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Lenovo BIOS Setup using Windows Management Instrumentation Deployment Guide

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Note: Before using the information in this document, read Appendix C "Notices" on page 29.

Seventh Edition (March 2013)

Contents

Preface

The purpose of this guide is to explain how to modify BIOS passwords, settings, and boot order using Windows Management Instrumentation (WMI) through the Lenovo client-management interface. This guide is intended for skilled IT administrators who are familiar with configuring BIOS settings on computers in their organizations.

This guide is provided in a ZIP file package that contains this deployment guide as well as Visual Basic sample scripts to use when configuring BIOS settings.

This deployment guide is developed for IT professionals to assist with the unique challenges that they encounter. If you have suggestions or comments, communicate with your Lenovo® authorized representative. To learn more about the technologies that can help you lower the total cost of ownership and to check for periodic updates to this guide, visit the following Web site:
http://www.lenovo.com/support

Chapter 1. Overview

IT administrators are always looking for easier ways to manage client computer BIOS settings, which include passwords, hardware settings, and the boot order. The Lenovo BIOS WMI interface provides a simplified way to change these settings. Lenovo has developed a BIOS interface that can be manipulated through Windows Management Instrumentation (WMI). The Lenovo BIOS WMI interface enables IT administrators to make queries on current BIOS settings, restore settings to their factory defaults, change single settings, reset or change passwords, and modify the boot order either at client computers or remotely.

Using Windows Management Instrumentation

WMI is provided as a standard feature in most Windows® operating systems. It provides a powerful set of functions, such as query-based information retrieval and event notification, which enables users to manage both local and remote computers. The Lenovo BIOS WMI interface extends the capabilities of WMI to allow management of BIOS settings.

The following illustration shows how WMI can be used to access Lenovo BIOS settings.
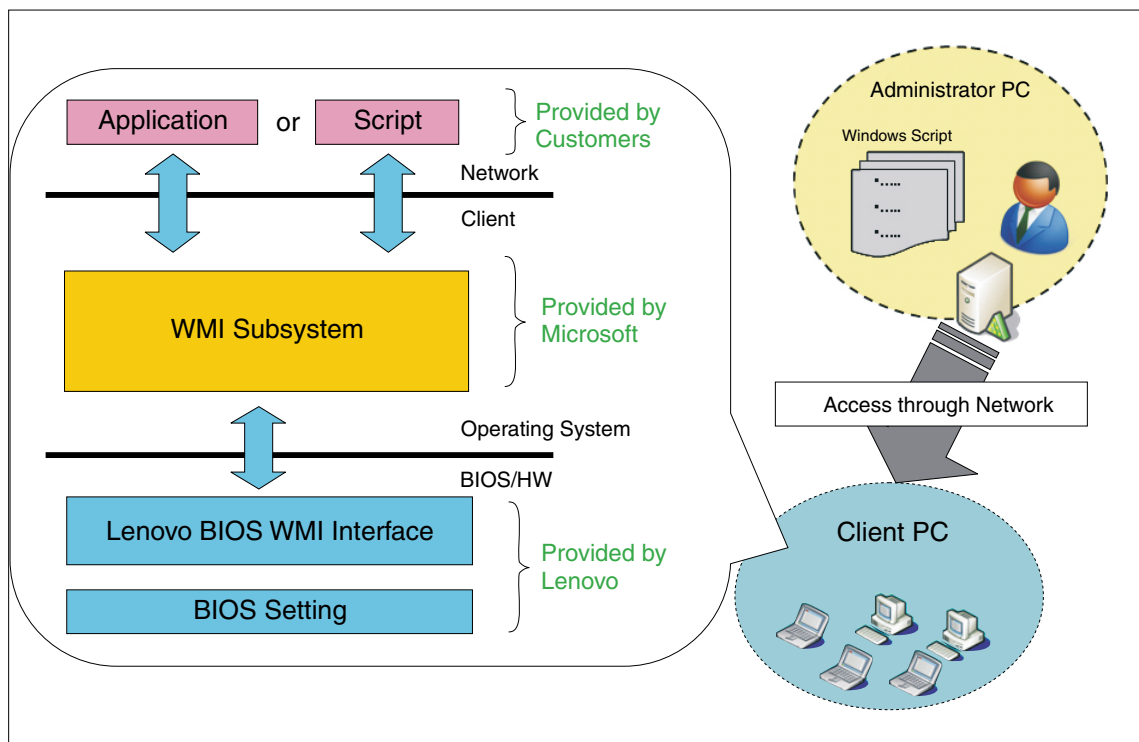
WMI uses Windows Script host (WSH) to interpret scripts. You can write your scripts in either Windows Visual Basic Scripting Edition (VBScript) or JavaScript.

Key benefits

The Lenovo BIOS WMI interface provides the following benefits:

Functions

• Flexible BIOS configuration, including the ability to change a single BIOS setting or all BIOS settings

- BIOS password management, including updating supervisor passwords, power-on passwords, and hard disk drive (HDD) passwords
- No dependency on a specific BIOS level

Environment

- Remote or local capabilities
- Support of unattended operations
- No software installation, including managed object format (MOF), required
- Replaces DOS-based BIOS configuration tools

Interface

- Easy to adopt for various management servers
- Replaces current SMI interface
- Common interface for different products

Supported computers

BIOS setup through WMI is supported on the following ThinkPad products only:

- R400, R500, T400, T500, W500, X200, X200s, X200 Tablet
- X301
- W700, W700ds, W701
- T400s
- X201, X201s, T410, T410s, T510, W510
- T420, T420i, T420s, T420si, T520, T520i, W520, X220, X220i, X220 Tablet, X220i Tablet
- X1
- T430, T430s, T430si, T530, W530
- X230, X230i, X230 Tablet
- L430, L530
- T430u
- X1 Carbon
- Helix
- X230s
- T431s

Chapter 2. Script classes and parameters

This chapter contains WMI implementation details for configuring BIOS settings.

Configuring BIOS settings

The following interface details can be used to access Lenovo BIOS settings.

- Namespace: "\root\WMI"
- Base Class: "Lenovo_BIOSElement"
- Interface details (see Table 1 "Interface Details" on page 3)

Table 1. Interface Details

Class Name	Type	Parameter / Return	Example
Lenovo_BiosSetting	Query	CurrentSetting: "Item,Value"	"WakeOnLAN,Enable"
Lenovo_SetBiosSetting	Method	"Item,Value,Password,Encoding, KbdLang;"	"WakeOnLAN,Disable,pswd, ascii,us;"
Lenovo_SaveBios Settings	Method	"Password,Encoding,KbdLang;"	"pswd,ascii,us;"
Lenovo_DiscardBios Settings	Method	"Password,Encoding,KbdLang;"	"pswd,ascii,us;"
Lenovo_LoadDefault Settings	Method	"Password,Encoding,KbdLang;"	"pswd,ascii,us;"
Lenovo_SetBios Password	Method	"PasswordType,CurrentPassword, NewPassword, Encoding,KbdLang;"	"pop,oldpop,newpop,ascii,us;"

Notes:

1. See Appendix A "Sample Visual Basic scripts for configuring BIOS settings" on page 17 for Visual Basic sample scripts.
2. See Appendix B "Sample PowerShell scripts for remote BIOS management" on page 25 for PowerShell sample scripts.
3. See Table 4 "List of available BIOS settings" on page 5 for a listing of acceptable setting names.

Return types

You will receive one of the following return types after making changes to BIOS settings:

Table 2. Return Types

Return Type	Description
Success	Operation completed successfully.
Not Supported	The feature is not supported on this system.
Invalid Parameter	The item or value provided is not valid.

Table 2. Return Types (continued)

Return Type	Description
Access Denied	The change could not be made due to an authentication problem. If a supervisor password exists, the correct supervisor password must be provided.
System Busy	BIOS changes have already been made that need to be committed. Reboot the system and try again

Password Authentication

If a supervisor password is already set, you must specify that supervisor password before you can change any BIOS settings.

The format for password parameters is "abc,ascii,us" with descriptions in the following table.

Table 3. Password parameters format, password authentication

Parameter	Description	Possible selections
Parameter 1	Current password	• "abc" - raw ascii character • "1e302e" - scancode
Parameter 2	Password encoding	• "ascii" • "scancode"
Parameter 3	Keyboard languages (valid only if encoding is "ascii")	• "us" - English US, English UK, Chinese-Traditional, Danish, Dutch, French-Canadian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Spanish-European, Spanish-Latin American, Swiss, Turkish • "fr" - French-European, Belgian • "gr" - German, Czech, Slovak, Slovenian

Available BIOS setting names

Some BIOS settings are dependent on the presence of certain hardware features. Settings might vary on different computers.

Notes:
1. BIOS settings and values are case sensitive.
2. The security-related options are not changed even if the "load default" is requested.

The numbers listed in the **Supported products** column in Table 4 "List of available BIOS settings" on page 5 mean the following:

1 - R400, R500, T400, T500, W500, X200, X200s, X200 Tablet

2 - X301

3 - W700, W700ds, W701

4 - T400s

5 - X201, X201s, T410, T410s, T510, W510

6 - T420, T420i, T420s, T420si, T520, T520i, W520, X220, X220i, X220 Tablet, X220i Tablet

7 - X1

8 - T430, T430s, T430si, T530, W530

9 - X230, X230i, X230 Tablet

10 - L430, L530

11 - T430u

12 - X1 Carbon

13 - Helix

14 - X230s

15 - T431s

Table 4. List of available BIOS settings

Item name	Selection name	Load default?	Supported products
WakeOnLAN	"Enable", "Disable"	N	1, 2, 3, 4
	"Enable", "Disable", "ACOnly", "ACandBattery"	N	5
		Y	6, 7, 8, 9, 10, 11, 14, 15
FlashOverLAN	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7
EthernetLANOptionROM	"Enable", "Disable"	N	1, 2, 3, 4, 5
		Y	6, 7, 8, 9, 10, 11, 14, 15
IPv4NetworkStack	"Enable", "Disable"	Y	8, 9, 10, 14, 15
IPv6NetworkStack	"Enable", "Disable"	Y	8, 9, 10, 14, 15
UefiPxeBootPriority	"IPv4First", "IPv6First"	Y	8, 9, 10, 14, 15
HarddriveDMA	"Enable", "Disable"	N	1, 2, 3, 4, 5
WirelessLANandWiMAXRadios	"Enable", "Disable"	Y	1, 2, 3, 4, 5
	"On", "Off"	Y	11
SerialPort	"Enable", "Disable"	Y	1
SerialPortIO	"3F8", "2F8", "3E8", "2E8"	Y	1
SerialPortIRQ	"3", "4", "5", "7"	Y	1
ParallelPort	"Enable", "Disable"	Y	1
ParallelPortMode	"OutputOnly", "BiDirectional", "ECP"	Y	1
ParallelPortIO	"378", "278", "3BC"	Y	1
ParallelPortIRQ	"5", "7"	Y	1

Table 4. List of available BIOS settings (continued)

Item name	Selection name	Load default?	Supported products
ParallelPortDMA	"0", "1", "3"	Y	1
PCIINTA	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTB	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTC	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTD	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTE	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTF	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTG	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
PCIINTH	"Disable", "Auto Select", "3", "4", "5", "6", "7", "9", "10", "11"	Y	1, 2, 3, 4, 5
USBBIOSSupport	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
AlwaysOnUSB	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15
AlwaysOnUSBMode	"Blackberry", "iPodiPhone", "OtherUSBDevices"	Y	4
	"Blackberry", "iPodiPhone", "OtherUSBDevices", "Automatic"	Y	5
USB30Mode	"Disable", "Enable", "Automatic"	Y	8, 9, 10, 11, 12, 13, 14, 15
TrackPoint	"Disable", "Automatic"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15
FnCtrlKeySwap	"Disable", "Automatic"	Y	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
TouchPad	"Disable", "Automatic"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15
FnKeyLock	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
ThinkPadNumLock	"Independent", "Synchronized"	Y	1, 2, 3, 4, 5, 6, 7

Table 4. List of available BIOS settings (continued)

Item name	Selection name	Load default?	Supported products
PowerOnNumLock	"Auto", "On", "Off"	Y	1, 2, 3, 4, 5, 6, 7
KeyboardIllumination	"ThinkLightOnly", "BacklightOnly", "Both"	Y	8, 9
PrimaryVideo	"PCIExpress", "Internal"	Y	1, 3
BootDisplayDevice	"LCD", "VGA", "DisplayPort", "DVI"	Y	1, 2, 3, 4
	"LCD", "VGA", "Digital", "Digital1onDock", "Digital2onDock"	Y	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
	"LCD", "Digital"	Y	11, 12
GraphicsDevice	"IntegratedGfx", "DiscreteGfx", "SwitchableGfx"	Y	1, 5, 6, 7, 8
	"IntegratedGfx", "NVIDIAOptimus"	Y	10
	"IntegratedGfx", "SwitchableGfx"	Y	11
OsDetectionForSwitchableGraphics	"Enable", "Disable"	Y	1, 5, 6, 7, 8, 10, 11
TimerWakeWithBattery	"Enable", "Disable"	Y	1, 2, 3, 4, 5
SpeedStep	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
SpeedStepModeAC	"MaximumPerformance" "BatteryOptimized", "MaximumBattery", "Automatic"	Y	1, 2, 3, 4, 5
SpeedStepModeBattery	"MaximumPerformance" "BatteryOptimized", "MaximumBattery", "Automatic"	Y	1, 2, 3, 4, 5
AdaptiveThermalManagementAC	"MaximizePerformance", "Balanced"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15
AdaptiveThermalManagementBattery	"MaximizePerformance", "Balanced"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15
CDRomSpeed	"High", "Normal", "Silent"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
CPUPowerManagement	"Disable", "Automatic"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
PCIPowerManagement	"Disable", "Automatic"	Y	1, 2, 3, 4, 5
PCIExpressPowerManagement	"Disable", "Automatic"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13
ExpressCardSpeed	"Generation1", "Automatic"	Y	8, 9, 10
OnByAcAttach	"Enable", "Disable"	Y	6, 7, 8, 9, 10, 12, 13, 14, 15
RapidStartTechnology	"Enable", "Disable"	Y	8, 9, 10, 11, 12, 13, 14, 15

Table 4. List of available BIOS settings (continued)

Item name	Selection name	Load default?	Supported products
PowerControlBeep	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7
LowBatteryAlarm	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7
PasswordBeep	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
KeyboardBeep	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
ExtendedMemoryTest	"Enable", "Disable"	Y	1, 2, 3, 4, 5
SATAControllerMode	"Compatibility", "AHCI"	Y	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
	"Compatibility", "AHCI", "RAID"	Y	3
CoreMultiProcessing	"Enable", "Disable"	N	1, 2, 3, 4, 5
		Y	6, 7, 8, 9, 10, 11, 12, 13, 14, 15
HyperThreadingTechnology	"Enable", "Disable"	Y	6, 7, 8, 9, 10, 11, 12, 13, 14, 15
VirtualizationTechnology	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
VTdFeature	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
AMTControl	"Enable", "Disable"	N	1, 2, 3, 4, 5
		Y	6, 7, 8, 9, 12, 13, 15
IDERForNormalBoot	"Hidden", "NotHidden"	N	1, 2, 3, 4
LegacyDevicesOnMiniDock	"Enable", "Disable"	N	1
HardwarePasswordManager	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15
Passphrase	"Enable", "Disable"	N	1, 2, 3, 4, 5
LockBIOSSetting	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
MinimumPasswordLength	"Disable", "4", "5", "6", "7", "8", "9", "10", "11", "12"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
BIOSPasswordAtUnattendedBoot	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
BIOSPasswordAtReboot	"Enable", "Disable"	N	6, 7, 8, 9, 10, 11, 12, 13, 14
FingerprintPredesktopAuthentication	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15
FingerprintReaderPriority	"External", "InternalOnly"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15
FingerprintSecurityMode	"Normal", "High"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15
FingerprintPasswordAuthentication	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15

Table 4. List of available BIOS settings (continued)

Item name	Selection name	Load default?	Supported products
SecurityChip	"Active", "Inactive", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15
PhysicalPresenceForTpmProvision	"Enable", "Disable" **Note:** It is not supported to set this feature to "Disable" because of security reason.	N	8, 9, 10, 11, 12, 13, 15
PhysicalPresenceForTpmClear	"Enable", "Disable" **Note:** It is not supported to set this feature to "Disable" because of security reason.	N	8, 9, 10, 11, 12, 13, 15
TXTFeature	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15
BIOSUpdateByEndUsers	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
SecureRollBackPrevention	"Enable", "Disable" **Note:** It is not supported to set this feature to "Disable" because of security reason.	N	8, 9, 10, 11, 12, 13, 14, 15
DataExecutionPrevention	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
EthernetLANAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15
WirelessLANAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
WiMAXAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
WirelessWANAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
BluetoothAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
WirelessUSBAccess	"Enable", "Disable"	N	1, 2, 3, 4
ModemAccess	"Enable", "Disable"	N	1, 3, 4, 5, 6
USBPortAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
IEEE1394Access	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7
SerialPortAccess	"Enable", "Disable"	N	1
ParallelPortAccess	"Enable", "Disable"	N	1
CardBusSlotAccess	"Enable", "Disable"	N	1, 2, 3, 4
ExpressCardAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Table 4. List of available BIOS settings (continued)

Item name	Selection name	Load default?	Supported products
PCIExpressSlotAccess	"Enable", "Disable"	N	1, 3
UltrabayAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
MemoryCardSlotAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
SmartCardSlotAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8
SensorHubAccess	"Enable", "Disable"	N	13
IntegratedCameraAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
MicrophoneAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
FingerprintReaderAccess	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,12, 14, 15
eSATAPortAccess	"Enable", "Disable"	N	3, 4, 5, 6, 7, 8, 9, 10, 15
NfcAccess	"Enable", "Disable"	N	13
ComputraceModuleActivation	"Enable", "Disable"	N	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
FullTheftProtectionModuleActivation	"Enable", "Disable"	N	1, 2, 4
RemoteDisableModuleActivation	"Enable", "Disable"	N	1, 2, 4
ATpModuleActivation	"Enable", "Disable"	N	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
SecureBoot	"Enable", "Disable" **Note:** It is not supported to set this feature to "Disable" because of security reason.	N	8, 9, 10, 11, 12, 13, 14, 15
BootMode	"Quick", "Diagnostics"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
StartupOptionKeys	"Enable", "Disable"	Y	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
BootDeviceListF12Option	"Enable", "Disable"	N	1, 2, 3, 4, 5
		Y	6, 7, 8, 9, 10, 11, 12, 13, 14, 15
BootOrder	"HDD0", "HDD1", "HDD2", "PCILAN", "ATAPICD0", "ATAPICD1", "USBFDD", "USBCD", "USBHDD", "NODEV"	Y	1, 2, 3, 4, 5
	"HDD0", "HDD1", "HDD2", "HDD3", "HDD4", "PCILAN", "ATAPICD0", "ATAPICD1", "ATAPICD2", "USBFDD", "USBCD", "USBHDD",	Y	6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Table 4. List of available BIOS settings (continued)

Item name	Selection name	Load default?	Supported products
	"OtherHDD", "OtherCD"		
NetworkBootOrder	"HDD0", "HDD1", "HDD2", "PCILAN", "ATAPICD0", "ATAPICD1", "USBFDD", "USBCD", "USBHDD", "NODEV"	Y	1, 2, 3, 4, 5
NetworkBoot	"HDD0", "HDD1", "HDD2", "HDD3", "HDD4", "PCILAN", "ATAPICD0", "ATAPICD1", "ATAPICD2", "USBFDD", "USBCD", "USBHDD", "OtherHDD", "OtherCD"	Y	6, 7, 8, 9, 10, 11, 14, 15
BootOrderLock	"Enable", "Disable"	Y	6, 7, 8, 9, 10, 11, 12, 13, 14, 15
RapidBoot	"Normal", "Diagnostics", "Rapid"	Y	7
ReserveMemoryForUEFIBootManager	"Enable", "Disable"	N	7
DuplicityCfg	"Enable", "Disable"	Y	7

Chapter 3. Typical usage

Through WMI, you can configure BIOS settings in the following ways:

- List BIOS settings
- Change BIOS settings
- Change the boot order (sometimes referred to as the startup sequence)
- Load default BIOS settings

Listing current BIOS settings

For a list of all available BIOS settings that can be changed through WMI on a specific computer, use the Lenovo_BiosSetting class (see "List all BIOS settings on the local computer" on page 17 and "List all BIOS settings on the remote computer" on page 20 for sample scripts).

See Table 4 "List of available BIOS settings" on page 5 for a list of available BIOS settings.

Changing BIOS settings

To change a BIOS setting, complete the following steps:

1. Identify the BIOS setting you want to change using the Lenovo_BiosSetting class (see "List all BIOS settings on the local computer" on page 17 and "List all BIOS settings on the remote computer" on page 20 for sample scripts).
2. Identify the value to which the setting will be changed.

   Note: See Table 4 "List of available BIOS settings" on page 5 for a list of available values for a particular setting.

3. Change the BIOS setting to the desired value using the Lenovo_SetBiosSetting class, then use the Lenovo_SaveBiosSetting class to save the settings (see "Set a single BIOS setting on the local computer" on page 18 and "Set a single BIOS setting on a remote computer" on page 20 for sample scripts).

   Note: BIOS settings and values are case sensitive.

After making changes to the BIOS settings, you must reboot the computer before the changes will take effect.

Changing the boot order

To change the boot order, complete the following steps:

1. Determine the current setting for "BootOrder" by using the Lenovo_BiosSetting class (see "List all BIOS settings on the local computer" on page 17 and "List all BIOS settings on the remote computer" on page 20 for sample scripts).
2. To set a new boot order, use the Lenovo_SetBiosSetting class, then use the Lenovo_SaveBiosSetting class to save the settings (see "Set a single BIOS setting on the local computer" on page 18 and "Set a single BIOS setting on a remote computer" on page 20 for sample scripts). Specify a new boot order by listing the boot devices in order, separated by colons. Devices that are not specified are excluded from the boot order. In the following example, the CD drive 0 is the first boot device and hard disk drive 0 is the second startup device.

   ```
   ATAPICD0:HDD0
   ```

Restoring default settings

To restore default BIOS settings, use the Lenovo_LoadDefaultSettings class, then use the Lenovo_SaveBiosSettings class to save the BIOS changes (see sample scripts).

Changing an existing hardware password

To update a password, specify a password type and format the password. The format for password parameters is "pop,abc,def,ascii,us" with descriptions in Password parameters format, changing existing hardware password (see "Set a supervisor password on the local computer when a supervisor password exists" on page 22 and "Set a supervisor password on a remote computer when a supervisor password exists" on page 23 for sample scripts).

Table 5. Password parameters format, changing existing hardware password

Parameter	Description	Possible selections
Parameter 1	Password type string	• "pap": Supervisor • "POP": Power-on • "uhdp1": User HDP 1 • "mhdp1": Master HDP 1 • "uhdp2": User HDP 2 • "mhdp2": Master HDP 2 • "uhdp3": User HDP 3 • "mhdp3": Master HDP 3
Parameter 2	Current password string	• "abc" - raw ascii character • "1e302e" - scancode
Parameter 3	New password string	• Raw ascii "def" • Scan code "201221"
Parameter 4	Password encoding	• "ascii" • "scancode"
Parameter 5	Keyboard languages	• "us" - English US, English UK, Chinese-Traditional, Danish, Dutch, French-Canadian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Spanish-European, Spanish-Latin American, Swiss, Turkish • "fr" - French-European, Belgian • "gr" - German, Czech, Slovak, Slovenian

Limitations

The following WMI limitations exist for BIOS setup:

• BIOS settings cannot be changed at the same boot as power-on passwords (POP) and hard disk passwords (HDP). If you want to change BIOS settings and POP or HDP, you must reboot the system after changing one of them.

• A password cannot be set using this method when one does not already exist. Passwords can only be updated or cleared.

Chapter 4. Security

WMI-based administration scripts operating over a remote connection send data over the network in clear text by default. You can enhance security by modifying WMI-based administration scripts to establish an encrypted remote connection as follows:

1. Set an impersonation level of "impersonate"

2. Set an authentication level of "pktPrivacy"

See Appendix A "Sample Visual Basic scripts for configuring BIOS settings" on page 17 for sample scripts used to implement WMI-based administration scripts that include these parameters for encryption.

Appendix A. Sample Visual Basic scripts for configuring BIOS settings

The Visual Basic command line scripts in the ZIP file are examples that you may find helpful when configuring BIOS settings.

The scripts in the ZIP file can be used as-is on Windows XP, Windows Vista, or Windows 7 to modify BIOS settings on your Lenovo computer. The scripts can be executed on a command prompt using the cscript.exe utility. On Windows Vista and Windows 7, you must run the scripts from an administrator command prompt.

Note: The scripts in this appendix are for reference only. To copy and paste scripts, use the scripts in the ZIP file.

Restore default settings

Use the example scripts in the ZIP file as templates to restore default settings on the local computer.

Syntax: `cscript.exe LoadDefaults.vbs`
Example: `cscript.exe LoadDefaults.vbs`

```
'
' Load default BIOS settings
'
On Error Resume Next
Dim colItems

strComputer = "LOCALHOST"    ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
  &"{ImpersonationLevel=Impersonate}!\\" & strComputer & "\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_LoadDefaultSettings")

strReturn = "error"
For Each objItem in colItems
  ObjItem.LoadDefaultSettings ";", strReturn
Next

WScript.Echo " LoadDefaultSettings: " + strReturn

If strReturn <> "Success" Then
  WScript.Quit
End If

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
  ObjItem.SaveBiosSettings ";", strReturn
Next

WScript.Echo " SaveBiosSettings: " + strReturn
```

List all BIOS settings on the local computer

Use the sample scripts in the ZIP file as templates to list all BIOS settings and values on the local computer.

Syntax: `cscript.exe ListAll.vbs` **Example**: `cscript.exe ListAll.vbs`

```
'
' List all BIOS settings
'
On Error Resume Next
Dim colItems

strComputer = "LOCALHOST"    ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate}!\\" & strComputer & "\root\wmi")
Set colItems = objWMIService.ExecQuery("Select * from Lenovo_BiosSetting")

For Each objItem in colItems
   If Len(objItem.CurrentSetting) > 0 Then
      Setting = ObjItem.CurrentSetting
      StrItem = Left(ObjItem.CurrentSetting, InStr(ObjItem.CurrentSetting, ","))
 - 1)
      StrValue = Mid(ObjItem.CurrentSetting, InStr(ObjItem.CurrentSetting, ","))
 + 1, 256)
      WScript.Echo StrItem + " = " + StrValue
   End If
Next
```

Set a single BIOS setting on the local computer

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on the local computer.

Syntax: cscript.exe SetConfig.vbs [Item] [Value]**Example**: cscript.exe SetConfig.vbs WakeOnLAN Disable

```
'
' Set specific BIOS Setting
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 2 Then
   WScript.Echo "SetConfig.vbs [setting] [value]"
   WScript.Quit
End If

strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) + ";"

strComputer = "LOCALHOST"    ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate}!\\" & strComputer & "\root\wmi")
Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SetBiosSetting")

For Each objItem in colItems
   ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo " SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
   WScript.Quit
End If
```

```
Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
   ObjItem.SaveBiosSettings ";", strReturn
Next

WScript.Echo strRequest
WScript.Echo " SaveBiosSettings: " + strReturn
```

Set a single BIOS setting on the local computer if a supervisor password exists

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on the local computer if a supervisor password exists.

Syntax: `cscript.exe SetConfigPassword.vbs [Item] [Value]`
`[Password + Encoding]`
Example: `cscript.exe SetConfigPassword.vbs WakeOnLAN Disable pass,ascii,us`

```
'
' Set specific BIOS Setting
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 3 Then
   WScript.Echo "SetConfigPassword.vbs [setting] [value] [password + encoding]"
   WScript.Quit
End If

strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) + "," +
 WScript.Arguments(2) + ";"

strComputer = "LOCALHOST"    ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate}!\\" & strComputer & "\root\wmi")
Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SetBiosSetting")

For Each objItem in colItems
   ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo " SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
   WScript.Quit
End If

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
   ObjItem.SaveBiosSettings WScript.Arguments(2) + ";", strReturn
Next
```

```
WScript.Echo strRequest
WScript.Echo " SaveBiosSettings: " + strReturn
```

List all BIOS settings on the remote computer

Use the sample scripts in the ZIP file as templates to list all BIOS settings and values on a remote computer.

Syntax: cscript.exe ListAllRemote.vbs [Hostname]**Example**: cscript.exe ListAllRemote.vbs mattdev-c5

```
'
' List all BIOS settings
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 1 Then
  WScript.Echo "ListAllRemote.vbs [hostname]"
  WScript.Quit
End If

strComputer = WScript.Arguments(0)

Set objWMIService = GetObject("WinMgmts:" _
  &"{ImpersonationLevel=Impersonate," _
  &"authenticationLevel=pktPrivacy}!\\" _
  & strComputer & "\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_BiosSetting")

For Each objItem in colItems
  If Len(objItem.CurrentSetting) > 0 Then
    Setting = ObjItem.CurrentSetting
    StrItem = Left(ObjItem.CurrentSetting, InStr(ObjItem.CurrentSetting, ",")
 - 1)
    StrValue = Mid(ObjItem.CurrentSetting, InStr(ObjItem.CurrentSetting, ",")
 + 1, 256)
    WScript.Echo StrItem + " = " + StrValue
  End If
Next
```

Set a single BIOS setting on a remote computer

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on a remote computer.

Syntax: cscript.exe SetConfigRemote.vbs [Item] [Value] [Hostname]**Example**: cscript.exe SetConfigRemote.vbs WakeOnLAN Disable mattdev-c5

```
'
' Set specific BIOS Setting
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 3 Then
```

```
   WScript.Echo "SetConfigRemote.vbs [setting][value][hostname]"
   WScript.Quit
End If

strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) + ";"

strComputer = WScript.Arguments(2)

Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate," _
   &"authenticationLevel=pktPrivacy}!\\" _
   & strComputer & "\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SetBiosSetting")

For Each objItem in colItems
   ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo " SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
   WScript.Quit
End If

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
   ObjItem.SaveBiosSettings ";", strReturn
Next

WScript.Echo strRequest
WScript.Echo " SaveBiosSettings: " + strReturn
```

Set a single BIOS setting on a remote computer when a supervisor password exists

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on a remote computer when a supervisor password exists.

Syntax: `cscript.exe SetConfigPasswordRemote.vbs [Item] [Value]`
`[Password + Encoding] [Hostname]`**Example**: `cscript.exe SetConfigPasswordRemote.vbs WakeOnLAN`
`Disable pass,ascii,us mattdev-c5`

```
'
' Set specific BIOS Setting
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 4 Then
   WScript.Echo "SetConfigPasswordRemote.vbs [setting][value]
 [password + encoding][hostname]"
   WScript.Quit
End If
```

```
strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) + "," +
 WScript.Arguments(2) + ";"

strComputer = WScript.Arguments(3)

Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate," _
   &"authenticationLevel=pktPrivacy}!\\" _
   & strComputer & "\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SetBiosSetting")

For Each objItem in colItems
   ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo " SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
   WScript.Quit
End If

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
   ObjItem.SaveBiosSettings WScript.Arguments(2) + ";", strReturn
Next

WScript.Echo strRequest
WScript.Echo " SaveBiosSettings: " + strReturn
```

Set a supervisor password on the local computer when a supervisor password exists

Use the sample scripts in the ZIP file as templates to set a supervisor password on the local computer when a supervisor password exists.

Note: You cannot set a supervisor password if one does not already exist.

Syntax: `cscript.exe SetSupervisorPassword.vbs [Old Password] [New Password]`
`[encoding]`
Example: `cscript.exe SetSupervisorPassword.vbs oldpass newpass ascii,us`

```
'
' Update Admnistrator Password
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 3 Then
   WScript.Echo "SetSupervisorPassword.vbs [old Password] [new Password]
[encoding]" WScript.Quit
End If
```

```
strRequest = "pap," + WScript.Arguments(0) + "," + WScript.Arguments(1) + "," +
WScript.Arguments(2) + ";"

strComputer = "LOCALHOST"    ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate}!\\" & strComputer & "\root\wmi")
Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SetBiosPassword")

strReturn = "error"
For Each objItem in colItems
   ObjItem.SetBiosPassword strRequest, strReturn
Next

WScript.Echo " SetBiosPassword: "+ strReturn
```

Set a supervisor password on a remote computer when a supervisor password exists

Use the sample scripts in the ZIP file as templates to set the supervisor password on a remote computer when a supervisor password exists.

Note: You cannot set a supervisor password if one does not already exist.

Syntax: `cscript.exe SetSupervisorPasswordRemote.vbs [Old Password]`
`[New Password] [encoding] [Hostname]`**Example**: `cscript.exe SetSupervisorPasswordRemote.vbs oldpass newpass ascii,us mattdev-c5`

```
'
' Update Admnistrator Password
'
On Error Resume Next
Dim colItems

If WScript.Arguments.Count <> 4 Then
   WScript.Echo "SetSupervisorPasswordRemote.vbs [old Password]
 [new Password] [encoding] [hostname]"
   WScript.Quit
End If;
strRequest = "pap," + WScript.Arguments(0) + "," + WScript.Arguments(1)
+ "," + WScript.Arguments(2) + "*"

strComputer = WScript.Arguments(3)

Set objWMIService = GetObject("WinMgmts:" _
   &"{ImpersonationLevel=Impersonate," _
   &"authenticationLevel=pktPrivacy}!\\" _
   & strComputer & "\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from Lenovo_SetBiosPassword")

strReturn = "error"
For Each objItem in colItems
   ObjItem.SetBiosPassword strRequest, strReturn
Next

WScript.Echo " SetBiosPassword: "+ strReturn
```

Appendix B. Sample PowerShell scripts for remote BIOS management

The following PowerShell scripts are examples that can be used with management servers.

Get all current BIOS settings

Use the following script as a template to display all current BIOS settings on the local computer.

<Command>
```
gwmi -class Lenovo_BiosSetting -namespace root\wmi | ForEach-Object
{if ($_.CurrentSetting -ne "") {Write-Host $_.CurrentSetting.replace(","," = ")}}
```

To obtain the current BIOS settings from a remote computer on your network, replace test-pc with the computer name of the target computer in the following command. You will be prompted to enter the userid and password of the administrator-level account for the remote computer.

<Command>
```
gwmi -class Lenovo_BiosSetting -namespace root\wmi -ComputerName test-pc
-credential
(get-credential) | ForEach-Object {if ($_.CurrentSetting -ne "")
{Write-Host $_.CurrentSetting.replace(","," = ")}}
```

<Sample output>
```
PS C:\> gwmi -class Lenovo_BiosSetting -namespace root\wmi -ComputerName test-pc
-credential (get-credential) | ForEach-Object {if ($_.CurrentSetting -ne "")
{Write-Host $_.CurrentSetting.replace(","," = ")}}

cmdlet get-credential at command pipeline position
1 Supply values for the following parameters:
Credential
WakeOnLAN = Enable
FlashOverLAN = Enable
EthernetLANOptionROM = Enable
HarddriveDMA = Enable
WirelessLANandWiMAXRadios = On
SerialPort = Disable
SerialPortIO = 3F8
SerialPortIRQ = 4
ParallelPort = Enable
ParallelPortMode = BiDirectional
ParallelPortIO = 3BC
ParallelPortIRQ = 7
ParallelPortDMA = 0
PCIINTA = 11
PCIINTB = 11
PCIINTC = 11
PCIINTD = 11
PCIINTE = 11
PCIINTF = 11
PCIINTG = 11
PCIINTH = 11
USBBIOSSupport = Enable
AlwaysOnUSB = Disable
TrackPoint = Automatic
TouchPad = Automatic
FnKeyLock = Disable
```

```
ThinkPadNumLock = Independent
PowerOnNumLock = Auto
SpeedStep = Enable
SpeedStepModeAC = Automatic
SpeedStepModeBattery = BatteryOptimized
AdaptiveThermalManagementAC = MaximizePerformance
AdaptiveThermalManagementBattery = Balanced
CDROMSpeed = Normal
CPUPowerManagement = Automatic
PCIPowerManagement = Automatic
PowerControlBeep = Enable
LowBatteryAlarm = Enable
PasswordBeep = Disable
KeyboardBeep = Enable
ExtendedMemoryTest = Disable
SATAControllerMode = Compatibility
CoreMultiProcessing = Enable
VirtualizationTechnology = Disable
LegacyDevicesOnMiniDock = Enable
Passphrase = Enable
LockBIOSSetting = Disable
MinimumPasswordLength = Disable
BIOSPasswordAtUnattendedBoot = Enable
PasswordResetService = Enable
FingerprintPredesktopAuthentication = Enable
FingerprintReaderPriority = External
FingerprintSecurityMode = Normal
SecurityChip = Inactive
BIOSUpdateByEndUsers = Enable
DataExecutionPrevention = Enable
EthernetLANAccess = Enable
WirelessLANAccess = Enable
WiMAXAccess = Enable
WirelessWANAccess = Enable
BluetoothAccess = Enable
WirelessUSBAccess = Enable
ModemAccess = Enable
USBPortAccess = Enable
IEEE1394Access = Enable
SerialPortAccess = Enable
ParallelPortAccess = Enable
CardBusSlotAccess = Enable
ExpressCardAccess = Enable
PCIExpressSlotAccess = Enable
PrimaryVideo = Internal
BootDisplayDevice = LCD
TimerWakeWithBattery = Disable
UltrabayAccess = Enable
MemoryCardSlotAccess = Enable
SmartCardSlotAccess = Enable
IntegratedCameraAccess = Enable
MicrophoneAccess = Enable
BootMode = Quick
StartupOptionKeys = Enable
BootDeviceListF12Option = Enable
BootOrder = USBFDD:ATAPICD0:USBCD:HDD0:PCILAN:USBHDD:HDD
NetworkBootOrder = PCILAN:USBFDD:ATAPICD0:USBCD:HDD0:USBHDD:HDD1
PS C:\>
```

Show a particular BIOS setting

Use the sample scripts in the ZIP file as templates to display the current value of a specified setting. Replace "AlwaysOnUSB" with the name of the setting to be queried.

```
gwmi -class Lenovo_BiosSetting -namespace root\wmi | Where-Object
{$_.CurrentSetting.split(",",[StringSplitOptions]::RemoveEmptyEntries) -eq
"AlwaysOnUSB"}
| Format-List CurrentSetting
```

Remote computer:

‹Command›

```
gwmi -class Lenovo_BiosSetting -namespace root\wmi -ComputerName test-pc -credential
(get-credential) | Where-Object {$_.CurrentSetting.split(",",[StringSplitOptions]
::RemoveEmptyEntries) -eq "AlwaysOnUSB"} | Format-List CurrentSetting
```

‹Sample output›

```
PS C:\> gwmi -class Lenovo_BiosSetting -namespace root\wmi -ComputerName test-pc
-credential (get-credential) | Where-Object {$_.CurrentSetting.split(",",
[StringSplitOptions]::RemoveEmptyEntries) -eq "AlwaysOnUSB"}
| Format-List CurrentSetting

cmdlet get-credential at command pipeline position 1
Supply values for the following parameters:
Credential

CurrentSetting : AlwaysOnUSB,Disable
```

Setting a BIOS setting

Use the following script as a template to set the value of a setting. Replace "WakeOnLAN,Disable" with the item and value of your choice.

Note: The setting string is case sensitive and should be in the format "‹item, ‹value›".

‹Command›

```
(gwmi -class Lenovo_SetBiosSetting
-namespace root\wmi).SetBiosSetting ("WakeOnLAN,Disable")


__GENUS     : 2
__CLASS     : __PARAMETERS
__SUPERCLASS   :
__DYNASTY     : __PARAMETERS
__RELPATH    :
__PROPERTY_COUNT   : 1
__DERIVATION   : {}
__SERVER    :
__NAMESPACE   :
__PATH     :
return    : Success

PS C:\> (gwmi -class Lenovo_SaveBiosSettings -namespace root\wmi).
SaveBiosSettings

MemberType    : Method
OverloadDefinitions : {System.Management.ManagementBaseObject
 SaveBiosSettings(System.String parameter)}
TypeNameOfValue   : System.Management.Automation.PSMethod
Value    : System.Management.ManagementBaseObject
 SaveBiosSettings(System.String parameter)
Name     : SaveBiosSettings
```

```
IsInstance    : True


PS C:\>
```

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(1P) P/N:

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