IBM LinuxONE Delivers Performance And Cost Benefits

Research by Moor Insights & Strategy

November, 2020

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DATACENTER MODERNIZATION STARTS WITH INFRASTRUCTURE MODERNIZATION

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SUMMARY

Successful technology trends and innovations often have roots in cost reduction, simplicity and business agility. Ironically, in the era of virtualization and consolidation, the datacenter footprint has grown for many businesses, with a corresponding increase in capital expenditures (CapEx) and operational expenditures (OpEx).

One of the reasons costs increase through the adoption of technology is the distributed nature of many datacenters. New applications and workloads are deployed regularly to fuel digital transformation. As a result, new infrastructure is purchased, deployed, provisioned and managed in support of the business needs. And before long, costs have increased significantly.

Total cost of ownership (TCO) has taken on new meaning in the modern business as IT shifts to an "as-a-service" role. Direct costs (such as hardware and software) and indirect costs (such as network configuration) must be complete and fully accounted for as the days of shifting cost burdens have passed.

The IBM LinuxONE platform is designed to be an open yet secure infrastructure platform that supports modern applications at lower total cost. This IBM-sponsored paper will dive into how LinuxONE delivers business agility, IT operations modernization and performance for the applications that drive the digitally transformed business, all while lowering costs in a real and quantifiable way.

THE TCO MISUNDERSTANDING

For this paper, Moor Insights & Strategy (MI&S) defines TCO as the direct costs of purchasing and maintaining hardware and software, and the indirect costs of supporting deployed infrastructure (labor, energy, data center floor space and network). We consider the standard lifecycle of server hardware to be five years at the time of this writing.

Every IT solutions vendor promises to deliver significant TCO savings and return on investment (ROI). However, when examining most TCO calculations, the claims frequently assume operating models and conditions that are not necessarily based in the real world. Examples include:

- CPU utilization rates that are not seen in the typical datacenter. When estimating TCO, calculators may assume CPU utilization rates at approximately 70%. However, the average CPU utilization in enterprise IT environments sits at less than 20%.[1] While IT organizations must provision hardware for peak usage, average utilization should drive TCO calculations.
- Virtual machine (VM)-to-CPU core ratios that are theoretical in nature and unrealistic in practice. While many TCO calculators assume a 1:1 ratio, any IT practitioner realizes the real-world ratio is far different and very difficult to measure.
- Workload placement considerations that do not consider the real-world deployment of underutilized, dedicated operating environments for specific functions (e.g., separate and dedicated development, test and production environments)
- Per-core software licensing that must account for the distribution of an application across multiple, underutilized servers.
- Disaster recovery site deployment and maintenance costs that are not accounted for.
- System configurations that are used to demonstrate maximum performance and cost savings, but again, are not representative of real-world deployment. Many calculators look to categorize VMs too broadly (S, M, L) rather than the more nuanced requirements of workload types.
- Power consumption claims that are based on ratings and not actual utilization.
- Impact of network costs that are not typically included.

[1] IBM tests show that application servers and databases exhibiting high-peak-to-average levels of workload demand in a distributed architecture running on average at 10% - 20% CPU utilization can run on LinuxONE III LT1 at the same throughput while maintaining a higher sustained average CPU utilization of 89% reducing wasted CPU resource. The test is designed to replicate a mix of application servers and database workloads on x86 and IFLs on LinuxONE using JMeter and HammerDB. Workloads were driven to emulate real customer environments running under a service level agreement of 130,400 TPS within 500 milliseconds 95% of the time. For the x86 environment workload activity drivers were configured to represent a population of servers with a variety of workloads exhibiting varying levels of demand for computing resources similar to that observed in 15 client environments for development, test, quality assurance, and production levels of CPU and throughput. The test measured average CPU utilization that varied between 10% and 20% for x86 workloads running on 65 16-core, 24-core and 28-core x86 servers with 1,476 cores total. For the IFL environment the same workload activity drivers were used on 120 LinuxONE III LT1 IFLs and driven at 89% CPU utilization achieving the same required transactions per second and response time as were observed on the x86 servers. LinuxONE III LT1 throughput was projected from actual LinuxONE Emperor II test results. Results may vary.

Most TCO claims, models and even calculators are flawed for two reasons – incomplete data and exaggerated hypotheticals. Direct and indirect costs are rarely thoroughly covered. Floor space, full energy costs, burdened labor rates, downtime due to outages and maintenance, performance issues related to overcommitting resources and the like are real-world costs that are often not considered or captured.

As a result, TCO claims are often discounted and not appreciated as a real tool to help an IT organization better understand the economics of infrastructure deployment, utilization and lifecycle management.

DON'T FORGET ABOUT THE SOFTWARE "TAX"

The rise of multicore servers has led to a market in which commercial software vendors have shifted from "per-socket" to "per-core" licensing. In some license agreements, core-based licensing references the number of cores (or virtual cores) used by an application. In other instances, licensing is based on the total number of available CPU cores in a system. This disparity is seen in commercial database distributions. Regardless, a distributed environment running core-based commercial software increases TCO considerably.[2]

Meanwhile, the open-source community has a variety of data management tools that can be utilized at a fraction of the cost, with support for a variety of infrastructure architectures. There is a maintenance cost associated with many open-source distributions, however, that should be considered when developing an accurate cost of ownership equation.

THIS DOESN'T MEAN THAT TCO IS FLAWED

Despite the justified skepticism with which most IT organizations view TCO, the need to better understand the economics of infrastructure is arguably more important than ever. The broad adoption of the cloud and the digital transformation of organizations has reshaped the expectations of the business and cast IT in a different light. New

[2] IBM LinuxONE III uses 78% fewer licenses for a competitive database versus the compared x86 environment by reducing the number of cores required to run the same transactional workload.
This is an IBM internal study designed to replicate a typical IBM customer workload usage in the marketplace. It consists of IBM LinuxONE III with 50 cores, 2,048 GB memory, z/VM, RHEL, and competitive database, compared to a comparably tuned x86 configuration with a total of sixteen x86 systems, each with 28 Intel Broadwell cores, using 768 GB memory, RHEL Linux, and competitive database executing a materially identical order fulfillment database workload in a controlled laboratory environment. The test for the database workloads, each running as a guest on z/VM in a logical partition, executed an identical SQL query transaction mix for a total throughput of 48,974 transactions per second. For the x86 configuration, the test measured the same number of database workloads, each running on bare metal and executing an identical SQL query transaction mix at a total throughput of 48,974 transactions per second. The results were obtained under laboratory conditions, not in an actual customer environment. IBM's internal workload studies are not benchmark applications.

technologies must be delivered faster, with the security and reliability to which the business has become accustomed.

MI&S sees IBM as uniquely qualified to deliver on the promise of openness, security, performance and reliability, all while driving down cost. LinuxONE, IBM's Linux-based enterprise platform, delivers performance and openness with all of the security and reliability that has made IBM a leader in IT for decades.

In recent TCO studies undertaken by IBM, LinuxONE cost savings versus a comparable x86 environment have been impressive. Workload consolidation analysis requested by financial institutions found that the same Java workloads on LinuxONE provided, on average, a 60% lower TCO over five years than on compared x86 servers.[3]

REAL DATACENTER CONSOLIDATION

Consolidation was the use case that drove the adoption of virtualization. The thought was that consolidation of highly underutilized, application-specific servers onto a single physical platform would significantly reduce the number of servers in a datacenter.

The result, however, was the exact opposite for many distributed server environments. Virtualization simplified how applications are provisioned and managed, paving the way for business users to “spin up” applications and services on-demand, resulting in VM sprawl. As a result, datacenter consolidation turned into datacenter expansion.

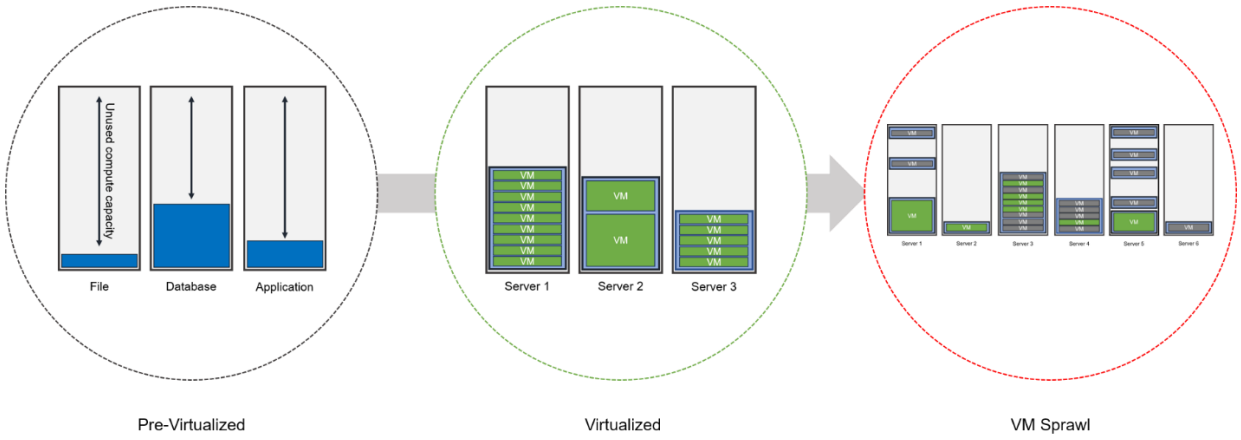
Given the promise of virtualization and the ability to deliver considerable consolidation ratios, the following drivers have led to this expansion phenomenon:

- Though virtualization enables high consolidation rates in theory, the distributed architecture deployed by most IT departments tend to run at lower utilization rates for a sustained time.[4]

[3] Financial institutions in different geographies requested analysis of Java x86 workloads for consolidation onto LinuxONE. The assessments involved business critical workloads running in production and non-production environments for IBM Java application server middleware running on different types of x86 and distributed servers. TCO costs included migration, hardware, software, networking, energy, floor space and people costs. TCO savings with IFLs or LinuxONE ranged from 43% to 80% over five years with an on average savings of 60%. Each client engaged the IT Economics team to evaluate the distributed workloads and the proposed IFL or LinuxONE environment for the consolidation. For each assessment, IT Economics consultants met with the client to discuss consolidation planning and execution, analyzed the client's current total cost of ownership, and provided a projected total cost of ownership with workload consolidation based on estimated core consolidation ratios for the client's workloads based on workload sizing estimates from IBM internal testing and comparable client workload data. For additional information on x86 workload analysis contact the IBM IT Economics team, IT.Economics@us.ibm.com.
[4] Based on IT Economics assessments of customer environments running a total of 13,800 x86 cores, average measured peak utilization is 16%. Peak utilization of 16% is derived from a weighted average of x86 workloads in four large enterprise client IT environments using a total of the compared 13,861 x86 cores in production and test environments. For additional information on x86 workload analysis contact the IBM IT Economics team, IT.Economics@us.ibm.com.

- The provisioning and deployment of virtualized infrastructure must account for peak utilization rates, though average utilization rates typically run at a fraction of peak. While this practice is easier for IT administrators, it leads to highly underutilized servers consuming significantly more power and requiring more IT resources to manage.
- Consolidation of server workloads increases the risk profile. This vulnerability has led to the deployment of dedicated mirror clusters and sites for failover purposes. These environments routinely sit idle, consuming floor space and power, and require routine maintenance.
- The IT practice of maintaining separate and siloed virtualized environments for both "legacy" and modernized "cloud-native" workloads.
- The separation of development, testing and production environments forces IT to maintain separate clusters for each environment, leading to highly underutilized resources.

FIGURE 1: THE MARCH TO VM SPRAWL

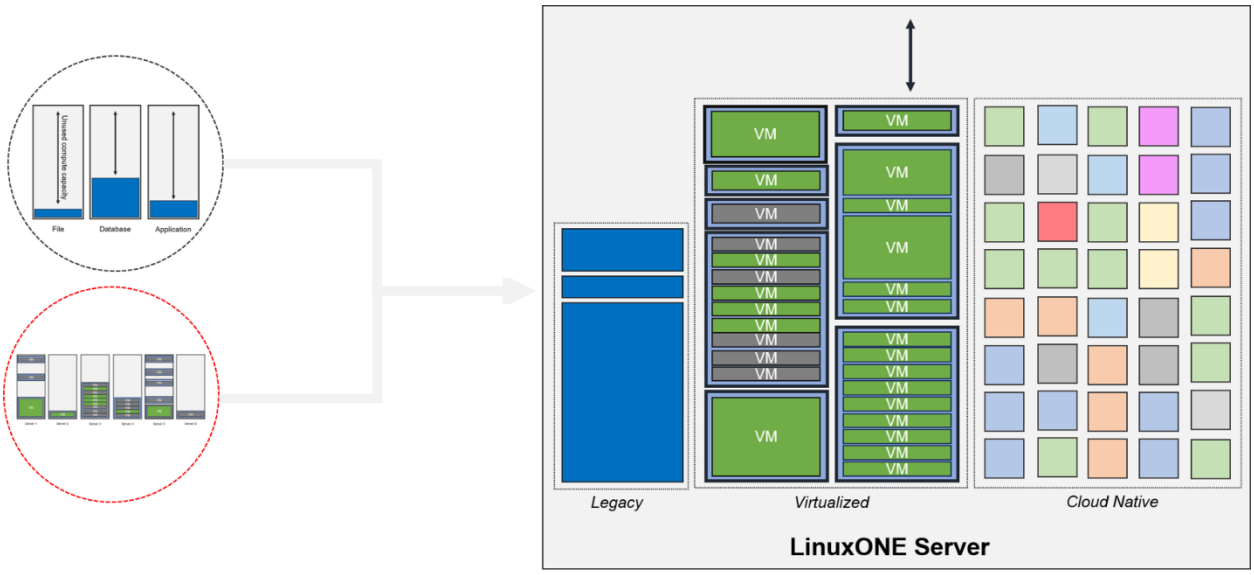


Source: Moor Insights & Strategy

The causes of VM and server sprawl are understandable. As the world continues to digitize, operating environments will continue down this path of expansion. However, IBM LinuxONE was designed to deliver more resources and reduce the datacenter footprint. In a LinuxONE environment, consolidation is not just possible but is reality. These servers were designed to support an average utilization of 80%,[1] meaning utilization of more than 80% on LinuxONE is the norm, not the exception. Additionally, this hardware is built with core and memory architectures designed for reliable performance at high sustained utilization. Isolation technologies can deliver seclusion for each operating environment, regardless of "noisy neighbors." LinuxONE is unique

because its promise of consolidating hundreds of servers onto a single platform is happening routinely in the real world.

FIGURE 2: DATACENTER CONSOLIDATION ON LINUXONE



Source: Moor Insights & Strategy

LINUXONE – WHAT REAL TCO LOOKS LIKE

The TCO savings realized from LinuxONE are the result of the centralized approach that IBM has taken to developing a fully contained compute platform. When comparing the potential TCO savings of a LinuxONE environment with a distributed environment, the differences can be significant.

While some of these costs are quite obvious, others significant costs are not always considered. For example, the costs associated with configuring and managing networking and storage environments are on par with (if not greater than) traditional server deployment and management costs. However, these costs are not typically captured in a TCO analysis of infrastructure in a distributed environment.

Two drivers of cost savings are power consumption and floor space. An IBM LinuxONE III LT2 can save on average 59% more per year in power consumption than compared x86 systems running workloads with the same throughput.[5] It also requires 75% less floor space than compared x86 2U servers in racks, running the same workloads and throughput.[6] While these are significant savings, they are not always fully recognized by IT as they are classified as facility costs. However, even if not part of an IT budget, they impact the IT budget as they become top-line expenses that use allocated dollars.

Digging deeper into management and maintenance is warranted when discussing such a significant consolidation ratio. Deploying LinuxONE should free up resources, enabling IT administrators to focus on more strategic initiatives. While this is difficult to quantify in terms of dollars, accelerating the digital transformation of a business is a priority for almost every IT organization.

[5] Compared LinuxONE III LT2 model consists of two CPC drawers containing 64 IFLs, and one I/O drawer to support both network and external storage versus 49 x86 systems with a total of 1,080 cores. LinuxONE III LT2 power consumption was based on 40 power draw samples for workloads on 64 IFLs running at 90% CPU utilization. x86 power consumption was based on 45 power draw samples for three workload types running from 10.6% to 15.4% CPU utilization. x86 CPU utilization rates were based on data from 15 customer surveys representing Development, Test, Quality Assurance, and Production levels of CPU utilization and throughput.

Each workload ran at the same throughput and SLA response time on LinuxONE and x86. Power consumption on x86 was measured while each system was under load. LinuxONE III LT2 performance data and number of IFLs was projected from actual LinuxONE Rockhopper II performance data. To estimate LinuxONE III LT2 performance, a 3% lower throughput adjustment based on the LinuxONE III LT2 / LinuxONE Rockhopper II MIPS ratio was applied.

Compared x86 models were all 2-socket servers containing a mix of 8-core, 12-core and 14-core Xeon x86 processors.

External storage is common to both platforms and is not included in power consumption. Assumes LinuxONE and x86 are running 24x7x365 with 42 Development, Test, Quality Assurance, and Production servers and 9 High Availability servers.

Power consumption may vary depending on factors including configuration, workloads, etc. Energy cost savings are based on a U.S. national average commercial power rate of $0.10 per kWh based on U.S Energy Information Administration (EIA) data, https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a. Individual rates may vary.

Savings assumes a power usage effectiveness (PUE) ratio of 1.66 to calculate additional power for data center cooling. PUE is based on IBM and the Environment - Climate protection - Data center energy efficiency data, https://www.ibm.com/ibm/environment/climate/datacenter_energy.shtml

[6] Actual floor space covered by the systems includes doors and covers. The LinuxONE III LT2 consists of two CPC drawers containing 64 IFLs, and one I/O drawer containing 7 FCP and 3 OSA adapters versus 4 x86 racks, each occupying 16 2U slots to run the comparable workloads, consisting of a mix of databases and application servers. Each workload ran at the same throughput and SLA response time on LinuxONE and x86.

x86 systems ran at various CPU utilizations according to 15 customer surveys, representing Development, Test, Quality Assurance, and Production levels of CPU utilization and throughput. 16 x86 2U form factor servers populated a standard 32U rack. Other 10 2U slots contained PDU, network switches, SAN switches and allowed space for air circulation. External storage floor space is not included.

LinuxONE III LT2 performance data and number of IFLs was projected from actual LinuxONE Rockhopper II performance data including a 3% lower throughput using MIPS ratio on LinuxONE III LT2 versus LinuxONE Rockhopper II with high availability.

Assumes LinuxONE and x86 are running 24x7x365 with 42 Development, Test, Quality Assurance, and Production servers and 9 High Availability servers.

Compared x86 models were all 2-socket servers containing a mix of 8-core, 12-core and 14-core Xeon x86 processors.

One of the more interesting cost elements – security – is indeed hard to quantify. IBM as a company and LinuxONE as a platform are known for industry-leading security. Pervasive encryption built into silicon is meant to ensure that data is protected in the LinuxONE environment, at work, in-flight and at rest. In contrast, distributed heterogeneous environments cannot necessarily assure the same level of security as they lead to less-than-optimal interoperability.

Finally, the impact of IBM embracing open source in its development of LinuxONE cannot be overstated. While open source has increased its footprint in the datacenter, many companies continue to pay a premium for commercial application functionality. Organizations ready to embrace the innovation, capabilities and cost savings associated with the open-source community should give LinuxONE serious consideration.

LINUXONE ARCHITECTURE – THE FOUNDATION OF CONSOLIDATION

When considering IBM LinuxONE versus distributed systems, it's important to understand a few things about the differences between the two platforms.

- *Not all processors are created equally*. The distributed datacenter lives on x86 CPUs, with Arm-based servers beginning to emerge. In contrast, the LinuxONE platform is powered by IBM's CPU – IFL (Integrated Facility for Linux). IFLs are extremely powerful processors optimized for Linux in either bare metal or virtualized mode. The performance of an x86 or Arm-based CPU is not equivalent to the performance of an IFL. What makes an IFL so performant?
    - High-performance clock speeds, up to 5.2 GHz
    - Rich caching capabilities
    - Up to 40TB of shared memory that can be allocated as needed
    - Efficient workload management, ensuring VMs get the resources they need to adhere to specific SLAs
    - Greater availability (RAS) characteristics that remove the need for multiple servers for high availability (HA). For example, LinuxONE servers ship with back-up processors (aka “dark" processors) that light up in the event of an active processor failure with no interruption. In other words, automatic processor failover with no interruption.
    - Fewer processor cycles required to perform network functions and virtualization functions because of the LinuxONE architecture, allowing those cycles to be dedicated to supporting critical applications

- *LinuxONE is a native Linux platform*. LinuxONE is a platform optimized for the emerging applications and workloads populating the modern datacenter.
- *Centralized means centralized. But centralized also means open.* As previously mentioned, LinuxONE achieves such significant direct and indirect cost savings due in part to its centralized, self-contained architecture. However, the platform is designed to support the emerging workloads of today and tomorrow. It is important to note the depth and breadth of the IBM open-source ecosystem across supported Linux distributions.

WORKLOAD AFFINITY – WHERE LINUXONE SHINES

As discussed, LinuxONE is a platform that can support massive server consolidation projects, resulting in significant cost savings. However, MI&S sees this platform as equally impressive in its support for some of the most demanding workloads populating the enterprise datacenter. Below are a few of the workloads that are candidates for LinuxONE:

- *Data management.* LinuxONE excels at supporting both structured and unstructured management platforms. The vast memory footprint and highly performant cores should enable robust performance on traditional SQL databases and newer data analytics platforms.
- *Cloud and cloud-native.* LinuxONE can deliver a reliable hybrid cloud platform for modern organizations looking to drive seamless integration of its on-prem and off-prem environments. Pervasive encryption and IBM Data Privacy Passports are complemented by Secure Service Containers, a combination of hardware, firmware and software technologies that serve as extensions for an organization's container environment.

"CENTRALIZED MEANS CENTRALIZED. BUT CENTRALIZED ALSO MEANS OPEN. AS PREVIOUSLY MENTIONED, LINUXONE ACHIEVES SUCH SIGNIFICANT DIRECT AND INDIRECT COST SAVINGS DUE IN PART TO ITS CENTRALIZED, SELF-CONTAINED ARCHITECTURE."

IBM internal tests show the same OLTP workloads on OpenShift require 17 times fewer cores on LinuxONE III LT2 and deliver a 48% lower TCO over three years than compared x86 servers.[7] All of this is seamless to the software developer. In short, LinuxONE provides an open yet secure platform for hybrid cloud.

- *Blockchain*. Blockchain is a workload where IBM's history in enterprise server technology comes to bear. By leveraging technologies such as pervasive encryption, LinuxONE is uniquely positioned to secure data at the point of creation and through delivery.
- *Application Environments.* Standard application environments such as IBM's WebSphere, SAP and WebLogic all benefit from the LinuxONE architecture. IBM's internal tests show that when running WebSphere and Db2 workloads, IBM LinuxONE III LT2 requires 22 times fewer cores than the compared x86 servers and delivers a 63% lower TCO over five years.[8] The optimizations between compute, memory, storage and networking result in performance above what is typically seen in a disaggregated environment.

While it's been stated several times, this point bears repeating: What makes LinuxONE stand out against distributed environments is its ability to support the above workloads and more on a single server, including high-availability environments. The direct and

[7] This is an IBM internal study designed to replicate banking OLTP workload usage in the marketplace on an IBM LinuxONE III T02 using eight IFLs across two LPARs. Seven IFLs and a total of 640 GB memory were allocated to one LPAR for three OpenShift masters and four worker nodes. One IFL and a total of 128 GB memory were allocated to the second LPAR for the OpenShift load balancer. IBM Storage DS8886 was used to create eight 250 GB DASD minidisks for each of the eight z/VM guests running in the LPARs. The OpenShift cluster version 4.2.20, using Red Hat Enterprise Linux CoreOS (RHCOS) for LinuxONE, was running across seven z/VM guests and the remaining eighth z/VM guest was running the OpenShift load balancer. SMT was enabled across all IFLs. The x86 configuration was comprised of six servers running KVM with 15 guests (three masters and twelve workers) for the OpenShift cluster version 4.3.5 with RHCOS and a seventh server was used for the load balancer on RHEL 7.6. For x86 storage each guest operating system was configured with a 100 GB of virtual disk. Each guest had access to all vCPUs of the KVM server on which it was running. Compared x86 models for the cluster were all 2-socket servers containing a mix of 6-core, 8-core, 12-core and 16-core Haswell, Skylake and Ivy Bridge x86 processors using a total of 136 cores with a total of 2,304 GB memory. The load balancer was a 2-socket 8-core server with a total of 384 GB memory. Both environments used jMeter to drive maximum throughput against two OLTP workload instances and were sized to deliver comparable results (15,487 responses per second (RPS) with LinuxONE and 14,325 RPS with x86). The results were obtained under laboratory conditions, not in an actual customer environment. IBM's internal workload studies are not benchmark applications. Prices, where applicable, are based on U.S. prices as of 02/12/2020 from our website and x86 hardware pricing is based on IBM analysis of U.S. prices as of 03/01/2020 from IDC. Price comparison is based on a three-year total cost of ownership including HW, SW, networking, floor space, people, energy/cooling costs and three years of service & support.

[8] This is an IBM internal study designed to replicate a typical IBM customer workload usage in the marketplace. Results may vary. The workloads consisted of a transactional core banking application running on WAS and Db2. Eight instances of the core banking application were run with four instances representing a Dev/Test/QA environment and four instances representing a Production environment. Dev/Test/QA and Production environments were differentiated by their CPU utilization levels ranging from 3% - 30% utilization based on IT Economics client assessment x86 workload data. Average aggregate throughput was within 5% across all instances on both platforms in the internal study. On LinuxONE the banking application ran on RHEL 7.6 in two LPARs with z/VM 7.1, with 4GB and16 GB memory, and 4 virtual CPs. Total number of LinuxONE cores needed to deliver the workloads was 20. Actual tests were run on a z14 M04/LinuxONE Emperor II, which is rated within 3% of LinuxONE III LT2 performance, when also configured with 20 cores. To achieve the same workload throughput on x86, the banking application ran on a total of 24 standard model, 2-processor x86 systems, with speeds ranging from 2.4-3.2 GHz with a total of 448 cores. Both the x86 and LinuxONE environments had access to the same storage array. Total cost of ownership is defined to include hardware, software, labor, networking, floor space and energy costs over a period of 5 years. IBM internal hardware list prices were used. x86 server prices were acquired from IDC. IBM software pricing was based on standard U.S. list prices with a 30% discount.

indirect cost savings associated with this model can be significant, freeing up IT resources to drive greater engagement with business partners.

WHO SHOULD CONSIDER LINUXONE?

Data-centric IT organizations can benefit from deploying LinuxONE. In today's world of interpretive languages, converged infrastructure and cloud ubiquity, LinuxONE can help companies of all sizes and types, from cloud hosting firms to public sector institutions to financial services organizations.

MAKING THE CASE FOR LINUXONE

Any IT organization may benefit from deploying LinuxONE to drive consolidation and support performance-hungry workloads in an open yet secure way. However, some IT organizations may find LinuxONE especially compelling. As a guide, consider the following questions in assessing the relative value of LinuxONE to your organization:

- Is your organization experiencing a high-growth rate? If business conditions or internal challenges around digital transformation require sustained growth of IT resources in the future, LinuxONE should be considered. The ability to support a variety of workload needs and growth of VMs makes LinuxONE a compelling platform.
- Is your organization budget-challenged? Every IT organization is budget-challenged. However, not every IT organization looks to infrastructure as a way to control the budget. LinuxONE can significantly drive down the cost of delivering IT services while simultaneously increasing IT operational agility.
- Is your organization transforming? Many IT organizations are tasked with rolling out new applications and services on a seemingly daily basis without the ability to add headcount in support. The LinuxONE architecture enables this transformation by providing a richness and abundance of resources.
- Is your organization prioritizing security? Like budget, cybersecurity is a topic given top priority in word but not always in deed. However, LinuxONE makes security both inherent and touch-free. If privacy and security are a priority due to government regulations or other issues, LinuxONE should be given special consideration.

CONCLUSION

Datacenter modernization trends such as digital transformation have inundated IT organizations. Every trend drives the organization toward the same goals: increase agility, decrease time to market and reduce costs. However, in this drive the result of VM sprawl and new workload deployments has been more servers, more infrastructure, greater complexity and higher costs. In other words, business agility is somewhat achieved, but at a very high cost to the organization. This dynamic is due in part to workload placement methodologies driven by server designs that cannot support high utilization rates for a sustained period.

IBM LinuxONE is different. As a compute platform, it is unique in that it can deliver on consolidation without sacrificing performance, security or openness. In today's IT environment, where open source plays a significant role in driving the most critical business initiatives, LinuxONE appears to be tailor-made for workloads and their unique requirements.

While TCO has been co-opted by marketing organizations, it is an essential measure in determining the real value of products and services. The key to TCO is completeness and accuracy, capturing all required inputs in terms of direct and indirect costs and ensuring those inputs are accurately measured.

Based on what MI&S has seen in the market, the total cost savings claims made by IBM regarding LinuxONE appear to be real and compelling and worth exploring. The company has gone to great lengths to capture data based on real-world usage and account for all the variables that make up the direct and indirect costs.

MI&S recommends IT organizations undertake a critical assessment of their distributed environments and compare those costs to deploying LinuxONE. During this examination, it is vital to consider the fully burdened costs. Meaning, consider the costs associated with potential migrations of applications and data.

To review an in-depth TCO analysis of database and application environments running on LinuxONE versus a distributed platform, please visit here.

For more information on LinuxONE, visit here.

Or visit here to see how companies have benefited from LinuxONE

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