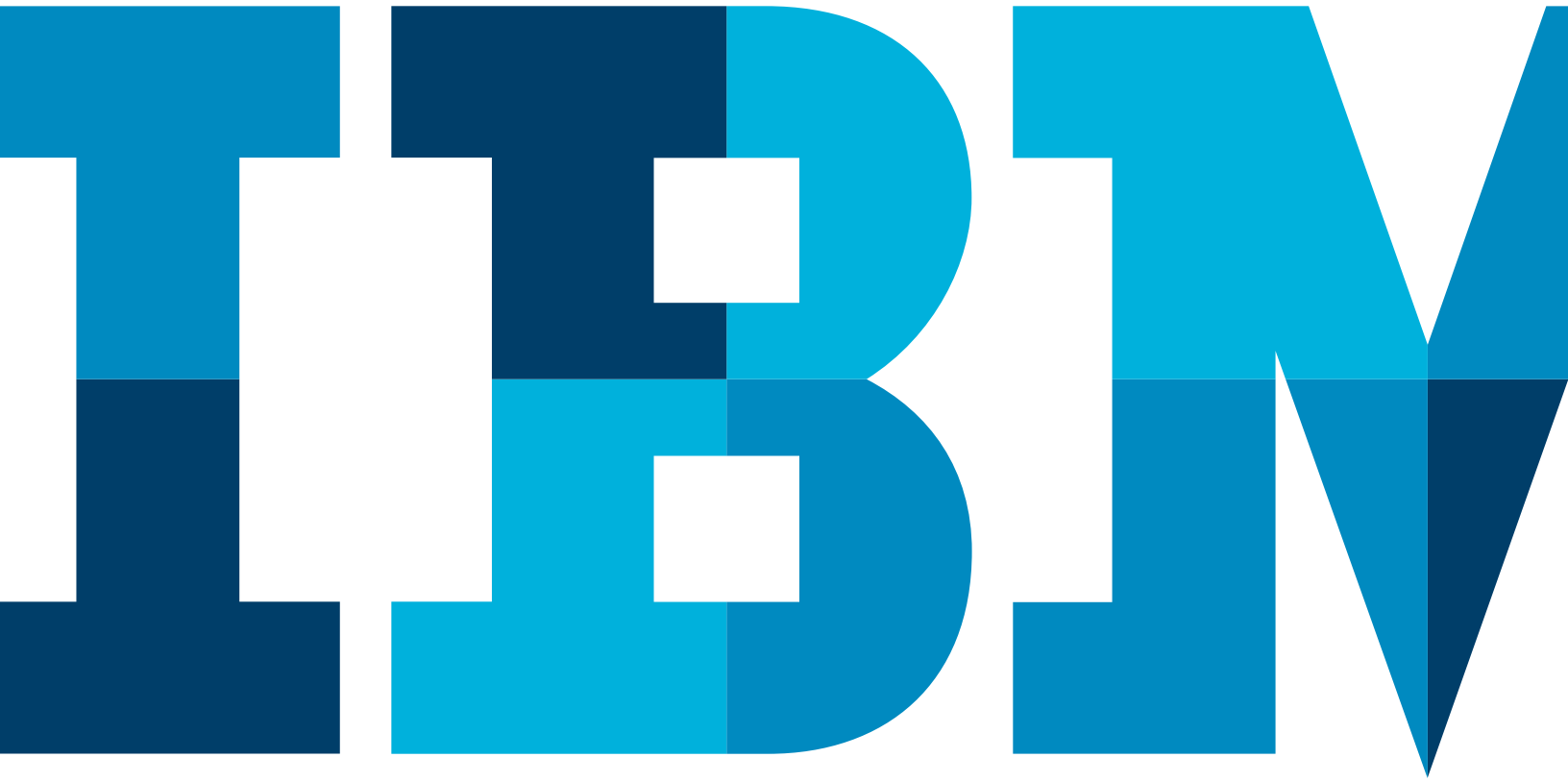
The new alternative for leveraging the power of Business Intelligence

Comparing the total cost of ownership and acquisition of IBM Cognos 8 Business Intelligence on System z to x86 distributed servers



Executive summary

What would you say?

What would you say if I told you that you could reduce your cost of delivering Business Intelligence (BI) by upwards of 50 percent over five years? That you could deliver greater economies of scale, enabling IT to allocate a smaller portion of their budget to facilities and administrative costs while delivering BI to a broader audience at a reduced cost point? That you could ensure the ongoing availability of your BI solution with minimal, if any, incremental costs? And that your initial acquisition costs are on par with your current strategy?

Would you buy it?

You should.

You should, according to our in-depth study comparing the total cost of acquisition (TCA) and total cost of ownership (TCO) of IBM® Cognos® 8 BI on System z® to x86 distributed servers.

This report comes at a pivotal point for many organizations, as it is now recognized that there is a consistent gap between the promise of BI and the harsh realities in today's implementations, in terms of our ability to deliver against the business objectives. Data is growing at an exponential rate, and gaining insight into that data has become more critical than ever for businesses to remain competitive. Greater access to that data is a top priority for companies, with increasing demand for information insight coming from every level of the business. With the right access and insight, individuals in every position in every industry can do their jobs better, smarter and faster.

Deployment strategy

As the need for more sophisticated analysis of data becomes ever greater, and as the nature of data itself changes, businesses are rethinking their BI deployment strategy in order to leverage that data to its full potential and gain a competitive advantage. BI and Business Analytics (BA) solutions are now considered to be critical strategic assets that are essential for business insight: they provide an immediate view of how the business is performing, why it's happening, and what should be done going forward. Business intelligence software, solutions and services provide everyone in your organization with the ability to spot and analyze trends, patterns and anomalies. Armed with these tools, companies can predict potential threats and opportunities, and change course to improve outcomes. In fact, studies have shown that organizations that invest in BI for business decisions achieve better business performance and competitive advantage.

Delivering a successful BI strategy and infrastructure is not trivial. To address the requirements for BI, many IT organizations have implemented isolated solutions in individual departments in lieu of an enterprise model. Many individual units working within their own budgets looked to achieve their own business goals using tools they selected. There was little focus on developing a BI standard for the enterprise, resulting in tool overlap, shelf ware, duplicate license agreements, under-licensing exposure and technology gaps. The traditional approach was to deploy BI systems on distributed servers, which was perceived to be the optimal way to lower costs and reduce the time it takes to deliver BI to the business.

In terms of BI strategy, the question facing many IT departments today remains: is there value in consolidation and standardization? Whereas a distributed departmental infrastructure has often been advocated in the past, a recent IBM study demonstrates that consolidating your enterprise BI deployments with System z over distributed servers can greatly reduce your TCO over five years regardless of the size of deployment.

The results of the study

Whether deployed departmentally or centrally, floor space, cooling, system administration, acquisition and maintenance-contract costs add up with distributed servers over the course of five years, with the overall infrastructure costs becoming cost prohibitive. By year five, companies can find themselves maintaining a BI infrastructure that is too expensive and too complex to scale to meet the growing needs of the business, forcing IT to choose between satisfying growing business demands or maintaining the status quo.

In June 2010, this TCO/TCA study completed by IBM clearly shows that Cognos 8 Business Intelligence on System z offers a powerful, more cost effective alternative to a distributed infrastructure. When all associated costs are assessed over five years, System z has the potential to significantly reduce the total cost of ownership of a BI infrastructure, while leveraging the inherent capabilities of System z itself to provide stronger performance, better security and greater scalability.

This study concludes that:

- The perceived cost barriers associated with a System z implementation versus x86 are a myth, not a reality, and that in fact TCO can be reduced dramatically over a multiyear time horizon.
- Cognos 8 BI on System z enables organizations to ensure the high availability of their BI solution at a price point they can afford, unlike x86 distributed servers.
- System z is a lower-cost alternative over the long term regardless of the size of deployment, providing organizations with the ability to start small and expand across the enterprise as requirements demand.

Additional high-level findings of the study include:

- The acquisition costs (hardware, network and software) to leverage System z is not the barrier to entry we had initially perceived it to be, and total cost of acquisition is either lower or only slightly more expensive with System z versus x86 when all costs are considered.
- TCO is dramatically lower for organizations that are considering future costs such as technology refresh, growth and high availability for users.
- A System z deployment saves, on average, up to 36 percent across all scenarios evaluated with System z over a five-year time horizon.
- On average, leveraging System z for your BI infrastructure reduces the number of CPUs required to manage a Cognos 8 BI infrastructure by up to 87 percent, and reduces the number of servers required to buy and manage by 96 percent.

One of the most striking findings is that in terms of cost, System z pays for itself over five years based on the savings from system-administrative costs alone. Regardless of the size of the deployment, it always costs less for System z versus x86 from an administrative and facilities perspective.

Business Intelligence on System z:

- Reduces TCO
- Reduces TCA
- Delivers greater economies of scale
- Delivers BI to a broader audience
- Ensures ongoing availability
- Pays for itself after five years

Our proposition

This study demonstrates that System z delivers greater economies of scale, enabling IT to allocate a smaller portion of the budget to facilities and administrate costs. This result further enables organizations to reallocate their budget from management to more value-add activities, such as delivering BI to a broader audience and/or educating both users and management on how to best maximize their BI investment — all at a reduced cost point. System z ensures the ongoing availability of BI as a viable option for IT, with minimal (if any) incremental costs, and the TCO for customers who require high availability is consistently around 50 percent lower with System z.

In sum, a System z deployment makes it faster and more cost effective to meet the demand for BI when compared to a distributed environment. Existing System z customers only stand to further reduce their TCO as portions of their initial acquisition costs are already covered, further increasing the return on investment (ROI) of their System z investment. Combine these findings with the performance, security, deployment speed, scalability and reliability of Cognos 8 BI on System z, and the case for enterprise-level BI deployment strategy becomes clear.

Join us in this study, where we will explore what costs need to be considered to get a true picture of the TCA and TCO of a BI deployment. We will review the recommended best practices required to ensure you meet the expectations of the business and look at how those requirements impact your TCA/TCO. Finally, we will dissect the results to to clarify and detail the results of our findings.

Introduction

Organizations today are implementing business intelligence (BI) to promote better decision-making and increase productivity at all levels of the business.

The onus of supporting these strategic directives falls squarely on the shoulders of the IT department. To gain more intelligence from company data, business users want access to the data they need when they need it, with the right analytics tools for manipulating that data into a meaningful form, with the performance they have come to expect from enterprise applications.

It is up to IT to deliver on all strategic directives while also lowering costs. For the IT organization, that means minimizing the cost of the back end of a business intelligence project, without compromising performance or user satisfaction.

The high cost of inadequate performance

While bringing down costs is important, the motivation to ensure user satisfaction is high. Organizations do not want to make major investments in BI, only to discover that users are dropping it because of inadequate performance, reliability, or data quality/security assurance.

When lines of business are pleased with BI applications, not only is your project a success, but a domino effect kicks in, with more and more users utilizing BI applications — thereby further improving the return on investment (ROI) of the BI investment. Ideally, every IT department strives for greater economies of scale from more users and a higher ROI on the initial project.

Reasons people drop BI:

- Too many tools
- Lack of trust in the data
- Inability to access the data they want
- Slow system performance
- Unreliable system
- Lack of data security

Typical infrastructure considerations for supporting business intelligence today

Traditionally, many organizations have delivered against their strategic objectives for business intelligence by implementing BI software on a distributed server farm because of their perceived lower price tag and the comfort of familiarity. Each department or unit worked within its own budgets and delivered against its own business goals using whichever tools it selected. As long as the goals were reached, there was little focus on commonality of business and delivery patterns.

To explore the total cost of ownership (TCO) and total cost of acquisition (TCA), there are key costs that the business must include to truly understand and compare the TCO and TCA. It is not uncommon for organizations to just consider the hardware costs or the BI licensing costs when determining which BI vendor to choose, as well as decide which deployment option is best for them.

According to an April 2010 Gartner report:

> *"Price should not be the sole driving consideration in vendor selection. Total cost of ownership should be a key consideration, but only within the context of a solution that first and foremost, meets requirements."* [1]

Comparing costs of x86 distributed servers to IBM System z

For this study, we compared the costs associated with delivering BI to a variety of differently sized user populations. Sizes were defined to cover a broad spectrum of customer scenarios, from a departmental 100 named-user scenarios to 1000, 10,000, 20,000, and up to 50,000 enterprise-named users.

This study was completed with the Right-fitting Applications into Consolidated Environments (RACEv) tool (where v stands for virtualization). The RACEv tool was designed by the IBM® Systems and Technology Group (STG) organization in an effort to help customers evaluate key platforms and their associated costs when trying to determine what the best infrastructure is for them and their business. All costs used in the model are based upon realist defaults developed from North American and European enterprises,, many of which have been provided by IBM customers over the course of hundreds of evaluations. For the purpose of this study, RACEv has enabled us to compare the costs associated with deploying Cognos 8 BI on x86 non-virtualized, distributed servers rack-mounted x86 servers with quad-core 2.26 GHz Intel® E5520 Xeon technology to System z® 10 Enterprise Class servers with a Linux® OS.

IBM z/Enterprise 196

This analysis was completed with the IBM System z10® Enterprise Class (z10 EC) server, prior to the recent announcement and general availability of the IBM z/Enterprise™ 196 (z196), the most powerful, scalable mainframe server ever. The z196 offers enhanced scalability, performance, security, resiliency and availability while delivering 60 percent more performance for Linux workloads with a savings of 35 percent in per core licensing costs over z10. Therefore, TCO savings with the z196 will be higher than shown here with the z10 as fewer cores and processors will be needed with the z196.

IBM Cognos 10

This TCA/TCO study was completed with IBM Cognos 8 Business Intelligence V4.1, prior to the availability of IBM Cognos Business Intelligence V10.1. IBM Cognos 10 revolutionizing how organizations use business intelligence. Designed to change how organization make decisions, allocate resources, predict and plan the future, it fuels insight into everything people do across the organization for the ultimate competitive advantage. Cognos 10 leverages the value of the proven technology platform and delivers optimized performance with architectural enhancements and in-memory processing to achieve faster results. We fully expect the TCO to be further reduced with Cognos 10 because we anticipate that less computing resources will be required to achieve the same or better results.

To determine the TCO/TCA, there are two core areas that must first be defined and subsequently applied across all scenarios to ensure an accurate comparison:

- What costs are being compared?
- What are the infrastructure design requirements?

What costs are being compared?

RACEv enables us to evaluate the following categories when exploring the total cost of ownership across the various platform options available to us:

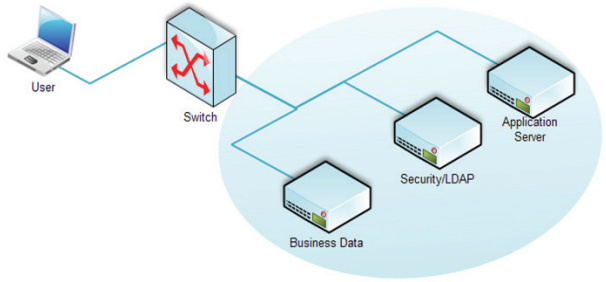
- **Acquisition costs** associated with purchasing all hardware, equipment and software necessary to deliver BI to the business:
  - Server acquisition: the costs associated with purchasing the hardware itself
  - Connectivity acquisition: includes the costs for the actual network ports, switches and cables, as well as the SAN boxes, hard disks and SAN switches for storage
  - Software licenses: the costs of the middleware, hypervisor licenses, and operating systems (Windows® OS versus Linux, VMware®, and Hypervisor), and excludes the cost of the Cognos software, as there is no difference in the Cognos license price across the different platforms with Cognos 8 BI named user pricing
- **Maintenance costs** refers to the costs for the maintenance contact from the vendor:
  - Server maintenance: the vendor warranty cost for support of the hardware
  - Connectivity maintenance: includes the vendor warranty costs for those connectivity components
  - Software maintenance: the vendor warranty cost for support of the software
- **Facilities costs** associated with housing the infrastructure that is required to deliver the service to the business:
  - Powering and cooling the machines, which have been adjusted to a steady state (similar to the equal billing concept versus one based on meeting the peaks)
  - Floor space, which looks at the floor space occupied and the required surrounding floor space to manage and administer the server (often referred to as service clearance)
- **Administration costs** associated with the day-to-day operation of delivering BI to the business:
  - Network administration: the cost of the network administration in the case of x86 is the physical network versus the virtual network with System z, which is generally considered faster and simpler to manage
  - System administration: includes the cost of people administering the BI infrastructure and includes everything from acquiring, installing, and operating to retiring)

What are the infrastructure design requirements to ensure performance and maximize success?

Infrastructure design best practices: hardware and software requirements

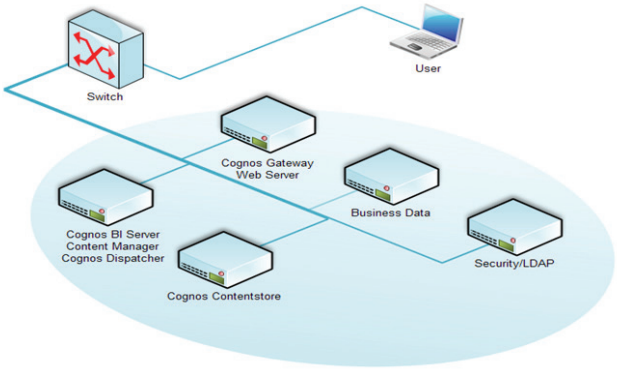
The hardware and software requirements calculated in this study have been defined based on the Cognos 8 BI deployment best practices, which are required to ensure that we meet our customers' performance expectations.

In this realistic and widespread starter setup, the Cognos 8 BI application layer is separated from the business data (for example, data warehouse or operational sources) and from the security layer.



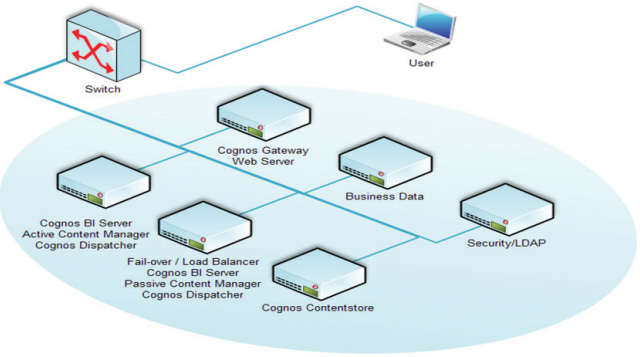
Within this setup, the different functions of Cognos 8 BI (for example, the Web server, content store, metadata management, report services, log services, and so on) compete for resources, which can lead to suboptimal performance, with the application (+web) server layer representing a potential point of failure.

To resolve the competition between these important functions, it is recommended to provide the web server functionality with a dedicated server, as well as the metadata database (Cognos 8 BI content store). This ensures that access to the metadata database does not compete with access to the business data and affect performance. In this model the Cognos 8 BI application server can now focus on its core business, which is producing report output.



At a minimum, this should be the basic architecture, but it still does not provide any failover or load-balancing functionality — without which, availability and ultimately user satisfaction can be affected.

To leverage the load-balancing and failover features that are built into the Cognos 8 BI software architecture, it is recommended that the reporting load is spread across two reporting servers. Therefore, if one fails, the other takes over. This is the basic architectural best practice and the basis for building a scalable architecture that meets the performance expectations of the business — and is therefore used as the basis for defining our hardware and software requirements within this study. We have not included the costs associated with the business data and security/LDAP servers, as they are shared services across other applications.



On System z, the hardware and software requirements to meet the performance and scalability expectations of the business for Cognos 8 BI have been defined by allocating logical Linux servers or virtual guests under z/VM rather than physical Linux servers. z/VM can allocate the physical processor resources on a dynamic, as needed, on-demand basis to each guest server. Increased throughput can then be achieved, as not all Cognos 8 BI components utilize resources equally and unused virtual guest resources are then available to other Cognos 8 BI components as required to meet demand. This is unlike the physically separate distributed servers, which can only perform a single component function well and therefore require the dedicated function-based server allocation. System z and z/VM's superior resource management enable a very high level of sharing amongst virtual guests while maintaining high throughput.

Although the hardware and software requirements are defined by the number of users, we must also account for the usage pattern of the users themselves, as the degree of intensity of usage changes with the different types of users, thereby affecting computing requirements. Based on what we see with many of our customers, we defined our hardware and software requirements based on the type of users and concurrency ratio as follows:

- Type of users:
  – 70 percent consumers
  – 10 percent business authors
  – 5 percent professional authors
  – 15 percent analysts
- User concurrency ratio
  – 1 percent for consumers and recipients
  – 3 percent for authors and analysts

Important to note: The hardware and software requirements used in this study are based on the system performance and query response times of Cognos 8 BI. Also critical to any Business Analytics strategy is the ability to provide the highest levels of data access and data quality. It is recommended that a solid Data Warehousing strategy be developed in conjunction with your overall Business Analytics infrastructure to ensure user satisfaction remains high. IBM Business Analytics on System z is the industry's only end to end solution on a single platform-- delivering the business intelligence and predictive analytics capabilities you need with the enterprise level Data Warehousing capabilities required to deliver faster access to transactional data while maintaining a single version of the truth.

What are the infrastructure design requirements to ensure we deliver a solution which meets the expectations of the business?

Infrastructure design best practices: development and test environment

To minimize the number of servers required and environments that they need to manage, certain companies look to lower costs by cutting back on or omitting their test and development environments for BI applications. For the organization that wants to ensure user satisfaction, such practices are risky business. Investing in test and development environments helps to ensure that applications, especially operational ones, are fully tested and will meet the needs of the business before going live in the production environment.

Jo Coutuer, Managing Partner at Numius, a Belgium-based performance management consulting firm, firmly believes that adequate test and development environments are integral to successful BI. After 10 years of developing and implementing BI solutions, he has seen how the costs of inadequate test and development environments add up:

> *Development and test environments are equally important for business intelligence applications as they are for operational applications. More so, they are much more sensitive to security and performance challenges, mainly because they use a vital asset, corporate data, as their raw material. Not providing the right architecture for a business intelligence project can result in developers not delivering the right applications, in testers not adequately testing (it is too slow) and in end-users/clients being dissatisfied with the result that is of so much poorer quality than the applications they used to enter the raw data into the corporate memory in the first place.*

We believe that adequate test and development environments are essential for ensuring user satisfaction and proper security around handling data. Cognos 8 BI best practices stipulate having these environments precisely so that companies can ensure user uptake of their new BI system. Therefore, for the purpose of this study, all scenarios include the costs associated with building hardware and software and managing both development and test environments. To ensure optimal performance of the development and test environments, capacity for development has been calculated based on 25 percent of the production capacity, and capacity for test has been calculated based on 50 percent of the production capacity.

Study results

Within this study, across our various deployment sizes (100, 1000, 10,000, 20,000, and 50,000), we have strived to answer four key questions that IT must consider when defining the scope of their BI initiative:

1. What is the TCO, based on the Cognos 8 BI best practices identified above, acquired to meet the number and performance expectations of our users?
2. How does the industry best practice of having to refresh our hardware every three to five years affect our TCO?[2]
3. What are the TCO implications of meeting the growing demand over five years for BI?
4. Can we afford to commit to a service level that requires high availability?

With an understanding of the total ownership costs over five years, we then looked deeper into where those costs came from — including total cost of acquisition, maintenance contracts, facilities and system administration — in an effort to help customers determine where they would rather allocate their budget.

What is the TCO/TCA, based on the Cognos 8 BI best practices, required to meet the number and performance expectations of our users?

Based on the best practices and including the costs defined above, we explored the TCO and TCA (first year costs include both the initial acquisition and setup costs, as well as first year maintenance and management) of deploying Cognos 8 BI on x86 distributed non-virtualized versus System z10 Enterprise Class servers.

For consistency, the same type/model of server was used in all deployment sizes. The cost of the Cognos 8 BI licenses have been removed from the TCO and TCA cost analysis, as they are the same regardless of the platform choice with named user pricing and therefore do not alter the total price. All hardware and software pricing was based upon the estimated street price for North American and European enterprises, and in the case of the 10,000+ user scenarios, we used IBM Solution Edition Packaging for the System z components, which provides special pricing for specific workloads that meet certain size requirements. All operating and facilities costing are based on realistic defaults and get-started values from hundreds of real customer evaluations. Also key to note is that all scenarios include the cost of net new hardware for both x86 and System z servers. For this portion of the study we are exploring the TCA/TCO of a basic "get started" infrastructure and excluding the incremental costs associated with a technology refresh, scaling to meet additional demand, and building out an infrastructure to ensure the high availability associated with their BI service. These areas will be explored later in the study.

Cost comparison of x86 distributed servers versus System z10 Enterprise Class for Cognos 8 Business Intelligence 100 Named User Deployment

	1st yr	2nd yr	3rd yr	4th yr	5th yr	Total
x86	$592 K	$319 K	$319 K	$319 K	$319 K	$1.9 M
System z	$352 K	$204 K	$204 K	$204 K	$204 K	$1.2 M
Approximate percent Savings with System z	40%	36%	36%	36%	36%	36%

The approximate total cost of ownership of managing and building a high-performing Cognos 8 BI infrastructure over five years for 100 users equates to $1.9 million with x86 and $1.2 million with System z. Although it is recognized that the number of x86 servers and the System z10 Enterprise Class configured to enable failover, load balancing, and isolated development and system test may be considered by some to be excessive for a deployment of this size, year-over-year System z consistently comes in as a more cost-effective option for customers. In essence, this configuration creates an infrastructure which will ensure delivery of a solution that meets the needs of the business, providing end-user satisfaction which will ultimately help to encourage other users to adopt the new technology. With this configuration, increased adoption can be addressed, in the case of System z providing the option to leverage System z for other workloads, therefore further improving the ROI of a System z investment.

Cost comparison of x86 distributed servers versus System z10 Enterprise Class for Cognos 8 Business Intelligence 1000 Named User Deployment

	1st yr	2nd yr	3rd yr	4th yr	5th yr	Total
x86	$736 K	$389 K	$389 K	$389 K	$389 K	$2.3 M
System z	$530 K	$278 K	$278 K	$278 K	$278 K	$1.6 M
Approximate percent Savings with System z	28%	29%	29%	29%	29%	30%

When we scale up to 1000 named users we see a slight increase in the TCO over five years to $2.3 million with x86 and $1.6 million for System z, which interestingly enough is still less than the TCO for 100 users at $1.9 million over five years with an x86-based infrastructure — allowing for future growth at less cost to the business.

Cost comparison of x86 distributed servers versus System z10 Enterprise Class for Cognos 8 Business Intelligence 10,000 Named User deployment

	1st yr	2nd yr	3rd yr	4th yr	5th yr	Total
x86	$1386 K	$718 K	$718 K	$718 K	$718 K	$4.3 M
System z	$2077 K	$352 K	$352 K	$609 K	$609 K	$4 M
Approximate percent Savings with System z	-33%	51%	51%	15%	15%	7%

As we continue to scale up to larger enterprise deployments we begin to see a shift in the TCO model. Although the TCO over five years continues to be less with System z at $4 million versus $4.3 million with x86, for 10,000 named users the yearly costs are no longer always lower with System z. In the first year, the system administration savings with System z are no longer able to outweigh the initial acquisition costs, which in this scenario are greater. The Solution Edition pricing for System z included the first three years of the maintenance contract, so the delta in years 4 and 5 is reduced as that cost is added back in, but continues at the end of the day to be less expensive.

Cost comparison of x86 distributed servers versus System z 10 Enterprise Class for Cognos 8 Business Intelligence 20,000 Named User Deployment

	1st yr	2nd yr	3rd yr	4th yr	5th yr	Total
x86	$2425 K	$1261 K	$1261 K	$1,261 K	$1261 K	$7.6 M
System z	$3392 K	$568 K	$568 K	$1072 K	$1072 K	$6.7 M
Approximate percent Savings with System z	-29%	55%	55%	15%	15%	12%

For organizations with 20,000 users, System z continues to be a more affordable choice, with the TCO over five years coming in at $6.7 million with System z versus $7.6 million with x86.

Cost comparison of x86 distributed servers versus System z10 Enterprise Class for Cognos 8 Business Intelligence 50,000 Named User Deployment

	1st yr	2nd yr	3rd yr	4th yr	5th yr	Total
x86	$5991 K	$3095 K	$3095 K	$3095 K	$3095 K	$18.4 M
System z	$9034 K	$1434 K	$1434 K	$2420 K	$2420 K	$16.7 M
Approximate percent Savings with System z	-34%	54%	54%	22%	22%	9%

This model continues to hold true with 50,000 users. System z continues to be a more affordable choice, with the TCO over five years coming in at $16.7 million with System z versus $18.4 million with x86.

How does the industry best practice of having to refresh our hardware every three to five years affect our TCO?

Now that we have established that System z is consistently the more affordable option for customers deploying Cognos 8 BI with a best practice configuration, let us build on that to understand the implications of refreshing our hardware every three to five years. Common industry practice is to replace all hardware every 36 to 60 months in order to realize operational cost savings with improved performance and avoid incremental data center capital spending.[3]

For the purposes of this study, we looked at the cost implications of a technology refresh at 36 months.

For x86 servers, this includes all the costs associated with:

- The acquisition of the new hardware (the model assessed the cost of the replacement servers as equal to the cost of the old servers)
- Installation
- Moving workload
- De-installing and trading in/shipping out the old servers
- Administration (for the purpose of this study, we estimated that the administrative cost burden of executing the technology refresh is a 25 percent, one-time increase over the normal annual cost of administration)

For System z servers, this includes the costs associated with:

- Acquisition of the upgrade package and replacement parts (It is important to note that traditionally there has not been any incremental costs from a hardware perspective for upgrading to the next version of System z, as upgrades were included in the price of the maintenance contract; therefore, we have not applied any additional cost from a hardware perspective.)
- Acquisition of additional processing power is additional if required (MIP), but is not required in these scenarios as we were not assuming any growth in this scenario
- The installation of the new hardware package
- Administration (assessed as an additional 5 percent, as there is no workload movement required, and the upgrade is installed on the existing server)

Once all these costs are assessed, we will show that the delta between System z and x86-based infrastructure continues to grow, and System z continues to show itself to be less expensive than a distributed server farm regardless of the size of deployment. It is also worthwhile to note that we are not taking into account the significant costs of validating a new upgraded environment from an end-user/application point of view. Upgrading a distributed environment would not only generate a much longer downtime (or would require expensive measures to avoid that), it would also require more retesting and validation, considering the much larger and more direct impact of the hardware layer on the proper functioning of the environment. On System z, the hardware is less intertwined with the proper functioning of the application, so hardware upgrades have a lesser impact.

Total cost comparison of x86 distributed servers versus System z10 Enterprise Class for a Cognos 8 BI deployment when all servers are updated for a technology refresh at 36 Months

Named Cognos 8 BI Users	x86	System z	Approx Savings with System z over 5 yrs	Percent savings with System z over 5 yrs
100	$2 M	$1.2 M	$800 K	40%
1000	$2.4 M	$1.6 M	$800 K	33%
10000	$4.5 M	$4 M	$500 K	11%
20000	$8 M	$6.7 M	$1.3 M	16%
50000	$19.6 M	$16.8 M	$2.8 M	14%

What are the TCO implications of meeting the growing demand over five years for BI?

When an organization embarks upon a BI roadmap, it traditionally starts with either a departmental aspiration or with a corporate, but application-specific, scope. Not as much for infrastructural reasons, but rather for project and change management reasons, it is unlikely that an enterprise embeds BI in all its business processes at the corporate level in one big bang. Unlike implementing an Enterprise Resource Planning (ERP) system, which often requires big-bang approaches, BI allows for gradual growth.

As prudent as gradual growth may be, underestimating the impact of future use at the infrastructural level can turn out to be very cost-inefficient. An organization should be aware of its ambitions and set out to architect for those ambitions, not necessarily implementing to the full extent, but at least designing with considerations for the future architecture. Being able to start on a platform that entails the least amount of cost to implement the full vision is vital.

The need for infrastructural growth can come from three dimensions:[4]

1. Organizations evolve on the business-intelligence roadmap, fulfilling their information agenda aspirations, and implement new applications in new departments or on top of new business processes.
2. Within existing processes and applications, the number of users increases from the initial pilot population to the general population.
3. Pioneer populations become more and more proficient at using BI and start to embed it more into their daily processes, thereby generating a higher BI workload.

Which of these factors comes into play first is hard to predict. To a large extent, this depends on the vision of the organization and where it puts its change-management efforts.

When planning for success, these three factors, separately or combined, tend to cause a surge in computing requirements after the first year. For BI, it is not so much the number of users that is critical, but rather the number of users times the degree of intensity of usage. Factors 1 and 2 increase the absolute number of users, and factor 3 increases the degree of intensity. Either of those increases the hunger for computing resources at the BI level.

It is not uncommon to see year-on-year growth following a pattern of 50 percent in year 1, an additional 50 percent in year 2, a decreasing growth in year 3 to 20 percent, and stabilization towards years 4 and 5 with 10 percent and 5 percent growth respectively. The initial explosive growth typically occurs because all three factors tend to increase. After the initial explosive growth in year 1 and year 2, it is rather factor 3, the intensity of usage, which explains the additional growth rate in future years.

In real-life cases we often see that infrastructure is the limiting factor to this growth. Because the infrastructure cannot sufficiently scale, users go through a phase of disappointment due to system instability or slow performance, and their growth ambitions wither. The hidden cost of this negative spiral is immense, in terms of underutilization of software licenses (which cost just as much, whether you use them intensively or not) and unattained business advantages. If these two cost factors were to be considered systematically, investments in infrastructural scalability would seem minimal.

For the purpose of this study and based on observations from the field, growth rates were assumed to be the following:

- 50 percent in year 2
- 50 percent in year 3
- 20 percent in year 4
- 10 percent in year 5

To accommodate each year's growth, the appropriate hardware, software and administration required to ensure optimal service to the business has been added.

System z's strength in scaling[5] makes it much more cost efficient for accommodating growth. It is simply a matter of adding additional Integrated Facility for Linux (IFL, a specialty CPU/core processor that can only execute z/VM and Linux programs) processors, which can be done dynamically without taking the system down.

For a x86 environment, accommodating growth requires acquiring, installing and managing the new hardware. Once these costs are taken into account, System z proves to be vastly less costly to manage.

Total cost comparison of x86 distributed servers versus System z10 Enterprise Class for a Cognos 8 BI deployment when the Infrastructure is expanded to meet additional capacity

Named Cognos 8 BI Users	x86	System z	Approx Savings with System z over 5 yrs	Percent savings with System z over 5 yrs
100	$3.7 M	$2 M	$1.7 M	46%
1000	$5.3 M	$3.2 M	$2.1 M	40%
10000	$16.6 M	$13.9 M	$2.7 M	16%
20000	$31.4 M	$27.9M	$3.5 M	11%
50000	$78 M	$65.6 M	$12.4 M	16%

Can we afford to commit to a service level that requires high availability?

As organizations recognize the strategic value that their BI investments deliver to the business, more and more businesses are deeming BI a mission-critical application and are therefore looking to build an infrastructure that ensures its availability 99.999 percent of the time.

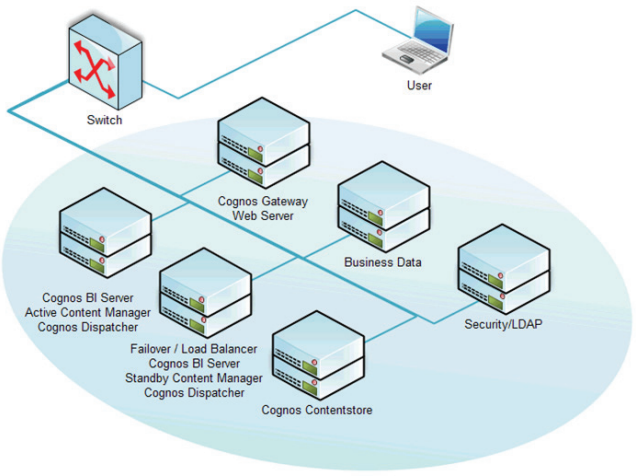
Building a high-availability infrastructure can be defined as the measures taken to reduce the probability that the failure of a single component in the architecture will make the entire infrastructure defective. In that definition, a full high-availability environment is one in which all potential points of failure have been made redundant. No single device or software failure can cause the solution to become defective. In a distributed environment, this requires a duplicate implementation of every component, hardware and software, for every function.

To help achieve a base level of high availability, Cognos 8 BI provides core standard high-availability features. Based on the deployment best practices above, we have two report servers. Workload comes in through the gateway server and the dispatcher services on the report servers will distribute the workload amongst them, based on the power they both have available and based on the workload they are currently handling (which is called "load balancing"). The same mechanism ensures that any one failing report server's new workload is directed to the other report server, without alerting the user, during which time the one remaining server must handle the full load. Although it may compromise performance, at least the service is still available.

The Content Manager Service is a vital service in the Cognos 8 BI architecture, as it handles the communication with the security servers and with the Cognos 8 BI metadata in the content store database. Unlike the report services, it cannot function in a load-balancing mode. One active content manager service needs to process the full load. Architecture best practices dictate we provide a separate content manager server, so even without the load-balancing feature, a second server can be made the standby content manager, which takes over when the primary (active) content manager goes down. This standby content manager can be put on one of the report servers in an effort to reduce hardware.

Although the Cognos 8 BI report services and the content management service can both benefit from standard high-availability features, these features alone do not protect the most singular potential point of failure, which is the content store database. Best practices dictate that this database be made highly available by using database or server-clustering mechanisms.

For the purpose of this study, to ensure the high availability of Cognos 8 BI as defined in the definition above, we have made all potential points of failure redundant with a duplicate implementation of every component, hardware and software.



The costing model for the x86 infrastructure includes the cost of the equipment acquired to provide for high availability and the cost of operating that incremental equipment over the five years.

With System z we are able to leverage the inherent high availability built into the system itself, but to ensure that we are protected 100 percent of the time we incorporated the cost associated with deploying backup IFLs — which are dedicated to the Cognos 8 BI workload and only made available in the event of a disaster. These IFLs are offered at a reduced price, as they have limited usage; and because the workload is dynamically moved over for failover, there is no additional software or administrative costs required, and there is no impact to the user community in the event they are required.

Regardless of the user-population size or the infrastructure design requirements, the TCO was greatly reduced over the course of five years for Cognos 8 BI with System z compared with a distributed server environment.

Cost comparison of a standard best practices based architecture with high availability on distributed x86 servers versus System z

Named Cognos 8 BI Users	x86	System z	Approx Savings with System z over 5 yrs	Percent savings with System z over 5 yrs
100	$2.9 M	$1.2 M	$1.7 M	59%
1000	$3.6 M	$1.7 M	$1.9 M	53%
10000	$6.7 M	$4.1 M	$2.6 M	39%
20000	$11.7 M	$7 M	$4.7 M	40%
50000	$28.9 M	$17.5 M	$11.4 M	39%

Cost comparison of a standard best practices based architecture including the cost of a technology refresh with a high-availability environment on distributed x86 servers versus System z

Named Cognos 8 BI Users	x86	System z	Approx Savings with System z over 5 yrs	Percent savings with System z over 5 yrs
100	$3 M	$1.2 M	$2 M	67%
1000	$3.8 M	$1.7 M	$2.1 M	55%
10000	$7 M	$4.2 M	$2.8 M	40%
20000	$12.4 M	$7 M	$5.4 M	44%
50000	$30.5 M	$17.6 M	$12.9 M	42%

Cost comparison of a standard best practices-based architecture designed to accommodate growth rates with a high-availability environment on distributed x86 servers versus System z

Named Cognos 8 BI Users	X86	System z	Approx Savings with System z over 5 yrs	Percent savings with System z over 5 yrs
100	$5.8 M	$2 M	$3.8 M	66%
1000	$8.3 M	$3.4 M	$4.9 M	59%
10000	$26 M	$14.9 M	$11.1 M	43%
20000	$49.5 M	$29.7 M	$19.8 M	40%
50000	$122.7 M	$70.4 M	$52.3 M	43%

TCO breakdown

To understand and appreciate the savings associated with leveraging System z for your BI infrastructure, we need to understand where the savings come from. To simulate real-world requirements, we have broken down the costs based on a standard architecture designed for high availability and have included the costs associated with a technology refresh.

When we look at the physical number of servers and CPUs required to meet the various workloads, it is easy to see where the savings are going to come from. System z has been designed to support mixed workloads. Therefore, unlike x86 servers, which require dedicated boxes for the development, test and production environments, System z can be run on a single box, and those resources can be shared with the production environment when not in use — resulting in a significant reduction in the hardware required to meet the business needs.

	Servers Standard architecture with high availability		CPUs Standard architecture with high availability	
	x86	System z	x86	System z
100	17	1	69	0.5
1000	22	1	88	2.3
10000	42	1	170	22.9
20000	74	1	295	48.3
50000	184	3	735	121.7

As we begin to break down the total costs into the core costing categories (acquisition, maintenance contract, facilities and system administration), it is important that we don't misinterpret the following percentages, as the System z percentages sometimes represent a higher percentage of the total costs over the five years. To put that in perspective we need to remember that those percentages are based on the total costs. We have already established that the total costs over five years are substantially less with System z. Therefore, although the percentages may be higher, they generally translate to lower costs to the bottom line.

Acquisition costs

As discussed, the acquisition costs include the costs associated with purchasing everything necessary to deliver BI to the business — including the hardware, network connectivity requirements, and software (while excluding the Cognos 8 BI software, as it is the same for all cases with named user pricing), and the additional hardware, software and connectivity required to ensure the high availability of your BI solution.

Named Cognos users		100	1000	10000	20000	50000
System z	**Total Cost over 5yrs**	$1.1 M	$1.6 M	$7.1 M	$7 M	$17.5 M
	Acquisition Costs (% of total costs) Includes: Server Connectivity High availability Software	**14.9%**	**20.1%**	**33.51%**	**33.87%**	**36.01%**
	Total Acquisition Cost	$164 K	$322 K	$1,374 K	$2,371 K	$6,302 K
x86	**Total Cost over 5yrs**	$3 M	$3.8 M	$7 M	$12.4 M	$30.5 M
	Acquisition Costs (% of total costs) Includes: Server Connectivity High availability Software	**17.5%**	**18%**	**19.11%**	**18.6%**	**19.7%**
	Total Acquisition Cost	$525 K	$684 K	$1338 K	$2306 K	$6009 K
Savings with System z		$361 K	$362 K	-$36 K	-$65 K	-$293 K

Many organizations dismiss System z as a viable platform for their projects due to the perceived high acquisition costs, which is correct if they compare a single x86 server to a single System z Enterprise class server. But the reality is that a single x86 server is not sufficient to meet the recommended best practices required to meet the performance expectations of the business. As discussed, to ensure that your BI solution will meet the expectations of the business, we need to ensure that it will deliver the functionality required, be able to scale to meet the user demands, and be available when and where they need it, which cannot be done with a single box.

It is true that if we break down these numbers and look at the costs of the servers alone and do not consider the acquisition costs of the other components required to get your BI infrastructure up and running, System z is initially more expensive. But when we look at the combined cost of acquiring all the components required, System z proves to be either cheaper or nominally more expensive than a x86 distributed infrastructure.

Therefore, the acquisition cost to leverage System z is not the barrier to entry we had initially perceived it to be.

Annual maintenance agreements

Maintenance agreements, like acquisition costs, are an unavoidable cost of any IT initiative that cannot be debated. Although we may be able to negotiate varying levels of discounts, the costs are generally proportionally predefined by the vendor. Maintenance contracts, like the products themselves, come with a defined list of features, and we need to weigh the value of these features to our business and consider the costs of accessing those features elsewhere.

		100	1000	10000	20000	50000
System z	**Total Cost over 5yrs**	$1.1 M	$1.6 M	$4.1 M	$7 M	$17.5 M
	Facilities (% of total costs) Server Software Connectivity	**15.4%**	**31.4%**	**40.08%**	**44.69%**	**39.59%**
	Total approx. cost over five years	$16.9 K	$502 K	$1643 K	$3128 K	$6928 K
x86	**Total Cost over 5yrs**	$3 M	$3.8 M	$7 M	$12.4 M	$30.5 M
	Facilities (% of total costs) Server Software Connectivity	**1.7%**	**2.1%**	**2.1%**	**2.1%**	**2.1%**
	Total approx. cost over five years	$51 K	$80 K	$86 K	$147 K	$662 K
Savings with System z over 5 yrs		-$118 K	-$422 K	-$1557 K	-$2981 K	-$6266 K

At first glance, this is the one area where choosing a System z infrastructure represents a reasonably significant incremental cost over an x86 infrastructure. With that being said, when we explore the features and value to the business, it is easy to understand and justify this incremental cost. Unlike the x86-based maintenance contract, where we have only included the costs of a standard support contract and did not include the cost associated with the customer maintaining replacement parts on site, the System z maintenance contract delivers a much more feature-rich solution.

The System z maintenance contract includes upgrades, which replace the cost of a technology refresh in the distributed world. It also includes a dedicated support engineer with intimate working knowledge of the customer's deployment. When the automatic phone-home capability alerts them of a potential issue, the dedicated support engineer is in a position to quickly and efficiently deal with the issue at hand, saving IT hours and hours of time on the support line trying to identify and fix the issue. In the event of a malfunctioning part, the customer does not need to maintain the liability of stocking replacements on site that they may or may not end up needing, as IBM commits to delivering replacement parts within two hours of a reported issue. So although the sticker price may be overwhelming at first, one needs to clearly understand the alternatives.

Facilities costs

Facilities costs, floor space, and power costs for your BI infrastructure represent, on average, approximately 10 percent or more of your overall operating costs and are one of those areas that can easily be forgotten when exploring the total cost of ownership. If not monitored, facilities costs can quickly spiral out of control as a BI infrastructure is built out across our various departments by failing to maximize the economies of scale of the available capacity that we may already have at our disposal.

		100	1000	10000	20000	50000
System z	**Total Cost over 5yrs**	$1.1 M	$1.6 M	$4.1 M	$7 M	$17. 5M
	Facilities (% of total costs)	**22.8%**	**16.6%**	**7.6%**	**5.1%**	**6.2%**
	Power	3.8%	2.7%	2%	1.8%	2.2%
	Floor space	19%	13.9%	5.6%	3.3%	4%
	Total approx. cost over five years	$250 K	$265 K	$312 K	$357 K	$1085 K
x86	**Total Cost over 5yrs**	$3 M	$3.8 M	$7 M	$12.4 M	$30.5 M
	Facilities (% of total costs)	**12.6%**	**12.7%**	**11.7%**	**11.9%**	**11.6%**
	Power	1.8%	1.9%	2%	2%	2%
	Floor space	10.8%	10.8%	9.7%	9.9%	9.6%
	Total approx. cost over five years	$378 K	$483 K	$819 K	$1476 K	$3538 K
Savings with System z over 5 yrs		$128 K	$218 K	$507 K	$1119 K	$2453 K

When we look closely at the facilities costs, it becomes easy to see where the total cost savings associated with leveraging System z start to surface. The ability of System z to handle mixed workloads and scale translates to the need for less CPUs and servers — resulting in the need for less floor space, and less power to run them.

Although the x86 deployment model comes in at a lower percentage of the total cost, it translates to a higher bottom-line cost over the five years. Also, the percentage of total costs for power and floor space continues to hold steady across various deployment sizes, failing to deliver the economies of scale normally expected with growth.

With System z we see that we can allocate a smaller portion of our budget to facilities costs as we grow, enabling IT to deliver cost savings to the business or redirect their budget to more value-add activities, or both.

System administration costs

System administration covers the costs to deploy and operate our BI infrastructure design based on our stated best practices and includes the duties of installing, supporting and maintaining that infrastructure, while planning for and responding to service outages and other problems.

		100	1000	10000	20000	50000
System z	**Total Cost over 5yrs**	$1.1 M	$1.6 M	$4.1 M	$7 M	$17.5 M
	System Admin (% of total costs)	**45.25%**	**31.9%**	**18.4%**	**16.5%**	**18.2%**
	Network admin	0.4%	0.3%	0.2%	0.3%	3.5%
	System admin	44.8%	31.6%	18.2%	16.2%	14.7%
	High-availability admin	0%	0%	0%	0%	0%
	Total System Admin Costs	$498 K	$510 K	$754 K	$1155 K	$3185 K
	Total Cost over 5yrs	$3 M	$3.8 M	$7 M	$12.4 M	$30.5 M
x86	**System Admin** (% of total costs)	**68.1%**	**67.2%**	**67.5%**	**67.4%**	**66.6%**
	Network admin	2.7%	2.8%	2.9%	2.9%	2%
	System admin	35.8%	35.2%	35.6%	35.5%	35.6%
	High-availability admin	29.6%	29.2%	29%	29%	29%
	Total System Admin Costs	$2043 K	$2554 K	$4725 K	$8358 K	$20313 K
Savings with System z over 5 yrs		$1.5 M	$2 M	$3.9 M	$7.2 M	$17 M

Similar to the facilities costs, System z delivers significant savings in our ability to deliver BI to the business. Most significant to note is the impact of System z's architecture in ensuring the availability of our BI infrastructure. While delivering high availability, System z requires no additional administrative resources to be allocated. With x86, the management of those additional components required to ensure high availability translates into a substantial cost to the business and in some cases prohibits IT's ability to commit to service level agreements (SLA).

As with the facilities costs, the system-administration costs as a percentage of our total continues to go down as we grow our BI deployment on System z, which delivers greater economies of scale and allows IT to redirect its budget to more value-add activities — such as delivering BI to a broader audience, or focusing resources on better educating our user community to help improve the ROI. With an x86-based infrastructure — in which we do not experience any economies of scale from an administrative perspective — the bigger we get, the more it costs.

What's key to note is that when we look at the cost savings of leveraging System z for your BI infrastructure, the system-administration savings alone equal the TCO over five years of System z. In other words, System z pays for itself.

Conclusion

Organizations that want to ensure a successful enterprise-wide BI project should consider System z as a lower-cost alternative over the long term when compared to a distributed-server environment. While initial acquisition costs may be marginally higher, after five years, the total cost of ownership is consistently lower. Furthermore, an enterprise-level BI deployment is less expensive for both new and existing customers over the long term. And finally, System z achieves high availability, and enables dramatic scalability that would be cost-prohibitive within a distributed infrastructure.

We have established that:

- The TCO with System z is dramatically lower for organizations that are considering future costs such as technology updates, growth, and high availability for users.
- The acquisition costs to leverage System z are not the barrier to entry we had initially perceived it to be when we consider all costs.
- With the savings from system-administration costs over five years, System z pays for itself.
- System z delivers greater economies of scale, so we can allocate a smaller portion of our budget to facilities and administrate costs, enabling IT to deliver BI to a broader audience at a reduced cost point.
- System z makes ensuring the ongoing availability of BI a viable option for IT.
- System z makes it faster and more cost-effective to meet the growing demand of the business.
- Existing System z customers only stand to further reduce their TCO, as portions of their initial acquisition costs are already covered, further increasing the ROI of their System z investment.

With its vastly superior performance, security, deployment speed, scalability and reliability, Cognos 8 BI for Linux on System z allows IT departments to move from being merely a lights-on organization to a true strategic partner for the business.

Get your own TCA/TCO study done today

To get a total cost of ownership assessment for a Cognos 8 Business Intelligence deployment on System z in your environment, send an email to zcognos@us.ibm.com. A Cognos representative specializing in System z deployments will contact you shortly.

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1 Source: Gartner "What's the Real Price of Business Intelligence Software?" James Richardson, 01 April 2010

2 "New hardware architectures incorporating major improvements in the areas of computing performance, manageability, power consumption, and key differentiators arrive on approximately a three-year basis." Robert Frances Group. Demystifying Commodity and Blade Server TCO – Part Three: Leasing Analysis. Feb. 2, 2007.

3 "New hardware architectures incorporating major improvements in the areas of computing performance, manageability, power consumption, and key differentiators arrive on approximately a three-year basis." Robert Frances Group. Demystifying Commodity and Blade Server TCO – Part Three: Leasing Analysis. Feb. 2, 2007.

4 This is in line with observations made by industry experts and academics about new technology adoption rates. Bass, Frank (1969). "A new product growth model for consumer durables". Management Science 15 (5): 215–227 and Rogers, Everett M. (1983). Diffusion of Innovations, New York: Free Press.

5 When it comes to scalability, System z is a world-record holder, delivering 9,445 business transactions per second based on more than 380 million accounts with 3 billion transaction histories as part of the world's largest Core Banking Benchmark run by IBM and Financial Network Services (FNS), a subsidiary of Tata Consultancy Services, for the Bank of China.


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