

# VMware Mirage Installation Guide

VMware Mirage 5.9

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# Mirage Installation

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The *VMware Mirage Installation Guide* provides information about how to install and deploy the Mirage components and prepare the system to centralize endpoint devices.

Installing the system involves installing the Mirage Management server, console, and server components, and associated applications that facilitate, for example, file portal access.

## Intended Audience

This information is intended for anyone who wants to install Mirage. The information is written for experienced Windows system administrators who are familiar with typical Windows Data Center environments such as Active Directory, SQL, and MMC.



# Mirage System Components

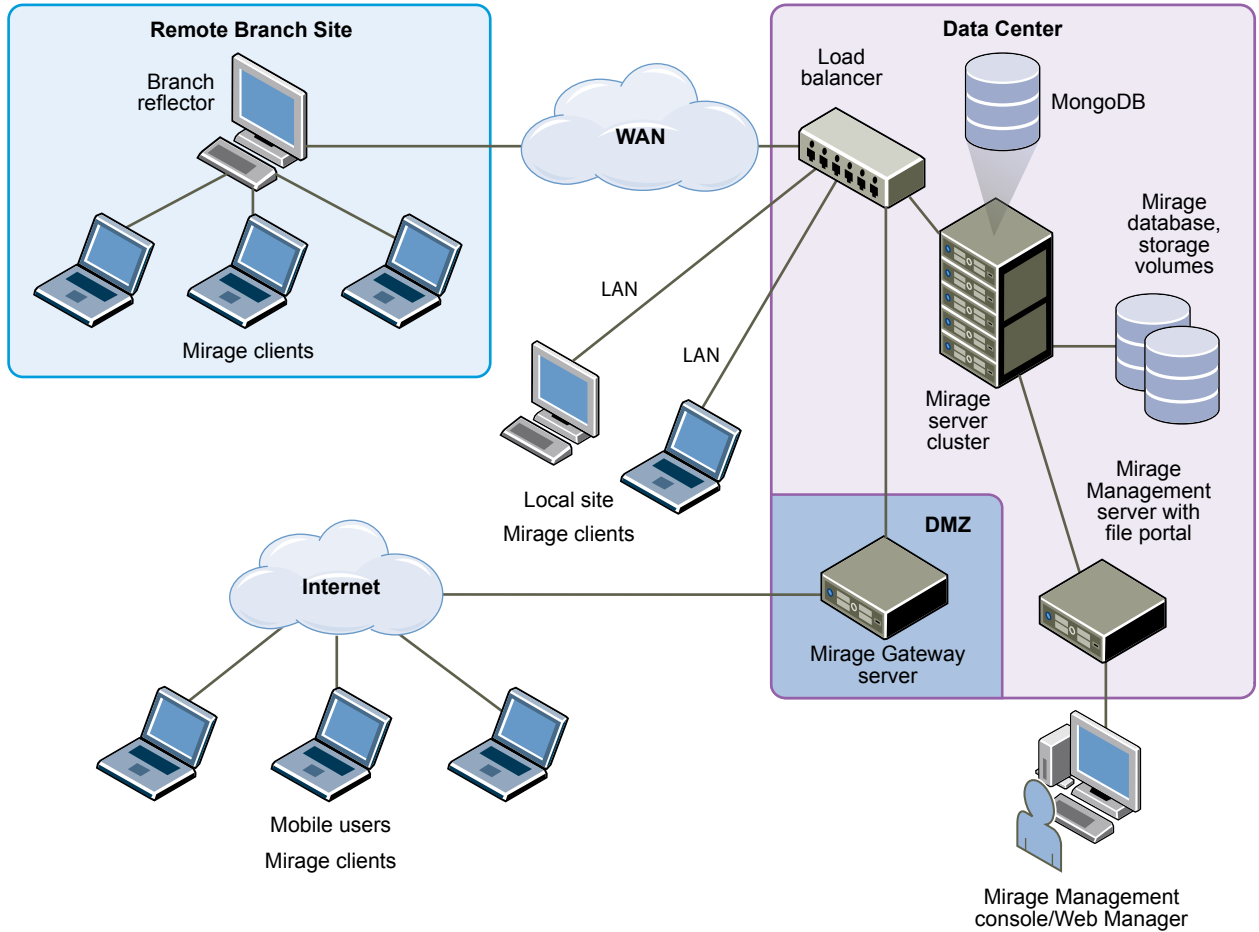
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Mirage software centralizes the entire desktop contents in the data center for management and protection purposes, distributes the running of desktop workloads to the endpoints, and optimizes the transfer of data between them.

The Mirage components integrate into a typical distributed infrastructure, with the following relationships between the system components:

- Mirage clients connect to a Mirage server, either directly or through a load balancer.
- The administrator connects to the system through the Mirage Management server.
- Mirage servers and the Mirage Management server share access to the back end Mirage database and storage volumes. Any server can access any volume.

**Figure 1-1. System Components**



## Mirage Client

The Mirage client software runs on the base operating system and makes sure the images at the endpoint and the CVD are synchronized. The client does not create or emulate a virtual machine. No virtual machines or hypervisors are required. The Mirage client software can run on any Type 1 or Type 2 hypervisor.

## Mirage Management Server

The Mirage Management server, located in the data center, is the component that controls and manages the Mirage server cluster. Installing multiple Mirage Management servers increases Mirage availability in the event that a Mirage Management server fails.

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**NOTE** VMware recommends to set up multiple Management Servers to prevent data loss in case the Management Server fails. A message pops up in the Mirage Management Console whenever you connect to a server inside a cluster with only one enabled Mirage Management server.

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## Mirage Management Console (Optional)

The Mirage Management console is an optional graphical user interface used for scalable maintenance, management, and monitoring of deployed endpoints. The administrator can use the Mirage Management console to configure and manage Mirage clients, base layers, app layers, and reference machines. The administrator uses the Mirage Management console to update and restore CVDs.



## MongoDB File Database

Mirage uses the MongoDB file database to store system data and small files, reducing IOPS and upload time. A MongoDB instance is installed with each Mirage Management server that you install.

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**NOTE** VMware recommends that you replicate the file database by installing an additional Mirage Management server to achieve a fault tolerance deployment.

If your configuration has only one Mirage Management Server, the Web Management displays a red banner with the following message:

**Your system has a single active Management Server. Set up multiple Management Servers to prevent data loss in case the Management Server fails. Important: Do not clone the VM.**

If there is more than one management server, but any of the management servers is down or disabled, the following text is displayed:

**Some of the Mongo nodes on your system are down, if all nodes are down Mirage operations will fail. View the Management Servers tab for details. After resolving the issue start the Management Server via Management Servers tab. For more information refer to KB2144975.**

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After you install two Mirage Management servers Mirage creates a replica of the MongoDB database.

Verify that you have a dedicated drive with at least 250GB of free disk space for the MongoDB database files. If you cannot designate a local drive or SAN for the MongoDB database files, designate a dedicated NAS volume on higher-end storage with lower latency to minimize disconnects between MongoDB and the MongoDB files.

As an administrator, you can move the MongoDB data of a selected Mirage Management Server to a different location. This feature is enabled only after installing more than one Mirage Management Server. In your Web Management, click **Servers > Management Servers > Configure**. In the Configure Mirage Management Server dialog, enter the name of the location where you move the MongoDB data and click **OK**.

## Mirage Web Management

The Mirage Web Management is the Web-based application that is used for scalable maintenance, management, and monitoring of deployed endpoints. Mirage Web Management has roles such as Helpdesk, Data Protection manager, Image Manager, and Administrator. Data Protection Manager ensures data is properly backed up and protected on user devices. Image manager can capture and deploy layers, provision new devices, and manage branch reflectors. The administrator role has the highest level of permissions and can preform all operations in the system including managing servers. It helps administrator and help desk personnel respond to service queries, and lets the Protection Manager role ensure that user devices are protected. The administrator can use the Mirage Management console to configure and manage Mirage clients, base layers, app layers, and reference machines. The administrator uses the Mirage Management console to update and restore CVDs. For more information, see the *VMware Mirage Web Management Guide*.

## Mirage Server

The Mirage servers, located in the data center, synchronize data between the Mirage client and the datacenter. The Mirage servers also manage the storage and delivery of base layers, app layers, and CVDs to clients, and consolidate monitoring and management communications. You can deploy multiple servers as a server cluster to manage endpoint devices for large enterprise organizations. It is good practice to keep the server on a dedicated machine or a virtual machine. However, a server can run on the same machine as the Mirage Management server.

The server machine must be dedicated for the Mirage server software to use. The server machine must not be used for other purposes.

## Centralized Virtual Desktop

CVDs represent the complete contents of each PC. This data is migrated to the Mirage server and becomes the copy of the contents of each PC. You use the CVD to centrally manage, update, patch, back up, troubleshoot, restore, and audit the desktop in the data center, regardless of whether the endpoint is connected to the network. A CVD comprises several components.

**Table 1-1.** CVD Components

Component	Defined By (Role)	Description
Base layer	Administrator	The base layer includes the operating system (OS) image and core applications such as antivirus, firewall, and Microsoft Office. A base layer is used as a template for desktop content, cleared of specific identity information, and made suitable for central deployment to a large group of endpoints.
App layers	Administrator	App layers include sets of one or more departmental or line-of-business applications, and any updates or patches for already installed applications. App layers are suitable for deployment to a large number of endpoints.
Driver profile	Administrator	The driver profile specifies a group of drivers for use with specific hardware platforms. These drivers are applied to devices when the hardware platforms match the criteria that the administrator defines in the driver profile.
User-installed applications and machine state	End users	User-installed applications and machine state can include a unique identifier, host name, any configuration changes to the machine registry, DLLs, and configuration files.

## Mirage Reference Machine

A Mirage reference machine is used to create a standard desktop base layer for a set of CVDs. This layer usually includes OS updates, service packs, patches, corporate applications for all target end users to use, corporate configurations, and policies. A reference machine is also used to capture app layers, which contain departmental or line-of-business applications and any updates or patches for already installed applications.

You can maintain and update reference machines regularly over the LAN or WAN, using a Mirage reference CVD in the data center. You can use the reference CVD at any time as a source for base and app layer capture.

## Mirage Branch Reflector

A Mirage branch reflector is a peering service role that you can enable on any endpoint device. A branch reflector can then serve adjacent clients in the process of downloading and updating base or app layers on the site, instead of the clients downloading directly from the Mirage server cluster. A branch reflector can significantly reduce bandwidth use in several situations, such as during mass base or app layer updates. The branch reflector also assists in downloading hardware drivers.

## Mirage File Portal

End users can use appropriate Mirage login credentials and the Mirage file portal to access their data from any Web browser. The back-end component runs on the Management server.

## Distributed Desktop Optimization

The Distributed Desktop Optimization mechanism optimizes transport of data between the Mirage server and clients, making the ability to support remote endpoints feasible regardless of network speed or bandwidth. Distributed Desktop Optimization incorporates technologies that include read-write caching, file and block-level deduplication, network optimization, and desktop streaming over the WAN.

## Mirage Gateway Server

The Mirage Gateway server is the secure gateway server that is deployed outside the Mirage data center environment, but should be within the datacenter. The Mirage Gateway server meets the enterprise security and firewall requirements and provides a better user experience for Mirage clients that access the Mirage servers through the Internet. The Mirage Gateway server seamlessly integrates with the Mirage system with minor modifications to the Mirage system and protocol.



# Planning the Mirage Deployment

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Deploying the Mirage system involves ensuring that various requirements of its hardware components, the Mirage Management server, Mirage Management console, Mirage server components, and associated software applications, are satisfied.

The Mirage components support a range of operating systems. Software, hardware, and database requirements apply to each component. The Mirage system and clients use default communication ports and protocols.

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**NOTE** You must install the Mirage Management Server and all Mirage cluster components within the same LAN. You cannot install Mirage storage and servers in a branch office and the Mirage Management server in the data center. You can install endpoints, including branch reflectors, remotely.

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This chapter includes the following topics:

- [“Operating System Requirements,”](#) on page 14
- [“Hardware Requirements,”](#) on page 15
- [“Software Requirements,”](#) on page 17
- [“Database Requirements,”](#) on page 18
- [“Ports and Protocols Used by Mirage,”](#) on page 18

## Operating System Requirements

Before you deploy Mirage, verify that the operating system requirements for each Mirage component that you install are satisfied.

**Table 2-1.** Operating System Requirements for Mirage Components

Component	Requirements
Mirage client	<ul style="list-style-type: none"> <li>■ Windows XP Professional with SP3, 32-bit</li> <li>■ Windows Vista Business or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 7 Professional or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 8.0 and 8.1 Professional or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 10 Enterprise 32-bit and 64-bit</li> <li>■ Windows Server 2012 R2 standard or Datacenter Edition (Supported as a Branch Reflector only)</li> <li>■ Windows Embedded Point of Service (WEPOS), 32-bit</li> <li>■ Windows Embedded POSReady 2009, 32-bit</li> <li>■ Windows Embedded POSReady 7, 32-bit and 64-bit</li> </ul> <p><b>IMPORTANT</b></p> <ul style="list-style-type: none"> <li>■ only supports updating WEPOS to POSReady 2009 as part of a base layer update procedure.</li> <li>■ Enable virtual memory on Windows Embedded POSReady7 images before installing Mirage.</li> </ul>
Mirage server	<ul style="list-style-type: none"> <li>■ Windows Server 2008 R2 with SP1 Standard or Enterprise Edition, 64-bit</li> <li>■ Windows Server 2012 Standard Edition, 64-bit</li> <li>■ Windows Server 2012 R2 Standard or Datacenter Edition</li> <li>■ Domain membership required.</li> </ul>
Mirage Management server	<ul style="list-style-type: none"> <li>■ Windows Server 2008 R2 with SP1 Standard or Enterprise Edition, 64-bit</li> <li>■ Windows Server 2012 Standard Edition, 64-bit</li> <li>■ Windows Server 2012 R2 Standard or Datacenter Edition</li> <li>■ Domain membership required</li> </ul>
Mirage file portal	<ul style="list-style-type: none"> <li>■ Windows Server 2008 R2 with SP1 Standard or Enterprise Edition, 64-bit</li> <li>■ Windows Server 2012 Standard Edition, 64-bit</li> <li>■ Windows Server 2012 R2 Standard or Datacenter Edition</li> <li>■ Domain membership required</li> </ul>
Mirage Web Management	<ul style="list-style-type: none"> <li>■ Windows Server 2008 R2 with SP1 Standard or Enterprise Edition, 64-bit</li> <li>■ Windows Server 2012 Standard Edition, 64-bit</li> <li>■ Windows Server 2012 R2 Standard or Datacenter Edition</li> <li>■ Domain membership required</li> </ul>
Mirage Management console	<ul style="list-style-type: none"> <li>■ Windows XP Professional with SP3, 32-bit</li> <li>■ Windows Vista Business or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 7 Professional or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 8.0 and 8.1 Professional or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 10 64-bit</li> <li>■ Windows Server 2008 R2 with SP1 Standard or Enterprise Edition, 64-bit</li> <li>■ Windows Server 2012 Standard Edition, 64-bit</li> <li>■ Windows Server 2012 R2 Standard or Datacenter Edition</li> </ul>

**Table 2-1.** Operating System Requirements for Mirage Components (Continued)

Component	Requirements
Mirage reference machine	<ul style="list-style-type: none"> <li>■ Windows XP Professional with SP3, 32-bit</li> <li>■ Windows 7 Professional or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 8.1 Professional or Enterprise, 32-bit and 64-bit</li> <li>■ Windows 10 64-bit</li> </ul>
Mirage Gateway server	The Mirage Gateway server runs on the SUSE Linux Enterprise Server 12 operating system. The OS is deployed during the Mirage Gateway installation.

**NOTE** Mirage Web Management is recommended over Mirage Image Service Management Console. The Mirage Web Management provides a modern and intuitive user experience and is generally recommended over the legacy Mirage Management Console.

**NOTE** Windows XP Fast User Switching mode must be disabled if the computer is not an AD domain member.

The following actions on a Windows 8 device are blocked:

- Assign App layers (not as part of OS migration)
- Assign Base Layers
- Enforce layers (assigned as part of the migration process)

## Hardware Requirements

Before you deploy Mirage, verify that the hardware requirements for each Mirage component that you install are satisfied.

**Table 2-2.** Hardware Requirements for Mirage Components

Component	Requirements
Mirage client	<ul style="list-style-type: none"> <li>■ Client systems: <ul style="list-style-type: none"> <li>■ Enterprise-class laptops and desktops Virtual machines compatible with Windows XP SP2 or later, Windows Vista or Windows 7</li> </ul> </li> <li>■ Minimum RAM: 512 MB for Windows XP, 1 GB for Windows Vista, Windows 7, Windows 8, and Windows 8.1 and 1 GB for Windows 10 64-bit</li> <li>■ Client installation and normal operation: At least 5 GB of free space</li> </ul>
Mirage server node (up to 1000 clients when policy includes uploads or 5,000 clients using Layer Management Only policy )	<ul style="list-style-type: none"> <li>■ Minimum RAM: 8 GB</li> <li>■ Minimum CPU: 4 vCPU</li> <li>■ Minimum System Drive capacity: 146 GB, including 100 GB for the Mirage network cache</li> </ul> <p>Mirage SIS storage is not included.</p> <ul style="list-style-type: none"> <li>■ 2 x Gigabit Ethernet Port</li> </ul> <p><b>NOTE</b> It is good practice to separate client network and storage network access to dedicated ports.</p>
Mirage server node (up to 1500 clients when policy includes uploads or 5,000 clients using Layer Management Only policy )	<ul style="list-style-type: none"> <li>■ Minimum RAM: 16 GB</li> <li>■ Minimum CPU: 8 vCPU or dual Quad-Core Processor, 2.26 GHz Intel core speed</li> <li>■ Minimum System Drive capacity: 146 GB, including 100 GB for the Mirage network cache</li> </ul> <p>Mirage SIS storage is not included.</p> <ul style="list-style-type: none"> <li>■ 2 x Gigabit ethernet port</li> </ul> <p><b>NOTE</b> It is good practice to separate client network and storage network access to dedicated ports.</p>

**Table 2-2.** Hardware Requirements for Mirage Components (Continued)

Component	Requirements
Mirage storage	<ul style="list-style-type: none"> <li>■ Standalone Mirage server: <ul style="list-style-type: none"> <li>■ Direct Attached Storage (DAS)</li> <li>■ Storage Area Network (SAN) connected through iSCSI or Fiber Channel (FC)</li> <li>■ Network Attached Storage (NAS) connected through iSCSI, Fiber Channel (FC), or CIFS network share</li> </ul> </li> <li>■ Mirage server cluster: Network Attached Storage (NAS) connected using a CIFS network share. A Windows-based NAS (CIFS share or a file server) can be used for up to 500 endpoints. An enterprise-grade NAS devices is required for more than 500 endpoints.</li> <li>■ Alternate Data Streams: NAS through CIFS share must support Alternate Data Streams. To verify that the NAS device conforms with the Mirage requirements, use the <code>Wanova.Server.Tools.exe NasCompatibilityTest</code>.  See the VMware knowledge base article at <a href="http://kb.vmware.com/kb/2070000">http://kb.vmware.com/kb/2070000</a></li> <li>■ Storage Capacity: Consumed capacity varies, depending on file duplication level across CVDs, base layers, and the number of snapshots stored, but on average, each user requires 15 GB of data center storage.</li> <li>■ Storage Performance: A minimum of 1.2 IOPS per CVD is required for Mirage steady-state (incremental) uploads. For the centralization phase, higher performance might be needed. Consult with VMware or its partners for the appropriate requirements.</li> <li>■ Enabling Compression: For DAS, SAN (FC, iSCSI), and Windows-based NAS (CIFS shares), you can realize up to 40% in storage savings by enabling the built-in Windows NTFS compression on your <code>MirageStorage</code> folder. For NAS systems that are not NTFS, you need to leverage the systems' compression options.  <b>Note</b> Apply this change only when <code>Mirageservices</code> are stopped. Also consider making this change before the directory is heavily populated .</li> </ul>
Mirage Management Server	<ul style="list-style-type: none"> <li>■ Minimum RAM: 8 GB.</li> <li>■ Minimum CPU: 1 Quad-Core Processor or 4 vCPUs in virtual configuration, 2.26GHz Intel core speed or equivalent</li> <li>■ Minimum local drive capacity: At least 250 GB of free space for MongoDB database files.</li> <li>■ The local storage should reside on a low latency (&lt;5ms) device.</li> </ul>
Mirage Management console	<ul style="list-style-type: none"> <li>■ Minimum RAM: 512 MB and 1 GB for Windows 10 64-bit .</li> <li>■ Network connectivity to the Mirage Management server</li> <li>■ Minimum screen resolution: 1280 x 1024</li> </ul>
Mirage File Portal	<ul style="list-style-type: none"> <li>■ Minimum RAM: 512 MB.</li> <li>■ Network connectivity to the Mirage Management server</li> <li>■ Minimum screen resolution: 1280 x 1024</li> </ul>
Mirage Web Management Console	<ul style="list-style-type: none"> <li>■ Minimum RAM: 512 MB.</li> <li>■ Network connectivity to the Mirage Management server</li> <li>■ Minimum screen resolution: 1280 x 1024</li> </ul>
Mirage Gateway server	<ul style="list-style-type: none"> <li>■ 4 core CPU, 2.26 GHz Intel core speed or equivalent</li> <li>■ 4 GB RAM</li> <li>■ 40 GB available disk space</li> <li>■ 1 x Gigabit Ethernet port</li> </ul>
Microsoft SQL Server 2014	Use the recommended Microsoft Hardware and Software Requirements for Installing SQL Server 2014.
Microsoft SQL Server 2012	Use the recommended Microsoft Hardware and Software Requirements for Installing SQL Server 2012.



**Table 2-2.** Hardware Requirements for Mirage Components (Continued)

Component	Requirements
Microsoft SQL Server 2008 R2	Use the recommended Microsoft Hardware and Software Requirements for Installing SQL Server 2008 R2.
Network	<ul style="list-style-type: none"> <li>■ For steady-state operations, a minimum bandwidth of 15 Kbps is required for each endpoint.</li> <li>■ For centralization operations, contact VMware Support to calculate the required minimum bandwidth based on the CVD size, the length of the centralization operation, connectivity time, and so on.</li> </ul>

## Software Requirements

This section lists all of the software required for installing the Mirage components. Before you deploy Mirage, verify that the software requirements are satisfied for each Mirage component that you install.

**Table 2-3.** Software Requirements for Mirage Components

Component	Requirements
Mirage client	<p>Microsoft .NET Framework version 3.5 SP1 on Windows XP 32-bit POSReady 2009. Microsoft .NET Framework 4.5 for Windows Vista and Windows 7.</p> <p><b>NOTE</b> Microsoft .NET Framework 4.5 is used in Mirage clients to enable the use of TLS 1.2. If you do not have Microsoft .NET Framework 4.5, Mirage client work with TLS 1.0.</p> <p><b>NOTE</b> Windows 8.0, 8.1, and Windows 10 come pre-installed with .NET Framework 4.5.</p>
Mirage server	<ul style="list-style-type: none"> <li>■ Microsoft .NET Framework version 4.5.1 or later.</li> <li>■ For the file portal, an IIS 7.0 or later installation, the IIS 6 Management Compatibility Role, and the ASP.NET feature. Both options are within the IIS installation and are not selected by default.</li> </ul>
Mirage Management server	<ul style="list-style-type: none"> <li>■ Microsoft .NET Framework version 3.5 or later.</li> <li>■ When you specify the MongoDB database file location for a Windows 2008 R2, install the hotfix in <a href="https://support.microsoft.com/en-us/kb/967351">https://support.microsoft.com/en-us/kb/967351</a>.</li> </ul>
Mirage Management console	<ul style="list-style-type: none"> <li>■ Microsoft .NET Framework version 4.5.1 or later.</li> <li>■ Microsoft Management Console version 3.0 or later.</li> </ul>
Mirage reference machine	<ul style="list-style-type: none"> <li>■ Mirage client.</li> <li>■ The OS and applications installed on the reference machine must use volume licenses and be designed for multiuser and multimachine deployment.</li> <li>■ Verify that the reference machine does not include the following items: <ul style="list-style-type: none"> <li>■ Applications that install and use hardware-specific licenses.</li> <li>■ Applications that install and use local user accounts, local groups, or both.</li> <li>■ Software that uses a proprietary update service. Such software must be installed directly on endpoints.</li> </ul> </li> </ul>
Mirage file portal	<ul style="list-style-type: none"> <li>■ Microsoft IIS 7 or later.</li> <li>■ Microsoft .NET Framework version 4.5.1 or later.</li> </ul>
Mirage Web Management	<ul style="list-style-type: none"> <li>■ Microsoft IIS 7.0 or later.</li> <li>■ Microsoft .NET Framework 4.5.1 or later.</li> </ul>

## Database Requirements

Before you deploy Mirage, verify that all database software requirements are satisfied.

**Table 2-4.** Database Software Requirements for Mirage Components

Component	Requirements
Database software	<ul style="list-style-type: none"> <li>■ Windows Installer 4.5 (MS KB942288) or later</li> <li>■ Microsoft SQL Server 2012 64-bit SP1 Express, Standard, and Enterprise editions</li> <li>■ Microsoft SQL Server 2008 64-bit R2 Express, Standard, and Enterprise editions</li> <li>■ Microsoft SQL Server 2014 Express, Standard, and Enterprise editions</li> <li>■ Microsoft SQL Server 2016 Express, Standard and Enterprise editions</li> <li>■ <b>NOTE</b> If you install SQL Server 2008 R2 on Windows Server 2012, you must install Service Pack 1 or later.</li> </ul> <p>MS SQL Server must be set up with Windows Authentication. The Windows account used for installing Mirage must have <b>dbcreator</b> privileges, and the user account running the Mirage server services must be configured with access privileges to the Mirage database.</p>

## Database Sizing Requirements

**Table 2-5.** Mirage Database Sizing Guidelines

Mirage Cluster Size	Minimum System Requirements
Mirage cluster with fewer than 5000 endpoints	<p>Microsoft SQL Server 2008 Express R2, Microsoft SQL Server 2012 Express, Microsoft SQL Server 2014 Express, Standard, and Enterprise editions</p> <hr/> <p>At least one CPU, 2.0 GHz or faster</p> <hr/> <p>At least 1 GB RAM</p>
Mirage cluster with more than 5000 endpoints	<p>Microsoft SQL Server 2008 Standard R2, Microsoft SQL Server 2012 Standard, Microsoft SQL Server 2014 Express, Standard, and Enterprise editions</p> <hr/> <p>At least two CPUs, 2.0 GHz or faster</p> <hr/> <p>At least 4 GB RAM</p>

The database sizing requirements for Mirage are based on the Microsoft hardware and software requirements for installing SQL Server 2008 R2.

## Ports and Protocols Used by Mirage

The Mirage system and clients use default communication ports. Make sure that the correct ports and protocols are selected for the system.

The Mirage Management server and Mirage servers use external communications to communicate with the Mirage clients or the Mirage Management console, and internal communications to communicate with each other.

**Table 2-6.** Ports and Protocols for Mirage Components

Component	Communications	Port	Protocol	Notes
Mirage service	External	8000	TCP/IP or SSL/TLS	The only port required for communications between Mirage clients and servers. <b>NOTE</b> SSL/TLS is optional and can be enabled. See <a href="#">“Install an SSL Server Certificate for the Mirage Server,”</a> on page 26.
Mirage Branch Reflector	External	8001	TCP/IP	Used for communication between the branch reflector and the local peers at the remote site.
Mirage Management service	External	8443 , 1443	TCP/IP	Used for communication between the Mirage Management console and the Mirage Management service. SOAP Message-level Security is applied.
Mirage Server service	Internal	135, 445	TCP/IP	Used for control communication between the Mirage Management service and the Mirage server. <b>NOTE</b> You can limit access to this port to incoming connections from the Mirage Management service host.
File portal	Internal	6080, 6443	TCP/IP	Used to access the file portal.
Mirage Web Management	Internal	7080, 7443	TCP/IP	Used to access the Web Management.
Mirage Gateway server	Internal	8000	TCP/IP	Used for communication between the Mirage Gateway server and the Mirage server. <b>NOTE</b> The port must have DNS update access.
	Internal	389, 636	TCP/IP LDAP or LDAPS	Used for communications between the Mirage Gateway server and the LDAP servers.
	Internal	8080 /8 443	TCP/IP	Used for communications between the Mirage Gateway server and the Mirage Management server. Used for the Mirage Gateway Web console.
	External	8000	TLS/SSL	Used for communication between the Mirage client and the Mirage Gateway server.
	Internal	8093	TCP/IP	Used for communication between Mirage Gateway authentication service and Mirage Management Server.
Mirage API	Internal	7443	HTTPS	
MongoDB File Database	Internal	27017, 27018	TCP/IP	Used to communicate with the MongoDB nodes located on each Mirage server and Mirage Management server.



# Installing the Mirage System

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The Mirage deployment involves a number of components, which you must install in a specific order.

## Prerequisites

- Verify that all hardware and software prerequisites are fulfilled.
- Verify that you have a valid license for the system.
- Verify that the latest version of the Mirage software is downloaded from the support site.
- Verify that the SQL server is installed and reachable. The SQL browser service must be started to allow remote connections. Verify that firewall settings allow remote connections on the SQL server host.
- Prepare the required database information, or install a new database instance to use with Mirage.
- Verify that antivirus software running on the server machine excludes Mirage server folders and processes from scanning.
  - Server folders, including the Mirage storage directory folder and the local cache directory, for example, `C:\ProgramData\Wanova Mirage\LocalCache`.
  - Server processes, for example, `Wanova.Server.Service.exe`.
- You must have **dbcreator** privileges to create the Mirage database in the SQL express database. If you do not have these privileges, ask the database administrator to create the database and then designate you as the database creator.

## Procedure

- 1 [Worksheet for Installing the Mirage Management Server](#) on page 23  
When you install the Mirage Management server, the installation wizard prompts you to configure certain options. You must prepare your configuration options before you install the Management server.
- 2 [Install the Mirage Management Server](#) on page 24  
The Mirage Management server is the component that controls and manages the Mirage server cluster.
- 3 [Install a Mirage Server](#) on page 25  
The Mirage server manages the storage and delivery of base and app layers and CVDs to clients, and consolidates monitoring and management communications. After you install and license the Mirage Management server, you can install Mirage servers.
- 4 [Install IIS](#) on page 29  
You must install Windows Internet Information Services (IIS) 7.0 before installing the Mirage file portal or the Mirage Web Management.

- 5 [Install the Web Management](#) on page 31  
You install the Mirage Web Management using the Web Management .msi file provided in the installation package.
- 6 [Install the Mirage File Portal](#) on page 31  
Install the Mirage file portal so that end users can view files in their CVD snapshots from a Web browser. End users can access the file portal with the appropriate login credentials.
- 7 [Install the Mirage Management Console](#) on page 32  
The Mirage Management console is the graphical user interface used to perform scalable maintenance, management, and monitoring of deployed endpoints. The Management console is built as a Microsoft Management Console version 3.0 snap-in.
- 8 [Connect the Console to the Mirage System](#) on page 33  
After you install the Mirage Management console, you can connect the console to the Mirage system.
- 9 [Installing the Mirage Gateway Server](#) on page 34  
The Mirage Gateway server is a secured gateway server that is deployed outside the Mirage data center environment.
- 10 [Installing the Mirage Client](#) on page 45  
You can install the Mirage client by running the .msi installer file. Administrators can also push out the client installer silently, without disturbing user operations, by using command-line arguments.
- 11 [Install SSRS for the Mirage Web Console](#) on page 47  
SQL Server Reporting Services (SSRS) is a server-based software system that can generate Mirage reports.
- 12 [Configure SSRS for the Mirage Image Service Management Server](#) on page 48  
After you install SSRS for the Mirage Web management, you must configure SSRS settings for the Mirage Image Service Management server.
- 13 [Install the Mirage PowerCLI](#) on page 49  
Mirage PowerCLI provides a Windows PowerShell interface for command-line access to administration tasks.
- 14 [Managing VMware Mirage Software Licenses](#) on page 49  
The VMware Mirage Management server requires a license. The license file enforces the number of CVDs that you can run on your system and the duration of the license agreement.
- 15 [Configure the Environment for Endpoints](#) on page 50  
Before you can attach endpoints to your system, you need to perform a minimum configuration, which includes configuring the Web URL for the file portal, importing USMT settings, and performing domain joining operations .

## Worksheet for Installing the Mirage Management Server

When you install the Mirage Management server, the installation wizard prompts you to configure certain options. You must prepare your configuration options before you install the Management server.

**Table 3-1.** Configuration Options for Installing the Mirage Management Server

Option	Description	Your Value
SQL server name and instance	<p>Select the SQL server name and instance.</p> <ul style="list-style-type: none"> <li>■ SQLEXPRESS is defined as the default SQL instance for the SQL Server Express edition.</li> <li>■ You can type the server name without an SQL instance when using a default unnamed instance such as SQL Standard. Alternatively, you can type the SQL instance name that is configured in your environment.</li> <li>■ MSSQL is defined as the default SQL instance for the SQL Server Enterprise edition.</li> <li>■ Use the default SQL instance name if your Microsoft SQL Server edition was installed with default options, or the custom instance name if you defined a custom name.</li> </ul>	
Storage areas	<p>Use the <b>Create new storage areas</b> option if this is a new installation of the system or if you do not want to keep the current data.</p> <p>Do not select the <b>Create new storage areas</b> check box when upgrading the Mirage Management server. If you select this option and enter the path to the original storage area, your entire Mirage installation, including base layer, app layer, CVD data, and so on, are deleted and become irretrievable if a backup is unavailable.</p>	
Services account configuration	<p>You can use a local system account or a specific user account.</p> <p>Use a local system account for evaluation purposes only. When you use a local system account verify that all of the components are installed on the same machine. The components are the Mirage Management server, the Mirage Image Service server, the SQL server, and the Mirage volume.</p> <p>If these components are not installed on the same machine, you must use a specific user account.</p>	

**Table 3-1.** Configuration Options for Installing the Mirage Management Server (Continued)

Option	Description	Your Value
	Use of a specific ser account requires use of login credentials. VMware recommends running the Mirage service a specific user account.	

## Install the Mirage Management Server

The Mirage Management server is the component that controls and manages the Mirage server cluster.

When you install Mirage Management servers, Mirage installs an instance of MongoDB file database to store small files, which reduces IOPS and upload time. It is important to install additional Mirage Image Service Management servers to create a replica of MongoDB files, which ensures data availability and system fault tolerance.

When you install multiple Mirage Management servers, Mirage configures the MongoDB instances as a single node. To achieve a fault tolerance deployment, you need a minimum of three server machines. Two of the server machines should have a Mirage Management server installed, and one server machine should have the Mirage server installed on it.

In the installation process, you are prompted to join the VMware Customer Experience Improvement Program (CEIP). If you join CEIP, the CEIP tool collects technical data from the Mirage database and log files, and sends the data to VMware on a daily basis. Before the data is sent to VMware, the identification details are removed and the data is encrypted in your systems or servers. If you do not join CEIP during the Mirage Image Service Management server installation, you can join CEIP by updating the CEIP settings in the Web Management. See the *VMware Mirage Web Management Guide*.

### Prerequisites

- Verify that you have local administrator privileges on the Mirage Management server machine.
- Verify that you have **db\_creator** privileges on the SQL Server.
- Verify that you have **dbo** permissions on the MongoDB database.
- The relevant software requirements are met. See [“Software Requirements,”](#) on page 17.
- You have a dedicated drive with at least 250 GB of free disk space for the MongoDB database files. If you cannot designate a local drive or SAN for the MongoDB database files, designate a dedicated NAS volume on higher-end storage with lower latency to minimize disconnection between MongoDB and the MongoDB files.
- VMware recommends that you install two or more Mirage Management servers so that Mirage remains available in the event of system or storage failure.
- Do not use the same drive for Mirage storage and MongoDB database files. Also, you need to provide separate MongoDB database paths when installing multiple Mirage Management Servers.



**Procedure**

- 1 Start the installation wizard.

Option	Action
<b>.msi file</b>	<ul style="list-style-type: none"> <li>■ Double-click the <code>mirage.management.server.x64.buildnumber.msi</code> file to start the installation wizard.</li> </ul>
<b>Command prompt</b>	<ul style="list-style-type: none"> <li>■ Access the command prompt as an administrator and run the <code>.msi</code> installation file.</li> </ul> <p>Use this option if you are not a local administrator.</p>

- 2 Follow the prompts to install the Mirage Management server.

Use the configuration information that you gathered in the [“Worksheet for Installing the Mirage Management Server,”](#) on page 23.

The Mirage Management server is installed.

**What to do next**

- Set the SQL server recovery model to simple.
- Install a Mirage server. See [“Install a Mirage Server,”](#) on page 25.
- If you plan to use Mirage PowerCLI, you must enable the WCF HTTP Activation option in Windows Server 2008 R2 and Windows Server 2012. See the *VMware Mirage API Programming Guide*.
- In the event that you install a single Mirage Management server, install an additional Mirage Management server to ensure fault tolerance and maintain data availability.

## Install a Mirage Server

The Mirage server manages the storage and delivery of base and app layers and CVDs to clients, and consolidates monitoring and management communications. After you install and license the Mirage Management server, you can install Mirage servers.

You can deploy multiple servers as a server cluster to manage endpoint devices for large organizations. With multiple servers and storage volumes, enterprise organizations can store, manage, and protect end-user device data for large numbers of managed endpoint devices. For more information, see [Deploying Additional Mirage Servers](#) in the *VMware Administrator’s Guide*.

The Mirage server uses local cache, a storage of popular data blocks, to perform data deduplication over the WAN. When large files are transferred, their blocks are kept in the cache, and the next time similar files need to be transferred, the server obtains the blocks from the cache instead of over the network. It is good practice to keep the cache on fast storage, for example, on a local drive or even on an SSD drive.

The server installation process includes the default option to set up SSL, which requires an SSL Certificate to be installed on the server. See [“Install an SSL Server Certificate for the Mirage Server,”](#) on page 26.

If SSL is not implemented during server installation, you can implement it after the server is installed. See [Configuring Secure Socket Layer Communication](#) in the *VMware Mirage Administrator’s Guide*.

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**IMPORTANT** Disabling SSL encryption is not recommended as this mode of connection is not secure.

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**Procedure**

- 1 [Install an SSL Server Certificate for the Mirage Server](#) on page 26

To set up SSL on the Mirage server, you must obtain SSL certificate values and configure them on the server. SSL certificates is a Windows feature.

- 2 [Worksheet for Installing the Mirage Server](#) on page 27

When you install the Mirage server, the installation wizard prompts you to configure certain options. Prepare your configuration options before you install the Mirage server.

- 3 [Install the Mirage Server](#) on page 28

The Mirage servers manage the storage and delivery of base layers, app layers, and CVDs to clients, and consolidate communications for monitoring and management. You can deploy multiple servers as a server cluster to manage endpoint devices for large enterprise organizations.

## Install an SSL Server Certificate for the Mirage Server

To set up SSL on the Mirage server, you must obtain SSL certificate values and configure them on the server. SSL certificates is a Windows feature.

The Mirage server uses the local computer store.

### Prerequisites

- Ensure that the certificates are installed in the local Computer Trust Store. If you do not have a certificate, you can create one with tools such as the Microsoft MakeCert. You must then import the result into the Certificate Manager.
- Verify that you can export the private key.

### Procedure

- 1 Open the Windows Management Console, add the Certificates snap-in, and select the local computer account.
- 2 To navigate to your certificate, select **Certificates > Personal > Certificates**.
- 3 Note the Certificate Subject and Certificate Issuer values.

## Worksheet for Installing the Mirage Server

When you install the Mirage server, the installation wizard prompts you to configure certain options. Prepare your configuration options before you install the Mirage server.

**Table 3-2.** Configuration Options for Installing the Mirage Server

Option	Description	Your Value
SQL server name and instance	<p>Select the SQL server name and instance.</p> <ul style="list-style-type: none"> <li>■ SQLEXPRESS is defined as the default SQL instance for the SQL Server Express edition.</li> <li>■ You can type the server name without an SQL instance when using a default unnamed instance such as SQL Standard. Alternatively, you can type the SQL instance name that is configured in your environment.</li> <li>■ MSSQL is defined as the default SQL instance for the SQL Server Enterprise edition.</li> <li>■ Use the default SQL instance name if your Microsoft SQL Server edition was installed with default options, or the custom instance name if you defined a custom name.</li> </ul>	
Local cache areas	<p>Select the <b>Create new local cache area</b> check box to allocate a new local cache area. If not selected, the installer attempts to use existing cache data.</p> <p>Do not select the <b>Create new storage areas</b> check box when upgrading the Mirage server. If you select this option and the path of the original storage area is entered, the local cache of the server itself is deleted. This might result in short-time performance penalties as the cache has to be refilled.</p>	
Name of the Mirage server local cache folder	The path to where the local cache is stored if different from the default. A default path is provided.	
Size of local cache in MB	A cache size of 100GB (102400MB) is recommended.	
Port	<p>The default port for client-server communication is 8000.</p> <p>If you change the port, additional firewall rules might be required to open the port.</p>	

**Table 3-2.** Configuration Options for Installing the Mirage Server (Continued)

Option	Description	Your Value
Encryption type	<p>You can select to have an SSL certificate to have clients communicate with the server using SSL encryption.</p> <p>SSL encryption requires the Certificate Subject and Certificate Issuer values.</p> <p>Typically, the Certificate Subject is the FQDN of the Mirage server, and the Certificate Issuer is a known entity like VeriSign. You can leave the <b>Certificate Issuer</b> text box blank if only one certificate is installed on this server.</p>	
Services account configuration	<p>You can use a local system account or a specific user account.</p> <p>You can only use a local system account if all of the components are installed on the same machine. The components are the Mirage Management server, the Mirage server, the SQL server, and the Mirage volume.</p> <p>If these components are not installed on the same machine, you must use a specific user account.</p> <p>Use of a specific ser account requires use of login credentials.</p> <p>VMware recommends running the Mirage service a specific user account.</p>	

## Install the Mirage Server

The Mirage servers manage the storage and delivery of base layers, app layers, and CVDs to clients, and consolidate communications for monitoring and management. You can deploy multiple servers as a server cluster to manage endpoint devices for large enterprise organizations.

You can allocate a larger number of concurrent CVDs for high-end servers, or a smaller number for low-end servers.

The .msi installation file is located in the Mirage installation package.

### Prerequisites

- Install an SSL Certificate on the server. See [“Install an SSL Server Certificate for the Mirage Server,”](#) on page 26.
- Verify that the SQL server is reachable from the server node, and that the firewall settings on the SQL server allow for remote connections.
- The relevant software requirements are met. See [“Software Requirements,”](#) on page 17.

**Procedure**

- 1 Start the installation wizard.

Option	Action
<b>.msi file</b>	<ul style="list-style-type: none"> <li>■ Double-click the <code>mirage.server.x64.buildnumber.msi</code> file to start the installation wizard.</li> </ul> <p>Use this option if you are a local administrator and user access control (UAC) is enabled.</p>
<b>Command prompt</b>	<ul style="list-style-type: none"> <li>■ Access the command prompt as an administrator and run the <code>.msi</code> installation file.</li> </ul> <p>Use this option if you are not a local administrator and user access control (UAC) is enabled.</p>

- 2 Follow the prompts in the wizard to install the Mirage server.  
Use the configuration information that you gathered in the worksheet.
- 3 Restart the server when the installation is completed.

**What to do next**

You can now install IIS and the Mirage Web Management.

**Install IIS**

You must install Windows Internet Information Services (IIS) 7.0 before installing the Mirage file portal or the Mirage Web Management.

The `.msi` installation file is located in the Mirage installation package.

**Procedure**

- 1 Install the IIS server role on the Windows Server 2008 R2 or later machine where the Mirage server software is installed.
  - a In the Server Manager, right-click the **Roles** node and select **Add Roles**.
  - b On the left-panel menu, select **Server Roles**.
  - c Select the **Web Server (IIS)** check box.

- 2 After the IIS server role is installed, install Web Service (IIS) services.
  - a Expand the **Roles** node and select **Web Server (IIS)**.
  - b On the right panel, click **Add Role Services**.
  - c Expand the **Web Server** node and add these services.

Role Service	Required Items
<b>Common HTTP Features</b>	<ul style="list-style-type: none"> <li>■ Static Content</li> <li>■ Default Document</li> <li>■ Directory Browsing</li> <li>■ HTTP Errors</li> <li>■ HTTP Redirection</li> </ul>
<b>Application Development</b>	<ul style="list-style-type: none"> <li>■ ASP.NET</li> <li>■ .NET Extensibility</li> <li>■ ISAPI Extensions</li> <li>■ ISAPI Filters</li> </ul>
<b>Health And Diagnostics</b>	There are no required items for this role service.
<b>Security</b>	Request Filtering
<b>Performance</b>	There are no required items for this role service.

- 3 Install Management Tools services.
  - a Expand the **Roles** node and select **Web Server (IIS)**.
  - b On the right panel, click **Add Role Services**.
  - c Expand the **Management Tools** node and add these services.

Role Service	Required Items
<b>IIS Management Console</b>	All subitems are required
<b>IIS Management Scripts and Tools</b>	All subitems are required
<b>Management Service</b>	All subitems are required
<b>IIS 6 Management Compatibility</b>	All subitems are required

### What to do next

Verify that the appropriate ports are enabled between IIS and the Mirage Management server. See [“Ports and Protocols Used by Mirage,”](#) on page 18.

## Cipher Suites

You can configure cipher suites in IIS.

VMware recommends that you configure IIS with TLS cipher-suites during the Mirage deployment.

TLS Cipher-Suites

- TLS\_ECDHE\_ECDSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_ECDHE\_RSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_ECDH\_ECDSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_ECDH\_RSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_DHE\_RSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_DHE\_DSS\_WITH\_AES\_256\_CBC\_SHA

- TLS\_DH\_RSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_DH\_DSS\_WITH\_AES\_256\_CBC\_SHA
- TLS\_RSA\_WITH\_AES\_256\_CBC\_SHA
- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA
- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA
- TLS\_DHE\_DSS\_WITH\_AES\_128\_CBC\_SHA
- TLS\_DH\_RSA\_WITH\_AES\_128\_CBC\_SHA
- TLS\_DH\_DSS\_WITH\_AES\_128\_CBC\_SHA

## Install the Web Management

You install the Mirage Web Management using the Web Management .msi file provided in the installation package.

The .msi installation file is located in the Mirage installation package.

### Prerequisites

- You must enable Cookies and JavaScript.
- The Mirage Web Management must be installed on a Windows server with IIS 7 or later and .NET Framework 4.
- You can view the Web Management using Microsoft Internet Explorer 9 and later, Chrome, and Firefox.
- Make sure that your Microsoft Internet Explorer browser supports JavaScript and Cookies on an intranet environment.

### Procedure

- 1 Double-click the `mirage.WebManagement.x64.buildnumber.msi` and click **Run** to start the installation wizard.
- 2 When prompted, provide the path to the Mirage Management server location.
- 3 Verify the HTTP port and the HTTPS port.  
The default HTTP port is 7080, and the default HTTPS port is 7443.
- 4 Follow the prompts to complete the installation.

## Install the Mirage File Portal

Install the Mirage file portal so that end users can view files in their CVD snapshots from a Web browser. End users can access the file portal with the appropriate login credentials.

The .msi installation file is located in the Mirage installation package.

### Prerequisites

You must install Microsoft IIS 7.0 or later for the file portal. For more information about installing IIS, see [“Install IIS,”](#) on page 29.

### Procedure

- 1 Double-click the `mirage.WebAccess.x64.buildnumber.msi` file for your environment and click **Run** to start the installation wizard.

- 2 Follow the prompts until you come to Web Access Configuration page and provide the Web access configuration information.

Option	Description
<b>Web Access</b>	Select <b>Web Access</b> to provide access to only an end-user's user files, as defined by the administrator, across all CVD snapshots. The Mirage client user can access the Web Access feature to only download their files at <code>http://server:6080/Explorer</code> .
<b>Admin Web Access</b>	Select <b>Admin Web Access</b> to give the administrator full access to all user CVDs across all CVD snapshots. The administrator can access the Admin Web Access feature to download all files of any user at <code>http://server:6080/AdminExplorer</code> .

By default, both the **Web Access** and **Admin Web Access** web applications are configured for the file portal. You can choose not to configure either of these options by clicking the drop-down menu and selecting **Entire feature will be unavailable**.

- 3 When prompted, provide the path to the Mirage Management server location.
- 4 Verify the HTTP port and the HTTPS port.  
The default HTTP port is 6080, and the default HTTPS port is 6443.
- 5 Complete the installation.

#### What to do next

You can now install the Mirage Management console.

## Troubleshooting the File Portal Installation

You might be unable to access the Mirage file portal because of local or domain security policies.

#### Problem

After the installation is finished, you might experience difficulty accessing the file portal.

#### Cause

You might be unable to access the file portal because of a local or domain security policy on IIS servers.

#### Solution

- 1 On the IIS server machine where the file portal is installed, select **Local Security Policy > Local Policies > User Rights Assignments**.
- 2 Add all users who need file portal access to the `Allow logon locally` policy.

## Install the Mirage Management Console

The Mirage Management console is the graphical user interface used to perform scalable maintenance, management, and monitoring of deployed endpoints. The Management console is built as a Microsoft Management Console version 3.0 snap-in.

#### Prerequisites

Install the Mirage Management server.



**Procedure**

- 1 Double-click the .msi installation file (located in the Mirage installation package) for your environment to start the installation wizard.

Option	Description
64-bit	mirage.management.console.x64.buildnumber.msi
32-bit	mirage.management.console.x86.buildnumber.msi

- 2 Follow the prompts to complete the installation wizard.

After you install the Management console, you can see a shortcut to the Management console on your desktop.

---

**NOTE** For Mirage 5.5 and later, Mirage Web Management is recommended over Mirage Management Console because of the enhancements, which are available only in Mirage Web Management.

Restrict using Mirage Management Console only for the following operations (not available in the Mirage Web Management):

- Role-based access control
  - Define roles and add users to existing roles.
  - View results of CVD integrity reports.
  - Edit Layer Rules.
  - Force upload of a Pending Assignment device (The Web console lets you force upload only Pending Restore device).
- 

**What to do next**

You can connect the console to the Mirage Management system. See [“Connect the Console to the Mirage System,”](#) on page 33.

## Connect the Console to the Mirage System

After you install the Mirage Management console, you can connect the console to the Mirage system.

**Procedure**

- 1 In the Mirage Management console tree, click **VMware** Mirage in the root directory, and select **Add System**.
- 2 Type the IP address or host name of the Mirage Management server in the **Management Server Address** text box, and click **OK**.

The Management console is connected to the system. A Mirage server node now appears in the console window.

After the console is connected, it shows Server Down status for the system because a Mirage server is not yet installed. The server status changes to Up when a server is installed.

**What to do next**

You can install the Mirage Gateway server. See [“Installing the Mirage Gateway Server,”](#) on page 34.

## Installing the Mirage Gateway Server

The Mirage Gateway server is a secured gateway server that is deployed outside the Mirage data center environment.

The Mirage Gateway server lets end users who have installed the Mirage client to communicate securely with the Mirage servers over the Internet without using VPN configurations.

When you set the FDQN of the Mirage Gateway server as the value for the Mirage server location, the Mirage client establishes a TLS connection with the Mirage Gateway server.

After installing the Mirage Gateway server, you can configure a Gateway server to your Mirage system by accessing the configuration web portal or by using the Mirage Management console.

You can use a load balancer to balance incoming Mirage traffic to the DMZ via Mirage Gateways to the Mirage servers. Configure a load balancer in the DMZ to balance traffic from Mirage clients to multiple Mirage Gateway servers. Each Mirage Gateway should be configured to work with a dedicated Mirage server.

- 1 [Create a Certificate for the Mirage Gateway Server](#) on page 34  
The certificate verifies for Mirage clients that the Mirage Gateway server they are connecting to can be trusted.
- 2 [Configure the Mirage Server to Work with SSL](#) on page 39  
After you convert the certificate file type, you configure the Mirage server to work with SSL.
- 3 [Deploy the OVA Template in ESX](#) on page 40  
You must deploy the OVA template before installing the Mirage Gateway server.
- 4 [Worksheet for Installing the Mirage Gateway Server](#) on page 41  
When you install the Mirage Gateway server, you are prompted to configure certain options. You must prepare your configuration options before you install the Mirage Gateway server.
- 5 [Install the Mirage Gateway by Using the Configuration Web Portal](#) on page 43  
Install the Mirage Gateway server to secure your data center environment for users that communicate with the corporate enterprise data center via Internet.
- 6 [Install the Mirage Gateway Server by Using a Command Line](#) on page 43  
Install the Mirage Gateway server to secure your data center environment for users that communicate with the corporate enterprise data center via Internet.
- 7 [Install the Mirage Gateway Server Using an Input File](#) on page 44  
You can install the Mirage Gateway server with an input file that you edit before the installation procedure.
- 8 [Upgrade the Mirage Gateway Server](#) on page 45  
You can upgrade the Mirage Gateway server exporting the configuration settings from your current environment and importing them to your new environment by using the Mirage Image Service Gateway Web console. The file that you export is encrypted UU encoding technology.

### Create a Certificate for the Mirage Gateway Server

The certificate verifies for Mirage clients that the Mirage Gateway server they are connecting to can be trusted.

There are various procedures that you perform in order, to create a certificate for the Mirage Gateway server. You can create certificate for the Mirage Gateway server by using OpenSSL or by using the MakeCert tool.

**Procedure**

- 1 [Generating a Certificate Signing Request and Obtaining a Certificate with OpenSSL for the Mirage Gateway Server](#) on page 35

VMware products implement the OpenSSL libraries and toolkits to generate the default certificates that are created during installation process. You can use OpenSSL to prepare a request and certificate authority (CA) as a trusted root authority to generate a signed certificate.

- 2 [Generating a Certificate Signing Request and Obtaining a Certificate with the Microsoft Management Console for the Mirage Gateway Server](#) on page 37

To make a certificate available to a Mirage Gateway server, you create a certificate signing request (CSR) and send the signing request to a CA. When the CA returns the certificate, you convert the certificate file extension and import the signed certificate into the certificate store on computer that has the Mirage Gateway server.

## Generating a Certificate Signing Request and Obtaining a Certificate with OpenSSL for the Mirage Gateway Server

VMware products implement the OpenSSL libraries and toolkits to generate the default certificates that are created during installation process. You can use OpenSSL to prepare a request and certificate authority (CA) as a trusted root authority to generate a signed certificate.

### Create the OpenSSL Configuration File for the Mirage Gateway Server

You use the configuration file to generate a certificate for the Mirage Gateway server.

**Prerequisites**

- Download the appropriate installer for OpenSSL from <http://www.openssl.org/related/binaries.html>. Use the downloaded OpenSSL installer to install OpenSSL on Windows.

**Procedure**

- 1 Create a configuration file in C:\certs named `server.conf`.
- 2 Add the required information to the configuration file.

Change the information in italics to match your environment.

```
[ ca ]
default_ca = myca

[ crl_ext ]
authorityKeyIdentifier=keyid:always

[ myca ]
dir = ./
new_certs_dir = $dir
unique_subject = no
certificate = $dir/root.cer
database = $dir/certindex
private_key = $dir/privkey.pem
serial = $dir/certserial
default_days = #ofdays
default_md = sha512
policy = myca_policy
x509_extensions = myca_extensions
crlnumber = $dir/crlnumber
default_crl_days = #ofcrldays
```

```

[ myca_policy ]
commonName = supplied
stateOrProvinceName = optional
localityName = optional
countryName = optional
emailAddress = optional
organizationName = optional
organizationalUnitName = optional

[ myca_extensions ]
basicConstraints = CA:false
subjectKeyIdentifier = hash
authorityKeyIdentifier = keyid:always
keyUsage = digitalSignature,keyEncipherment,dataEncipherment
extendedKeyUsage = serverAuth
# Alternative Subject Name defined in alt_names
# subjectAltName = @alt_names

[alt_names]
# if it contains dns type name, then it MUST be used and CN of subject MUST be ignored.
Please refer to rfc2818 for details.
# following items as example:
#dns.1=*.miragedomain.com
#dns.2=*.example.com

#ofdays is the number of days the certificate is valid. #ofcrldays is the number of days before the next
CRL.

```

The OpenSSL configuration file for the Mirage Gateway server is created.

### What to do next

Generate the certificate request.

### Generate a Certificate for the Mirage Gateway Server by Using OpenSSL

You create a CA certificate for the Mirage Gateway server using OpenSSL.

Linux is case sensitive.

### Prerequisites

- Create the server.conf file.

### Procedure

- 1 Access the OpenSSL command prompt.
- 2 Create a root CA certificate.
 

```
openssl req -newkey rsa:4096 -sha512 -days 9999 -x509 -nodes -out root.cer
```
- 3 Create additional internal data used in the server.conf file.
 

```
touch certindex
echo 000a > certserial
echo 000a > crlnumber
```

- 4 Generate a CA certificate request for the Mirage Gateway server and the Mirage server.

```
openssl req -newkey rsa:4096 -sha512 -nodes -out server.csr -keyout server.key -subj
"/C=CN/ST=bj/L=bj/O=VMware/OU=EUC/CN=10.117.162.236"
```

The value for the CN variable must be the same as the FQDN or the IP address of the Mirage server specified during the Mirage server installation.

- 5 Create a certificate for the Mirage Image Service Gateway server and the Mirage Image Service server.

```
openssl ca -batch -config server.conf -notext -in server.csr -out server.cer
```

- 6 Convert the certificate for the Mirage Gateway server to .pem format.

```
cat server.key server.cer >GW.pem
```

- 7 Convert the certificate for the Mirage server to .pfx format.

```
openssl pkcs12 -export -inkey server.key -in server.cer -out Server.pfx
```

Import the certificate by using the Web console.

## Generating a Certificate Signing Request and Obtaining a Certificate with the Microsoft Management Console for the Mirage Gateway Server

To make a certificate available to a Mirage Gateway server, you create a certificate signing request (CSR) and send the signing request to a CA. When the CA returns the certificate, you convert the certificate file extension and import the signed certificate into the certificate store on computer that has the Mirage Gateway server.

### Generate the Certificate Signing Request for the Mirage Gateway Server

When you set up the SSL certificate for the Mirage Gateway server, you must first generate the Certificate Signing Request (CSR).

#### Procedure

- 1 On the Microsoft Management Console, select **File > Add/Remove Snap-in**.
- 2 On the Add or Remove Snap-ins window, select **Certificates** and click **Add**.
- 3 On the Certificates snap-in window, select **Computer account** and click **Next**.
- 4 Select **Local computer** and click **Finish**.
- 5 Click **OK** in the Add or Remove Snap-ins window to close the window.
- 6 Expand the **Certificates (Local Computer)** node.
- 7 Expand the **Personal** node and right-click **Certificates**.
- 8 Select **All Tasks > Advanced Operations > Create Custom Request**.
- 9 Follow the prompts, and on the Select Certificate Enrollment Policy page, select **Proceed without enrollment policy** and click **Next**.
- 10 Verify the relevant information on the Custom Request page and click **Next**.
  - a Select **Legacy key** for the template type.
  - b Select **PKCS #10** for the request format.
- 11 Expand the **Details** drop-down menu and click **Properties**.
- 12 On the **General** tab of the Certificate Information page, type a certificate-friendly name.  
You must use this name in the DNS record.

- 13 On the **Subject** tab, verify the relevant information.

Option	Description
<b>Common name, value</b>	The server FQDN. This is the certificate subject name that is used in the Mirage configuration to locate the certificate. The FQDN must point to that server and is validated by the client upon connection.
<b>Organization, value</b>	The company name. Usually required by the CA.
<b>Country, value</b>	A two-letter standard country name, for example, US or UK. Usually required by the CA.
<b>State, value</b>	The state name.
<b>Locality, value</b>	The city name.

- 14 On the **Extensions** tab, select the key-use information from the drop-down menus.
- Expand the **Key usage** drop-down menu, select **Data encipherment** and click **Add**.
  - Expand the **Extended Key usage** drop-down menu, select **Server Authentication** and click **Add**.
- 15 On the **Private Key** tab, select the key size and export options.

Option	Description
<b>Key Options</b>	This is the required key size (usually 1024 MB or 2048 MB).
<b>Make private key exportable</b>	This option exports the CSR, and later the certificate, with the private key for backup or server movement purposes.
<b>Key Type</b>	Select <b>Exchange</b> (the default value is <b>Signature</b> ).

- 16 Click **Apply** and then click **OK** to close the Certificate Properties window, and click **Next** in the Certificate Enrollment wizard.
- 17 On the Certificate Enrollment page, leave the default file format (Base 64), and click **Browse** to enter a file name and location for the CSR, and click **Finish**.
- The certificate request is complete.
- 18 On the **Certificates Enrollments & Certificates** tab, click **Refresh**.
- You can export the CSR with the private key for backup purposes.

### What to do next

After generating the Certificate Signing Request, submit the CSR. See [“Submit the Certificate Request,”](#) on page 38.

### Submit the Certificate Request

After you generate the certificate signing request, you submit the request.

#### Procedure

- Go to the external CA Web site and click **Request a certificate**.
- On the Request a Certificate page, select **advanced certificate request**.
- On the Advanced Certificate Request page, select **Submit a certificate request using a base-64-encoded CMC or PKCS #10 file or submit a renewal request by using a base-64-encoded PKCS #7 file**.
- Open the `csr.req` file with a text editor and copy the text.
- Paste the CSR text in the **Base-64-encoded certificate request** text box.
- Select **Web Server** from the **Certificate Template** drop-down menu and click **Submit**.
- On the Certificate Issued page, select **Base 64 encoded**, and then click **Download certificate**.

- 8 When prompted, select **Save As**, type the file name, and save the certificate as a .p7b file.

### Convert the Certificate File Extension

After you generate the certificate, you convert the certificate file extension from .p7b to .pfx. The certificate file extension must be .pfx for the Mirage Gateway server installation.

#### Prerequisites

- Verify that you installed the Mirage server.
- Verify that you generated a certificate.

#### Procedure

- 1 Double-click the certificate and right-click **Install Certificate** to start the Certificate Install wizard.
- 2 Select **Place all certificates in the following store** and click **Browse**.
- 3 Select the **Personal** folder in the Select Certificate Store window, click **OK** to close the window, and click **Next**.
- 4 Verify the information for installing the certificate, and click **Finish**.
- 5 In the Windows MMC, expand the **Certificates** node followed by the **Personal** node, and then select **Certificates**.
- 6 Right-click the certificate and select **All Tasks > Export**.
- 7 Follow the prompts, select **Yes, export the private key**, and click **Next**.
- 8 Select the export file format.
  - a Select the **Personal Information Exchange - PKCS #12 (.PFX)** check box.
  - b Select the **Include all certificates in the certification path if possible** check box.
  - c Click **Next**.
- 9 On the Security page, select the **Password** check box and enter a new password, confirm the password, and click **Next**.
- 10 Save the certificate.
  - a On the File to Export page, click **Browse**
  - b Locate and select the certificate, and save it as a .pfx file.
  - c Click **Save**.
- 11 Follow the prompts to complete the export procedure.

The certificate is now installed on the Mirage server and configured for SSL.

## Configure the Mirage Server to Work with SSL

After you convert the certificate file type, you configure the Mirage server to work with SSL.

#### Prerequisites

Verify that you converted the certificate to the .pfx file extension.

#### Procedure

- 1 In the MMC, expand the **Certificates** node, then expand the **Personal** node, and then select **Certificates**.

- 2 Double-click the **certificate** and on the **Details** tab, select **Subject**.
  - a Note the common name (CN) of the certificate.
- 3 On the **Details** tab, select **Issuer**.
  - a Note the CN of the issuer.
- 4 In the Mirage Management console, expand the **System and Configuration** node and select **Servers**.
- 5 Right-click the **server** and select **Configure**.
- 6 Configure the server and click **OK**.
  - a Select the **SSL** option.
  - b Enter the CN of the certificate in the **Certificate Subject** text box.
  - c Enter the CN of the certificate issuer in the **Certificate Issuer** text box.

## Deploy the OVA Template in ESX

You must deploy the OVA template before installing the Mirage Gateway server.

The .ova file is located in the Mirage installation package.

### Prerequisites

Verify that VMware ESX<sup>®</sup> is installed to deploy the OVA template.

### Procedure

- 1 Double-click the .ova file and click **Run** to start the deployment wizard.
- 2 Provide login credentials for the Mirage, and click **Login**.
- 3 In the Mirage console, select **File > Deploy OVF Template** to start the deployment wizard.
- 4 Deploy the OVA template and click **Next**.

Option	Description
<b>File</b>	You can specify a location that is accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive. To select a file location, click <b>Browse</b> .
<b>URL</b>	You can type a URL to download and install the OVA package from the Internet.

After the OVA template is verified, a green check mark appears next to the publisher name.

- 5 Verify the OVA template details and click **Next**.
- 6 Accept the end user license agreement and click **Next**.
- 7 Enter a name, select a location for the deployed template, and click **Next**.
- 8 Select the host and cluster and click **Next**.
- 9 Select the resource pool and click **Next**.
- 10 Select a storage destination for the virtual machine files and click **Next**.



- 11 Select the disk format and click **Next**.

Option	Description
<b>Thick Provision Lazy Zeroed</b>	Create a virtual disk in a default thick format. Space required for the virtual disk is allocated when the disk is created. Data remaining on the physical device is not erased during creation, but is zeroed out on demand at a later time on first write from the virtual machine. Virtual machines do not read stale data from the physical device.
<b>Thick Provision Eager Zeroed</b>	Create a type of thick virtual disk that supports clustering features such as Fault Tolerance. Space required for the virtual disk is allocated at creation time. In contrast to the thick provision lazy zeroed format, the data remaining on the physical device is zeroed out when the virtual disk is created. It might take longer to create virtual disks in this format than to create other types of disks.
<b>Thin Provision</b>	Use this format to save storage space. For the thin disk, you provision as much datastore space as you expect the disk to require based on the value that you enter for the virtual disk size. However, the thin disk starts small and at first, uses only as much datastore space as the disk needs for its initial operations. If the thin disk needs more space later, it can grow to its maximum capacity and occupy the entire datastore space provisioned to it. Thin provisioning is the fastest method to create a virtual disk because it creates a disk with just the header information. It does not allocate or zero out storage blocks. Storage blocks are allocated and zeroed out when they are first accessed.

- 12 Complete the deployment wizard.

The OVA template is deployed.

## Worksheet for Installing the Mirage Gateway Server

When you install the Mirage Gateway server, you are prompted to configure certain options. You must prepare your configuration options before you install the Mirage Gateway server.

**Table 3-3.** Configuration Options for Installing the Mirage Gateway Server

Option	Action	Your Value
LDAP type	You can select either <b>LDAP</b> or <b>LDAPS</b> . The default value is LDAP.	
LDAP server address	You can type either the LDAP server or the IP address, for example, ldap.yourcompany.com, or, ldapIPAddress.	
LDAP server port	The default port is 389. Verify that your firewall settings allow the selected port.	

**Table 3-3.** Configuration Options for Installing the Mirage Gateway Server (Continued)

Option	Action	Your Value
LDAP user DN to bind Mirage Gateway with the LDAP server	<p>There are three valid formats:</p> <ul style="list-style-type: none"> <li>■ DN: <ul style="list-style-type: none"> <li>cn=username, cn=users, dc=domain, dc=com</li> </ul> <p>For Web console and command line installation:</p> <p>CN=Administrator, CN=USERS, DC=MIRAGEDOMAIN, DC=COM</p> <p>The DN must contain ASCII characters only.</p> </li> <li>■ Username@domain <ul style="list-style-type: none"> <li>For Web console and command line installation: administrator@miragedomain.com</li> </ul> </li> <li>■ domain\username <ul style="list-style-type: none"> <li>For Web console installation: miragedomain.com\administrator</li> <li>For command line installation: miragedomain.com\administrator</li> </ul> </li> </ul>	
LDAP bind user password	This is your password.	
Token expiration time (in hours)	The default is 168 hours.	
Mirage server address	<p>You can type either the hostname or the IP address, for example, <i>mirageserver.yourcompany.com</i></p> <p>The default is <i>mirageserver.yourcompany.com</i>.</p>	
Mirage server port	<p>The default is 8000.</p> <p>Verify that your firewall settings allow the selected port.</p>	
Mirage Gateway activation code	<p>You create the activation code during the installation.</p> <p>The activation code must contain at least 8 characters, including a number, an upper-case character, a lower-case character, and a special character.</p>	

**Table 3-3.** Configuration Options for Installing the Mirage Gateway Server (Continued)

Option	Action	Your Value
Certificate file	This follows the format: /opt/MirageGateway/certif icatename.pfx or /opt/MirageGateway/cert ificatename.pem	
Certificate private key password	The password you created as part of the certificate export procedure.	

## Install the Mirage Gateway by Using the Configuration Web Portal

Install the Mirage Gateway server to secure your data center environment for users that communicate with the corporate enterprise data center via Internet.

Linux is case sensitive.

### Prerequisites

- Verify that you installed the following Mirage components:
  - Mirage server
  - Mirage Management server
  - Mirage Management console
- Create a bind user to authenticate the communication request between the Mirage client and the Mirage servers.
- Deploy the OVA for the Mirage Gateway server.

### Procedure

- 1 In the ESX console, power on the VM.
- 2 Navigate to `https://MirageGWIPaddress:8443/WebConsole`.  
*MirageGWIPaddress* is the IP address of the Mirage Gateway server.
- 3 When prompted, provide the login credentials.  
The default username is **mirage**, and the default password is **vmware**.
- 4 Follow the prompts to install the Mirage Gateway server.  
Use the configuration information that you gathered in the worksheet.

The Mirage Gateway server is installed and available in the Mirage Management console.

## Install the Mirage Gateway Server by Using a Command Line

Install the Mirage Gateway server to secure your data center environment for users that communicate with the corporate enterprise data center via Internet.

Linux is case sensitive.

### Prerequisites

- Ensure that you installed the following Mirage components:
  - Mirage server

- Mirage Management server
- Mirage Management console
- Create a bind user to authenticate the communication request between the client and the Mirage servers.
- Add your company's DNS server IP address to the top of the `/etc/resolv.conf` file. In the `/etc/resolv.conf` file, type **nameserver *IP address***, where *IP address* is the IP address for the DNS server. You can use the Linux *vim* text editor, or WinSCP to use a Windows text editor. If you use WinSCP to edit the file, use the username *root* and the password *vmware*. If you cannot use your company's DNS server, then you must add a DNS record to the `/etc/hosts` file.

### Procedure

- 1 In the ESX console, power on the VM.
- 2 On the **Console** tab, press **Enter**.
- 3 When prompted, provide the login credentials.  
The default username is **mirage**, and the default password is **vmware**.
- 4 To start the installation, run the `sudo /opt/MirageGateway/bin/install.sh` command.
- 5 Follow the prompts to install the Mirage Gateway server.  
Use the configuration information that you gathered in the worksheet.

The Mirage Gateway server is installed and available in the Mirage Management console.

## Install the Mirage Gateway Server Using an Input File

You can install the Mirage Gateway server with an input file that you edit before the installation procedure.

### Prerequisites

Use the configuration information that you gathered in the worksheet to install the Mirage Gateway server to edit the configuration text file. See [“Worksheet for Installing the Mirage Gateway Server,”](#) on page 41.

### Procedure

- 1 Edit the configuration text file with a text editor.

Option	Description
<b>vim</b>	Use this option to edit the text file with the Linux text editor.
<b>WinSCP</b>	Use this option to edit the configuration text file with a Windows text editor, such as notepad. The configuration file is located on the Linux server panel. The file path for the configuration file is <code>/opt/MirageGateway/etc/config.txt</code> .

- 2 To install the Mirage Gateway server with the input file, run the install command.  
`sudo /opt/MirageGateway/bin/install.sh -f /opt/MirageGateway/etc/updatedconfigfile.txt` where *updatedconfigfile.txt* is the name of the configuration text file you created.  
For example, `sudo /opt/MirageGateway/bin/install.sh -f /opt/MirageGateway/etc/config.txt`

The Mirage Gateway server is installed and available in the Mirage Management console.

The password is removed from the input file.

## Upgrade the Mirage Gateway Server

You can upgrade the Mirage Gateway server exporting the configuration settings from your current environment and importing them to your new environment by using the Mirage Image Service Gateway Web console. The file that you export is encrypted UU encoding technology.

### Prerequisites

- Verify that you upgraded the following Mirage components. See the *Administrator's Guide*.
  - Mirage Management server
  - Mirage server
  - Mirage Web console
  - Mirage file portal
  - Mirage Management console

### Procedure

- 1 Navigate to `https://MirageGWIPaddress:8443/WebConsole`.  
*MirageGWIPaddress* is the IP address of the Mirage Gateway server.
- 2 Export the Mirage Gateway configuration settings in a `.enc` file.
  - a Click **Export Settings**.
  - b Type a password for the `.enc` file.
  - c Click **Submit**.
  - d Select a location to save the `.enc` file.  
The file that you export is `MirageGatewayConfig.enc`.
- 3 Deploy the new OVA.
- 4 Navigate to `https://MirageGWIPaddress:8443/WebConsole`.  
*MirageGWIPaddress* is the IP address of the Mirage Gateway server.
- 5 Click the **Import Settings** tab and select the `MirageGatewayConfig.enc` file.
- 6 Type the password for the `MirageGatewayConfig.enc` file and click **Submit**.

## Installing the Mirage Client

You can install the Mirage client by running the `.msi` installer file. Administrators can also push out the client installer silently, without disturbing user operations, by using command-line arguments.

The installation procedures apply to first-time installation of the client and re-installation of the client.

When the installation is finished: the Mirage icon appears in the notification area, indicating that the client is pending assignment. Right-click actions are available from this icon. The Mirage client also appears in Mirage Management console in the pending devices list.

### Install the Mirage Client Using the Active Installer

You can install the Mirage client by running the `.msi` installer file.

The `.msi` installation file is located in the Mirage installation package.

**Prerequisites**

- 1 Verify that you have administrative permissions.
- 2 Verify that your platform meets the software and hardware requirements.
- 3 Because you cannot place Mirage servers in your DMZ premises, you must use a VPN to connect clients that are used outside the network.
- 4 You must configure SSL on both the Mirage client and the Mirage server for the clients to connect using SSL.

**Procedure**

- 1 Double-click the `.msi` file for your environment to start the installation wizard.

Option	Description
<b>64-bit</b>	<code>MirageClient.x64.buildnumber.msi</code>
<b>32-bit</b>	<code>MirageClient.x86.buildnumber.msi</code>

- 2 Follow the prompts until you come to the server settings page, type the server settings, and then click **Next**.

Option	Action
<b>IP or FQDN of server</b>	Type the IP address or FQDN of the Mirage server or the shared IP of the load balancer in a cluster that you want this client to communicate with. You can also append a port to the server location if you do not want to use the port (the default port is 8000).
<b>Use SSL to connect to the server option</b>	Select this option to enable SSL if your server is configured for SSL use, and type the required SSL port.

- 3 Click **Install**, and when the installation is finished, click **Finish**.
- 4 (Optional) Restart your computer.  
For first-time installation and re-installation, restarting assures better backup protection and enables streaming, which promotes faster restore.

After the Mirage client is installed, the endpoint appears in the Management console as Pending Assignment.

**What to do next**

Activate the device in the Management console and use a CVD on the server to assign it. This process synchronizes the device and centralizes management of the device data.

**Install the Mirage Client Silently**

The administrator can deploy the client installer silently, without disturbing user operations, by using command-line arguments.

**Prerequisites**

- 1 Verify that you have administrative permissions.
- 2 Verify that your platform meets the software and hardware requirements.
- 3 Because you cannot place Mirage servers in your DMZ premises, you must use a VPN to connect clients that are used outside the network.
- 4 You must configure SSL on both the Mirage client and the Mirage server for the clients to connect using SSL.

**Procedure**

- 1 Select **Start > Run**, type `cmd`, and click **OK**.
- 2 Type the required expression for your environment and press **Enter**.

Option	Description
<b>32-bit clients</b>	<pre>&lt;Mirage MSI path&gt;\MirageClient.x86.buildnumber.msi SERVERIP=MirageServer /quiet</pre> <p><i>SERVERIP</i> is the FQDN, hostname, or IP of the Mirage server or shared IP of the load balancer.</p>
<b>64-bit clients</b>	<pre>&lt;Mirage MSI path&gt;\MirageClient.x64.buildnumber.msi SERVERIP=MirageServer /quiet</pre> <p><i>SERVERIP</i> is the FQDN, hostname, or IP of the Mirage server or shared IP of the load balancer.</p>

- 3 (Optional) If SSL needs to be enabled, type the following expression and press **Enter**:

```
<Mirage MSI path>\MirageClient.x86.buildnumber.msi SERVERIP=MirageServer:port
USESSLTRANSPORT=true /quiet
```

- 4 (Optional) Restart your computer.

For first-time installation and re-installation, restarting the computer assures better backup protection and enables streaming which promotes faster restoration.

After the Mirage client is installed, the endpoint appears in the Mirage Management console as Pending Assignment.

**What to do next**

Verify that SSL is enabled on the Mirage server.

Activate the device in the Mirage Management console to assign the device to a CVD on the server. This process synchronizes the device and centralizes management of the device data.

## Install SSRS for the Mirage Web Console

SQL Server Reporting Services (SSRS) is a server-based software system that can generate Mirage reports.

You install the reporting service on the same machine as the Mirage database and use a Web interface to administer the reporting service.

**Prerequisites**

- Verify that you have **db\_creator privileges** on the SQL Server.
- Verify that you have **dbo** permissions on the MirageDB database.
- Verify that the relevant software requirements are met. See [“Software Requirements,”](#) on page 17.
- Verify that the relevant operating system requirements are met. See [“Operating System Requirements,”](#) on page 14.

**Procedure**

- 1 Access the SQL server installation center.
- 2 Click the **Installation** tab and select **New SQL Server stand-alone installation or add features to an existing installation**.

- 3 On the Installation Type page, select an installation type.

Option	Description
<b>Perform a new installation of SQL Server</b>	For the first time you are installing the reporting service.
<b>Add features to an existing instance of SQL Server</b>	For upgrading from a previous installation.

- 4 Select **Reporting Services - Native** on the Feature Selection page.
- 5 Confirm the disk space requirements on the Disk Space Requirements page.
- 6 Accept the default settings on the Server Configuration page.
- 7 Select **install only** on the Reporting Services Configuration Mode page.
- 8 Accept the default settings on the Error Reporting page.

#### What to do next

Configure SSRS for the Mirage Management server.

## Configure SSRS for the Mirage Image Service Management Server

After you install SSRS for the Mirage Web management, you must configure SSRS settings for the Mirage Image Service Management server.

#### Prerequisites

- If you are using SSL access, verify that you updated the certificate for SSL access on the Report Manager URL.
- Configure the Reporting Server Web Service URL for SSL. See <https://msdn.microsoft.com/en-us/ms345223.aspx>. Ensure that you installed the root CA certificate on the Mirage Management server.

#### Procedure

- 1 Access the Reporting Services Configuration Manager from the Windows **Start** menu.  
The `Server Name` is the name of the server for the Mirage database, and the `Report Service Instance` is the Mirage instance.
- 2 When the Reporting Services Configuration Manager page, verify that the report server status is *Started*.
- 3 Click the **Service Account** tab on the left panel, select **Use another account**, and enter the login credentials.  
Use the login credentials that you use for the MirageDB account.
- 4 Click the **Web Service URL** tab on the left panel, verify the default settings, and click **Apply**.
- 5 Configure the database and then click **Finish**.
  - a Click the **Database** tab on the left panel, and click **Change Database**.
  - b Click the **Action** tab on the left panel, select **Create a new report server database**, and click **Next**.
  - c In the **Database Server** dialog box, enter the name of the Mirage database for the `Server Name`, and click **Test Connection**.
  - d In the **Database** dialog box, enter **ReportServerDB** for the database name and click **Next**.
  - e In the **Credentials** dialog box, enter the login credentials and click **Next**.
- 6 In the **Database** dialog box, click **Apply**.



- 7 Click the **Report Manager URL** tab on the left panel and click **Apply** to accept the default settings.
- 8 Use the URL listed on the Report Manager URL page to access the Report Manager.

The first time that you access the Report Manager, the Report Manager homepage might take several minutes to load.

- 9 In a separate Web browser, use the URL listed on the Reporting Services Configuration Manager to access the Report Services.

The reporting service is successfully deployed if the Microsoft SQL Server Reporting Services Version 11.0.2100.60 message appears.

- 10 Configure user settings in the Report Manager.

Option	Description
<b>Site Settings</b>	You can add users and configure user privileges. Configurations made on Site Settings affect all folders.
<b>Folder Settings</b>	You can specify folder access privileges. Configurations made on Folder Settings override configurations made on Site Settings.

### What to do next

Access the reporting service in the Mirage Web console. If the configuration settings did not transfer correctly, follow the prompts to configure the reporting service in the Mirage Web console.

## Install the Mirage PowerCLI

Mirage PowerCLI provides a Windows PowerShell interface for command-line access to administration tasks.

The Mirage PowerCLI client is intended for standalone use (Mirage only). If you use PowerCLI to administer other VMware products and want to use Mirage cmdlets, see the VMware Mirage.

### Prerequisites

- Verify that you installed Microsoft PowerShell 3.0.
- Verify that you installed .NET 4.5.1 or later.

### Procedure

- 1 Double-click the `VMwarePowerCLIForMirage.buildnumber.msi` file (located in the Mirage installation package) to start the installation wizard.
- 2 When prompted in the Execution Policy window, access Windows PowerShell as an administrator, and run the `Set-ExecutionPolicy RemoteSigned` command.
- 3 Type **Y** and press **Enter** to accept the execution policy change, and close the Windows PowerShell window.
- 4 Follow the prompts to complete the installation wizard.

## Managing VMware Mirage Software Licenses

The VMware Mirage Management server requires a license. The license file enforces the number of CVDs that you can run on your system and the duration of the license agreement.

Individual VMware Mirage servers do not need licenses.

Software licenses are separate from the server installation package.

You can view the license details at any time. See [“Add and View Licenses,”](#) on page 50.

When a license expires, all management actions are disabled. However, the administrator can still view the system status and track operation status. Mirage endpoint-related functions, including backup, restore, and image management operations continue, so that clients can still upload changes to the CVD on the server.

When a license expires, or when you install the VMware Mirage system, a dialog box appears when you open the VMware Mirage Management console, where you can type the license key. An audit event is created.

When you need a new license, contact VMware.

## Add and View Licenses

The license file enforces the number of CVDs that you can run on your system and the duration of the license agreement. You can view the current license details at any time.

You can add a license or view the number of CVDs currently licensed and the license expiry date through system configuration settings.

If your license expires, or when the system is installed, when you open the Management console a dialog box appears where you can type the license key.

You do not need to restart the VMware Mirage Management server to update the license.

### Procedure

- 1 In the Management console tree, right-click **System Configuration**, select **Settings**, and click the **License** tab.
- 2 Type or copy and paste the serial key in the **Use license key** text box.
- 3 Click **OK**.

## Configure the Environment for Endpoints

Before you can attach endpoints to your system, you need to perform a minimum configuration, which includes configuring the Web URL for the file portal, importing USMT settings, and performing domain joining operations .

For information on importing USMT files, see [Import USMT Settings](#).

For information on join domain account, see [General System Settings](#).

### Prerequisites

Verify that a VMware Mirage server is installed.

### Procedure

- 1 (Optional) Configure the file portal Web URL.
- 2 (Optional) To perform migration and user data restore operations, import the USMT folder.
- 3 (Optional) To perform domain joining operations, provide join domain account details.

### What to do next

You can now configure and use your VMware Mirage system.

# Prepare to Upgrade Mirage

---

You can upgrade to the latest version of Mirage if you have an existing installation of Mirage.

## Procedure

- 1 Make a note of these items to use during installation (either in the server config file or locate via other methods):

- Database server name
- Credentials for the database server
- Mirage Server cache directory location

---

**NOTE** The default location of the Mirage Server Cache is C:\ProgramData\Wanova\Mirage\LocalCache.

---

- Cache size

---

**NOTE** You can identify the cache size by selecting this directory and viewing the properties to see the size.

---

- 2 Prepare MongoDB deployment.

MongoDB, introduced in Mirage 5.4 and later, dramatically improves the IO consumption of Mirage Image Service. MongoDB requires some prerequisites to function correctly and reliably.

If you are upgrading from Mirage 5.3 or earlier, perform the following steps:

- a Prepare the server to install a second management server. The second management server is recommended to eliminate MongoDB as a single point of failure and prevent corruption. The second management server keeps a replicated copy of the MongoDB database.
- b Prepare a local, dedicated, 250GB disk drive for MongoDB on each management server (both the original management server and the new secondary one). If the environment contains more than 3000 CVDs, prepare a disk of at least 5% of your total Mirage volume size.
- c The management server installation wizard prompts you enter the location of the disks you have prepared for the upgrade.

If you are upgrading from Mirage version 5.4 or later, perform the following steps:

- a In Mirage 5.4, MongoDB was located on a Mirage volume on the same disk with CVDs. This is not a good practice for Mirage 5.5 and above; it is highly recommended to install MongoDB on a local disk.

- b Check if MongoDB is located on a volume or a local disk (The current MongoDB path can be seen in the web management under Servers > Management Servers). If it is not located on a local, dedicated disk, prepare a local, dedicated, 250GB disk drive for MongoDB on each management server (both the original management server and the new secondary management server).
  - c If the environment contains more than 3000 CVDs, prepare a disk of at least 5% of your total Mirage volume size. Make sure there are two managements server instances. If not, prepare a second server to eliminate MongoDB as a single point of failure and prevent corruption. The second management server keeps a replicated copy of the MongoDB database.
- 3 Stop Mirage Service.
  - 4 Back up the Mirage database using one of these methods:
    - Run a full sysreport in Mirage by double-clicking this file:  
C:\Program Files\Wanova\Mirage Management Server\sysreport\_full.cmd
    - Use SQL Server Management Studio.

---

**NOTE**

- For more information on backing up the MS SQL database, see Using SQL Server Management Studio in the MSDN article <https://msdn.microsoft.com/en-us/library/ms174173.aspx>
  - Ensure you select the database named MirageDB, and that you use the Full backup type.
  - Make a note of the location of the backup file.
  - If the MirageDB is a remote Database, the backup of the database may not be able to capture the backup file. Confirm the backup file has been created in the sysreport zip file under the ServerDB folder. If it has been created successfully a MirageDB.bak exists. If this file does not exist, see Collecting the database backup (MirageDB.bak) when the database is remote to the Mirage Management Server (2086220) for remote database configuration settings.
- 
- 5 Take snapshots of all Mirage volumes. Ensure that you use image based block backup, and not file based.

---

**NOTE** If snapshot functionality is not available, create and run a backup job for each volume's directory using any available backup program. This takes a significant amount of time to complete. The backup software must support Alternate Data Streams (ADS). VMware recommends using block based backup programs rather than file level backup using ADS.

---

# Upgrade Mirage

---

This section describes the procedure to upgrade from an existing deployment of Mirage to the current version of Mirage.

## Procedure

- 1 Install the latest version of Mirage using the new MSIs in the following order:
  - a Upgrade Mirage Management Server.
  - b Upgrade all Mirage Servers.
  - c Upgrade Mirage Web Management.
  - d Upgrade all instances of Mirage Management Server.
  - e Upgrade Mirage WebAccess.

---

**NOTE** Mirage 5.x and later versions do not require the uninstallation and reinstallation as Mirage installers perform these actions. VMware recommends keeping the same order of the installation. However, it is not a requirement as the console notifies if there is any version mismatch.

---

- 2 After the upgrade is complete, perform the following steps to complete configuring Mirage
  - a Make sure that you have space allocated for MongoDB on the local disk.
  - b Make sure that both the management servers are up and replicated (marked as **Up in the Web Management** console under **Servers > Management Servers**).
  - c If upgrading to Mirage 5.6 and later, perform the following steps:
    - In the Web Management, go to **Servers > Management Servers**.
    - Choose the correct MongoDB instance and click **Configure**.
    - Change the path to the target local dedicated disk and click **OK**.

---

**NOTE** For upgrading from version 5.5, or without a second replicated MongoDB node, and for more information, see KB2131044.

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