This document provides a description of the RecoverPoint for Virtual Machines 4.3 product and its main features, concepts, and terminology. Topics include:

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Revision History

The following table presents the revision history of this document:

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<tr>
<td>01</td>
<td>July 14, 2015</td>
<td>First draft</td>
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Overview

RecoverPoint for Virtual Machines (VMs) allows replicating virtual machines with virtual machine level granularity. This solution runs in VMware virtual environments and does not depend on any specific hardware.

RecoverPoint for VMs enables customers to replicate virtual machines simply and easily and to manage virtual machine replication from within vSphere Web Client using the RecoverPoint plug-in. Customers will also be able to use RecoverPoint features such as point-in-time access, failover, testing, and so on. These options are available in the VMware vSphere management console.

New features

In RecoverPoint for VMs 4.3:
◆ Up to two non-production copies are supported. Both of these copies can be local, both can be remote, or one can be local and one remote (for concurrent local and remote replication).
◆ New VMDKs are automatically protected by default.
◆ When you add VMDK(s) to the production, RecoverPoint automatically creates the relevant copy VMDK(s) for you.
◆ When you expand a production VMDK, RecoverPoint for VMs automatically expands all corresponding copy VMDKs.
◆ VMDKs can be excluded from replication, and the excluded VMDKs can be re-included in replication without journal loss.
◆ Copy VMDKs can automatically be provisioned in one of three ways; the same as their corresponding production VMDKs, thinly, or thickly.
◆ The hardware resource settings (such as CPU and memory) of each production VM are automatically replicated to the copy VMs by default.
◆ You can manage the configuration of virtual networks per RecoverPoint for VMs system or per consistency group copy using a comma-separated value (CSV) file which can be exported from the system, modified, and then re-imported into the system, applying a new network configuration automatically.

Limitations

For the current release of RecoverPoint for VMs, the following limitations apply:
◆ All vRPA clusters must be running RecoverPoint for VMs.
◆ Every ESXi server in an ESXi cluster involved in RecoverPoint for VMs replication or running vRPAs should have the RecoverPoint for VMs splitter installed.
◆ Upgrading VMware tools on the vRPAs is strictly unsupported and may lead to undesired results.
◆ For scale limitations, refer to the *EMC RecoverPoint for Virtual Machines 4.3 Scale and Performance Guide*. 

EMC RecoverPoint for Virtual Machines is a hypervisor-based, software-only data protection solution for protecting VMware® virtual machines (VMs) and their datastores. RecoverPoint for VMs enables local and remote replication, allowing recovery to any point-in-time. RecoverPoint for VMs consists of a VMware vSphere web client plug-in, a RecoverPoint write-splitter embedded in the ESX hypervisor, which enables replication from any storage type to any storage type, as well as a virtual appliance integrated in the VMware ESXi server environment.

RecoverPoint for VMs allows recovery to any point in time.

The following terms and concepts define the RecoverPoint for VMs system architecture, and all of its components:

- **RecoverPoint for VMs system**: All RecoverPoint for VMs components at all vRPA clusters. There can be several RecoverPoint for VMs systems in one vCenter server.

- **RecoverPoint for VMs splitter**: Proprietary software installed on every ESXi server in an ESXi cluster involved in RecoverPoint replication or running virtual RPAs. The RecoverPoint for VMs splitter splits every write to the VMDK and sends a copy of the write to the vRPA first.

- **Virtual RecoverPoint appliance**: A virtual data appliance, called a vRPA, that manages all aspects of data replication.
- **vRPA cluster**: A group of 2–8 vRPAs that work together to replicate and protect data. A RecoverPoint for VMs system can contain up to three vRPA clusters; a maximum of one vRPA cluster for local replication and a maximum of two vRPA clusters for remote replication.

- **vSphere Web Client Plug-in**: The RecoverPoint for VMs plug-in within the vSphere Web Client. This is the user interface for managing VM replication. Access the vSphere Web Client at: https://<vCenter-ip-address>:<port>/vsphere-client/

Where `<vCenter-IP>` is the IP address of the vCenter and `<port>` is the port selected in the installation of the web client plug-in. The default port is 9443.

**Interfaces**

The following networking interfaces are required in RecoverPoint for VMs:

- LAN
- WAN
- iSCSI
RecoverPoint for VMs terminology

The following definitions are of the logical entities that constitute the RecoverPoint for VMs replication environment:

- **Consistency group**: A container for virtual machines and all their copies whose application data needs to be replicated to a consistent point in time. For instance, if you replicate a database and its transaction log, you need both files, and you always need both files to be at the exact same point in time. You can achieve this by placing the virtual machine running the database and the virtual machine running the transaction log in one consistency group or in one group set. The consistency group comprises virtual machines, their copies, and their journals.

- **Group set**: A user-defined set of consistency groups used to perform operational and recovery activities and periodically bookmark the same consistent point in time, across volumes in multiple groups, simultaneously.

- **Copy**: All of the VMs of a consistency group that are either a source or a target of replication at a given vRPA cluster, including their journal volumes. All VM copies can be identified by the *.copy extension at the end of the virtual machine name.

  **NOTICE**

  After failover, the *.copy extension at the end of the virtual machine name is not automatically changed. Therefore, it may be a good idea to remove the *.copy extensions from the new production VMs.

The following types of copies exist in a consistency group:

- **Production copy**: Consists of all of the VMs that are the sources of replication for a consistency group and the copy journal.

- **Local copy**: Consists of all of the VMs that are the targets of replication for a specific consistency group and the copy journal. The local copy is geographically located at the same site as the production VMs, and is replicated by the local vRPA cluster.

- **Remote copy**: Consists of all of the VMs that are the targets of replication, for a specific consistency group, and the copy journal. The remote copy is geographically located in a different site than the production VMs.

- **Shadow VM**: For internal RecoverPoint use only; user action on shadow VMs is not supported. During copy testing, failover, and production recovery the copy VMs are replaced by shadow VMs, which can be identified by the *.recoverpoint extension at the end of the virtual machine name. Shadow VMs allow the target vRPA to access the copy image, and RecoverPoint to manage its VMDK.

  **Note**: A shadow VM is identified by the period at the front of the virtual machine name and the .recoverpoint extension at the end of the VM name.

- **Journal**: Each copy of a consistency group must contain a resource pool that is dedicated to holding important information critical to your replication environment:
• **Production journal**: Store information about the replication process that makes synchronization between the production and copies more efficient. After failing over, the production journal becomes a copy journal.

• **Copy journal**: Receives successive writes written to production. Since the write-order is maintained, it is possible to apply or undo writes so that the copy image can reflect any point in time.

• **Replication set**: A set of VMDKs consisting of a production VMDK and any local and remote VMDKs to which it is replicating, per consistency group. The number of replication sets in your system is equal to the number of production VMDKs being replicated.

• **Snapshot**: The difference between one consistent image of stored data and the next. Snapshots of each copy are stored in the copy’s journal.

• **Snapshot consolidation**: A process that consolidates the data of multiple snapshots into a single snapshot to allow a longer history to be retained in the journal. Automatic snapshot consolidation settings can be specified in the copy protection policy. For example, the settings in the figure below maintain two days of continuous data, three daily consolidations, two weekly consolidations, and monthly consolidations up to the capacity of the journal.
- **Bookmark**: A label you apply to identify a snapshot. Parallel bookmarks are bookmarks with the same name applied at the same time to multiple consistency groups in a group set.

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</table>

- **Link**: The communication connection between RecoverPoint copies. When the link is open, data can be transferred between copies.
Protection and recovery

The following concepts are integral in RecoverPoint for VMs protection and recovery:

- **Protection**: The replication of a virtual machine to a copy by adding it to a consistency group. Protection can be used to recover from logical data corruption by selecting a point in time before the corruption; or from a physical disaster by failing over to the copy. The VM Protection wizard guides you through this process, as illustrated below:

- **Protection policy**: Defines how replication is carried out for each consistency group, copy, and link. The protection settings defined in the policy will affect how replication behavior changes depending on the level of system activity and the availability of network resources.

- **Policy template**: A set of protection policies that are saved and reusable. Three default policy templates are included in RecoverPoint for VMs: Default local link; default remote link; default copy.

- **Image access**: Allows you read/write-access to a selected point in time at a copy. Image access is used to test a copy to verify that it is a reliable and consistent replica of its corresponding production source. It is also the first step in restoring production from the copy, rolling back to a previous point in time, recovering data, and failing over to the copy.

- **Testing a copy**: When replicating, copies are read only. Testing a copy suspends the read-only property of the copy. RecoverPoint for VMs allows you to select any point-in-time image for testing.

- **Failover**: Sets a non-production copy to be the production copy and the original production copy to become the non-production copy. Failing over to a copy can be used to recover from a disaster at the production site and allows system operations to continue from the non-production copy. Failing over temporarily can be used to restore the production copy; failing over permanently can be used to
move production to this copy. During failover, transfer is paused and access to the original production is blocked. After failover, system operations can be resumed at the original production source by failing back.

- **Production recovery:** Restores the production from the selected point in time at the copy.

- **Initialization:** The process used to ensure consistency by synchronizing the data of the copy VMs with their corresponding production VMs.

- **Full sweep:** An initialization performed on all of the VMs in a consistency group. A full sweep initialization occurs when a consistency group is created. Full sweeps are also required when you enable a disabled consistency group and when there is production journal loss.

- **Distribution:** The RecoverPoint replication phase responsible for the writing of the production snapshots to the copy storage, and it is performed by the target vRPA. Since the copy storage is being written to during this process, during distribution, the state of the copy Storage is No Access. By default, the system distributes in Five-phase distribution mode. In rare cases the system switches to Three-phase distribution mode, and in some initialization scenarios, the system switches to One-phase distribution mode. Each VM copy journal consists of snapshots that have already been distributed to the copy storage and snapshots that are still waiting for distribution. When data is received by the vRPA faster than it can be distributed to the copy storage volumes, it accumulates in the queue of snapshots waiting for distribution in the copy journal.

  The Maximum Journal Lag setting dictates the maximum amount of snapshot data (in MB or GB) that is permissible to retain in the copy journal before distribution to the copy storage. In other words, the amount of data that would have to be distributed to the copy storage before failover to the latest image could take place, or (in terms of RecoverPoint’s role in the RTO) the maximum time that would be required in order to bring the copy up-to-date with production.

- **One-phase distribution:** The process in which the target vRPA writes the initialization data directly to the copy VMDK (bypassing the copy journal). This process is used to save on initialization time, in times in which the saving of a journal history is not critical (for example, in first-time initialization, when the first snapshot being transferred contains the whole image). When the initialization snapshot is too large for the capacity of the journal dedicated on storage, and the saving of a journal history is not critical, enabling this distribution mode saves the cost of adding additional journal volumes for the sole purpose of storing the initialization snapshot. During one-phase distribution, the distribution process is much faster, but no history is saved in the journal. Also, from the start of the process, and until the end of the process, the copy is not consistent with its production source. Therefore, if a disaster were to occur during this process, you would not be able to fail over to the copy VM until a full sweep was performed.

- **Group start-up sequence:** Defines the order in which the consistency groups in a group set power-on when image access is enabled during a recovery activity (such as testing a copy, failover, or production recovery). The group start-up sequence overrides the VM start-up sequence.
• **VM start-up sequence:** Defines the order of the power-on sequence of the virtual machines in a consistency group is initiated when image access is enabled during a RecoverPoint for VMs recovery activity (such as testing a copy, failover, or production recovery). Virtual machines are powered-up in order of priority, as defined by the user, where 3 is default. 1 is first to power-up and 5 is last to power-up. All virtual machines with the same priority will power-up simultaneously. The start-up sequence can also be defined between consistency groups within the same group set. The start-up sequence can be set as Critical. When a virtual machine is set to critical, if it fails to power-up, the start-up sequence will be paused by system, and no other virtual machines will power-up.

• **User script:** Runs scripts during image access of a VM or group start-up sequence, at a copy. The scripts are executed with ssh on the external host provided by the user. Before doing this, the external host must be defined. Each script has a mandatory time-out period. The start-up sequence will not commence until the script executes successfully. If the script does not execute within the set time, the system will retry the script a pre-defined number of times (set by the user) for the specified timeout period, and then the start-up sequence will commence. The user will receive a message indicating if the script executed or failed.

• **User prompt:** Define a message to be displayed in vCenter to prompt the user to perform specified tasks before continuing with the start-up sequence. The user must dismiss the prompt before the start-up sequence will continue. If the user defines a time-out, the user prompt will automatically dismiss if the set time-out period passes. If no time-out is defined and the user does not dismiss the start-up prompt, the start-up sequence will not continue until the user dismisses the prompt.

• **External host:** A dedicated system for running user scripts. It can be a computer or a virtual machine in the RecoverPoint for VMs system. If the external host is a virtual machine it must be powered-on when any image access flow is initiated.

• **Activity report:** Display the current status of activities (including user scripts, user prompts, failover, start-up, etc.). The reports display the start time, the end time, the overall status of the activity, the steps of the activity and the final status of the activity.

• **Automatic network configuration:** A feature used to manage VM networking by automatically changing all of the network settings of every VM in a RecoverPoint system or at a consistency group copy. The user displays and exports the current network configuration of a RecoverPoint for VMs system or a specific consistency group copy to a CSV file, reconfigures that CSV file with new network settings and then imports their new network configuration (automatically applying it to the system).
Getting help

EMC support, product, and licensing information can be obtained as follows:

**Product information** — For documentation, release notes, software updates, or information about EMC products, go to EMC Online Support at:

https://support.emc.com

**Technical support** — Go to EMC Online Support and click Service Center. You will see several options for contacting EMC Technical Support. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.