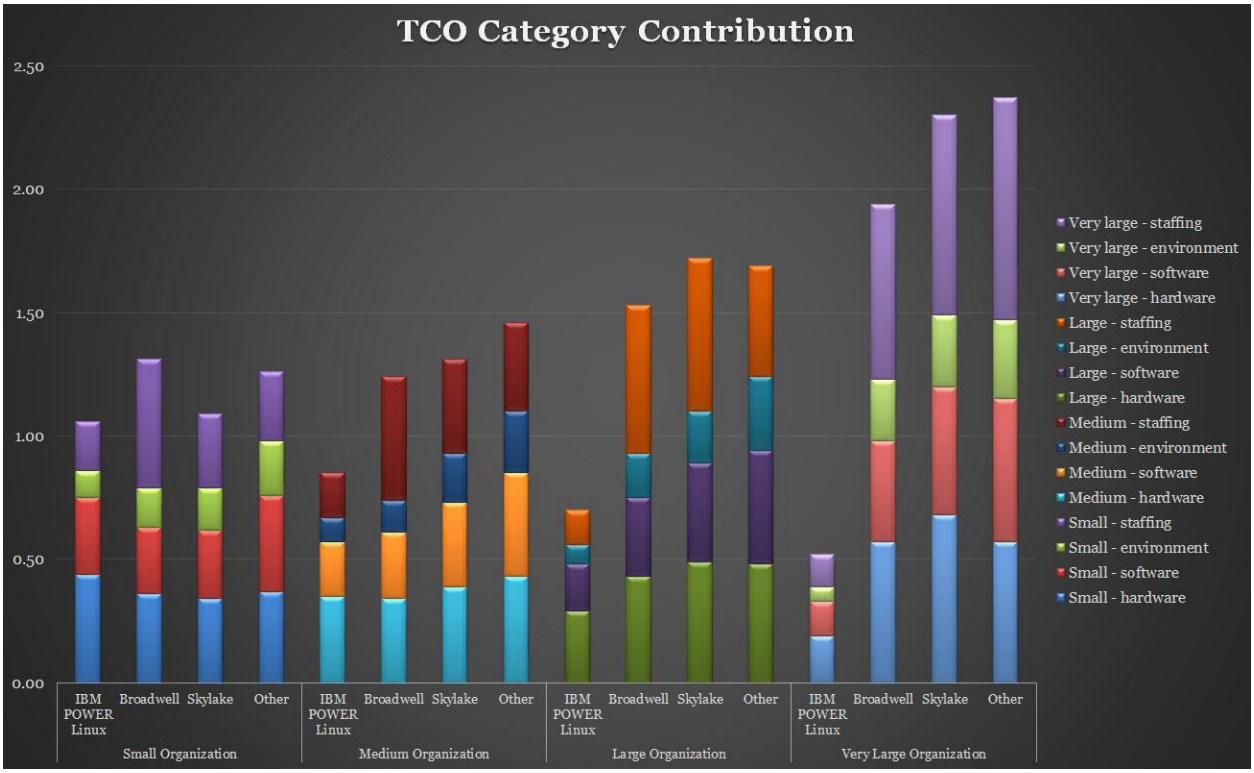
By normalizing the TCO based on a standard work unit definition, like function points, an accurate comparison can be made, and trending highlighted. The patterns of expenditures show increasing trends for some of the platform types as the complexity of the deployment grows.



There is a contradictory trend for POWER platforms. A declining pattern of unit expenditure translates into the efficiency of scale, where the leveraging of framework and foundation allows a cost-efficient model of financial investment. As seen in the accompanying chart, the expenditures for POWER implementations are lower by as much as 78% than for those of other platforms.

This stems partially from the combination of architectural components and a scalable platform. The efficiency of this synergy is demonstrated as the architecture is more heavily loaded. In this situation, a significant drop in cost per work unit is realized. This footprint is present in all situations where the structure is designed for highly scalable environments but is more commonly seen only in hardware. In this case, the commonality of design for scalability is present both in the physical hardware and the operating system.

A further examination of the general cost categories shows the trending for both POWER and x86 platform solutions.

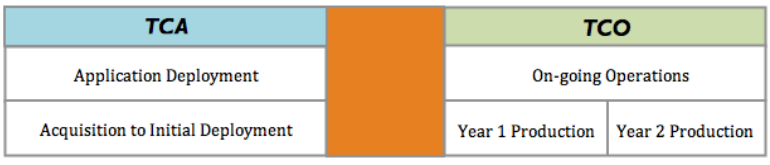


Many organizations focus on only the cost of initial acquisition, or TCA, rather than looking at the overall cost of ownership. Examining the two metrics at the same time provides insightful patterns into vendor accuracy and estimation that should be considered in the choice of platform.

This cost perspective looks at the total cost of the production deployment, as well as the cost of acquisition. These metrics summarize very distinct views on cost and organizational impact. TCA differs from TCO because it focuses on the expenses necessary to move a system from installation to production deployment.

These expenditures include the actual cost for the deployed equipment, services necessary for installation and test, initial licensing costs for all infrastructure components, personnel for initial staffing, education for deployment and operational staff, facility amendment, and so on. Any cost associated with IT end-user training is excluded, as is any burden for customization or enhancement.

Any expense encompassed in this view of organizational impact reflects the amounts extended by the organization, rather than a quoted amount from a vendor bid. In short, TCA measures only the expenses that occur from first equipment arrival to production cutover, while TCO measures ongoing production costs. A visual summary can be seen in the following diagram.

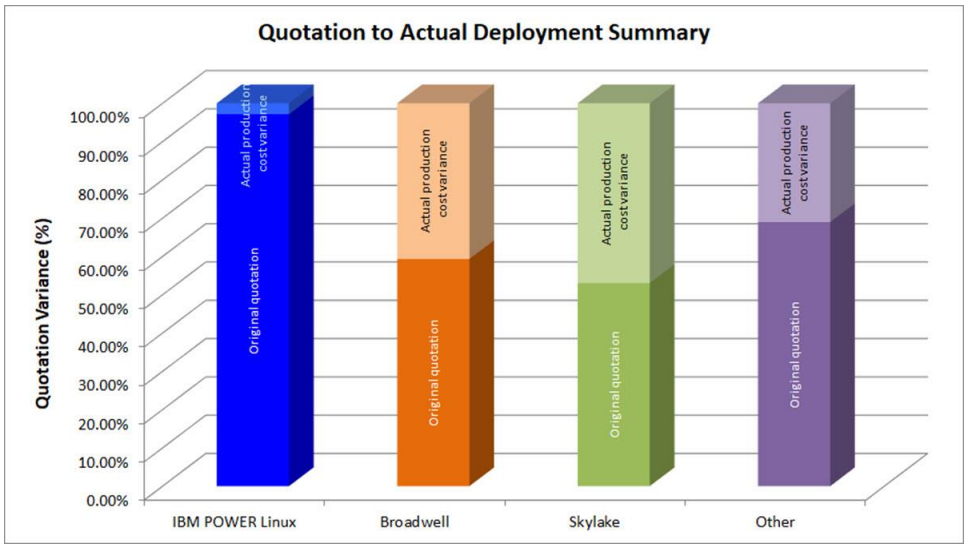


The expenditures that are included in TCO span many divergent expense categories, including personnel, equipment (i.e., servers, network infrastructure, etc.), utilities, software, and maintenance (facilities, hardware, software, etc.), to name a few. All

outlays in these categories pertain to the operation of SAP HANA, but specifically exclude development and initial production rollout costs. The burden for new enhancement functions is not included, leaving just the summation that identifies the organizational running rate for an installed ERP system.

The TCO financial metric is more comprehensive than a straight operational metric. This metric it should not be viewed in isolation, since extraordinary expense patterns for individual organizations may cause minor variance in the exact comparison values. For this reason, the comparison metric should be viewed as indicative and providing a general range rather than an exact value.

However, with a large number of contributing organizations, the data is sufficiently large that, combined with the other business metrics, this comparison helps to set an appropriate perspective. Both TCA and TCO have been normalized in the study based on employee count, sales revenue, and legal entity count.



One challenge with looking at TCA is that many organizations look at TCA as defined by vendor quotations. SIL takes a different view since the reporting organizations provide the actual costs for deployment. Since some initial quotations vary widely from the actual cost of deployment, the real implementation cost is a more valid measurement of TCA. The view of the variance by platform between quoted and actual demonstrates the danger in using quoted figures as a TCA metric.

The actual TCA provides a much different perspective from the comparisons of vendor quotations. If the degree of variance is summarized into four categories based on the percentage of variance from vendor quotation to deployed production infrastructure, significant differences in sizing methodology are highlighted

This significant difference between the quotation and the actual expense can cause significant problems for an organization. The cost overruns, with their associated schedule impacts, can hamper the strategic deployments necessary to compete in today's market.

The large majority of IBM SAP HANA quotations show a smaller variance between the initial sizing and the actual deployment than other vendors, with the average variance for IBM being only 2.86%. This accurate sizing and cost projection provides the organization with a significant advantage in budget compliance. The architectural

topology of the POWER platform also affects the quotation accuracy, with the ability of the platform to combine different types of workload, i.e., AIX and Linux, as a powerful benefit.

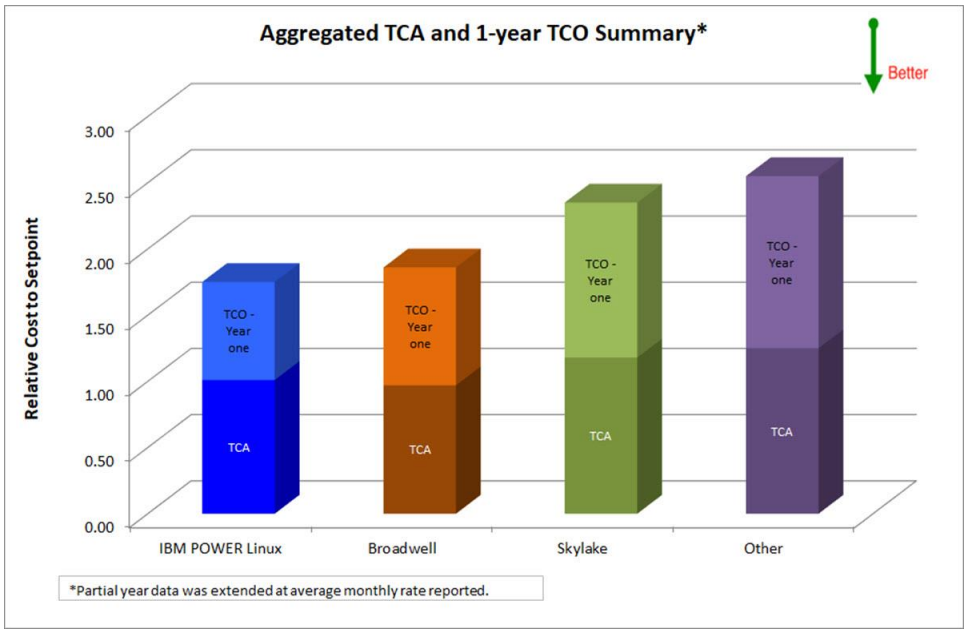
"Our SAP HANA implementation has been very challenging from an infrastructure perspective, with a growth in demand that we really did not anticipate. The IBM box that we put in was sized by IBM itself, and we thought that it was totally over-sized but decided to be safe rather than sorry. It turned out to the right path because we have been able to run well no matter the unexpected workload that has appeared. If we would have gone the original way, or we would have been scrambling to get enough computing and storage for our needs with a vendor that did not know enough to help us plan wisely."

EU Finance company CFO

The TCA for the various SAP HANA deployment options is most accurate when viewed from a real-world perspective, ignoring the preliminary quotations. This view does cause some consternation since the confusion caused by unreliable sizing and infrastructure quotation tends to provide customers with faulty information on which to make decisions.

However, if the actual deployment costs are used for TCA, the fallacy of a substantially higher expense for IBM POWER platform deployment is exposed. The chart shows the actual TCA expenditures reported for each platform type, summarized across all organization sizes. While the IBM POWER Linux solutions are not uniformly lower than all other options, the costs are not significantly higher than the competition.

Since TCA occurs only in the period from equipment installation to production deployment, the metric that examines the ongoing operation (TCO) is a repeated measurement of the application burden for an organization. The comparison of the TCO for the different platform options can be seen below.



The cost of hardware acquisition to fully deploy an SAP HANA solution with IBM POWER Linux is slightly higher than for the smaller Intel platforms, in some cases. This disparity in cost levels is obviated over time, as the defining expense metric switches from TCA to TCO. This switch happens in all deployments eventually but is more rapid

in the larger installations. The chart shows the total cost of ownership over the initial production deployment period and for a year of production operations.

Since some of the deployments did not have a full year of TCO data reported, the missing data for a full year was extrapolated at the average run rate of the data that was reported by the customer. If an organization did not have any TCO information reported, that implementation was omitted from the analysis.

When viewed from an annual year production plus acquisition perspective, the IBM POWER Linux solutions have an advantage of up to 31.37%.

The difference in TCO among the solutions is based largely on the lower expenses for the efficient deployment and operations of the SAP HANA implementation and the lower overall cost of the solution, including staffing. This is affected by the scope of the SAP HANA Linux deployment, with increased expenditure efficiency present as the complexity and size of the deployment increases. More than 89% of the reporting organizations cited these factors as the most influential factor in their perception of cost.

STAFFING

An underlying factor that shows itself in many other areas is the efficiency of the interface between the system administrator and the infrastructure. It includes software, hardware and operating system components, and the subsequent effect on staffing. As staffing efficiency increases, the level of productivity improves. The effort necessary to accomplish the same task is lessened so that each member of the staff is more productive.

The efficiency of any of the specific components that provide that influence on the user experience is difficult to break down into metrics other than in overly-detailed comparisons that lose their effectiveness by virtue of the degree of detail. A general view of the staff effort groups into FTE was reviewed to provide a broad metric for the platform comparison. This average includes all reports, irrespective of size.

The comparative effort levels are those required to maintain a “gold standard” environment for each operating system group. The workload on the systems was normalized to identical levels to maintain the same level comparison field as defined in earlier comparisons. The set point for comparison is the median of the overall responding field since so many options are available for security components.

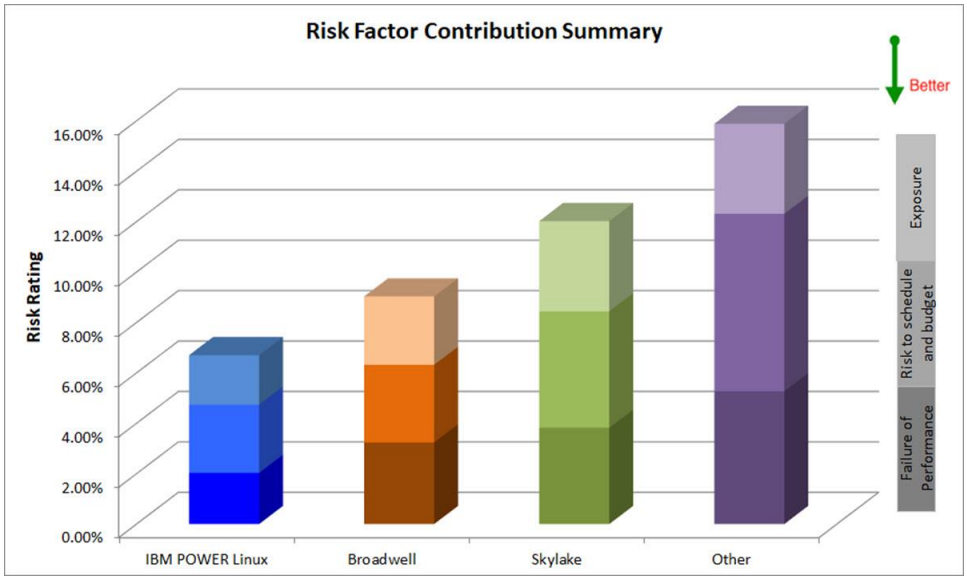
Since different architectures have varying sets of implementation standards, it is essential to keep the rigor of those standards in mind when reviewing the staffing. The noticeably lower staffing level for the IBM POWER platform deployment and use is directly attributable to the integrated nature of the operational stack and the reduction in staff time required to solve problems, such as performance bottlenecks. This is of particular note as an organization increases in size or if an organization is on the path to a cloud service delivery model.

Based on the detailed customer reports, deployment on POWER Linux requires less staffing to do the same amount of work. The overall staffing was a little as 67.32% of the operational staff time reported for other alternatives.

COST OF RISK

The presence of risk and the typical methods of mitigating that exposure involve setaside funds, over-engineering platforms, excessive staff time and architected, multi-channel availability. All of those strategies carry the burden of financial cost and process complication.

When examining the impact of the cost of risk, a baseline risk rating is essential. The following chart shows the relative risk, based on experiential data. This type of data and depth of validation and calibration is the same metric that SIL provides to insurers for setting their policy controls and quotes for cyber insurance.



The increasing damage to business from cyber criminals has given rise to specialized cyber insurance policies. This burgeoning market is on a constant journey to capture enough data to accurately rate the risk and exposure of their clients in their business endeavors.

The demonstrated lower risk for the POWER platforms is a litmus test for an environment that lowers risk in its deployments. The substantial reduction has been reported as much as *57.81% lower* than the rest of the studied platforms. With that cost already incorporated in the reported TCO, the smaller chance of adverse performance and critical failures is a substantial consideration for executive management.

RELIABILITY

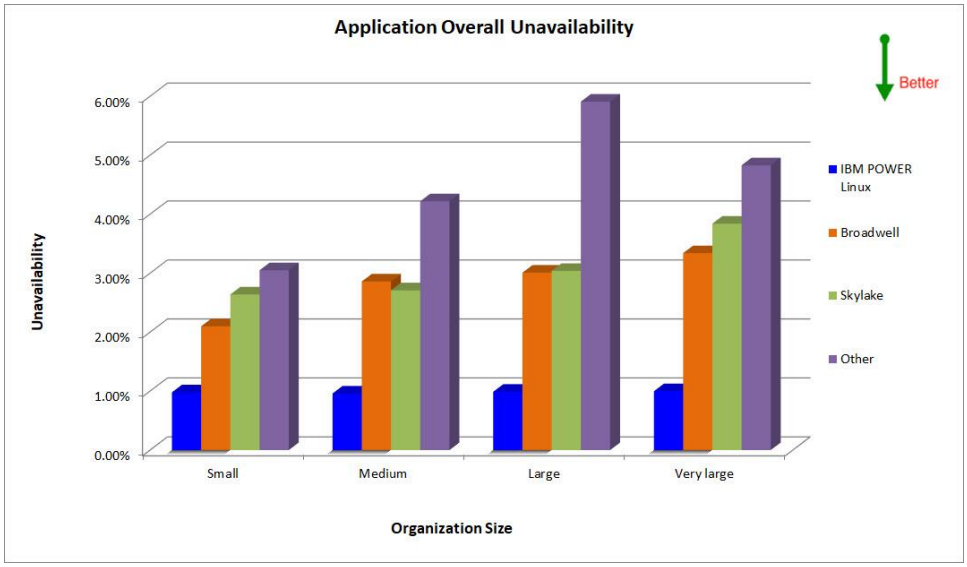
There is another aspect to risk that deserves special consideration. Reliability is the term normally used to group behaviors that cover consistent delivery of services, predictable performance, and fewer critical situation firecalls.

This reliability is measured on an individual platform level. Many architectures attempt to engineer the solution around the shortfalls of reliability by having a stable of standby machines. These platforms are held in reserve, ready to be swapped in when the primary machine fails.

The practice has become commonplace, and where the platform acquisition cost is low, the marketing message is that the "swap-in-and-out" approach is cost-effective and a smart solution. That attitude is a fallacy in that it fails to incorporate some important considerations.

For a machine to fail and need to be replaced, staff also has to be on standby to effectuate the swap. The substitution platform must be configured, updated, maintained, and tested to make sure that it is indeed ready periodically. This results in an increase in operational complexity, which costs the organization significantly.

Additionally, the period of time that signals failure is characterized by poor performance and erratic delivery. Neither of these can exist without adverse influence on an organization's user satisfaction, service delivery, or staffing stress levels.

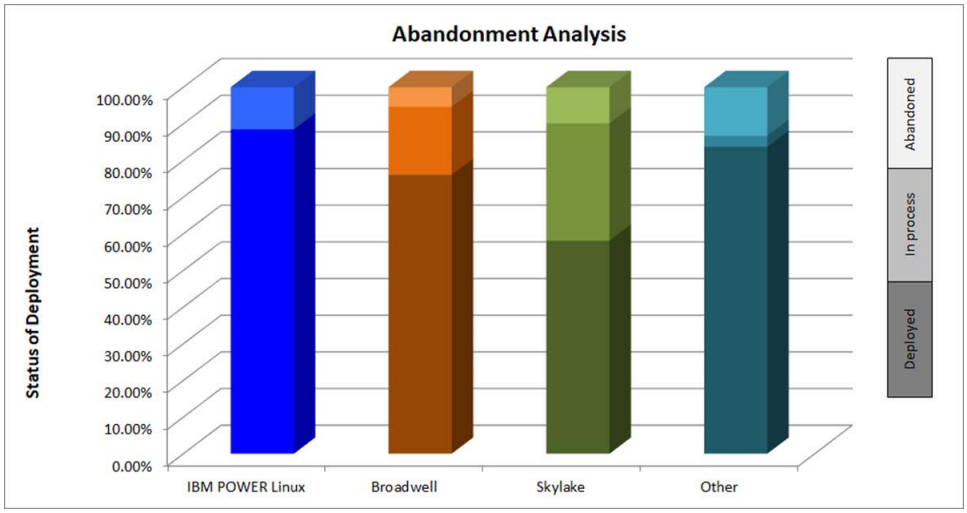


The substantial differentiation of the IBM POWER Linux platform delivery is another aspect of lower risk and smaller contribution to TCO that the IBM offering provides. With unavailability that can be as low as 1/6th as other options, IBM POWER Linux provides a more reliable and consistent platform choice.

ABANDONMENT

There is a secondary level of risk with any deployment. When a deployment approaches the limits of acceptance for performance and support of the organization business functions, it risks the abandonment of that architectural choice. The equipment in question may not be discarded but may be deployed elsewhere in the organization, recovering some of the costs. However, for the initially targeted implementation, the choice to remove the initial architecture and replace it with a more suitable one places a significant burden on the organization.

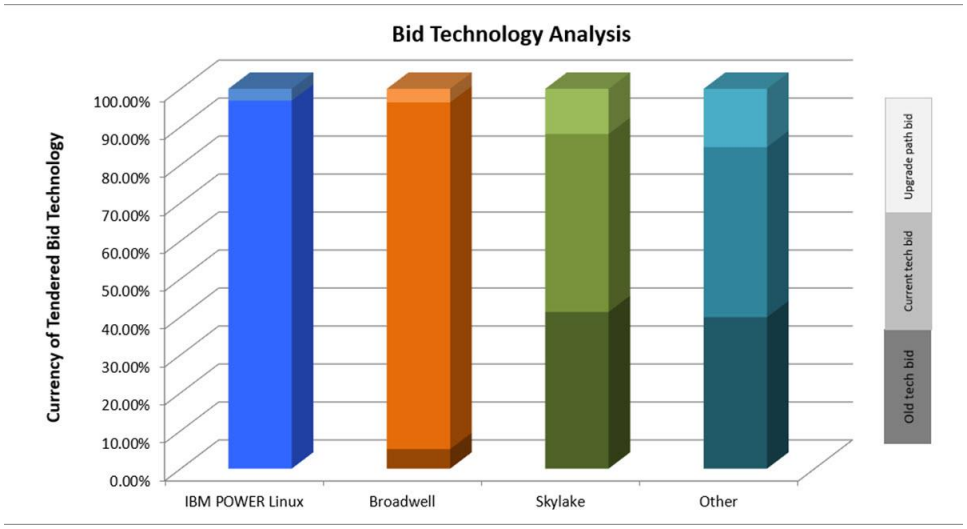
In this situation, the organization does not recover the initial expense and simply adds on the cost of the secondary deployment, plus the cost of IT service degradation during that replacement timeframe. In such a situation, the costs can be considerable.



The sizing methodology, its rigor and the resiliency of the equipment are vital to the success of the deployment. Customers that find that they have been wrongly advised as to the cost and configuration of the infrastructure required for an SAP HANA solution are more likely to abandon the entire project.

This has been exacerbated by a significant number of implementations that have contained older technology as part of their competitive bids. Although this practice reduces the cost of the initial deployment, the resulting challenges for the deploying organization lessen the chance of success. In a significant number of cases, abandonment can be tied to this tactic. It demonstrably leads to overruns of both schedule and budget, as well as increased abandonment of SAP, the associated hardware vendor, and other adverse results.

The reported occurrences of this from customer experience can be seen in the following chart. In addition to the bidding of older technology, the customer reports also identified the situations where a known older technology was submitted as part of a planned upgrade path. This allowed the customer advantages that were significant enough to overcome the cost of a rehosting of the implementation soon after initial deployment.



Whatever the situation, the currency of the technology is a significant concern and area of scrutiny for any organization that is thinking of deploying SAP HANA on Linux.

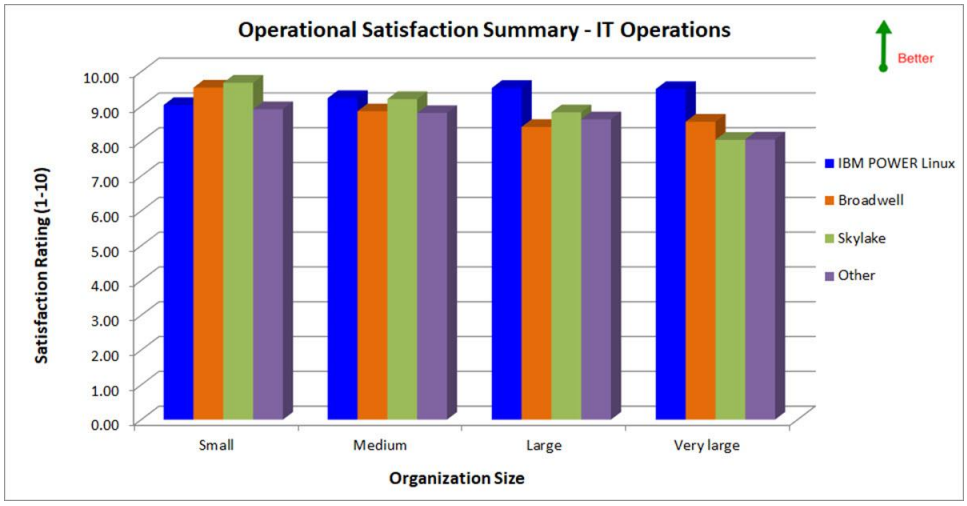
CUSTOMER SATISFACTION

The ultimate measurement of a successful implementation is *customer satisfaction*. SIL tracks this metric split out among IT operational management, line-of-business (LOB) management, and executive management from each organization, since the perception of satisfaction may radically differ among those groups.

Satisfaction with IT implementation and operation provides the most general metric for evaluation. This satisfaction rating was obtained from a large group of customers and provides a singular perspective on the overall success of security deployment. While this is a subjective rating provided, it does provide the business' actual perception of success.

Customer Satisfaction – IT Management

The LOB management perception of the customer, based on a variety of component metrics (e.g., support levels, communication, price, flexibility, etc.), demonstrates satisfaction and success at a generic level. This satisfaction metric examines the feedback from the operational business side of the organization.



The satisfaction of the IT staff with the IBM POWER Linux deployments is significant. This metric is as much as 18.16% higher than the other platform architectures.

The top reasons cited by reporting customers for the IT satisfaction were:

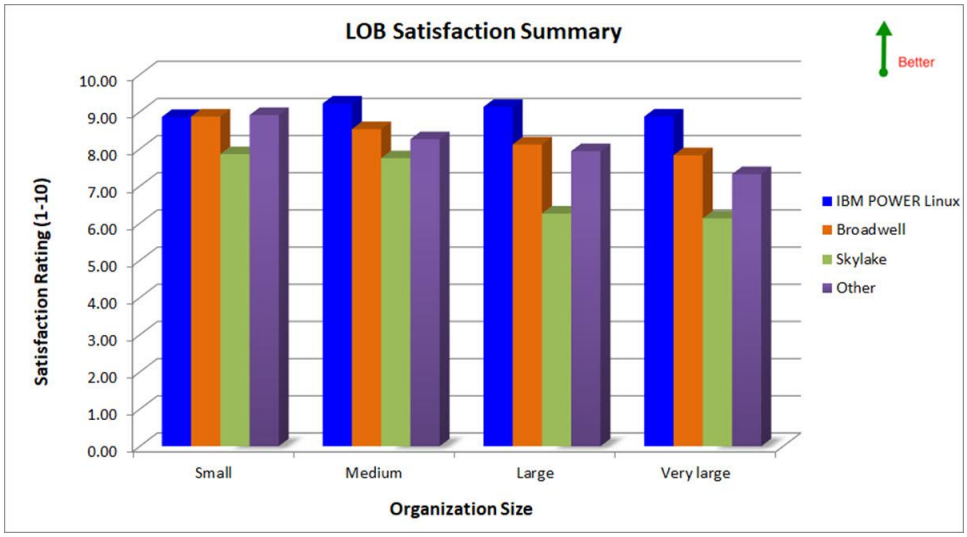
1. Lack of known problems
2. Smooth running operation with little downtime and complaints
3. Flexibility of infrastructure to changing demand

Over 91% of the respondents in this study cited one of the reasons listed above.

Customer Satisfaction – LOB Management

The satisfaction of the LOB user about their computer systems tends to focus on the delivery of services, rather than the platform itself, although systems can be impacted adversely by a poorly configured or fragile infrastructure.

The advantages seen by the reporting clients show increasing satisfaction in the applications run on the IBM POWER Linux platform.



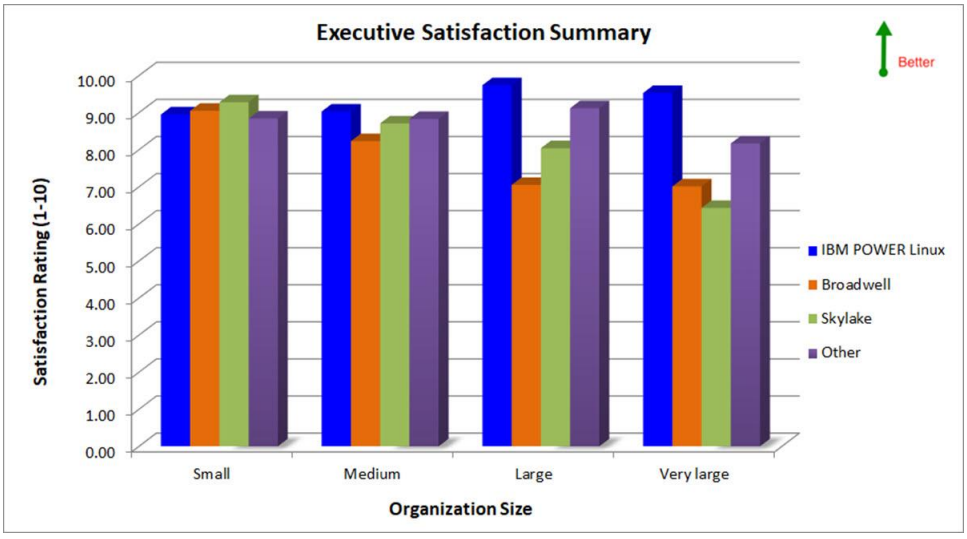
The satisfaction of the LOB staff with the IBM POWER Linux deployments is significant. This metric is as much as 46.45% higher than the other platform architectures. The most highly cited reasons for the satisfaction were:

1. Lack of known problems
2. Speed of implemented changes

More than 95% of the reporting customers cited one or more of these reasons for their satisfaction.

Customer Satisfaction – Executive Management

The final place for verification of system success is in the executive management position. The satisfaction of the customer executive management with their IT systems tends to focus on the application and cost, rather than the technology. This level of satisfaction is totally reflective since satisfaction means that the platform is both transparent and successful.



The relative degrees of satisfaction at this level in an organization is a legitimate indicator of how well the SAP HANA solution supports the processing of the organization. The result in executive satisfaction is up to 38.16% higher than the other architectures. The three top reasons cited by reporting executives for the satisfaction were:

1. Lack of known problems
2. Reasonable costs
3. Speed of available information

All reporting organizations in this study cited at least one of these reasons for their satisfaction.

CONCLUSION

In the analysis that SIL has just completed, the original purpose was to examine the real-world impact on business based on platform architecture. For that purpose, significant architectures such as SAP HANA platforms running IBM POWER8 and POWER9 Linux, and other Linux products were compared.

The overall finding of the analysis was that the POWER8 and POWER9 offerings have introduced a strong differentiator for business in today's market, one that will provide a more agile, less expensive, and more secure operation.

SOLITAIRE INTERGLOBAL LTD.

Solitaire Interglobal Ltd. (SIL) is an expert services provider that specializes in applied predictive performance modeling. Established in 1978, SIL leverages extensive AI technology and proprietary chaos mathematics to analyze prophetic or forensic scenarios. SIL analysis provides over 8,000 customers worldwide with ongoing risk profiling, performance root cause analysis, environmental impact, capacity management, market trending, defect analysis, application Fourdham efficiency analysis, organizational dynamic leverage identification, as well as cost and expense dissection. SIL also provides RFP certification for vendor responses to government organizations around the world and many commercial firms.

A wide range of commercial and governmental hardware and software providers work with SIL to obtain certification for the performance capabilities and limitations of their offerings. SIL also works with these vendors to improve throughput and scalability for customer deployments and to provide risk profiles and other risk mitigation strategies. SIL has been involved deeply in the establishment of industry standards and performance certification for the last several decades and has been conducting active information gathering for the Operational Characterization Master Study (OPMS) – chartered to develop a better understanding of IT-centric organizational costs and behavioral characteristics. The OPMS has continued to build SIL's heuristic database, currently exceeding 600 PB of information. The increased statistical base has continued to improve SIL accuracy and analytical turnaround to unmatched levels in the industry. Overall, SIL runs over 160M models annually in support of both ongoing subscription customers and ad hoc inquiries.

METHODOLOGY NOTES

In order to understand the impact of POWER8 and POWER9 platforms as a key part of an organization's IT infrastructure and the effects on customer experience, a significant number of deployments were examined. The relative degree of difference in operating behavior for each factor, i.e., the total number of outages, etc., was then compared to understand the net effect of the respective combinations. The effects were observed in general performance and capacity consumption, as well as other business metrics.

The approach taken by SIL uses a compilation and correlation of operational production behavior, using real systems and real business activities. For the purposes of this investigation, customer environmental setups were observed, recorded and analyzed to substantiate the findings. Customer experience was obtained to match against the deployment data. Over 950 customer feedback profiles on their experience were analyzed, matched against the IT environments and included in the study. Using a large mass of customer and industry experiential data, a more accurate understanding of real-world behavior can be achieved. The data from these systems was used to construct a meaningful perspective on current operational challenges and benefits. The reported behavior of the systems was analyzed to isolate characteristics of the architecture from both a raw performance and a net business effect perspective.

In a situation such as that presented by this study, SIL uses a methodology that incorporates the acquisition of operational data, including system activity information at a very detailed level. It should be noted that customers, running on their production platforms, provided all of the information. It is essential to understand that none of the data was captured from artificial benchmarks or constructed tests since the value in this study comes from the understanding of the actual operational process within an organization, rather than the current perception of what is being done. Therefore, these sites have tuning that is representative of real-life situations, rather than an artificial benchmark configuration. Since the focus of this analysis was not to tightly define the differences among different minor variations of operating system or hardware, the various releases were combined to show overall architectural differences. This provides a more general view of architectural strategy.

To support the comprehensive nature of this analysis, information from diverse deployments, industries, geographies, and vendors was obtained. In any collection of this type, there is some overlap that occurs, such as when multiple vendors are present at an organization. In such cases, the total of the discrete percentages may exceed 100%. Those organizations with a multi-layered deployment, such as multiple geographical locations or industrial classifications, have been analyzed with discrete breakouts of their feedback for all metrics. Additional filtering was performed to eliminate those implementations that substantially failed to meet best practices. Since the failure rates, poor performance and high costs that appear in a large number of those implementations have little to do with the actual hardware and software choices, these projects were removed from the analytical base of this study.

The industry representation covers manufacturing (20.63%), distribution (10.74%), healthcare (9.05%), retail (16.21%), financial (16.95%), public sector (11.37%), communications (15.05%) and a miscellaneous group (0.00%).

The geographies are represented with North America providing 100.0% of the reporting organizations.

Since strategies and benefits tend to vary by organization size, SIL further groups the organizations by the categories of small, medium, large and extra large. These categories combine the number of employees and the gross annual revenue of the organization. This staff count multiplied by gross revenue creates a metric for a definition that is used throughout the analysis. In this definition, a small organization could be expected to have fewer than 100 employees and gross less than $20 million, or a value of 2,000, e.g., 100 (employees) X 20 (million dollars of gross revenue). An organization with 50 employees and gross revenue of $40 million would have the same size rating and would be grouped in the analysis with the first company. The classifications used by SIL use thresholds of 2,000 (small), 10,000 (medium), 100,000 (large) and 1,000,000 (extra large).

The information in this study has been gathered as part of the ongoing data collection and system support in which SIL has been involved since 1978. Customer personnel executed all tests at SIL customer sites. The results of the tests were posted to SIL via the normal, secured data collection points that have been used by those customers since their SIL support relationship was initiated. As information was received at the secure data point, the standard SIL AI processing prepared the data in a standard format, removing all detailed customer references. This scrubbed data was then input to the analysis and findings.

ATTRIBUTIONS AND DISCLAIMERS

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