

HDDclone





HDClone 6

Manual

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1 Introduction

Thank you very much for choosing HDClone. It is our expressed goal to offer a product which fully meets your requirements and expectations. Should you wish to offer any suggestions for improvement or if you for any reason are not satisfied with the software, we kindly ask that you send your suggestions and feedback to feedback@miray.de.

1.1 Brief description

HDClone is a universal tool for cloning storage media on a hardware sector level. HDClone manages many application uses quickly and easily, for example hard disk migration, backups, creating file images and sector-by-sector copies. This allows HDClone to create copies or file images of storage media regardless of the respective partitioning scheme, the used file system or the installed operating system. HDClone is especially suitable for the tasks described in ► 2 Fields of application.

1.2 Chapter summary

1 Introduction: General information about this manual and HDClone. Summary of the available editions and features.

2 Fields of application: Descriptions of the most common use cases.

3 Supported hardware: Minimal requirements and supported devices.

4 Quickstart: Short description of installation and program startup.

5 Installation: Installation of HDClone in minutes under Windows and/or creating a HDClone bootable media (USB stick or CD/DVD).

6 Program startup: Starting HDClone - under Windows and self-booting.

7 Inline help: Operating information is available directly within the program.

8 Troubleshooting: Should you encounter any problems when using HDClone, this chapter provides information and suggestions for solutions.

9 Miray Virtual Disk: The HDClone software package includes the **Miray Virtual Disk** application. You can use it to mount file images as virtual drives.

10 Miscellaneous: Legal disclaimer and feedback.

1.3 Character conventions

In this manual, keys on the keyboard are printed with an inverted background, for example **Esc** for the escape key or **Return** for the return key. Some keys are represented by their corresponding symbol, for example **↑** for the 'up'-key. Visual controls on the screen, particularly buttons are represented over-and-underlined with italic font, for example next, back.

1.4 Edition summary

There are various editions of HDClone. They differ from one another by the number of features they offer, their supported device types, performance and special options. The following table shows a side-by-side comparison of each edition and its features.

Edition ¹⁾	FE	BE	SE	AE	PE	EE
Copying Speed						
Maximum speed in MB per sec.	30	50	60	∞ ²⁾	∞ ²⁾	∞ ²⁾
Device Support						
IDE/ATA/SATA hard disks	●	●	●	●	●	●
AHCI (SATA II)	●	●	●	●	●	●
USB 1.1 and 2.0	●	●	●	●	●	●
Bluetooth (HDI input device)	●	●	●	●	●	●
Hard disks > 2048 GB (2 TB)	○	●	●	●	●	●
USB 3.0 (XHCI)	○	○	●	●	●	●
Firewire / IEEE1394 (OHCI)	○	○	○	○	●	●
Intel & NVIDIA Software RAID 0/1/10/5	○	○	○	○	●	●
Dynamic disks	○	○	○	○	●	●
ATA-Password unlock	○	○	○	●	●	●
TRIM command for faster SSDs	○	○	○	●	●	●
SCSI hard disks	○	○	○	○	●	●
SATA-Hotplug & Port-Multiplier	○	○	○	○	○	●
Copy Modes						
Drive copy	●	●	●	●	●	●
Partition copy	○	●	●	●	●	●
SmartCopy	○	○	●	●	●	●
PartitionSelect	○	○	●	●	●	●
BitCopy	○	○	○	○	●	●
MultiCopy (4x, 8x, 16x)	○	○	○	○	○	●

Edition ¹⁾	FE	BE	SE	AE	PE	EE
File Images						
Physical images	●	●	●	●	●	●
Logical images (SmartImage)	○	○	●	●	●	●
Compressed images	○	○	●	●	●	●
Password protected images	○	○	●	●	●	●
QuickCompress	○	○	○	●	●	●
StrongCompress	○	○	○	○	●	●
Securely encrypted images	○	○	○	○	●	●
Differential images	○	○	○	○	●	●
RAW images	○	○	○	○	●	●
Dynamic VMDK/VHD(X)/VDI images	○	○	○	○	●	●
Special Modes						
HotCopy	●	●	●	●	●	●
Expanding (NTFS, FAT, ext2-ext4, HFS+)	●	●	●	●	●	●
Shrinking (NTFS, FAT, HFS+)	○	●	●	●	●	●
LiveImage	○	●	●	●	●	●
SafeRescue mode	○	●	●	●	●	●
Advanced Format / 4K conversion	○	●	●	●	●	●
Defragmentation (NTFS, FAT)	○	○	●	●	●	●
Verification mode	○	○	●	●	●	●
FastCopy mode	○	○	○	●	●	●
Command line interface	○	○	○	○	●	●
Storing a clone report (TXT & PDF)	○	○	○	○	●	●
Miray Virtual Disk						
Virtual volumes	○	1	1	7	7	7
File image management	○	1	1	●	●	●
Persistent virtual disks	○	○	○	○	●	●
Writeable virtual disks	○	○	○	○	●	●
Virtual volumes @ TrueSpeed ³⁾	○	○	○	○	●	●
Mounting VMDK/VHD(X)/VDI images	○	○	○	○	●	●

¹⁾ Within the table the following abbreviations are used to identify the different editions:

FE = Free Edition, **BE** = Basic Edition, **SE** = Standard Edition, **AE** = Advanced Edition,

PE = Professional Edition, **EE** = Enterprise Edition

²⁾ No software speed limit.

³⁾ Use of RAW images at nearly hardware speed.

2 Fields of application

HDClone specializes in creating physical and logical 1-to-1 clones and file images. Therefore, HDClone offers specific advantages for copying, and respectively rescuing defective media (▶ 2.2 Data rescue). In addition, HDClone runs independently from any partitioning scheme, file system or operating system. This allows copying of entire operating system installations (▶ 2.1 Upgrading hard disks & migrating an OS) or the creation of an exact copy, in case of unknown/proprietary file systems (▶ 2.6 Proprietary hard disk formats). Altogether, HDClone covers a wide spectrum of available applications through its universal copying technology. The following text describes the most common application uses of HDClone. Each individual chapter offers instructions, as well as additional tips for the execution of the application.



Hint: HDClone allows you to copy data randomly among all types of recognized media, particularly between different types of drives.

2.1 Upgrading hard disks & migrating an OS

Because HDClone works independently from any file system formats or operating systems, it can be used to migrate entire installations, including the installed operating system, to another hard disk. This is especially useful in order to migrate an existing installation to a new hard disk without having to re-install the operating system and application. For this type of application, a SmartCopy (or Full-Copy) of the entire hard disk is most suitable. Use the **PartitionSelect** feature to choose the individual partitions to be cloned.



Note: Please ensure that only one hard disk is connected after completing the copy, and before starting the operating system. It should be plugged in to the same channel as the original. Therefore, either the copy must be removed, or it may be connected in place of the source media.

2.1.1 Unused disk space

Free disk space on the target media can be converted into a partition and used as an additional drive from within Windows by use of the **fdisk** tool or the Windows Computer Management (C:\WINDOWS\system32\compmgmt.msc).

2.1.2 Smaller target media

Copies can be made from larger to smaller media. HDClone has the ability to decrease your NTFS and FAT partition size automatically while copying. For other file systems, you can downsize the partitions on the original media before cloning, using appropriate third-party tools.

2.2 Data rescue

In case of hard disks with defective areas, it is especially important that they are first rescued onto intact media before starting any recovery attempts. Otherwise, depending on the kind of defect, the recovery procedure may cause further defects resulting from the inherent exposure of this procedure. Of course, using HDClone also causes exposure to the hard disk. Yet the physical copying causes much less exposure than any other usage due to its linear operation, i.e. only linear movement of the disk's heads. Furthermore, the option **SafeRescue** keeps exposure to an absolute minimum. In very critical cases, you can also copy single partitions in order to reduce exposure to the media even more. After rescuing the data from the defective hard disk, you can then perform a recovery on the (functional) target media without risking any further damages.



Important: For the purpose of data rescue, first create a FullCopy or BitCopy of the entire hard disk (or a FullImage or RAW images, respectively). This clone can then be used to conduct recovery attempts without any risk to the original data.



Note: Only a physical copy allows you to rescue all of the data (except for irrecoverable areas), even if there are logical errors resulting from defective areas. For this reason, **never** use SmartCopy mode for rescuing data.



Hint: Alternatively, you may create a RAW image, or a physical image. You can then restore the image to another hard disk later on, or you can perform the recovery directly on the image by mounting it as a virtual drive using ► 9 Miray Virtual Disk.

2.3 Installation backup

HDClone can also create a local backup of an entire system installation. If required, a simple restoration from the backup partition will bring the system installation back to its original state – without any previous affliction of faulty program installations, viruses, etc. In addition to the system partition, create an unused partition of at least the same size as a backup partition. Then create a file image from which to restore the original system when needed.



Note: Before restoring from the backup partition, save your work files and other data from the system partition, or store them elsewhere as they will otherwise be overwritten.

2.4 Mass copying

HDClone Enterprise Edition was specifically designed to create up to 16 copies at one time. This makes it especially suitable for industrial duplication of pre-installed software (e.g. hard disks or CompactFlash media), or to create several identical operating system installations (▶ 2.5 Master installations).

2.5 Master installations

HDClone is also optimal for duplicating (deployment) system installations (▶ 2.4 Mass copying). You may copy an entire disk master directly or from a file image to the target media in order to use it directly from there.



Note: To duplicate Windows installations, we recommend running the Microsoft tool `sysprep` prior to cloning. Further information can be found at <http://www.microsoft.com>, search for 'sysprep'.

2.6 Proprietary hard disk formats

HDClone is capable of copying arbitrary hard disk formats. Especially for hard disks installed in proprietary systems (e.g. studio technology, medical technology etc.), there are often no programs aside from system software, which can read the data on these media. HDClone can rescue this data and transfer it to a new media without any problem. The best way to achieve this is to copy the source media to a target media of the same or larger size. Any target media smaller than the source should not be used, as the transfer of all relevant user data cannot be assured in this case.



Note: With unknown or proprietary (non-standardized) formats, always copy the entire source media. Only use the **Cloning Partitions** mode if you are certain that the partitions are reported correctly.

2.7 Forensic examination

HDClone also serves to secure data for forensic purposes, as all data from a disk is copied completely - including data that has possibly been hidden or deleted. This data can no longer be reached via the usual file system mechanisms. Therefore it is advisable to create a copy in BitCopy mode or as a RAW image before performing a detailed forensic examination of secured disks. This allows you to make changes to the copy during analysis without altering and thereby endan-

gering the original content of the media.



Note: When backing up data for forensic examination, hidden and deleted files can be located anywhere on the media, the creation of a copy of the entire media to a target media of the same or larger size is always required. **Never** use **SmartCopy** mode for this type of application.

2.8 Image files

In HDClone, working with physical and logical images follows the same basic logic as physical and logical copies, which are performed directly from one storage media to another. File images offer the following advantages:

- Simple storage and management of your file system
- Optional compression onto minimally required space
- Password protection and AES encryption to protect data
- Use random storage media for exchange
- Distribution without physical media via networks and the internet
- Access of individual files via virtual drives (▶ 9 Miray Virtual Disk)
- Virtual machines



Example: To rescue a defective hard disk, you may create a physical FullCopy instead of a physical FullImage. In both cases, this will result in a bit-wise identical clone of the master hard disk.

2.9 HotCopy & LiveImage

HDClone supports the creation of clones or images of a Windows drive while Windows is running - even of the Windows system partition itself. To use this feature, it is not necessary to take any additional steps. When using HDClone/W, the appropriate mechanisms for using **HotCopy** and **LiveImage** will be activated automatically.

3 Supported hardware

This section contains information on the hardware supported by HDClone/W (Windows) and HDClone/S (self-booting).

3.1 HDClone/W

Under Windows, HDClone can use all devices which are supported by Windows natively or which have a specific Windows driver installed.

3.1.1 Supported systems

HDClone/W runs on PCs (x86 + x64) with the following versions of Windows:

Workstation

- Windows XP (32+64 bit)
- Windows Vista (32+64 bit)
- Windows 7 (32+64 bit)
- Windows 8 (32+64 bit)
- Windows 8.1 (32+64 bit)

Server

- Windows Server 2003 (32+64 bit)
- Windows Server 2008 (32+64 bit)
- Windows Server 2008 R2 (64 bit)
- Windows Server 2012 (64 bit)
- Windows Server 2012 R2 (64 bit)

3.1.2 Supported controllers and adapter cards

All controllers and adapter cards supported by Windows.

3.1.3 Supported devices and media

All devices and mass storage media supported by Windows.

3.2 HDClone/S

The self-booting version of HDClone runs on PCs (x86) and supports a wide range of hardware. Details about the supported systems, controllers and devices are listed in the following subchapters.



Note: The devices listed below show the entire spectrum of hardware supported by HDClone. ▶ **1.4 Edition summary** shows which devices can be used with certain editions of the software.

3.2.1 Supported Systems

- PC 80586 or higher, 500 MHz, 128 MB RAM, VGA (optimal: VESA support)
- Keyboard & mouse: PS/2, USB or Bluetooth
- Bootable CD drive or USB bootable media

3.2.2 Supported controllers

- PCI-IDE controller and Bus Master IDE controller
- Adaptec PCI-SCSI host adapter (▶ 3.3 Compatibility)
- SATA controller with IDE interface
- SATA-II controller with AHCI interface
- USB 1.1 (UHCI & OHCI controller)
- USB 2.0 (EHCI controller)
- USB 3.0 (XHCI controller)
- Bluetooth USB-HCI
- Firewire (IEEE1394 OHCI controller)
- Intel Onboard RAID Controller (SATA-RAID)

3.2.3 Supported devices

- IDE/ATA hard disks, CompactFlash via IDE ¹⁾
- SATA hard disks (internal & external)
- Intel Software RAID (0, 1, 10, 5)
- SCSI hard disks (internal & external)
- USB hard disks (internal & external)
- Firewire hard disks (internal & external)
- USB sticks ²⁾
- SD ³⁾, microSD ³⁾, SDHC ³⁾ and MMC ³⁾
- CompactFlash I ³⁾, CompactFlash II ³⁾
- MicroDrive ³⁾, xD-Picture Card ³⁾
- Memory Stick ³⁾, Memory Stick PRO ³⁾, Memory Stick DUO ³⁾

¹⁾ CompactFlash media with TrueIDE support

²⁾ must support the USB-Mass-Storage-Class protocol

³⁾ connected over a USB card reader or an equivalent adaptor

3.3 Compatibility

HDClone was developed to support general hardware standards. It has been tested on many devices. (▶ 3.2 HDClone/S , ▶ 3.3.1 Compatibility check)

3.3.1 Compatibility check

You can use HDClone Free Edition to check in advance if your devices are supported at no cost to you. To do so, start HDClone Free Edition on your PC, then select the **SpeedTest** function from the **Tools** group. Select the desired drive list entry. The edition required for the listed disks will be shown in the info box to the right of the list field under the **Supported** caption.

3.3.2 Device standards

To support a wide spectrum of devices, HDClone/S implements the official interface standards for the particular device types. In addition, we perform extensive tests with each type of device. Though should you experience any issues, in most cases these can be resolved by setting the options appropriately (see ▶ 8 Troubleshooting). The event that this does not solve the issues, our Support Team (▶ 10.4 Support) will be glad to help you.

3.3.3 Transfer rates

The achievable speed always depends on the physical abilities of your storage device hardware. The following table offers a rough classification:

Type	Age	Transfer rate
Older drives	5-10 years	~ 5-30 MB/sec
Newer drives	2-5 years	~ 30-60 MB/sec
Top models	0-2 years	~ 60-150 MB/sec and more
SSD's	0-2 years	~ 90-300 MB/sec and more

3.4 SATA

HDClone supports SATA disks of any generation (SATA, SATA-II, SATA-6G). Subject to the BIOS settings, these can be used in AHCI or IDE operating mode. Setting of the SATA controller to AHCI operating mode in BIOS is recommended, if available. Should the installed operating system require IDE mode to boot, AHCI mode may be set temporarily for the copying, then be reset.

3.4.1 SATA-Hotplug

Enterprise Edition required

To connect SATA devices to a running system (hot-plugging), the SATA controller has to be set to **AHCI** (instead of **IDE**) operating mode in BIOS, and the ports to be used for hot-plugging must be set to **Hotplug**. Alternatively, SATA ports can also commonly be used for hot-plugging when they have a SATA device connected at power-on.



Warning: It is absolutely essential to first set the AHCI operating mode for the SATA controller in BIOS. In IDE operating mode, the plugging of devices into a running system usually causes a system crash.

3.4.2 Port-Multiplier

Enterprise Edition required

A port multiplier allows the connection of several SATA devices to a single SATA port, thereby sharing the transfer rate of the port. This enables the connection of more SATA disks than native SATA ports are available at one time. Disks connected over a port multiplier will be recognized and displayed automatically.

3.5 SCSI and SAS

Professional Edition or more advanced required

Under Windows, HDClone/W supports available SCSI and SAS drives, should a suitable driver be installed. HDClone/S currently only supports the following Narrow-, Wide-, Ultra- and Ultra-Wide-SCSI controllers from Adaptec:

AHA-2930U	AHA-2940 Ultra	AHA-2940UW	AHA-2940AU
AHA-2944UW	ASC-19160	ASC-29160	ASC-29160LP
ASC-29160N	ASC-39160		



Hint: Use the Free Edition in order to determine whether your SCSI/SAS controller is supported (► 3.3.1 Compatibility check). If HDClone recognizes the connected drive, the SCSI/SAS controller is supported.

3.6 RAID

Professional Edition or more advanced required

HDClone can also clone RAIDs. There are three different variants:

- RAID to normal disk

- RAID to RAID
- Normal disk to RAID

Cloning pure data RAIDs does not require any prior action. This also applies to cloning bootable system installations from a RAID to a normal media or to a RAID for the same type of RAID controller. Cloning bootable system installations to a RAID requires assurance that a software driver for the target RAID has been installed on the same source as a boot driver before starting with cloning.

3.6.1 RAID under Windows

In general, HDClone/W can use any mass storage media available in Windows, including RAIDs that are accessible as normal drives. They can be cloned with HDClone to and from normal disks as well. HDClone clones these RAIDs just as it would be normal drives. The special RAID substructure is hidden by Windows. Special RAID properties are therefore invisible to HDClone/W.

3.6.2 Intel RAID

Since 2003, Intel offers chipsets with support for software RAIDs, which we will refer to as Intel RAIDs for our purposes here. HDClone/S allows to clone from, to and between Intel RAIDs. For this purpose, RAIDs have to be connected to the internal Intel SATA controller in their original configuration. The drive list shows available RAID volumes as disks. Only complete and sound RAIDs can be used as a target.

3.7 USB

HDClone can be used with USB devices of the USB versions 1.1 (UHCI, OHCI), 2.0 (EHCI) and 3.0 (XHCI). HDClone supports USB mass storage media (USB Mass Storage Class), USB keyboards, mice (HID) and USB hubs.

3.8 Firewire (IEEE1394)

Professional Edition or more advanced required

HDClone works with any Firewire drive or Firewire card reader which supports the **Serial-Bus-Protocol** (SBP).



Note: Please ensure to connect Firewire devices prior to starting HDClone, and if possible directly to the PC or to the Firewire controller.

4 Quickstart

You can use HDClone in two variants: HDClone/W as a Windows application or HDClone/S as a self-booting program.



Note: Further information on launching the program can be found under ▶ **5 Installation** and ▶ **6 Program startup**. Information on how to use HDClone can be found under ▶ **7 Inline help**.

4.1 Windows – HDClone/W

Please take the following steps to start HDClone in Windows:

1. Start the setup for Windows (**setup.exe**) and follow the instructions. Accept the default settings.
2. When setup is finished, HDClone will start automatically. Alternately, you can start HDClone from the Desktop or the Windows Start Menu.
3. After starting HDClone, select the desired function and follow the course of the program. For further information, please refer to ▶ **7 Inline help**.

4.2 Self-booting – HDClone/S

To start (=boot) HDClone without Windows, the following steps are required:

1. If you already have a bootable media (CD/DVD or USB stick) with HDClone, please proceed with step 4.
2. Plug a USB stick into your PC or insert an empty CD/DVD into your CD/DVD writing drive. Start the Boot-Setup under:
Programs ▶ *HDClone...* ▶ *Create bootable media*
3. Select the desired CD/DVD drive or the desired USB stick and create a bootable media.
4. Boot the desired PC from this media.
5. When the main program screen opens, select the desired function and follow the course of the program. For further information, please refer to the ▶ **7 Inline help**.

5 Installation

HDClone has two variants, HDClone/W (Windows program) and HDClone/S (self-booting program). Use ▶ 5.1 Setup for Windows to install HDClone/W in Windows and/or create a bootable media (HDClone/S) with ▶ 5.2 Boot-Setup or as described in ▶ 5.4 ISO image.



Note: Should you have obtained HDClone on a media (CD/DVD or USB stick), you can start HDClone/W and/or HDClone/S directly from there (▶ 6 Program startup).

5.1 Setup for Windows

Setup will install HDClone on your Windows PC. Start `setup.exe` and select the desired option on the first screen (▶ fig. 1). Then click Next and follow the course of the Setup. After this process is completed, you can start HDClone/W immediately.

5.1.1 Miray Virtual Disk

Some editions of HDClone also contain the software ▶ 9 Miray Virtual Disk. To exclude the installation of the software, please deselect this option on the first installation screen (▶ fig. 1).

Miray Virtual Disk also includes a device driver (Miray Storage Controller), enabling Windows to present virtual drives as real drives. For this reason, the Windows Security popup (▶ fig. 2) will open at the end of the installation process. Click Install in order to confirm device driver installation.

In Windows XP, confirm the Hardware Installation popup (▶ fig. 3) by selecting Continue Anyway. If Windows opens the Found New Hardware Wizard (▶ fig. 4), close it by selecting Cancel.

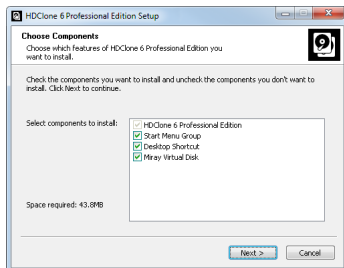


fig. 1: HDClone Setup start screen

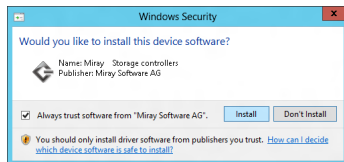


fig. 2: Windows dialog driver installation



fig. 3: Windows Hardware Installation

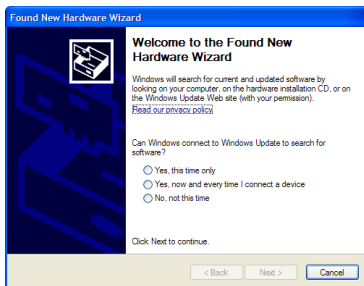


fig. 4: Windows Hardware Wizard

5.2 Boot-Setup

Boot-Setup (▶ fig. 5) creates a bootable disk for booting HDClone/S on a PC without running Windows.

Start Boot Setup one of three ways:

- After HDClone has been installed (▶ 5.1 Setup for Windows), you find the Boot-Setup under Programs ▶ HDClone... ▶ Create bootable disk.
- Start HDClone/W, click on the Toolbox symbol (🔧) or press **F6** and select **Boot-Setup**.
- Start hddclone.exe from the program package. Then select the Create bootable disk button.



fig. 5: Boot-Setup

The Boot-Setup window offers these options:

- **Select target:** Select the desired type (USB or CD/DVD) and a drive from the drop-down box. Drive lists are updated automatically. Alternately, you may select an ISO image to be created.
- **UEFI boot support:** Adds boot support for modern UEFI systems. The disk will also still boot on BIOS systems. Should you encounter any boot problems, simply deactivate this option to create a bootable disk without UEFI bootcode.
- **Format drive:** This option is available for USB disks only. It formats the selected drive prior to making it bootable. This is helpful with boot problems or for simply starting with a fresh drive. All data on the drive will be deleted.

Click on Create now to start creating the bootable disk. Follow the instructions and wait for the program to confirm successful completion. Continue under **► 6 Program startup** or **► 4 Quickstart**.



Note: When creating a CD/DVD, please always use a new, empty writeable CD/DVD. Otherwise there may be problems when trying to boot HDClone from this CD/DVD.

5.3 Bootable Windows CD

Use of HDClone with storage devices or controllers requiring special Windows drivers must occur directly on Windows. If no Windows installation is available, you may create a bootable Windows CD which includes the required drivers described in the paragraphs below.

5.3.1 BartPE (Windows XP)

BartPE creates a specially configured Windows XP system, which can be started from CD. Download PE Builder at <http://www.nu2.net/pebuilder/>. A plug-in used to integrate HDClone into the PE system is to be found at <http://www.miray-software.com/public/support/HDClone-BartPE-Plugin.en.zip>. Install PE Builder on your system and unpack the plug-in to `pebuilder3110a\plugin`. Create the new folder HDClone there. Copy `hdclone.exe` to `pebuilder3110a\plugin\HDClone\files`. If the mass storage devices and controller on your target system will require special drivers, copy the driver files to `pebuilder3110a\drivers\SCSIAdapter`.

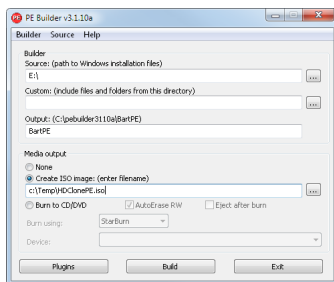


fig. 6: PE Builder configuration dialog

Then start `pebuilder.exe` from the folder `pebuilder3110a`. After few seconds, a popup window will appear (► fig. 6). Please enter the path to the Windows XP installation files into the input field at the top. These can be found on your Windows XP installation CD. Therefore, this field usually contains the drive letter of your CD/DVD drive – unless you have copied the installation files to another location. You can now choose a name and a location for the boot image by clicking on Create ISO image in the box **Media output**. If another CD/DVD writer is available, you can immediately create a CD by clicking on Burn to CD/DVD. Otherwise, an ISO image must be created first.

After clicking on Build, PE Builder creates the CD. Depending on your system, this may take a few minutes. If you did not select Burn to CD/DVD in the previous step, it is necessary to write the newly created ISO image to CD with your recording software. Please note that the file has to be written directly to CD as an image. Normal writing will not be sufficient in this case. Instead, please start your recording software and select Create from image file (or similar description, depending on the recording software used).

Start your PC from the CD created. HDClone is to be found at **Go ► Programs**.

5.3.2 Windows PE

You may also create a bootable CD version of Windows Vista, Windows 7, or Windows 8/8.1. For this purpose, we recommend the Builder projects of CWCodes which can be found at <http://www.cwcodes.net/> at no cost to you.

You will find the projects for **Windows Vista PE**, **Windows 7 PE** and **Windows 8 PE** and **Windows 8.1** at the following URLs:

- **Windows Vista PE (VistaPE):** <http://vistape-capi.cwcodes.net/>
- **Windows 7 PE (Win7PE SE):** <http://w7pese.cwcodes.net/>
- **Windows 8 PE (Win8PE SE):** <http://w8pese.cwcodes.net/>
- **Windows 8.1 PE (Win8.1 SE):** <http://win81se.cwcodes.net/>

When using a 64 bit Windows PE (x64), HDClone, as it is a 32 bit application requires the WoW64 subsystem. In order to ensure that this is included with the Windows PE image, select the Build ► 5 - WoW64 Basic option on the left hand side in Builder.

After having created a USB stick with Builder, copy **hdclone.exe** into the stick's root folder. If using a CD/DVD, select Finals ► Create ISO on the left hand side in builder prior to creating the ISO. The button Put Files for 'RootCD' Here will open a folder to which you can copy **hdclone.exe**, in order for it to be included with the ISO image to be created.



Hint: You may also include device drivers, especially for RAID's, with Windows PE. This will make them accessible from HDClone. For this purpose, the desired drivers must already be installed on the system you are using. On the left hand side, select in Builder Drivers ► Driver Integration. Click on Double Driver Export Host Drivers to include the installed drivers with the Windows PE to be created.

5.3.3 Windows HotCopy

There is a practical alternative to creating a ▶ 5.3.1 BartPE (Windows XP) or ▶ 5.3.2 Windows PE in order to obtain an independently bootable Windows; for example to use special Windows drivers for RAID or SCSI/SAS. Simply create a temporary clone of an existing Windows Installation. Install additional required drivers before or after creating the clone. This clone will then offer a Windows which can be booted independently from the installed operating system, similar to a BartPE or Windows PE. Start HDClone/W from there.

5.4 ISO image

The HDClone software package contains an ISO image (hdclone.iso):

- To be created with ▶ 5.2 Boot-Setup, option ISO image.
- In a program package in ZIP format as hdclone.iso.
- On the genuine media (CD/DVD or USB stick) as hdclone.iso.

It can be used to create a bootable HDClone CD/DVD in any operating system using third party CD/DVD writing software capable of burning ISO files. For further information, please refer to the manual of your CD/DVD writing software.

1. Start your CD/DVD writing software and choose **Create CD from image file** (or similar option, depending on the CD/DVD writing software used).
2. Specify the file **hdclone.iso** as an image file (instead of adding it as a normal file).
3. Insert a blank CD /DVD into the drive and start the burning process.

Once these steps have been completed, you will have created a bootable CD/DVD. You can use it to start (boot) the software directly on any PC with a bootable CD/DVD drive as described in ▶ 6 Program startup.



Hint: The easiest way to create a bootable CD under Linux is to use the software tool **cdrecord** with the following syntax:
cdrecord hdclone.iso

6 Program startup

6.1 Windows – HDClone/W

Following the installation (▶ 5.1 Setup for Windows), you may start HDClone from the Windows Start Menu under Program ▶ HDClone 6... ▶ Start HDClone. Alternately HDClone can be started by invoking the file `hdclone.exe` either from the genuine HDClone media or directly from the software package (ZIP archive).

6.2 Self-booting – HDClone/S



Connect the bootable USB stick or insert the bootable CD/DVD (▶ 5.2 Boot-Setup). Start the PC and ensure that BIOS will boot from the desired media. HDClone will then be launched from the bootable media.




Note: Should your PC not boot from the HDClone boot media, press **F8**, **F11** or **F12** (BIOS dependent) as soon as you power on the PC to access the boot menu and select the boot media.

Symbi will also boot on UEFI systems, with or without SecureBoot mode.

6.3 Quit program

In the lower right of the system bar you find a symbol to close the application ( in HDClone/W) or to power off the PC ( in HDClone/S). Click on the particular symbol or press the **Esc** key to quit HDClone.

If a program function remains open, you can return to the main screen by clicking on the menu symbol () in the lower left hand corner of the system bar or by pressing the **Esc** key. An actively running process will have to be finished or cancelled first.



Note: (HDClone/S only) If you do not want to start HDClone when starting the computer next time, remember to first remove the HDClone boot media from the boot drive.

7 Inline help

7.1 General

HDClone contains an inline help system (Help), which allows you to review a detailed description of the program functions and controls, as well as their modes of operation, which can be accessed directly within the program. You can access Help using the questionmark symbol (?) on the system bar in the lower left hand corner of the screen, or by pressing the **F1** key. In many cases, Help will already show a page with the current program context upon opening. Should there be no context available, Help's starting page will be displayed, allowing you to use either the table of contents or the search function to open the desired topic.

Generally, Help has the same contents for HDClone/W and HDClone/S. Yet there are some minor differences between both Help variants, which are described in the following chapters.

7.2 Windows (HDClone/W)

If HDClone was installed by using ▶ 5.1 Setup for Windows, HDClone/W will use the Windows help system, this means Help will open in a separate window.

In this case, you may also open Help independently from the program under the HDClone entry in the Windows Start Menu (▶ fig. 7).

If HDClone/W is started without previous installation using the Setup for Windows, the integrated help system will be used, as described in ▶ 7.3 Self-booting (HDClone/S). The Help window will then appear within the HDClone application window.

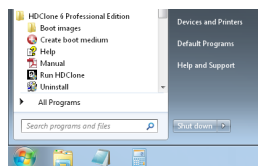


fig. 7: Windows Start Menu

7.3 Self-booting (HDClone/S)

The bootable version of HDClone also contains the Help in full. Here it will display in an integrated help system. This integrated help system is also used, if HDClone is used in Windows without installing it before.

8 Troubleshooting

This paragraph describes problems you may possibly encounter when using HDClone and offers proposals for solutions of these problems. Should you find no proposed solution to a problem, please feel free to contact our ► **10.4 Support**.


8.1 General

8.1.1 Retry

Should a process not run as expected during the first attempt, a common, yet often effective solution is to give it a second try. This saves time, especially if hardware issues are the root cause, as many problems will resolve upon reconnecting hardware, or by using a different port.

8.1.2 System-Log

Should you encounter any problems in general, but especially when contacting our ► **10.4 Support**, please create a System Log first and attach it. Similar to a flight recorder, it will contain information about internal program activities; this will help us – as well as you – to find a solution more quickly. Store the System Log as follows:

1. **HDClone/S:** If you have not booted HDClone from a USB stick, please connect one to store the System Log onto.
2. Click on the Toolbox symbol () or press **Ctrl + Alt + F12**.
3. Select the **Store System Log** option.
HDClone/S: If you have booted HDClone from a USB stick, the System Log will be stored to it automatically. Otherwise, a popup will open and prompt you to select a storage media.
HDClone/W: The System Log will be stored on the Public Desktop. If it is not visible on your desktop, press **F5** or open the path **C:\Users\Public\Desktop** (hidden folder) in Windows Explorer.
4. A popup window will appear, which will display the storage progress as well as the storage location and the file name.

If an older System Log is found at the storage location, the number contained in the file name will be increased automatically. The latest System Log will always be the one with the highest number.



Hint: If saving the System Log to a log file fails when triggered over the System Bar, you can still force HDClone to store a continuous System Log upon startup. Use the Startup option **System Log: <Startup>** (HDClone/S) to store the log to the HDClone bootable disk, or start **hdclone.exe log** (HDClone/W) to store the log automatically to the Public Desktop.

8.2 Create a bootable HDClone media

This chapter addresses potential issues when creating a bootable media for the self-booting version of HDClone.

8.2.1 USB stick not working

If creating a bootable USB stick or booting from this USB stick fails, the cause may be that the USB stick lacks a partition table. Should this be the case, start ▶ **5.2 Boot-Setup**, use the option **Format media** and recreate the bootable USB stick. All stored data on the USB stick will be irretrievably lost.

8.2.2 CD/DVD writer not selectable

Should no drive be offered for selection at **CD/DVD writer** although a CD/DVD writer is available on the system, the installed CD/DVD writing software may be the culprit. It may reserve the drive exclusively, so that Boot-Setup cannot access it. Deactivate or uninstall the CD/DVD writer software in this case or create a bootable CD/DVD with your CD/DVD writing software the ▶ **5.4 ISO image** contained in the software package.

8.3 Booting HDClone

Should issues arise while booting HDClone from a USB stick or CD/DVD (for example black screen or startup screen freezes), the following chapters provide appropriate solutions.

8.3.1 BIOS-USB-Boot

If the HDClone bootable media (USB stick or USB CD/DVD drive) is not listed in the BBS menu (▶ **6.2 Self-booting – HDClone/S**), activate USB boot support in the BIOS setup first. Press **F2**, **Del**, or **F10** (depending on BIOS) to enter BIOS setup. The setting can be found under different names and menu items, depending on the BIOS version. In most cases, it can be found under labels such as **USB**, **Boot** and **Legacy**. In BIOS setup you can also opt to boot from USB permanently, usually under the menu item **Boot**.

8.3.2 UEFI-Boot and SecureBoot

Current PC models often have a UEFI-BIOS. HDClone/S supports booting with UEFI. Some PCs also offer the SecureBoot function, which HDClone/S also supports. Should an issue arise when booting with SecureBoot, deactivate SecureBoot while using HDClone/S. You can activate SecureBoot again afterwards. Should you encounter any issue when booting with UEFI, recreate the HDClone bootable media (► 5.2 Boot-Setup) while the Include UEFI boot support option is disabled. Restart HDClone/S from this bootable media.

8.3.3 Extended Boot Options

The boot settings of HDClone/S are optimized for fast booting. If there are any problems with booting, change the settings on the boot screen (► fig. 8) press the **M** key for **More Options**. This will display the Extended Boot Options.

Startup modes

The startup modes already cover a certain boot setting, which will be modified by the selected startup options.

- **Start Symbi:** Start the system normally.
- **Single Core Mode:** Recommended in the event of booting issues.
- **Safe Mode:** Recommended in the event of issues with connected devices, especially mass storage or input devices.

Startup options

These options can be activated or deactivated independently. They will be applied when booting one of the startup modes.

- **IRQ:** Deactivate if any hardware problems occur (passive device access).
- **SATA & Parallel ATA (AHCI/IDE):** Deactivate to eliminate interference caused by SATA and IDE devices.
- **SATA PortMultiplier: extended detection:** Activate in the event that disks which are connected over a PortMultiplier are not properly detected.
- **USB 1.0/1.1/2.0 (UHCI/OHCI/EHCI):** Deactivate to eliminate interference caused by devices which are connected to normal USB ports (connect input devices to USB 3 or PS/2 instead!).
- **USB 3.0 (XHCI):** Deactivate to eliminate interference caused by devices

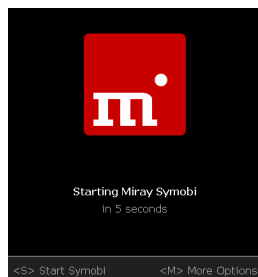


fig. 8: Boot screen

connected to USB-3-Ports.

- **Advanced input device drivers + Bluetooth:** Deactivate in the event of issues with input devices.
- **SCSI & Firewire (IEEE1394):** Deactivate to eliminate interference caused by SCSI or Firewire devices.
- **Advanced bootloading:** Deactivate in the event of booting issues.
- **Video mode:** The default **auto** will select the video mode automatically. **Native** will use the video mode set via BIOS/UEFI. **VESA**, **VGA-BIOS** and **VGA** allow to activate one of these legacy drivers explicitly.
- **System log:** Default is **normal**. Select **reduced** only in the event of oversized system logs. The option **autosave** will save the system log automatically and continuously to the root directory of the bootable disk as **Symobi.1.log**.

Select the desired startup options, then boot, invoking the desired startup mode (**↑**, **↓** and **Return** key).

8.4 Input devices

If there is no reaction on the mouse or keyboard input after starting HDClone/S, the following subchapters provide further information and solutions.

8.4.1 General

A generally very successful solution when having issues with input devices is to connect an alternative USB input device of the same type.

8.4.2 Bluetooth devices

HDClone/S also supports Bluetooth mice and keyboards. If a Bluetooth input device is not recognized, please connect another USB device of the same type.

8.4.3 Problem devices

A few input devices contain a flawed implementation of the standard. Though those devices may work with Windows, as vendors usually test them against Windows, they will not work with other operating systems. Should this be the case, please use a different USB device temporarily. Create a **► 8.1.2 System-Log** and submit it, together with information about the applicable vendor and model of the non-working device to our **► 10.4 Support**.

8.5 Copied disk

8.5.1 Clone not booting

If the clone (or the restored image) of a bootable disk does not boot as expected, please review the following:

- Will the source boot successfully? If not, this is what causes the issue.
- Ensure that the automatic boot data adjustment is applied to the target after the copying process has been completed.
- Could the file system of the source be defective? Check on this prior to creating a copy by running `chkdsk /f` on the source. Errors on the source's file system may result in problems on the target, even if the source appears to boot and work correctly. Otherwise, use FullCopy or BitCopy.
- Is the disk connected to the target system in the same way as the source in the original system? Some versions of Windows refuse booting if a SATA port is configured as **AHCI** in the BIOS of the original system, and as **IDE** in the target system. If this is the case, change the BIOS setting accordingly.
- Usually, Windows is unable to boot from USB disks. If you have created a copy of a Windows system to USB, connect the disk as an internal drive before attempting to boot Windows from it.

8.5.2 Decelerated system

If the performance of the target disk is clearly decreased after cloning or restoring from an image, the drive may use 4K sectors internally. Create another copy or restore the disk once more while ensuring that the **4K alignment** option is selected for the target disk.

8.6 Copying process

8.6.1 Read, write and verification errors

When HDClone reports errors, it is usually the result of defective areas on the corresponding disk. General hardware problems can also cause reading and writing errors, which are usually indicated by a very high number of errors. In this event, cancel the copying process, connect the affected disk to another port, or check it for defects. Then restart the copying process.



Note: If disks are connected by USB, use another USB port and ensure sufficient power supply. When using USB cases for SATA or IDE hard disks, first check if the case is working properly.

8.6.2 Copying performance

Should the copying performance of HDClone not achieve the expected value, please consider the following:

- Is the disk working without any issue? Please use the SpeedTest function to check if source and target achieve the expected speed, or which of them shows a lack of transfer speed.
- When using USB cases for SATA and IDE hard disks, please note that the maximum transfer speed is much lower for USB 2 than for SATA or IDE.
- When using USB3 devices, ensure that they are connected to a USB 3 connector (blue). While in fact USB3 devices are downward-compatible, yet they only run at USB2 speed when plugged to a USB2 connector (black).
- Also be advised that creating a SmartCopy or images will not achieve the nominal transfer speed of a FullCopy or BitCopy. This is a normal occurrence due to technical reasons.

8.7 Mass storage

Please ensure that the disks are working properly and connected correctly and the power supply is sufficient. The following subchapters contain information about certain types of storage media.

8.7.1 SCSI

When using SCSI devices, they must be configured correctly and connected to one of the supported SCSI controllers. A list of supported SCSI controllers can be found at ► 3.3 Compatibility.

HDClone supports even more controllers, either as onboard chipset (AIC) or as add-on card (AHA, ASC). These can be determined by their respective vendor and device IDs which are listed in the table below.

Vendor	Model	Device
9004h	AHA-2930U	3860h
9004h	AHA-2930CVAR	3868h
9004h	AHA-2930CVAR	3869h
9004h	AHA-4944(U)W	3B78h
9004h	AIC-755x	5x75h
9004h	AIC-785x	5x78h
9004h	AIC-7560	6075h
9004h	AIC-786x	6x78h
9004h	AIC-7870	7078h
9004h	AHA-2940(W)	7178h
9004h	AHA-3940(W)	7278h

Vendor	Model	Device
9004h	AHA-4944UW	8678h
9004h	AIC-7887	8778h
9004h	AIC-7888	8878h
9004h	AHA-4944(U)W	EC78h
9005h	AHA-2940/50U2W	0010h
9005h	AIC-789x	001xh
9005h	AIC-789x	002xh
9005h	AIC-789x	003xh
9005h	AHA-3940/50U2x	0050h
9005h	AHA-3950 U2x	0051h
9005h	AIC-7896/7 U2	005Fh

Vendor	Model	Device
9004h	AHA-2944	7478h
9004h	AHA-3944(W)	7578h
9004h	AHA-4944(U)W	7678h
9004h	AIC-7877	7778h
9004h	AIC-7860	7860h
9004h	AIC-7895	7895h
9004h	AIC-7880	8078h
9004h	AHA-2940U(W)	8178h
9004h	AHA-3940U(W)(D)	8278h
9004h	AHA-2944UW	8478h
9004h	AHA-3944U(WD)	8578h

Vendor	Model	Device
9005h	AIC-789x	006xh
9005h	AIC-789x	007xh
9005h	AIC-7892(A B)U160	008xh
9005h	AIC-789x	009xh
9005h	AIC-789x	00Axh
9005h	AIC-789x	00Bxh
9005h	AIC-7899(A) U160	00Cxh
9005h	AIC-789x	00Dxh
9005h	AIC-789x	00Exh
9005h	AIC-789x	00Fhx
9005h	AHA-2930U2	0180h

8.8 USB hubs

USB devices can either be connected directly or over a USB hub. In order to achieve the highest transfer rates as possible, it is recommended that they be connected directly to the PC or the USB controller.

8.8.1 USB 3 devices

Always ensure that USB3 devices are connected to a proper USB3 connector (blue) in order to utilize the full performance of USB3.

8.9 Mapped network drives

When using mapped drives in Windows, in some cases HDClone may not find the mapped drives, since HDClone runs in administrator mode. To use the established mapped drives, a small change to the Windows Registry is required. Usually, **► 5.2 Boot-Setup** will handle this automatically, you can also make this change manually, by following the directions below:

- Open the registry editor (**regedit.exe**)
- Move to the following registry key in the tree structure
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System
- Create the **DWORD** value **EnableLinkedConnections**
- Set its value data to 1 and restart your computer



Note: To undo these changes, simply delete the registry value.

9 Miray Virtual Disk

HDClone contains the **Miray Virtual Disk** software, which allows mounting file images created with HDClone – even VMDK, VHD/VHDX, VDI images – as virtual Windows drives. You can then access files and folders stored within a file image directly. **Miray Virtual Disk** can be started either on demand or automatically at the system start-up. File images may be mounted either only on demand or persistently.



Note: You can also open and mount file images as virtual drives directly from the network, using network drives or network shares.

9.1 Installation

Miray Virtual Disk is included in the ▶ 5.2 Boot-Setup. You can choose to install **Miray Virtual Disk** during setup (▶ 5.1 Setup for Windows). It will be installed to a separate location within the **Program Files** directory.

9.2 Program startup

You will find **Miray Virtual Disk** in the Windows Start Menu within the HDClone folder. The program window will appear at the start-up. Since **Miray Virtual Disk** works in the background, the program icon will appear in the System Tray. **Miray Virtual Disk** will remain active in the background, even if the program window is closed. You can reopen the program window using the **System Tray** icon.

9.2.1 Inline help

Miray Virtual Disk contains an inline help which can be opened from within the program by the context menu in SystemTray, or by pressing the **F1** key. Help for **Miray Virtual Disk** can also be opened apart from the program via the HDClone entry in the Windows Start Menu (▶ 7.2 Windows (HDClone/W)).

10 Miscellaneous

10.1 Disclaimer

Parts of this product are based on products which are licensed under the GNU General Public License (GPL). The applicable license can be found by visiting <http://www.gnu.org/copyleft/gpl.html>. Upon submission of a request to support@miray.de you will be sent a copy of the source code.

While HDClone was programmed and tested with the greatest possible care, please understand that we cannot assume any liability for the proper functionality of the program, and that we cannot be held liable for any damages that may result from its usage, which may be subject to gross negligence or intent.

10.2 Licensing

10.2.1 License types

HDClone is offered under different license types to serve various types of use.

- **Workplace License:** Permanent installation on up to two PCs belonging to the licensee, typically PC and laptop.
- **Technician License:** Usable on random PCs with the associated USB token. Additional permanent installation on up to two PCs owned by the licensee.
- **Volume License:** Permanent use on a determined number of PCs, according to the selected licensing volume. May also be used to extend existing Workplace, Technician and Volume Licenses.
- **Maintenance License:** Usable on random PCs with the associated USB token. Extends existing Technician Licenses.
- **One-time License:** Contingent on individual start-ups of the software. May be used with random PCs. Also suitable for simultaneous usage and for remotely operated systems. Extends existing Technician Licenses.

We offer further licensing options per request, for example within local networks or as a Corporate or Site License.

10.2.2 Activation

Some license types require mandatory activation (Workplace License, Volume License, One-time License), while some activations are optional (Technician License). Activations are divided into Single Activation (SA) and Permanent Activation (PA). These are performed automatically upon installation or when starting the program. In the event that both activation types are available, the software will prompt you on which one to use.



Important: Workplace and Technician Licenses contain only a small number of SAs, which are intended for emergencies. Therefore, please always use PAs or the USB stick (Technician License) first.

A PA has only to be completed once per system. Afterwards, the program can be started without any further activation. When switching systems (for example migration), you can release an existing PA by uninstalling the software. Your activation may then be (re-)used on the new system.



Note: With a Technician License, the USB stick must be connected to the PC before installing or starting the program. The software will then automatically recognize no need for activation in this case.

10.3 Feedback

Your feedback is highly valued. Should you experience any program errors, we will certainly make every effort to rectify these issues. If you would like to make any suggestions for improvement, we would like to hear them in order to implement and integrate your ideas. We welcome and look forward to any opinions or information that you would like to share with us regarding this software.

Internet	miray-software.com
Email	feedback@miray.de
Fax	+49 (0)89 72013-647
Postal address	Miray Software AG Gaissacher Str. 18 81371 Munich Germany

10.4 Support

Should you encounter any problems with any of our products, our support team will be glad to assist you. Please send us your inquiry via our homepage at miray-software.com/support or email us at support@miray.de.