

NVIDIA WMI

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White Paper

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WHAT IS NVWMI

NVIDIA WMI (NVWMI) is a graphics and display management and control technology that interfaces to Microsoft's Windows Management Instrumentation infrastructure, specific to NVIDIA graphics processing units (GPUs). This allows scripts and programs to be created that configure specific GPU related settings, perform automated tasks, retrieve and display a range of information related to the GPU as well as many other administrative tasks and functions. Through the integration within Microsoft's WMI this management and control also operates across networks making it extremely powerful for remote administration and configuration of Windows systems on corporate networks.

NVWMI is only supported on Windows 7 and later operating systems. For more information on WMI see: <u>MSDN</u>

USING NVWMI

NVWMI programs can be written in C and C++, Visual Basic, while managed programs can be written in C# or Visual Basic.NET. NVWMI scripts can be written in scripting languages that support Microsoft ActiveX script hosting, which includes Visual Basic Scripting Edition (VBScript), PowerShell, and Perl. Scripts can be hosted in Windows Script Host (WSH), Active Server Pages, and Internet Explorer.

Additionally, NVWMI can be used via command line or a standard UI within Windows. For more information on programming and scripting WMI, refer to the following links respectively:

- ▶ Programing WMI: MSDN
- ► Scripting WMI: <u>MSDN</u>

INSTALLING NVWMI

NVWMI can be installed in the following three ways:

- ▶ When the NVIDIA GPU driver is installed
- ► Via a standalone install
- Via command line install

When installing the full GPU driver, please be aware that NVWMI is not installed by default. To ensure that it is installed, it is necessary to customize the installation and ensure that the NVWMI check box is checked, as shown in Figure 1 and Figure 2 in the following procedure.

Note: Starting with Driver Version 320.29 (branch R319_00) and Driver Version 325.66 (branch R325_00), NVWMI will be installed by default.

INSTALLING NVWMI AS PART OF THE DRIVER

- 1. Download the full GPU driver from www.nvidia.com/drivers.
- 2. Double click the setup.exe.
- 3. Select Custom (Advanced Options) under "Installation options."



Figure 1. Custom Checkbox

4. Select the NVIDIA WMI checkbox under "Custom installation options."

 System Check License Agreement 	Custom installat	ion optic	ons	
Options	Component	New Version	Current Version	
	Graphics Driver	320.00	320.00	
Install	Vision Controller Driver			
Finish	3D Vision Driver			
	HD Audio Driver	1.3.24.2	1.3.24.2	
		2.12.0	2.12.0	
	Perform a clean installation A clean installation restore any profiles you have cre	es all NVIDIA settir ated.	gs to the default value	and remove

Figure 2. NVIDIA WMI Checkbox

5. Continue to install the driver and follow the on-screen instructions to complete the installation.

INSTALLING NVWMI FROM THE STANDALONE INSTALLER

- 1. Go to <u>www.nvidia.com/drivers</u>
- 2. Select the NVIDIA Enterprise Manager under "Beta, Older drivers and more."

📀 NVIDIA.			Search NVIDIA	USA - United States 🛛 👻	
DRIVERS > PRODUCTS >	COMMUNITIES > SUPP	DRT SHOP ABOUTI	IVIDIA +		
DOWNLOAD DRIVER	5				
NVIDIA Home > Download Drivers	NVIDIA Driver	Downloads			
TO PERFORM	Option 1: Manually find d	rivers for my NVIDIA products		Help	
GEFORCE® GTX 700 SERIES	Product Type:	Quadro	•		
	Product Series:	Quadro Series	•		
27	Product:	Quadro K5000	•		
	Operating System:	Windows 7 64-bit	•		
	Download Type:	Quadro ODE Graphics Driver	•		
	Language:	English (US)	SEARCH		
OUR LAUNCH	Option 2: Automatically f	ind drivers for my NVIDIA pro	ducts.	Learn More	
FAVORITE ONES				GRAPHICS DRIVERS	
	Beta, Older drivers and	i more.	Need help?		
ANDROID GAMING // PRE-ORDER YOURSI	Beta and Older Drive Unix Drivers	rs	 <u>Technical Support</u> Help Finding Drivers 		
Present Annual Annual	Quadro New Feature	Drivers	Help Installing Drivers Erequently Asked Questions		
GEFORCE® EXPERIENCE	NVIDIA Inview Deskto NVIDIA Enterprise Ma	nagement Toolkit (NVWMI)	File a Bug		
Keep your drivers	NVIDIA CUDA Driver	for MAC			

Figure 3. NVIDIA Enterprise Management Toolkit (NVWMI)

rsion:	2.12				
elease Date:	2013.05.02	12			
perating System:	Windows 7, W	/indows 8, Windows 8 64-bit, Windows	7 64-bit		
anguage:	English (U.S.)				
ile Size: 4.28 MB					
DOWN OF D					
DOWNLOAD					
RELEASE HICH	IL ICLITTE				
"NVIDIA Enterprise N NVIDIA NVS and NVID	Aanagement Toolkit NA Quadro products	(NVWMI) is a WMI based interface to t . It allows end-users & IT Managers to	he NVIDIA graphics driver available on configure and monitor various		
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3. Ensure to verify the minimum driver version is met and download the driver.

Figure 4. NVIDIA WMI Minimum Driver Requirements

4. Continue to install the driver and follow the on-screen instructions to complete the installation.

INSTALLING NVWMI VIA THE COMMAND LINE

Using the command line navigate to the extracted directory of the downloaded driver

Use command: setup.exe [switches][package]

Where:

- package = Display.NVWMI
- switches (most frequently used options as listed in Table 1)

Table 1.Most Frequently Used Switch Options

Switches	Description
-S	Silent install or uninstall
-k	Force a reboot after install or uninstall
-uninstall	Performs an uninstall instead of an install

To confirm if NVIDIA WMI is already installed, simply look in the list of programs available to change or uninstall in the Control Panel under Programs and Features heading.

<u>File Edit View Tools H</u> elp					
Control Panel Home View installed updates					
Turn Windows features on or off				··· • 🔞	
Install a program from the	Name	Publisher	Installed On	Size	Versic
network	NVIDIA GBU Computing SDK 4.0	NVIDIA Comparation	5/27/2011	JILL	4.0
	NVIDIA GPU Direct for Video SDK	NVIDIA	2/10/2012	10.2 MR	1.2.0
	NVIDIA Graphics Driver 320.00	NVIDIA Corporation	5/16/2012	10.2 1010	320.00
	NVIDIA GRID Pro Client	NVIDIA Corporation	3/28/2013		0.8
	NVIDIA HD Audio Driver 1 3 24 2	NVIDIA Corporation	5/16/2013		1 3 24
	NVIDIA nView 140 54	NVIDIA Corporation	5/16/2013		140.54
	NVIDIA OpenGL SDK 10	TWIER CORPORATION	11/23/2011		10.20
		NVIDIA Corporation	8/19/2010	7.26 MB	2100
	NVIDIA PhysX Plug-in for Autodesk Maya 2012 64 bit	NVIDIA Corporation	5/2/2011	152 MB	2.60.0
	NVIDIA Physic System Software 9.12.0213	NVIDIA Corporation	6/1/2012	102 110	9.12.0
	NVIDIA Quadro SDI Mercury Transmit Plugin for Adobe CS6	NVIDIA Corporation	5/4/2012	864 KB	1.0.0.0
	NVIDIA UI Composer	NVIDIA Corporation	5/10/2013	86.4 MB	5.0
	NVIDIA WMI 2.12.0	NVIDIA Corporation	6/5/2013		2.12.0
	NVRemote-Client-0.5.3	NVIDIA Corporation	6/3/2013	17.7 MB	0.5.3
	n Screen Display		8/19/2010		6.10.0
	OpenGL Extensions Viewer 3.0		10/12/2010		332
	Pandoras Box		3/7/2013		552
	III ParaView-3.12.0-RC2 a cross-platform, open-source visualization system	Kitware Inc.	10/25/2011		3.12.0
	2 Perforce Visual Components	Perforce Software	5/27/2011	59.5 MB	102.29
	BGD Darkton	DGD Composition	9/10/2010	71 0 MID	0120
	· · · · · · · · · · · · · · · · · · ·				•
	NVIDIA Corporation Product version: 2.12.0				

Figure 5. NVIDIA WMI in Control Panel

GPU SUPPORT

The following NVIDIA products support NVWMI:

- ▶ NVIDIA Quadro® K600
- ▶ Quadro® K6000
- Quadro K5000
- Quadro K4000
- Quadro K2000D
- ▶ Quadro K2000
- Quadro FX 5800
- ▶ Quadro FX 580
- Quadro FX 570
- Quadro FX 5600
- Quadro FX 4800
- Quadro FX 4700 X2
- Quadro FX 4600
- Quadro FX 380 Low Profile
- Quadro FX 3800
- Quadro FX 380
- Quadro FX 3700
- Quadro FX 370
- ▶ Quadro FX 3450
- Quadro FX 1800
- Quadro FX 1700
- Quadro CX

- Quadro 7000
- ▶ Quadro 6000
- Quadro 600
- Quadro 5000
- Quadro 410
- Quadro 4000 for Mac
- Quadro 4000
- Quadro 400
- Quadro 2000D
- Quadro 2000
- ► NVIDIA[®] NVS[®] 510
- ▶ NVS 450
- ► NVS 420
- NVS 315
- ► NVS 310
- ▶ NVS 300
- ▶ NVS 295
- ▶ NVS 290
- Quadro Plex S Series
- Quadro Plex Model IV
- Quadro Plex D Series
- Quadro Plex 7000

CONFIGURABLE AND/OR OBSERVABLE PARAMATERS

NVWMI provides information and configuration options for many areas of the GPU. Broadly, they can be categorized into the following key areas:

- ► System
- ► GPU
- ► Board
- Cooler and thermal details
- ► NVWMI performance counter



Figure 6. NVIDIA WMI API Help File

The full list of classes and methods for a specific version of NVWMI are detailed in the documentation that comes with that version. Over time there will be additional methods and classes available exposing more information and control.

DOCUMENTATION

Every version of NVWMI includes full documentation of all the classes and methods for that version. The help files are documented in a file 'nvwmi.chm' that is automatically installed, when NVWMI is installed along with the NVIDIA drivers.

Once NVWMI is installed in the end-user system, the help file (nvwmi.chm) is copied by the NVIDIA installer into a predefined location ("%ProgramFiles%\NVIDIA Corporation\NVIDIA WMI Provider\nvwmi.chm").

EXAMPLES OF USING NVWMI

This section provides examples of using NVWMI in both scripts and programs. While not exhaustive to all the ways NVWMI can be used and implemented, they are intended to be a useful starting point to highlight how to use NVWMI in different forms such as scripting and a managed program. Once installed the help file *nvwmi.chm*, as listed above, contains more detailed information and examples.

USING NVWMI TO SHOW GPU TEMPERATURE WITH POWER SCRIPT

PowerShell script that examines GPU class instances \$computer = "localhost" *# substitute with remote name as necessary* \$namespace = "root\CIMV2\NV"
\$classname = "ThermalProbe" # For local system (e.g. "LocalHost", ".") '-computername \$computer' could be omitted # retrieve all instances of the ThermalProbe class and store them: \$probes =Get-WmiObject -class \$classname -computername \$computer -namespace \$namespace \$probes # iterate through all Probe instances foreach(\$probe in \$probes) "Call the info() method and print all the data" \$res = \$probe.InvokeMethod("info",\$Null) \$res "Query just the temperature" \$temp = \$probe.temperature \$temp

Figure 7. NVIDIA WMI PowerShell Example

Running the script yield the following output:

PS C:\src\wmi> .\GpuTemp.ps1

GENUS	:	2
CLASS	:	ThermalProbe
SUPERCLASS	:	
DYNASTY	:	ThermalProbe
RELPATH	:	ThermalProbe.handle=256
PROPERTY_COUNT	:	4
DERIVATION	:	{}
SERVER	:	APAGE-LTW7
NAMESPACE	:	root\CIMV2\NV
PATH	:	<pre>\\MISC\root\CIMV2\NV:ThermalProbe.handle=256</pre>
handLe	:	256
temperature	:	52
thermalLevel	:	0
ver	:	System.Management.ManagementBaseObject
Call the info()	met	thod and print all the data
class: ThermalPr	obe	2
class version: 1	.3	.0
GPU handle: 0x10	0	
Thermal level: 0		
Temperature: 52	°C	

Query just the temperature 52

WORKING WITH WINDOWS PERFORMANCE MONITOR

The following is an example of the steps to add information about your NVIDIA GPU to the Windows performance monitor.

- 1. From the command prompt of from the search bar in the Start window, run perfmon.exe.
- 2. Browse to Performance->Monitoring Tools->Performance Monitor in the navigation bar.
- 3. Select item Add counters from context menu (right-click in graph area).
- 4. Select target system (local or remote).
- 5. Browse the list to find NVIDIA GPU.
- 6. Expand **NVIDIA GPU** item.

N Performance Monitor	window Holo		
Performance Monitoring Tor	🎯 🔍 🗮 🖌 🦨 🗙 🥒 💀 📋 🖼 🔍 🛙		
 Data Collector Reports 	Available counters Select counters from computer: <local computer=""> [NVIDIA GPU] % Fan Speed Available Memory (MB) Core Clock (MHz) Power Consumption (mW) Temperature (%C) Total Memory (MB) [Instances of selected object: #0 NVS 510 (d=256)</local>	Added gounters	
	All instances> Search Add >>	Remove << Miton Help OK Cancel Cor	3:22:40 PM 1:40 mputer AD-PC

Figure 8. Perfmon Counter Options

- 7. Select any counter from the list, multiple selections supported.
- 8. Select the instance of that counter from the instance list below.
- 9. Add the counter instance and press OK.
- 10. Choose appropriate graph scale and sampling rate.



Figure 9. Perfmon Counter Output

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