# SLOS VIRTUALIZATION PLATFORM: VMWARE MIGRATION

## TECHNOLOGY OVERVIEW

### INTRODUCTION

As the virtualization market matures and alternative virtualization platforms emerge, VMware customers are recognizing the advantages of deploying SLOS Virtualization Platform either as a second virtualization platform to coexist with VMware vSphere or as a complete replacement. The flexibility and security of open source software, improved workload density, and lower cost of ownership are among the reasons companies around the world are migrating to SLOS Virtualization Platform.

There are a number of tools to help enterprises migrate to SLOS Virtualization Platform, and third-party vendors can help automate the virtual-to-virtual (V2V) migration of virtual machines (VMs) from VMware to SLOS Virtualization Platform. With intuitive and easily deployed management features, the transition to SLOS Virtualization Platform is extremely straightforward. This paper summarizes the migration benefits and overviews the steps required to move Linux® and Windows VMs from VMware to SLOS Virtualization Platform.

### THE PROBLEM

Proprietary vendors, such as VMware, Oracle, and Microsoft, limit choice and increase enterprise dependence on a single vendor. VMware customers have to upgrade to more costly versions if they want to deploy advanced features. As business requirements change, solutions and other infrastructure components should not be limited by software.

Unlike at the beginning of the x86 virtualization technology, VMware is no longer the only leader in the virtualization market.

### OPEN SOURCE IS A STRATEGIC ALTERNATIVE

SLOS Virtualization Platform is built on the open source development model — making it a true strategic alternative. Open standards speed up the adoption of new technologies and the speed at which enterprises can address customer needs. These same open standards allow SLOS products to work well together and with products from other vendors — providing software flexibility that frees enterprises to choose the best solution for their needs. SLOS Virtualization Platform does not limit customers. Investing in open source software preserves its value by not locking enterprises in to a single vendor or product.

## ENTERPRISE FUNCTIONALITY

SLOS Virtualization Platform eliminates the need for costly version upgrades to deploy advanced features with a comprehensive enterprise management system in a single SKU without stripped versions. The table below provides a high-level feature comparison between SLOS Virtualization Platform and VMware vSphere.

## SLOS VS VMWARE

| FEATURES | SLOS VIRTUALIZATION PLATFORM | VMWARE VSPHERE 5.6 ENTERPRISE EDITION |
|---|---|---|
| Max vCPUs per VM | 160 vCPUs/VM | 32 vCPUs/VM (64 with Enterprise Plus) |
| Management features | . | . |
| Single view for centralized control | Y | Y |
| High availability | Y | Y |
| VM live migration | Y | Y |
| Storage live migration | Y | Y |
| Live snapshots | Y | Y |
| System scheduler: Cluster policies to automatically distribute workload evenly across cluster host servers | Y | Y |
| Power saver: Concentrates VMs on fewer hosts during off-peak hours | Y | Y |
| Thin provisioning | Y | Y |

# SLOS
# Virtualization Platform

**SL OS**

| FEATURES | SLOS VIRTUALIZATION PLATFORM | VMWARE VSPHERE 5.6 ENTERPRISE EDITION |
| --- | --- | --- |
| Templates: VMs can be deployed from master installations | Y | Y |
| Import/export of VMs in the standard open virtualization format (OVF) | Y | Y |
| Self-service user portal: Provides administrative access to users for creating/running VMs and managing environments | Y | N |
| Application programming interface (API): Programmatic access to all management commands | Y | Y |
| Customizable reporting engine: Reporting of historic usage, trending, and quality of service (QoS) | Y | N: Requires VMware Operations Manager Standard Edition |
| Integration with OpenStack® Glance and Neutron Services | Y | Y |

SLOS Virtualization Platform offers a feature-rich server virtualization management system with advanced capabilities for hosts and guests, including high availability, live migration, storage management, system scheduler, and more.

## SECURITY

SLOS Virtualization Hypervisor protects enterprises with military-grade security. Using the hardened SLOS Linux kernel as its security core, SLOS Virtualization Platform inherits the security architecture of SLOS's flagship operating system.

Both products use kernel-level security — such as Security-Enhanced Linux (SELinux) and Secure Virtualization Using SELinux (sVirt). SELinux was developed with the United States Department of Defense, National Security Agency (NSA), and vendors such as IBM, HP, and MITRE to isolate virtual machines between machines.

While proprietary virtualization products layer security on top of the hypervisor and/or operating system, SLOS Virtualization Platform uses SELinux to place security policies inside the kernel itself. Rogue programs can break out of layered securities and do significant harm to the host or other VMs before being detected; compromised VMs are prevented from breaking out with SELinux baked into the kernel.

### COST ADVANTAGE

Because SLOS Virtualization Platform is open source and is offered through a subscription model, it often costs less than proprietary solutions. The example below demonstrates how SLOS Virtualization Platform costs 50-80% less than VMware vSphere 5.6.

The following table compares costs for SLOS Virtualization Platform and VMware vSphere 5.6 Enterprise Edition. In this scenario, 100 virtual machines on 10 physical machines are configured to support workloads ranging from IT and web infrastructure services to business applications.

| THREE-YEAR TOTAL COST OF OWNERSHIP (TCO) ANALYSIS | SLOS VIRTUALIZATION PLATFORM | VMWARE |
|---|---|---|
| Number servers | 10 | 10 |
| Number sockets | 20 | 20 |
| License costs | $ 0.00 | $ 69.900 |
| Premium support | $ 14.990 | $ 17.840 |
| Cost for three years | $ 44.970 | $ 122.340 |
| Management server | $ 0.00 | $ 10.492 |
| TOTAL | $ 44.970 | $ 132.832 |

### MIGRATING FROM VMWARE TO SLOS VIRTUALIZATION PLATFORM
### MIGRATION OVERVIEW

The process of migrating virtual server workloads, including operating systems, applications, and data, from one virtualization platform to another is called a V2V migration. Each virtualization hypervisor uses a different file format for the VM. There are two methods for V2V migration:

1. Manually recreate new VMs from scratch.

2. Migrate VMs using the V2V migration tools available in SLOS Virtualization Platform.

While manually recreating VMs in a new environment fully optimizes workload and application configurations into separate virtual servers if necessary, V2V tools significantly ease migration. Instead of backing up data, rebuilding VMs and applications, and restoring data, V2V tools migrate VMs nondestructively from the old platform to the new one. In general, most V2V projects include a flexible, automated approach when possible and a manual or semi-automated approach for the most strategic and resource-intensive server workloads. In almost all cases, these projects consist of assessment, preparation, evaluation, execution, and testing phases.

### PROJECT CONSIDERATIONS

V2V migrations are generally less complicated than virtualizing physical servers or physical-tovirtual (P2V) migrations. Unlike physical servers, virtual servers are not configured with a wide range of hardware devices, meaning fewer problematic hardware dependencies. Enterprises need to understand VM performance requirements prior to the migration to ensure project success. Understanding RAM, disk, network connection, and CPU capacity requirements up front will save time and effort during migration.

Start with a pilot project to ease into the V2V migration process using a SLOS downloadable evaluation subscription as a guide. Begin by identifying a group of virtual servers to move to SLOS Virtualization Platform. Many customers using SLOS Enterprise Platform as a guest operating system in a VMware cluster choose to start with VMs that support infrastructure services, internal web portals, or file/print servers. This pilot can result in valuable data that can be assessed and promoted within the enterprise.

Next, identify and assess all the virtual servers to be migrated. Analyze these VMs' average and peak CPU, memory, disk, and networking resources. The results will be used to build a new SLOS Virtualization infrastructure and will help determine optimal VM distribution across clusters of hypervisor server hosts. SLOS Consulting is available to support these tasks in part or in full.

### VIRTUAL MACHINE PORTABILITY

All VM formats consist of VM configuration data (CPUs, memory, operating system, etc.) and a binary virtual disk image. SLOS's V2V automatically converts a VMware ESX or ESXi VM into a SLOS Virtualization VM. However, VMs are not as portable across different hypervisor platforms since they use their own formats.

Industry efforts to develop standards that facilitate VM migration between environments has led to formats like OVF. OVF is supported by many vendors and packages one or more VMs into a single file for distribution. A drawback of OVF is that implementations vary by vendors and virtual disk content since OVF does not mandate virtual disk formats or contents. VMware vSphere uses the virtual machine disk file (VMDK) format, Microsoft Hyper-V uses the virtual hard disk (VHD) format, and SLOS Virtualization Platform uses the raw format for pre-allocated virtual files and the QEMU copy on write (QCOW) format for thin-provisioned virtual disks.

To migrate VMs between hypervisors, the virtual disk image needs to be converted to the target hypervisor's native virtual disk image. VMDK virtual disk images include content such as VMware tools and drivers that are not portable and work only with a VMware hypervisor. These tools and drivers must be removed and replaced with device drivers that are native to SLOS Virtualization Platform. For example, if a Windows VM was configured in the VMware environment, it was likely installed with VMware tools, a number of paravirtualized drivers, and perhaps sound card emulation. These VMware drivers are not portable — they must be removed and replaced with SLOS Virtualization virtualized drivers, which can be easily installed as part of the migration process using SLOS tools.

## CONVERTING VIRTUAL MACHINES

The lack of standardization for the virtual disk format and content means there is no true VM portability across different hypervisor hosts. VMs must be converted to the target hypervisor's native format during V2V migration.

In general, performing a V2V migration consists of:

1. Reading the VMs' configuration file and creating a VM with the target hypervisor's configuration.
2. Copying the VMDK and converting it to SLOS Virtualization Platform's raw or QCOW format.
3. Replacing VMware tools and virtualized drivers in the guest operating system (inside the virtual disk) with SLOS Virtualization Platform tools and virtual device drivers.

SLOS Virtualization Platform's open source V2V migration tool helps customers automatically convert and import VMs created on other systems, including VMware ESX/ESXi. This tool, known as virt-v2v, is available from the command line and SLOS Virtualization Platform Manager. It automatically packages VMs as OVF files and uploads them to SLOS Virtualization Platform.

The supported guest operating systems include:

• SLOS Enterprise Platform
• Fedora
• Windows Server 2003, 2003R2, 2008, 2008R2, 2012R, and 2012
• Windows XP
• Windows 7 and 8
• SUSE Linux Enterprise Server 10 and 11

This automated process includes:

• Pulling VM configurations
• Changing the disk formats to SLOS Virtualization Platform hypervisor standards
• Changing the registry (applicable to Windows guests)

• Installing paravirtualized drivers for optimal disk and network performance

• Importing the VM into SLOS Virtualization Platform

The command-line tool can easily run on a large scale, automating hundreds of VM migrations with simple scripts. The V2V tool operates on a copy of the original guest image,8 and the conversion takes less than a minute after copying. The tool creates the OVF file on the SLOS Virtualization Platform export domain, and the VM will appear in the SLOS Virtualization Platform Manager console as an available VM.

SLOS Virtualization Platform Manager's graphical tool features an additional option to add a VMware vSphere environment as an external provider — allowing multiple imports to occur over a period of time. Administrators can use the tool to scan VMware data stores and select one or many virtual machines to import.

### VIRTUAL MACHINE PORTABILITY

SLOS Consulting offers a range of migration services, from foundation and quickstart options to onsite migration planning, project scoping, and execution support. SLOS Training and Certification offers online, classroom, and onsite training, as well as a certification program that ensures staff members and consultants have advanced SLOS Virtualization Platform knowledge in addition to basic virtualization skills.