Radeon Pro Settings for VMware vSphere Client allows system administrators to manage and deploy VMware ESXi Hosts with AMD FirePro™ S7100X, S7150 and S7150x2
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1 Overview

This user guide provides an overview of the Radeon Pro Settings user interface plug-in developed for VMware vSphere® Client. This user interface plug-in was designed to allow system administrators to manage and deploy VMware ESXi™ Hosts with AMD FirePro™ S7100X, S7150 and S7150 x2 family of products in MxGPU mode.

Using Radeon Pro Settings, you can virtualize your AMD FirePro™ GPUs and create up to 16 virtual GPUs (defined as mxGPUs) per physical GPU (defined as MxGPUs). These mxGPUs can then be assigned – manually or automatically – to Virtual Machines (VMs) on the ESXi Host.

1.1 Advantages of Using Radeon Pro Settings

- Manage your VMs and MxGPUs on multiple Hosts and Datacenters.
- Change the partitioning of MxGPUs on the fly. No need to reboot the ESXi host system.
- Assign virtual mxGPUs to your VMs with a simple mouse click.
- Easily visualize your deployment with partition usage for MxGPUs and VMs.
2 Hardware and Software Requirements
The sections below detail the hardware and software that are required for setting up the VMware environment. Consult the VMware Basic Setup Guide or VMware’s website for details on setting up the VMware environment.

2.1 Hardware Requirements

2.1.1 Host/Server

Sample Certified Server Platforms:
- Dell PowerEdge R730 Server.
- HPE ProLiant DL380 Gen9 Server.
- SuperMicro 1028GQ-TR Server.

Additional Hardware Requirements:
- CPU: Minimum 2 CPUs of 4 cores each.
- System memory: 32 GB of RAM minimum, up to a maximum of 1 TB. Number of guest VM’s is dependent on RAM.
- Hard disk: 500 GB and up; more guest VMs require more HDD space.
- Network adapter: Gigabit Ethernet (GbE) and up.

2.1.2 Client
Any of the following client devices can be used to access the virtual machine once these VMs are started on the host server:
- Zero client (up to 4 connectors) with standard mouse/keyboard and monitor.
- Thin client with standard mouse/keyboard and monitor running Microsoft® Windows® Embedded OS.
- Laptop/desktop with standard mouse/keyboard and monitor running with Microsoft Windows 7 and up.

2.2 Software Requirements

2.2.1 Host/Server
- VMware ESXi 6.0 U2 and up.
- VMware ESXi 6.5 build 4564106 and up.

2.2.2 vCenter system
- Microsoft Windows Server 2012 R2.
- VMware vCenter 6.0 and up
- vSphere Client (HTML).
  - vCenter 6.0 users can deploy a standalone Appliance. See vSphere Client (HTML5) Fling.
2.2.3 Administrator system
Any OS with one of these internet browsers: Microsoft Internet Explorer® 11+, Microsoft Edge™, Google Chrome™, or Firefox®.

2.2.4 Guest VM
- Microsoft Windows 7 Service Pack 1 (SP1) 64-bit.
- Microsoft Windows 10 Version 1511 TH2 64-bit.
- Latest Radeon Pro Software Enterprise Unified Driver.
- VMware Horizon® View™ Agent (7.x.x).

2.3 System Configuration

2.3.1 Host/Server Configuration
- Enable IOMMU, SR-IOV, and ARI in CMOS.
- Enable above 4G space memory mapping IO.
- Enable UEFI Boot.
- AMD FirePro™ S7100X, S7150 or S7150 x2.

2.3.2 Guest VM Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>vCPU</th>
<th>System memory (GB)</th>
<th>Framebuffer size (MB)</th>
<th>Enabled mxGPU</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Performance</td>
<td>4</td>
<td>8</td>
<td>3840</td>
<td>2</td>
<td>Workstation User</td>
</tr>
<tr>
<td>Professional</td>
<td>2</td>
<td>4</td>
<td>1920</td>
<td>4</td>
<td>Power User</td>
</tr>
<tr>
<td>Enhanced</td>
<td>2</td>
<td>3</td>
<td>960</td>
<td>8</td>
<td>Knowledge User</td>
</tr>
<tr>
<td>Standard</td>
<td>1</td>
<td>2</td>
<td>480</td>
<td>16</td>
<td>Task worker</td>
</tr>
</tbody>
</table>

(Note: Make sure all guest memory is locked/reserved.)
3 Install Driver on VMware ESXi Host

On each VMware ESXi host that will be managed by the UI, install amdgpuv and amdgpuv-cim.

- For VMware ESXi 6.5, download the Radeon Pro - VMware vSphere ESXi 6.5 Driver and install:
  
amdgpuv-1.02-1OEM.650.0.0.4598673.x86_64-CL1356850.vib
  amdgpuv-cim-1.00-6.5.0-4598673.vib

- For VMware ESXi 6.0, download the Radeon Pro - VMware vSphere ESXi 6.0 Driver and install:
  
amdgpuv-1.02-1OEM.600.0.0.2494585.x86_64-CL1356850.vib
  amdgpuv-cim-1.00-6.0.0-2768847.vib

After rebooting the server, no matter how many virtual mxGPUs are configured for each GPU, you should see:

1) 15 mxGPUs on the bus for each GPU on VMware ESXi 6.0.
2) 16 mxGPUs on the bus for each GPU on VMware ESXi 6.5.

To install the drivers, copy the amdgpuv driver and CIM to a data store using SSH and use the following commands to install:

```
esxcli software vib install --no-sig-check -v /vmfs/volumes/datastore1/amdgpuv-1.02-1OEM.650.0.0.4598673.x86_64.vib

esxcli software vib install --no-sig-check -v /vmfs/volumes/datastore1/amdgpuv-cim-1.00-6.5.0-4598673.vib
```
4  Install the Plug-in on VMware vCenter Server

4.1  Install the Plug-in using Radeon Pro Settings Registration Tool

The Radeon Pro Settings Registration Tool allows a Windows or Linux computer to remotely register the plugin to a vSphere Client. By using this tool, a user can quickly update or register the plugin by simply providing the client’s credentials.

4.1.1  Register and install the plug-in

1. Download and unzip the Registration Tool to your local system.
2. Launch the RPSRegistrator suitable for Linux or Windows depending on your OS
3. Click Next and enter your vCenter credentials

![Radeon Pro Settings Registration Tool](image)

4. Pick the Version of the plugin you would like to install
5. Click on Connect and the tool will attempt to register and install the plugin on the server
6. If the plugin is already registered, click Update when prompted
7. If registration was successful, you will be prompted to restart the vSphere Client Service
4.2 Install the Plug-in through VMware Managed Object Browser

4.2.1 Register and Install the Plug-in

1. Open a browser and type in the following URL:

   https://<NAME_OF_VCENTER>/mob/?moid=ExtensionManager

2. A window will appear similar to the following:
3. Click on the **RegisterExtension** link. The window shown below will pop up:
4. In the pop-up window, copy and paste the XML below into the VALUE text box. This will register the plugin and install the necessary files to your VMware vCenter Server.

```xml
<extension>
  <description>
    <label>AMD Radeon Pro Settings</label>
    <summary>MxGPU Control Panel for vSphere Client</summary>
  </description>
  <key>com.amd.mxgpui</key>
  <company>AMD</company>
  <version>1.0.1</version>
  <subjectName></subjectName>
  <server>
    <url>https://download.amd.com/software/mxgpui-plugin.zip</url>
    <description>
      <label>AMD Radeon Pro Settings</label>
      <summary>MxGPU Control Panel for vSphere Client</summary>
    </description>
    <company>AMD</company>
    <type>HTTPS</type>
    <adminEmail>string</adminEmail>
  </server>
  <client>
    <version>1.0.1</version>
    <description>
      <label>AMD Radeon Pro Settings</label>
      <summary>MxGPU Control Panel for vSphere Client</summary>
    </description>
    <company>AMD</company>
    <type>vsphere-client-serenity</type>
    <url>https://download.amd.com/software/mxgpui-plugin.zip</url>
  </client>
  <lastHeartbeatTime>2017-03-15T09:00:00Z</lastHeartbeatTime>
  <healthInfo>
    <url></url>
  </healthInfo>
  <shownInSolutionManager>true</shownInSolutionManager>
</extension>
```
5. Click **Invoke Method**. It should show **Method Invocation Result: void** if it was successfully registered and installed.

![Method Invocation Result: void](image)

### 4.2.2 Restart VMware vSphere Client Service

Same as [Section 4.1.2](#).

### 4.3 Offline Installation

Please try this alternative install process if you cannot download the plug-in via the vCenter server.

1. Download the plugin as a zip from [here](#).
2. Copy the plugin zip to the appropriate location:
   a. VCSA:
      `/usr/lib/vmware-vsphere-ui/plugin-packages/`
   b. Windows vCenter:
      `C:\ProgramData\VMware\vCenterServer\runtime\vsphere-ui\plugin-packages`
3. Create a new folder in plugin-packages named **mxgpui** and unzip the contents of the zip file into **plugin-packages/mxgpui**
4. Register the plugin using the MoB, as outlined in Section 4.2.1
   a. Use the following XML script, instead of the XML script provided in section 4.2.1

```xml
<extension>
  <description>
    <label>MxGPUUI</label>
    <summary></summary>
  </description>
  <key>com.amd.mxgpuui</key>
  <version>1.0.1</version>
  <lastHeartbeatTime>2017-04-17T18:53:00Z</lastHeartbeatTime>
</extension>
```

5. Restart the vSphere Client, as shown in Section 4.1.2

### 4.4 Update the Plug-in

If there is a new plug-in to update, follow the steps below:

#### 4.4.1 Update the Plug-in

1. Open a browser and type in the URL:

   https://<NAME_OF_VCENTER>/mob/?moid=ExtensionManager

2. A window will appear similar to the following:
3. Click on the **UpdateExtension** link. In the pop-up window field **VALUE**, enter the following. Change the version and URL as necessary.

```xml
<extension>
  <description>
    <label>AMD Radeon Pro Settings</label>
    <summary>MxGPU Control Panel for vSphere Client</summary>
  </description>
  <key>com.amd.mxgpui</key>
  <company>AMD</company>
  <type></type>
  <version>1.0.1</version>
  <subjectName></subjectName>
  <server>
    <url>https://download.amd.com/software/mxgpui-plugin.zip</url>
    <description>
      <label>AMD Radeon Pro Settings</label>
      <summary>MxGPU Control Panel for vSphere Client</summary>
    </description>
    <company>AMD</company>
    <type>HTTPS</type>
    <adminEmail>string</adminEmail>
  </server>
  <client>
    <version>1.0.1</version>
    <description>
      <label>AMD Radeon Pro Settings</label>
      <summary>MxGPU Control Panel for vSphere Client</summary>
    </description>
    <company>AMD</company>
    <type>vsphere-client-serenity</type>
    <url>https://download.amd.com/software/mxgpui-plugin.zip</url>
  </client>
  <lastHeartbeatTime>2017-03-15T09:00:00Z</lastHeartbeatTime>
  <healthInfo>
    <url></url>
  </healthInfo>
  <shownInSolutionManager>true</shownInSolutionManager>
</extension>
```
4. Click **Invoke Method**. It should show **Method Invocation Result: void** if it was successfully registered and installed.

![Method Invocation Result: void](image)

4.4.2 Restart VMware vSphere Client Service

The same step as section 4.1.2
5 Using the Plug-in

5.1 VMware vSphere HTML5 Client

1. After installing/updating the plug-in on the VMware vCenter Server. Open a browser and type in the URL https://<NAME_OF_VCENTER>, where the name of the server can be either the IP or FQDN of the server. This will lead to a page with two entries as shown in the image below.

2. Click on VSphere Client (HTML5). If the option is not available, please ensure you are using vSphere 6.5. If you are using a fling HTML5 client, you can use:

   https://<NAME_OF_HTML5_CLIENT>/ui

3. Log in with an account with administrator privileges.
5.2 Starting the Plug-in

5.2.1 From the VMware vSphere Client Home Page

1. Click the **Radeon Pro Settings** icon on the home page.

2. Select the Datacenter you wish to manage. There are two options:
   a. You can view and manage VMs and MxGPUs on all hosts on the selected Datacenter by clicking **Go to Data Center**.
   b. You can view and manage VMs and MxGPUs on a specific host in the Datacenter by selecting a host from the second drop-down and then clicking on **Go to Host**.
5.2.2 From the VMware vSphere Client Navigation Bar

Right-click a Datacenter or Host from the left navigation bar and select **Radeon Pro Settings**.

5.3 The Virtual Machine Tab

The first tab that you will see is the VM tab and it displays all the VMs in your Datacenter or Host. It also contains the following information for each VM:

- Host name.
- VM name.
- The PCI-E bus number and name of the mxGPU that has been assigned to it.
- Power state.
5.3.1 Virtual Machine States

There are 3 possible states for a VM in the Radeon Pro Settings Plug-in:

- Under **Power**:
  1. **Power Off**: No mxGPU is assigned.
  2. **Power On**: mxGPU is assigned.
  3. **Power On**: VM is turned on.

*Note: mxGPUs cannot be assigned to or removed from a VM that is powered on.*

5.3.2 Assigning mxGPUs to VMs

1. Manually

*Note: Configure the partitioning of MxGPUs before assigning. See Section 5.4.2*

- Click on the **MxGPU** drop-down menu of a VM and select an MxGPU.
  
  - The drop-down menu displays all MxGPUs available to the VM
  - It also displays the available number of virtual mxGPUs out of the total configured number for each physical MxGPU.
  - Select **No MxGPU** to remove an mxGPU from a VM.

Click the **APPLY** button to assign a virtual mxGPU to the respective VMs from the selected MxGPU if the MxGPU has any available.

2. Automatically

*Note: Configure the partitioning of MxGPUs before assigning. See Section 5.4.2.*
When Auto Assigning, it is recommended that all MxGPUs on a host are partitioned the same so that VMs have identical performance.

- Click the **AUTO ASSIGN** button to automatically assign mGPU.s to all VMs.

- Virtual mGPU.s will be assigned from the first MxGPU in a host that has available mGPU.s until the MxGPU has no more available mGPU.s. This continues until either all VMs have been assigned an mGPU or there are no more available mGPU.s.

- Click the **AUTO REMOVE** button to automatically remove mGPU.s from all VMs.

Auto Assign and Auto Remove act on all VMs in a Datacenter while in the Datacenter view, but only act on VMs of a specific host when in a Host view.

**Additional Notes**

- VMs need to be powered off in order to be able to assign or remove an mGPU.

- Only one mGPU can be assigned to a VM at once. Consider reducing the number of partitions of the MxGPU for better graphics performance on the guest VM.
5.4 The MxGPU Tab

The MxGPU tab displays all physical MxGPUs and the virtual mxGPUs partitioned from each MxGPU. It also contains the following information for each MxGPU:

- PCIE Bus No.
- MxGPU name.
- Power state.
- Name of VM assigned if the mxGPU is assigned to VM.

5.4.1 mxGPU States

There are 3 possible states for a virtual mxGPU in the Radeon Pro Settings Plug-in:

1. Not Assigned.
2. Assigned – Assigned but VM is powered off.
3. In Use – Assigned and VM is powered on.
5.4.2 Configuring MxGPUs

There are 3 different levels of sliders to configure the partitioning of MxGPUs.

- **MxGPU slider**: change the configuration of a single MxGPU:

  ![MxGPU slider](image)

- **Host slider**: click the checkbox to enable this slider and change the configuration of all MxGPUs on the host:

  ![Host slider](image)

  *(Note: this slider is only available in the Datacenter view)*

- **Master slider**: click the checkbox to enable this slider and change the configuration of all MxGPUs:

  ![Master slider](image)

  This slider will apply the configuration to all MxGPUs in the Host or Datacenter.

**Additional Notes**

- MxGPUs with mxGPUs in use cannot be reconfigured.

- If you plan to use Auto Assign, it is recommended to use the Host or Master slider to configure MxGPUs to ensure that all assigned VMs have identical performance.

- In the case where an MxGPU with mxGPUs assigned is reconfigured to a lower number of mxGPUs such that some of the assigned mxGPUs are no longer valid, the invalid mxGPUs are automatically removed from the VMs. For this reason, it is recommended to configure all MxGPUs first before assigning mxGPUs to VMs.
6 Known Issues

- The plugin is currently not compatible with the vSphere Web Client (Flash)

- The current VMware vSphere Client (Build 4598948) doesn't have the functionality to detect PCI pass-through devices in VM settings. To confirm that your mxGPU assignment was successful, power on the VM and check device manager or log in to the VMware vSphere Web Client (Flash) and check the VM setting there.

- The new AMDGPUV host driver for ESXi host has the functionality to repartition MxGPUs without the requirement of a reboot of the host to enable a smoother user experience, but this requires that all 16 virtual mxGPUs are visible to the VMware ESXi host system at all times. This means that only the first N partitions are usable and the rest are not usable, where N is the number of partitions configured on the MxGPU. It is advised to use the Radeon Pro Settings interface to make all changes since it will only detect usable mxGPUs.
7 Troubleshooting

7.1 XML Errors when Registering the plugin

1. Invalid Property: “extension.key”

This error may occur if the plugin is already registered. Check the extension list:

A similar error is also seen on vCenter 6.0 when registering the plugin without a connected vSphere Client (HTML5) Appliance. Consult VMware documentation on vSphere Client (HTML5) Fling.
7.2 Plugin Errors

1. Plugin is unresponsive or fails to load data.
   a. Exit the plugin by clicking “Exit Radeon Pro Settings” and then relaunch the plugin.
   b. Log out of the vSphere client, and log back in
      i. Sometimes the vSphere backend session will end due to inactivity.
         If you are seeing loading issues after some period of inactivity, simply
         logging out and logging back in should reload the plugin.
      ii. This will also refresh any caches in the backend.
   c. Restart the vSphere Client

2. Radeon Pro Settings will not adjust the number of MxGPU partitions
   a. Make sure that the service that handles CIM requests by running the below command on the host.
      `/etc/init.d/sfcbd-watchdog status`

   b. If the service is not running, execute the following commands to start the service
      `esxcli system wbem set --enable true`
      `/etc/init.d/sfcbd-watchdog start`