Creating and Managing Server Configuration Profiles

This Dell technical white paper describes the procedure to effectively use server configuration profiles to perform various server management operations or to achieve console workflows using WS-Man commands.

Dell Engineering
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Revisions

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Executive Summary

With Lifecycle Controller 2 version 1.2 and later, Dell introduced the concept of server configuration profiles for performing server hardware configuration through a single file. A server configuration profile can be generated in XML format with an “Export Server Configuration” operation. Any configuration changes can be edited into the profile and can be applied to one or more systems via the “Import Server Configuration” operation. The results of the application of the server configuration profile ahead of the actual application without any reboot are achieved using the “Preview Server Configuration” operation. The feature has further been enhanced in Lifecycle Controller 2 version 1.4. A server administrator no longer needs to remember multiple commands so as to configure multiple server settings. Instead, they have a single command to specify what needs to be configured on multiple components using a single file in an XML format. Console application developers no longer need to remember various operations and their proper sequence to achieve a required end state. Now, the end state can be specified in human-readable XML file format. Developers can use this new feature to perform frequent configuration operations in a very efficient manner.
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1 Introduction

Lifecycle Controller 2 version 1.4 and later adds support for Server Configuration Profiles (SCP). A server’s configuration can be exported or imported using the Server Configuration Profile feature. The export operation captures a snapshot of the system configuration to an XML file and exports it to a network file share. The SCP file can be edited to change one or multiple configuration settings spanning different device classes, and be imported to one or more target systems.

Several console workflows can be made efficient by making appropriate edits to the input server configuration profile. This is far more efficient than performing multiple operations to change multiple component configurations or console workflows. Instead, developers can use a single Import Configuration operation with the changes in the SCP file, a Preview Configuration operation can also be used to preview the results of the application of the SCP ahead of the actual application without any restart of the server. This document describes the process followed by Lifecycle Controller 2 version 1.4 to perform the most common configuration tasks as identified by management consoles using Server Configuration Profiles.

Wouldn’t it be easier to manage systems if an administrator only had to remember one command? What if an administrator could specify how systems were to be configured with an easy-to-read configuration file? The latest 12th generation Dell PowerEdge servers with Lifecycle Controller 2 provide this exciting feature.
1.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

**FQDD:** Fully Qualified Device Descriptor is used to identify a particular component in a system. This is a consistent and generic identifier that clearly represents a physical or logical device that abstracts the underlying architecture and implementation.

**Real Time configuration changes:** Configuration changes that can be made effective without requiring a system restart. Multiple operations can be stacked onto one workflow. For example, a virtual disk can be created, initialized and a hot spare assigned to it. Three individual RAID operations are stacked here.

**Attribute Registry:** Database of configuration settings (attributes), grouped by device type. This database contains all possible settings for each attribute as well as dependency information. Use this to determine the appropriate settings when editing a Server Configuration Profile.


**Event/Exception Message Registry:** Database of error message IDs, messages, and recommended response actions for various iDRAC and Lifecycle Controller EEMI messages.

2 Command Line Syntax

This section describes the various tools and interfaces that can be used for exporting, importing, and previewing server configuration profiles.

2.1 Win-RM Commands Using WS-Man API

Exporting Server Configuration Profiles

An SCP can be exported to NFS (0) or CIFS (2) shares, as specified by the “ShareType” parameter. The share, where the exported file as specified by “FileName” should reside, is specified in the “ShareName” parameter. In the case of CIFS shares, credentials to access the share must be specified by the “UserName” and “Password” parameters.

```plaintext
winrm i ExportSystemConfiguration
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LCService?SystemCreationClassName=DCIM_ComputerSystem
m+CreationClassName=DCIM_LCService+SystemName=DCIM:ComputerSystem+Name=DCI M:LCService -u:root -p:calvin -r:https://192.168.1.2/wsman
-SkipCNCheck - SkipCACheck -encoding:utf-8 -a:basic
@{IPAddress="192.168.1.3";ShareName="/nfs";ShareType="0";FileName="Export.xml"}
```

Previewing Server Configuration Profiles

The import of an SCP can be previewed without the contents of the SCP actually being applied to the server. The SCP can be provided from NFS (0) or CIFS (2) shares, as specified by the “ShareType” parameter. The share where the exported file as specified by “FileName” should reside is specified in the “ShareName” parameter. In the case of CIFS shares, credentials to access the share should also be specified by the “UserName” and “Password” parameters.

```plaintext
winrm i ImportSystemConfigurationPreview
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LCService?SystemCreationClassName=DCIM_ComputerSystem
m+CreationClassName=DCIM_LCService+SystemName=DCIM:ComputerSystem+Name=DCI M:LCService -u:root -p:calvin -r:https://192.168.1.2/wsman
-SkipCNCheck - SkipCACheck -encoding:utf-8 -a:basic
@{IPAddress="192.168.1.3";ShareName="/nfs";ShareType="0";FileName="Preview.xml"}
```

Importing Server Configuration Profiles

An SCP can be imported from NFS (0) or CIFS (2) shares, as specified by the “ShareType” parameter. The network share where the exported file as specified by “FileName” should
reside is specified in the "ShareName" parameter. In the case of CIFS shares, credentials to access the share should also be specified by the "UserName" and "Password" parameters. If the import file "Import.xml" specifies some configuration changes that require a server restart (such as in BIOS, NIC, RAID, or FC configuration), the user also needs to specify whether or not a Graceful (0) or a Forced (1) shutdown of the server is required, by using the "ShutdownType" parameter. The default behavior is to turn off the server gracefully. If Graceful shutdown has been specified, the user could optionally specify a time to wait until the server turns off using the "TimeToWait" parameter. The default "TimeToWait" is 300 seconds or 5 minutes. The maximum allowed "TimeToWait" is 3600 seconds or 60 minutes. User can also specify whether the target server must be left in ON(1) or OFF(0) state after configuration changes are applied. This can be done using the "EndHostPowerState" parameter. The "ShutdownType", "TimeToWait" and "EndHostPowerState" are optional parameters and the user is not required to use them to invoke the Import method.

```
winrm i ImportSystemConfiguration
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LCService?SystemCreationClassName=DCIM_ComputerSystem
m+CreationClassName=DCIM_LCService+SystemName=DCIM:ComputerSystem+Name=DCIM+LCService -u:root -p:calvin -r:https://192.168.1.2/wsman
-SkipCNCheck - SkipCACheck -encoding:utf-8 -a:basic

@{IPAddress="192.168.1.3";ShareName="/nfs";ShareType="0";FileName="Import.xml";ShutdownType="0";TimeToWait="300";EndHostPowerState="1"}
```

**Command to check job status**

The ExportSystemConfiguration, ImportSystemConfigurationPreview, and ImportSystemConfiguration commands return a Lifecycle Job ID. The following command can be used to get status and details about the job.

```
winrm g "http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/DCIM_LifecycleJob?InstanceID=JID_186409478164+
-SkipCACheck
```
2.2 RACADM Commands

Exporting a server configuration profile to a CIFS share

```
racadm get -f file -t xml -u myuser -p mypass -l //10.1.12.13/share
```

Exporting an SCP to an NFS share

```
racadm get -f file -t xml -l 10.1.12.13:/myshare
```

Previewing an SCP from a remote CIFS share

```
racadm set -f myfile.xml -t xml -u myuser -p mypass -l //10.1.2.3/myshare --preview
```

Previewing an SCP from a remote NFS share

```
racadm set -f myfile.xml -t xml -l 10.1.2.3:/myshare --preview
```

Importing a server configuration profile from a remote CIFS share

```
racadm set -f myfile.xml -t xml -u myuser -p mypass -l //10.1.2.3/myshare
```

Importing an SCP from a remote NFS share

```
racadm set -f myfile.xml -t xml -l 10.1.2.3:/myshare
```

2.3 Additional RACADM Command Options

- **-b**: Specifies the shutdown type for the host server after the import operation completes. The parameters are “Graceful” and “Forced” for graceful and forced shutdown respectively. If this parameter is not specified, graceful shutdown is considered as the default.

- **-w**: Maximum time to wait for the graceful shut down to occur. Unit of measurement is seconds. The maximum accepted value is 3600 seconds (one hour). The default value is 300 seconds (5 minutes).

- **-s**: Power state of the host when the import operation completes. The parameters are “On” and “Off” for Powered ON and Powered OFF respectively. If this parameter is not specified, power ON is considered as default.

2.4 Workflows

1. Creating a virtual disk (VD) and initializing the VD
2. Assigning Hot Spares
3. Performing RAID and BIOS operations
4. Updating the BIOS system and setup password
5. Setting BIOS, UEFI, or HDD boot order
6. Setting the one-time-boot order
7. Creating a bootable device and booting to the bootable device target
8. Enabling CNA partitioning and configuring partition attributes
9. Various Real time configuration workflows

2.5 General Guidelines

- The server configuration profile to be used as input for "Preview Configuration" and "Import Configuration" must be a valid XML file and adhere to the schema published in the Dell Lifecycle Controller Schema guide.
- The feature performs more efficiently if the input is limited to only those attributes that are being changed. For example, if NIC configuration is intended, it would be more efficient if the input consisted of just the NIC XML snippets. Additional components and their attributes do not pose an issue and will not cause changes on the target, but the job will take longer to complete because the implementation compares the current settings on the target to the input.
- If only RAID configuration is being performed, the RAID excerpt needs to have the enclosing Controller component node, even if VD or PD configuration is being performed. Ordering of attributes within a component node is not required as the implementation processes the attributes in a defined order. For example, if RAIDResetConfig is specified in the input XML regardless of where it is located, it is performed as the first RAID operation. VDs, on the other hand, get created on the basis of order in which they were specified in the input XML. As VD FQDDs are decided by the target controller, post import, the VD FQDD may not match with that specified in the XML.
- The user is expected to look up the various attribute registries for valid values, ranges for the various attributes. An alternate method to lookup all possible values for attributes is by enumerating the various WS-Man attribute classes. Another efficient method is to use a single server as the "source" server for exporting all common attributes to an SCP. Portions of that SCP can be used for other servers.
3 RAID Stacking—Creating and Initializing a Virtual Disk (VD)

Server configuration profiles can be used to create a VD and initialize it. The following XML snippet illustrates how this can be specified.

The highlighted attributes identify the component to be operated on and the RAID operations to be performed on it. The other attributes serve as input parameters for creating the VD.

```xml
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="RAID.Slot.2-1">
    <Component FQDD="Disk.Virtual.0:RAID.Slot.2-1">
      <Attribute Name="IncludedPhysicalDiskID">Disk.Bay.0:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>
      <Attribute Name="IncludedPhysicalDiskID">Disk.Bay.9:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>
      <Attribute Name="RAIDaction">Create</Attribute>
      <Attribute Name="RAIDinitOperation">Fast</Attribute>
      <Attribute Name="DiskCachePolicy">Default</Attribute>
      <Attribute Name="RAIDdefaultWritePolicy">WriteBack</Attribute>
      <Attribute Name="RAIDdefaultReadPolicy">Adaptive</Attribute>
      <Attribute Name="Cachecade">Not a Cachecade Virtual Disk</Attribute>
      <Attribute Name="Name">xmlconfig</Attribute>
      <Attribute Name="Size">146163105792</Attribute>
      <Attribute Name="StripeSize">128</Attribute>
      <Attribute Name="SpanDepth">1</Attribute>
      <Attribute Name="SpanLength">2</Attribute>
      <Attribute Name="RAIDTypes">RAID 1</Attribute>
    </Component>
  </Component>
</SystemConfiguration>
```
3.1 RAID Stacking: Creating and Initializing VD—Without Specifying PhysicalDiskID

In the Lifecycle Controller2 1.40 (iDRAC 1.50.50) and later versions, server configuration profiles can be used to create a VD and initialize it without specifying the Included PhysicalDiskID. It implies that for a given RAIDTypes and Size, physical disk drives are automatically selected. An example command given here specifies the process.

The highlighted attributes identify the component to be operated on and the RAID operations to be performed on it. Note that RAIDaction attribute has a new value, “CreateAuto”. This value indicates that physical disk drive has to be selected automatically when creating a VD. The other attributes serve as input parameters for creating the VD.

```
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jun 14 11:15:00 2013">
  <Component FQDD="RAID.Slot.2-1">
    <Component FQDD="Disk.Virtual.1:RAID.Slot.2-1">
      <Attribute Name="RAIDaction">CreateAuto</Attribute>
      <Attribute Name="RAIDinitOperation">Fast</Attribute>
      <Attribute Name="Size">146163105792</Attribute>
      <Attribute Name="RAIDTypes">RAID 1</Attribute>
    </Component>
  </Component>
</SystemConfiguration>
```

Because physical disk drives included in the VDs are selected automatically based on size and RAIDTypes, span parameters such as SpanLength and SpanDepth are also determined automatically. Hence, they also must not be specified in the input server configuration profile.

When Size value is specified as “0”, the VD will be created with minimum number of disks required for the RAIDTypes.
3.2 RAID Stacking—ResetConfig, CreateVD, and Assigning HotSpares

Multiple RAID operations can be combined further. The following XML sample illustrates the process to Reset Config, Create a VD, assign a dedicated spare to the VD, and assign a physical disk drive as a global hot-spare.

<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDVI" TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="RAID.Slot.2-1">
    <Attribute Name="RAIDresetConfig">True</Attribute>
  </Component>
  <Component FQDD="Disk.Virtual.0:RAID.Slot.2-1">
    <Attribute Name="IncludedPhysicalDiskID">Disk.Bay.0:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>
    <Attribute Name="IncludedPhysicalDiskID">Disk.Bay.9:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>
    <Attribute Name="RAIDdedicatedSpare">Disk.Bay.5:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>
    <Attribute Name="RAIDaction">Create</Attribute>
    <Attribute Name="DiskCachePolicy">Default</Attribute>
    <Attribute Name="RAIDdefaultWritePolicy">WriteBack</Attribute>
    <Attribute Name="RAIDdefaultReadPolicy">Adaptive</Attribute>
    <!-- <Attribute Name="Cachecade">Not a Cachecade Virtual Disk</Attribute> -->
    <Attribute Name="Name">xmlconfig</Attribute>
    <Attribute Name="Size">146163105792</Attribute>
    <Attribute Name="StripeSize">128</Attribute>
    <Attribute Name="SpanDepth">1</Attribute>
    <Attribute Name="SpanLength">2</Attribute>
  </Component>
</SystemConfiguration>
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The highlighted attributes identify the component to be operated on and the RAID operations to be performed on it. The other attributes serve as input parameters for creating the VD.

To mark a particular physical disk as a dedicated hot spare for the VD to be created, the value for the “RAIDDedicatedSpare” attribute is set to the FQDD of the PD. The attribute is listed under the VD component node.

To mark a particular physical disk drive as a global hot-spare, the value for the “RAIDHotSpareStatus” attribute is set to “Global”. The attribute is listed under the PD component node. “Dedicated” is not a valid value for the “RAIDHotSpareStatus” attribute and will result in an error.

3.3 RAID Stacking: ResetConfig, CreateVD, and Assigning HotSpares – Without Specifying PhysicalDiskID

Multiple RAID operations can be combined further. The following XML sample illustrates how to Reset Config, Create a VD, assign a dedicated spare to the VD. This workflow is available in Lifecycle controller2 v 1.40 (iDRAC 1.50.50) or later.

```xml
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jun 14 11:15:00 2013">
  <Component FQDD="RAID.Slot.2-1">
    <Attribute Name="RAIDresetConfig">True</Attribute>
    <Component FQDD="Disk.Virtual.0:RAID.Slot.2-1">
      <Attribute Name="RAIDdedicatedSpare">AutoSelect</Attribute>
      <Attribute Name="RAIDaction">CreateAuto</Attribute>
    </Component>
  </Component>
</SystemConfiguration>
```
<Attribute Name="DiskCachePolicy">Default</Attribute>
<Attribute Name="RAIDdefaultWritePolicy">WriteBack</Attribute>
<Attribute Name="RAIDdefaultReadPolicy">Adaptive</Attribute>

<!-- <Attribute Name="Cachecade">Not a Cachecade Virtual Disk</Attribute> -->
<Attribute Name="Name">VDWithHotSpare</Attribute>
<Attribute Name="Size">146163105792</Attribute>
<Attribute Name="StripeSize">128</Attribute>
<Attribute Name="RAIDTypes">RAID 5</Attribute>

The highlighted attributes identify the component to be operated on and the RAID operations to be performed on it. The other attributes serve as input parameters for creating the VD.

To mark a particular physical disk drive as a dedicated hot-spare for the VD to be created, the value for the “RAIDDedicatedSpare” attribute is set to AutoSelect. The attribute is listed under the VD component node.

3.4 RAID Stacking with BIOS Attributes

It is possible to modify BIOS, NIC, or any other component configuration along with RAID components. The XML sample here illustrates the process to configure one BIOS attribute along with RAID operations such as Reset Config, Create VD, and assign dedicated hotspare.

<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="BIOS.Setup.1-1">
    <Attribute Name="EmbNic1Nic2">Enabled</Attribute>
  </Component>
  <Component FQDD="RAID.Slot.2-1">
    <Attribute Name="RAIDresetConfig">True</Attribute>
  </Component>
  <Component FQDD="Disk.Virtual.0:RAID.Slot.2-1">
    <!-- BIOS attributes -->
  </Component>
</SystemConfiguration>
<Attribute Name=" IncludedPhysicalDiskID">Disk.Bay.0:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>

<Attribute Name=" IncludedPhysicalDiskID">Disk.Bay.9:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>

<Attribute Name=" RAIDdedicatedSpare">Disk.Bay.5:Enclosure.External.0-0:RAID.Slot.2-1</Attribute>

<Attribute Name=" RAIDaction">Create</Attribute>

<Attribute Name=" DiskCachePolicy">Default</Attribute>

<Attribute Name=" RAIDdefaultWritePolicy">WriteBack</Attribute>

<Attribute Name=" RAIDdefaultReadPolicy">Adaptive</Attribute>

<!-- <Attribute Name="Cachecade">Not a Cachecade Virtual Disk</Attribute> -->

<Attribute Name=" Name">xmlconfig</Attribute>

<Attribute Name=" Size">146163105792</Attribute>

<Attribute Name=" StripeSize">128</Attribute>

<Attribute Name=" SpanDepth">1</Attribute>

<Attribute Name=" SpanLength">2</Attribute>

<Attribute Name=" RAIDTypes">RAID 1</Attribute>

</Component>

</Component>

</SystemConfiguration>
4 Setting, Changing, or Deleting BIOS System and Setup Passwords

BIOS system and setup passwords can be set, changed, or deleted using Import Configuration. It is also important to note that if the password jumper is not correctly set on the planar, the attributes corresponding to the BIOS system and setup passwords are not supported and hence will not be exported in the XML.

The following excerpts illustrate how the BIOS system and setup passwords can be set, changed or deleted.

4.1 Setting BIOS Passwords

The "OldSysPassword" attribute must be uncommented and the value must be left blank because the system password has not been set previously. The "NewSysPassword" attribute should be uncommented and a value (clear text, ASCII format) should be provided. Invalid values will cause an error.

The PasswordStatus attribute must be set to "Unlocked" when setting the System Password.

```xml
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="BIOS.Setup.1-1">
    <!-- Attribute Name="MemRefreshRate">lx</Attribute> -->
    <!-- Attribute Name="MemVolt">AutoVolt</Attribute> -->
    <Attribute Name="OldSysPassword">
    </Attribute>
    <Attribute Name="NewSysPassword">new password value</Attribute>
    <!-- Attribute Name="OldSetupPassword">******</Attribute> -->
    <!-- Attribute Name="NewSetupPassword">******</Attribute> -->
    <Attribute Name="PasswordStatus">Unlocked</Attribute>
    <Attribute Name="TpmSecurity">Off</Attribute>
  </Component>
</SystemConfiguration>
```
4.2 Changing BIOS passwords

The “OldSysPassword” attribute must be uncommented and the value must be the current server password. The “NewSysPassword” attribute should be uncommented and a value (clear text, ASCII format) should be provided. Invalid values will cause an issue.

The PasswordStatus attribute must be set to “Unlocked” when setting the System Password.

```
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1"
TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="BIOS.Setup.1-1">
    <!-- <Attribute Name="MemRefreshRate">1x</Attribute> -->
    <!-- <Attribute Name="MemVolt">AutoVolt</Attribute> -->
    <Attribute Name="OldSysPassword">current BIOS system password</Attribute>
    <Attribute Name="NewSysPassword">new password value</Attribute>
    <!-- <Attribute Name="OldSetupPassword">******</Attribute> -->
    <!-- <Attribute Name="NewSetupPassword">******</Attribute> -->
    <Attribute Name="PasswordStatus">Unlocked</Attribute>
    <Attribute Name="TpmSecurity">Off</Attribute>
  </Component>
</SystemConfiguration>
```

4.3 Deleting BIOS Passwords

The “OldSysPassword” attribute should be uncommented and the value should be the current system password. The “NewSysPassword” attribute should be uncommented and the value should be left empty.

The PasswordStatus attribute must be set to “Unlocked”.

```
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1"
TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="BIOS.Setup.1-1">
    <!-- <Attribute Name="MemRefreshRate">1x</Attribute> -->
    <!-- <Attribute Name="MemVolt">AutoVolt</Attribute> -->
  </Component>
</SystemConfiguration>
```
<Attribute Name="OldSysPassword">current BIOS system password</Attribute>

<Attribute Name="NewSysPassword"></Attribute>

<!-- <Attribute Name="OldSetupPassword">******</Attribute> -->

<!-- <Attribute Name="NewSetupPassword">******</Attribute> -->

<Attribute Name="PasswordStatus">Unlocked</Attribute>

<Attribute Name="TpmSecurity">Off</Attribute>

</Component>

</SystemConfiguration>

4.4 Setting, Changing, or Deleting BIOS Setup Passwords

Steps would be similar to those outlined in sections 6.5.1-6.5.3 except that the user would need to uncomment and modify the "OldSetupPassword" and "NewSetupPassword" attributes appropriately.

The "PasswordStatus" attribute has no bearing on the "SetupPassword" attributes.

4.5 Setting BIOS, UEFI, or HDD Boot Order

The BIOS, UEFI or HDD boot order can be modified through Import Configuration. A sample of the command is given here. The highlighted attributes indicate the component and attributes to be modified.

<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jul 20 10:12:55 2012">

<Component FQDD="BIOS.Setup.1-1">

<Attribute Name="BootMode">Bios</Attribute>

<!-- <Attribute Name="MemRefreshRate">1x</Attribute> -->

<!-- <Attribute Name="MemVolt">AutoVolt</Attribute> -->

<!-- <Attribute Name="UefiBootSeq">NIC.Integrated.1-1-1,
NIC.Integrated.1-2-1, NIC.Integrated.1-3-1, NIC.Integrated.1-4-1,
Floppy.iDRACVirtual.1-1, Optical.iDRACVirtual.1-1</Attribute> -->

<!-- <Attribute Name="BiosBootSeq">NIC.Integrated.1-1-1,
NIC.Integrated.1-1-1, NIC.Integrated.1-4-1, NIC.Integrated.1-3-1,
Floppy.iDRACVirtual.1-1, Optical.iDRACVirtual.1-1</Attribute> -->
In order to change the BIOS, UEFI or HDD boot order, the appropriate boot order attribute must be uncommented first (BiosBootSeq, UefiBootSeq, or HddSeq respectively). The “BootMode” attribute should be also set appropriately.

For example, to set the BIOS Boot Order, the “BiosBootSeq” attribute must be uncommented and the “BootMode” must be set to “Bios”. The value of the “BiosBootSeq” attribute can be a comma-separated list of FQDDs or a single FQDD of the device to boot to. If only one device is specified, this device will be the first device in the boot order and other devices move down in the boot sequence.

Only one boot order attribute can be configured at a time. However, to this is that the BIOS and HDD boot order can be set at the same time.

### 4.6 Setting One-time-boot Order

The BIOS, UEFI or HDD one time boot order can also be modified via an appropriate XML excerpt. The highlighted attributes indicate the component and attributes to be modified.

```xml
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1" TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="BIOS.Setup.1-1">
    <!-- Attribute Name="MemRefreshRate">1x</Attribute>  -->
    <!-- Attribute Name="MemVolt">AutoVolt</Attribute>  -->
    <!-- Attribute Name="UefiBootSeq">NIC.Integrated.1-1-1, NIC.Integrated.1-2-1, NIC.Integrated.1-3-1, NIC.Integrated.1-4-1, Floppy.iDRACVirtual.1-1, Optical.iDRACVirtual.1-1</Attribute>  -->
    <!-- Attribute Name="BiosBootSeq">NIC.Integrated.1-2-1, NIC.Integrated.1-1-1, NIC.Integrated.1-4-1, NIC.Integrated.1-3-1, Floppy.iDRACVirtual.1-1, Optical.iDRACVirtual.1-1</Attribute>  -->
    <!-- Attribute Name="HddSeq"></Attribute>  -->
    <!-- Attribute Name="OneTimeBiosBootSeq"> NIC.Integrated.1-1-1, NIC.Integrated.1-2-1, NIC.Integrated.1-3-1, NIC.Integrated.1-4-1, Floppy.iDRACVirtual.1-1, Optical.iDRACVirtual.1-1</Attribute>  -->
  </Component>
</SystemConfiguration>
```
Only one type of one time boot attribute can be changed at a given time. Irrespective of what current boot mode is set to, one time boot can be performed to any device in the appropriate list.

For example, if the BIOS boot mode is set to UEFI, the “OneTimeBiosBootSeq” attribute can be set to the FQDD of a DOS-bootable USB drive.

As another example, here is how the BIOS boot sequence can be set to boot once to a BIOS bootable device. Namely, one time boot to the first NIC port in the BIOS boot order which is set to PXE. Uncomment the “OneTimeBiosBootSeq” attribute and set it to “NIC.Integrated.1-1-1” value from the “BiosBootSeq” attribute. The “BiosBootSeq” attribute lists all the BIOS bootable devices.

4.7 Creating a Bootable Target and Booting into Target

A bootable device can be created and booted to using a single import job. The FQDD of the bootable device being created must be predetermined and included in the appropriate boot sequence or one time boot attribute.

A bootable device can be created in one of the following ways:

- Create a VD using directions in section 6.1 or Section 6.2 of this white paper.
- Set a NIC target as iSCSI or PXE or iBFT bootable target depending on the feature supported by the NIC card.

The sample XML commands given here describe the process to create a bootable target and boot to that target. The highlighted attributes indicate the component and attributes to be modified.

As an example, consider enabling a NIC port as a bootable PXE target and booting to it. The excerpt here enables PXE boot on the first NIC port and sets the NIC port as the first device in the boot order. As highlighted, under FQDD for “NIC.Integrated.1-1-1”, the “LegacyBootProto” attribute is set to “PXE”. The “BiosBootSeq” attribute is set to “NIC.Integrated.1-1-1”, to indicate that the NIC port is the first device in the BIOS boot order.

```
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1"
TimeStamp="Fri Jul 20 10:12:55 2012">
  <Component FQDD="BIOS.Setup.1-1">
    <Attribute Name="BootMode">Bios</Attribute>
  </Component>
</SystemConfiguration>
```
The following XML excerpt creates a VD that does not exist locally on the controller (RAID 0 VD) and assign it as the first device in the BIOS boot sequence. Under the component with FQDD "Disk.Virtual.0:RAID.Integrated.1-1", the "RAIDAction" is set to "Create". Under the component with FQDD "BIOS.Setup.1-1", the "BootMode" attribute is set to "Bios" and the "BiosBootSeq" attribute is set to "HardDisk.List.1-1".

If an export is performed on a host server where VDs are not created, the RAID excerpt corresponding to "Disk.Virtual.0:RAID.Integrated.1-1" will not exist. To create a VD, the user must add the appropriate RAID XML excerpt. Only the "RAIDTypes" and the "RAIDAction" attributes are highlighted, but the other attributes are also required for creating the VD. For reference, the user could use the XML from a system that already has VDs created.

The following XML excerpt creates a VD that does not exist locally on the controller (RAID 0 VD) and assign it as the first device in the BIOS boot sequence. Under the component with FQDD "Disk.Virtual.0:RAID.Integrated.1-1", the "RAIDAction" is set to "Create". Under the component with FQDD "BIOS.Setup.1-1", the "BootMode" attribute is set to "Bios" and the "BiosBootSeq" attribute is set to "HardDisk.List.1-1".

If an export is performed on a host server where VDs are not created, the RAID excerpt corresponding to "Disk.Virtual.0:RAID.Integrated.1-1" will not exist. To create a VD, the user must add the appropriate RAID XML excerpt. Only the "RAIDTypes" and the "RAIDAction" attributes are highlighted, but the other attributes are also required for creating the VD. For reference, the user could use the XML from a system that already has VDs created.
Disk</Attribute>
<Attribute Name="Name">RAID ZERO</Attribute>
<Attribute Name="Size">0</Attribute>
<Attribute Name="StripeSize">128</Attribute>
<Attribute Name="SpanDepth">1</Attribute>
<Attribute Name="SpanLength">2</Attribute>
<Attribute Name="RAIDTypes">RAID 0</Attribute>
<Attribute Name="IncludedPhysicalDiskID">Disk.Bay.1:Enclosure.Internal.0-1:RAID.Integrated.1-1</Attribute>
<Attribute Name="IncludedPhysicalDiskID">Disk.Bay.0:Enclosure.Internal.0-1:RAID.Integrated.1-1</Attribute>
</Component>
</Component>
</SystemConfiguration>
5 Enabling NIC Partitions and Configuring Partition Attributes

This section primarily pertains to the Broadcom cards that support partitioning (57800 or 57810 chipset).

Partitions can be enabled and partition attributes can be configured using Import Configuration. The sample code here describes the process to complete this task. The highlighted attributes indicate the component and attributes to be modified. QLogic cards have partitions enabled, but configuring partition attributes are similar.

Enabling partitions and configuring partition attributes can be done in two types:

- Configuration can be exported from a server with similar cards and partitioning enabled. The exported configuration can then be imported to a server where partitioning is disabled. After importing, the target server will have partitioning enabled and partitions configured appropriately.
- XML can be manually edited to enable partitioning on a NIC device by setting the value of the "NicPartitioning" attribute to "Enabled". If partitioning is not enabled for any NIC card, the partition attributes will not be visible. The partition attributes and values must be added in to the XML. Exported configuration from a server that has similar cards can be used as a reference for a list of partition attributes.

In the sample here, the FQDD NIC.Slot.3-1-1 corresponds to the 57810 Broadcom NDC.

```xml
<SystemConfiguration Model="PowerEdge R620" ServiceTag="HPGBDV1"
TimeStamp="Fri Jul 20 10:12:55 2012">
<Component FQDD="NIC.Slot.3-1-1">
  <!-- <Attribute Name="UseIndTgtName">Disabled</Attribute> -->
  <Attribute Name="NicPartitioning">Enabled</Attribute>
  <Attribute Name="FlowControlSetting">Tx/RxFlow</Attribute>
  <Attribute Name="NicMode">Enabled</Attribute>
  <Attribute Name="iScsiOffloadMode">Enabled</Attribute>
  <Attribute Name="MinBandwidth">25</Attribute>
  <Attribute Name="MaxBandwidth">50</Attribute>
  <Attribute Name="FCoETgtBoot">Enabled</Attribute>
  <Attribute Name="FCoEFirstHddTarget">Disabled</Attribute>
  <Attribute Name="FCoELnkUpDelayTime">0</Attribute>
  <Attribute Name="FCoELunBusyRetryCnt">0</Attribute>
  <Attribute Name="FCoEFabricDiscoveryRetryCnt">4</Attribute>
  <!-- <Attribute Name="ConnectFirstFCoETarget">Disabled</Attribute> -->
  <!-- <Attribute Name="FirstFCoEWWPNTarget">00:00:00:00:00:00:00:00</Attribute> -->
  <!-- <Attribute Name="FirstFCoEBootTargetLUN">0</Attribute> -->
</Component>
```
<Component FQDD="NIC.Slot.3-1-2">
  <Attribute Name="NicMode">Enabled</Attribute>
  <Attribute Name="iScsiOffloadMode">Enabled</Attribute>
  <!-- <Attribute Name="MacAddr">00:10:18:D0:31:D4</Attribute> -->
  <!-- <Attribute Name="VirtMacAddr">00:10:18:D0:31:D4</Attribute> -->
  <!-- <Attribute Name="IscsiMacAddr">00:10:18:D0:31:D5</Attribute> -->
  <!-- <Attribute Name="VirtIscsiMacAddr">00:10:18:D0:31:D5</Attribute> -->
  <Attribute Name="PCIDeviceID">16AE</Attribute>
  <Attribute Name="BusDeviceFunction">05:00:02</Attribute>
  <Attribute Name="MinBandwidth">26</Attribute>
  <Attribute Name="MaxBandwidth">50</Attribute>
</Component>

<Component FQDD="NIC.Slot.3-1-3">
  <Attribute Name="NicMode">Enabled</Attribute>
  <!-- <Attribute Name="iScsiOffloadMode">Disabled</Attribute> -->
  <!-- <Attribute Name="MacAddr">00:10:18:D0:31:D8</Attribute> -->
  <!-- <Attribute Name="VirtMacAddr">00:10:18:D0:31:D8</Attribute> -->
  <!-- <Attribute Name="IscsiMacAddr">00:10:18:D0:31:D9</Attribute> -->
  <!-- <Attribute Name="VirtIscsiMacAddr">00:10:18:D0:31:D9</Attribute> -->
  <Attribute Name="PCIDeviceID">16AE</Attribute>
  <Attribute Name="BusDeviceFunction">05:00:04</Attribute>
  <Attribute Name="MinBandwidth">20</Attribute>
  <Attribute Name="MaxBandwidth">50</Attribute>
</Component>

<Component FQDD="NIC.Slot.3-1-4">
  <Attribute Name="NicMode">Enabled</Attribute>
  <!-- <Attribute Name="iScsiOffloadMode">Disabled</Attribute> -->
  <!-- <Attribute Name="MacAddr">00:10:18:D0:31:DC</Attribute> -->
  <!-- <Attribute Name="VirtMacAddr">00:10:18:D0:31:DC</Attribute> -->
  <!-- <Attribute Name="IscsiMacAddr">00:10:18:D0:31:DD</Attribute> -->
  <!-- <Attribute Name="VirtIscsiMacAddr">00:10:18:D0:31:DD</Attribute> -->
  <Attribute Name="PCIDeviceID">16AE</Attribute>
  <Attribute Name="BusDeviceFunction">05:00:06</Attribute>
  <Attribute Name="MinBandwidth">26</Attribute>
  <Attribute Name="MaxBandwidth">50</Attribute>
</Component>
</SystemConfiguration>
5.1 Various Real-time Configuration Workflows

In the Lifecycle Controller2 versions earlier than 1.40, various real-time configurations have been effected using WS-Man in two types:

**SetAttributes and CreateConfigJob**: In this case, the configuration changes can be scheduled to be applied either now or at a future time. The attributes are required to be set in the order that satisfies the attribute dependencies in order for the SetAttributes to be successful.

**ApplyAttributes**: In this case, the attribute changes are applied immediately. As in the case of SetAttributes, the attributes should be set in an order that satisfies the attribute dependencies.

RACADM has a number of commands that can be used to tweak various settings, the usual syntax is:

```
racadm config -g <groupname> -o <objectname> <objectvalue>
```

The user must know both the group and the object name of the property that is being configured.

Unlike configuration changes that require a server restart, there are no visible time savings (as compared to the earlier releases of Lifecycle Controller) for real-time configuration changes. However, with the “Import Configuration” feature, there are two key advantages:

- The attributes need not be specified in the order of dependencies in the input.
- There is a single command from both WS-Man and RACADM to configure any attribute.

XML sample commands to be used as input for various configuration commands are described in the following sections.
5.2 Configuring and Un-configuring iDRAC Users

Configuring iDRAC users is a task that is performed on initial server setup or redeployment. User attributes have dependencies, and therefore the user name and password of a user had to be configured first before the other attributes could be configured. With server configuration profiles, adhering to the order in the input XML is not mandatory. For import, password is specified in clear text, but it is obfuscated on export.

Sample XML to configure user #3

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <Component FQDD="iDRAC.Embedded.1">
    <Attribute Name="Users.3#UserName">user3</Attribute>
    <Attribute Name="Users.3#Password">user3</Attribute>
    <Attribute Name="Users.3#Privilege">511</Attribute>
    <Attribute Name="Users.3#IpmiLanPrivilege">Administrator</Attribute>
    <Attribute Name="Users.3#IpmiSerialPrivilege">Administrator</Attribute>
    <Attribute Name="Users.3#Enable">Enabled</Attribute>
    <Attribute Name="Users.3#SolEnable">Disabled</Attribute>
    <Attribute Name="Users.3#ProtocolEnable">Enabled</Attribute>
    <Attribute Name="Users.3#AuthenticationProtocol">SHA</Attribute>
    <Attribute Name="Users.3#PrivacyProtocol">AES</Attribute>
  </Component>
</SystemConfiguration>
```

Sample XML to un-configure user #3

In the earlier versions of Lifecycle Controller, to unconfigure a user, all the user attributes had to be specified in the reverse order of the “configuring users” workflow. With “Import Configuration”, leaving the username blank and specifying the user to be Disabled will cause all settings for that user to get reset to the defaults, thus effectively un-configuring the user.

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <Component FQDD="iDRAC.Embedded.1">
  </Component>
</SystemConfiguration>
```
5.3 Making Sure Power Consumption Stays Low—Setting Power Cap

In order to make sure that the total power draw stays under a given threshold, Power Capping can be enabled and a user defined limit (in Watt) set for the PowerCap, as illustrated by the following XML sample.

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <Component FQDD="System.Embedded.1">
    <Attribute Name="ServerPwr.1#PowerCapSetting">Enabled</Attribute>
    <Attribute Name="ServerPwr.1#PowerCapValue">247</Attribute>
  </Component>
</SystemConfiguration>
```

5.4 Configuring SNMP and Email Alert Destinations

When iDRAC senses a platform event such as an environmental warning or a component failure, SNMP traps can be sent to up to eight destinations. Destinations can be specified by IP address (IPv4 or IPv6) or FQDN. The following XML sample illustrates the procedure to configure various trap destinations and enable them, and then how to set email alert destinations.

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <!-- 8 SNMP destinations and 4 Email alert destinations can be configured -->
  <Component FQDD="iDRAC.Embedded.1">
    <Attribute Name="SNMPAlert.1#Destination">192.168.1.2</Attribute>
    <Attribute Name="SNMPAlert.1#State">Enabled</Attribute>
  </Component>
</SystemConfiguration>
```
<Attribute Name="SNMPAlert.2#Destination">3ffe:1900:4545:3:200:f8ff:fe21:67cf</Attribute>

<Attribute Name="SNMPAlert.2#State">Enabled</Attribute>

<Attribute Name="SNMPAlert.3#Destination">trapsink.dell.com</Attribute>

<Attribute Name="SNMPAlert.3#State">Enabled</Attribute>

<Attribute Name="EmailAlert.1#Enable">Enabled</Attribute>

<Attribute Name="EmailAlert.1#Address">admin@mycompany.com</Attribute>

<Attribute Name="EmailAlert.1#CustomMsg">Alert</Attribute>

</Component>

</SystemConfiguration>

5.5 Configuring Time Zone and NTP

Network time protocol can be enabled and the reference time servers and time zone can be configured using the following XML code sample. Modifying the time zone changes the iDRAC time only if NTP is enabled and the iDRAC has obtained the time from the NTP server.

<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">

<Component FQDD="iDRAC.Embedded.1">

<Attribute Name="Time.1#TimeZone">US/Central</Attribute>

<Attribute Name="NTPConfigGroup.1#NTP1">192.168.2.3</Attribute>

<Attribute Name="NTPConfigGroup.1#NTP2">192.168.1.3</Attribute>

<Attribute Name="NTPConfigGroup.1#NTPEnable">Enabled</Attribute>

<Attribute Name="NTPConfigGroup.1#NTPMaxDist">16</Attribute>

</Component>

</SystemConfiguration>
5.6 Configuring Static IP

In contrast to earlier releases of Lifecycle Controller, static IP can be configured for the target even when DHCP is enabled. The following XML command sample describes the process:

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <Component FQDD="iDRAC.Embedded.1">
    <Attribute Name="IPv4Static.1#Address">192.168.0.120</Attribute>
    <Attribute Name="IPv4Static.1#Netmask">255.255.255.0</Attribute>
    <Attribute Name="IPv4Static.1#Gateway">192.168.0.1</Attribute>
  </Component>
</SystemConfiguration>
```

5.7 Configuring Thermal Monitoring Alert Generation Interval

If the system operating temperature continuously exceeds the expected threshold limits then a warning or critical event is generated. The following attributes can be configured to set the alert generation interval (in days). XML sample is given here:

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <Component FQDD="System.Embedded.1">
    <Attribute Name="ThermalConfig.1#EventGenerationInterval">60</Attribute>
    <Attribute Name="ThermalConfig.1#CriticalEventGenerationInterval">45</Attribute>
  </Component>
</SystemConfiguration>
```

5.8 Configuring System Location

After a server is deployed, an administrator can configure the system location so that it can be easily located in case of an issue. XML code sample is given here:

```xml
<SystemConfiguration Model="PowerEdge R720" ServiceTag="FJGDNX1" TimeStamp="Wed Oct 10 01:11:37 2012">
  <Component FQDD="System.Embedded.1">
    <Attribute Name="ThermalConfig.1#EventGenerationInterval">60</Attribute>
    <Attribute Name="ThermalConfig.1#CriticalEventGenerationInterval">45</Attribute>
  </Component>
</SystemConfiguration>
```
<Attribute Name="ServerTopology.1#DataCenterName">Super Secret DC</Attribute>

<Attribute Name="ServerTopology.1#AisleName">Aisle 3</Attribute>
<Attribute Name="ServerTopology.1#RackName">Rack 2</Attribute>
<Attribute Name="ServerTopology.1#RackSlot">3</Attribute>
<Attribute Name="ServerTopology.1#RoomName">Lab 2</Attribute>

</Component>

</SystemConfiguration>
6 Troubleshooting

6.1 Prerequisites for Running Export / Preview / Import Configuration

Lifecycle Controller State attribute must be “Enabled”.

- The Lifecycle Controller version installed must have appropriate capabilities (server configuration profiles, Shutdown Job). The latest versions of iDRAC and Lifecycle Controller that have the appropriate capabilities are: iDRAC 1.30.30, A00 and Lifecycle Controller 1.1.0.1109, A00.
- The Remote Configuration feature must be enabled in the installed license.
- The user running the operations must have the Server Control privilege.
- Only one export or preview or import operation can run at any given time. These operations cannot be scheduled.
- Other configuration or update jobs must not be running during this time.

6.2 Checklist

The following is a checklist of items that can be used to ensure there are no user errors if “Export / Preview / Import Configuration” is not working as expected.

- If the Preview or Import Configuration job fails with a schema validation failure error: Ensure that the server configuration profile is well formed and adheres to the schema published in the Dell Lifecycle Controller Schema Guide. The Lifecycle logs may contain additional information about the line at which invalid characters are encountered. This is not possible if the invalid characters are Unicode characters, in this case, viewing the XML in a browser will give an indication of where the problem is.

  - If Export Configuration job fails with one or more components not found:
    - Make sure that the server updated to the recommended versions of iDRAC, Lifecycle Controller, and BIOS. After the recommended versions are installed, make sure that Collect System Inventory On Restart (CSIOR) is complete after the server is turned on.
6.3 Errors

The Lifecycle Controller Profile documents available at the TechCenter list the various errors that can be returned from an Export or Preview or Import operation. After an Export or Preview or Import job is created, there are some cases where the job can fail. The possible errors are listed below.

For a complete list of all errors messages, please lookup the error message registry.

Table 1 – Error messages from Export or Preview or Import

<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS044</td>
<td>Unable to export one or more component configurations.</td>
</tr>
<tr>
<td>SYS045</td>
<td>Unable to copy the system configuration XML file to the network share.</td>
</tr>
<tr>
<td>SYS046</td>
<td>Unable to import the system configuration XML file from the network share.</td>
</tr>
<tr>
<td>SYS047</td>
<td>Input file for system configuration XML is not compliant with configuration schema</td>
</tr>
<tr>
<td>SYS048</td>
<td>System configuration XML input file contains invalid characters, &lt;character&gt; at line &lt;line&gt;</td>
</tr>
<tr>
<td>SYS050</td>
<td>The system configuration XML file for import configuration is not compliant with schema nesting checks.</td>
</tr>
<tr>
<td>SYS051</td>
<td>The system could not be shut down within the specified time.</td>
</tr>
<tr>
<td>SYS062</td>
<td>Input file for import configuration operation is invalid. The expected XML root element was not found.</td>
</tr>
<tr>
<td>SYS064</td>
<td>Input file for import configuration operation is invalid at line &lt;line&gt;</td>
</tr>
<tr>
<td>SYS065</td>
<td>Input file for import configuration operation cannot be found or opened</td>
</tr>
<tr>
<td>SYS071</td>
<td>System configuration XML export operation timed-out.</td>
</tr>
<tr>
<td>SYS072</td>
<td>System configuration XML import operation timed-out.</td>
</tr>
<tr>
<td>SYS077</td>
<td>Unable to perform the preview operation because the specified file does not exist on the remote share.</td>
</tr>
<tr>
<td>SYS079</td>
<td>The Preview operation indicates the input file for system configuration XML is not compliant with the configuration XML schema.</td>
</tr>
<tr>
<td>SYS082</td>
<td>Preview of system configuration XML file completed. Some configuration changes may not be successful.</td>
</tr>
</tbody>
</table>
7 Results of Previewing Configuration

When the Preview job is unsuccessful, the errors will be logged as job configuration results associated with the job ID in the Lifecycle Log. Users can utilize the existing “GetConfigResults” function using WS-Man specifying the Preview Job ID to get the results associated with the Preview operations. Here are some samples of ConfigResults.

In this case, the input file for Preview Configuration contained changes for import template. The failure had an incorrect attribute value and it also provides estimated time for applying the Configuration to the system.

```xml
<ConfigResults>
  <JobID>JID_799960101471</JobID>
  <JobName>Preview Configuration</JobName>
  <Messages>
    <MessageID>SYS088</MessageID>
    <Message>Estimated time for applying configuration changes is 10 seconds.</Message>
  </Messages>
</ConfigResults>

<ConfigResults>
  <JobID>JID_799960101471</JobID>
  <FQDD>LifecycleController.Embedded.1</FQDD>
  <JobName>Preview Configuration</JobName>
</ConfigResults>

<ConfigResults>
  <JobID>JID_799960101471</JobID>
  <JobName>Import Configuration</JobName>
  <JobDisplayName>Configure: Import system configuration XML file</JobDisplayName>
  <FQDD>BIOS.Setup.1-1</FQDD>
  <Operation name="CHANGE">
    <DisplayValue>FailSafeBaud</DisplayValue>
    <Name>FailSafeBaud</Name>
  </Operation>
</ConfigResults>
```
7.1 Results of Applying Configuration

Both successful configuration changes and failures to effect the configuration changes are logged to Lifecycle Log and can be retrieved using WS-Man operations to retrieve them for a particular job ID (GetConfigResults). Here are some samples of ConfigResults.

In this case, the input file for Import Configuration contained two attributes. The first attribute had an incorrect value and the second attribute was misspelled.

```xml
<Detail>
<OldValue>115200</OldValue>
>NewValue>1152001234567890</NewValue>
</Detail>
<MessageID>BIOS014</MessageID>
<Message>Invalid AttributeValue for AttributeName</Message>
>Status>Failure</Status>
<ErrorCode>5</ErrorCode>
</Operation>
</ConfigResults>
```

```xml
<ConfigResults>
<JobID>JID_461686954303</JobID>
<FQDD>System.Embedded.1</FQDD>
<JobName>Import Configuration</JobName>
<JobDisplayName>Configure: Import system configuration XML file</JobDisplayName>
<Operation name="CHANGE">
<DisplayValue>Event Generation Interval</DisplayValue>
<Name>ThermalConfig.1#EventGenerationInterval</Name>
</Operation>
<Detail>
<OldValue>30</OldValue>
</Detail>
<MessageID>RAC007</MessageID>
```
<Message>Input out of Range</Message>

<Status>Failure</Status>

<ErrCode>9219</ErrCode>

</Operation>

<Operation name="CHANGE">

<DisplayValue/>

<Name>ThermalConfig.1#CriticalEventGenerationInter</Name>

<Detail>

<OldValue/>

</Detail>

<MessageID>RAC014</MessageID>

<Message>Invalid Attribute was entered</Message>

<Status>Failure</Status>

<ErrCode>9235</ErrCode>

</Operation>

</ConfigResults>

The input contained an invalid character, making the XML invalid. The output shows the message logged in this case.

<ConfigResults>

<JobID>JID_461683071407</JobID>

<JobName>Import Configuration</JobName>

<Messages>

<MessageID>SYS048</MessageID>

<Message>Systemconfiguration XML input file contains invalid characters, AMPERSAND at line 12</Message>

</Messages>

</ConfigResults>
Conclusion

In summary, the ability to export a configuration snapshot to a server configuration profile, modify it, and import it to one or more target systems significantly alleviates the tasks of a system administrator or a console application developer. The system administrator or console application developer no longer needs to sift through multiple profile documents or commands to configure different aspects of the system and does not need to know or adhere to specific sequences of steps to achieve a desired end state.
Learn more

Visit Dell.com/PowerEdge for more information on Dell's enterprise-class servers. Also lookup the Lifecycle Controller page on Dell Tech Center (www.delltechcenter.com/lc) for the following documents:

- Dell Lifecycle Controller Schema Guide
- Server Configuration Profile (Document takes a sample snapshot and explains various pseudo attributes, dependencies and why some attributes are commented)
- Best Practices Guide (Document describes best practices for achieving console workflows, referred to for a comparison of how a particular workflow can be accomplished with the new feature vs. best practices in LC 2.0)
- Dell Profile Documents
- Sample XMLs, Batch files and Sample Video
About the Authors

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Relevant Links

- XML Configuration Feature - XML File Structure
  http://en.community.dell.com/techcenter/extras/m/white_papers/20269601.aspx
- The corresponding files can be found at the following link:
  http://en.community.dell.com/techcenter/extras/m/white_papers/20269604.aspx
- Creating and Managing Server Configuration Profiles (this doc)
  http://en.community.dell.com/techcenter/extras/m/white_papers/20269586.aspx
- The corresponding scripts are at the following link:
  http://en.community.dell.com/techcenter/extras/m/white_papers/20269591.aspx