

# VELOSTRATA RELEASE NOTES

# Table of Contents

Articles..... 3

    Velostrata v1.3 Release Notes ..... 4

    Velostrata v2.1 Release Notes ..... 10

    Velostrata v2.3 Release Notes ..... 16

    Velostrata v2.4 Release Notes ..... 20

    Velostrata v2.5 Release Notes ..... 26

    Velostrata v2.6 Release Notes ..... 39

    Velostrata v2.7 Release Notes ..... 49

    Velostrata v3.0 Release Notes ..... 60

    Velostrata v3.1 Release Notes ..... 69

    Velostrata v3.2 Release Notes ..... 77

    Velostrata v3.5 Release Notes ..... 85

    Velostrata Open Source Disclosure Information ..... 94

# Articles

# Velostrata v1.3 Release Notes

## Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Version Compatibility

This Velostrata release is compatible with vSphere 5.5 U1 or higher and vSphere 6.0 U1 or higher

### Web Browser Compatibility

The latest versions of the following web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser is updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

### Virtual Machine Compatibility

Only virtual machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is **not** supported.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported. Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are **not** supported.

### Guest Operating System Compatibility

Supported Windows versions: Windows Server 2008 R2 SP1 or higher, Windows Server 2012 and Windows Server 2012 R2. No pre-installation is required for Windows Virtual Machines.

Supported Linux distributions and versions: Red Hat Enterprise Linux 6.x, CentOS 6.x, SUSE Linux Enterprise Server 11 SP2 or higher.

You will need to install the pre-requisite Velostrata prep RPM package and its dependencies on the virtual machine you intend to run in cloud. The Velostrata package can remain installed when the virtual machine is running on-premises to allow for a future impromptu run-in-cloud.

- For RHEL/CentOS 6, download and install the Velostrata RPM from: <http://tiny.cc/velos-v1-rhel6>
- For SUSE 11, download and install the Velostrata RPM from: <http://tiny.cc/velos-v1-suse11>

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks.

## VPN Connection Bandwidth

A minimum of 20 Mbit/sec symmetric or equivalent VPN connection bandwidth is required for acceptable access times when moving a VM to the cloud. As a general guideline, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

- When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on premises.
- Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
- Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 40 VMDKs **per ESX host**, for virtual machines that run in the cloud (whether active or stopped). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
- A system event is not yet implemented for write back that is put on-hold. The write back for a VM running in the cloud is put on hold when the backing vSphere Datastore's free capacity is lower than 10%. Write back will resume automatically as space is freed up on the datastore. **Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.
- AWS instance type - c4.8xlarge - 10G network is not supported for a RedHat workload.
- AWS instance type - g2.2xlarge - is not supported for a RedHat workload.

# Fixed Issues

## **Build 1.3.0.6461**

**#536:** The Create Cloud Extension wizard allows an empty Cloud Extension name field. The task will start but will fail later. A non-empty name is mandatory.

**#668, #1057:** When multiple run-in-cloud tasks are in progress, canceling a single task may, on some occasions, cause another task to cancel as well.

**#1214:** Newly created Cloud Extension information may appear in the summary tab portlet for a virtual datacenter after a 1-minute delay.

**#1396:** The Velostrata vCenter Web Client Plug-in registration page on the Velostrata Manager Virtual Appliance for vSphere does not accept a FQDN of the vCenter server.

## **Build 1.0.0.5421**

This update adds support for CentOS 6 (64 bit) as well as non-LVM configurations for RHEL. The RHEL and SUSE RPMs have been updated and should be reinstalled to replace older version deployments.

#1735 - Updated the Velostrata Windows driver signing certificate used during Run-in-Cloud.

#1581, #1583, #1696: Improvements added to SUSE 11 RPM to allow improved service load handling.

#1589, #1643, #1682, #1710: Improvements added to RHEL 6 RPM and offline servicing to handle further boot variations such as non-LVM setup, multiple GRUB entries, boot without a separate boot partition.

## **Build 1.0.0.5184**

\* **ENI Support** - added an option to specify a reserved **Elastic Network Interface (ENI)** in the Run-in-Cloud wizard. To use this capability, select **Static** option in **Private IP** field, and specify the **ENI ID** string (**eni-xxxx**) instead of an IP address. Running a VM in the cloud with a specified ENI allows for a reserved MAC address to be used, which certain application licenses may require. An ENI also allows a reserved Public IP (EIP) association to be preserved across VM movement, for a consistent public service address configuration.

**Note:** when specifying an ENI, the ENI settings for subnet and security group and EIP assignment will apply and override any respective prior selection in the wizard.

\* **Removed Public IP checkbox** option in the Run-in-Cloud wizard due to usability issues. To gain Internet access when a VM is running in the cloud, use one of the following options:

(1) When running in a subnet where the default route 0.0.0.0/0 is associated with an Amazon Internet Gateway (IGW), you may reserve and assign an Elastic IP (EIP) using the AWS console.

(2) When running in a subnet where a NAT Gateway is configured, Internet access will be provided by the NAT Gateway.

(3) When running in a subnet where the default route 0.0.0.0/0 is associated with an Amazon VPN Gateway (VGW), Internet access will be routed according to the VPN Gateway static routes or BGP published routes.

### **Build 1.0.0.5058**

#1380 - Rare race condition on read request.

#1495 - Write back checkpoint aborted due to the race between management RPC and storage connection teardown.

#1598 - Velostrata Manager virtual appliance does not reconnect to the vCenter after certain vCenter outage scenarios.

#1618 - Write back does not resume after certain vCenter connectivity loss scenarios.

#1633 - Inflated logs on Velostrata Edge due to debug level configuration.

### **Build 1.0.0.5024**

#1593: AWS service region addition caused failure to create a new Cloud Extension.

#1623: Velostrata Manager virtual appliance service disruption due to the lack of free disk space.

### **Build 1.0.0.4054**

#1395: The Finish button in the Reconfigure Virtual Machine wizard remains disabled in Internet Explorer and Firefox. **Note:** Velostrata recommends that the Flash plug-in for your browser is updated to the latest version. Use Flash player version 19.0.0.245 or later.

**Note:** To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

## **Known Issues**

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Workaround:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that

committing a large number of pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#2071, #2082:** Velostrata Cloud Extension and VM Portlets might take time to update.

**Workaround:** Log out from the vSphere web client and re-login.

**#1745:** After registering the Velostrata plug-in, Creating a Cloud Extension might fail.

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere web client service, then re-register the plug-in. Contact support if issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** Retry the operation.

**#1909:** In rare case, Create Cloud Extension might take hours to complete successfully.

**Workaround:** Disconnect the Velostrata management from network and re-connect it.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#2124:** In rare cases when moving a workload back to premises, the Velostrata task might be shown as failed although it finished successfully. This is due to vm snapshot consolidation task taking too long to finish.

**Workaround:** It is safe to ignore this task message.

**#2114:** In rare cases, when the vCenter or ESX host is stressed, a Workload running in the cloud may be unable to perform a write-back of changes back to on premises storage.

**Workaround:** Contact support.

**#2069:** Error message "java NullPointerException in vSphere UI" may appear when trying to "Reconfigure" a Workload while it is in a Move back state.

**Workaround:** Refresh the vCenter web client.

**#2054:** When attempting to move a workload that is in a "Migrating storage" state back to on premises, the error message - "a previous task is already in progress" appears indicating that the move failed.

**Workaround:** Pause the storage migration first, and then start the run-on-premises task.

**#1951:** When moving a Workload to the cloud while the ESXi host is running, it is put into maintenance mode meaning that a rollback will be performed but will get stuck.

**Workaround:** Manually cancel the task and re-run the Run in cloud operation for the workload after it was moved to another ESXi host.

**#1917:** A Run in cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".



**Workaround:** Contact support.

**#1808:** After running a Workload back on premises - Workload vmdk's are locked. In certain cases this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Workaround:** The issue will resolve itself after 1-2 hours.

**#1806:** WAN Disruption may cause RHEL\SUSE workloads not to complete a boot sequence in the cloud.

**Workaround:** Reboot the Workload.

# Velostrata v2.1 Release Notes

## Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Version Compatibility

This Velostrata release is compatible with vSphere 5.5 U1 or higher and vSphere 6.0 U1 or higher

### Web Browser Compatibility

The latest versions of the following web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser is updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

### Virtual Machine Compatibility

Only virtual machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is **not** supported.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported. Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are **not** supported.

### Guest Operating System Compatibility

Supported Windows versions: Windows Server 2008 R2 SP1 or higher, Windows Server 2012 and Windows Server 2012 R2. No pre-installation is required for Windows Virtual Machines.

Supported Linux distributions and versions: RHEL 6.x, RHEL 7.x, CentOS 6.x, CentOS 7.x, SUSE Linux Enterprise Server 11 SP2 or higher.

You will need to install the pre-requisite Velostrata prep RPM package and its dependencies on the virtual machine you intend to run in cloud. The Velostrata package can remain installed when the virtual machine is running on-premises to allow for a future impromptu run-in-cloud.

- For RHEL/CentOS 6.x, 7.x, download and install the Velostrata RPM from: <http://tiny.cc/velos-v2-rhel6>
- For SUSE 11, download and install the Velostrata RPM from: <http://tiny.cc/velos-v2-suse11>
- AWS instance type - c4.8xlarge - 10G network is not supported for a RedHat workload.
- AWS instance type - g2.2xlarge - is not supported for a RedHat workload.

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks.

## VPN Connection Bandwidth

A minimum of 20 Mbit/sec symmetric or equivalent VPN connection bandwidth is required for acceptable access times when moving a VM to the cloud. As a general guideline, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

- When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on premises.
- Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
- Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 40 VMDKs **per ESX host**, for virtual machines that run in the cloud (whether active or stopped). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
- A system event is not yet implemented for write back that is put on-hold. The write back for a VM running in the cloud is put on hold when the backing vSphere Datastore's free capacity is lower than 10%. Write back will resume automatically as space is freed up on the datastore. **Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.
- Migration to cloud is not supported for a Virtual Machine with more than 20 disks.
- Workloads with VMDK size larger than 2TB will fail to boot in cloud. **Workaround:** Use VMDKs smaller than 2TB, otherwise contact support to obtain hotfix.

- Inconsistencies between Azure locations may result A VM size instances A0-A3 to fail booting in cloud in some locations. **Workaround:** use D or DS VM size instance instead.

## Fixed Issues

### **Build 2.1.0.8563**

#2210: A Velostrata managed workload that was started via Azure Resource Manager would fail to boot but its state will remain running in VM portlet.

#2114: In rare cases, when the vCenter or ESX host is stressed, a Workload running in the cloud may be unable to perform a write-back of changes back to on premises storage.

### **Build 2.0.0.8025**

#2650: Due to disruptions Velostrata Exporter may get into an infinite loop

### **Build 2.0.0.7989**

#2069: Error message "java NullPointerException in vSphere UI" may appear when trying "Reconfigure Cloud Instance" for a Workload while it is in a Move back state.

### **Build 1.3.0.6461**

#536: The Create Cloud Extension wizard allows an empty Cloud Extension name field. The task will start but will fail later. A non-empty name is mandatory.

#668, #1057: When multiple run-in-cloud tasks are in progress, canceling a single task may, on some occasions, cause another task to cancel as well.

#1214: Newly created Cloud Extension information may appear in the summary tab portlet for a virtual datacenter after a 1-minute delay.

#1396: The Velostrata vCenter Web Client Plug-in registration page on the Velostrata Manager Virtual Appliance for vSphere does not accept a FQDN of the vCenter server.

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This update adds support for CentOS 6 (64 bit) as well as non-LVM configurations for RHEL. The RHEL and SUSE RPMs have been updated and should be reinstalled to replace older version deployments.

#1735 - Updated the Velostrata Windows driver signing certificate used during Run-in-Cloud.

#1581, #1583, #1696: Improvements added to SUSE 11 RPM to allow improved service load handling.

#1589, #1643, #1682, #1710: Improvements added to RHEL 6 RPM and offline servicing to handle further boot variations such as non-LVM setup, multiple GRUB entries, boot without a separate boot partition.

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\* **ENI Support** - added an option to specify a reserved **Elastic Network Interface (ENI)** in the Run-in-Cloud wizard. To use this capability, select **Static** option in **Private IP** field, and specify the **ENI ID** string (**eni-xxxx**) instead of an IP address. Running a VM in the cloud with a specified ENI allows for a reserved MAC address to be used, which certain application licenses may require. An ENI also allows a reserved Public IP (EIP) association to be preserved across VM movement, for a consistent public service address configuration.

**Note:** when specifying an ENI, the ENI settings for subnet and security group and EIP assignment will apply and override any respective prior selection in the wizard.

\* **Removed Public IP checkbox** option in the Run-in-Cloud wizard due to usability issues. To gain Internet access when a VM is running in the cloud, use one of the following options:

(1) When running in a subnet where the default route 0.0.0.0/0 is associated with an Amazon Internet Gateway (IGW), you may reserve and assign an Elastic IP (EIP) using the AWS console.

(2) When running in a subnet where a NAT Gateway is configured, Internet access will be provided by the NAT Gateway.

(3) When running in a subnet where the default route 0.0.0.0/0 is associated with an Amazon VPN Gateway (VGW), Internet access will be routed according to the VPN Gateway static routes or BGP published routes.

#### **Build 1.0.0.5058**

#1380 - Rare race condition on read request.

#1495 - Write back checkpoint aborted due to the race between management RPC and storage connection teardown.

#1598 - Velostrata Manager virtual appliance does not reconnect to the vCenter after certain vCenter outage scenarios.

#1618 - Write back does not resume after certain vCenter connectivity loss scenarios.

#1633 - Inflated logs on Velostrata Edge due to debug level configuration.

#### **Build 1.0.0.5024**

#1593: AWS service region addition caused failure to create a new Cloud Extension.

#1623: Velostrata Manager virtual appliance service disruption due to the lack of free disk space.

#### **Build 1.0.0.4054**

#1395: The Finish button in the Reconfigure Virtual Machine wizard remains disabled in Internet Explorer and Firefox. **Note:** Velostrata recommends that the Flash plug-in for your browser is updated to the latest version. Use Flash player version 19.0.0.245 or later.

**Note:** To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

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**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Workaround:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing a large number of pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#2023, #2071:** Velostrata Cloud Extension Portlet might take time to update.

**Workaround:** Log out from the vSphere web client and re-login.

**#1745:** After registering the Velostrata plug-in, Creating a Cloud Extension might fail.

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere web client service, then re-register the plug-in. Contact support if issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** Retry the operation.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#2124:** In rare cases when moving a workload back to premises, the Velostrata task might be shown as failed although it finished successfully. This is due to vm snapshot consolidation task taking too long to finish.

**Workaround:** It is safe to ignore this task message.

**#2054:** When attempting to move a workload that is in a "Migrating storage" state back to on premises, the error message - "a previous task is already in progress" appears indicating that the move failed.

**Workaround:** Pause the storage migration first, and then start the run-on-premises task.

**#1951:** When moving a Workload to the cloud while the ESXi host is running, it is put into maintenance mode meaning that a rollback will be performed but will get stuck.

**Workaround:** Manually cancel the task and re-run the Run in cloud operation for the workload after it was moved to another ESXi host.

**#1917:** A Run in cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** Contact support.

**#1808:** After running a Workload back on premises - Workload VMDK's are locked. In certain cases this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Workaround:** The issue will resolve itself after 1-2 hours.

**#1773, #1806:** WAN Disruption may cause RHEL\SUSE workloads not to complete a boot sequence in the cloud.

**Workaround:** Reboot the Workload.

**#2136:** Post Velostrata version upgrade - in some cases Windows workload may enter a boot loop state

**Workaround:** Contact support.

**#2490:** After performing a Detach operation - Workload is unable to complete its boot.

**Workaround:** Retry the operation.

**#2551:** Workload whose disks were shrunken is unable to boot in cloud.

**Workaround:** Contact support.

# Velostrata v2.3 Release Notes

## Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Version Compatibility

This Velostrata release is compatible with vSphere 5.5 U1 or higher and vSphere 6.0 U1 or higher

### Web Browser Compatibility

The latest versions of the following web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser is updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

### Virtual Machine Compatibility

Only virtual machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is **not** supported.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported. Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are **not** supported.

IDE virtual disks are currently **not** supported. Change the virtual disk type to SCSI to enable move to cloud.

### Guest Operating System Compatibility

Supported Windows versions: Windows Server 2008 R2 SP1 or higher, Windows Server 2012 and Windows Server 2012 R2. No pre-installation is required for Windows Virtual Machines.

Supported Linux distributions and versions: RHEL 6.x, RHEL 7.x, CentOS 6.x, CentOS 7.x, SUSE Linux Enterprise Server 11 SP2 or higher.

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks.



You will need to install the pre-requisite Velostrata prep RPM package and its dependencies on the virtual machine you intend to run in cloud. The Velostrata package can remain installed when the virtual machine is running on-premises to allow for a future impromptu run-in-cloud.

## Cloud Instance Type Compatibility

The following AWS instance types may experience missing driver issues. Please refer to the AWS driver lists for specific kernel and driver information.

For C4 types, see:

<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/c4-instances.html>

For G2 and P2 types, see: [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)

For X1 types, see:

<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

### Known Compatibility Issues

- **c4.8xlarge** - Verified to work with CentOS 6.8, 7.2, RHEL 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x.
- **g2.2xlarge** - Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- **x1.32xlarge** - Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.

## VPN Connection Bandwidth

A minimum of 20 Mbit/sec symmetric or equivalent VPN connection bandwidth and 0.5-1 Mbit/sec upload BW to cloud is required for acceptable access times when moving a VM to the cloud.

For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

- When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on premises.
- Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20Mbytes/sec. When workloads are highly concentrated into

a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.

- Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs **per ESX host**, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
- A system event is not yet implemented for write back that is put on-hold. The write back for a VM running in the cloud is put on hold when the backing vSphere Datastore's free capacity is lower than 10%. Write back will resume automatically as space is freed up on the datastore. **Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.
- Workloads with VMDK size larger than 2TB will fail to boot in cloud. **Workaround:** Use VMDKs smaller than 2TB, otherwise contact support to obtain hotfix.
- Inconsistencies between Azure locations may result A-type VM size instances A0-A3 to fail booting in cloud in some locations. **Workaround:** use D, F or DS VM size instance instead.

## Fixed Issues

### Build 2.3.0.10198

**#2023, #2071:** Velostrata Cloud Extension Portlet might take time to update.

**#2054:** When attempting to move a workload that is in a "Migrating storage" state back to on-premises, the error message - "a previous task is already in progress" appears indicating that the move failed.

**#1773, #1806:** WAN disruption may cause RHEL/SUSE workloads not to complete a boot sequence in the cloud.

**#2490:** After performing a Detach operation - Workload is unable to complete its boot.

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Workaround:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted

writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#1745:** After registering the Velostrata plug-in, creating a Cloud Extension might fail.

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere web client service, then re-register the plug-in. Contact support if issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** If the Cloud Extension appears in "impaired" state, retry using the "Repair Cloud Extension" operation. If no Cloud Extension entry is shown, retry the create operation.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#1951:** With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation will fail but will get stuck in rollback phase.

**Workaround:** Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-cloud operation.

**#1917:** A Run-in-cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

**#1808:** After running a Workload back on premises - Workload VMDK's are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Workaround:** The issue will resolve itself after 1-2 hours.

**#2551:** Workload whose disks were shrunk using VMware-Converter is unable to boot in cloud.

**Workaround:** VMware-Converter may have replaced the MBR to a non-supported version. Contact support for assistance in correcting the issue.

**#2736:** During Detach, operation might fail with the following error message "Operation was canceled"

**Workaround:** Retry the Detach operation.

# Velostrata v2.4 Release Notes

## What's New in v2.4

Velostrata version 2.4 is adding Azure Marketplace support for integrated pay-as-you-go billing.

See: <http://velostrata.com/AzureMarketplace> for more information.

## Contacting Support

All Velostrata BYOL and Marketplace subscription include support. For options to contact support see: <http://velostrata.com/support>

When reaching out to support, please include your Velostrata Subscription ID (for BYOL customers), your AWS 12-digit account number for AWS Marketplace users or your Azure Subscription ID for Azure Marketplace customers.

## Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Version Compatibility

This Velostrata release is compatible with vSphere 5.5 U1 or higher and vSphere 6.0 U1 or higher. In certain configurations, ESXi version 5.0 and 5.1 may be used, please contact support for details.

vCenter is a required component in a deployment. At minimum, version 5.5 or higher of vCenter is required even in cases where ESXi host version is lower.

### Web Browser Compatibility

The latest versions of the following web browsers are known to be compatible with the Velostrata vCenter Web Client plugin:

Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser is updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

## Virtual Machine Compatibility

Only virtual machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is **not** supported.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported at full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported at limited functionality contact support for details if used.

IDE virtual disks are currently **not** supported. Change the virtual disk type to SCSI to enable move to cloud.

### Guest Operating System Compatibility

#### Windows

Supported Windows versions: Windows Server 2008 R2 SP1 or higher, Windows Server 2012 and Windows Server 2012 R2.

No pre-installation is required for Windows Virtual Machines.

#### Linux

Supported Linux distributions and versions: RHEL 6.x, RHEL 7.x, CentOS 6.x, CentOS 7.x, SUSE Linux Enterprise Server 11 SP2 or higher. SUSE Linux Enterprise Server 12 is currently in BETA level support.

You will need to install the pre-requisite Velostrata prep RPM package and its dependencies on the virtual machine you intend to run in cloud. The Velostrata package can remain installed when the virtual machine is running on-premises to allow for a future impromptu run-in-cloud.

**Note:** block device naming considerations differ across target cloud provider and depend on underlying virtualization platforms. Velostrata recommends to use either LVM or GUID based device names in configuration files such as those used by the boot loader, file system and mount tables. The Velostrata RPM will automatically check for direct device mapping in typical configuration files and indicate in a warning during installation if any found. A script is provided in the RPM to change such configurations to use GUIDs as device names.

#### General

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks.

## Guest Operating System Compatibility

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Windows Server 2008 R2 SP1 or higher, Windows Server 2012 and Windows Server 2012 R2. No pre-installation is required for Windows Virtual Machines.

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## Cloud Instance Type Compatibility

The following AWS instance types may experience missing driver issues. Please refer to the AWS driver lists for specific kernel and driver information.

For C4 types, see:

<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/c4-instances.html>

For G2 and P2 types, see: [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)

For X1 types, see:

<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

### Known Compatibility Issues

- **c4.8xlarge** - Verified to work with CentOS 6.8, 7.2, RHEL 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x.
- **g2.2xlarge** - Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- **x1.32xlarge** - Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.

## VPN Connection Bandwidth

A minimum of 20 Mbit/sec symmetric or equivalent VPN connection bandwidth and 0.5-1 Mbit/sec upload BW to cloud is required for acceptable access times when moving a VM to the cloud.

For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

- When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on premises.
- Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
- Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs **per ESX host**, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
- A system event is not yet implemented for write back that is put on-hold. The write back for a VM running in the cloud is put on hold when the backing vSphere Datastore's free capacity is lower than 10%. Write back will resume automatically as space is freed up on the datastore. **Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.
- Workloads with VMDK size larger than 2TB will fail to boot in cloud. **Workaround:** Use VMDKs smaller than 2TB, otherwise contact support to obtain hotfix.
- Inconsistencies between Azure locations may result A-type VM size instances A0-A3 to fail booting in cloud in some locations. **Workaround:** use D, F or DS VM size instance instead.

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Workaround:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

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**Workaround:** The issue will resolve itself after 1-2 hours.

**#2551:** Workload whose disks were shrunk using VMware-Converter is unable to boot in cloud.

**Workaround:** VMware-Converter may have replaced the MBR to a non-supported version. Contact support for assistance in correcting the issue.

**#2736:** During Detach, operation might fail with the following error message "Operation was canceled"

**Workaround:** Retry the Detach operation.

**#2811:** Azure - In rare cases, a "Run in Cloud" operation might fail.

**Workaround:** Retry the operation.



**#3466:** Velostrata Manager fails to start an Azure VM that is stopped externally (not using the Velostrata manager UI, PowerShell Module or API), if it is left in Stopped but not Deallocated state.

**Workaround:** Using the Azure Portal, Stop and Deallocate the VM, then Start using the Velostrata Manager.

**#3472:** Cancel detach might fail due to network disruptions.

**Workaround:** Retry the operation.

**#3510:** Azure Marketplace error - "409, Code: ResourcePurchaseCanceling" - a "Cancel Detach" operation might fail if initiated less than 15 minutes following a previous detach operation.

**Workaround:**Contact Support.

**#3512:** Azure Marketplace error - "500, Code: InternalBillingError when trying to purchase too close to previous cancel" - a "Cancel Detach" operation might fail if initiated less than 15 minutes following a previous detach operation.

**Workaround:**Wait for 15 minutes and Retry the operation.

# Velostrata v2.5 Release Notes

## New Functionality

### Public REST API for Automation

In addition to a GUI, Velostrata can connect with third-party management tools for automation, monitoring and creation of catalogs. In previous versions, a PowerShell module was provided. From version 2.5, a new REST API is provided too. The API is currently at preview stage and may still change in future versions.

The API enables third-party systems to manage:

1. Cloud Extensions
2. VMs
3. Tasks

Functions includes getting inventories, status information and applying various operations such as create Cloud Extension, move VM to cloud and VM migration.

The API is served by a REST Web service, protected with basic HTTP authentication. API input and output objects are serialized in JSON format.

You may find complete documentation for the API in the Velostrata documentation site [here](#), or you may access it from the Velostrata Manager landing page.

Reference implementations for the REST API are also available in the Velostrata github community:

- Integration with Ansible: <https://github.com/velostrata-community/velostrata-ansible>

### Azure: Using Internal Azure DNS Server

In some cases, network access for a public DNS server is not available. In such cases, Cloud Extension nodes may be impacted. The system can now overcome this by working with the internal Azure DNS server.

### Azure: Encryption of Cache and Object Store

All data in Azure cloud extension, including cache and blob object store is now encrypted using Azure SSE (Storage Service Encryption): 256-bit AES encryption.

## **AWS: Auto-Move-Back of Spot Instances**

When a spot in AWS is terminated (e.g. due to marketplace price threshold or time limited), it is now automatically moved back on-prem in order to avoid needless human intervention.

## **AWS: Page File on EBS Drive**

Velostrata configures VMs to keep page files on ephemeral storage, which is provided for some of the instances. In this release, Velostrata optimizes performance for the instances that do not have ephemeral storage, by creating a small dedicated volume and configuring VMs to keep page file on it. This improves VM performance, reduces load on Velostrata Edge and reduce traffic over VPN to the on-prem system.

## **AWS: Windows 2016**

Velostrata operations for Windows 2016 VMs are now supported in AWS as beta.

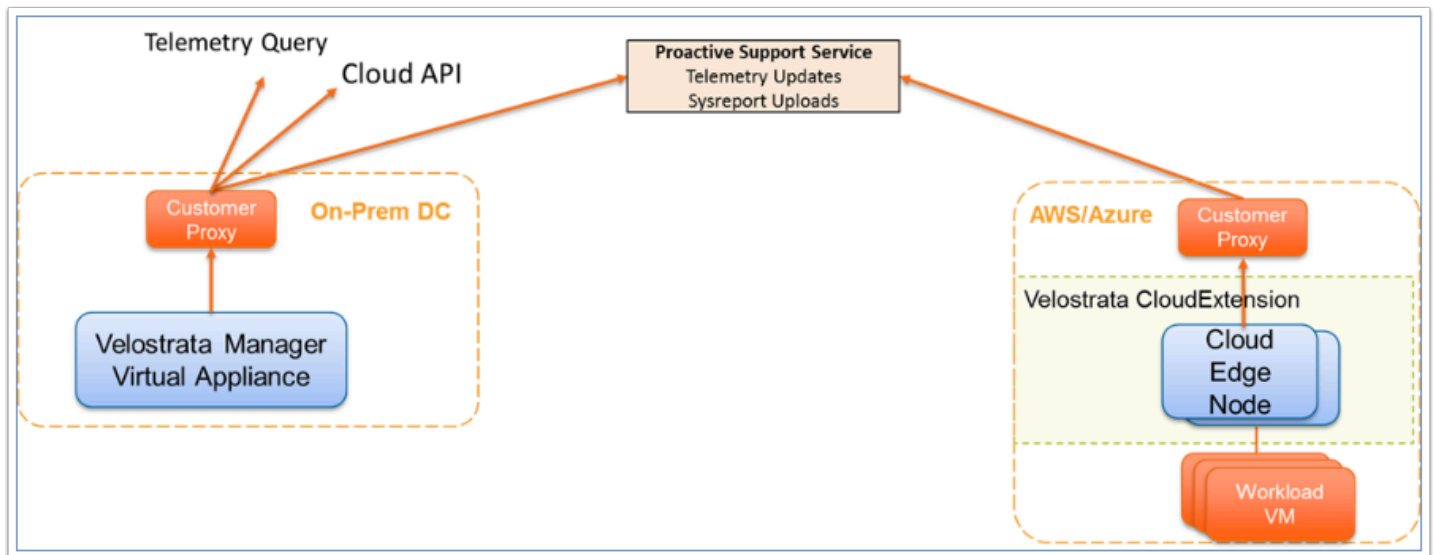
## **New: Security and Compatibility Improvements**

### **Support for HTTP(s) Proxy in the Cloud Extension**

IT managers may choose to divert HTTP(S) traffic through an HTTP(S) proxy for reasons of security and network monitoring.

Today, communication from the Velostrata manager and edge node on-prem supports a proxy configuration. From version 2.5, several changes were made:

- There is no more direct access to AWS S3 for telemetry and support services. Rather, this is implemented as an API gateway with communication over HTTPS.
- Velostrata CloudExtension also supports the option to communication with the Velostrata proactive support service through an HTTPS Proxy.



Note that you can define communication through the proxy to include either control only, or also include data-plane communication. The latter option may require significant bandwidth and have proxy scale implications.

When implementing such configuration, the following steps may be required

- Define the proxy during Velostrata Cloud Extension creation process.
- If you would like to inspect the SSL traffic by the proxy, the proxy's SSL certificate needs to be configured in the Velostrata Cloud Extension.
- If you apply URL whitelisting, you will need to whitelist the following URLs:
  - AWS:

[windows.core.net](https://windows.core.net)

[qt1.velostrata.com](https://qt1.velostrata.com)

[.amazon.com](https://amazon.com)

[.cloudfront.net](https://cloudfront.net)

[telemetry1.prod.velostrata.com](https://telemetry1.prod.velostrata.com)

- Azure:

[windows.core.net](https://windows.core.net)

[login.microsoftonline.com](https://login.microsoftonline.com)

[management.azure.com](https://management.azure.com)

[qt1.velostrata.com](https://qt1.velostrata.com)

[telemetry1.prod.velostrata.com](https://telemetry1.prod.velostrata.com)

- Contact [support@velostrata.com](mailto:support@velostrata.com) for help with this process.

## AWS: Using VPC Endpoints

Previously access to S3 required public internet access. With the introduction of AWS VPC endpoints <http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/vpc-endpoints.html>, Velostrata Cloud Extension nodes now communicate with S3 without leaving the AWS network. VPC endpoints are virtual devices, they are horizontally scaled, redundant, and highly available VPC components. This direct communication reduces risks and bandwidth constraints on your network traffic.

## Cloud Credential Management

In CloudExtension creation process, you no longer need to provide the actual credentials (password). Instead the system can save credentials and allow using them in later stage by reference only.

See operation instructions here: [Adding a Cloud Extension](#).

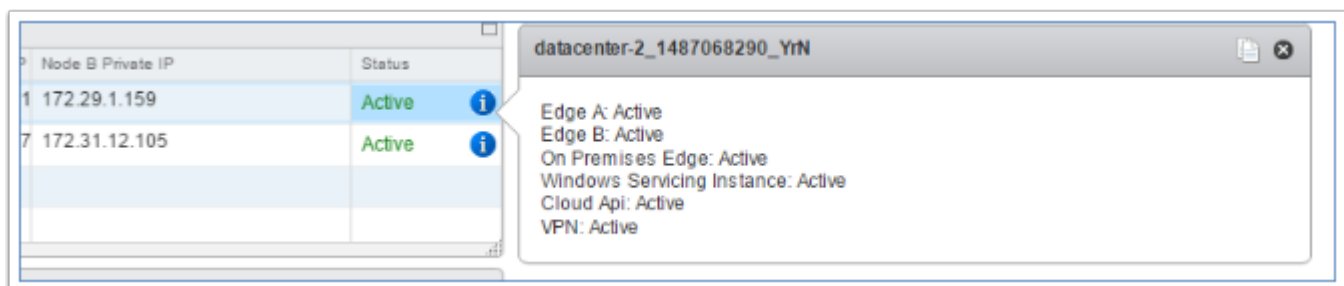
## Management Server Dual Networks Connectivity

Separate networks for management and internet/VPN access are now supported. This can be accomplished by defining an additional NIC from the Velostrata Manager landing page.

## New: Operation and Maintenance Improvements

### System Health Indicators are Now Available to System Admin

The Velostrata system keeps track of the health of system components at all times (at one minute intervals). This information is now available for system admins directly from the vCenter UI.



Healthchecks can also be retrieved from our APIs using commands:

- REST: GET / cloudextensions

- Powershell: Get-VelosCe

The information is available per system component and allows quick and simple view of major faults to enable fast issue resolution.

The complete list of health-checks can be found here [Understanding Velostrata Health Checks](#).

## Integration with vCenter Events and Alarms

Velostrata is integrated with VMware vCenter in order to allow system administrators ease of system operation using a single system.

From version 2.5, Velostrata integrates with vCenter alarms and events to enable notifications, custom actions, and event propagation in vCenter and related products. This allows for easier monitoring of the system using the vCenter tools already deployed and in use.

The following events were added in version 2.5:

- Data loss (VM level) - this will only be sent in the event of dual failure in the CE
- FrontendStarted
- BackendStarted

The following alarms were added in version 2.5:

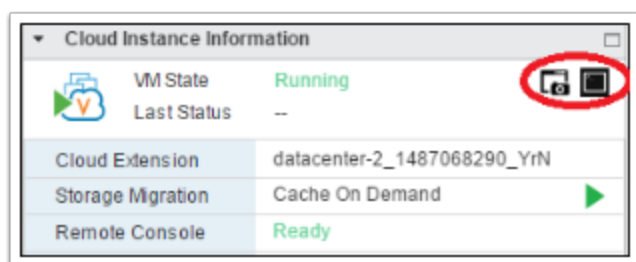
- VM moved to degraded mode
- CE moved to impaired mode
  - This alarm is set when any CE enters an impaired state
  - This alarm is cleared once all associated CEs are no longer Impaired (either Active/Stopped)

Some alarms are configured by Velostrata to be included by default. Additional alarms can be created by a system administrator.

## Easy View of Cloud VM Console Log and Screenshot

To view the cloud VM status, administrators no longer need to open a separate window and access Azure or AWS portals. Instead, you can now view the console log and a screenshot of the VM from vCenter, as if it was running locally.

The console log and screenshot are available from the VM Velostrata portlet in vCenter with a single click. .



## Temporary Credentials for Cloud Access

For support purposes, there may be a need for Velostrata or Velostrata partners support engineers to access the CloudExtension components using SSH. In order to do so in a secure way, and without compromising security considerations, the following mechanism has been developed.

The Velostrata management server now enables the creation of credentials for SSH access to CloudExtension components. The credentials have private and public keys which can function as CA certificates. Credentials are passphrase protected and are valid for eight hours only in order to avoid abuse.

## Other O&M Improvements

- Telemetry now supports multiple deployments under the same subscription ID.
- The number of logs generated in the Velostrata support bundles have been reduced in order to make it easier to upload for support.
- There is an option to opt-out of support bundle uploads if you do not want to enable them.
- Status of connectivity to vCenter plugin is now visible from the manager UI.
- Easy download of support bundle is available in the Velostrata manager UI (under configuration).
- It is now possible to repair a CE (Velostrata repair operation) in cloud that has attached VMs. Note that the VMs need to be stopped first.
- When a VM fails to boot in cloud it performs auto-healing, and system reboot if required.
- The following AWS packages installed on workloads were updated:
  - EC2ConfigServer upgraded to v4.5.1534.0
  - SSM agent upgraded to v2.0.645.1

## New: Optimizations

### AWS: New Instance Types in Use

- Large CE: m4.2xlarge (first choice), r4.2xlarge (fallback)
- Small CE: r4.large (first choice), m4.large (fallback)

The new instance types provide higher performance at a lower cost.

## Other Performance Improvements

- Cache read latency optimizations, specifically read-after-write. This is specifically important for CI/CD cases and DevTest cases.
- Migration throughput optimizations storage migration is now faster.

## New: Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Compatibility

This Velostrata release is compatible with vSphere 5.5 U1 or higher and vSphere 6.0 U1 or higher. In certain configurations, ESXi version 5.0 and 5.1 may be used, please contact support for details.

vCenter is a required component in a deployment. At minimum, version 5.5 or higher of vCenter is required even in cases where the ESXi host version is lower.

### Web Browser Compatibility

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IDE virtual disks are currently **not** supported. Change the virtual disk type to SCSI to enable move to cloud.



# Guest Operating System Compatibility

## Windows

Supported Windows versions:

- Windows Server 2008 R2 SP1 or higher
- Windows Server 2012 / Windows Server 2012 R2.
- Windows 2016 supported only for AWS (beta)
- No pre-installation is required for Windows Virtual Machines.

## Linux

Supported Linux distributions and versions:

- RHEL 6.x, RHEL 7.x, CentOS 6.x, CentOS 7.x, SUSE Linux Enterprise Server 11 SP2 or higher.
- SUSE Linux Enterprise Server 12 is currently in BETA level support.

You will need to install the pre-requisite Velostrata prep RPM package and its dependencies on the virtual machine you intend to run in cloud. The Velostrata package can remain installed when the virtual machine is running on-premises to allow for a future impromptu run-in-cloud.

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For G2 and P2 types, see:

[http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)

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## Known Compatibility Issues

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## VPN Connection Bandwidth

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For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Solved Bugs

Item#	Description	Comment
3502	For workloads running RHEL 6.7 - after Detach, missing default gateway configuration.	Fixed, added default Gateway.
3501	RHEL 6.7 workload with multiple volume groups failed to load in cloud.	Fixed, refreshing volume groups.
3556	Telemetry is not supported for multiple deployments with the same subscription ID.	Fixed, now supported.
3882	Problem in creating CE in Azure in regions where Standard_DS1 instance is not available.	Fixed. By using Standard_DS2_v2.
2811	Azure – in rare cases, a “run-in-cloud” operation may fail.	Fixed.
3466	Velostrata Manager fails to start an Azure VM that is stopped externally (not using the Velostrata manager UI, PowerShell Module or API), if it is left in Stopped but not Deallocated	Fixed.

Item#	Description	Comment
	state.	
3472	Cancel detach might fail due to network disruptions	Fixed. Velostrata manager will retry.
3512	Azure Marketplace error- "500, Code: InternalBillingError when trying to purchase too close to previous cancel" - a "Cancel Detach" operation might fail if initiated less than 15 minutes following a previous detach operation	Fixed. Cancelling of a VM in Azure results in lock on resources for a certain period of time. Velostrata manager will retry longer in order to avoid error due to resources lock. Note that the operation may be prolonged as a result.
2808	Workloads with VMDK size larger than 2TB fail to boot in the cloud	Fixed.

## Known Limitations

Velostrata vCenter UI Plugin does not work properly for vCenter in linked-mode.

**Workaround:** Use PowerShell or the REST API

When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on-premises.

Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.

Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs per ESX host, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.

A system event is not yet implemented for write back that is put on-hold. The write back for a VM running in the cloud is put on hold when the backing vSphere Datastore's free capacity is lower than 10%. Write back will resume automatically as space is freed up on the datastore.

**Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.

**#3647:** Note that the "collect console log" action does not work in Google Chrome incognito mode.

**Workaround:** Work in Chrome regular mode.

**#3265:** The system supports up to 10 SetPowerState parallel requests.

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Workaround:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#1745:** After registering the Velostrata plug-in, creating a Cloud Extension might fail.

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere web client service, then re-register the plug-in. Contact support if issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** If the Cloud Extension appears in "impaired" state, retry using the "Repair Cloud Extension" operation. If no Cloud Extension entry is shown, retry the create operation.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#1951:** With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation will fail but will get stuck in rollback phase.

**Workaround:** Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-cloud operation.

**#1917:** A Run-in-cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

**#1808:** After running a Workload back on premises - Workload VMDK's are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Workaround:** The issue will resolve itself after 1-2 hours.

**#2551:** Workload whose disks were shrunk using VMware-Converter is unable to boot in cloud.

**Workaround:** VMware-Converter may have replaced the MBR to a non-supported version. Contact support for assistance in correcting the issue.

**#2736:** During Detach, operation might fail with the following error message "Operation was canceled".

**Workaround:** Retry the Detach operation.

**# 3775:** When performing a detach after a cancel detach operation, the action may fail.

**Workaround:** retry

**#3682:** In the event of certain system failures, Velostrata components disconnect from vCenter. In this case, an event may not be sent, resulting in the alarm either not being set properly or not being cleared properly.

**Workaround:** Clear the alarm manually in vCenter.

**#3412:** In some cases, creating a Cloud Extension fails with the following message: "Failed to Create Cloud Extension: Your previous request to create the named bucket succeeded and you already own it...."

**Workaround:** Use the Repair CE Velostrata operation.

**#3320:** For workloads with Windows machine using a retail license, when returning from the cloud, the license is not present.

**Workaround:** Reinstall the license.

**#3281:** Export OVA is an available option when VM in cloud is running in cache mode, however, this operation results in a corrupted OVA.

**Workaround:** Only create OVA after the detach.

**#3142:** In rare cases, when a cloud component instance is created and system fails before it is tagged, the instance will remain untagged. This will not allow full clean-up or repair of the CE.

**Workaround:** manually tag the instance, and then run "Repair"

**#2596:** In Azure, in some cases when canceling the detach operation in the middle of the operation - after the instance is terminated, the VM rolls back on-prem.

**Workaround:** Instead of cancelling the detach task in process, wait for the task to complete and then run the “Cancel Detach” action.

**#3681:** Workloads running RHEL7.2 fail in AWS instance type g2.8xlarge.

**Workaround:** Use a different instance type.

**#3779:** Workloads running Windows OS fail to boot in Azure using A instance types.

**Workaround:** Use AV2 instance types.

# Velostrata v2.6 Release Notes

## New Functionality

### 2.6.5 (build 13860)

#### **Azure: Windows Hybrid Use Benefit (HUB)**

You can now save costs by using your on-premises license when migrating a windows server to Azure with Velostrata.

#### **Offline Migration – Windows Server 2008 (non-R2)**

Offline migration of Windows Server 2008 (non-R2) was tested successfully and works since Velostrata version 2.6. Further migration optimization added in version 2.6.5.

#### **Linux: configuration adaptation of direct mounts for cloud**

Some device mount configurations (e.g. /dev/sda) are not identified correctly when migrating to AWS. Velostrata Linux RPM now automatically adapts physical source name to UUID to overcome this.

#### **Linux: configuration adaptation of LVM for cloud**

LVM (Logical Volume Management) discovery filters in some Linux distributions does not work correctly with cloud disk naming. Velostrata RPM now adapts LVM filters to overcome this without the need for manual intervention.

#### **Security enhancements**

##### **Powershell signing**

Velostrata Powershell module is now signed with Velostrata certificate to enable security measures in Powershell execution policy.

##### **Wannacrypt vulnerability (MS17-010) fix**

Solution for Windows vulnerability MS17-010, also known as Wannacrypt, that was reported by Microsoft here: <https://technet.microsoft.com/en-us/library/security/ms17-010.aspx>.

This version includes installation of Windows hotfix KB402216, and blocking of non-required ports including of relevant SMB ports: 445,139.

### 2.6.0

#### **Offline Migration Solution for Windows 2003, RHEL5 and More**

Migrate workloads with operating systems that are not yet supported by Velostrata's streaming technology. In the offline migration process, the VM storage is migrated to the cloud first and

started in the cloud only after the storage migration and detach action is completed. Preparation procedures are required on-premises before migration is started. Procedures are provided for Windows 2003 and RHEL 5. Contact Velostrata Support for other operating systems or versions. For further details, see [Using Offline Migration](#).

### **BETA: Added Support for Physical Servers in Source**

It is now possible to migrate physical servers, running in cloud in cached mode within minutes, while migrating storage to the cloud. For further details, see [Migrating Physical Servers](#).

### **Tenancy Type (Dedicated Instances) and Disk Encryption**

For AWS, an option was added to select a “dedicated instances” tenancy type for a cloud extension and its related workloads. In this mode, the AWS hardware is shared only with instances of the same account. When creating the native EBS drives, as part of the prepare to detach operation, encrypted EBS drives are used if the “dedicated instances” tenancy type was selected. For further details, see [Adding a Cloud Extension](#).

### **Automation Runbook Changes**

The following invoke commands were added:

- Test Clone.
- RunOnPrem Performs either move-back or delete clone, based on the VM running mode.
- Start Migration Changed from previous version. Now there is a single command to manage the following separate operations: move VM to cloud, storage migration and prepare to detach.
- Offline migration . For further details, see [Using Offline Migration](#).
- Cleanup.

A custom tagging option has been added as optional automation runbook column(s). Currently applicable only to AWS instances. For further details, see [Creating the Rubbook](#).

### **Added Support for VMware vSphere Version 6.5**

### **Added Support for VMware vCenter Server in Linked Mode (Versions 5.5, 6.0, 6.5).**

**Note:** You must install a Velostrata system per vCenter server.

## **Compatibility and Installation**

### **ESXi, vCenter Server, and vSphere Web Client Compatibility**

This Velostrata release is compatible with vSphere 5.5 U1 or higher, vSphere 6.0 U1 or higher; vCenter 6.5 is supported with ESXi of versions 5.5, 6.0. In certain configurations, ESXi version 5.0 and 5.1 may be used, please contact support for details.

vCenter is a required component in a deployment. As a minimum, version 5.5 or higher of vCenter is required even in cases where the ESXi host version is lower.



## Web Browser Compatibility

The latest versions of the following web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser be updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

## Virtual Machine Compatibility

Only virtual machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is **not** supported. A conversion procedure may be available contact Velostrata Support.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported with full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported with limited functionality contact Velostrata Support for details if used.

IDE virtual disks are currently **not** supported. Change the virtual disk type to SCSI to enable move to cloud.

## Physical Server Support (Beta)

Migrating a physical server to cloud is done by booting a Velostrata Connector ISO image into RAM from a virtual or physical DVDROM/CDROM device. The Velostrata connector maps the local storage and creates a Stub VMware VM as a management object for Velostrata cloud migration operations. From this point on, the migration is done in similar way to the migration of other VMs, only in Write Isolation mode.

**Note:** The Stub VM created in the process is intended for Velostrata management operations only, and not set up for local execution on vSphere. It is set up with no network interface, and a minimal CPU/RAM setting.

System requirements:

- Disk types supported include SAS, SATA, SSD, virtual disks presented by hardware controller, and SAN volumes mounted on physical HBAs. PATA/IDE disks are not supported.
- Minimum 4GB RAM.
- Physical DVDROM/CDROM or virtual CDROM to boot the Velostrata Connector ISO from.

Follow user guide instructions for the physical migration process. For further details, see [Migrating Physical Servers](#).

# Guest Operating System Compatibility

## Windows

Supported Windows versions:

- Windows Server 2008 R2 SP1 or higher.
- Windows Server 2012/Windows Server 2012 R2.
- Windows 2016 Beta support. Currently available for AWS only.
- Windows Server 2003 Supported with offline migration. Requires a preparation procedure on-premises, prior to migration. For further details, see [Using Offline Migration](#).

## Linux

Supported Linux distributions and versions:

- RHEL 6.x, RHEL 7.x, CentOS 6.x, CentOS 7.x, SUSE Linux Enterprise Server 11 SP2 or higher.
- SUSE Linux Enterprise Server 12 BETA level support.
- RHEL 5.1 or higher 64-bit Supported with offline migration. For further details see: [Using Offline Migration](#)
- RHEL 5.11 and higher supported also with 32-bit for AWS t2 instances using offline migration

You need to install the pre-requisite Velostrata prep RPM package and its dependencies on the virtual machine you intend to run in cloud. The Velostrata package can remain installed when the virtual machine is running on-premises to allow for a future run-in-cloud.

**Note:** Block device naming considerations differ across target cloud provider and depend on underlying virtualization platforms. **Velostrata recommends you use either LVM or GUID-based device names in configuration files such as those used by the boot loader, file system and mount tables.**

The Velostrata RPM automatically checks for direct device mapping in typical configuration files and a warning appears during installation if any is found. A script is provided in the RPM to change such configurations to use GUIDs as device names.

## General

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks. If you have machines with GPT boot disks, contact Velostrata Support for possible conversion options.

**#4266: run-in-cloud or migratoin operation may fail for windowws 2016 workload** when symantec endpoint protection(SEP) is installed. This may happen also in case SEP appears to be disabled.

Workaround: disable SEP using the following powershell command: Disable-NetAdapterBinding -IncludeHidden -AllBindings -Name "\*" -ComponentID "symc\_teefer2"

# Cloud Instance Type Compatibility

The following AWS instance types may experience missing driver issues. Refer to the AWS driver lists for specific kernel and driver information.

For C4 types, see:

<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/c4-instances.html>

For G2 and P2 types, see:

[http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)

For X1 types, see:

<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

## Known Instance type Compatibility Issues

- **c4.8xlarge**- Verified to work with CentOS 6.8, 7.2, RHEL 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x.
- **g2.2xlarge**- Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- **x1.32xlarge**- Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.
- **#3779**: Workloads running Windows OS may fail to boot in Azure using A-series VM sizes.  
**Workaround**: Use Av2-series VM sizes
- **#4432**: Workloads running Windows 2008R2 fail to boot in Azure using DSv2-series VM sizes.  
**Workaround**: Use alternative VM sizes (e.g. Av2-series and D-series)

## VPN/DirectConnect/ExpressRoute Connection Bandwidth

The minimum link bandwidth recommended would be the larger of:

1. Link bandwidth of 20 Mbit/sec, symmetric,
2. Upload bandwidth to cloud calculated as total number of VMs migrating concurrently, multiplied by 0.5-1 Mbit/sec per VM.

This is required for acceptable access times when moving VMs to the cloud in streaming mode.

For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

1. **VMware virtual disk consolidation warning** - When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on-premises.
2. **Typical storage throughput per virtual disk** - Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20-30Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
3. **Maximum concurrent read sessions per ESX host** - Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs or RDMs **per ESX host**, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
4. **Free space on source datastore** - Write back activity for a VM running in the cloud is temporarily put on hold when the backing vSphere Datastore's free capacity is lower than 10%, and a vCenter Alarm is raised to indicate of the issue. Write back will resume automatically as space is freed up on the datastore.  
**Workaround** - Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.
5. **#3647** - The "collect console log" action button in the Velostrata portlet on the VM Summary page does not work when running the vCenter Web Client on Google Chrome browser, in "Incognito" mode.  
**Workaround:** Work in Chrome normal browsing mode.

## Fixed Bugs

### 2.6.5 (Build 13860)

Following introduction of a new VM size, "Prepare to detach" action in Azure may fail for virtual machines that have only one or two disks. Virtual machines with three disks or more are not affected. Fixed

## 2.6.5 (Build 13680)

ID	Description	Comment
4262 4201	In some rare cases the Storage Grid failed.	Issue fixed. Additionally, automatic healing was added to the storage grid component.
4378	Some core dumps taken for troubleshooting purposes were too large and hard to manage.	Fixed. Removed unneeded data
4338	When selecting Tenancy Type = "Default (inherited from VPC settings)", and the VPCsettings are set to use Dedicated Instances, the Cloud Extension creation fails.	Fixed
4285	Velostrata virtual appliance fails to deploy in VMware environment when vSphere 6.5b issued due to VMware bug in reading VcIP parameter.	Fixed. Removed the read of VcIP (no longer shown in the Velostrata portal)
4247	Exporter experiences network disconnections.	Fixed.
4237	Windows VM preparation to run in cloud failed in some cases	Fixed
4146	Windows 2008 and higher may encounter Microsoft time sync issues that results in network inaccessibility due to DHCP lease time.	Fixed
4072	In some rare scenario CloudExtension log files were not properly rotated, causing system operation disruptions.	Fixed

## 2.6.0

Item#	Description	Comment
4019	Azure - when checking instance health for VMs that fail to boot, excessive calls to Azure APIs may occur	Fixed.
3918	Windows NLB (Network Load Balancing)	Fixed by removing the

Item#	Description	Comment
	service installed on a network interface in Windows server fails on boot in cloud.	service before running in cloud. Windows NLB is not supported on Azure or AWS.
3909	/etc/hosts file when running in streaming mode in cloud is regenerated on every boot, deleting any user settings.	Fixed. The primary IP for the hostname entry is updated in-place while preserving other content.
3940	VM running CentOS/RHEL 6.x which has NICs attached to specific MAC address were not reachable after detach.	Fixed.

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Workaround:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#1745:** After registering the Velostrata plug-in, creating a Cloud Extension might fail.

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere web client service, then re-register the plug-in. Contact support if issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** If the Cloud Extension appears in “impaired” state, retry using the “Repair Cloud Extension” operation. If no Cloud Extension entry is shown, retry the create operation.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#1951:** With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation will fail but will get stuck in rollback phase.

**Workaround:** Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-cloud operation.

**#1917:** A Run-in-cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

**#1808:** After running a Workload back on premises - Workload VMDK's are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Workaround:** The issue will resolve itself after 1-2 hours.

**#2551:** Workload whose disks were shrunk using VMware-Converter is unable to boot in cloud.

**Workaround:** VMware-Converter may have replaced the MBR to a non-supported version. Contact support for assistance in correcting the issue.

**#2736:** During Detach, operation might fail with the following error message "Operation was canceled".

**Workaround:** Retry the Detach operation.

**# 3775:** When performing a detach after a cancel detach operation, the action may fail.

**Workaround:** Retry the operation.

**#3682:** In the event of certain system failures, Velostrata components disconnect from vCenter. In this case, an event may not be sent, resulting in the alarm either not being set properly or not being cleared properly.

**Workaround:** Clear the alarm manually in vCenter.

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**Workaround:** Use the Repair CE Velostrata operation.

**#3320:** For workloads with Windows machine using a retail license, when returning from the cloud, the license is not present.

**Workaround:** Reinstall the license.

**#3281:** Export OVA is an available option when VM in cloud is running in cache mode, however, this operation results in a corrupted OVA.

**Workaround:** Only create OVA after the detach.

**#3142:** In rare cases, when a cloud component instance is created and system fails before it is tagged, the instance will remain untagged. This will not allow full clean-up or repair of the CE.

**Workaround:** Manually tag the instance, and then run "Repair"

**#2596:** In Azure, in some cases when canceling the detach operation in the middle of the operation - after the instance is terminated, the VM rolls back on-prem.

**Workaround:** Instead of cancelling the detach task in process, wait for the task to complete and then run the "Cancel Detach" action.

**#3681:** Workloads running RHEL7.2 fail in AWS instance type g2.8xlarge.

**Workaround:** Use a different instance type.

**#4012:** Storage policy and security group cannot be changed in Spot market bid mode.

**#3988:** AWS: when performing detach or reconfigure actions for a VM in dedicated instance tenancy type, and choosing an instance type that is not supported by AWS for dedicated instances, the instance will not be able to run in the cloud.

**Workaround:** Change the cloud instance type to one that is supported in dedicated instances mode.

**#3265:** Too many parallel stop/start VM in cloud requests (API, PowerShell or vCenter Web Client Plugin) may cause operation to time out. Please note this limitation does not apply for the Automation Runbook as requestes are sequential

**Workaround:** limit concurrent start/stop requests to 10.

**#3908:** In some cases, a test clone operation would fail when the system cannot create snapshot in quiesce mode through vCenter.

**Workaround:** Ensure that VMware Tools are activated on the VM guest to allow quiescing.



# Velostrata v2.7 Release Notes

## New Features

### **AWS: Encrypted EBS Disks Support**

When creating native EBS disks for migrated instances, it is now possible to select EBS disk encryption as well as customer specified KMS keys.

### **Cloud Extension Availability Enhancements**

Velostrata Cloud Extension now provides high availability for workloads running in streaming migration and cached mode by using multipath access to workload storage in an active-passive model. When the primary Cloud Edge node fails, the workloads failover to use the secondary Cloud Edge node; failback to the primary Cloud edge node is done once it becomes active again.

The Cloud Extension is now more robust with the addition of auto-healing mechanisms.

User operations that were previously blocked when Cloud Extension was impaired are now available and depend on granular component health rather than overall Cloud Extension state.

### **Removal of the Windows Servicing Instance Component**

The Windows Servicing Instance component was removed in the Cloud Extension deployment. This enhances our mass scaling of Windows OS adaptation phase of multiple concurrent migrations; this also reduces the cost of a Cloud Extension.

### **Azure: Large disks supported**

Microsoft announced, on June 15th 2017, an increase of maximum disk sizes that extends the maximum size of Azure disks from 1,024 GB to 4,095 GB (see announcement [here](#)). Velostrata version 2.7 now supports the migration of disks with an extended size to Azure.

### **Ubuntu Support**

Streaming migration support for Ubuntu 14.04.x.

### **Offline Migration Enhancements**

Added unmapped blocks optimization for offline migration of Windows workloads.

Tested offline migration for the following OS versions:

- Windows Server 2008
- Ubuntu 12
- Ubuntu 14
- Ubuntu 16.04

# Compatibility and Installation

## ESXi, vCenter Server, and vSphere Web Client Compatibility

This Velostrata release is compatible with the following VMware versions:

- vCenter: 5.5U1, 6.0U1, 6.5.

**Note:** vCenter is a required component in a deployment.

- ESXi: 5.5U1, 6.0 U1. Note: 5.0 and 5.1 may be used in certain configurations; contact support for details.

## Web Browser Compatibility

The latest versions of the following Web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser be updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

## Virtual Machine Compatibility

Only virtual machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is **not** supported. A conversion procedure may be available; contact Velostrata Support.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported with full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported with limited functionality; contact Velostrata Support for details if used.

IDE virtual disks are currently **not** supported. Change the virtual disk type to SCSI to enable move to cloud.

## Physical Server Support (Beta)

Migrating a physical server to cloud is done by booting a Velostrata Connector ISO image into the server's RAM from a virtual or physical DVDROM/CDROM device. The Velostrata connector maps the local storage and creates a Stub VMware VM as a management object for Velostrata

cloud migration operations. From this point on, the migration is done in similar way to the migration of other VMs, only in Write Isolation mode.

**Note:** The Stub VM created in the process is intended for Velostrata management operations only, and not set up for local execution on vSphere. It is set up with no network interface, and a minimal CPU/RAM setting.

System requirements:

- Disk types supported include SAS, SATA, SSD, virtual disks presented by hardware controller, and SAN volumes mounted on physical HBAs. PATA/IDE disks are not supported.
- Minimum 4GB RAM.
- Physical DVDROM/CDROM or virtual CDROM to boot the Velostrata Connector ISO from.

Follow user guide instructions for the physical migration process. For further details, see [Migrating Physical Servers](#).

## Guest Operating System Compatibility

### Supported Windows Versions:

- Windows Server 2008 R2 SP1 or higher.
- Windows Server 2012/Windows Server 2012 R2.
- Windows 2016. Currently available for AWS only (Beta)

**Supported Windows Versions with Offline Migration** (see further details in [Using Offline Migration](#)):

- Windows Server 2003, Windows Server 2003R2, Windows Server 2008

### Supported Linux Distributions and Versions:

- RHEL 6.x, RHEL 7.x
- CentOS 6.x, CentOS 7.x
- SUSE Linux Enterprise Server 11 SP2 or higher
- SUSE Linux Enterprise Server 12 SP2 or higher
- Ubuntu 14.04.x

**Note:** Ubuntu support for streaming migration was recently introduced in version 2.7. Velostrata welcomes customer feedback on this new capability.

**Supported Linux Versions in Offline Migration** (see further details in [Using Offline Migration](#)):

- Ubuntu 12.x, Ubuntu 16.x
- RHEL 5.1 or higher 64-bit RHEL 5.11 and higher supported also with 32-bit

**Note:** Block device naming considerations differ across target cloud provider and depend on underlying virtualization platforms. Use of either LVM or GUID-based device names in configuration files is recommended. The Velostrata RPM automatically checks for direct device mapping in the typical configuration files (/etc/fstab, and GRUB) and replaces the physical source (e.g. /dev/sda/) with a GUID.

## General

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks. If you have machines with GPT boot disks, contact Velostrata Support for possible conversion options.

### **#4266: Run-in-cloud and migration operations may fail for Windows Server 2016**

**workload** when Symantec Endpoint Protection (SEP) is installed. This may also happen when SEP appears to be disabled.

**Workaround:** Modify workload Network interface bindings to remove SEP option

1. Download Microsoft Network VSP Bind (nvspbind) - [download link](#)
2. Install **Microsoft Nvspbind package.EXE** into c:\temp
3. Open Command prompt as an Administrator and run the following:

```
nvspbind.exe /d * symc_teefer2
```

## Known Instance Type Compatibility Issues

### AWS

The following AWS instance types may experience missing driver issues. Refer to the AWS driver lists for specific kernel and driver information.

- For C4 types, see: <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/c4-instances.html>
- For G2 and P2 types, see: [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)
- For X1 types, see: <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>
- **c4.8xlarge** - Verified to work with CentOS 6.8, 7.2, RHEL 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x.
- **g2.2xlarge** - Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- **x1.32xlarge** - Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.

#3681: Workloads running RHEL7.2 fail in AWS instance type g2.8xlarge.

**Workaround:** Use a different instance type.

### Azure

**#3779:** Workloads running Windows OS may fail to boot in Azure using A-series VM sizes.

**Workaround:** Use Av2-series VM sizes.

**#4432:** Workloads running Windows 2008R2 may fail to boot in Azure using DSv2-series VM sizes.

**Workaround:** Use alternative VM sizes (e.g. Av2-series and D-series).

## Cloud Connectivity

The minimum link bandwidth between on-premises and the Cloud Extension nodes is recommended to be the larger of:

1. Link bandwidth of 20 Mbit/sec, symmetric
2. Upload bandwidth to cloud calculated as total number of VMs migrating concurrently, multiplied by 0.5-1 Mbit/sec per VM.

This is required for appropriate access times when moving VMs to the cloud in streaming mode.

For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

1. **VMware virtual disk consolidation warning** - When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on-premises.
2. **Typical storage throughput per virtual disk** - Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20-30Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
3. **Maximum concurrent read sessions per ESX host** - Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs or RDMs per ESX host, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
4. **Free space on source datastore** - Write back activity for a VM running in the cloud is temporarily put on hold when the backing vSphere Datastore's free capacity is lower than 10%, and a vCenter Alarm is raised to indicate of the issue. Write back will resume automatically as space is freed up on the datastore

**Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.

5. **#3647** - The "collect console log" action button in the Velostrata portlet on the VM Summary page does not work when running the vCenter Web Client on Google Chrome browser, in "Incognito" mode.

**Workaround:** Work in Chrome normal browsing mode.

# Fixed Bugs

## Build #14771

#4683: Azure only: Windows server 2012 R2 with OS update KB4025333 fails to boot in azure with Velostrata (boot sequence gets stuck). Issue fixed.

#4679: when no customer keys are defined in the account KMS, migration and prepare-to-detach wizards get stuck. Fixed.

#4684: Tasks cancellation may take few minutes, in which time new VM operations fails. Fixed.

#4677: Velostrata vCenter plug-in may result in connection errors when vCenter is configured in linked mode. Fixed.

#4665: On-prem virtual appliance cannot run on ESXi 5.1 without manual configuration change. Fixed.

**#4415:**After the system is running for a lengthy period of time, the API authentication may become faulty. This impacts any process that requires use of the API such as Automation Runbook and Powershell. Fixed.

### **Fixes included in Velostrata prep RPM #1.7-20**

#4964: Networking issues after detach for a Linux server with virtual static IP.

Fixed by resetting network configuration for eth0.

#4667: When installing RPM on a physical server, post-detach actions may be executed on-prem. Fixed.

#4705: In migration of physical server with NIC bonding configuration, networking issues encountered after detach. Fixed by removing the bonding interface.

#4668: SUSE only: In migration of server with a static route configuration, networking issues encountered after detach. Fixed.

#4670: Migration of physical server with Linux OS failed for the following cases:

Hardware specific mount configurations

LVM filters which included /dev/cciss, /dev/mapper but did include /dev/sdX or /dev/xvdX

Fixed.

## Build #14427

ID	Description	Comment
4257	Physical server migration is not supported when iSCSI multipath is enabled.	Fixed in a new ISO connector (also works with Velostrata 2.6).
2551	Workload whose disks were shrunk using VMware-Converter is unable to boot in cloud.	Fixed
3412	In some cases, creating a Cloud Extension fails with the following message: "Failed to Create Cloud Extension: Your previous request to create the named bucket succeeded and you already own it...."	Fixed
4012	Storage policy and security group cannot be changed in Spot market bid mode.	Fixed
3265	Too many parallel stop/start VM in cloud requests (API, PowerShell or vCenter WebClient Plugin) may cause operation to time out.	Fixed
4554	All migration tasks fail when moving back on prem or cancelling the "run-in-cloud" process for a VM that suffers from storage IO issues.	Fixed
4473	Exporter workers communicate with Velostrata proactive support even when proactive support was set as disabled.	Fixed
4172	The Migration wizard enables selection of the Cloud Edge node regardless of subnet; this may lead to erroneous	Fixed, now the Cloud Edge node is derived from the selected subnet.

ID	Description	Comment
	user configuration of VM using the Cloud Edge node in the wrong AZ.	
4136	When a large write-back queue was accumulated (e.g. vCenter connection problems), that queue was not managed effectively and created excessive snapshots.	Fixed by improving batch handling.
4098	Offline migration to AWS is not supported for Windows 2003 with certain instance types that supports enhanced networking by default (C3, C4, D2, I2, R3, and M4 instance types).	Fixed, enhanced networking option is disabled by Velostrata when workload OS is Windows Server 2003.
4061 3908	In some cases, a test clone operation would fail when the system cannot create snapshot in quiesce mode through vCenter (vmtools disabled).	Fixed, Velostrata recommends enabling vmtools but will not fail test-clone if it is disabled.
4023	In Create Cloud Extension wizard, not all user roles are displayed properly.	Fixed.
3960	When opening an instance screenshot window in lower resolution displays, there is no easy way to close it.	Fixed.
3894	List of storage accounts in prepare to detach wizard is hard to navigate.	Fixed, list is now sorted alphabetically.
4139	In some cases, the uncommitted writes information was wrong due to sync Issues between management and backend services.	Fixed
3804	When virtual appliance on	Fixed



ID	Description	Comment
3805	prem was configured to use DHCP and later configuration changed to static IP, an error was encountered connecting to the network.	
4419 2512	After detach for instance with OS RHEL7/CentOS7, active network interface is defined as ibft0 instead of eth0..	Fixed by updating relevant networking config

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Note:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to run-in-cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#1745:** After registering the Velostrata plug-in, running the Cloud Extension wizard might generate an error "XXXXXXXXXX" upon "Finish".

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere Web client service, then re-register the plug-in. Contact support if issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** If the Cloud Extension appears in "impaired" state, retry using the "Repair Cloud Extension" operation. If no Cloud Extension entry is shown, retry the create operation.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#1951:** With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation will fail and get stuck in the rollback phase.

**Workaround:** Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-Cloud operation.

**#1917:** A Run-in-Cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

**#1808:** In rare cases, after running a Workload back on premises - Workload VMDK's are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Note:** The issue will resolve itself after 1-2 hours.

**#2736:** During Detach, the operation might fail with the following error message "Operation was canceled".

**Workaround:** Retry the Detach operation.

**# 3775:** When performing a detach after a cancel detach operation, the action may fail.

**Workaround:** Retry the operation.

**#3682:** In the event of certain system failures, Velostrata components disconnect from vCenter. In this case, an event may not be sent, resulting in the alarm either not being set properly or not being cleared properly.

**Workaround:** Clear the alarm manually in vCenter.

**#3320:** For workloads with Windows machine using a retail license, when returning from the cloud, the license is not present.

**Workaround:** Reinstall the license.

**#3281: vCenter "Export OVA" operation is available when the VM in cloud is running in cache mode, however, this operation results in a corrupted OVA.**

**Workaround:** Only create OVA after the detach.

**#3142:** In rare cases, when a cloud component instance is created and system fails before it is tagged, the instance will remain untagged. This will not allow full clean-up or repair of the CE.

**Workaround:** Manually tag the instance, and then run "Repair".

**#2596:** In Azure, in some cases when canceling the detach operation in the middle of the operation - after the instance is terminated, the VM rolls back on-prem.

**Best practice:** Instead of cancelling the detach task in process, wait for the task to complete and then run the “Cancel Detach” action.

**Workaround:** Migrate the VM to the cloud again.

**#3988:** AWS: When performing detach or reconfigure actions for a VM in dedicated instance tenancy type, and choosing an instance type that is not supported by AWS for dedicated instances, the instance will not be able to run in the cloud.

**Workaround:** Change the cloud instance type to one that is supported in dedicated instances mode.

**#4604:** Cloud Extension high availability does not work for workloads running Ubuntu OS with LVM configuration.

**#3199:** Suse12: Due to a bug in SUSE kernel older than 4.2, configurations that include BTRFS mounts with subvolumes are not supported.

**Workaround:** upgrade to SUSE version with Kernal >=4.2 (SP2).

# Velostrata v3.0 Release Notes

## New Features

### Google Cloud Platform Support (Beta)

Velostrata V3.0 introduces Google Cloud Platform support (beta). In addition to Velostrata's support of AWS and Azure, you can now migrate VMs in streaming mode to GCP as well. GCP support is at beta level in terms of functionality and scale. The following features are not available in beta: offline migration, reconfigure Cloud Extension (CE), reconfigure VM, rightsizing recommendations. Contact Velostrata support for more details.

### Non-disruptive Upgrade from 2.7 to 3.0

Upgrade to V3.0 from V2.7 in a non-disruptive manner. The upgrade process includes both Backend (BE) and Cloud Extension instances.

### Reconfigure Cloud Extension

V3.0 allows users to update the Cloud Extension configuration parameters such as the edge security group, default workload security group and cloud credentials.

### Bandwidth Throttling and Bandwidth Utilization

WAN traffic from BE to Cloud Extension instances can now be throttled to avoid congestion of WAN link to the cloud vendor during migration (this does not apply to on-demand traffic).

### Rightsizing

Rightsizing is a workload analysis and recommendation tool to help reduce cloud instances consumption costs and/or optimize for cloud instances performance.

The feature includes built-in usage monitoring and a recommendation engine that provides cost- and performance-optimized cloud instance type and size recommendations and can be enabled/disabled per VM.

### Azure Storage Account Key Rotation Support

Velostrata V3.0 introduces support for Azure storage account keys rotation.

### Ubuntu 16 Support

Streaming migration support for Ubuntu 16.04.x

## Compatibility and Installation

ESXi, vCenter Server, and vSphere Web Client Compatibility

This Velostrata release is compatible with the following VMware versions:

- vCenter: 5.5U1, 6.0U1, 6.5, 6.5U1.

**Note:** vCenter is a required component in a deployment.

- ESXi: 5.5U1, 6.0 U1.

**Note:** 5.0 and 5.1 may be used in certain configurations; contact support for details.

### Web Browser Compatibility

The latest versions of the following Web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser be updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

### Virtual Machine Compatibility

Only Virtual Machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is not supported. A conversion procedure may be available; contact Velostrata Support.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported with full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported with limited functionality; contact Velostrata Support for details if used.

IDE virtual disks are currently not supported. Change the virtual disk type to SCSI to enable move to cloud.

### Physical Server Support

Migrating a physical server to cloud is done by booting a Velostrata Connector ISO image into the server's RAM from a virtual or physical DVDROM/CDROM device. The Velostrata connector maps the local storage and creates a Stub VMware VM as a management object for Velostrata cloud migration operations. From this point on, the migration is done in similar way to the migration of other VMs, only in Write Isolation mode.

**Note:** The Stub VM created in the process is intended for Velostrata management operations only, and not set up for local execution on vSphere. It is set up with no network interface, and a minimal CPU/RAM setting.

System requirements:

- Disk types supported include SAS, SATA, SSD, virtual disks presented by hardware controller, and SAN volumes mounted on physical HBAs. PATA/IDE disks are not supported.
- Minimum 4GB RAM.
- Physical DVDROM/CDROM or virtual CDROM to boot the Velostrata Connector ISO from.

Follow user guide instructions for the physical migration process. For further details, see Migrating Physical Servers.

## Guest Operating System Compatibility

### Supported Windows Versions:

- Windows Server 2008 R2 SP1 or higher.
- Windows Server 2012/Windows Server 2012 R2.
- Windows 2016 (Beta)

Supported Windows Versions with Offline Migration(see further details in Using Offline Migration):

- Windows Server 2003, Windows Server 2003R2, Windows Server 2008

### Supported Linux Distributions and Versions:

- RHEL 6.x, RHEL 7.x
- CentOS 6.x, CentOS 7.x
- SUSE Linux Enterprise Server 11 SP2 or higher
- SUSE Linux Enterprise Server 12 SP2 or higher
- Ubuntu 14.04.x, [16.04.x](#)

### Supported Linux Versions in Offline Migration (see further details in Using Offline Migration):

- Ubuntu 12.x, Ubuntu 16.x
- RHEL 5.1 or higher 64-bit RHEL 5.11 and higher supported also with 32-bit

**Note:**Block device naming considerations differ across target cloud provider and depend on underlying virtualization platforms. Use of either LVM or GUID-based device names in configuration files is recommended. The Velostrata RPM automatically checks for direct device mapping in the typical configuration files (/etc/fstab, and GRUB) and replaces the physical source (e.g. /dev/sda/) with a GUID.

## V3.0 REST API

### API Changes:

- ReconfigureVm operationId was changed from reconfigure to reconfigureVm.
- In VmStateDescription, added ActualEdgeNode, PreferredEdgeNode is instead of EdgeNode.

### New items in API:

- GCP support
- ReconfigureCE Operation
- Recommendations feature added
- In HealthChecks, added PendingUpgrade and SqsReachability
- In CheckedElementType added CloudExtension
- In HealthCheckImpact, added Medium
- New task types: ReconfigureCloudExtension and UpgradeCloudExtension
- SubscriptionType and about API (ProductInfo)
- Added Security groups for AWS and Azure cloud extension object
- In CloudExtensionState added Upgrading
- In CloudExtensionState, added credsId
- In AzureVmInfo, added azureHubLicense

- securityGroupIds moved from the base MoveToCloudRequest to AWS and Azure
- WL security group moved from base CCE request to AWS and Azure
- CredentialsDescription now have 3 sub types AWS/Azure/GCP, base remains the same.

## General

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks. If you have machines with GPT boot disks, contact Velostrata Support for possible conversion options.

#4266: Run-in-cloud and migration operations may fail for Windows Server 2016 workload when Symantec Endpoint Protection (SEP) is installed. This may also happen when SEP appears to be disabled.

Workaround: Modify workload Network interface bindings to remove SEP option.

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The following AWS instance types may experience host missing driver issues. Refer to the AWS driver lists for specific kernel and driver information.

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- For X1 types, see: <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

Specific AWS instances known issues:

- c4.8xlarge - Verified to work with CentOS 6.8, 7.2, RHEL 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x.
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Workaround: Use Av2 or Av3 series VM sizes.

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The minimum link bandwidth between on-premises and the Cloud Extension nodes is recommended to be the larger of:

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**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

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**Workaround:** Only create OVA after the detach.

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**Workaround:** Change the cloud instance type to one that is supported in dedicated instances mode.

**#4604:** Cloud Extension high availability does not work for workloads running Ubuntu OS with LVM configuration.

**#3199:** Suse12: Due to a bug in SUSE kernel older than 4.2, configurations that include BTRFS mounts with subvolumes are not supported.

**Workaround:** Upgrade to SUSE version with Kernel  $\geq 4.2$  (SP2).

**#4967:** Run In Cloud will fail with an error when the VM name contains characters not supported by the target cloud provider

**Workaround:** Change the machine name in vSphere to contain supported characters only.

**#4961:** When moving a machine from GCP to on-prem or after the clean-up operation, the reserved address created by Velostrata for the machine will be released within an hour.

**Workaround:** if you need to release the address immediately, manually delete the reserved IP.

**#4915:** Following a successful force back operation on a VM an alert is not cleared.

**Workaround:** Manually clear the alert

**#4834:** After MGMT system reboot, previous alarms that were raised are not cleared in the GUI although the condition is back to normal.

**Workaround:** Clear the alarms manually.

**#4619:** Velostrata telemetry configuration for FE will not update after BE changes.

**Workaround:** Contact Velostrata technical support to update the FE telemetry configuration.

**#4590:** Prepare to detach is not grayed out for spot instances (but the operation fails).

**Workaround:** GUI issue, no functional impact.

**#3905:** When unregistering a VC and registering a new VC, the system continues to use the previous VC.

**Workaround:** Reboot the Velostrata virtual appliance, and the system will load the new VC configuration.

**#3570:** When using the Create Cloud Extension wizard, using illegal http proxy address will not generate a warning message.

**Workaround:** Delete the CE and then create the CE with a valid http proxy address.

**#3142:** In rare cases, creating a CE instance may fail, the system will restart the process to recreate the CE instance and will fail due to missing instance tags.

**Workaround:** Manually terminate the CE instance via the AWS console, and run Repair CE.

**#3133:** Run on-premise operation succeeded but the status is marked as failed with error "Failed to consolidate snapshots"

**Workaround:** Consolidate snapshots via vCenter, and clear the error manually.

**#5161:** Streaming Windows 2012R2 to AWS R4 dedicated instance fails to boot.

**Workaround:** Migrate the VM to R3 instance, once instance is detached you can switch the instance to R4.

**#5242:** Migrated Linux machines to AWS dedicated instance will not boot.

**Workaround:** Contact Velostrata technical support to apply system wide workaround.

# Velostrata v3.1 Release Notes

## New Features

### Cloud-to-Cloud Migration: AWS to GCP

Velostrata V3.1 introduces cloud-to-cloud migration support. In addition to Velostrata's support of AWS and Azure and GCP, you can now migrate VMs in streaming mode from the AWS cloud to GCP.

### Cloud-to-Cloud Runbook

This release introduces a new orchestration engine that runs on the management appliance to manage and run large-scale migrations from the source cloud to the destination cloud. The Cloud-to-Cloud Runbook includes a new UI and a PowerShell module.

### GCP (GA)

V3.1 now supports GCP in GA. This includes support for Run in Cloud, Storage Migration, Offline Migration, Reconfigure CE and VM, Right Sizing, DNS, and IP Aliases. The system is fully tested for large-scale migrations to GCP as the target (either from on-prem or from the AWS cloud).

### Ubuntu 17.10 and Windows Server 1709 Support

This release includes streaming migration support for Ubuntu 17.10 and Windows server 1709.

### New System UI

Velostrata V3.1 introduces a new system UI for easier management of the system.

### Cloud Extension Custom Tags

A cloud extension can now have multiple custom tags added to every instance created in the cloud extension. This allows for easier management of resources migrated to the cloud.

## Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Compatibility

This Velostrata release is compatible with the following VMware versions:

- vCenter: 5.5U1, 6.0U1, 6.5, 6.5U1.

**Note:** vCenter is a required component in a deployment.

- ESXi: 5.5U1, 6.0 U1.

**Note:** 5.0 and 5.1 may be used in certain configurations; contact support for details.

## Web Browser Compatibility

The latest versions of the following Web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, and Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser be updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

## Virtual Machine Compatibility

Only Virtual Machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is not supported. A conversion procedure may be available; contact Velostrata Support for possible conversion options.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported with full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported with limited functionality; contact Velostrata Support for details if used.

IDE virtual disks are currently not supported. Change the virtual disk type to SCSI to enable move to cloud.

## Physical Server Support

Migrating a physical server to cloud is done by booting a Velostrata Connector ISO image into the server's RAM from a virtual or physical DVDROM/CDROM device. The Velostrata connector maps the local storage and creates a Stub VMware VM as a management object for Velostrata cloud migration operations. From this point on, the migration is done in a similar way to the migration of other VMs, only in Write Isolation mode.

**Note:** The Stub VM created in the process is intended for Velostrata management operations only, and is not set up for local execution on vSphere. It is set up with no network interface, and a minimal CPU/RAM setting.

System requirements:

- Disk types supported include SAS, SATA, SSD, virtual disks presented by hardware controller, and SAN volumes mounted on physical HBAs. PATA/IDE disks are not supported.
- Minimum 4GB RAM.
- Physical DVDROM/CDROM or virtual CDROM to boot the Velostrata Connector ISO from.

For further details and for instructions for the physical migration process, see Migrating Physical Servers in the User Guide.

# Guest Operating System Compatibility

## Supported Windows Versions:

- Windows Server 2008 R2 SP1 or higher
- Windows Server 2012/Windows Server 2012 R2
- Windows 2016
- Windows server 1709

## Supported Windows Versions with Offline Migration

- Windows Server 2003, Windows Server 2003R2, Windows Server 2008

For further details, see Using Offline Migration in the User Guide.

## Supported Linux Distributions and Versions:

- RHEL 6.x, RHEL 7.x
- CentOS 6.x, CentOS 7.x
- SUSE Linux Enterprise Server 11 SP2 or higher
- SUSE Linux Enterprise Server 12 SP2 or higher
- Ubuntu 14.04.x, 16.04.x, 17.10.x

## Supported Linux Versions in Offline Migration

- Ubuntu 12.x
- RHEL 5.1 or higher 64-bit RHEL 5.11 and higher supported also with 32-bit

For further details, see Using Offline Migration in the User Guide.

**Note:** Block device naming considerations differ across target cloud providers and depend on the underlying virtualization platforms. Use of either LVM or GUID-based device names in configuration files is recommended. The Velostrata RPM automatically checks for direct device mapping in the typical configuration files (/etc/fstab, and GRUB) and replaces the physical source (e.g., /dev/sda/) with a GUID.

## General

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks. If you have machines with GPT boot disks, contact Velostrata Support for possible conversion options.

**#4266:** Run-in-cloud and migration operations may fail for Windows Server 2016 workload when Symantec Endpoint Protection (SEP) is installed. This may also happen when SEP appears to be disabled.

### Workaround:

- Modify workload network interface bindings to remove SEP option.
- Download Microsoft Network VSP Bind (nvspbind) - [download link](#).
- Install Microsoft\_Nvspbind\_package.EXE into c:\temp.

- Open the command prompt as an Administrator and run the following: `nvspbind.exe /d *symc_teefer2`.

## Known Instance Type Compatibility Issues

### AWS

The following AWS instance types may experience host missing driver issues. Refer to the AWS driver lists for specific kernel and driver information.

- For G2 and P2 types, see: [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)
- For X1 types, see: <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

### Specific AWS instances

- g2.2xlarge: Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- x1.32xlarge: Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.

### Azure

- #3779: Workloads running Windows OS may fail to boot in Azure using A-series VM sizes.
- Workaround: Use Av2 or Av3 series VM sizes.

### Cloud Connectivity

The minimum link bandwidth between on-premises or source cloud and the Cloud Extension nodes is recommended to be the larger of:

- Link bandwidth of 20 Mbit/sec, symmetric
- Upload bandwidth to cloud calculated as total number of VMs migrating concurrently, multiplied by 0.5-1 Mbit/sec per VM.

This is required for appropriate access times when moving VMs to the cloud in streaming mode. For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

- VMware virtual disk consolidation warning – When write-back consistency checkpoints persist in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, a virtual machine event indicates that its disks require consolidation. This status is temporary and is automatically resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on-premises.
- Typical storage throughput per virtual disk – Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20-30Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access



latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.

- **Maximum concurrent read sessions per ESX host** – Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs or RDMs per ESX host for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
- **Free space on source datastore** – Write back activity for a VM running in the cloud is temporarily put on hold when the backing vSphere Datastore's free capacity is lower than 10%, and a vCenter alarm is raised to indicate the issue. Write back automatically resumes as space is freed up on the datastore.

**Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.

## Fixed Issues

**#2596:** In Azure, in some cases when canceling the detach operation in the middle of the operation – after the instance is terminated, the VM rolled back on-prem.

**#4967:** Run In Cloud failed with an error when the VM name contained characters not supported by the target cloud provider.

**#4961:** When moving a machine from GCP to on-prem or after the clean-up operation, the reserved address created by Velostrata for the machine would be released within an hour.

**#4915:** Following a successful force back operation on a VM, an alert was not cleared.

**#4834:** After MGMT system reboot, previous alarms that were raised were not cleared in the GUI although the condition returned to normal.

**#3905:** When unregistering a VC and registering a new VC, the system continued to use the previous VC.

**#5161:** Streaming Windows 2012R2 to AWS R4 dedicated instance failed to boot.

**#5242:** Migrated Linux machines to AWS dedicated instance would not boot.

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Note:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to Run-in-Cloud while a third-party, VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations do not

complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM shows an increasing size and no consistency checkpoint is created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which commits all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes might take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#1745:** After registering the Velostrata plug-in, running the Cloud Extension wizard might generate an error "XXXXXXXXXX" upon "Finish".

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere Web client service, then re-register the plug-in. Contact support if the issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

**Workaround:** If the Cloud Extension appears in "impaired" state, retry using the "Repair Cloud Extension" operation. If no Cloud Extension entry is shown, retry the create operation.

**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

**Workaround:** Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

**#1951:** With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation fails and gets stuck in the rollback phase.

**Workaround:** Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-Cloud operation.

**#1917:** A Run-in-Cloud operation fails with the error, "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

**#1808:** In rare cases, after running a Workload back on-premises. Workload VMDKs are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Note:** The issue will resolve itself after 1-2 hours.

**#2736:** During Detach, the operation might fail with the following error message "Operation was canceled".

**Workaround:** Retry the Detach operation.

**#3775:** When performing a detach after a cancel detach operation, the action may fail.

**Workaround:** Retry the operation.

**#3682:** In the event of certain system failures, Velostrata components disconnect from vCenter. In this case, an event may not be sent, resulting in the alarm either not being set properly or not being cleared properly.

**Workaround:** Clear the alarm manually in vCenter.

**#3320:** For workloads with Windows machine using a retail license, when returning from the cloud, the license is not present.

**Workaround:** Reinstall the license.

**#3281:** vCenter "Export OVA" operation is available when the VM in cloud is running in cache mode, however, this operation results in a corrupted OVA.

**Workaround:** Only create OVA after the detach.

**#3142:** In rare cases, when a cloud component instance is created and the system fails before it is tagged, the instance remains untagged. This does not allow full clean-up or repair of the CE.

**Workaround:** Manually tag the instance, and then run "Repair".

**#3988:** AWS: When performing detach or reconfigure actions for a VM in a dedicated instance tenancy type and choosing an instance type that is not supported by AWS for dedicated instances, the instance is unable to run in the cloud.

**Workaround:** Change the cloud instance type to one that is supported in dedicated instances mode.

**#4604:** Cloud Extension high availability does not work for workloads running Ubuntu OS with LVM configuration.

**#3199:** Suse12: Due to a bug in SUSE kernel older than 4.2, configurations that include BTRFS mounts with subvolumes are not supported.

**Workaround:** Upgrade to SUSE version with Kernel 4.2 (SP2) or above.

**#4619:** Velostrata telemetry configuration for FE does not update after BE changes.

**Workaround:** Contact Velostrata technical support to update the FE telemetry configuration.

**#4590:** Prepare to detach is not grayed out for spot instances (but the operation fails).

**Workaround:** GUI issue, no functional impact.

**#3570:** When using the Create Cloud Extension wizard, using illegal http proxy address does not generate a warning message.

**Workaround:** Delete the CE and then create the CE with a valid http proxy address.

**#3142:** In rare cases, creating a CE instance may fail; The system restarts the process to recreate the CE instance and fails due to missing instance tags.

**Workaround:** Manually terminate the CE instance via the AWS console and run Repair CE.

**#3133:** Run on-premises operation succeeded but the status is marked as failed with error "Failed to consolidate snapshots"

**Workaround:** Consolidate snapshots via vCenter, and clear the error manually.

**#5706:** In rare case canceling a task may take time to complete.

**Workaround:** This is by design due to uninterruptable processes; and canceling tasks may take a while to complete.

**#5547:** PowerShell client for cloud to cloud Runbook reports errors when running on PS 3.0.

**Workaround:** Upgrade to Powershell 4.0.

**#5425:** When logging to runbook first, login to system web page may fail.

**Workaround:** Log in to system web page using a different browser.

**#5299:** Vcenter portlet may not show Public IP address for VM that is in Azure cloud.

**Note:** When adding a public IP address to an Azure Instance after the Run In Cloud operation the Vcenter is not updated.

# Velostrata v3.2 Release Notes

## New Features

### Cloud-to-Cloud Migration: AWS to GCP

Velostrata V3.2 introduces cloud-to-cloud migration support. In addition to Velostrata's support of AWS and Azure and GCP, you can now migrate VMs in streaming mode from AWS cloud to GCP.

### Cloud-to-Cloud Runbook

This release introduces a new orchestration engine running on the management appliance to manage and run large scale migrations from source cloud to destination cloud. The Cloud-to-Cloud runbook includes a new UI and a PowerShell module.

### GCP (GA)

V3.2 now supports GCP in GA. This includes support for Run in cloud, Storage migration, Offline migration, Reconfigure CE and VM, Right Sizing, DNS and IP alias. The system is fully tested for large-scale migrations to GCP as the target (either from on-prem or from AWS cloud).

### Ubuntu 17.10 and Windows Server 1709 Support

This release includes streaming migration support for Ubuntu 17.10 and Windows Server 1709.

### New System UI

Velostrata V3.2 introduces a new system UI for easier management of the system.

### Cloud Extension Custom Tags

A cloud extension can now have multiple custom tags to be added to every instance created in the cloud by the cloud extension. This allows for easier management of resources migrated to the cloud.

## Compatibility and Installation

### ESXi, vCenter Server, and vSphere Web Client Compatibility

This Velostrata release is compatible with the following VMware versions:

- vCenter: 5.5U1, 6.0U1, 6.5, 6.5U1.

**Note:** vCenter is a required component in a deployment.

- ESXi: 5.5U1, 6.0 U1.

**Note:** 5.0 and 5.1 may be used in certain configurations; contact support for details.

## Web Browser Compatibility

The latest versions of the following Web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, and Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser be updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

## Virtual Machine Compatibility

Only Virtual Machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is not supported. A conversion procedure may be available; contact Velostrata Support for possible conversion options.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported with full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported with limited functionality; contact Velostrata Support for details if used.

IDE virtual disks are currently not supported. Change the virtual disk type to SCSI to enable move to cloud.

## Physical Server Support

Migrating a physical server to cloud is done by booting a Velostrata Connector ISO image into the server's RAM from a virtual or physical DVDROM/CDROM device. The Velostrata connector maps the local storage and creates a Stub VMware VM as a management object for Velostrata cloud migration operations. From this point on, the migration is done in similar way to the migration of other VMs, only in Write Isolation mode.

**Note:** The Stub VM created in the process is intended for Velostrata management operations only, and not set up for local execution on vSphere. It is set up with no network interface, and a minimal CPU/RAM setting.

System requirements:

- Disk types supported include SAS, SATA, SSD, virtual disks presented by the hardware controller, and SAN volumes mounted on physical HBAs. PATA/IDE disks are not supported.
- Minimum 4GB RAM.
- Physical DVDROM/CDROM or virtual CDROM to boot the Velostrata Connector ISO from.

For further details and for instructions for the physical migration process, see Migrating Physical Servers in the User Guide.

## Guest Operating System Compatibility

### Supported Windows Versions:

- Windows Server 2008 R2 SP1 or higher.
- Windows Server 2012/Windows Server 2012 R2.
- Windows 2016
- Windows server 1709

### Supported Windows Versions with Offline Migration:

- Windows Server 2003, Windows Server 2003R2, Windows Server 2008

For further details, see Using Offline Migration in the User Guide.

### Supported Linux Distributions and Versions:

- RHEL 6.x, RHEL 7.x
- CentOS 6.x, CentOS 7.x
- SUSE Linux Enterprise Server 11 SP2 or higher
- SUSE Linux Enterprise Server 12 SP2 or higher
- Ubuntu 14.04.x, 16.04.x, 17.10.x

### Supported Linux Versions in Offline Migration (see further details in Using Offline Migration):

- Ubuntu 12.x
- RHEL 5.1 or higher 64-bit RHEL 5.11 and higher supported also with 32-bit

**Note:** Block device naming considerations differ across target cloud provider and depend on the underlying virtualization platforms. Use of either LVM or GUID-based device names in configuration files is recommended. The Velostrata RPM automatically checks for direct device mapping in the typical configuration files (/etc/fstab, and GRUB) and replaces the physical source (e.g., /dev/sda/) with a GUID.

## General

Only MBR disks are supported for Guest OS boot disks. Both MBR and GPT disks are supported for data disks. If you have machines with GPT boot disks, contact Velostrata Support for possible conversion options.

**#4266:** Run-in-cloud and migration operations may fail for Windows Server 2016 workload when Symantec Endpoint Protection (SEP) is installed. This may also happen when SEP appears to be disabled.

### Workaround:

- Modify workload Network interface bindings to remove SEP option.

- Download Microsoft Network VSP Bind (nvspbind) - download link.
- Install Microsoft\_Nvspbind\_package.EXE into c:\temp.
- Open Command prompt as an Administrator and run the following: nvspbind.exe /d \*symc\_teefer2.

## Known Instance Type Compatibility Issues

### AWS

The following AWS instance types may experience host missing driver issues. Refer to the AWS driver lists for specific kernel and driver information.

M5 and C5 types are not supported at this time for direct migrations. Customers can switch to these type post migration (this will require installation of the relevant drivers).

- For G2 and P2 types, see: [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)
- For X1 types, see: <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

### Specific AWS instances

- g2.2xlarge - Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- x1.32xlarge - Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.

### Azure

- #3779: Workloads running Windows OS may fail to boot in Azure using A-series VM sizes.
- Workaround: Use Av2 or Av3 series VM sizes.

### Cloud Connectivity

The minimum link bandwidth between on-premises or source cloud and the Cloud Extension nodes is recommended to be the larger of:

- Link bandwidth of 20 Mbit/sec, symmetric.
- Upload bandwidth to cloud calculated as total number of VMs migrating concurrently, multiplied by 0.5-1 Mbit/sec per VM.

This is required for appropriate access times when moving VMs to the cloud in streaming mode. For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

- VMware virtual disk consolidation warning – When write-back consistency checkpoints persist in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, a virtual machine event indicates that its disks require consolidation. This status is temporary and is automatically resolved when



consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on-premises.

- **Typical storage throughput per virtual disk** – Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20-30Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
- **Maximum concurrent read sessions per ESX host** – Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs or RDMs per ESX host, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
- **Free space on source datastore** – Write back activity for a VM running in the cloud is temporarily put on hold when the backing vSphere Datastore's free capacity is lower than 10%, and a vCenter alarm is raised to indicate of the issue. Write back automatically resumes as space is freed up on the datastore.

**Workaround:** Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.

## Fixed Issues

**#2596:** In Azure, in some cases when canceling the detach operation in the middle of the operation, after the instance is terminated, the VM rolls back on-prem.

**#4967:** Run In Cloud failed with an error when the VM name contained characters not supported by the target cloud provider

**#4961:** When moving a machine from GCP to on-prem or after the clean-up operation, the reserved address created by Velostrata for the machine would be released within an hour.

**#4915:** Following a successful force back operation on a VM an alert was not cleared.

**#4834:** After MGMT system reboot, previous alarms that were raised are not cleared in the GUI although the condition is back to normal.

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**#5161:** Streaming Windows 2012R2 to AWS R4 dedicated instance failed to boot.

**#5242:** Migrated Linux machines to AWS dedicated instance would not boot.

## Known Issues

**#1257:** When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

**Note:** The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

**#1027:** In some cases, when a VM is moved to Run-in-Cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations do not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM shows an increasing size and no consistency checkpoint is created on-premises.

**Workaround:** Select the Run On-Premises action for the VM and wait for the task to complete, which commits all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes might take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

**#1745:** After registering the Velostrata plug-in, running the Cloud Extension wizard might generate an error "XXXXXXXXXX" upon "Finish".

**Workaround:** Un-register the Velostrata plug-in and restart the vSphere Web client service, then re-register the plug-in. Contact support if the issue persists.

**#1744:** In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

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**#1667:** vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

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**#1951:** With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation fails and gets stuck in the rollback phase.

**Workaround:** Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-Cloud operation.

**#1917:** A Run-in-Cloud operation fails with the error, "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

**Workaround:** The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

**#1808:** In rare cases, after running a Workload back on-premises. Workload VMDKs are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

**Note:** The issue will resolve itself after 1-2 hours.

**#2736:** During Detach, the operation might fail with the following error message "Operation was canceled".

**Workaround:** Retry the Detach operation.

**#3775:** When performing a detach after a cancel detach operation, the action may fail.

**Workaround:** Retry the operation.

**#3682:** In the event of certain system failures, Velostrata components disconnect from vCenter. In this case, an event may not be sent, resulting in the alarm either not being set properly or not being cleared properly.

**Workaround:** Clear the alarm manually in vCenter.

**#3320:** For workloads with Windows machine using a retail license, when returning from the cloud, the license is not present.

**Workaround:** Reinstall the license.

**#3281:** vCenter "Export OVA" operation is available when the VM in cloud is running in cache mode, however, this operation results in a corrupted OVA.

**Workaround:** Only create OVA after the detach.

**#3142:** In rare cases, when a cloud component instance is created and system fails before it is tagged, the instance remains untagged. This did not allow full clean-up or repair of the CE.

**Workaround:** Manually tag the instance, and then run "Repair".

**#3988:** AWS: When performing detach or reconfigure actions for a VM in a dedicated instance tenancy type and choosing an instance type that is not supported by AWS for dedicated instances, the instance is unable to run in the cloud.

**Workaround:** Change the cloud instance type to one that is supported in dedicated instances mode.

**#4604:** Cloud Extension high availability does not work for workloads running Ubuntu OS with LVM configuration.

**#3199:** Suse12: Due to a bug in SUSE kernel older than 4.2, configurations that include BTRFS mounts with subvolumes are not supported.

**Workaround:** Upgrade to SUSE version with Kernel 4.2 (SP2) or above.

**#4619:** Velostrata telemetry configuration for FE will not update after BE changes.

**Workaround:** Contact Velostrata technical support to update the FE telemetry configuration.

**#4590:** Prepare to detach is not grayed out for spot instances (but the operation fails).

**Workaround:** GUI issue, no functional impact.

**#3570:** When using the Create Cloud Extension wizard, using illegal http proxy address does not generate a warning message.

**Workaround:** Delete the CE and then create the CE with a valid http proxy address.

**#3142:** In rare cases, creating a CE instance may fail; the system restarts the process to recreate the CE instance and fails due to missing instance tags.

**Workaround:** Manually terminate the CE instance via the AWS console, and run Repair CE.

**#3133:** Run on-premise operation succeeded but the status is marked as failed with error "Failed to consolidate snapshots".

**Workaround:** Consolidate snapshots via vCenter, and clear the error manually.

**#5706:** In rare cases, canceling a task may take time to complete.

**Workaround:** This is by design to uninterruptable processes; canceling tasks may take longer to complete.

**#5547:** PowerShell client for cloud to cloud Runbook reports errors when running on PS 3.0

**Workaround:** Upgrade to Powershell 4.0.

**#5425:** When logging to runbook first, login to system web page may fail.

**Workaround:** Log in to the system web page using a different browser.

**#5299:** Vcenter portlet may not show Public IP address for VM that is in Azure cloud

**Note:** When adding a public IP address to an Azure Instance after the Run In Cloud operation, the Vcenter is not updated.

**#5387:** CentOS6 cannot boot in AWS m4 instance type.

**Workaround:** Use different instance type for migration phase, then switch to m4 instance type post migration.

**#5700:** RHEL 6.5 occasionally fails to boot at AWS.

**Workaround:** Move back to source and try again.

**#VD-801:** Detaching an instance with more than 16 disks to a GCP custom instance fails.

**Workaround:** GCP custom instances support of to 16 disks, detach to a predefined instance type. See [Link](#)

# Velostrata v3.5 Release Notes

## New Features

### Enhanced WebUI

Velostrata V3.5 introduced an enhanced WebUI which includes the following components:

1. System setting
  1. Telemetry Setting
  2. vCenter plugin setting
  3. Network setting
2. Source Cloud
  1. Credentials
  2. Cloud Details
3. Destination Cloud
  1. Credentials
  2. CE deployment and monitoring
4. Runbook
  1. Runbook Jobs
  2. Runbook Job monitoring

### Deployment of Velostrata Manager at GCP

Velostrata V3.5 supports deploying the Velostrata Manager at GCP. This allows customer that have no vSphere setup to deploy the Manager in cloud for AWS->GCP migrations.

### Runbook support for vSphere to Cloud

Velostrata (new) Runbook application is now supporting on-prem -> cloud migrations in addition to AWS-> GCP migrations. In addition to Jobs and Job monitoring, you can now Rerun a job at any point in time, the system will assess the Runbook vs. actual states and will act accordingly to get to the desired state described in the Runbook definition.

### Support for Migration of UEFI based VM

Velostrata V3.5 now supports migration of VMs that are configured with UEFI BIOS setting to cloud (which currently supports only legacy BIOS). During the migration the boot disk layout will be altered to support MBR boot. Please note that Write-Back is not supported with VMs that are configured with UEFI BIOS at the source.

### Right Sizing enhancements

Velostrata V3.5 Right Sizing feature add support recommending custom instances at GCP where applicable.

### **Attaching GCP Service Account to migrated Instances.**

Velostrata V3.5 allows the user to define a GCP Service Account to be attached to a migrated instance.

### **Cloud Extensions performance improvements**

Various improvements to cache logic and disk access which improve overall system performance

## **Compatibility and Installation**

### **ESXi, vCenter Server, and vSphere Web Client Compatibility**

This Velostrata release is compatible with the following VMware versions:

- vCenter: 5.5U1, 6.0U1, 6.5, 6.5U1.

Note: vCenter is a required component in a deployment.

- ESXi: 5.5U1, 6.0 U1.

Note: 5.0 and 5.1 may be used in certain configurations; contact support for details.

### **Web Browser Compatibility**

The latest versions of the following Web browsers are known to be compatible with the Velostrata vCenter Web Client plugin: Chrome, Internet Explorer, Firefox, Safari.

The vCenter Web Client leverages the Adobe Flash extension in your browser. Velostrata recommends that the Flash plug-in for your browser be updated to the latest version. Use Flash player version 19.0.0.245 or later.

To check your current Flash player version, go to: <http://www.adobe.com/software/flash/about/>.

### **Virtual Machine Compatibility**

Only Virtual Machines configured with BIOS virtual firmware are supported. UEFI virtual firmware is not supported. A conversion procedure may be available; contact Velostrata Support.

Velostrata makes use of Virtual Machine snapshots. Virtual Machine disks in Dependent mode (default) and Virtual RDM mode are supported with full functionality.

Virtual Machine disks in Independent mode (persistent and non-persistent) and Physical RDM mode are supported with limited functionality; contact Velostrata Support for details if used.

IDE virtual disks are currently not supported. Change the virtual disk type to SCSI to enable move to cloud.

### **Physical Server Support**

Migrating a physical server to cloud is done by booting a Velostrata Connector ISO image into the server's RAM from a virtual or physical DVDROM/CDROM device. The Velostrata connector maps the local storage and creates a Stub VMware VM as a management object for Velostrata cloud migration operations. From this point on, the migration is done in similar way to the migration of other VMs, only in Write Isolation mode.

Note: The Stub VM created in the process is intended for Velostrata management operations only, and not set up for local execution on vSphere. It is set up with no network interface, and a minimal CPU/RAM setting.

System requirements:

- Disk types supported include SAS, SATA, SSD, virtual disks presented by hardware controller, and SAN volumes mounted on physical HBAs. PATA/IDE disks are not supported.
- Minimum 4GB RAM.
- Physical DVDROM/CDROM or virtual CDROM to boot the Velostrata Connector ISO from.

Follow user guide instructions for the physical migration process. For further details, see Migrating Physical Servers.

## **Guest Operating System Compatibility**

### Supported Windows Versions:

- Windows Server 2008 (64 bit)
- Windows Server 2008 R2 SP1 or higher.
- Windows Server 2012/Windows Server 2012 R2.
- Windows 2016
- Windows server 1709

Supported Windows Versions with Offline Migration(see further details in Using Offline Migration):

- Windows Server 2003, Windows Server 2003R2, Windows Server 2008

### Supported Linux Distributions and Versions:

- RHEL 6.x, RHEL 7.x
- CentOS 6.x, CentOS 7.x
- SUSE Linux Enterprise Server 11 SP2 or higher
- SUSE Linux Enterprise Server 12 SP2 or higher
- Ubuntu 14.04.x, 16.04.x, 17.10.x, 18.04.x

Supported Linux Versions in Offline Migration (see further details in Using Offline Migration):

- Ubuntu 12.x

- RHEL 5.1 or higher 64-bit RHEL 5.11 and higher supported also with 32-bit

Note: Block device naming considerations differ across target cloud provider and depend on underlying virtualization platforms. Use of either LVM or GUID-based device names in configuration files is recommended. The Velostrata RPM automatically checks for direct device mapping in the typical configuration files (/etc/fstab, and GRUB) and replaces the physical source (e.g. /dev/sda/) with a GUID.

## General

#4266: Run-in-cloud and migration operations may fail for Windows Server 2016 workload when Symantec Endpoint Protection (SEP) is installed. This may also happen when SEP appears to be disabled.

Workaround: Modify workload Network interface bindings to remove SEP option.

Download Microsoft Network VSP Bind (nvspbind) - [download link](#).

Install Microsoft\_Nvspbind\_package.EXE into c:\temp.

Open Command prompt as an Administrator and run the following: nvspbind.exe /d \*symc\_teefer2.

## Known Instance Type Compatibility Issues

### AWS

Paravirtualized (PV ) instance types are not supported.

The following AWS instance types may experience host missing driver issues. Refer to the AWS driver lists for specific kernel and driver information.

- M5 and C5 types are not supported at this time for direct migrations. Customer can switch to these type post migration (will require installation of the relevant drivers).
- For G2 and P2 types, see: [http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using\\_cluster\\_computing.html](http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using_cluster_computing.html)
- For X1 types, see: <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/x1-instances.html>

### Specific AWS instances known issues:

- g2.2xlarge - Verified to work with CentOS 6.8, 7.2, SUSE 11 SP4 and Windows Server 2008 R2 SP1, Windows Server 2012 R2. Not supported with RHEL 6.x, 7.2.
- x1.32xlarge - Verified to work with CentOS 6.8 and RHEL 7.2, SUSE Linux Enterprise for SAP Applications 11 SP4. Not supported with RHEL 6.x, CentOS 7.2, SUSE 11 and Windows Server.

### Azure

#3779: Workloads running Windows OS may fail to boot in Azure using A-series VM sizes.

Workaround: Use Av2 or Av3 series VM sizes.

### Cloud Connectivity



The minimum link bandwidth between on-premises or source cloud and the Cloud Extension nodes is recommended to be the larger of:

- Link bandwidth of 20 Mbit/sec, symmetric
- Upload bandwidth to cloud calculated as total number of VMs migrating concurrently, multiplied by 0.5-1 Mbit/sec per VM.

This is required for appropriate access times when moving VMs to the cloud in streaming mode.

For example, Velostrata recommends a minimum of 50-100 Mbit/sec for production use of up to 100 VMs running in the cloud.

## Known Limitations

1. VMware virtual disk consolidation warning - When write-back consistency checkpoints are persisted in the vSphere Datastore on-premises, a snapshot rotation and virtual disk consolidation is performed. During consolidation, the virtual machine will have an event showing that its disks require consolidation. This status is temporary and will automatically get resolved when consolidation triggered by Velostrata has completed. A similar behavior occurs when moving a virtual machine to run back on-premises.
2. Typical storage throughput per virtual disk - Due to vSphere Storage API limitations, throughput achieved on-premises per VMDK is observed to be limited to about 20-30Mbytes/sec. When workloads are highly concentrated into a single virtual disk, the initial performance seen in the cloud may be limited due to an increase in storage access latency back on-premises. This situation typically resolves itself within minutes, as soon as an active working set is established in the Velostrata cache, in the cloud.
3. Maximum concurrent read sessions per ESX host - Due to vSphere Storage API limitations, the number of storage access sessions per ESX host is constrained. Velostrata enforces a limit of up to 60 VMDKs or RDMs per ESX host, for virtual machines that run in the cloud (active). Multiple ESX hosts may be used. Given that these virtual machines are not actually executing on the ESX hosts, these hosts can be of minimal specs.
4. Free space on source datastore - Write back activity for a VM running in the cloud is temporarily put on hold when the backing vSphere Datastore's free capacity is lower than 10%, and a vCenter alarm is raised to indicate of the issue. Write back will resume automatically as space is freed up on the datastore

Workaround: Monitor the Uncommitted Writes counter and correlate it to low-disk space events from the vSphere datastore. When write back is put on-hold, the Uncommitted Writes graph indicates a growing count for longer periods.

## Fixed Issues

#5706: In rare case canceling task may take time to complete.

#5425: When logging to runbook first, login to system web page may fail

#5299: Vcenter portlet may not show Public IP address for VM that is in Azure cloud

## Known Issues

#1257: When Velostrata Prep RPM is installed on a SUSE Linux Enterprise Server 11, the VM obtains a DHCP IP address in addition to an existing static IP configuration. This issue occurs when the VM is started on-premises in a subnet that is enabled with DHCP services.

Note: The issue does not occur when the subnet has no DHCP services. There is no connectivity impact for communications with the original static IP address.

#1027: In some cases, when a VM is moved to Run-in-Cloud while a 3rd party VM-level backup solution holds a temporary snapshot, the Velostrata periodic write-back operations will not complete even after the backup solution deletes the temporary snapshot. The uncommitted writes counter on the VM will show an increasing size and no consistency checkpoint will be created on-premises.

Workaround: Select the Run On-Premises action for the VM and wait for the task to complete, which will commit all pending writes. Then select the Run-in-Cloud action again. Note that committing many pending writes may take a while. Do not use the Force option as this will result in the loss of the uncommitted writes.

#1745: After registering the Velostrata plug-in, running the Cloud Extension wizard might generate an error "XXXXXXXXXX" upon "Finish".

Workaround: Un-register the Velostrata plug-in and restart the vSphere Web client service, then re-register the plug-in. Contact support if the issue persists.

#1744: In rare cases, creating a Cloud Extension in Microsoft Azure fails due to the Azure service reporting it is busy.

Workaround: If the Cloud Extension appears in "impaired" state, retry using the "Repair Cloud Extension" operation. If no Cloud Extension entry is shown, retry the create operation

#1667: vCenter reboot causes Velostrata tasks in vCenter to disappear from UI. This is a vCenter limitation.

Workaround: Use the Velostrata PowerShell module to monitor Velostrata managed VMs or Cloud Extensions tasks that are currently running.

#1951: With an ESXi host in maintenance mode, if a VM is moved to cloud, the operation will fail and get stuck in the rollback phase.

Workaround: Manually cancel the Run-in-Cloud task, migrate the VM to another ESXi host in the cluster and retry the Run-in-Cloud operation.

#1917: A Run-in-Cloud operation fails with the error - "Failed to create virtual machine snapshot. The attempted operation cannot be performed in the current state (Powered off)".

Workaround: The VMware VM snapshot file may be pointing to a non-existent snapshot. Contact support for assistance in correcting the issue.

#1808: In rare cases, after running a Workload back on-premises - Workload VMDK's are locked. In certain cases, this is due to network disruptions between the Velostrata management appliance and the ESXi host on which the workload is running.

Note: The issue will resolve itself after 1-2 hours.

#2736: During Detach, the operation might fail with the following error message "Operation was canceled".

Workaround: Retry the Detach operation.

#3775: When performing a detach after a cancel detach operation, the action may fail.

Workaround: Retry the operation.

#3682: In the event of certain system failures, Velostrata components disconnect from vCenter. In this case, an event may not be sent, resulting in the alarm either not being set properly or not being cleared properly.

Workaround: Clear the alarm manually in vCenter.

#3320: For workloads with Windows machine using a retail license, when returning from the cloud, the license is not present.

Workaround: Reinstall the license.

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Workaround: Manually tag the instance, and then run "Repair".

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#3199: Suse12: Due to a bug in SUSE kernel older than 4.2, configurations that include BTRFS mounts with subvolumes are not supported.

Workaround: Upgrade to SUSE version with Kernel  $\geq 4.2$  (SP2).

#4619: Velostrata telemetry configuration for FE will not update after BE changes.

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Workaround: GUI issue, no functional impact.

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Workaround: Consolidate snapshots via vCenter, and clear the error manually.

#5547: PowerShell client for cloud to cloud Runbook reports errors when running on PS 3.0

Workaround: Upgrade to Powershell 4.0

#5387: CentOS6 cannot boot in AWS m4 instance type.

Workaround: Use different instance type for migration phase, switch to m4 instance type post migration.

#5700: RHEL 6.5 may occasionally fail to boot at AWS

Workaround: Move back to source and retry

#6095: RHEL-7.5\_HVM\_GA-20180322-x86\_64-1-Hourly2-GP2 (ami-7c491f05) based instance migrated from AWS to GCP will not boot at GVP

Workaround: Contact Velostrata support prior migrating instance based on this image

#6026: On rare case Ubuntu based instance may hang at first boot in cloud

Workaround: Reboot the instance from GCP console

#6024: When login to the System Setting section in the Web UI with "apiuser" the system returns 403

Workaround: Reopen the page with incognito mode.

#6007: When migrating Windows system to dedicated R4.xlarge instance at AWS the instance will not boot.

Workaround: use different type of instance.

#5974: When migrating Windows system to dedicated R4.xlarge instance at AWS the instance will not boot.

Workaround: use different type of instance.

#5387: CentOS6 may hang 2-3 minutes after booting in dedicate m4.large instance

Workaround: use different type of instance.

#5709: When migrating RHEL 7.4 from AWS to GCP, GCP agent will not be installed automatically.

Workaround: Manually remove AWS agent and install GCP agent

#5974: In certain environments with high latency between Velostrata Management appliance and vCenter, restart of Velostrata Management appliance may cause VMs in cloud and their data migration to be stuck.

Workaround: Potential workarounds (one of):

1. Reduce latency between Velostrata Management appliance and vCenter
2. Reduce load on vCenter
3. Reduce number of concurrently migrated VMs
4. Increase backend health-check retry intervals

# Velostrata Open Source Disclosure Information

Velostrata values the open source community as an essential resource and partner in innovation. You can find information and license documentation for the open source used in connection with Velostrata's services and products at the following URL: <https://velostrata.com/3rd-party-terms> .

Applicable open source code is available for download at the following URL: <http://tiny.cc/velostrata-oss>