

zLinux-in-a-Box^(SM)

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Huge numbers of distributed servers are straining IT staff and budgets, taking up too much space, causing energy bills to skyrocket, and limiting further IT expansion. These problems are fueling a smart solution – the move of distributed workloads to **Linux on System z**.



Enterprises around the world are faced with a growing set of challenges.

Executive Summary

Competition is intense, managing risk is more challenging than ever and responding quickly to change is a necessity.

These challenges are helping to shape the business strategies of global enterprises dealing with large data. Despite changing market conditions, enterprises are now focused on achieving organic growth as their primary objective.

To achieve organic growth, business strategies are expected to focus heavily on customer retention and increased wallet share. Customer service, rather than products or price, may be a differentiator for most companies to survive irrespective of the industry vertical.

In order to support organic growth, organizations may look at transforming their IT environment to meet these challenges. The benefits organizations may

achieve through transforming an environment to a Service Oriented Architecture (SOA) center on increased agility and the ability to respond to changing market conditions. For example, Banks have the goal of bringing new products to market more quickly, centralizing multiple Core Banking Systems into one system, adhering to regulatory and compliance mandates and reducing response time delays that negatively impact customer service. These are all benefits that may be able to be achieved through migration to a Service Oriented Architecture on the mainframe platform. By mainframe, we are referring to the IBM® zSeries® platforms.

In the banking industry, the mainframe is a platform of choice. In fact, the number of MIPS (million instructions per second) installed increased dramatically between 2004 and 2011 and continue to increase.





Top five mainframe myths in the industry

Myth1:

**Mainframes are
expensive to buy
and operate**

Market Reality

Two concepts are important to discuss in the context of this myth: Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO). TCA refers to the upfront costs of acquiring hardware, license fees and maintenance. TCO refers to the long-term operational cost: hardware and software acquisition, management and support, end-user expenses, opportunity cost of downtime, training and other productivity expenses. Enterprises may be able to achieve both TCA and TCO benefits in a mainframe environment.

TCA—For those banks that already have a mainframe, the additional TCA for the mainframe can be lower because the incremental cost to add additional MIPS is marginal as opposed to acquiring a completely new system. Additionally, typically the cost of resources to manage a distributed computing environment is linear but can be lower in a mainframe environment. As an example users may get discounted capacity when they upgrade their systems with Integrated Facility for Linux (IFL—dedicated processors for running Linux) and zSeries Application Assist Processors (zAAPs—WebSphere workloads).

TCO—When a comprehensive definition of TCO is examined, one that includes indirect costs such as end-user operations and cost of downtime, cost of security breaches and ensuing reputation damage, the mainframe can provide an advantage. This may be achieved through the leadership of the mainframe in areas such as availability, scalability, security and business continuity. The bottom line is that the mainframe, particularly for organizations that already have a mainframe installed, can provide superior cost performance with both a TCA and TCO analysis.

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Myth2:

Inability to find talent as those with mainframe skills retire

Market Reality

Lets take an example of BFSI sector greatly dependent on Mainframe. Heavy integration and business process management requirements are mainly addressed at the middleware layer. This results in higher demand for Java/C++ programmers than Cobol programmers in the banking industry. However, mainframe programmers are still needed. But the demand for Cobol programmers is often overstated. Yet, in response to the retirement plans of many current Cobol programmers, IBM has launched a number of initiatives to bolster the mainframe workforce, including the IBM Academic Initiative: a joint program with 230 universities worldwide designed to train mainframe engineers. The program includes developing courses in mainframe technology, training professors, offering access to computing facilities and recruiting students.

The efforts put in by IBM and the partners are not only making progress but also has resulted in making mainframe engineering to be considered an attractive career option. In addition to ongoing efforts at the university level, there are new mainframe engineers coming up by cross-training existing specialists from relevant fields. UNIX and Linux engineers are likely candidates. In addition, specialists in IT security and those involved in the new field of regulatory compliance are excellent candidates joining the mainframe world.

Today, the mainframe has been given new life by the availability of new OSs, the need to centralize key client-facing applications, and the growing regulatory oversight of IT systems. Rather than being a repository for aging back-office applications, mainframes are now becoming central repositories of key corporate assets, and their role in large enterprises is likely to continue to grow.

Myth3:

Mainframes are inflexible and unable to change quickly

Market Reality

Mainframes are flexible due to domain partitioning and workload management and optimization capabilities. Contrasted to distributed servers, the mainframe is designed to maximize its capabilities in a multi-workload environment because the zSeries and System z9 have been designed with a focus on operational performance. Therefore, the zSeries and System z9 have a balance between high performance and RAS. Mainframes also enjoy flexibility benefits because UNIX APIs, J2EE, grid standards and Linux can now be run on mainframes.

New technologies simplify the operation and maintenance of these systems, permitting them to be managed effectively by fewer and less experienced individuals.

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Myth4:

ISV enthusiasm for mainframe applications is dwindling

Market Reality

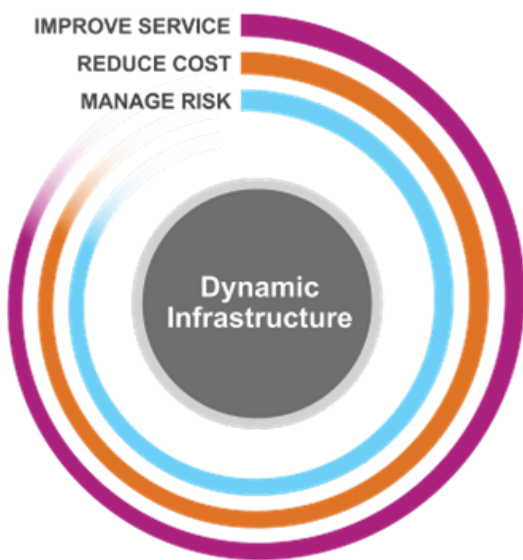
ISV enthusiasm is a challenge in some industries, but for industries dependent on Mainframe its not, for example banking is not one of them. Leading Core Banking System ISVs have invested many millions of dollars in applications that run on the mainframe. In addition, many open standards-based applications can be run on mainframes as a server. As an example, this makes it possible to run Core Banking applications developed in J2EE environments on the mainframe.

Myth5:

There is nothing new in the world of mainframes

Market Reality

Sometimes new is not such a good thing. While there are incremental technologies constantly making mainframes better, one of the greatest advantages of the mainframe is its stability and ability to help protect your existing investment in applications. But it is true, the mainframe is being used in new and exciting ways. Innovations like virtualization, GRID computing and collaboration are just a few of the ways mainframes are being used in new and exciting ways in the industry. Business Process Management (BPM) has also extended the use of the mainframe from back-office operations to Linux-based front-office and branch operations on the mainframe.



System designed to optimize the deployment of a broad set of workloads for maximum efficiency and improved service, creates value by delivering ongoing savings

Mainframe Advantages

Best practices indicate conditions under which a mainframe environment is being considered in the industry:

- When the business requires reduction of downtime
- Fast and simple scalability is critical to business operations
- Security breaches and identity theft are of major concern and must be managed effectively and allow for continued customer trust, particularly with regard to self-service channels like Internet banking
- Control cost / TCO (TCO is measured by the definition recommended by Gartner: hardware and software

acquisition, management and support, end-user expenses, opportunity cost of downtime, training and other productivity expenses).

- The self-service channel is important and must be able to handle utilization spikes
- Capability to achieve utilization rates of up to 100% without performance degradation are desirable.

Big Data concept is a reality and the rate at which current and future transaction volume is growing Mainframe's on demand capacity and provisioning capabilities can help dynamically and non-disruptively (when properly configured) add capacity. Many banks list some or all of the above requirements in their overall business requirements for core systems, which is reflects growth of mainframe MIPS in the industry.

Greater simplicity and flexibility

In a mainframe environment, when properly configured, adding processor capacity and storage can occur quickly, without necessarily disrupting the business, when you need it, and typically without having to increase staffing levels. Capacity backup can be added on demand in an emergency.

Deeper levels of security

This is particularly important for BFSI sector given the prevalence of security breaches and identity thefts. With IBM zSeries mainframes, security and encryption are at the hardware level, it can act as a hub instead of hundreds of distributed servers providing highly secure data transfer at very high speeds, help reduce the complexity of security management and potential points of vulnerability.

Superior product and operations management capabilities

Mainframes, augmented with Geographically Dispersed Parallel Sysplex (GDPS) for automated recovery fail over are, according to Gartner, more reliable and available than an environment that includes thousands of distributed servers. IBM zSeries is unmatched for Processor technology, System performance, Unplanned downtime (single/clustered), Disaster tolerance/recovery, Planned downtime, Partitioning, Capacity On Demand, OS manageability, Server management tools, Workload management.

TCA & TCO Advantages

TCA - Upfront cost of a mainframe is higher than distributed servers but Incremental costs are lower with the mainframe because the cost to add incremental MIPS declines significantly. The cost of adding resources to manage the environment is linear in a distributed computing environment but negligible in the mainframe environment. TCO - Given its strengths in security, availability, business continuity, utilization and performance, mainframes may provide an opportunity to cost effectively meet the infrastructure demands of an enterprise as it pursues growth

Enterprises are deploying mainframes in new and exciting ways

Virtualization

A mainframe can also support hundreds of distributed servers in a virtual environment. This can help improve manageability and enable efficient use of system resources by allowing servers to be prioritized and allocated to the workloads that need them most at any specific moment in time.

With this type of virtual environment, generally there may be less need to overprovision for excess capacity to be able to absorb individual workload spikes compared to a distributed server network, and total capacity needed is typically less than in a distributed server network. Mainframes are designed to be capable of utilization rates of up to 100%. Typically, distributed servers achieve a utilization rate of approximately 10-20% (see, First National Bank of Omaha case study). By leveraging the benefits

of virtualization in a mainframe environment, a bank may be able to reduce its investments needed and achieve a lower overall TCA/TCO.

Openness

Mainframes are able to support J2EE, Linux, grid standards, SOA, Web services and other forms of open and industry standards. Because of this, it is no longer accurate to equate open systems with UNIX.

Running Linux on a mainframe is gaining market momentum. Virtualization may enable significant server consolidation and help reduced cost—hundreds of Linux servers can run on a single server. In addition, running Linux on a mainframe may bring some of

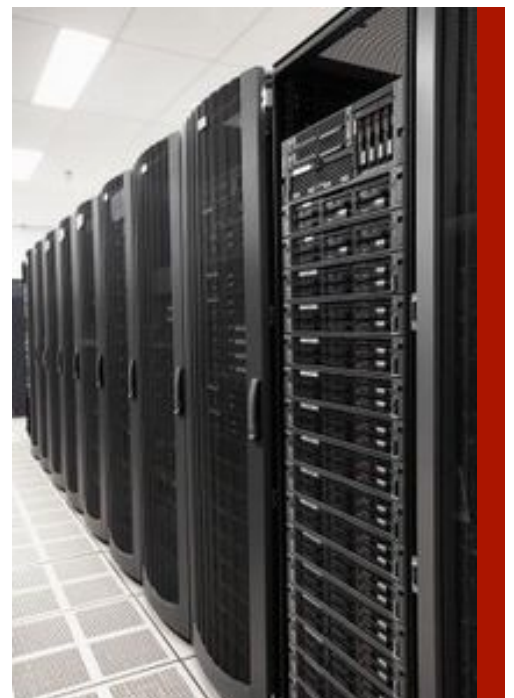
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the benefits of the traditional mainframe environment: availability, scalability, disaster recovery and capacity on demand.

Collaboration

Increasingly, banks must collaborate with partners and even other banks. For example, while some banks leverage check image exchange networks like Viewpointe Archive Services, others are transmitting digital images directly between banks for settlement.

Open systems and dynamic, deep levels of security and real-time capabilities that mainframes can provide may help simplify integration and therefore help facilitate collaboration.



Linux on system z brings in the best of two worlds viz, the Mainframe and the open source Linux to deliver greater business benefits for enterprises. While looking back through the last one decade, we can see that the adoption rate of Linux on system z is on the increase exponentially year after year.

Benefits of adopting Linux on system z

Virtualization and Cost Savings

Linux on System z offers Mainframe customers an easy to manage, easy to scale and budget friendly business environment for large-scale computational purposes. With virtualization software - z/VM, customers can create multiple instances of Linux running on a single system z. z/VM helps organizations meet their increasing requirements for multi-system server solutions with a broad range of support for operating system environments. Virtualizing enables Mainframe system to do the job of many distributed systems within an IT enterprise. This reduces the number of servers and extends of networking infrastructure, thereby reducing the overall TCO. Additional savings will be in cooling, maintenance, power, software support, human resources and infrastructure costs. Linux on system z is significantly more economical when compared to ten x86 based architectures.

Operational Efficiency

Linux on System z effectively employs the virtualization technology, to create and manage discrete virtual processors, communications, storage and I/O devices in a single System z server. These resources virtually available can be dynamically shared or reconfigured, reducing the complexity and resulting in greater operational efficiency in enterprise computing environments. Thousands of distributed servers can be consolidated with z/VM virtualization technology enabling quick turnaround in business.

Management Capabilities

Linux on Mainframe enhances the systems management capability of enterprises by providing with advanced dynamic infrastructure backup consolidation & patch management software distribution. Advantages of backup consolidation include the quick and flexible provisioning of additional resources for backup and workload balancing of backup with daytime jobs. With this improvised management capabilities, Linux on System z brings in a smarter new and more streamlined approach. Linux on system z can run up to hundreds of different workloads in parallel, providing load-balancing and efficient systems management.

IT Optimization

Linux on system z is highly capable of optimizing an organization's IT assets through virtualization, consolidation, integration and standardization of the infrastructure. In order to drive greater IT efficiencies, quality and optimization for Linux on System z, IBM introduced IBM Tivoli, a single point of control to handle heterogeneous technologies.

Business Integration

Linux System z combination brings in a great flexibility for multiple applications and middle ware to work together. This enables faster deployment options for new solutions and efficient data processing. The combination utilized the large Linux application portfolio and widespread Linux expertise for business integration. Linux on System z also brought in support for open standards Linux, J2EETM, Service-Oriented Architecture and Web services with IBM WebSphere, leading software for business integration.

Security

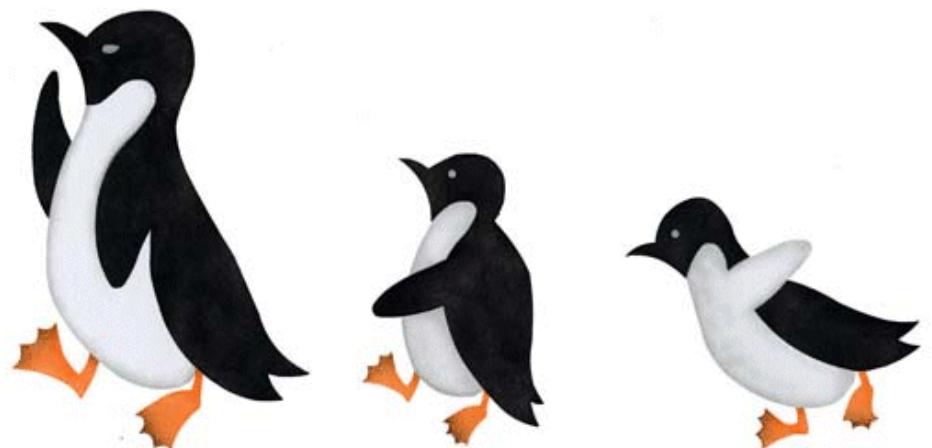
Linux on System z possesses some of its most valuable security and integrity features. The open-source nature of Linux operating systems already provides a favourable security profile, but running Linux on System z further extends these advantages by integrating hardware-based security features into the operating environment. The combination also supports encryption and cryptographic solutions to help secure data from leakage threats. In addition to this, it also incorporates Access Control Management and wide auditing features. With these data security measures, enterprises can carry out their sensitive business operations much more securely.

Business Resiliency

Linux on system z provides greater business resilience for the users with efficient error checking facilities and layer upon layer fault tolerance. The built in redundant mechanism helps from system fail over at the time of unpredicted disasters or outages. Linux on System z works as an integrated environment where hardware, operating systems, firmware and middle ware work together to offer maximum availability and business resiliency.

Flexibility

The open source features of Linux, allows easier application integration. Linux on system z allows enterprises to break the link between the operating system and specific hardware platforms, or in other words, the consolidation offers choice of hardware platform matching with the application requirements. IBM z/VM virtualization can create new Linux test and development partitions in minutes avoiding additional infrastructure purchase cost and saving time.



The Total Cost of Ownership (TCO) of migrating to Linux on System z

What are the financial benefits and cost savings of moving workloads from distributed to mainframe environments. Here we 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 mainframe technology.

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

Along with the open systems capabilities required by organizations looking to reduce long-term risks and reliance on specific vendors, the combination, Linux on z, should be considered by any organization trying to control costs while

broadening their options for future agility and success.

Let us quantify the value that a migration to Linux on System z solution delivers. 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

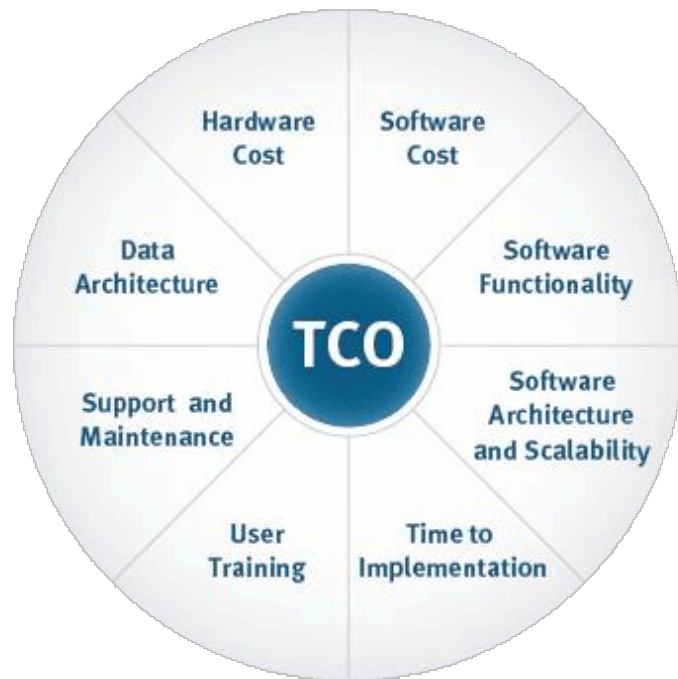
Conclusions

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.

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;

this model helps to identify the circumstances in which Linux on System z offers the better option for any given organization.



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, Linux 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 Linux on 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.

The combination of IBM software and Linux on System z supports powerful solutions for numerous traditional, transaction-focused business applications and processes. But the highly synergistic combination is also an intriguing choice for new and emerging use cases, such as:

The Complementary Benefits of IBM's Software and Linux on System z

IT Consolidation

While virtualization has become hugely popular over the past 5 years, particularly in x86 server environments, a large majority of these deployments have been performed to consolidate x86 servers and workloads. This is not especially surprising, given the low (5%-15%) utilization these systems typically offer. Along with streamlining IT infrastructures, consolidation allows companies to enjoy significant reductions in datacenter power costs and improved IT management efficiency. But despite the increasingly robust performance of Intel Xeon and AMD Opteron technologies, are new x86 servers the best architectural choice for consolidating older x86 servers?

System z organization would argue that Linux and the company's IFL and z/VM technologies offer a powerful, valuable alternative for consolidating x86 Windows and Linux, and UNIX applications and workloads onto mainframe systems. The various consolidation capabilities of these solutions are robust enough for virtually any enterprise. IBM leveraged Linux on System z for its own datacenter consolidation effort, in which over 3900 x86 and UNIX servers were consolidated onto ten z10 mainframe systems. Additionally, a recent company project designed to test maximum mainframe virtual machine capacity found that a fully configured System z10 was capable of supporting 97,943 VMs. Finally, developers are leveraging IBM's Open Virtual Client technology on System z for virtual desktop infrastructure (VDI) solutions, including Virtual Bridges, which claims that its Verde 2.0 can scale to one million users.

Enterprise Content Management

Enterprise content management (ECM) resides at the intersection of two critical issues: 1) the continuing, massive growth of structured data residing in traditional databases and unstructured information including email, reports and other documents, and 2) enabling organizations to maximize the benefits of their information assets, wherever they reside.

IBM's ECM solutions for System z can blend established mainframe reliability and performance benefits with scalability across 100s of terabytes of structured and unstructured data. These are critical points for System z customers in banking, finance, insurance and other sectors whose services depend on efficiently managing high volumes of data. But since IBM's ECM solutions can be deployed on existing mainframe systems without buying additional hardware, the company is working to spread the ECM gospel beyond its traditional congregation. The cross-platform capabilities of IBM's ECM solutions are broader than most competing products. Plus, their ability to drive economies of scale and utilize existing IT staff skills make them particularly attractive to existing System z customers, including those leveraging Linux.

Cloud Computing

The myriad benefits of IBM's software and Linux on System z come into clear focus in cloud computing environments. It could be argued that the mainframe was made for the cloud – and vice versa – since cloud computing solutions of every sort aim to leverage technologies including virtualization, automation, and self-managing/healing which have been available for decades on the mainframe.

Cloud computing is in an evolutionary state which will continue as users such as corporations, service providers and consumers figure out the intricacies of the cloud. But at the same time, public and private sector IBM clients are already leveraging System z and Linux to consolidate, support, manage and deliver cloud-based services and other offerings.

What Maintec Offers?

zLinux-in-a-Box^(SM)

Maintec Technologies, a mainframe outsourcing service provider headquartered in Raleigh N.C, is offering [zLinux-in-a-Box^{\(SM\)}](#) service for enterprises running Linux servers in their data centers.

Maintec provides the hardware, software, human resources and infrastructure to deliver onsite or offsite zLinux solutions. Maintec's zLinux-in-a-Box^(SM) offering include:

Fully managed zLinux Solution at Client Data Center

- Installation of Hardware
- Creating environment for application migration
- Assistance for application migration
- 24/7/365 on-going support on offshore/onsite model

Fully outsourced zLinux Solution at Maintec Data Center

- Save Up-front Capital Expenses
- Flexible Plug & Play facility
- Physical & Data Security
- Capacity Based on requirements
- 24x7x365 Support and maintenance
- Disaster recovery Capability



For more information, get in touch!

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