

Transworld Data



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For twenty-five years, Transworld Data has performed technology analytics, market research and IT consulting on every world continent, including Antarctica. The firm's primary focus is on how enterprises worldwide implement technology to advance business performance, and how technology providers bring technologies to market to facilitate advancements for businesses and consumers. The company is headed by Mary E. Shacklett, President. Prior to founding Transworld Data, Mary was Vice President of Product Research and Software Development at Summit Information Systems, a commercial software house; and Vice President of Strategic Planning and Technology at FSI International, a multi-national manufacturing company in the semiconductor industry. Transworld Data offices may be reached at 360-956-9536 or at inquiries@twdtransworld.com.

Transworld Data White Paper

Building Workload Images for IBM z Systems with SUSE Studio

Over the past decade, businesses have consolidated their data centers, reduced hardware footprints and decreased energy utilization to shrink their operating expenses. They have primarily done this by using virtualization to install multiple images of operating systems and applications on a single server. Nowhere has this activity been any more intense than in the area of the Linux operating system, which is able to run on virtually any hardware platform with the potential for unparalleled scalability.

At the same time that businesses have consolidated servers and virtualized systems, they have also increased their expectations for Quality of Service (QoS) and up-time from their data centers. The IBM z Systems mainframe (with the latest hardware generation release IBM z13), continues to be the “gold standard” for systems reliability and quality of service. Unsurprisingly, enterprises worldwide continue to run 70 percent of their mission-critical applications on this platform. Many enterprises have also looked to IBM z Systems as a virtualization and expansion platform for their Linux applications.

Organizations continue to move forward with data center initiatives to support their mission-critical applications, but they also look to capitalize on virtualization to increase flexibility and scalability through private clouds and on-demand provisioning. The ability to rapidly deploy Linux on any given platform, including IBM z Systems, with minimal disruption and absolute quality of service, becomes imperative. SUSE Studio, with its ability to rapidly create enterprise-ready virtual images built on SUSE Linux Enterprise Server on x86 and x86-64 as well as on the z Systems architecture, delivers on this promise.

The Rapid Deployment Challenges Presently Facing IT

The ability to do rapid system deployment with no downtime, and to instantaneously respond to changing business conditions with IT solutions are on virtually every CIO’s strategic roadmap. The challenges are rooted in getting there, and they exist in several key areas:

Home grown tools

Many IT departments have evolved their own internal tools for creating images of virtual systems, including Linux. There is a comfort level with these tools because they have been developed internally to fit a specific IT environment, and IT staff is already familiar with them. Unfortunately, these tools often require manual “assembly line” creation of new virtual workload images, a labor-intensive endeavor. These tools also frequently lack automation that can update the virtual images and error-check new image creation to ensure that the end product will remain compatible with systems already running in production.

Multiple toolsets and organizational silos

In other cases, organizations have purchased commercial Linux tools and toolsets, but the tools that they use on the x86 and the IBM z Systems platforms for virtual workload image creation differ from each other. This can create inconsistent results when it becomes time to move a virtual Linux image from one platform to another. Organizationally, using different tools for Linux image creation on x86 and z Systems platforms also maintains the “silos” within IT, because x86 and z Systems personnel continue to work independently of each other, instead of working together for best results.

Reducing the Time to Results

With the z Systems workforce aging, many organizations are faced with how they are going to transfer key IT contributors’ experiences as those contributors begin to retire. The young IT workforce often lacks critical mainframe skills, but this does not change an organization’s need to create and deploy Linux-based workloads on z Systems or x86 platforms. Understandably, organizations want tools that can create virtual Linux images on *any* platform, using a standard toolset and methodology. If tools and methodologies can help to reduce the time for deployment and maintenance, valuable time is saved and can be used to expand knowledge and apply fine-tuning to the infrastructure. This allows IT to deploy solutions more efficiently and reliably in highly demanding business environments.

Quality of Service

To achieve quality of service, image creation must be a consistent and predictable process, regardless of the virtualization platform or the workload being virtualized. As virtual Linux images are being created, there are also compliance and governance standards that IT must meet. It can be difficult to guarantee consistency of workload image creation, performance, compliance, governance, tracking and versioning when multiple commercial and homegrown tools are being used, depending on whether the target platform is the mainframe or distributed systems.

Making Workload Creation Easy

SUSE Studio toolset solves major IT challenges in the areas of rapid and consistent SUSE Linux Enterprise workload creation. This can expedite system deployments in a QoS environment. SUSE Studio accomplishes this by presenting an intuitive graphical user interface (GUI) that is the same in appearance and function, whether you are creating a workload on an x86 or on a z Systems platform. The workload images that are created can easily be cloned or customized, with all images tracked and versioned so staff can easily go back to a prior version. Because workloads based on SUSE Linux Enterprise can be created using the same methodology on either an x86 or a z Systems platform, there is no skills or toolset “lock-in” on any given platform. This makes it easy for one team to create workload images for z Systems or x86 machines. The result is multi-directional flexibility and scalability, irrespective of platform. Staff learning curves are minimized because the strength of the graphical user interface allows staff to work with the toolset, without having to write or execute a single command line.

The ability to create consistent system images, together with a uniform graphical user interface that appears and works the same on both the x86 and z Systems platforms, also reduces the total time to configure, test and deploy systems. This is critical in both cloud and on demand computing environments. Here is how sites save on their deployment times:

When an organization uses Linux system image creation scripts that were developed in-house, or that perform the system image creation process manually, staff must usually perform one process per image. This repetitive procedure prevents sites from leveraging from the fruits of their original effort because they are performing the same procedure over and over again. The effect on deployment can be dramatic. In some cases, customers have reported that it can take two to three weeks to build out a toolset by hand. With SUSE Studio, you can take a template and perform system image creation in as little as one day. SUSE Studio also has built-in logic that checks the system image creation while you are developing the image to ensure that it is compatible with the supported SUSE Linux Enterprise Server that applications are using in production. Studio also has an integrated test bed for high level testing that functions as an isolated “sandbox” for the new image and the surrounding resources and applications that use it. In a manual environment, staff has to set up its own test environments.

How SUSE Studio Works

When Linux is deployed, it goes through certain phases that begin with the initial formatting of disk. After this, files get written. Finally, help and configuration files get inserted and the files are tracked in a database. Behind this entire process, there is a methodology for system setup, and you can query files to see which are installed and which are altered.

However, administrators also want full control over how these files are *created*. SUSE Studio addresses this need by providing an automated and streamlined process for workload creation based on SUSE Linux Enterprise that can be customized—but without the need to independently build or customize scripts. This workload creation process (and the ability to customize templates and defaults) is both *identical* and *repeatable*, whether you are creating workloads on an x86 or in a z Systems environment.

During system image creation, SUSE Studio automatically tracks the process to ensure continued compatibility with the target SUSE Linux production environment. It does so by issuing risk notifications whenever you attempt to effect a customization that could potentially introduce system incompatibility that could affect runtime or system quality. This feature reduces the risk of system incompatibilities that manual methods of system image creation can produce---and it dramatically lowers the overall risk factors for system deployment.

With SUSE Studio, you are also managing configurations of images, and not the images themselves. If you need to move an image from x86 to the IBM z Systems, you can do so by exporting the image description into an XML-style file, applying the necessary change to reflect the platform, and re-importing it. The process reduces the need to rewrite and adapt images that typically accompany manual image creation.

The streamlined SUSE Studio workload image creation process aids workload migration, so that if you have SUSE and a JAVA-based application like WebSphere on x86 and you need it on a z Systems platform, both machines exhibit the same structure. This gives you infrastructure flexibility. In this environment, IT staff have the opportunity to decide if a workload should be deployed on x86 or z Systems by importing the workload into SUSE Studio and then transforming it to the platform of choice. You can also recycle and “test drive” workload images in advance in a separate Enterprise “sandbox” to ensure that all components (i.e., policies, files, software, etc.) are in place. If a component is missing, you can retest. You have the flexibility to see the changes you have made, to research older versions, or to go back to older versions, if desired.

SUSE Studio and the Corporate Data Center

The scalability, flexibility, ease of use and quality automation of SUSE Studio solve several important issues for enterprise data centers.

For large enterprise data centers that run a small number of large, consolidated servers with many LPARS (logical partitions) and virtual SUSE Linux Enterprise images, SUSE Studio delivers its best value when the system images are similar, with perhaps small modifications, and the same software is running. With built-in automation and operating system compatibility risk checking, SUSE Studio allows IT staff to create only the workload images that are needed, and in a very controlled way. The images can be created using the same toolset, whether the image target platform is x86 or z Systems. Sites gain leverage from SUSE Studio when they want to make a specific modification for all images, or if they wish to recreate the same image 50 times, with ten percent change. The new modification can be replicated and changed in a systematic manner—and if you lose an image and have to recreate it, you can do versioning with Studio.

With SUSE Studio, it is also possible to create the same system image for each deployment. This guarantees consistency and contributes to quality of service and rapid deployment. In the past, companies used their own tools for this. There wasn't the same level of consistency, so there was also greater chance for error. This impeded scalability.

SUSE Studio templates provide the ability to safely modify Linux workload image creation for either x86 or z Systems platforms. This allows staff to create Linux system images for deployment on a variety of machines, and to then scale out these images as needed. It also allows easy cross-over of IT staff between hardware platforms, important in small to medium-sized organizations because smaller staffs are charged with running data centers.

Total Cost of Ownership

In tool evaluations for the data center, every organization also considers the Total Cost of Ownership (TCO) of its investments. For most organizations, TCO has come to mean not only the return on an initial financial investment in technology, but also the ability to continuously leverage that investment for gains in operational efficiency, strategic deployment and time to market, and flexibility.

In the case of workload image creation and deployment, the process begins with planning. The systems administrator must look at each workload to determine which version of an operating system it is going to require, which hardware and middleware will need to be configured, and which application will be involved. This process is much the same—whether you are creating your workload images manually or with an image creation tool like SUSE Studio.

It is after the planning phase—in end to end image creation and testing--where SUSE Studio delivers significant gains over similar manual processes in the area of time to market, agility, flexibility and operational efficiencies. In internal pilot testing of over one year duration, SUSE's data center administrative team, which had significant experience in the development of manual scripts for image creation, improved its image creation, testing and deployment results by a performance factor of 7-8x over what performance would have been using manual script creation, testing and image deployment.

This is how the results were achieved:

Image creation—Most organizations commit considerable time and effort when they create initial scripts for workloads. They then spend an additional one to two hours for each modification of a baseline script whenever a workload configuration needs to change. Because of the complexity involved, someone with programming skills usually must perform the modifications—not the system administrator. The overall process of image creation and modification over time becomes labor-intensive, and it involves separate activities by different people and an abundance of operational procedures—with absolutely no guarantee on what the results will be.

SUSE Studio takes an entirely different approach that begins when a system image is first created. The tool uses a “template” concept where all staff needs to do is to define the target environment of the image (e.g., z Systems, x86, etc.). With the click of a mouse on a GUI, the administrator then adds the necessary software and middleware packages, files, applications, etc., including resolved dependencies.

Image Modification—In a manual image scripting environment, programmers need to get involved with image recoding, and this can take one to two hours for each script. With SUSE Studio’s point and click environment, the process can be reduced to minutes.

Performance Gains and Streamlined Resource Utilization—When manual scripts are created or modified, attention is focused on the end deployment environment, but not necessarily on other aspects of “best practices” applications deployment—such as whether the operating system is optimized for the application and supporting middleware. SUSE Studio does this automatically. It follows the image creation and modification processes, and ensures that the underlying operating system is “fit for purpose” to the need of the application. This means that if the entire operating system is not needed to run the application, only those parts of the OS needed will be included. This reduces the footprint of the operating system so there is no additional OS overhead that can bring down application performance.

Testing—Significant time goes into thorough tests of manual image creations and modifications, because they must be right the first time when they are deployed in a production environment. With SUSE Studio, the demand of thorough testing is no different—except that this testing is further extended to elements that aren’t necessarily on standard test checkout lists, but which could play major roles in image performance and speed of deployment.

One area that is likely to be overlooked is the continued compatibility of an image with the underlying operating system so that the image performs optimally in production, and also that it continues to be a supportable OS under the licensing terms of the operating system. SUSE Studio automatically checks for compatibility and issues warning messages during testing if any modification is introduced that potentially impacts compatibility and supportability. SUSE Studio can also perform automated checks against company policies, security and compliance requirements based upon a set of business rules that is input by IT. If problems occur during testing that make it necessary to return to an earlier configuration of an image, SUSE Studio also makes it easy to rollback to any earlier image.

Proactive design for maintenance—Maintenance can consume over 50 percent of IT’s time, but it is frequently overlooked as an area that can contribute to operational efficiencies. During manual image creation, images are changed, retested and placed into production—but they are often not well documented. If someone else needs to enter the maintenance process down the line, effecting the necessary repairs can take three times the work because the documentation just isn’t there. SUSE Studio features built-in intelligence and automation that proactively approaches maintenance. Studio has automated change logs and image version control that streamline the image maintenance process.

The Advantages of SUSE Studio

Server consolidation, system virtualization and fail-proof creation and deployment of Linux-based workloads can be rapidly provisioned in physical, virtual or cloud environments depending on the IT priority list. A critical element of rapid deployment is the ability to create application stacks in advance of deployment. By pre-testing these stacks and tracking them with controlled versioning, workload images can be leveraged again and again. Sites can potentially save 80 percent of their deployment time by employing this methodology.

SUSE Studio also furthers the ability to leverage and to scale by checking for incompatibilities with the native SUSE Linux Enterprise operating environment which can sometimes arise when new workload images are being created. This reduces the risk of deploying systems that can introduce quality and performance problems. From a compliance standpoint, library name, module name and security rules are all locked in. SUSE Studio tracks all workload changes that have been done—and you can rebuild any workload at any time. These simplified system builds facilitate easier SUSE Linux Enterprise builds on z Systems. Additionally, if a site has a need to create a virtual instance of SUSE Linux Enterprise Server for z Systems, all of the system creation work can be done on an x86 machine and then transformed to the mainframe with the click of a mouse.

Since SUSE Studio has the flexibility to create Linux images on both the x86 and z Systems platforms, it is well positioned for the hybrid computing environment that characterizes most enterprise and cloud-based applications. Studio’s built-in automation and error checking also eliminate the need to prepare and modify manual scripts for image creation. This dramatically reduces IT’s overall time to deploy virtual Linux images, and delivers efficiencies that have the potential to revolutionize the data center. SUSE Studio also provides a way to standardize the workload image deployment process so that workload creation is a consistent and repeatable process. This leverages IT’s ability to rapidly migrate mainframe workloads to the cloud with SUSE Studio, while eliminating the chance of introducing error into the process.

Conclusion

With SUSE Studio, you can run Linux workloads on x86 and on IBM z Systems machines, and use any management software. There is also compatibility with other SUSE products, such as SUSE Manager. SUSE Manager delivers best-in-class capabilities that enable enterprises to comprehensively manage Linux servers with a single centralized solution. SUSE Manager provides automated and cost-effective software and update management, asset management, system provisioning, and monitoring capabilities. This enables customers to easily manage Linux server deployments across physical, virtual and cloud environments. SUSE Manager can be hosted on IBM z Systems and manages all virtual Linux instances in your environment.

The built-in flexibility and ease of use of the SUSE Studio allow you to do what you want to do with your IT architecture, without being limited by workload migration burdens. The transparency of the SUSE Studio toolset also breaks down staff “platform silos” in IT. It facilitates collaboration, and enables x86 staff to create virtual SUSE Linux Enterprise systems for the mainframe, as well as for other virtualization targets. With SUSE Studio, builds and restorations of workloads are no different on z Systems than they are on the x86 platform. Most importantly, sites are enabled to meet the aggressive goals for resource provisioning that executives in the end business expect. With the platform transparency of SUSE Studio, toolsets no longer interfere with the process.

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