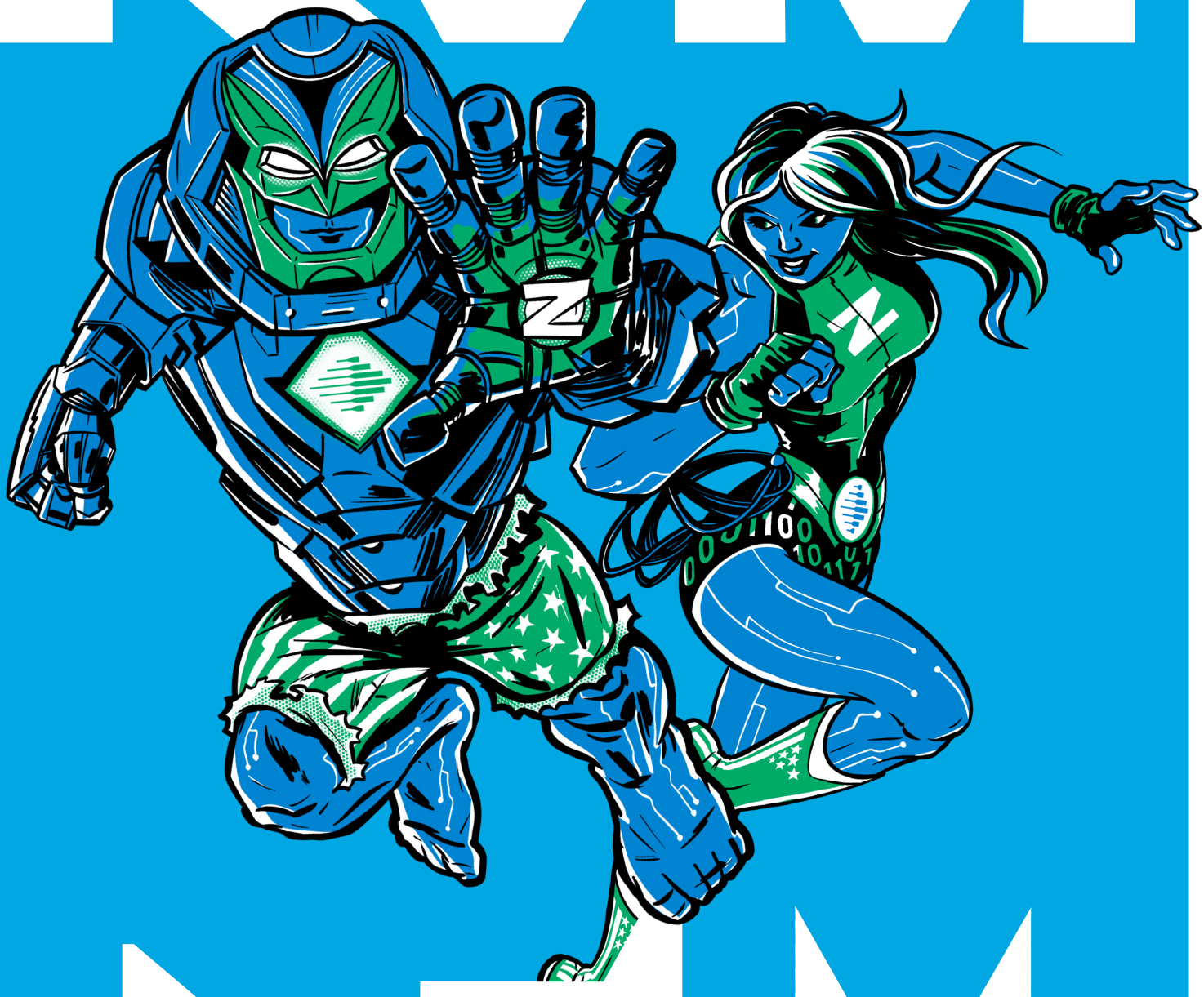
z/VM vs KVM



VELOCITY SOFTWARE

As installations evaluate their options for running workloads on LinuxONE, this article should help guide the decision-making process for choice of hypervisor and architecture – z/VM vs KVM.

Why LinuxONE?

LinuxONE provides increased sustainability, availability, enhanced security, government compliance, and AI capabilities, all at a reduced cost of ownership. For sustainability, consolidating x86 servers to LinuxONE reduces energy requirements by up to 75%, and footprints by at least 50%. For availability, LinuxONE offers eight 9s (99.999999%) of availability. For security and government compliance, LinuxONE adds significant additional protections. For AI, LinuxONE has advanced capabilities built into the hardware including new Spyre AI accelerator cards.

Consolidating many x86 servers to LinuxONE allows for much higher utilization in a smaller datacenter footprint. Reduced cores in a LinuxONE generally reduces software costs. Virtualizing multiple servers in a LinuxONE simplifies operational management, disaster recovery and the network architecture required for connectivity.

Why z/VM vs KVM?

In choosing the hypervisor, the following should be considered:

Utilization

z/VM target utilization is typically 90% peak and KVM should not exceed 60%, thus KVM requires at least 50% more engines for running workloads.

Cost

KVM requires 50% more per core software charges, and 50% more cores to power, further impacting sustainability goals.

Oracle support

Oracle does not support its databases on KVM. Oracle is fully supported and certified with z/VM, or in its own LPAR.

Skills and Education

The x86 virtualization skills are typically VMWare and not KVM. Multiple universities and installations are creating hands-on training programs for z/VM.

Security options

Multiple vendors have z/VM specific security, such as RACF, which will restrict access at many different levels, meeting government regulations.

Advanced management

Mature facilities are provided by multiple vendors on z/VM.

Why Linux on Velocity (zLOV)?

zLOV

- Provides full management requirements for large enterprises.
- Uses a single pane of glass for visualizing LinuxONE, including z/VM, Linux, OpenShift, MongoDB, Postgres and other applications.
- Dynamically sizes virtual servers to meet current workload requirements with zVRM.
- Uses significantly fewer resources, including CPU, memory and disk space than any other option.
- Empowers users to be self-sufficient for managing servers, reduces the skill requirements for system administrators and enhances security.

The reasons for moving workloads to LinuxONE from x86 servers and VMWare environments include:

- Costs in terms of licensing
- Sustainability (power)
- Datacenter costs (floor space)
- Security
- Avaavailability (nine nines or 99.999999% of uptime from the hardware)
- Management
- Regulatory requirements

With two primary options for operating the platform, z/VM and KVM, the question becomes which one better meets your corporate objectives. The choice based on cost is easier to define – but not as intuitive as one might think. Other intangible costs – such as skill gaps, delayed response times, or reduced performance – are more difficult to quantify.

Costs

The following LinuxONE operational components need to be evaluated to determine cost benefits:

1) Capacity requirements

2) Software licenses

3) People costs

4) Management costs

1] Capacity requirements

One key element of the platform analysis should be the number of IFLs required to run a workload. Running at higher utilization requires less hardware, which equates to less software and less environmental costs. Typically, in a z/VM environment, the peak target will be 90%.

> When asking Google or customers what is the target peak utilization for KVM, the answer is 60%.

This means KVM has a requirement of 50% more hardware and associated software licenses. With a long history of performance management for z/VM, the knowledge, tools and skills are readily available to maintain much higher levels of utilization. With a lack of sophisticated management software, KVM will require more hardware and associated licensing costs.

According to the internet:
This 60% recommendation stems from the fact that higher utilization rates can lead to several performance issues, including:

- Increased contention for CPU resources

  As an LPAR becomes more highly utilized, virtual machines (VMs) might experience delays in getting dispatched, leading to longer processing times and slower application responses.

- Growing workload queues

  When the system is heavily loaded, tasks might queue up, further exacerbating delays and potentially impacting overall system responsiveness.

- Elevated overhead at various levels

  By minimizing the hardware footprint, power consumption and administrative overhead, significant cost reductions can be achieved. With over 50 years of IBM z/VM software and hardware development, z/VM has the most experience and maximized performance of any virtualization platform with a recommended peak utilization of 90% as compared to KVM that should not exceed a peak of 60%.

Based on the above, KVM will require 50% more engines. For example, a system with one hundred available cores under z/VM provides the capacity of using at least ninety engines. Under KVM at 60% utilization, one hundred and fifty engines would be required for the same capacity.

2] Software licenses

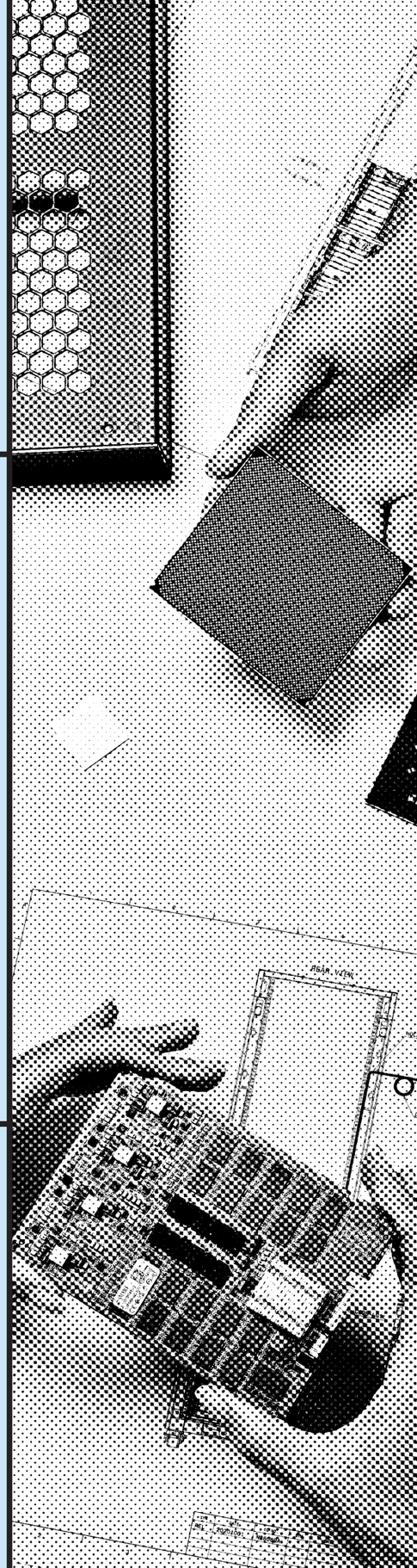
The pricing for RHEL, or any other supported Linux distributions should be the same per engine. Savings of 50% of the engines with z/VM will reduce the cost of Linux and applications measurably. Installations should do their due diligence about who is aggressively enhancing their software and pricing models rather than assume. The difference in pricing models is significant, as well as the development efforts required to keep software current.

3] People costs

When we hear there is a lack of skills, one should think of what that really means. There are a lot of skills available for small implementation of any platform. For a major implementation and consolidation to LinuxONE, the skills required are of a more sophisticated nature. What does it take to support thousands of servers on one box, when a single server on any LPAR can impact other workloads? That level of expertise is extremely rare and can only be found in individuals with decades of hands-on experience with z/VM and software specifically developed for the platform over the past 50 years. Implementation skills exist from many sources, and with a more modernized approach to managing systems, skills become easily transferable. There are two major software solutions to minimize the skill requirement to manage large systems, ICIC from IBM, and zPRO from Velocity Software. The intent of both is to provide the end users with the tools they need to manage their servers and resources.

4] Management costs

Management Costs (Software): The players in this world traditionally have been IBM, Computer Associates (now Broadcom), BMC, and Velocity Software. The number of players has decreased, with cost and function being more critical to success. Again, it is recommended that due diligence to pricing models, current functions, and development efforts be evaluated.



Management Requirements for a Large Enterprise

To be successful, traditional large environments must have all of the required functions implemented. When evaluating z/VM vs KVM, understanding the facilities available to manage such large systems will have a large financial and operational impact. Without proper management, the number of engines and real memory and even network resources must increase to avoid problems. When performance problems occur, often the perceived answer is to add hardware. For z/VM, the tools to diagnose bad performance have existed for decades. For a new platform such as KVM, the sophisticated requirements for managing large systems have not been there until only very recently. Like Linux, KVM was developed for x86 architecture, and the tools available for management may not transfer to IBM Z or LinuxONE systems like z/VM. Due diligence should be a major part of the selection criteria in making a hypervisor choice.

The required management functions fall into four categories:

Capacity Planning

Capacity planning is the financial acquisition function that is the most critical to the success of an implementation. Not enough resources impact the business applications; overly abundant resources impact the business financially. Capacity planning is about getting it right. Metrics and history are needed both as input and for feedback.

Performance Analysis

When there are performance problems (and there will be), data and skills are needed to quickly resolve the issue. Performance problems lead to losses from a business perspective. Banks have lost customers as a result of performance problems. Transactions may be authorized after a time delay without proper analysis.

Operational Support

When running large numbers of servers and applications, there are many flags of impending issues. It might be disks or file systems filling up, or an application not operational, or thousands of other potential problems. Without the metrics feeding into an intelligent operational alerting mechanism, the alternative is to wait for disaster and respond. Management by definition is not waiting for disaster but being proactive with proper operational support.

Chargeback / Resource Consumption Analysis

Knowing which applications are consuming what resources is not a challenge when running on small servers dedicated to the application. When running a large shared resource platform, metrics are required to evaluate costs associated with applications and workloads. This requires a level of sophistication not required on smaller platforms. When applications running on small platforms need more resources, both the requirements as well as the costs of solutions are obvious. Large systems need an elevated capability.

z/VM vs KVM

1. Workload Consolidation and Efficiency

- z/VM excels at consolidating hundreds to thousands of Linux images and other operating systems (like z/OS and z/VSE on IBM Z) onto a single IBM Z or LinuxONE system.
- It achieves high resource utilization by effectively sharing hardware resources among virtual machines.
- This can lead to significant cost reductions by minimizing hardware footprint, power consumption, and administrative overhead.

2. Robust Virtualization and Management

- z/VM provides a proven and stable hyper-visor with decades of development and a reputation for reliability.
- It offers advanced virtualization features such as live guest relocation for maintenance and workload balancing, minimizing disruption to operations.
- z/VM allows flexible and dynamic resource allocation, enabling administrators to easily add, remove, and shift resources to optimize performance and business results.

3. High Availability and Resilience

- IBM z17 and LinuxONE 5 with z/VM are known for their exceptional availability, often cited as eight 9s or 99.999999% of uptime.
- z/VM provides resiliency features including duplexed data, automated operations, and fast restart capabilities to minimize down-time and ensure continuous operations.
- It supports online configuration changes to eliminate many planned outages.

4. Security and Integrity

- IBM Z and LinuxONE offer baked-in security features like pervasive encryption and hardware security modules.
- z/VM leverages these hardware security capabilities to provide a highly secure environment with features like workload isolation.
- z/VM has a long history of providing system integrity and security for mission-critical workloads. IBM'S RACF works to keep your system with data quantum safe, providing the greatest levels of security available today.

5. Specific use cases and advantages

- Linux server virtualization: z/VM is an ideal platform for consolidating Linux workloads, offering efficient resource sharing and high-speed internal communications between Linux guests.
- Mixed workload environments: On IBM Z, z/VM can host a diverse mix of operating systems like Linux, z/OS, z/TPF and z/VSE, facilitating application and data integration and leveraging the strengths of each platform.
- Development and testing: z/VM provides a flexible and agile environment for creating and rebuilding test environments rapidly, aiding in efficient project delivery and change management.
- On-premises cloud infrastructure: z/VM with its robust virtualization capabilities can serve as the foundation for an on-premises cloud environment, integrating seamlessly with hybrid cloud strategies. Velocity Software's zPRO provides a cloud front end developed to ease z/VM administration requirements, allowing your business to focus on the applications required to move your business forward.

Due Diligence

References are a great tool as input for due diligence. z/VM is a platform run worldwide by banks, financial organizations, governments, and many other industries for over 50 years. Linux on z/VM has been common for 25 years. The associated experience, knowledge and product support is easy to verify. For a quickly growing platform like LinuxONE, please ask for multiple references for something close to what you are planning. Ask about their utilization (and how they measure it), what management tools are used, and how they have developed skills to manage potentially thousands of servers on a single platform. And, of course, there are always those installations that are willing to take the lead as pioneers.

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