The Path to a Software-Defined Infrastructure

In our increasingly digital age, IT vendors of every description are constantly talking about software-defined solutions. There seems little doubt that we are rapidly moving towards a world where almost everything is defined by software and expected to be nimble, flexible, adaptable and cost-effective. This is certainly true when it comes to the IT infrastructure that organizations depend upon to host their business-critical systems and workloads.

At a Glance:
In the ongoing search for greater agility, automation and efficiency, IT leaders are increasingly turning to software-defined infrastructure as the solution to their operational needs.

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Research shows that 95 percent of IT leaders are convinced that a software-defined infrastructure (SDI) is the future for their data centers and is therefore central to their IT strategy and planning. That statistic is not surprising when you consider the potential business benefits. Virtually every organization is looking for greater operational agility, automation and efficiency, along with the ability to react faster with flexible IT resource allocation and scaling. SDI helps to deliver all of this functionality. It is also increasingly accepted as the ideal foundation for adopting containers, microservices, DevOps and multi/hybrid cloud technologies, which are progressively being embraced to help improve the customer experience.

SDI represents a fundamental shift away from the rigid data center designs of the past. In these traditional environments, workloads typically ran on specifically allocated hardware platforms, with servers, storage and networking resources being managed in separate silos. Functionality and performance typically relied on proprietary technology, often leading to higher costs and vendor lock-in. This hardware-centric approach is slow to deploy and difficult to scale, adapt or upgrade. It is also complicated to manage.

By contrast, SDI adds new layers of software to abstract operations and applications from the underlying hardware. This removes the shackles of rigid system silos and enables fluid pools of compute, storage and networking to be created and rapidly deployed, managed, scaled or adapted as needed. Moving intelligence and functionality to software rather than proprietary hardware means that commodity or off-the-shelf hardware can be used. This helps to reduce costs, makes lifecycle management easier and lowers the risk of technology lock-in.

Just a few years ago, SDI was an aspirational concept that was tantalizingly just on the horizon. Today, it is a reality within the grasp of organizations of all types and sizes. The path to SDI began with the rise in popularity of virtualization technology. Prior to this, it was

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1 Research report: SDI, Containers and DevOps – Cloud Adoption Trends Driving IT Transformation
standard practice for a server to be dedicated to hosting one application running on a single operating system. By adding an additional software layer, called a hypervisor, virtualization technology took hardware abstraction to a higher level, enabling a single server to smoothly run multiple operating systems and applications. Public cloud providers have since refined this virtualization concept even further by creating scaled-out, shared platforms to give fast access to pools of IT resources and services that can be easily accessed by users and paid for as a utility.

While the impressive growth of public cloud is set to continue, it is also clear that many organizations still need to operate their own data centers. Very few organizations have the option of starting from scratch or adopting a “public cloud only” approach. In addition, existing enterprise-owned data centers will remain a vital IT investment for performance and/or data security reasons.

A large percentage of workloads are yet to be moved to the public cloud and are unlikely to be migrated anytime soon. For these reasons, over 90 percent of company leaders say that hybrid cloud is the ideal IT model for their organization, which encourages the use and adoption by large communities of technologists. The sharing of code and collaboration inherent in the open source development model lends itself well to technical advancement and rapid innovation. It is no wonder that hiring open source talent is a priority for 83 percent of hiring managers.

Today’s open source innovations can help you improve service agility and build a SDI with the flexibility to quickly provision resources based on the unique performance, availability and capacity requirements of each application, solution and workgroup.

Ideally, a SDI built with open source enables you to:

- Leverage your existing investment in physical and virtualized systems
- Select solutions from multiple suppliers that best meet your business needs
- Take a pragmatic approach that fits the way you implement and manage the lifecycle of your services
- Lower development costs, increase IT systems agility and maintain vendor independence

Several open source projects have formed around core SDI and cloud solutions—projects that are popular today and clearly gaining momentum, including:

**Linux**: has grown and matured into the backbone and mainstay of enterprise IT architectures, with a reputation for versatility and as the trusted foundation for secure, business-critical workloads where reliability, performance and uptime are crucial factors. You will find Linux at the heart of everything, from high-performance computing (HPC), embedded systems and Internet of Things (IoT) solutions to cloud platforms and the containerized applications that are becoming so prevalent in SDI environments. It is no surprise that Linux remains the most in-demand open source expertise, with 80 percent of hiring managers prioritizing it in their recruitment efforts.

**OpenStack**: the preeminent open source cloud operating system and software toolset to control large pools of compute, storage and networking resources for private or public clouds. The entire platform is managed through a dashboard that gives administrators control, while empowering their users to provision resources through a web interface. OpenStack is backed by a community of thousands of individual members, as well as leading software development, telco, hardware and
hosting businesses around the world. The OpenStack service market has already grown substantially since it was launched in 2010, and is expected to reach $8 billion by 2023, with nearly 70 percent of organizations feeling that OpenStack is vital to their cloud strategy.

**Ceph:** one of the leading distributed software-defined storage (SDS) platforms. Ceph stores data on a single unified storage cluster and provides interfaces for object, block and file level storage. Ceph delivers excellent performance, reliability and scalability—all while providing maximum compatibility with legacy applications. Ceph is the most prominent SDS solution to use with OpenStack cloud platforms.

**Kubernetes:** an orchestration engine that has quickly become the dominant choice for automating the deployment, management and scaling of containerized workloads. Containers are lightweight software packages that contain everything needed to support the applications that run in them. Kubernetes are highly portable and more resource efficient than virtual machines, making containers ideal for new cloud-native applications. Enabling this shift, Kubernetes is fast becoming an essential part of SDIs and multi/hybrid cloud solutions.

**Cloud Foundry:** an application delivery platform designed to handle all the heavy lifting for development and DevOps teams, enabling them to develop and deliver containerized and cloud-native applications fast, efficiently and at factory scale. Cloud Foundry can be used to deploy applications to any platform within a multi/hybrid cloud environment, ensuring seamless portability between the underlying SDIs. Over 50 percent of Fortune 500 companies are already using Cloud Foundry.

**Building the Foundation for a Software-Defined Infrastructure**

Open source software is at the forefront of virtually every area of technology innovation, and all the elements required to build a powerful and feature-rich SDI are available right now. The next challenge is choosing the most appropriate open source platforms for a business’s needs and deciding how to bring all the pieces together successfully to deliver the promised agility and innovation. Many organizations find it a challenge to work purely with upstream open source projects or code and will need to substantially enhance the skillset of their in-house IT teams in order to take a “do-it-yourself” approach.

Fortunately, that effort is not necessary because help is readily at hand. Expert open source veterans, such as SUSE, have taken care of the hard work by packaging together all of the enterprise-grade open source technologies and platforms you will need to make your SDI strategy a reality. SUSE takes a pragmatic and practical approach. We recognize the importance of protecting your existing investments by supporting mixed or multimodal IT environments. For this reason, we will help you integrate traditional, conventional or legacy systems (often called mode 1) with all the latest agile technologies and practices, such as cloud-native or containerized applications, along with DevOps and continuous integration/continuous deployment (CI/CD) methodologies (often called mode 2).

Our comprehensive SDI and application delivery product and solution portfolio is outlined in Figure 1, shown below:

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**Figure 1:** SUSE Software-Defined Infrastructure Portfolio

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6 Source: Market Research Future

7 Source: Forrester Report: The I&O Pro’s Guide to Enterprise Open Source Cloud Adoption
Linux is the operating system of choice to underpin the entire open source SDI environment. It is by far the most popular choice for building open source platforms, as well as the business-critical workloads that will run on them. **SUSE Linux Enterprise Server** features an enterprise-grade common code base, making it far easier to develop, deploy, manage and support workloads across your entire multimodal IT environment. SLES has become the “go-to” Linux for everything from IBM mainframes to cloud-native, containerized or embedded solutions and everything in between.

OpenStack cloud software provides the means to control, automate and provision the large pools of system resources at the heart of any SDI implementation. **SUSE OpenStack Cloud** was the first enterprise-grade OpenStack distribution on the market and has since built an enviable reputation for taking the stress out of deployment by being robust, agile, efficient and easy to manage and scale. SUSE OpenStack Cloud comes with the broadest hardware support, the widest hypervisor choice (including KVM, Xen and VMware) and the ability to support bare metal, virtualized or containerized applications. All of this makes it an outstanding choice for a software-defined IT platform or as part of a multi/hybrid cloud strategy.

To deal with the exponential growth in data volumes that IT teams have to manage, the SDS capabilities of Ceph can be easily added to your OpenStack environment. **SUSE Enterprise Storage** is built using Ceph and is designed to be resilient, self-healing, self-managing and massively scalable. Because it utilizes commodity off-the-shelf components, it is also highly cost-efficient and offers customers hardware choice, openness and flexibility. SUSE Enterprise Storage is fully integrated with SUSE OpenStack Cloud orchestration.

**SUSE Manager** is the essential extra ingredient to reduce the complexity of managing your entire SDI environment. It is designed to manage multiple Linux distributions across a broad set of hardware architectures, as well as bare metal, virtual, containerized and cloud implementations. And, it provides seamless system patching and provisioning from a single, centralized console.

**Hosting Workloads on a Software-Defined Infrastructure**

As mentioned at the outset, organizations of all types are progressively adopting an SDI strategy in order to deliver the agile, efficient and cost-effective environment on which to run their next-generation applications, as well as their business-critical systems and workloads.

Application delivery solutions that leverage Kubernetes and Cloud Foundry are specifically designed to integrate smoothly with SDI or cloud platforms. Kubernetes and Cloud Foundry handle all the heavy lifting involved in deploying, scaling and managing the lifecycle of containerized or cloud-native applications. They also provide the environment and automation tools needed by your developer and DevOps teams to swiftly release or support new code, thus boosting business agility and innovation. By adding an additional layer of abstraction, these application delivery solutions are also quickly becoming an indispensable element for multi/hybrid cloud implementations, where application portability is crucial.

**SUSE CaaS Platform** is a ready-to-use Kubernetes distribution that gets a Kubernetes cluster up and running quickly and easily, so that you are ready to deploy, run, manage and scale container-based applications. **SUSE Cloud Application Platform** is a full application delivery platform. Based on Cloud Foundry, it takes advantage of Kubernetes for container orchestration and management. It provides all the tools needed to develop containerized cloud-native applications at scale, and then deploy them to any platform within a SDI or multi/hybrid cloud infrastructure. It effectively facilitates a “write once, run anywhere” approach.
Taking Full Advantage of SUSE Solutions and Support

SUSE has more than 25 years of experience as a pioneer in enterprise-grade open source software distribution and support. We focus on delivering practical, smart and pragmatic innovations for companies with mixed IT environments.

This is important because each year hundreds of new open source projects are started. However, not all of the projects will reach critical mass or maturity. It takes a high degree of experience and expertise to track, select and support the projects that will yield the outstanding capabilities and functionality needed to help your business thrive and to keep you ahead of the competition. Our technical expertise is devoted to ensuring that the best open source technologies work well with your existing IT investments, in order to help you optimize your mixed environment.

SUSE actively contributes to the advancement of open source projects, while hardening the code from these projects and incorporating them into our commercially available and supported software products. We enhance these products to maximize service delivery efficiency while minimizing system downtime and its impact on your business operations. What is more, our multivendor partnering approach does not limit your options or lead to vendor lock-in. You can also take advantage of the best open source support and services available in the market.

All SUSE software products are backed by our global support team. This means wherever you are in your journey to meet the needs of the digital economy, you can be assured that you are working with a trusted, global partner that is always on, experienced and treats you like family.

SUSE Global services provides access to help you get a jump-start on designing, deploying and realizing value. From workshops to dedicated technical professionals, SUSE Global Services offers the expertise you need to get from where you are to where you want to go, so that your business enjoys the outcomes it requires and desires.

SUSE is in a strong position to help you transform your IT systems into the agile, high-performance, affordable and lower-risk software-defined environment you will need to meet future challenges.

We recognize that the SDI of the future requires a diligent journey of many steps. Those steps include gaining the agility and control you need today and making smooth, advantageous transitions as your requirements change.

**SUSE can help, all along the way.**

For more information, contact your local SUSE Solutions Provider, visit us online or call SUSE at:

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