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Q&A: Consolidating Linux Workloads On System Z
Best Fits For Making The Technology And Business Case

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EXECUTIVE SUMMARY

Transitioning Linux workloads to run on a System Z footprint will first require your chief information officer's (CIO) sponsorship — as any step away from convention would entail. Take the shortcut on this assignment by asking him three simple questions: 1) Is there a long-term commitment to the mainframe as a strategic systems platform? 2) Would you choose "good enough" technology over best-of-breed technology if the former resulted in dramatic life-cycle cost savings? 3) Do you believe that Linux and open source software in general has evolved to the point where you are comfortable running mission-critical apps on the platform? If your CIO answers "yes" to these questions, then you are on your way. Using the mainframe as a consolidation platform of choice for Linux workloads may seem like you're stepping out on a ledge — but don't worry, many others have successfully gone before you. Don't relax yet, though. Making the Linux consolidation case on IBM's mainframe will require lots of upfront spade work including due diligence on the business case, differentiating the technology benefits, and — most importantly — doing the math.

QUESTIONS

1. What do I need to know about Linux and Linux on the mainframe?

2. What's unique to Linux when it's leveraged by System Z?

3. Why is zVM so critical when running Linux workloads on System Z?

4. What is an IFL, and how is it different from a general-purpose System Z processor?

5. What are the ideal applications to consolidate and virtualize onto a mainframe?

THE KEY PRODUCT INGREDIENTS BEHIND THE TECHNOLOGY CASE

Linux on the mainframe was first released more than seven years ago, but it was only in the last several years that these complementary technologies really garnered widespread customer attention. The continual hardware- and software-pricing reductions, the functionality refinements to the Integrated Facility for Linux (IFL) specialty engine processor, and the ongoing feature-set enhancements to the zVM advanced virtualization stack collectively created a compelling business and technology case for moving Linux workloads onto the mainframe. This question-and-answer process will help you start your journey, outlining the best fits for consolidating and virtualizing Linux on an IBM System Z.

1. What do I need to know about Linux and Linux on the mainframe?

The Linux operating system has a lot going for it. Linux is a reliable, stable, and secure open-standards-based operating system. It is available from multiple distributors, but IBM only recommends RedHat or Novell SUSE as the preferred Linux distributions solutions for System Z. Linux also has a huge base of skilled administrators and developers with skills that are easily transferred to the mainframe world. Linux is now equally deployed into technical computing and commercial business processing environments. Linux benefits from a sizable portfolio of open source applications, middleware, and tooling, as well as from an equivalent software portfolio optimized for Linux from all of the commercial software vendors. Linux has a strong market position derived from its x86/x64 heritage, but Linux on Z is a native mainframe operating system, exploiting all of the IBM System Z hardware constructs.

In short, all current mainframe customers should view Linux on Z as providing additional opportunities to leverage their investments through Linux. So then, what is technically different about Linux on System Z? Linux has access to a sizable System Z-specific hardware base, inclusive of crypto support, traditional, and open I/O subsystems (both varieties of disk and tape), access to the high-speed OSA-based communications between z/OS and Linux, and HiperSockets technology for ultra-high-speed communications between z/OS and Linux on the same machine.

2. What's unique to Linux when it's leveraged by System Z?

System Z is designed to support multiple and mixed workloads. It allows for the consolidation of applications: The System Z virtualization stack can give complete workload isolation while still providing all of the high-speed interserver connectivity. Like high-end Unix alternatives, System z10 Enterprise Class can scale up to 64 applications processors. Most System Z customers refer to the platform as the "ultimate virtualization resource," a massive consolidation platform capable of up to 60 logical partitions and the addition of thousands of virtual servers under the direction of zVM technology. Known for its high levels of capacity utilization — 90% to 120% without degradation — its virtualization stack can create a much lower life-cycle cost outcome. If virtualized environments are being deployed across a distributed x86 environment, sustained capacity utilization rates much above 25% are rare. This results in not only wasted idle CPU cycles, but the power and cooling from idle servers is still costly. System Z has numerous management tools for the intelligent and autonomic management of a diverse set of application workloads.

3. Why is zVM so critical when running Linux workloads on System Z?

Essentially, the hypervisor-based zVM provides a highly flexible test and production environment for enterprises deploying a wide range of applications types. zVM's "software-derived" hypervisor is integrated with the hardware, so it can carve up CPU, memory, and I/O to share equally, and zVM can also virtualize everything else due to the "shared everything" nature of a mainframe. This creates a virtual network (virtual switches/routers), virtual I/O (mini-disks, virtual cache), as well as virtual appliances. Forrester clients tend to all weigh in with the same common set of benefits

from using zVM for Linux infrastructure optimization. The first, most obvious benefit is being able to run hundreds to thousands (in some cases) of virtual Linux servers on a single mainframe, easily maintained and deployed without adding costs associated with any new server footprints. The repeated benefits cited include:

- The ability to catalyze virtual growth at extremely high and sustained utilization rates.

- Efficient resource utilization because test, development, education, backup, and other types of server can share resources, applications, or code — offering a huge potential dividend in reduced software licensing costs.

- Network simplification through a highly virtualized network that is internal to the System Z. Security is also enhanced, since this same network is internal to the System Z.

- Easier systems management through a single point of control for administration and operations.

4.   What is an IFL, and how is it different from a general-purpose System Z processor?

The IFL is actually an optional specialty engine feature designed to add additional processing capacity exclusively for Linux workloads. It was created to support only zVM and Linux operating system environments on System Z. Understanding the pricing action taken with the IFL is important, as it only incurs a one-time charge (OTC) — as opposed to both the one-time fee plus the ongoing monthly license fees that make up most of the one- to three-year life-cycle software costs of an IBM software stack. Additionally, an IFL's pricing does not count in the normal graduated pricing algorithms set forth in the MIPs-derived millions of service units (MSU) software licensing framework. Specialty engines are additionally important, in that many other software vendors who want to reduce their software costs on the mainframe — particularly vendors with new workloads for the mainframe — are targeting the specialty engine for optimizing the performance of their application, and the price/performance benefits these "offload engines" provide.

5.   What are the ideal applications to consolidate and virtualize onto a mainframe?

The applications workloads that are the best fit for Linux on System Z are those that benefit from the classic strength of the mainframe and its consolidation capabilities. Linux-based workloads with existing data and applications on z/OS or z/VSE operating systems can naturally complement these environments and provide improvements to the quality of service, systems management, and performance attributes of the mainframe. Where the mainframe really shines is when the system is running multiple, mixed applications types — and lots of them. The actual solutions that fit best for Linux on Z are those applications that:

- Require a tight connection to the existing database management system (DBMS), and/or transactions and applications running under z/OS or z/VSE.

• Have high disaster recovery requirements, where both availability and failover is critical.

• Are well-suited for I/O-intensive applications.

• Have requirements for real-time server provisioning that may peak at different times.

Linux-based "best fit" applications would be able to take advantage of the System Z's benefits in shortening the end-to-end path link for applications processing, best optimized through: 1) the colocation of applications; 2) the consolidation of applications from distributed servers; 3) the reduction in network traffic; 4) and simplification in the overall support model. After a series of interviews with IBM consultants who perform IT consolidation assessments for a living, and cross-referencing that information with our client inquiry hotline, we found that the most popular best-fit applications were as follows: IBM WebSphere, Oracle, Java, network infrastructure applications (FTP, NFS, DNS, etc.), IBM's Lotus Domino, and lightweight directory access protocol (LDAP).