

The Total Cost of Ownership (TCO) of migrating to SUSE® Linux Enterprise Server for System z

This White Paper explores the financial benefits and cost savings of moving workloads from distributed to mainframe environments. It will highlight and identify both hard and soft benefits; specifically quantifying business benefits from an infrastructure that provides optimal performance, reliability, high availability with less downtime risk, real time-responsiveness, serviceability, lower application costs, power and virtualization to run hundreds to thousands of Linux images on IBM mainframe technology.

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SUSE® LINUX ENTERPRISE SERVER FOR SYSTEM Z

INTRODUCTION

Growing businesses and their IT departments typically must deal with an explosion of distributed servers running a wide variety of mission critical and lightweight applications. This results in ever increasing hardware, software, data center, systems management and business support costs. By leveraging the open source operating system, SUSE® Linux Enterprise Server, on the historically most reliable and efficient platform - the IBM System z mainframe, IT leaders can control Total Cost of Ownership (TCO) and address their most pressing challenges. Because the mainframe (System z) offers the most effective platform for virtualization, dramatically higher employment of the hardware investment (in terms of CPU utilization) is possible. Similarly more cost efficient software license and subscription models are offered. Furthermore, the System z platform with SUSE® Linux Enterprise Server delivers greater reliability, availability, and serviceability than distributed computing server environments.

Simply put, SUSE® Linux Enterprise Server running on System z delivers a lower TCO than a typical distributed systems environment. Along with the open systems capabilities required by organizations looking to reduce long term risk and reliance on specific vendors, the combination of SUSE® Linux Enterprise Server on the IBM System z platform (Linux on z) should be considered by any organization trying to control costs while broadening their options for future agility and success.

EXECUTIVE SUMMARY

Ever expanding server requirements in the distributed computing space result in a struggle to meet demand while dealing with the inevitable support challenges of a complex environment, including:

- Escalating software license costs,
- Challenges in achieving effective utilization of computing power,
- Reliability, availability, and serviceability (RAS) issues,
- Data center overhead (power and floor space) increases and
- A potential reliance on proprietary technologies

SUSE® Linux Enterprise Server for System z (Linux on z) addresses all these considerations and this paper provides a framework for quantifying the value that a migration to that solution delivers. For workloads that lend themselves to migration to the Linux on z environment either utilizing the same vendor applications (e.g. in the case of SAP, Oracle, Tivoli, WebSphere and others) or by substituting open source Linux solutions for proprietary options (e.g. DB2 Express/C rather than Microsoft SQL Server), a compelling cost story unfolds. The basic cost of software can be substantially lower based on the licensing approach of the Integrated Facility for Linux. The investment in a System z platform and equivalent computing power is offset over time by the considerably higher utilization offered by running z/VM at levels approaching and even exceeding 90%.

To demonstrate a positive Return on Investment from migrating to Linux on z, a set of straight-forward but increasingly complex measurement activities are prescribed:

- Measure the direct costs of the existing server environment for data center floor space and energy consumption. Depending on the efficiency of existing servers these can be reduced anywhere from 35%-90%, significantly offsetting any migration costs.
- Estimate the anticipated server growth over the next three to five years and the associated costs of those servers and software licenses. Compare those cost to those of growing a System z environment with associated IFLs and software licenses. Savings of typically 30-40% of existing costs augment the benefits above to exceed the breakeven point against migration costs.
- Evaluate the anticipated labor improvement in terms of on-going maintenance and new server (physical or virtual) provisioning. This increases total benefits to yield a positive Return on Investment (ROI).
- Calculate the current indirect costs of planned and unplanned downtime as well as time to market delays in rolling out new systems. While these values are heavily dependent on the current solution, the business type and applications, and the overall economic climate; reducing reliability, availability, and serviceability issues in some businesses delivers opportunity cost savings that significantly exceed the benefits of the direct costs above.

TCO ANALYSIS METHODOLOGY

Alinean, with IBM and Novell has developed a model for evaluating whether a migration to the System z environment running SUSE® Linux Enterprise Server provides a return for any given customer. This Total Cost of Ownership (TCO) methodology comprehensively explores the costs and impacts of running business applications on distributed servers and compares that Chart of Accounts to the values anticipated in a proposed mainframe environment. Depending on a number of factors including the class of current processors, the degree of utilization of virtualized servers, growth rates, software licensing differences between platforms, the cost to the business of planned downtime, unplanned downtime, and application deployment delays; the model helps to identify the circumstances in which SUSE® Linux Enterprise Server for System z offers the better option for any given organization.

The following table summarizes the key line items in the TCO comparison between the two alternatives:

TCO Category	Current Costs	Proposed Costs	Savings
Hardware	Continued acquisition of new servers and upgrades with each added product or increase in demand	Typically a single or dual system with capacity to avoid additional acquisitions for years to come	A new System z platform requires an investment, but unused capacity on existing systems can be used to run SUSE® Linux Enterprise Server for System z. Future growth comes at lower cost
Software	Licensing per platform and processor	Integrated Facility for Linux (IFL) licensing that is far more cost effective relative to utilization	Substantial reductions in software spending for key business applications
Systems Management Labor	Multiple systems to configure, support, maintain, patch and upgrade	A single physical platform image to manage	Significant reduction in both overall labor and the diversity of skills required as physical provisioning of servers in a distributed environment is no longer required. Typically this is 20% of systems management labor.
Power and Facilities Costs	Expanding footprint and power requirements	Fixed footprint and marginal power increases over time	Reduction in required floor space and power consumption with controlled future cost growth
Downtime	9.99% availability or less due to unplanned outages. Typically 16-20 hours annually for a midsize business	80% reductions in planned downtime and virtually 0 hours of unplanned downtime from eliminating single points of failure	Savings of typically 15 hours of unplanned outage and potential hundreds of planned hours.
Business Agility	Provisioning times for new physical server systems ranging from days to weeks	Provisioning times for new virtual server environment measured in minutes	Depending on the value of implementing each new system, days and weeks of additional business activity can be facilitated.
Professional Services Fees	Installation and configuration of physical devices on a routine and regular basis	Installation and configuration limited to the initial migration to the new platform, if an existing underutilized mainframe is not available	Provisioning of new virtual servers occurs within minutes, saving typically 20% of total provisioning labor
Total	Total	Total	Total

Hardware (Server Costs)

Compare the server hardware costs for on-going maintenance and growth expectations for the current environment versus the purchase price and growth expectations for the server hardware for the proposed IBM System z server solution. Effectively this is a trade-off between current physical server purchases and associated support costs today across all workloads, processor purchases and support costs on the System z platform in the future.

The two significant analyses required to assess the TCO differences in the environments are the evaluation of current and proposed computing power requirements in terms of the ðas isð server/processor configurations and the ðto beð System z platform and its processors. Doing

this requires an understanding of which workloads are to be migrated, as well as the existing and anticipated CPU utilization rates for each work load. Experience suggests that distributed servers running non-virtualized applications operate in the 10-20% utilization range. If virtualized, 40% utilization may be achieved. In contrast, with the System z hypervisor environment under z/VM, 85% utilization is common, and resources can be shared and reallocated across workloads as necessary. Significantly, this utilization is also possible because different workloads that interoperate (SAP and DB2 for instance) can communicate considerably faster across the same platform rather than across a network connection.

Software (Server Costs)

Compare the server software costs for on-going support and growth expectations for the current environment to the server software purchase price and growth expectations for the proposed IBM System z server solution. OS and Database licenses, application server licenses, systems management licenses, and other software in the current distributed server environment can be licensed more cost effectively on an IBM mainframe processor (the Integrated Facility for Linux or IFL) dedicated to running Linux workloads on the SUSE® Linux Enterprise Server operating system on the System z platform.

In the case of WebSphere for example, it is not uncommon for software licensing costs relative to performance capacity and utilization to drop 50% when moving from traditional Windows/Intel Server architectures to Linux on z.

Systems Management Labor

Compare the systems management labor costs for the current environment versus the proposed IBM System z server solution. While software and virtual environments still require effectively the same systems management labor, the physical provisioning labor, estimated at 20% of total labor in a distributed environment can be essentially eliminated. Provisioning of virtual servers in System z environment is a task measured in minutes rather than days or weeks, and increasing the underlying capacity of a System z mainframe with additional IFL or other co-processors occurs nearly transparently and without outage in most cases.

Furthermore, administration and management improvements from the wealth of systems management tools traditionally available in a mainframe environment versus a Wintel server architecture, and ratios of administrators to servers (physical or virtual) can often increase to a support ratio of 200 virtual servers to one administrator.

Power and Facilities Costs

Compare the facilities (space and power) requirements for the current set of servers versus the proposed IBM System z server solution. Physical space requirements can often be reduced as much as 85% due to the relative space required for equivalent utilized computing power when you compare distributed servers to System z. Depending on the cost model for data center space (owned, leased, co-located, etc.) it is often possible to recover real expenditures. Similarly power consumption for equivalent computing loads is greatly reduced, often by 35% or more.

Downtime

Unplanned Downtime – Productivity and Business Costs

The IBM System z server solution supports high availability capabilities, which can significantly reduce business interruptions due to system failures. At 99.7% availability for distributed servers, some 26.3 annual hours of unplanned downtime can be expected. Historically IBM Mainframe platforms have delivered five-9s (99.999%) uptime resulting in no more than a few minutes of annual downtime. When this downtime is viewed as loss of employee productivity and business activity (revenue, profit, customers, or reputation), improvements in reliability drive significant value.

Planned Downtime – Productivity Costs

The IBM System z server solution supports improved systems management capabilities, which can reduce or even eliminate planned downtime and business interruptions. With the best historical mainframe tools from Tivoli and other providers available in the Linux on z environment, 80% reductions of planned downtime from the distributed environment can be realized. To the extent that these planned outages impact worker productivity, real value can be achieved by reducing these outages.

Planned Downtime – Business Costs

The IBM System z server solution supports high availability capabilities, which can significantly reduce business interruptions due to system failures.

Business Agility – Productivity and Business Costs

Server consolidation and virtualization can often speed the deployment of new applications by reducing the time required for purchasing, installing and configuring new server resources. Often new server resources can simply be created by defining additional virtual machines on an existing physical server. With every day of accelerated deployment, productivity improvements and revenue enhancement associated with those deployments are accelerated as well and can deliver measurable value to the business sooner. With a typical 45 deployment cycle reduced by some 50%, 22 and 1/2 days of additional value can be realized with each application deployment.

Professional Services Fees

Compare the professional services and IT training costs for the current environment versus the proposed IBM System z server solution. Typically one time migration costs result when provisioning and migrating to a new System z solution platform. While migration costs can be substantial, they are often rapidly recovered with savings in the other category areas as well as by avoiding recurring support requirements for continuing implementation of new systems.

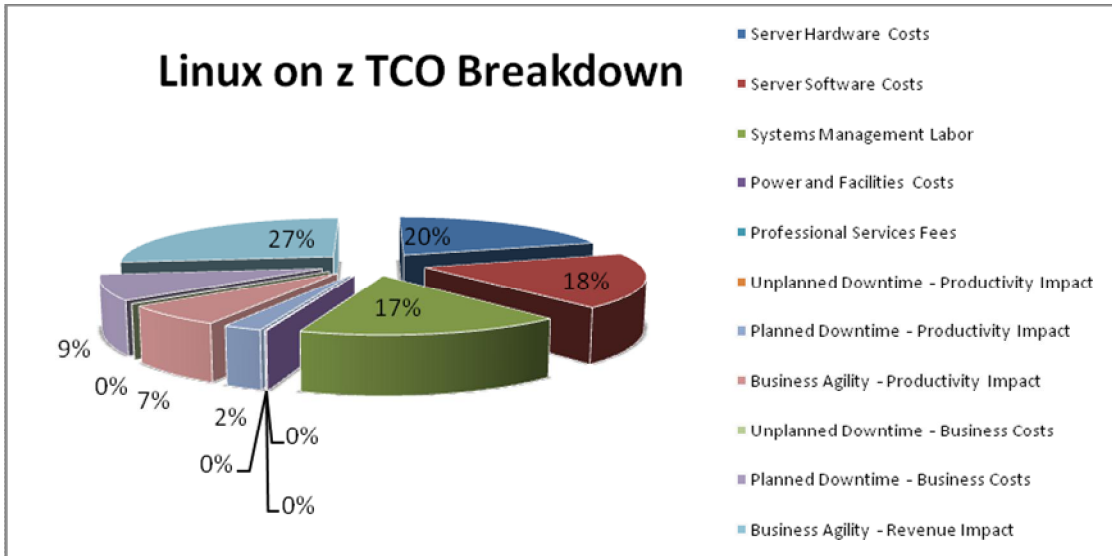
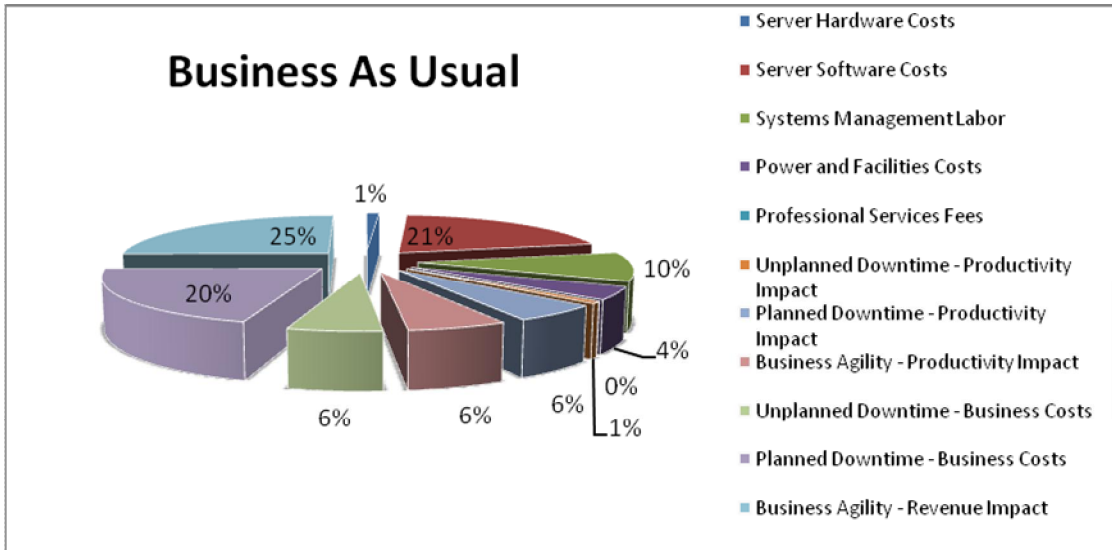
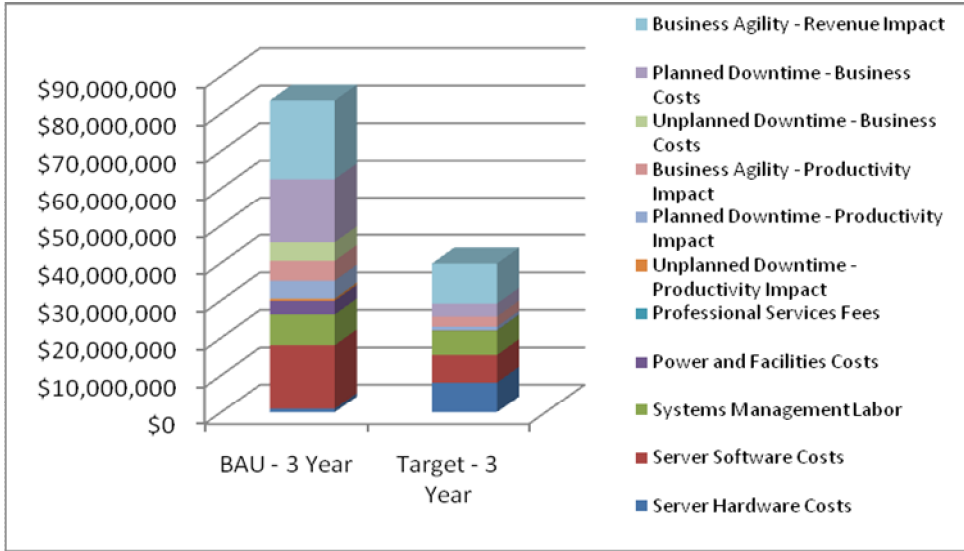
SCENARIOS

While it is not possible to itemize every circumstance where distributed server architectures poorly serve an organization relative to an open mainframe solution, the following can be highlighted among the most compelling:

- High growth environments where distributed servers are added regularly coupled with evolving technology and capabilities actually add unwanted complexity to an already diverse production environment.
- Escalating server software cost environments where the use of virtualization combined with the Integrated Facility for Linux (IFL) acts to reduce the license and cost requirement for key business software applications.
- Proprietary Windows environments where limited flexibility, increasing dependence, and lack of a competitive cost structure are recognized by organizations as business risks that should be proactively addressed with adoption of open systems and standards.
- High volume and I/O dependent transactional environments where server communication lag time impacts business and a single physical platform offers performance enhancements and reduced systems management complexity.
- Mission critical environments and workloads where uptime and availability are critical.

For purposes of this paper, a wide range of successful Linux on z customer implementations were reviewed and a model for a typical medium to large business enterprise was constructed reflecting elements of those real world environments. The result is a map of the potential savings by TCO category that a customer running this typical environment could expect to enjoy. Specifically, this analysis modeled a business earning US\$1 Billion in revenue annually in the consumer products industry sector. The simulation reflected a current environment of some 300 servers running Microsoft SQL Server and Oracle Enterprise Edition databases along with IBM WebSphere for applications and CA Unicenter for management. Close to 17 Full Time Equivalent (FTE) administrators were assumed to manage that environment where server growth was assumed to be growing at 8% annually.

With a migration to a single System z platform running SUSE® Linux Enterprise Server, a migration to DB2 and Tivoli, but maintaining the WebSphere application environment, a potential ROI of some 44% can be measured over a 3 year window. Specifically the benefits are broken down in the charts on the following page:



CONCLUSIONS

For an organization struggling with software license costs, that understands and wants to leverage virtualization to achieve high capacity utilization as well as improve uptime/reliability/serviceability or that wants to reduce the size and costs of its data centers, SUSE® Linux Enterprise Server on System z can be the ideal solution. In addition, customers seeking the most cost effective platform for a migration to OpenSource operating systems and applications and their inherent benefits should seriously consider running SUSE® Linux Enterprise Server on IBM System z.

In a relatively typical growing server environment, a migration to the System z platform results in higher hardware costs that are more than offset by the savings in software, facilities, energy and labor. Furthermore, in environments where the costs associated with inadequate reliability, availability, and serviceability can be measured, the potential business benefits of reducing outages outweighs most other considerations.