

VM Import/Export



VM Import/Export: User Guide

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What is VM Import/Export?

VM Import/Export enables you to import virtual machine (VM) images from your existing virtualization environment to Amazon EC2, and then export them back. This enables you to migrate applications and workloads to Amazon EC2, copy your VM image catalog to Amazon EC2, or create a repository of VM images for backup and disaster recovery. For more information, see [VM Import/Export](#).

Topics

- [Features of VM Import/Export](#)
- [How to get started with VM Import/Export](#)
- [Accessing VM Import/Export](#)
- [Pricing](#)
- [Related services](#)
- [How VM Import/Export works](#)

Features of VM Import/Export

VM Import provides the following features:

- The ability to import a VM from your virtualization environment to Amazon EC2 as an Amazon Machine Image (AMI). You can launch EC2 instances from your AMI any time.
- The ability to import a VM from your virtualization environment to Amazon EC2 as an EC2 instance. The instance is initially in a stopped state. You can create an AMI from the instance.
- The ability to export a VM that was previously imported from your virtualization environment.
- The ability to import disks as Amazon EBS snapshots.
- VM import supports ENA drivers for Linux. ENA support will be enabled only if the original VM has ENA and/or NVMe drivers installed. We recommend installing the latest drivers.

How to get started with VM Import/Export

First, you must decide whether you will import your VMs as AMIs or instances. To get started, read about how image import and instance import work. You can also read through the prerequisites and limitations of each method. For more information, see:

- [How VM Import/Export works](#)
- [Importing a VM as an image using VM Import/Export](#)
- [Importing a disk as a snapshot using VM Import/Export](#)

Accessing VM Import/Export

You can access VM Import/Export using the following interfaces:

Amazon Command Line Interface (CLI)

Provides commands for a broad set of Amazon products, and is supported on Windows, Mac, and Linux. To get started, see [Amazon Command Line Interface User Guide](#). For more information about the commands for Amazon EC2, see [ec2](#) in the *Amazon CLI Command Reference*.

Amazon Tools for Windows PowerShell

Provides commands for a broad set of Amazon products for those who script in the PowerShell environment. To get started, see the [Amazon Tools for Windows PowerShell User Guide](#). For more information about the cmdlets for Amazon EC2, see the [Amazon Tools for PowerShell Cmdlet Reference](#).

Amazon EC2 API

Amazon EC2 provides a Query API. These requests are HTTP or HTTPS requests that use the HTTP verbs GET or POST and a Query parameter named Action. For more information about the API actions for Amazon EC2, see [Actions](#) in the *Amazon EC2 API Reference*.

Amazon SDKs and Tools

If you prefer to build applications using language-specific APIs instead of submitting a request over HTTP or HTTPS, Amazon provides libraries, sample code, tutorials, and other resources for software developers. These libraries provide basic functions that automate tasks such as cryptographically signing your requests, retrying requests, and handling error responses, making it is easier for you to get started. For more information, see [Amazon SDKs and Tools](#).

Tip

In [supported Amazon Web Services Regions](#), you can also use [Amazon CloudShell](#) for a browser-based, pre-authenticated shell that launches directly from the Amazon Web Services Management Console.

Pricing

With Amazon Web Services, you pay only for what you use. There is no additional fee to use VM Import/Export. You pay the standard fees for the S3 buckets and EBS volumes used during the import and export processes, and for the EC2 instances that you run.

Related services

Consider the following services as you plan your migration to Amazon:

- You can use the Application Discovery Service to gather information about your data center, such as server utilization data and dependency mappings, so that you can view information about your workloads. For more information, see the [Application Discovery Service User Guide](#).
- If you use VMware vSphere, Microsoft Hyper-V, or Microsoft Azure, you can use Amazon Application Migration Service to automate the migration of your virtual machines to Amazon. For more information, see the [Application Migration Service User Guide](#).
- If you use Microsoft Systems Center, you can use Amazon Systems Manager for Microsoft SCVMM to import Windows VMs from SCVMM to Amazon EC2. For more information, see [Import your virtual machine using Amazon Systems Manager for Microsoft SCVMM](#) in the *Amazon EC2 User Guide for Windows Instances*.

How VM Import/Export works

To use your VM in Amazon EC2, you must first export it from the virtualization environment, and then import it into Amazon EC2 as either an Amazon Machine Image (AMI) or an instance.

Benefits

You can use VM Import/Export to migrate applications and workloads, copy your VM image catalog, or create a disaster recovery repository for VM images.

- **Migrate existing applications and workloads to Amazon EC2**—When you migrate your VM-based applications and workloads to Amazon EC2, you preserve their software and configuration settings. When you create an AMI from your VM, you can run multiple instances based on the same imported VM. You can also use the AMI to replicate your applications and workloads around the world using AMI copy. For more information, see [Copying an AMI](#) in the *Amazon EC2 User Guide for Linux Instances*.
- **Import your VM image catalog to Amazon EC2**— If you maintain a catalog of approved VM images, you can copy your image catalog to Amazon EC2 and create AMIs from the imported images. You can import your existing software, including products that you have installed such as anti-virus software, intrusion detection systems, and so on, along with your VM images. You can use the AMIs you create as your Amazon EC2 image catalog.
- **Create a disaster recovery repository for VM images**—You can import your local VM images into Amazon EC2 for backup and disaster recovery purposes. You can import your VMs and store them as AMIs. The AMIs you create will be ready to launch in Amazon EC2 when you need them. If your local environment suffers an event, you can quickly launch your instances to preserve business continuity while simultaneously exporting them to rebuild your local infrastructure.

Differences between image import and instance import

The following table summarizes the key differences between image import and instance import.

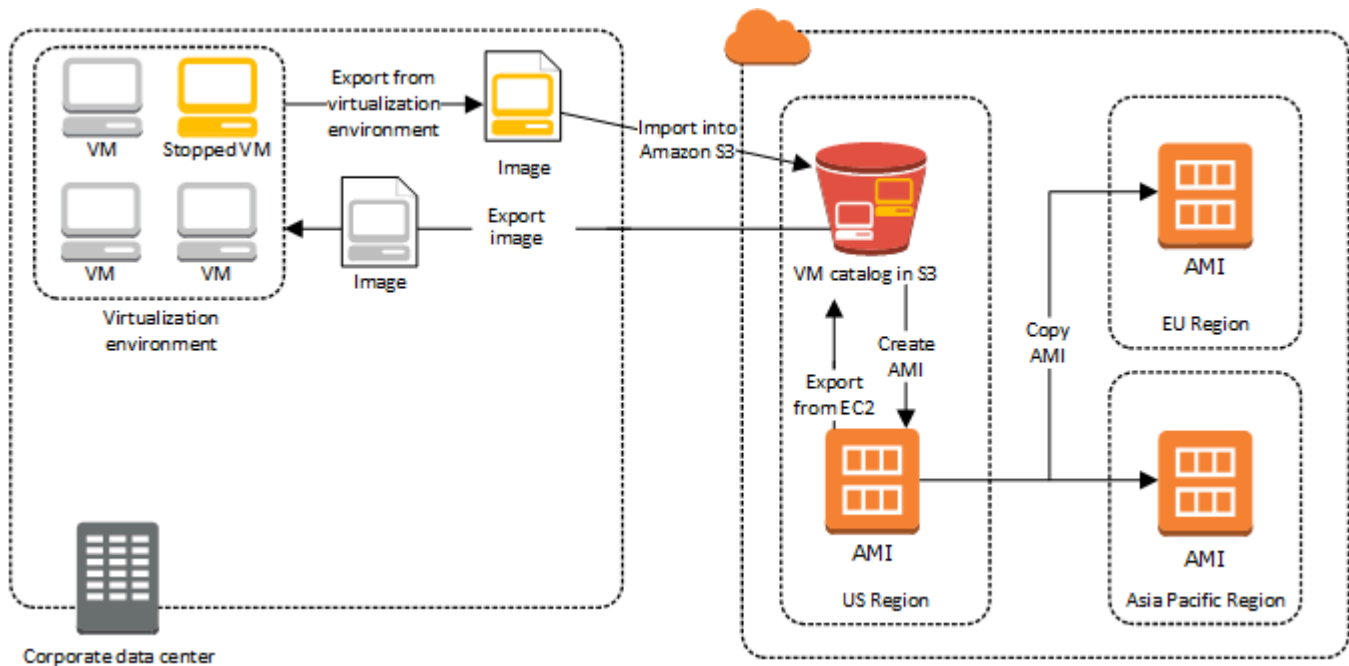
| Characteristic | Image import | Instance import |
|------------------------------|---------------------------|-----------------|
| CLI support | Amazon CLI | Amazon EC2 CLI |
| Supported formats for import | OVA, VHD, VHDX, VMDK, raw | VHD, VMDK, raw |
| Multi-disk support | ✓ | |
| Windows BYOL support | ✓ | |

Image import

First, prepare your virtual machine for export, and then export it using one of the supported formats. Next, upload the VM image to Amazon S3, and then start the image import task. After the

import task is complete, you can launch instances from the AMI. If you want, you can copy the AMI to other Regions so that you can launch instances in those Regions. You can also export an AMI to a VM.

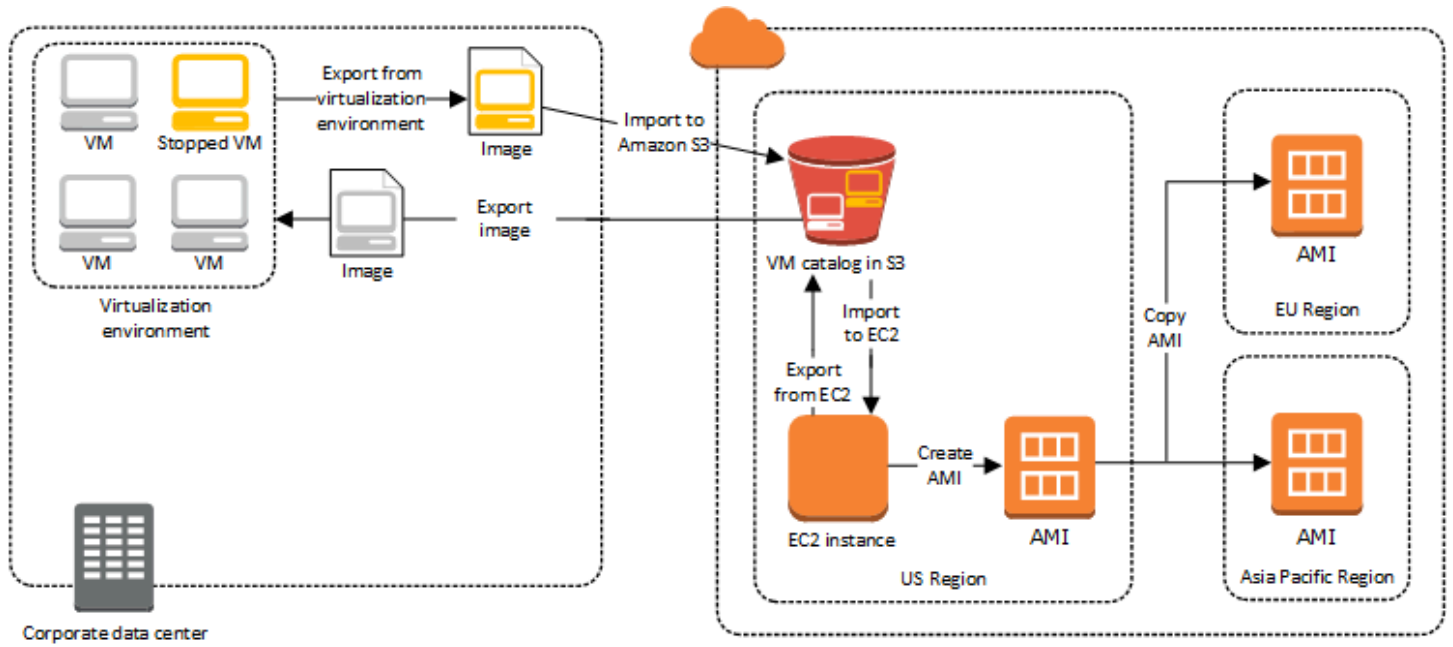
The following diagram shows the process of exporting a VM from your virtualization environment to Amazon EC2 as an AMI.



Instance import

First, prepare your virtual machine for export, and then export it using one of the supported formats. Next, upload the VM image to Amazon S3, and then start the instance import task. After the import task is complete, you can create an AMI from the stopped instance. If you want, you can copy the AMI to other Regions so that you can launch instances in those Regions. You can also export a previously imported instance to your virtualization environment.

The following diagram shows the process of exporting a VM from your virtualization environment to Amazon EC2 as an instance.



VM Import/Export Requirements

Before attempting to import a VM, you may need to perform tasks such as preparing your Amazon environment by creating a service account with appropriate permissions, and preparing your locally hosted VM so that is accessible once it is imported into Amazon. Review each of these requirements and take action as needed.

Contents

- [System requirements](#)
 - [Image formats](#)
 - [Operating systems](#)
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 - [Licensing for Windows](#)

System requirements

Before you begin, you must be aware of the operating systems and image formats that VM Import/Export supports, and understand the limitations on importing instances and volumes.

Topics

- [Image formats](#)
- [Operating systems](#)
- [Boot modes](#)
- [Volume types and file systems](#)
- [Limitations](#)

Image formats

VM Import/Export supports the following image formats for importing both disks and VMs:

- Open Virtual Appliance (OVA) image format, which supports importing images with multiple hard disks.
- Stream-optimized ESX Virtual Machine Disk (VMDK) image format, which is compatible with VMware ESX and VMware vSphere virtualization products.
- Fixed and Dynamic Virtual Hard Disk (VHD/VHDX) image formats, which are compatible with Microsoft Hyper-V, Microsoft Azure, and Citrix Xen virtualization products.
- Raw format for importing disks and VMs.

Important

VMs that are created as the result of a physical-to-virtual (P2V) conversion are not supported. For more information, see [Limitations](#).

Operating systems

The following operating systems (OS) can be imported to and exported from Amazon EC2. VMs using ARM64 architecture are not currently supported.

Topics

- [Linux/Unix OS \(64-bit only\)](#)
- [Windows OS](#)

Linux/Unix OS (64-bit only)

| Operating system | Version | Kernel | Service pack |
|------------------|-------------|-------------------------------|--------------|
| Amazon Linux 2 | - | 4.14, 4.19, 5.4, 5.10 | - |
| CentOS | 5.1–5.11 | 2.6.18 | - |
| | 6.1–6.8 | 2.6.32 | - |
| | 7.0–7.9 | 3.10.0 | - |
| | 8.0–8.2 | 4.18.0 | - |
| | 9 | 5.14.0 | - |
| Debian | 6.0.0–6.0.8 | 2.6.32 | - |
| | 7.0.0–7.8.0 | 3.2.0 | - |
| | 10 | 4.19.0 | - |
| | 11 | 5.10.0 | - |
| | 12.2 | 6.1.0 | - |
| | 12.4 | 6.1.0 | - |
| Fedora | 18 | 3.2.5 | - |
| | 19 | 3.9.5 | - |
| | 20 | 3.11.10 | - |
| | 37 | 6.0.7 | - |
| | 38 | 6.2.9 | - |
| | 39 | 6.5.6 | - |
| Oracle Linux | 5.10–5.11 | Unbreakable Enterprise Kernel | - |

| Operating system | Version | Kernel | Service pack |
|---------------------------------|----------|--|--------------|
| | | (UEK) el5uek kernel suffixes | |
| | 6.1–6.10 | Red Hat Compatible Kernel (RHCK) 2.6.32, 2.6.39 Unbreakable Enterprise Kernel (UEK) 3.8.13, 4.1.12 | - |
| | 7.0–7.6 | Red Hat Compatible Kernel (RHCK) 3.10.0 Unbreakable Enterprise Kernel (UEK) 3.8.13, 4.1.12, 4.14.35, 5.4.17 | - |
| | 8.0–8.8 | Red Hat Compatible Kernel (RHCK) 4.18.0 Unbreakable Enterprise Kernel (UEK) 5.15.0 (el8uek) | - |
| | 9.0–9.2 | Red Hat Compatible Kernel (RHCK) 5.14.0 Unbreakable Enterprise Kernel (UEK) 5.15.0 (el9uek) | - |
| Red Hat Enterprise Linux (RHEL) | 5 | 2.6.18 | - |
| | 6 | 2.6.32 (except 2.6.32-71) | - |

| Operating system | Version | Kernel | Service pack |
|-------------------------------------|---------|--------------------------|--------------|
| | 7 | 3.10.0 | - |
| | 8.0–8.8 | 4.18.0 | - |
| | 9.0–9.2 | 5.14.0 | - |
| Rocky Linux | 9.0 | 5.14.0 | - |
| SUSE Linux Enterprise Server (SLES) | 11 | 2.6.32.12 | 1 |
| | | 3.0.13 | 2 |
| | | 3.0.76, 3.0.101, 3.0.101 | 3 |
| | | 3.0.101 | 4 |
| | 12 | 3.12.28 | None |
| | | 3.12.49 | 1 |
| | | 4.4 | 2, 3 |
| | | 4.12 | 4, 5 |
| | 15 | 4.12 | None, 1 |
| | | 5.3 | 2, 3 |
| 5.14.21 | | 4, 5 | |
| Ubuntu | 12.04 | 3.2.0 | - |
| | 12.10 | 3.5.0 | - |
| | 13.04 | 3.8.0 | - |
| | 13.10 | 3.11 | - |
| | 14.04 | 3.13.0, 3.16.0, 3.19.0 | - |

| Operating system | Version | Kernel | Service pack |
|------------------|---------|--|--------------|
| | 14.10 | 3.16 | - |
| | 15.04 | 3.19.0 | - |
| | 16.04 | 4.2.0, 4.4.0, 4.8.0, 4.10.0, 4.15.0 | - |
| | 16.10 | 4.8.0 | - |
| | 17.04 | 4.10.0 | - |
| | 18.04 | 4.15.0, 5.4.0 | - |
| | 20.04 | 5.4.0 | - |
| | 22.04 | 5.15.0 | - |
| | 23.04 | 5.15.0 | - |

Windows OS

| Operating system | Edition | Bit version | Available with non-default Regions |
|--|--|-------------|------------------------------------|
| Windows Server 2003 (Service Pack 1 or later) | Standard, Datacenter, Enterprise | 32, 64 | No |
| Windows Server 2003 R2 | Standard, Datacenter, Enterprise | 32, 64 | No |
| Windows Server 2008 | Standard, Datacenter, Enterprise | 32, 64 | No |
| Windows Server 2008 R2 | Standard, Web Server, Datacenter, Enterprise | 64 | Yes ⁵ |

| Operating system | Edition | Bit version | Available with non-default Regions |
|---------------------------|---|---------------------|------------------------------------|
| Windows Server 2012 | Standard, Datacenter | 64 | Yes ⁵ |
| Windows Server 2012 R2 | Standard, Datacenter | 64 | Yes ⁵ |
| Windows Server 2016 | Standard, Datacenter ³ | 64 | Yes ⁵ |
| Windows Server 1709 | Standard, Datacenter | 64 | Yes ⁵ |
| Windows Server 1803 | Standard, Datacenter | 64 | Yes ⁵ |
| Windows Server 2019 | Standard, Datacenter | 64 | Yes ⁵ |
| Windows Server 2022 | Standard, Datacenter | 64 | Yes ^{5,6} |
| Windows 7 ¹ | Home, Professional, Enterprise, Ultimate | 32, 64 ⁴ | Yes ⁵ |
| Windows 8 ¹ | Home, Professional, Enterprise | 32, 64 ⁴ | Yes ⁵ |
| Windows 8.1 ¹ | Professional, Enterprise | 64 | Yes ⁵ |
| Windows 10 ¹ | Home, Professional, Enterprise, Education | 64 | Yes ⁵ |
| Windows 11 ^{1,2} | Home, Professional, Enterprise, Education | 64 | Yes ^{5,7} |

¹ The operating system must have its language set as US English during import.

² Windows 11 requires the Unified Extensible Firmware Interface (UEFI) boot mode to function. To help ensure a successful import of your VM, we recommend that you specify the optional `--boot-mode` parameter as `uefi`. For more information, see [Boot modes](#).

³ Nano Server installations are not supported.

⁴ Only the 64-bit version of the OS is supported when launching instances within non-default Amazon Web Services Regions. For more information, see [Available Regions](#) in the *Amazon EC2 User Guide for Windows Instances*.

⁵ You must first enable the Region before you can use the operating system there. For more information, see [Available Regions](#) in the *Amazon EC2 User Guide for Windows Instances* and [Managing Amazon Web Services Regions](#) in the *Amazon Web Services General Reference Guide*.

⁶ Windows Server 2022 is not supported in the China (Beijing) and China (Ningxia) Regions.

⁷ Windows 11 is not supported in the Asia Pacific (Hyderabad), Asia Pacific (Jakarta), Asia Pacific (Melbourne), China (Beijing), China (Ningxia), Europe (Spain), Europe (Zurich), and Middle East (UAE) Regions.

Boot modes

When a computer boots, the first software that it runs is responsible for initializing the platform and providing an interface for the operating system to perform platform-specific operations. VM Import/Export supports two variants of the boot mode: Unified Extensible Firmware Interface (UEFI) and Legacy BIOS. You can choose whether to specify the optional `--boot-mode` parameter as `legacy-bios` or `uefi` when importing your VM.

Refer to the [Boot Modes](#) section of the *Amazon Elastic Compute Cloud User Guide* for more information about specifying a boot mode, and UEFI variables.

Volume types and file systems

VM Import/Export supports importing Windows and Linux VMs with the following file systems:

Windows

GUID Partition Table (GPT) and Master Boot Record (MBR) partitioned volumes that are formatted using the NTFS file system are supported. If no boot parameter is specified, and the VM is compatible in both boot modes, the GPT volumes will be converted to MBR partitioned volumes.

Note

VM Import/Export will automatically detect the boot modes your Windows VM is compatible with. If the Windows VM is only compatible in a single boot mode, you don't need to specify a specific `--boot-mode` parameter.

If your Windows VM is compatible with both boot modes, and the following criteria is met for the imported disk, VM Import/Export will select Legacy BIOS by default. You can specify `uefi` for the `--boot-mode` parameter to override this behavior.

- The disk is smaller than 2 terabytes
- The disk does not contain more than 4 primary partitions
- The disk is not a Windows dynamic disk
- The file format is VHDX

Linux/Unix

MBR partitioned volumes and GUID Partition Table (GPT) partitioned volumes that are formatted using the ext2, ext3, ext4, Btrfs, JFS, or XFS file system are supported.

Important

Btrfs subvolumes are not supported.

Limitations

The following limitations apply to the virtual machines and volumes that you perform import and export processes on.

Topics

- [Importing VMs to Amazon EC2](#)

Importing VMs to Amazon EC2

When you import a VM into Amazon EC2, the following limitations apply.

General

- VMs that are created as the result of a physical-to-virtual (P2V) conversion are not supported. A P2V conversion occurs when a disk image is created by performing a Linux or Windows installation process on a physical machine and then importing a copy of that Linux or Windows installation to a VM.
- Importing VMs with dual-boot configurations is not supported.
- VM Import/Export doesn't support VMs that use Raw Device Mapping (RDM). Only VMDK disk images are supported.
- VM Import/Export doesn't support VMware SEsparse delta-file format.
- If you import a VM that's compatible with UEFI using the `import-image` command while specifying an EBS snapshot, you must specify a value for the `platform` parameter. For more information, see [import-snapshot](#) in the Amazon EC2 API Reference.
- An imported VM may fail to boot if the root partition is not on the same virtual hard drive as the MBR.
- A VM import task fails for VMs with more than 21 volumes attached. Additional disks can be individually imported using the `ImportSnapshot` API.
- VM Import/Export assigns only private IPv4 addresses to your instances, regardless of the auto-assign public IP setting for the subnet. To use a public IPv4 address, you can allocate an Elastic IP address to your account and associate it with your instance. You can also add IPv6 addresses. For more information, see [IP addressing for your VPCs and subnets](#) in the *Amazon Virtual Private Cloud User Guide*.
- Multiple network interfaces are not currently supported. After import, your VM has a single virtual network interface that uses DHCP to assign addresses.
- Disk images must be less than 16 TiB. For disk images that are larger than 8 TiB, you must use a [manifest file](#).
 - You can use the `ImportInstance` operation to import VMs with disks up to the maximum supported size.
 - You can use the `ImportImage` operation to import VMs with disks less than 8 TiB in size.

Windows

- When preparing Windows VMs for import, make sure that there is sufficient disk space available on the root volume for installing drivers and other software. For Microsoft Windows VMs, configure a fixed page file size and ensure that there is at least 6 GiB of free space available on

the root volume. If Windows is configured to use the "Automatically manage paging file size for all drives" setting, it might create 16 GB pagefile.sys files on the C drive of the instance.

- If you import a Windows VM compatible with UEFI, we convert GPT boot volumes to MBR if the following are true: the image format is VHDX, the uncompressed size is 2 TiB or smaller, there are no more than three primary partitions, and the volume is not a dynamic disk.
- If you import a Windows Server 2012 R2 VM, VM Import/Export installs the single root I/O virtualization (SR-IOV) drivers. These drivers are not required unless you plan to use enhanced networking, which provides higher performance (packets per second), lower latency, and lower jitter.
- VM Import/Export does not support Emergency Management Services (EMS). If EMS is enabled for a source Windows VM, we disable it in the imported image.
- Windows language packs that use UTF-16 (or non-ASCII) characters are not supported for import. We recommend using the English language pack when importing Windows VMs.
- Windows Server VMs with the Hyper-V server role installed are not supported.

Linux

- Imported Linux VMs must use 64-bit images. Migrating 32-bit Linux images is not supported.
- Imported Linux VMs should use default kernels for best results. VMs that use custom Linux kernels might not migrate successfully.
- When preparing Linux VMs for import, make sure that there is sufficient disk space available on the root volume for installing drivers and other software.
- To help ensure your Linux VM can import successfully and run on Amazon EC2 using the [Amazon Nitro System](#), you can install the Amazon NVMe and Amazon Elastic Network Adapter (ENA) drivers before exporting your VM from its virtualization environment. For more information, see [Amazon EBS and NVMe on Linux instances](#) and [Enable enhanced networking with the Elastic Network Adapter \(ENA\) on Linux instances](#) in the *Amazon EC2 User Guide for Linux Instances*.
- If you import a Linux VM compatible with UEFI, you must have a fallback EFI binary, BOOTX64.EFI, located on the EFI System Partition.
- Predictable network interface names are not supported for virtual machine imports.

Required configuration for exporting a VM to Amazon EC2

Before you can import your VM to Amazon EC2, you need to export it from your virtualization environment. Use the following guidelines to configure your VM before exporting it.

Topics

- [General configurations](#)
- [Windows configurations](#)
- [Linux configurations](#)

General configurations

The following configurations should be made in your VM before you export it from your virtualization environment. You should also review the section specific to your operating system for additional required configurations.

- Disable any antivirus or intrusion detection software on your VM. These services can be re-enabled after the import process is complete.
- Uninstall the VMware Tools from your VMware VM.
- Disconnect any CD-ROM drives (virtual or physical).
- Your source VM must have a functional DHCP client service. Ensure that the service can start and is not disabled administratively. All static IP addresses currently assigned to the source VM are removed during import. When your imported instance is launched in an Amazon VPC, it receives a primary private IP address from the IPv4 address range of the subnet. If you don't specify a primary private IP address when you launch the instance, we select an available IP address in the subnet's IPv4 range for you. For more information, see [VPC and Subnet Sizing](#).

Windows configurations

The following configurations should be made in your Windows VM before you export it from your virtualization environment. This section assumes you have already reviewed [General configurations](#).

- Enable Remote Desktop (RDP) for remote access.
- Make sure that your host firewall (Windows firewall or similar), if configured, allows access to RDP. Otherwise, you cannot access your instance after the import is complete.

- Make sure that the administrator account and all other user accounts use secure passwords. All accounts must have passwords or the import process might fail.
- Install .NET Framework 4.5 or later on the VM. We install the .NET framework on your VM as needed.
- Disable Autologon on your Windows VM.
- Open **Control Panel > System and Security > Windows Update**. In the left pane, choose **Change settings**. Choose the desired setting. Be aware that if you choose **Download updates but let me choose whether to install them** (the default value) the update check can temporarily consume between 50% and 99% of CPU resources on the instance. The check usually occurs several minutes after the instance starts. Make sure that there are no pending Microsoft updates, and that the computer is not set to install software when it reboots.
- Apply the following hot fixes as needed:
 - [You cannot change system time if RealTimeUniversal registry entry is enabled in Windows](#)
 - [High CPU usage during DST changeover in Windows Server 2008, Windows 7, or Windows Server 2008 R2](#)
- Set the RealTimeUniversal registry key. For more information, see [Setting the Time](#) in the *Amazon EC2 User Guide for Windows Instances*.
- Run System Preparation (Sysprep) on your Windows Server VM images.
 - If you run Sysprep before importing your VM, the import process adds an answer file (unattend.xml) to the VM that automatically accepts the End User License Agreement (EULA) and sets the locale to EN-US.
 - If you choose to run Sysprep after importing your VM, we recommend that you use EC2Launch (Windows Server 2016 and later) or EC2Config (through Windows Server 2012 R2) to run Sysprep.

To include your own answer file instead of the default (unattend.xml)

1. Copy the following sample file below and set the **processorArchitecture** parameter to **x86** or **amd64**, depending on your operating system architecture:

```
<?xml version='1.0' encoding='UTF-8'?>
<unattend xmlns:wcm='http://schemas.microsoft.com/WMIConfig/2002/State'
  xmlns='urn:schemas-microsoft-com:unattend'>
  <settings pass='oobeSystem'>
```



```
<component versionScope='nonSxS' processorArchitecture='x86 or amd64'  
name='Microsoft-Windows-International-Core' publicKeyToken='31bf3856ad364e35'  
language='neutral'>  
  <InputLocale>en-US</InputLocale>  
  <SystemLocale>en-US</SystemLocale>  
  <UILanguage>en-US</UILanguage>  
  <UserLocale>en-US</UserLocale>  
</component>  
<component versionScope='nonSxS' processorArchitecture='x86 or amd64'  
name='Microsoft-Windows-Shell-Setup' publicKeyToken='31bf3856ad364e35'  
language='neutral'>  
  <OOBE>  
    <HideEULAPage>true</HideEULAPage>  
    <SkipMachineOOBE>true</SkipMachineOOBE>  
    <SkipUserOOBE>true</SkipUserOOBE>  
  </OOBE>  
</component>  
</settings>  
</unattend>
```

2. Save the file in the C:\Windows\Panther directory with the name unattend.xml.
3. Run Sysprep with the **/oobe** and **/generalize** options. These options strip all unique system information from the Windows installation and prompt you to reset the administrator password.
4. Shut down the VM and export it from your virtualization environment.

Linux configurations

The following configurations should be made in your Linux VM before you export it from your virtualization environment. This section assumes you have already reviewed [General configurations](#).

- Enable Secure Shell (SSH) for remote access.
- Make sure that your host firewall (such as Linux **iptables**) allows access to SSH. Otherwise, you won't be able to access your instance after the import is complete.
- Make sure that you have configured a non-root user to use public key-based SSH to access your instance after it is imported. The use of password-based SSH and root login over SSH are both possible, but not recommended. The use of public keys and a non-root user is recommended

because it is more secure. VM Import does not configure an `ec2-user` account as part of the import process.

- Make sure that your Linux VM uses GRUB (GRUB legacy) or GRUB 2 as its bootloader.
- Make sure that your Linux VM uses one of the following for the root file system: EXT2, EXT3, EXT4, Btrfs, JFS, or XFS.
- Make sure that your Linux VM is not using predictable network interface device names.
- Shut down your VM before exporting it from your virtualization environment.

Required permissions for VM Import/Export

VM Import/Export requires certain permissions for your users, groups, and roles. Additionally, a service role is required to perform certain operations on your behalf.

Contents

- [Required permissions](#)
- [Required service role](#)

Required permissions

Your users, groups, and roles need the following permissions in their IAM policy to use VM Import/Export:

Note

Some actions require the use of an Amazon S3 bucket. This example policy does not grant permission to create Amazon S3 buckets. The user or role will need to specify an existing bucket, or have permissions to create a new bucket (`s3:CreateBucket`).

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
```

```

        "s3:GetBucketLocation",
        "s3:GetObject",
        "s3:PutObject"
    ],
    "Resource": ["arn:aws-cn:s3:::mys3bucket", "arn:aws-cn:s3:::mys3bucket/*"]
},
{
    "Effect": "Allow",
    "Action": [
        "ec2:CancelConversionTask",
        "ec2:CancelExportTask",
        "ec2:CreateImage",
        "ec2:CreateInstanceExportTask",
        "ec2:CreateTags",
        "ec2:DescribeConversionTasks",
        "ec2:DescribeExportTasks",
        "ec2:DescribeExportImageTasks",
        "ec2:DescribeImages",
        "ec2:DescribeInstanceStatus",
        "ec2:DescribeInstances",
        "ec2:DescribeSnapshots",
        "ec2:DescribeTags",
        "ec2:ExportImage",
        "ec2:ImportInstance",
        "ec2:ImportVolume",
        "ec2:StartInstances",
        "ec2:StopInstances",
        "ec2:TerminateInstances",
        "ec2:ImportImage",
        "ec2:ImportSnapshot",
        "ec2:DescribeImportImageTasks",
        "ec2:DescribeImportSnapshotTasks",
        "ec2:CancelImportTask"
    ],
    "Resource": "*"
}
]
}

```

Required service role

VM Import/Export requires a role to perform certain operations on your behalf. You must create a service role named `vmimport` with a trust relationship policy document that allows VM Import/

Export to assume the role, and you must attach an IAM policy to the role. For more information, see [IAM Roles](#) in the *IAM User Guide*.

Prerequisite

You must enable Amazon Security Token Service (Amazon STS) in any Region where you plan to use VM Import/Export. For more information, see [Activating and deactivating Amazon STS in an Amazon Region](#).

To create the service role

1. Create a file named `trust-policy.json` on your computer. Add the following policy to the file:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": { "Service": "vmie.amazonaws.com" },
      "Action": "sts:AssumeRole",
      "Condition": {
        "StringEquals": {
          "sts:Externalid": "vmimport"
        }
      }
    }
  ]
}
```

2. Use the [create-role](#) command to create a role named `vmimport` and grant VM Import/Export access to it. Ensure that you specify the full path to the location of the `trust-policy.json` file that you created in the previous step, and that you include the `file://` prefix as shown the following example:

```
aws iam create-role --role-name vmimport --assume-role-policy-document "file://C:\import\trust-policy.json"
```

3. Create a file named `role-policy.json` with the following policy, where *disk-image-file-bucket* is the bucket for disk images and *export-bucket* is the bucket for exported images:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "s3:GetBucketLocation",
        "s3:GetObject",
        "s3:ListBucket"
      ],
      "Resource": [
        "arn:aws-cn:s3:::disk-image-file-bucket",
        "arn:aws-cn:s3:::disk-image-file-bucket/*"
      ]
    },
    {
      "Effect": "Allow",
      "Action": [
        "s3:GetBucketLocation",
        "s3:GetObject",
        "s3:ListBucket",
        "s3:PutObject",
        "s3:GetBucketAcl"
      ],
      "Resource": [
        "arn:aws-cn:s3:::export-bucket",
        "arn:aws-cn:s3:::export-bucket/*"
      ]
    },
    {
      "Effect": "Allow",
      "Action": [
        "ec2:ModifySnapshotAttribute",
        "ec2:CopySnapshot",
        "ec2:RegisterImage",
        "ec2:Describe*"
      ],
      "Resource": "*"
    }
  ]
}
```

4. (Optional) To import resources encrypted using an Amazon KMS key from Amazon Key Management Service, add the following permissions to the `role-policy.json` file.

```
{
  "Effect": "Allow",
  "Action": [
    "kms:CreateGrant",
    "kms:Decrypt",
    "kms:DescribeKey",
    "kms:Encrypt",
    "kms:GenerateDataKey*",
    "kms:ReEncrypt*"
  ],
  "Resource": "*"
}
```

If you use a KMS key other than the default provided by Amazon EBS, you must grant VM Import/Export permission to the KMS key if you enable Amazon EBS encryption by default or enable encryption on an import operation. You can specify the Amazon Resource Name (ARN) of the KMS key as the resource instead of `*`.

5. (Optional) To attach license configurations to an AMI, add the following License Manager permissions to the `role-policy.json` file.

```
{
  "Effect": "Allow",
  "Action": [
    "license-manager:GetLicenseConfiguration",
    "license-manager:UpdateLicenseSpecificationsForResource",
    "license-manager:ListLicenseSpecificationsForResource"
  ],
  "Resource": "*"
}
```

6. Use the following [put-role-policy](#) command to attach the policy to the role created above. Ensure that you specify the full path to the location of the `role-policy.json` file.

```
aws iam put-role-policy --role-name vmimport --policy-name vmimport --policy-document "file:///C:\import\role-policy.json"
```

7. For additional security controls, context keys such as `aws:SourceAccount` and `aws:SourceArn` can be added to the trust policy for this newly created role. VM Import/

Export will publish the `SourceAccount` and `SourceArn` keys as specified in the example below to assume this role:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "vmie.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition": {
        "StringEquals": {
          "sts:Externalid": "vmimport",
          "aws:SourceAccount": "111122223333"
        },
        "ArnLike": {
          "aws:SourceArn": "arn:aws:vmie:*:111122223333:*"
        }
      }
    }
  ]
}
```

Licensing options

When you create a new VM Import task, you have two options for how to specify the license type for the operating system. You can specify a value for either the `--license-type` or the `--usage-operation` parameter. Specifying a value for both parameters will return an error. You can use `--usage-operation` to blend your operating system and SQL Server licenses.

Important

Amazon VM Import/Export strongly recommends specifying a value for either the `--license-type` or `--usage-operation` parameter when you create a new VM Import task. This ensures your operating system is licensed appropriately and your billing is optimized. If you choose a license type that is incompatible with your VM, the VM Import

task fails with an error message. For more information, see the following OS-specific information.

Specify license type

You can specify the following values for the `--license-type` parameter:

- Amazon (license included)

Replaces the source-system license with an Amazon license on the migrated VM.

- BYOL

Retains the source-system license on the migrated VM.

Note

Leaving the `--license-type` parameter undefined while importing a Windows Server OS is the same as choosing AWS and the same as choosing BYOL when importing a Windows client OS (such as Windows 10) or a Linux OS.

For example, to specify the license type as an Amazon license, run the following command:

```
aws ec2 import-image
--license-type aws
--disk-containers Format=OVA,Url=S3://bucket_name/sql_std_image.ova
```

Specify usage operation

Important

Amazon stamps the software edition with the information that you provide. You are responsible for entering the correct software edition information for any licenses that you bring to Amazon.

You can specify the following values for the `--usage-operation` parameter:

| Platform details | Usage operation * |
|---|-------------------|
| Windows Server License Included without SQL Server | RunInstances:0002 |
| Windows Server License Included with SQL Server (any edition) BYOL | RunInstances:0002 |
| Windows Server License Included with SQL Server Standard License Included | RunInstances:0006 |
| Windows Server License Included with SQL Server Enterprise License Included | RunInstances:0102 |
| Windows Server License Included with SQL Server Web License Included | RunInstances:0202 |
| Windows Server BYOL without SQL Server | RunInstances:0800 |
| Windows Server BYOL with SQL (any edition) BYOL | RunInstances:0800 |
| Linux/UNIX without SQL Server | RunInstances |
| Linux/UNIX with SQL Server (any edition) BYOL | RunInstances |
| Linux/UNIX with SQL Server Enterprise License Included | RunInstances:0100 |
| Linux/UNIX with SQL Server Standard License Included | RunInstances:0004 |
| Linux/UNIX with SQL Server Web License Included | RunInstances:0200 |

* If you are running Spot Instances, the `lineup/Operation` on your Amazon Cost and Usage Report might be different from the **Usage operation** value that is listed here.

For example, to specify the usage operation for Windows with SQL Server Standard, run the following command:

```
aws ec2 import-image
--usage-operation RunInstances:0006
--disk-containers Format=OVA,Url=S3://bucket_name/sql_std_image.ova
```

For more information about billing codes, see [AMI billing information fields](#).

Licensing for Linux

Linux operating systems support only the BYOL license type for a VM import task.

Migrated Red Hat Enterprise Linux (RHEL) VMs must use Cloud Access (BYOS) licenses. For more information, see [Red Hat Cloud Access](#) on the Red Hat website.

Migrated SUSE Linux Enterprise Server VMs must use SUSE Public Cloud Program (BYOS) licenses. For more information, see [SUSE Public Cloud Program—Bring Your Own Subscription](#).

Licensing for Windows

Windows Server operating systems support either the BYOL or AWS license type. Windows client operating systems (such as Windows 10) support only BYOL licenses.

By default, an Amazon license is used when you create a VM import task if the VM has a Windows Server OS. Otherwise, a BYOL license is used.

The following rules apply when you use your BYOL Microsoft license, either through MSDN or [Windows Software Assurance Per User](#):

- Your BYOL instances are priced at the prevailing Amazon EC2 Linux instance pricing, provided that you meet the following conditions:
 - Run on a Dedicated Host ([Dedicated Hosts](#)).
 - Launch from VMs sourced from software binaries provided by you using Amazon VM Import/Export, which are subject to the current terms and abilities of Amazon VM Import/Export.
 - Designate the instances as BYOL instances.
 - Run the instances within your designated Amazon Web Services Regions, and where Amazon offers the BYOL model.

- Activate using Microsoft keys that you provide or which are used in your key management system.
- You must account for the fact that when you start an Amazon EC2 instance, it can run on any one of many servers within an Availability Zone. This means that each time you start an Amazon EC2 instance (including a stop/start), it may run on a different server within an Availability Zone. You must account for this fact in light of the limitations on license reassignment as described in Microsoft's document [Volume Licensing Product Terms](#), or consult your specific use rights to determine if your rights are consistent with this usage.
- You must be eligible to use the BYOL program for the applicable Microsoft software under your agreements with Microsoft, for example, under your MSDN user rights or under your Windows Software Assurance Per User Rights. You are solely responsible for obtaining all required licenses and for complying with all applicable Microsoft licensing requirements, including the PUR/PT. Further, you must have accepted Microsoft's End User License Agreement (Microsoft EULA), and by using the Microsoft Software under the BYOL program, you agree to the Microsoft EULA.
- Amazon recommends that you consult with your own legal and other advisers to understand and comply with the applicable Microsoft licensing requirements. Usage of the Services (including usage of the **licenseType** parameter and **BYOL** flag) in violation of your agreements with Microsoft is not authorized or permitted.

For more information, see [Generating Windows Server and SQL Server on Amazon EC2 estimates in the Amazon Pricing Calculator User Guide](#).

VM Import/Export Processes

VM Import/Export has processes for eligible resources that you can use to import into and export out of the Amazon Web Services Cloud. You can import individual disks, or whole VMs that meet the respective requirements of the import process. You can also export an Amazon EC2 instance or an AMI in a supported file format. For more information on resources that are eligible for export, see [Considerations for instance export](#) and [Considerations for image export](#).

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Importing a VM as an image using VM Import/Export

Tip

To import your virtual machines (VMs) with a console-based experience, you can use the *Import virtual machine images to Amazon* template in the [Migration Hub Orchestrator console](#). For more information, see the [Amazon Migration Hub Orchestrator User Guide](#).

You can use VM Import/Export to import virtual machine (VM) images from your virtualization environment to Amazon EC2 as Amazon Machine Images (AMI), which you can use to launch instances. Subsequently, you can export the VM images from an instance back to your virtualization environment. This enables you to leverage your investments in the VMs that you have built to meet your IT security, configuration management, and compliance requirements by bringing them into Amazon EC2.

Important

- Amazon VM Import/Export strongly recommends specifying a value for either the `--license-type` or `--usage-operation` parameter when you create a new VM Import task. This ensures your operating system is licensed appropriately and your billing is optimized. For more information, see [Licensing options](#).
- Amazon VM Import/Export only supports images that were natively installed inside the source VM and not those created using a physical-to-virtual (P2V) conversion process. For more information, see the [VM Import/Export Requirements](#).

Export your VM from its virtualization environment

After you have prepared your VM for export, you can export it from your virtualization environment. When importing a VM as an image, you can import disks in the following formats: Open Virtualization Archive (OVA), Virtual Machine Disk (VMDK), Virtual Hard Disk (VHD/VHDX), and raw. With some virtualization environments, you would export to Open Virtualization Format (OVF), which typically includes one or more VMDK, VHD, or VHDX files, and then package the files into an OVA file.

For more information, see the documentation for your virtualization environment. For example:

- **VMware** — Search for "Export an OVF Template" on the [VMware Docs](#) site. Follow the instructions for creating an OVA.
- **Citrix** — [Importing and Exporting VMs](#) on the Citrix website.
- **Microsoft Hyper-V** — [Overview of exporting and importing a virtual machine](#) on the Microsoft website.
- **Microsoft Azure** — [Download a Windows VHD from Azure](#) or [Download a Linux VHD from Azure](#) on the Microsoft website. From the Azure Portal, choose the VM to migrate, and then choose **Disks**. Select each disk (either OS or data) and choose **Create Snapshot**. On the completed snapshot resource, choose **Export**. This creates a URL that you can use to download the virtual image.

Programmatic modifications to VMs

When importing a VM using the `ImportImage` API, Amazon modifies the file system to make the imported VM accessible. When writing a modified file, Amazon retains the original file at the same location under a new name. The following actions may occur:

General

- For parity with images provided by Amazon, the Amazon Systems Manager client is installed on the VM.

Windows

- Modifying registry settings to make the VM bootable.

Linux

- Installing Citrix PV drivers either directly in OS or modify `initrd/initramfs` to contain them.
- Modifying network scripts to replace static IPs with dynamic IPs.
- Modifying `/etc/fstab`, commenting out invalid entries and replacing device names with UUIDs. If no matching UUID can be found for a device, the `nofail` option is added to the device description. You must correct the device naming and remove `nofail` after import. As a best practice when preparing your VMs for import, we recommend that you specify your VM disk devices by UUID rather than device name.

Entries in `/etc/fstab` that contain non-standard file system types (`cifs`, `smbfs`, `vboxsf`, `sshfs`, etc.) are disabled.

- Modifying grub bootloader settings such as the default entry and timeout.

Import your VM as an image

After exporting your VM from your virtualization environment, you can import it to Amazon EC2. The import process is the same regardless of the origin of the VM.

Tasks

- [Prerequisites](#)
- [Upload the image to Amazon S3](#)
- [Import the VM](#)

Prerequisites

- Create an Amazon S3 bucket for storing the exported images or choose an existing bucket. The bucket must be in the Region where you want to import your VMs. For more information about S3 buckets, see the [Amazon Simple Storage Service User Guide](#).
- Create an IAM role named `vmimport`. For more information, see [Required service role](#).
- If you have not already installed the Amazon CLI on the computer you'll use to run the import commands, see the [Amazon Command Line Interface User Guide](#).

Tip

In [supported Amazon Web Services Regions](#), you can also use [Amazon CloudShell](#) for a browser-based, pre-authenticated shell that launches directly from the Amazon Web Services Management Console.

Upload the image to Amazon S3

Upload your VM image file to your Amazon S3 bucket using the upload tool of your choice. For information about uploading objects through the Amazon S3 console, see [Uploading Objects](#).

Import the VM

After you upload your VM image file to Amazon S3, you can use the Amazon CLI to import the image. These tools accept either the Amazon S3 bucket and path to the file or a URL for a public Amazon S3 file. Private Amazon S3 files require a [presigned URL](#). You can also use the *Import virtual machine images to Amazon template* in the [Migration Hub Orchestrator](#) console to import your on-premises virtual machine images to Amazon. For more information, see [Example 4](#).

The following examples use the Amazon CLI command [import-image](#) to create import tasks.

Example 1: Import an image with a single disk

Use the following command to import an image with a single disk.

```
aws ec2 import-image --description "My server VM" --disk-containers "file://C:\import\containers.json"
```

The following is an example `containers.json` file that specifies the image using an S3 bucket.

```
[
  {
    "Description": "My Server OVA",
    "Format": "ova",
    "UserBucket": {
      "S3Bucket": "my-import-bucket",
      "S3Key": "vms/my-server-vm.ova"
    }
  }
]
```



```
]
```

The following is an example `containers.json` file that specifies the image using a URL in Amazon S3.

```
[
  {
    "Description": "My Server OVA",
    "Format": "ova",
    "Url": "s3://my-import-bucket/vms/my-server-vm.ova"
  }
]
```

Example 2: Import an image with multiple disks

Use the following command to import an image with multiple disks.

```
$ C:\> aws ec2 import-image --description "My server disks" --disk-containers
"file://C:\import\containers.json"
```

The following is an example `containers.json` file.

```
[
  {
    "Description": "First disk",
    "Format": "vmdk",
    "UserBucket": {
      "S3Bucket": "my-import-bucket",
      "S3Key": "disks/my-server-vm-disk1.vmdk"
    }
  },
  {
    "Description": "Second disk",
    "Format": "vmdk",
    "UserBucket": {
      "S3Bucket": "my-import-bucket",
      "S3Key": "disks/my-server-vm-disk2.vmdk"
    }
  }
]
```

Example 3: Import with the encrypted option enabled

Use the following command to import an image with an encrypted root volume.

```
aws ec2 import-image --description "My server disks" --encrypted --kms-key-id 0ea3fef3-80a7-4778-9d8c-1c0c6EXAMPLE --disk-containers "file:///C:\import\containers.json"
```

The CMK provided for encryption must not be disabled during the entire import process. For more information, see [Amazon EBS Encryption](#) in the *Amazon EC2 User Guide*.

Example 4: Import an image using the *Import virtual machine images to Amazon* template in Migration Hub Orchestrator

1. Open the [Migration Hub Orchestrator console](#).
2. In the navigation pane, choose **Create migration workflow**.
3. On the **Choose a workflow template** page, choose the **Import virtual images to Amazon** template.
4. Configure and submit your workflow to begin the VM import. For more information, see the [Amazon Migration Hub Orchestrator User Guide](#).

Monitor an import image task

Use the [describe-import-image-tasks](#) command to return the status of an import task.

```
aws ec2 describe-import-image-tasks --import-task-ids import-ami-1234567890abcdef0
```

Status values include the following:

- `active` — The import task is in progress.
- `deleting` — The import task is being canceled.
- `deleted` — The import task is canceled.
- `updating` — Import status is updating.
- `validating` — The imported image is being validated.
- `validated` — The imported image was validated.
- `converting` — The imported image is being converted into an AMI.
- `completed` — The import task is completed and the AMI is ready to use.

After the import image task is completed, the output includes the ID of the AMI. The following is example output that includes ImageId.

```
{
  "ImportImageTasks": [
    {
      "ImportTaskId": "import-ami-01234567890abcdef",
      "ImageId": "ami-1234567890EXAMPLE",
      "SnapshotDetails": [
        {
          "DiskImageSize": 705638400.0,
          "Format": "ova",
          "SnapshotId": "snap-111222333444aaabb"
          "Status": "completed",
          "UserBucket": {
            "S3Bucket": "my-import-bucket",
            "S3Key": "vms/my-server-vm.ova"
          }
        }
      ],
      "Status": "completed"
    }
  ]
}
```

Cancel an import image task

If you need to cancel an active import task, use the [cancel-import-task](#) command.

```
aws ec2 cancel-import-task --import-task-id import-ami-1234567890abcdef0
```

Next steps

After the import image task is complete, you can launch an instance using the resulting AMI or copy the AMI to another Region.

Windows

- [Launching an Instance](#)
- [Copying an AMI](#)

Linux

- [Launching an Instance](#)
- [Copying an AMI](#)

For some operating systems, the device drivers for enhanced networking and NVMe block devices that are required by [Nitro-based instances](#) are not installed automatically during import. To install these drivers manually, use the directions in the following documentation. Next, create a new AMI from the customized instance.

Windows

- (Recommended) [Installing the Latest Version of EC2Config](#) or [Installing the Latest Version of EC2Launch](#)
- [Enabling Enhanced Networking on Windows Instances](#)
- [Amazon NVMe Drivers for Windows Instances](#)

Linux

- [Enabling Enhanced Networking on Linux Instances](#)
- [Install or Upgrade the NVMe Driver](#)

Importing a disk as a snapshot using VM Import/Export

VM Import/Export enables you to import your disks as Amazon EBS snapshots. After the snapshot is created, you can create an EBS volume from the snapshot, and then attach the volume to an EC2 instance.

An imported snapshot has an arbitrary volume ID that should not be used for any purpose.

Prerequisites

- The following disk formats are supported: Virtual Hard Disk (VHD/VHDX), ESX Virtual Machine Disk (VMDK), and raw.
- You must first upload your disks to Amazon S3.
- If you have not already installed the Amazon CLI on the computer you'll use to run the import commands, see the [Amazon Command Line Interface User Guide](#).

Tip

In [supported Amazon Web Services Regions](#), you can also use [Amazon CloudShell](#) for a browser-based, pre-authenticated shell that launches directly from the Amazon Web Services Management Console.

Start an import snapshot task

Use the following [import-snapshot](#) command to import a disk. You can specify the URL of the S3 bucket, or provide the S3 bucket name and key.

```
aws ec2 import-snapshot --description "My server VM" --disk-container "file:///C:\import\containers.json"
```

The file `containers.json` is a JSON document that contains the required information.

```
{
  "Description": "My server VMDK",
  "Format": "VMDK",
  "UserBucket": {
    "S3Bucket": "my-import-bucket",
    "S3Key": "vms/my-server-vm.vmdk"
  }
}
```

The following is an example response:

```
{
  "Description": "My server VM",
  "ImportTaskId": "import-snap-1234567890abcdef0",
  "SnapshotTaskDetail": {
    "Description": "My server VMDK",
    "DiskImageSize": "0.0",
    "Format": "VMDK",
    "Progress": "3",
    "Status": "active",
    "StatusMessage": "pending",
    "UserBucket": {
      "S3Bucket": "my-import-bucket",
```

```
        "S3Key": "vms/my-server-vm.vmdk"
    }
}
}
```

Monitor an import snapshot task

Use the [describe-import-snapshot-tasks](#) command to check the status of an import snapshot task.

```
aws ec2 describe-import-snapshot-tasks --import-task-ids import-snap-1234567890abcdef0
```

The following is an example response. The status shown is `active`, which means that the import is in progress. The snapshot is ready to use when the status is `completed`.

```
{
  "ImportSnapshotTasks": [
    {
      "Description": "My server VM",
      "ImportTaskId": "import-snap-1234567890abcdef0",
      "SnapshotTaskDetail": {
        "Description": "My server VMDK",
        "DiskImageSize": "3.115815424E9",
        "Format": "VMDK",
        "Progress": "22",
        "Status": "active",
        "StatusMessage": "downloading/converting",
        "UserBucket": {
          "S3Bucket": "my-import-bucket",
          "S3Key": "vms/my-server-vm.vmdk"
        }
      },
    }
  ]
}
```

Cancel an import snapshot task

If you need to, you can cancel an import task that is in progress using the [cancel-import-task](#) command.

```
aws ec2 cancel-import-task --import-task-id import-snap-1234567890abcdef0
```

Next steps

You can create one or more EBS volumes from an EBS snapshot. You can attach each EBS volume to a single EC2 instance.

The following procedure shows how to create a volume and attach it to an instance using the Amazon CLI. Alternatively, you could use the Amazon Web Services Management Console.

To create a volume and attach it to an EC2 instance

1. Use the [describe-import-snapshot-tasks](#) command to determine the ID of the snapshot that was created by the import task.
2. Use the following [create-volume](#) command to create a volume from the snapshot. You must select the Availability Zone of the instance to which you'll attach the volume.

```
aws ec2 create-volume --availability-zone us-east-1a --snapshot-id
snap-1234567890abcdef0
```

The following is example output:

```
{
  "AvailabilityZone": "us-east-1a",
  "VolumeId": "vol-1234567890abcdef0",
  "State": "creating",
  "SnapshotId": "snap-1234567890abcdef0"
}
```

3. Use the following [attach-volume](#) command to attach the EBS volume that you created in the previous step to one of your existing instances.

```
aws ec2 attach-volume --volume-id vol-1234567890abcdef0 --instance-id
i-1234567890abcdef0 --device /dev/sdf
```

The following is example output:

```
{
  "AttachTime": "YYYY-MM-DDTHH:MM:SS.000Z",
  "InstanceId": "i-1234567890abcdef0",
  "VolumeId": "vol-1234567890abcdef0",
  "State": "attaching",
}
```

```
"Device": "/dev/sdf"  
}
```

4. Mount the attached volume. For more information, see the documentation for the operating system for your instance.

Exporting an instance as a VM using VM Import/Export

Exporting as a VM is useful when you want to deploy a copy of an Amazon EC2 instance in your virtualization environment. You can export most EC2 instances to Citrix Xen, Microsoft Hyper-V, or VMware vSphere.

When you export an instance, you are charged the standard Amazon S3 rates for the bucket where the exported VM is stored. In addition, there might be a small charge for the temporary use of an Amazon EBS snapshot. For more information about Amazon S3 pricing, see [Amazon Simple Storage Service Pricing](#).

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Prerequisites

Important

You can't export a VM to an S3 bucket that uses the bucket owner enforced setting for S3 Object Ownership because ACLs are disabled. For more information, see [Configuring ACLs](#) in the *Amazon Simple Storage Service User Guide*.

To export a VM from Amazon EC2, first meet the following prerequisites.

- Install the Amazon CLI. For more information, see the [Amazon Command Line Interface User Guide](#).

Tip

In [supported Amazon Web Services Regions](#), you can also use [Amazon CloudShell](#) for a browser-based, pre-authenticated shell that launches directly from the Amazon Web Services Management Console.

- Create an Amazon S3 bucket for storing the exported instances or choose an existing bucket. The bucket must be in the Region where you want export your VMs. Additionally, the bucket must belong to the Amazon Web Services account where you are performing the export operation. For more information, see the [Amazon Simple Storage Service User Guide](#).
- Prepare your Amazon S3 bucket by attaching an access control list (ACL) containing the following grants. For more information, see [Managing Access with ACLs](#) in the *Amazon Simple Storage Service User Guide*.
- For Grantee, provide the appropriate Region-specific canonical account ID:

Africa (Cape Town)

```
3f7744aeebaf91dd60ab135eb1cf908700c8d2bc9133e61261e6c582be6e33ee
```

Asia Pacific (Hong Kong)

```
97ee7ab57cc9b5034f31e107741a968e595c0d7a19ec23330eae8d045a46edfb
```

Asia Pacific (Hyderabad)

```
77ab5ec9eac9ade710b7defed37fe0640f93c5eb76ea65a64da49930965f18ca
```

Asia Pacific (Jakarta)

```
de34aaa6b2875fa3d5086459cb4e03147cf1a9f7d03d82f02bedb991ff3d1df5
```

Asia Pacific (Melbourne)

```
8b8ea36ab97c280aa8558c57a380353ac7712f01f82c21598afbb17e188b9ad5
```

Asia Pacific (Osaka)

```
40f22ffd22d6db3b71544ed6cd00c8952d8b0a63a87d58d5b074ec60397db8c9
```

Canada West (Calgary)

```
78e12f8d798f89502177975c4ccdac686c583765cea2bf06e9b34224e2953c83
```

Europe (Milan)

04636d9a349e458b0c1cbf1421858b9788b4ec28b066148d4907bb15c52b5b9c

Europe (Spain)

6e81c4c52a37a7f59e103625162ed97bcd0e646593adb107d21310d093151518

Europe (Zurich)

5d9fcea77b2fb3df05fc15c893f212ae1d02adb4b24c13e18586db728a48da67

Israel (Tel Aviv)

328a78de7561501444823ebeb59152eca7cb58fee2fe2e4223c2cdd9f93ae931

Middle East (Bahrain)

aa763f2cf70006650562c62a09433f04353db3cba6ba6aeb3550fdc8065d3d9f

Middle East (UAE)

7d3018832562b7b6c126f5832211fae90bd3eee3ed3afde192d990690267e475

China (Beijing) and China (Ningxia)

834bafd86b15b6ca71074df0fd1f93d234b9d5e848a2cb31f880c149003ce36f

Amazon GovCloud (US)

af913ca13efe7a94b88392711f6cfc8aa07c9d1454d4f190a624b126733a5602

All other Regions

c4d8eabf8db69dbe46bfe0e517100c554f01200b104d59cd408e777ba442a322

- For each Grantee, provide the following permissions:
 - READ_ACP (In the Amazon S3 console, **Bucket ACL** should have the **Read** permission)
 - WRITE (In the Amazon S3 console, **Objects** should have the **Write** permission)

Considerations for instance export

Exporting instances and volumes is subject to the following limitations:

- You must export your instances and volumes to one of the following image formats that your virtualization environment supports:

- Open Virtual Appliance (OVA), which is compatible with VMware vSphere versions 4, 5, and 6.
- Virtual Hard Disk (VHD), which is compatible with Citrix Xen and Microsoft Hyper-V virtualization products.
- Stream-optimized ESX Virtual Machine Disk (VMDK), which is compatible with VMware ESX and VMware vSphere versions 4, 5, and 6.
- You can't export an instance if it contains third-party software provided by Amazon. For example, VM Export cannot export Windows or SQL Server instances, or any instance created from an image in the Amazon Web Services Marketplace.
- You can't export an instance with encrypted EBS snapshots in the block device mapping.
- You can't export an instance with instance store volumes in the block device mapping.
- You can only export EBS volumes that are specified in the block device mapping, not EBS volumes attached after instance launch.
- You can't export an instance launched from an imported image if you deleted the AMI or the EBS snapshot for the AMI. To work around the issue, create an AMI from the instance and export the AMI.
- You can't export an instance that has more than one virtual disk.
- You can't export an instance that has more than one network interface.
- You can't export an instance from Amazon EC2 if you've shared it from another Amazon account.
- By default, you can't have more than 5 conversion tasks per Region in progress at the same time. This limit is adjustable up to 20.
- VMs with volumes larger than 1 TiB are not supported.
- You can export a volume to either an unencrypted S3 bucket or to a bucket encrypted using SSE-S3. You cannot export to an S3 bucket encrypted using SSE-KMS.
- VM Import/Export only supports exporting VMs to an Amazon S3 bucket in the same Amazon Web Services account that you export them from.
- Export operations do not support hybrid configurations. GRUB2 must be enabled for either BIOS or UEFI, but it can't be enabled for both.

Start an instance export task

Important

Your instance might reboot during the export process. Ensure that you are performing this action when some downtime is acceptable.

To export your instance, use the [create-instance-export-task](#) command. The exported file is written to the specified S3 bucket in the following S3 key: `prefixexport-i-xxxxxxxxxxxxxxxxxxxxx.format` (for example, `my-export-bucket/vms/export-i-1234567890abcdef0.ova`).

```
aws ec2 create-instance-export-task --instance-id instance-id --target-  
environment vmware --export-to-s3-task file:///C:\file.json
```

The file `file.json` is a JSON document that contains the required information.

```
{  
  "ContainerFormat": "ova",  
  "DiskImageFormat": "VMDK",  
  "S3Bucket": "my-export-bucket",  
  "S3Prefix": "vms/"  
}
```

The following is an example response. The status shown is `active`, which means that the export task is in progress. The instance export is finished when the status is `completed`.

```
{  
  "ExportTask": {  
    "ExportTaskId": "export-i-021345abcdef6789",  
    "ExportToS3Task": {  
      "ContainerFormat": "ova",  
      "DiskImageFormat": "vmdk",  
      "S3Bucket": "my-export-bucket",  
      "S3Key": "vms/export-i-021345abcdef6789.ova"  
    },  
    "InstanceExportDetails": {  
      "InstanceId": "i-021345abcdef6789",  
      "TargetEnvironment": "vmware"  
    },  
  },  
}
```

```
    "State": "active"  
  }  
}
```

Monitor an instance export task

To monitor the export of your instance, use the following [describe-export-tasks](#) command:

```
aws ec2 describe-export-tasks --export-task-ids export-i-1234567890abcdef0
```

Cancel an instance export task

If you need to, you can use the following [cancel-export-task](#) command to cancel the export of an instance that is in progress.

```
aws ec2 cancel-export-task --export-task-id export-i-1234567890abcdef0
```

This command removes all artifacts of the export, including any partially created Amazon S3 objects. If the export task is complete or is in the process of transferring the final disk image, the command fails and returns an error.

Exporting a VM directly from an Amazon Machine Image (AMI)

Exporting a VM file based on an Amazon Machine Image (AMI) is useful when you want to deploy a new, standardized instance in your virtualization environment. You can export most AMIs to Citrix Xen, Microsoft Hyper-V, or VMware vSphere.

When you export an image, you are charged the standard Amazon S3 rates for the bucket where the exported VM is stored. In addition, there might be a small charge for the temporary use of an Amazon EBS snapshot. For more information about Amazon S3 pricing, see [Amazon Simple Storage Service Pricing](#).

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Prerequisites

To export a VM from Amazon EC2, first meet the following prerequisites.

- Install the Amazon CLI. For more information, see the [Amazon Command Line Interface User Guide](#).

Tip

In [supported Amazon Web Services Regions](#), you can also use [Amazon CloudShell](#) for a browser-based, pre-authenticated shell that launches directly from the Amazon Web Services Management Console.

- Create an Amazon S3 bucket for storing the exported images or choose an existing bucket. The bucket must be in the Region where you want to export your VMs. Additionally, the bucket must belong to the Amazon Web Services account where you are performing the export operation. For more information about S3 buckets, see the [Amazon Simple Storage Service User Guide](#).
- Create an IAM role named `vmimport`. For more information, see [Required service role](#).

Considerations for image export

Exporting images and volumes is subject to the following limitations:

- You must export to one of the following image formats that your virtualization environment supports:
 - Virtual Hard Disk (VHD), which is compatible with Citrix Xen and Microsoft Hyper-V virtualization products.
 - Stream-optimized ESX Virtual Machine Disk (VMDK), which is compatible with VMware ESX and VMware vSphere versions 4, 5, and 6.
 - Raw format.
- The base AMI used to launch an instance must exist when you attempt to export the instance. If you have deleted the AMI, the export fails.
- VM Import/Export only supports exporting VMs to an Amazon S3 bucket in the same Amazon Web Services account that you export them from.

- Export operations do not support hybrid configurations. GRUB2 must be enabled for either BIOS or UEFI, but it can't be enabled for both.
- You can't export an image if it contains third-party software provided by Amazon. For example, VM Export cannot export Windows or SQL Server images, or any image created from an image in the Amazon Web Services Marketplace.
- You can't export an image with encrypted EBS snapshots in the block device mapping.
- You can only export EBS data volumes that are specified in the block device mapping, not EBS volumes attached after instance launch.
- You can't export an image from Amazon EC2 if you've shared it from another Amazon account.
- You can't have multiple export image tasks in progress for the same AMI at the same time.
- By default, you can't have more than 5 conversion tasks per Region in progress at the same time. This limit is adjustable up to 20.
- VMs with volumes larger than 1 TiB are not supported.
- You can export a volume to either an unencrypted Amazon S3 bucket or to a bucket encrypted using SSE-S3 encryption. You cannot export to an S3 bucket encrypted using SSE-KMS encryption.

Start an export image task

To export your image, use the [export-image](#) command. The exported file is written to the specified S3 bucket using the following S3 key: *prefixexport-ami-id.format* (for example, my-export-bucket/exports/export-ami-1234567890abcdef0.vmdk).

```
aws ec2 export-image --image-id ami-id --disk-image-format VMDK --s3-export-location
S3Bucket=my-export-bucket,S3Prefix=exports/
```

Monitor an export image task

To monitor the export of your image, use the following [describe-export-image-tasks](#) command:

```
aws ec2 describe-export-image-tasks --export-image-task-ids export-
ami-1234567890abcdef0
```

The following is an example response. The status shown is `active`, which means that the export task is in progress. The image is ready to use when the status is `completed`.

```
{
  "ExportImageTasks": [
    {
      "ExportImageTaskId": "export-ami-1234567890abcdef0"
      "Progress": "21",
      "S3ExportLocation": {
        "S3Bucket": "my-export-bucket",
        "S3Prefix": "exports/"
      },
      "Status": "active",
      "StatusMessage": "updating"
    }
  ]
}
```

Cancel an export image task

If you need to, you can use the following [cancel-export-task](#) command to cancel the export of an image that is in progress.

```
aws ec2 cancel-export-task --export-task-id export-ami-1234567890abcdef0
```

If the export task is complete or is in the process of transferring the final disk image, the command fails and returns an error.

Security in VM Import/Export

Cloud security at Amazon is the highest priority. As an Amazon customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between Amazon and you. The [shared responsibility model](#) describes this as security of the cloud and security in the cloud:

- **Security of the cloud** – Amazon is responsible for protecting the infrastructure that runs Amazon services in the Amazon Cloud. Amazon also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the [Amazon Compliance Programs](#). To learn about the compliance programs that apply to VM Import/Export, see [Amazon Services in Scope by Compliance Program](#).
- **Security in the cloud** – Your responsibility is determined by the Amazon service that you use. You are also responsible for other factors including the sensitivity of your data, your company's requirements, and applicable laws and regulations

This documentation helps you understand how to apply the shared responsibility model when using VM Import/Export. It shows you how to configure VM Import/Export to meet your security and compliance objectives. You also learn how to use other Amazon services that help you to monitor and secure your VM Import/Export resources.

Contents

- [Data protection in VM Import/Export](#)
- [Compliance validation for VM Import/Export](#)
- [Resilience in VM Import/Export](#)
- [Infrastructure security in VM Import/Export](#)

For more information about security and EC2 instances, Amazon Machine Images (AMI), and EBS volumes, see [Security in Amazon EC2](#) in the *Amazon EC2 User Guide*.

Data protection in VM Import/Export

The Amazon [shared responsibility model](#) applies to data protection in VM Import/Export. As described in this model, Amazon is responsible for protecting the global infrastructure that runs all of the Amazon Web Services Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. You are also responsible for the security configuration and management tasks for the Amazon Web Services that you use. For more information about data privacy, see the [Data Privacy FAQ](#).

For data protection purposes, we recommend that you protect Amazon Web Services account credentials and set up individual users with Amazon IAM Identity Center or Amazon Identity and Access Management (IAM). That way, each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with Amazon resources. We require TLS 1.2 and recommend TLS 1.3.
- Set up API and user activity logging with Amazon CloudTrail.
- Use Amazon encryption solutions, along with all default security controls within Amazon Web Services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing sensitive data that is stored in Amazon S3.
- If you require FIPS 140-2 validated cryptographic modules when accessing Amazon through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see [Federal Information Processing Standard \(FIPS\) 140-2](#).

We strongly recommend that you never put confidential or sensitive information, such as your customers' email addresses, into tags or free-form text fields such as a **Name** field. This includes when you work with VM Import/Export or other Amazon Web Services using the console, API, Amazon CLI, or Amazon SDKs. Any data that you enter into tags or free-form text fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

Encryption at rest

VM Import/Export does not store your data at rest.

Encryption in transit

VM Import/Export encrypts your data while performing import tasks. To ensure that the destination AMI or snapshot is encrypted, specify the `--encrypted` parameter when you call the [import-image](#) or [import-snapshot](#) command.

When performing an import task, VM Import/Export stores data temporarily in an intermediate EBS volume. Each task gets a separate EBS volume. When an import task is completed, VM Import/Export deletes its intermediate EBS volume.

Compliance validation for VM Import/Export

Third-party auditors assess the security and compliance of VM Import/Export as part of multiple Amazon compliance programs. These include SOC, PCI, FedRAMP, HIPAA, and others.

For a list of Amazon services in scope of specific compliance programs, see [Amazon Services in Scope by Compliance Program](#). For general information, see [Amazon Compliance Programs](#).

You can download third-party audit reports using Amazon Artifact. For more information, see [Downloading Reports in Amazon Artifact](#).

Your compliance responsibility when using VM Import/Export is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. Amazon provides the following resources to help with compliance:

- [Security and Compliance Quick Start Guides](#) – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on Amazon.
- [Architecting for HIPAA Security and Compliance on Amazon Web Services](#) – This whitepaper describes how companies can use Amazon to run HIPAA-compliant workloads.
- [Amazon Compliance Resources](#) – This collection of workbooks and guides might apply to your industry and location.
- [Evaluating Resources with Rules](#) in the *Amazon Config Developer Guide* – Amazon Config; assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- [Amazon Security Hub](#) – This Amazon service provides a comprehensive view of your security state within Amazon that helps you check your compliance with security industry standards and best practices.

Resilience in VM Import/Export

The Amazon global infrastructure is built around Amazon Regions and Availability Zones. Regions provide multiple physically separated and isolated Availability Zones, which are connected through low-latency, high-throughput, and highly redundant networking. With Availability Zones, you can design and operate applications and databases that automatically fail over between zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information about Amazon Regions and Availability Zones, see [Amazon Global Infrastructure](#).

Infrastructure security in VM Import/Export

As a managed service, VM Import/Export is protected by Amazon global network security. For information about Amazon security services and how Amazon protects infrastructure, see [Amazon Cloud Security](#). To design your Amazon environment using the best practices for infrastructure security, see [Infrastructure Protection](#) in *Security Pillar Amazon Well-Architected Framework*.

You use Amazon published API calls to access VM Import/Export through the network. Clients must support the following:

- Transport Layer Security (TLS). We require TLS 1.2 and recommend TLS 1.3.
- Cipher suites with perfect forward secrecy (PFS) such as DHE (Ephemeral Diffie-Hellman) or ECDHE (Elliptic Curve Ephemeral Diffie-Hellman). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an IAM principal. Or you can use the [Amazon Security Token Service](#) (Amazon STS) to generate temporary security credentials to sign requests.

Troubleshooting VM Import/Export

When you import or export a virtual machine (VM), most errors occur because of an attempt to do something that isn't supported. To avoid these errors, be sure to check the requirements and limitations carefully.

An import task might stop before it completes, and then fail. You can gather details about the import task that appears to have stopped due to a failure before it changes to the completed status. To gather such details, use the appropriate command for the import operation you used to describe details of the conversion task that's in progress:

- **ImportInstance** and **ImportVolume** – Use the [DescribeConversionTasks](#) operation.
- **ImportImage** – Use the [DescribeImportImageTasks](#) operation.
- **ImportSnapshot** – Use the [DescribeImportSnapshotTasks](#) operation.

Errors

- [Import image errors](#)
- [Import instance errors](#)
- [VM export errors](#)
- [Windows VM errors](#)
- [Linux VM errors](#)

Import image errors

Error Code: InvalidParameter, Error Message: Message: Parameter disk-image-size=0 has an invalid format

The specified image format is not supported. Retry the operation using one of the following supported image formats: VHD, VHDX, VMDK, or raw.

A client error (MalformedPolicyDocument) occurred when calling the CreateRole operation: Syntax errors in policy

You must include the `file://` prefix before the policy document name.

ClientError: Disk validation failed [OVF file parsing error: OVA with chunked disk files is not supported]

VM Import/Export does not support importing disks separated into multiple files. Check the disk format and retry the operation with the VM disk as a single file.

ClientError: Disk validation failed [Unsupported VMDK File Format]

The VMDK file must be stream-optimized. For more information, see [Image formats](#).

ClientError: Multiple different grub/menu.lst files found

VM Import/Export found duplicate files during the import task for at least one of the following: `grub.cfg`, `grub.conf`, or `menu.lst`. VMs with dual-boot configurations are not supported. For more information, see [Importing VMs to Amazon EC2](#).

The service role `vmimport` does not exist or does not have sufficient permissions for the service to continue

The VM import service role is missing or incorrect. You may also receive this error if the user, group, or role trying to start the import does not have sufficient access privileges on Amazon EC2 resources.

This error can also occur if the user calling `ImportImage` has `Decrypt` permission but the `vmimport` role does not. If you use [Server-Side Encryption with Amazon KMS-Managed Keys \(SSE-KMS\)](#) to secure your at-rest data in Amazon S3, you need to assign additional `Decrypt` permission to your service role as shown in the following JSON code:

```
{
  "Sid": "Allow vmimport to decrypt SSE-KMS key",
  "Effect": "Allow",
  "Principal": {
    "AWS": [
      "arn:aws:iam::accountid:role/vmimport"
    ]
  },
  "Action": [
    "kms:Decrypt"
  ],
  "Resource": "*"
}
```

Import instance errors

Error Code: InvalidParameter, Error Message: Message: Parameter disk-image-size=0 has an invalid format

The specified image format is not supported. Retry the operation using one of the following supported image formats: OVA, VHD, VMDK, or raw.

Client.Unsupported: No bootable partition found. (Service: AmazonEC2; Status Code: 400; Error Code: Unsupported; Request ID: <RequestID>)

The root volume is GUID Partition Table (GPT) partitioned. GPT partitioned volumes are not supported. Convert the root volume to an MBR partition and try again.

ClientError: Footers not identical

You attempted to import a differencing VHD, or there was an error in creating the VHD. Export your VM again and retry importing it into Amazon EC2.

ClientError: Uncompressed data has an invalid length

The VMDK file is corrupted. You can try repairing or recreating the VMDK file, or use a different file.

ERROR: Bucket <MyBucketName> is not in the <RegionName> Region, it's in <RegionName>

The Amazon S3 bucket is not in the same Amazon Web Services Region as the instance you want to import. Try adding the `--ignore-region-affinity` option, which ignores whether the bucket's Region matches the Region where the import task is created. You can also create an Amazon S3 bucket using the Amazon Simple Storage Service console and set the Region to the Region where you want to import the VM. Run the command again and specify the new bucket you just created.

ERROR: File uses unsupported compression algorithm 0

The VMDK was created using OVA format instead of OVF format. Create the VMDK in OVF format.

Invalid S3 source location

The command syntax or Amazon S3 bucket name is incorrect. Create an Amazon S3 bucket in the appropriate Region solely for VM Import and upload the VM files to the root of the bucket.

The given S3 bucket is not local to the Region

The Amazon S3 Bucket used for VM Import must reside in the same Amazon Web Services Region where you want to import the VM.

ClientError: Unknown OS / Missing OS files

The operating system is not recognized. Verify that your OS is listed as support in the VM Import/Export [System requirements](#).

VM export errors

Client.UnsupportedOperation: This instance has multiple volumes attached. Please remove additional volumes.

Detach volumes other than the root volume and try again. If you need the data from the volumes, you can copy it to the root volume or import the volumes to Amazon EBS.

Client.NotExportable: This instance cannot be exported. (Service: AmazonEC2; Status Code: 400; Error Code: NotExportable; Request ID: <RequestID>)

You can only export certain instances. For more information, see [Considerations for instance export](#).

Error starting instances: Invalid value <instance ID> for instanceld. Instance does not have a volume attached at root (/dev/sda1).

You attempted to start the instance before the VM import process and all conversion tasks were complete. Wait for the VM import process and all conversion tasks to completely finish, and then start the instance.

An error occurred (InvalidParameter) when calling the CreateInstanceExportTask operation: The given S3 object is not local to the region.

The EC2 instance and S3 bucket must be in the same Amazon Web Services Region. You must also ensure the `create-instance-export-task` command is being run in the same Region as your resources being exported. You can specify the Region by using `--region` parameter. For more information, see [Amazon CLI supported global command line options](#) in the *Amazon Command Line Interface User Guide*.

Windows VM errors

ClientError: Booter Networking failure/instance not reachable. Please retry after installation of .Net framework 3.5 SP1 or greater.

The EC2 Config Service requires the Microsoft .NET Framework 3.5 Service Pack 1 or later. Install Microsoft .NET Framework 3.5 Service Pack 1 or later on your Windows VM and try again.

FirstBootFailure: This import request failed because the Windows instance failed to boot and establish network connectivity.

When you receive the `FirstBootFailure` error message, it means that your virtual disk image was unable to perform one of the following steps:

- Boot up and start Windows.
- Install Amazon EC2 networking and disk drivers.
- Use a DHCP-configured network interface to retrieve an IP address.
- Activate Windows using the Amazon EC2 Windows volume license.

The following best practices can help you to avoid Windows first boot failures:

- **Disable anti-virus and anti-spyware software and firewalls** — These types of software can prevent installing new Windows services or drivers or prevent unknown binaries from running. Software and firewalls can be re-enabled after importing.
- **Do not harden your operating system** — Security configurations, sometimes called hardening, can prevent unattended installation of Amazon EC2 drivers. There are numerous Windows configuration settings that can prevent import. These settings can be reapplied once imported.
- **Disable or delete multiple bootable partitions** — If your virtual machine boots and requires you to choose which boot partition to use, the import may fail.

This inability of the virtual disk image to boot up and establish network connectivity could be due to any of the following causes:

TCP/IP networking and DHCP are not enabled

Cause: TCP/IP networking and DHCP must be enabled.

Resolution: Ensure that TCP/IP networking is enabled. For more information, see [Change TCP/IP settings](#) at the Microsoft Support website. Ensure that DHCP is enabled. For more information, see [Dynamic Host Configuration Protocol \(DHCP\)](#) at the Microsoft website.

The Hyper-V server role is installed

Cause: Importing a virtual machine with the Hyper-V role installed is not supported.

Resolution: Remove the Hyper-V role from the virtual machine and try the import again.

A volume that Windows requires is missing from the virtual machine

Cause: Importing a VM into Amazon EC2 only imports the boot disk, all other disks must be detached and Windows must be able to boot before importing the virtual machine. For example, Active Directory often stores the Active Directory database on the D:\ drive. A domain controller cannot boot if the Active Directory database is missing or inaccessible.

Resolution: Detach any secondary and network disks attached to the Windows VM before exporting. Move any Active Directory databases from secondary drives or partitions onto the primary Windows partition. For more information, see ["Directory Services cannot start" error message when you start your Windows-based or SBS-based domain controller](#) at the Microsoft Support website.

Windows always boots into System Recovery Options

Cause: Windows can boot into System Recovery Options for a variety of reasons, including when Windows is pulled into a virtualized environment from a physical machine, also known as a physical-to-virtual (P2V) conversion process.

Resolution: Ensure that Windows boots to a login prompt before exporting and preparing for import. Do not import virtualized Windows instances that have come from a physical machine.

The virtual machine was created using a physical-to-virtual (P2V) conversion process

Cause: A P2V conversion occurs when a disk image is created by performing the Windows installation process on a physical machine and then importing a copy of that Windows installation into a VM. VMs that are created as the result of a P2V conversion are not supported by VM Import/Export. VM Import/Export only supports Windows images that were natively installed inside the source VM.

Resolution: Install Windows in a virtualized environment and migrate your installed software to that new VM.

Windows activation fails

Cause: During boot, Windows will detect a change of hardware and attempt activation. During the import process we attempt to switch the licensing mechanism in Windows to a volume license provided by Amazon Web Services. However, if the Windows activation process does not succeed, then the import fails.

Resolution: Ensure that the version of Windows that you are importing supports volume licensing. Beta or preview versions of Windows might not.

No bootable partition found

Cause: During the import process of a virtual machine, we could not find the boot partition.

Resolution: Ensure that the disk you are importing has a boot partition.

Linux VM errors

ClientError: Invalid configuration - Could not read fstab

Linux VMs with dual-boot volumes or multiple `/etc` directories are not supported.

ClientError: BLSC-style GRUB found, but unable to detect default kernel

VM Import/Export can't detect the default kernel. This can occur when it has been moved out of the main `grub.cfg` file. You can set the configuration to `$saved_entry` and ensure the `grubenv` contains the `bootloader` entry as the default.

ClientError: We were unable to read your import's initramfs/initrd to determine what drivers your import requires to run in EC2

We were unable to read required files while importing your Linux VM to prepare it to run as an instance in Amazon EC2. You can run the `lsinitramfs` command to verify the integrity of the file. For example, you might use the following command:

```
lsinitramfs /boot/initrd.img-5.4.0-77-generic 2>&1 | less
```

If errors are returned in the output, you can try rebuilding the `initramfs` file to resolve the issue and import the VM again.

ClientError: Unsupported configuration - Logical volume group activation failed

A logical volume on your virtual disk image failed to activate. This may indicate file or disk corruption. Verify the uploaded disk image files.

ClientError: Unsupported configuration - Multiple directories found

Linux VMs with multi-boot volumes or multiple `/etc` directories are not supported.

ClientError: Unsupported kernel version

The kernel version used by the operating system is not supported. Confirm that your import meets the requirements listed for the operating system. For more information, see [Operating systems](#).

Linux is not supported on the requested instance

Linux VMs can be imported to specific instance types. Try again using one of the following supported instance types.

- General purpose: `t2.micro` | `t2.small` | `t2.medium` | `m3.medium` | `m3.large` | `m3.xlarge` | `m3.2xlarge`
- Compute optimized: `c3.large` | `c3.xlarge` | `c3.2xlarge` | `c3.4xlarge` | `c3.8xlarge` | `cc1.4xlarge` | `cc2.8xlarge`
- Memory optimized: `r3.large` | `r3.xlarge` | `r3.2xlarge` | `r3.4xlarge` | `r3.8xlarge` | `cr1.8xlarge`
- Storage optimized: `i2.xlarge` | `i2.2xlarge` | `i2.4xlarge` | `i2.8xlarge` | `hi1.4xlarge` | `hi1.8xlarge`

Document history for VM Import/Export

The following table describes important additions to the VM Import/Export documentation after August 2019. For notification about updates to this documentation, you can subscribe to the RSS feed.

| Change | Description | Date |
|--|---|-------------------|
| VM Import/Export supports UEFI boot mode in more Amazon Web Services Regions | VM Import/Export supports UEFI boot in all of the commercial Amazon Web Services Regions. For more information, see Boot modes and Region in the <i>Amazon Web Services Glossary</i> . | April 18, 2024 |
| VM Import/Export supports more Debian and Fedora Linux operating systems | VM Import/Export added support for Debian 12.2 and Debian 12.4 with kernel 6.1.0 operating systems. VM Import/Export added support for Fedora Linux 37 with kernel 6.0.7, Fedora Linux 38 with kernel 6.2.9, and Fedora Linux 39 with kernel 6.5.6 operating systems. For more information, see Operating Systems . | January 25, 2024 |
| VM Import/Export is available in the Canada West (Calgary) Region | VM Import/Export is now available in the Canada West (Calgary) Region. | December 20, 2023 |
| VM Import/Export supports more Oracle Linux operating systems | VM Import/Export added support for Oracle Linux 8.0–8.8 with kernel 4.18.0 and Oracle Linux 9.0–9.2 | December 18, 2023 |

| | | |
|---|--|--------------------|
| | with kernel 5.14.0 operating systems. For more information, see Operating Systems . | |
| VM Import/Export supports more SLES kernels | VM Import/Export added support for the SLES 5.14.21 kernel with service packs 4 and 5. For more information, see Operating Systems . | December 1, 2023 |
| VM Import/Export supports more Windows operating systems | VM Import/Export added support for the Windows Server 2022 operating system. For more information, see Operating Systems . | September 26, 2023 |
| VM Import/Export supports more RHEL operating systems | VM Import/Export added support for Red Hat Enterprise Linux (RHEL) 8.7 and 8.8 operating systems with kernel 4.18.0. For more information, see Operating Systems . | September 1, 2023 |
| VM Import/Export added support for the Rocky Linux operating system | VM Import/Export added support for the Rocky Linux 9 operating system. For more information, see Operating Systems . | September 1, 2023 |
| VM Import/Export is available in the Israel (Tel Aviv) Region | VM Import/Export is now available in the Israel (Tel Aviv) Region. | August 1, 2023 |
| VM Import/Export supports more Ubuntu operating systems | VM Import/Export added support for the Ubuntu 23.04 operating system with kernel 5.15.0. For more information, see Operating Systems . | May 30, 2023 |

| | | |
|--|--|-------------------|
| VM Import/Export is available in the Asia Pacific (Melbourne) Region | VM Import/Export is now available in the Asia Pacific (Melbourne) Region. | January 24, 2023 |
| VM Import/Export supports more SLES operating systems | VM Import/Export added support for the SUSE Linux Enterprise Server (SLES) 15 operating system with service pack 3 and kernel 5.3. For more information, see Operating Systems . | December 15, 2022 |
| VM Import/Export is available in the Asia Pacific (Hyderabad) Region | VM Import/Export is now available in the Asia Pacific (Hyderabad) Region. | November 22, 2022 |
| VM Import/Export supports more Ubuntu operating systems | VM Import/Export added support for the Ubuntu 22.04 operating system with kernel 5.15.0. For more information, see Operating Systems . | November 18, 2022 |
| VM Import/Export is available in the Europe (Spain) Region | VM Import/Export is now available in the Europe (Spain) Region. | November 16, 2022 |
| VM Import/Export is available in the Europe (Zurich) Region | VM Import/Export is now available in the Europe (Zurich) Region. | November 9, 2022 |
| VM Import/Export supports more RHEL operating systems | VM Import/Export added support for Red Hat Enterprise Linux (RHEL) 8.3, 8.4, 8.5, and 8.6 operating systems with kernel 4.18.0. For more information, see Operating Systems . | October 19, 2022 |

[VM Import/Export supports more Windows operating systems](#)

VM Import/Export added support for the Windows 11 operating system. For more information, see [Operating Systems](#).

August 2, 2022

[VM Import/Export supports more SLES operating systems](#)

VM Import/Export added support for more SUSE Linux Enterprise Server (SLES) 12 and 15 operating systems. SLES 12 with service pack 4 and kernel 4.12, SLES 12 with service pack 5 and kernel 4.12, SLES 15 without any service pack and kernel 4.12, SLES 15 with service pack 1 and kernel 4.12, and SLES 15 with service pack 2 and kernel 5.3 are now supported . For more information, see [Operating Systems](#).

February 28, 2022

[VM Import/Export is available in the Middle East \(UAE\) Region](#)

VM Import/Export is now available in the Middle East (UAE) Region.

December 13, 2021

[VM Import/Export is available in the Asia Pacific \(Jakarta\) Region](#)

VM Import/Export is now available in the Asia Pacific (Jakarta) Region.

December 13, 2021

[VM Import/Export supports more Red Hat Enterprise Linux \(RHEL\) and CentOS operating systems](#)

VM Import/Export added support for RHEL and CentOS 8.0, 8.1, and 8.2 operating systems. For more information, see [Operating Systems](#).

July 17, 2020

[VM Import/Export is available in the Europe \(Milan\) Region](#)

VM Import/Export is now available in the Europe (Milan) Region.

April 28, 2020

Earlier updates

The following table describes important additions to the VM Import/Export documentation in 2019 and earlier years.

| Change | Description | Date |
|--|---|-------------------|
| Export a VM from an AMI | Added support for exporting a VM file based on an Amazon Machine Image (AMI). | August 23, 2019 |
| Import VMs with multiple volumes as images | Added support for importing VMs as an Amazon Machine Image (AMI) using the ImportImage API. ImportInstance also supports importing VMs with multiple volumes. The new API improves performance and flexibility. | April 23, 2015 |
| Import Linux virtual machines | Added support for importing Linux instances. | December 16, 2013 |
| Export a VM from an instance | Added support for exporting Windows Server instances that you originally imported into Amazon EC2. Added support for exporting Linux instances to Citrix Xen, Microsoft Hyper-V, and VMware vSphere. | May 25, 2012 |

| Change | Description | Date |
|---------------------------|--|-----------------|
| Import in VHD file format | Added support for importing virtual machine image files in VHD format. With this release, VM Import now supports RAW, VHD, and VMDK (VMware ESX-compatible) image formats. | August 24, 2011 |