Scripting vFlash Partition Management

This Dell Technical White Paper provides information about scripting in the vFlash partition management of iDRAC with Lifecycle Controller on Dell PowerEdge servers.

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Executive summary

vFlash is an iDRAC with Lifecycle Controller feature that helps automate server deployment and management by providing a comprehensive set of storage management functions that make the best use of the vFlash storage space.

This paper describes the interface (WS-Man) used to manage vFlash storage from a scripting environment.

Contents

Introduction

vFlash is a function of Dell Lifecycle controller on Dell PowerEdge 11th and 12th generation servers that provides shared storage space between a server system and its iDRAC. The storage itself is from a vFlash SD card, with a size up to 16GB, inserted into the system. This shared space adds flexibility to systems management functions.

The vFlash service provides several user interfaces for managing vFlash storage including the iDRAC GUI, remote WSMAN service, and various RACADM commands. This paper describes the CLI (WS-MAN) commands for vFlash service.

vFlash storage space is managed in partitions. An operator can create up to 16 vFlash partitions, and each partition can have a size of up to 4GB. When partitions are attached, vFlash runtime emulates the partitions to the server system as removable USB storage devices.

This paper includes examples of the following functionality, using WinRM for Microsoft® Windows® systems and Openwsman for Linux systems:

- Enable the vFlash service and initialize a vFlash SD card.
- Create and format an empty vFlash partition.
- Format a vFlash partition.
- Attach and detach a vFlash partition to the system as a removable USB storage device.
- Create a vFlash partition from a partition image.
- Copy a vFlash partition to a network share.
- Delete a vFlash partition.
- Change a vFlash partition to read-only or read-write.

For an overview of vFlash, see the whitepaper *vFlash: An Overview*.

For a description and examples of related RACADM commands, see the *Integrated Dell Remote Access Controller 7 (iDRAC7), Version 1.0.0, User's Guide*.

Before You Begin

Before you begin, it is recommended to take the following steps:

1. Make sure the target system is a Dell™ PowerEdge™ server with iDRAC enabled, configured, and network accessible for WS-MAN communication.

2. For Windows systems, make sure the WinRM command line interface is configured and ready. (see *Installation and Configuration of Windows Remote Management*).

   For Linux systems, make sure the Openwsman command line interface is built, installed, and ready.

3. Make sure the target system has an Enterprise or higher license, access privileges for Virtual Media, and privilege for vFlash features.

4. Switch the SD card write-protect tab to writable.

VFlash Examples

All scripts in this paper use *uuu* for the user name, *ppp* for the password, and <p_addr> in place of the iDRAC IP address. Replace these variables with the actual values for your environment.

Typical script output is indicated by `this font`.

Enable vFlash service and initialize a vFlash card

A vFlash card is an SD card that is compatible with the iDRAC system. Before a vFlash operation can be performed, you must enable the vFlash service so the system can access the inserted SD card.

Additionally, you must initialize the vFlash card before creating partitions. The initialization process creates structural files on the card to maintain vital vFlash partition information. The files are in a proprietary format and should not be changed in any way, or the vFlash system will see the SD card as not initialized.

vFlashStateChange.xml:

```
<p:VFlashStateChange_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService">
<p:RequestedState>1</p:RequestedState> // 1=Enable, 2=Disable
</p:VFlashStateChange_INPUT>
```

Command line to enable vFlash:

```
winrm i VFlashStateChange http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic -file:vFlashStateChange.xml

VFlashStateChange_OUTPUT
```

```
    ReturnValue = 0
```

Command line to initialize the vFlash card:
winrm i InitializeMedia http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic

```
InitializeMedia_OUTPUT

    Job

        Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

        ReferenceParameters

            ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/DCIM

_LifecycleJob

            SelectorSet

                Selector: InstanceID = JID_191589853005, __cimnamespace
= root/dcim

    ReturnValue = 4096
```

Use the “InstanceID” returned above to check the operation status. When the command returns with `JobStatus = Completed`, the operation is complete and the user can check the SD properties.

Command line to poll the job status:
winrm g http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LifecycleJob?InstanceID=**JID_191589853005** -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic

```
DCIM_LifecycleJob

    ElapsedTimeSinceCompletion = 2

    InstanceID = JID_191589853005

    JobStartTime = NA
```

```
    JobStatus = Completed

    JobUntilTime = NA

    Message = Initialize media successful

    MessageArguments = NA

    MessageID = VF048

    Name = VFlashInitialize:Media

    PercentComplete = 100
```

Command line to view vFlash property:

winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_VFlashView -u:uuu -p:ppp -r:https://<ip_addr**>**/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic DCIM_VFlashView

```
DCIM_VFlashView

    AvailableSize = 970

    Capacity = 976

    ComponentName = vFlash SD Card

    FQDD = Disk.vFlashCard.1

    HealthStatus = OK

    InitializedState = Initialized

    InstanceID = Disk.vFlashCard.1

    LastSystemInventoryTime = 20111020222458.000000+000

    LastUpdateTime = 20111020222458.000000+000

    Licensed = true

    VFlashEnabledState = true

   WriteProtected = false
```

Create and format a vFlash partition

A vFlash partition resides on the vFlash card as a disk image file. The largest size of a partition image file is 4GB.

When a vFlash system emulates a partition image file as a removable USB storage device, it emulates in one of the following modes: Floppy, Hard Disk Drive, or Compact Disk. Partition mode information is stored in the structure files on vFlash card.

CreatePartition.xml:

```
<p:CreatePartition_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService">
  <p:Size>100</p:Size>
  <p:SizeUnit>1</p:SizeUnit> // 1=MB, 2=GB
  <p:PartitionType>1</p:PartitionType>  // 1=FLOPPY, 2=HDD
  <p:PartitionIndex>3</p:PartitionIndex>
  <p:OSVolumeLabel>Label3</p:OSVolumeLabel>
  </p:CreatePartition_INPUT>
```

Command line to create a vFlash partition:

```
winrm i CreatePartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic -file:CreatePartition.xml
```

```
CreatePartition_OUTPUT

    Job

        EndpointReference

            Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

            ReferenceParameters

                ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-schema/2/DCIM_LifecycleJob

                SelectorSet

                    Selector: InstanceID = JID_256697726234,
__cimnamespace = root/dcim

    ReturnValue = 4096
```

Poll job status.

```
DCIM_LifecycleJob

    ElapsedTimeSinceCompletion = 0

    InstanceID = JID_256697726234

    JobStartTime = NA

    JobStatus = Completed

    JobUntilTime = NA

    Message = Empty partition creation successful

    MessageArguments = NA

    MessageID = VF005

    Name = VFlashCreate:Partition3

    PercentComplete = 100
```

An operator can also remotely list vFlash partition information.

Command line to list all vFlash partitions:

```
winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dcim/DCIM_OpaqueManagementData -u:uuu -p:ppp -
r:https://<ip_addr>/wsman:443 -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic

...
DCIM_OpaqueManagementData

    AccessType = Read Only

    AttachedState = Detach

    CreationClassName = DCIM_OpaqueManagementData

    DataFormat = Raw

    DeviceID = DCIM_OpaqueManagementData:Partition3

    ElementName = VFlash

    Name = Label3
```

```
PartitionIndex = 3

PartitionType = Floppy

Size = 100

SystemCreationClassName = DCIM_ComputerSystem

SystemName = DCIM:ComputerSystem
```

Command line to list just one vFlash partition by specifying the DeviceID of the partition (e.g. Partition3**):**

winrm g http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_OpaqueManagementData?DeviceID=DCIM_OpaqueManagementData:Partition3+CreationClassName=DCIM_OpaqueManagementData+SystemCreationClassName=DCIM_ComputerSystem+SystemName=DCIM:ComputerSystem -u:uuu -p:ppp -r:https://<ip_addr>/wsman:443 -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic

```
DCIM_OpaqueManagementData

AccessType = Read Only

AttachedState = Detach

CreationClassName = DCIM_OpaqueManagementData

DataFormat = Raw

DeviceID = DCIM_OpaqueManagementData:Partition3

ElementName = VFlash

Name = Label3

PartitionIndex = 3

PartitionType = Floppy

Size = 100

SystemCreationClassName = DCIM_ComputerSystem

SystemName = DCIM:ComputerSystem
```

Format a vFlash partition

After a vFlash partition is created, it is not formatted to any particular file system type; however, you can format the raw partition to one of the following:– FAT16, FAT32, Ext2, or Ext3.

The format operation can be performed out-of-band from iDRAC or in-band from the operating system when the vFlash partition is attached (emulated as a USB device) to the system.

FormatPartition.xml:

```
<p:FormatPartition_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService">
<p:PartitionIndex>3</p:PartitionIndex>
<p:FormatType>4</p:FormatType> // RAW=0, EXT2=1, EXT3=2, FAT16=3, FAT32=4
</p:FormatPartition_INPUT>
```

Command line to format a vFlash partition:

```
winrm i FormatPartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic -file:FormatPartition.xml
```

```
Job
EndpointReference

    Address = http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

    ReferenceParameters

        ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-schema/2/DCIM_LifecycleJob

        SelectorSet

            Selector: InstanceID = JID_256705567366, __cimnamespace = root/dcim

ReturnValue = 4096
```

Poll the job status.

```
DCIM_LifecycleJob
```

```
        ElapsedTimeSinceCompletion = 0

        InstanceID = JID_256705567366

        JobStartTime = NA

        JobStatus = Completed

        JobUntilTime = NA

        Message = Partition formatting successful

        MessageArguments = NA

        MessageID = VF009

        Name = VFlashFormat:Partition3

        PercentComplete = 100
```

Attach/detach a vFlash partition

Attaching and detaching a vFlash partition refers to starting and stopping vFlash emulation of a removable USB storage device. Once emulation starts, the vFlash partition acts as if a new USB device is attached (inserted) to the server system. Similarly, when the emulation stops, the virtual USB device is detached (removed).

Command line to attach a vFlash partition (e.g. Partition3**):**
winrm i AttachPartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic @{PartitionIndex="3"}

```
AttachPartition_OUTPUT

    Job

        EndpointReference

            Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

            ReferenceParameters
```

```
                ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/DCIM_LifecycleJob

                SelectorSet

                    Selector: InstanceID = JID_256644128994, __cimnamespace
= root/dcim

    ReturnValue = 4096
```

Poll the job status.

```
DCIM_LifecycleJob

    ElapsedTimeSinceCompletion = 0

    InstanceID = JID_256644128994

    JobStartTime = NA

    JobStatus = Completed

    JobUntilTime = NA

    Message = Attach partition successful

    MessageArguments = NA

    MessageID = VF036

    Name = VFlashAttach:Partition3

    PercentComplete = 100
```

Command line to detach a vFlash partition (e.g. Partition3**):**

winrm i DetachPartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:**basic** @**{**PartitionIndex="3"}

```
DetachPartition_OUTPUT

    Job

        EndpointReference
```

```
            Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

            ReferenceParameters

                ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/DCIM_LifecycleJob

                SelectorSet

                    Selector: InstanceID = JID_256644711234,
__cimnamespace = root/dcim

    ReturnValue = 4096
```

Poll the job status.
DCIM_LifecycleJob

```
    ElapsedTimeSinceCompletion = 0

    InstanceID = JID_256644711234

    JobStartTime = NA

    JobStatus = Completed

    JobUntilTime = NA

    Message = Detach partition successful

    MessageArguments = NA

    MessageID = VF038

    Name = VFlashDetach:Partition3

    PercentComplete = 100
```

Create a vFlash partition from a disk image

A vFlash partition can also be created by loading a disk image directly onto vFlash. For example, an operator can load a DVD ISO image to the vFlash and make it a vFlash partition. Later, the vFlash partition can be attached to the server system as a removable USB DVD device.

CreatePartitionUsingImage.xml:

<p:CreatePartitionUsingImage_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService">
<p:PartitionIndex>10</p:PartitionIndex>
<p:OSVolumeLabel>D10</p:OSVolumeLabel>
<p:ShareType>2</p:ShareType>
<p:PartitionType>1</p:PartitionType>
<p:IPAddress>xxx.xxx.xxx.xxx</p:IPAddress>
<p:SharePath>/cifs</p:SharePath>
<p:ImageName>firm.db</p:ImageName>
<p:Workgroup>americas</p:Workgroup>
<p:Username>Administrator</p:Username>
<p:Password>Dell123</p:Password>
</p:CreatePartitionUsingImage_INPUT>

Command line to load an image to vFlash as a partition:
winrm i CreatePartitionUsingImage http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic -file:CreatePartitionUsingImage.xml

```
CreatePartitionUsingImage _OUTPUT

    Job

        EndpointReference

            Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

            ReferenceParameters

                ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/DCIM_LifecycleJob

                SelectorSet

                    Selector: InstanceID = JID_256730250896,
__cimnamespace = root/dcim

    ReturnValue = 4096
```

Poll the job status.
DCIM_LifecycleJob

```
ElapsedTimeSinceCompletion = 0

InstanceID = JID_256730250896

JobStartTime = NA

JobStatus = Completed

JobUntilTime = NA

Message = Image partition creation successful

MessageArguments = NA

MessageID = VF007

Name = VFlashCreateUsingImage:Partition10

PercentComplete = 100
```

Copy a vFlash partition to a network share

A vFlash partition can also be copied to a network share.

ExportDataFromPartition.xml:

```
<p:ExportDataFromPartition_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService">
  <p:PartitionIndex>10</p:PartitionIndex>
  <p:ShareType>2</p:ShareType>
  <p:IPAddress>xxx.xxx.xxx.xxx</p:IPAddress>
  <p:SharePath>/cifs</p:SharePath >
  <p:ImageName>firm.db</p:ImageName>
  <p:Workgroup>americas</p:Workgroup>
  <p:Username>Administrator</p:Username>
  <p:Password>Dell123</p:Password>
 </p:ExportDataFromPartition_INPUT>
```

Command line to copy a vFlash partition to a remote network share:

```
winrm i ExportDataFromPartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic -file:ExportDataFromPartition.xml
ExportDataFromPartition_OUTPUT
```

```
    Job

        EndpointReference

            Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

            ReferenceParameters

                ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/DCIM_LifecycleJob

                SelectorSet

                    Selector: InstanceID = JID_256644128902,
__cimnamespace = root/dcim

    ReturnValue = 4096
```

Poll the job status.

```
DCIM_LifecycleJob

    ElapsedTimeSinceCompletion = 0

    InstanceID = JID_256644128902

    JobStartTime = NA

    JobStatus = Completed

    JobUntilTime = NA

    Message = Export partition successful

    MessageArguments = NA

    MessageID = VF050

    Name = VFlashAttach:Partition10

    PercentComplete = 100
```

Delete a vFlash partition

An existing vFlash partition can be removed from the SD Card once it is no longer needed.

Command line to delete a vFlash partition:

winrm i DeletePartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic @{PartitionIndex="3"}

```
DeletePartition_OUTPUT

    ReturnValue = 0
```

Change a vFlash partition from read-only to read-write

Partitions are created as read-only. The ModifyPartition() method allows you to change the state of the partition from read-only to read-write and vice versa.

ModifyPartition.xml:

```
<p:ModifyPartition_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService">
  <p:PartitionIndex>10</p:PartitionIndex>
  <p:AccessTyp>3</p:AccessTyp> // 1=Read-Only, 3=Read-Write
</p:ModifyPartition_INPUT>
```

Command line to change a vFlash partition access type:

winrm i ModifyPartition http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_PersistentStorageService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_PersistentStorageService+SystemName=DCIM:ComputerSystem+Name=DCIM:PersistentStorageService -u:uuu -p:ppp -r:https://<ip_addr>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic -file:**ModifyPartition**.xml

```
ModifyPartition_OUTPUT

    ReturnValue = 0
```

Summary

The remote service functions of vFlash partition management provide great flexibility for a system administrator. Combined with any scripting language—for example, Perl, Python, or the Windows command shell—a system administrator can perform vFlash operations remotely and automatically.

Additional Resources

Whitepaper - vFlash: An Overview

Whitepaper - How to use vFlash via GUI/USC

Integrated Dell Remote Access Controller 7 (iDRAC7), Version 1.0.0, User's Guide

Web Services for Management (WSMAN):
http://dmtf.org/standards/wsman

Learn more about firmware inventory as defined by the Dell CIM profile specification:
http://www.delltechcenter.com/page/DCIM.Library.Profiles.DCIM+Software+Inventory+Profile+1.0

Learn more about firmware update as defined by the Dell CIM profile specification:
http://www.delltechcenter.com/page/DCIM.Library.Profile.DCIM+Software+Update+Profile+1.0

Learn more about job control as defined by the Dell CIM profile specification:
http://www.delltechcenter.com/page/DCIM+Job+Control+Profile+1.1

WSMAN Interface Guide for Linux:
http://attachments.wetpaintserv.us/BMJk79WsVP3F0jwl50xR_w2088275

WSMAN Interface Guide for Windows:
http://attachments.wetpaintserv.us/utYVFQFaHmnfG_LHEnx1YQ2026735

WSMAN command line open source for Linux (Openwsman):
http://sourceforge.net/projects/openwsman/

WSMAN command line for Windows (Winrm):
http://msdn.microsoft.com/en-us/library/windows/desktop/aa384291(v=VS.85).aspx

All about Lifecycle Controller in iDRAC:
http://support.dell.com/support/edocs/software/smusc/smlc/lc_1_5/index.htm