HDClone 6

Miray

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, that fully meets your requirements and expectations. In case of having suggestions for improvement or not being satisfied with the software, we kindly ask you to send your suggestions and criticism to feedback@miray.de.

1.1 Brief description

HDClone is a universal tool for cloning storage media on hardware sector level. HDClone manages many cases of application, 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 and 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 for installation and program startup.

5 Installation: Installing HDClone in few minutes under Windows and/or creating a HDClone bootable medium (USB key or CD/DVD).

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

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

8 Troubleshooting: If you encounter any problems when using HDClone, this chapter provides information and proposals for solution.

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 a 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 different editions of HDClone. They differ from each other by the amount of features they offer, supported device types, performance and special options. The following table offers you a comparative summary of the editions and their 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	○	○	○	○	●	●
Differencial 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 is specialized on creating physical copies. Therefore HDClone offers particular advantages for copying and respectively rescuing defective media (▸ 2.2 Data rescue). In addition, HDClone can work independently from partitioning scheme, file system and operating system. This allows you to copy entire operating system installations (▸ 2.1 Upgrading hard disks & migrating an OS) or to be able to create an exact copy in case of unknown/proprietary file systems (▸ 2.6 Proprietary hard disk formats). Altogether, HDClone covers a wide spectrum of possible applications by its universal copying technology. In the following text you will find descriptions of the most common areas of the application of HDClone. The individual chapters offer instructions as well as further tips regarding the execution of the application.

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

2.1 Upgrading hard disks & migrating an OS

Because HDClone works independently of file system formats and operating systems, you can use it to migrate entire installations, including the installed operating system, to another hard disk. This is especially useful if you want to migrate an existing installation to a new hard disk without having to install the operating system and applications again. For this type of application, a SmartCopy (or FullCopy) of the entire hard disk is most suitable. Use the PartitionSelect feature to choose individual partitions to be cloned.

Note: Please take care to have only one hard disk connected after completing the copy and before starting the operating system. It should be plugged to the same channel as the original. Hence, either remove the copy or connect it instead of the original medium.

2.1.1 Unused disk space

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

2.1.2 Smaller target medium

In general, you can also copy from a larger to a smaller medium. HDClone can decrease your NTFS and FAT partition size automatically on the fly during copying. For other file systems, you may downsize the partitions on the source medium before cloning, using appropriate third-party tools before cloning.

2.2 Data rescue

In case of hard disks with defective areas it is especially important that they are being rescued to an intact medium 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. But 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 is able to reduce exposure to an absolute minimum. In very critical cases, you can also just copy single partitions to reduce exposure for the medium even more. After having rescued the data from the defective hard disk, you can then perform a recovery on the (functional) target medium without having to fear any further damages.

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

Note: Only a physical copy allows you to rescue all of the data (except 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, or 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 restore from the backup partition brings the system installation back into its original state – without the previous affliction of faulty program installations, viruses etc. For this purpose, create an unused partition in addition to the system partition of at least the same size to serve as a backup partition. Then cre-

ate a file image and restore the original system from that image when needed.

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

2.4 Mass copying

HDClone Enterprise Edition is specially designed for creating up to 16 copies at a time. This makes it especially suitable for industrial duplication of pre-installed software (e.g. on hard disks or on CompactFlash media etc.) or for creating several identical operating system installations (▸ 2.5 Master installations)

2.5 Master installations

HDClone is also suitable for duplicating (deployment) system installations (▸ 2.4 Mass copying). Copying an entire master directly or from a file image to the target medium to use it directly from there.

Note: For duplicating Windows installations, we recommend to run the Microsoft tool **sysprep** before cloning. Further information is to 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 besides system software, which can read the data on these media. HDClone can rescue this data and transfer it to a new medium without any problem. The best way is to copy the original medium to a target medium of the same or larger size. A target medium smaller than the original medium should not be used, as it cannot be assured that all relevant user data will be transferred in this case.

Note: In case of unknown or proprietary (non-standardized) formats, always copy the entire original medium. You should only use the mode Cloning Partitions if you know for sure that the partitions are reported correctly.

2.7 Forensic examination

HDClone is also suitable for securing data for forensic purposes, as all data from a disk is copied completely, including data that has possibly been hidden or deleted. This data cannot be reached any more via the usual file system mecha-

nisms. Therefore it will be useful to create a copy in BitCopy mode or 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 thus endangering the original content of the medium.

Note: When backing up data for forensic examination, hidden and deleted files can be located anywhere on the medium, it is always required to create a copy of the entire medium to a target medium of the same or larger size. **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 storage medium to storage medium. File images offer the following advantages:

- Simple storing and managing in your file system
- Optional compression for minimum space required
- Password protection and AES encryption to protect data
- Use arbitrary storage media for exchange
- Distributing without physical media via networks and the Internet
- Accessing 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. Both cases will result in a bitwise identical clone of the master hard disk.

2.9 HotCopy & LiveImage

HDClone supports creating clones or images of a Windows drive while Windows is working - even of the Windows system partition itself. To use this feature, it is not necessary to take certain 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 when using HDClone/W (Windows) and HDClone/S (self-booting).

3.1 HDClone/W

Under Windows, HDClone can use all devices that are supported by Windows natively or that 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 represent the entire spectrum of hardware supported by HDClone. Which of them can be used with a certain edition is listed in ▸ 1.4 Edition summary.

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 medium

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 keys [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 is developed to support general hardware standards. It has been tested on a large number of 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 and for free if your devices are supported. Start HDClone Free Edition on the particular PC, select **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 right of the list field at the caption **Supported**.

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 device type. If you experience an issue, though, it can be solved in most cases by setting the options appropriately (see ▸ 8 Troubleshooting). In case of even this does not work, 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
SSDs	0-2 years	~ 90-300 MB/sec and more

3.4 SATA

HDClone supports SATA disks of any generation (SATA, SATA-II, SATA-6G). Depending on the BIOS settings, they can be used in AHCI or IDE operating mode. It is recommended to set the SATA controller to AHCI operating mode in BIOS, if available. In case the installed operating system requires IDE mode to boot, AHCI mode may just be set temporarily for the copying and be set back afterwards.

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** (not **IDE**) operating mode in BIOS and the ports to be used for hot-plugging to **Hotplug**. Alternatively, SATA ports can commonly also be used for hot-plugging when they have a SATA device connected at power-on.

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

3.4.2 Port-Multiplier

Enterprise Edition required

A port multipler allows to connect several SATA devices to a single SATA port, sharing the transfer rate of the port. This makes it possible to connect more SATA disks at a time than native SATA ports are available. 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, if a suitable driver has been 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 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 preliminary action. The same applies for cloning bootable system installations from a RAID to a normal medium or to a RAID for the same type of RAID controller. Cloning bootable system installations to a RAID requires to ensure that a software driver for the target RAID has been installed on the source as a boot driver before starting with cloning.

3.6.1 RAID under Windows

In general, HDClone/W can use any mass storage medium available in Windows, including RAIDs that are accessible as normal drives. They can be cloned with HDClone – from and to normal disks as well. HDClone clones these RAIDs just like 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 refer to as Intel RAIDs 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 and 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 that supports the Serial-Bus-Protocol (SBP).

Note: Please take care 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 and HDClone/S as a self-booting program.

Note: Further information on launching the program is to be found at ▸ 5 Installation and ▸ 6 Program startup. Information on how to use HDClone is to be found in the ▸ 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 be started automatically. Otherwise 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 the ▸ 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 medium (CD/DVD or USB key) with HDClone, please proceed with step 4.
2. Plug a USB key to your PC or insert an empty CD/DVD into your CD/DVD writing drive. Start the Boot-Setup under:
   Programs ▸ *HDClone...* ▸ *Create bootable medium*
3. Select the desired CD/DVD drive or the desired USB key and create a bootable medium.
4. Boot the desired PC from this medium.
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 medium (HDClone/S) with ▸ 5.2 Boot-Setup or as described in ▸ 5.4 ISO image.

Note: In case you have obtained HDClone on a medium (CD/DVD or USB key), 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 finishing, you can start HDClone/W immediately.

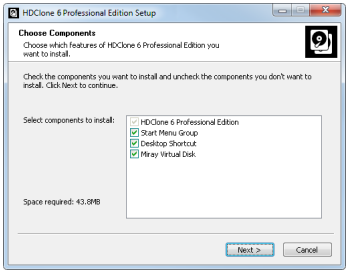

fig. 1: HDClone Setup start screen

5.1.1 Miray Virtual Disk

Some editions of HDClone also contain the software ▸ 9 Miray Virtual Disk. To have it not installed, please deselect it in 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) opens at the end of the installation process. Click on *Install* in order to confirm device driver installation.

fig. 2: Windows dialog driver installation

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

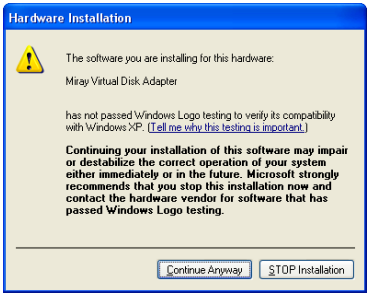

fig. 3: Windows Hardware Installation

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 Windows.

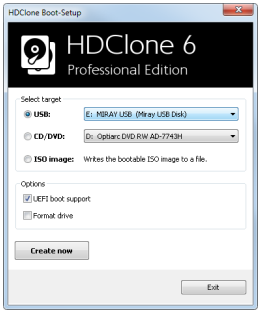

fig. 5: Boot-Setup

You can start Boot-Setup in 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, klick on the Toolbox symbol (🔧) or press F6 and select **Boot-Setup**.
- Start **hdclone.exe** from the program package. Then click on the *Create bootable disk* button.

The Boot-Setup window offers these options:

- Select target: Select the desired type (**USB** or **CD/DVD**) and a drive from the list. Drive lists are updated automatically. Or select an **ISO image** to be created.
- UEFI boot support: Adds boot support for modern UEFI systems. The disk will still boot on BIOS systems, too. Just if encountering any boot problems, deactivate this option to create a bootable disk without UEFI bootcode.
- Format drive: Available for USB disks only. Formats the selected drive before making it bootable. 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 reporting successful completion. Continue at ▸ 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

When using HDClone with storage devices or controllers, which require special Windows drivers, it has to be used directly on Windows. If there is no Windows installation available, the options you to create a bootable Windows CD which includes the required drivers are described in the following paragraphs.

5.3.1 BartPE (Windows XP)

BartPE creates a specially configured Windows XP system, that can be started from CD. Download PE Builder at http://www.nu2.nu/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**.

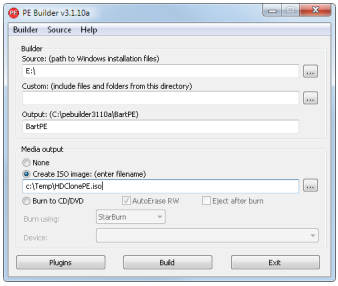

fig. 6: PE Builder configuration dialog

Then start **pebuilder.exe** from the folder **pebuilder3110a**. After few seconds, a popup window appears (▸ **fig. 6**). Please enter the path to the Windows XP installation files in the input field on top. They are to be found on your Windows XP installation CD. Hence, this field usually contains the drive letter of your CD/DVD drive – except 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 create an ISO image 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 to CD directly as an

image. Normal writing will not be sufficient in this case. Instead, please start your recording software and choose *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 freely available Builder projects of CWCodes under http://www.cwcodes.net/.

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 a 32 bit application requires the WoW64 subsystem. In order to ensure this to be included with the Windows PE image, select the *Build* ► *5 - WoW64 Basic* option on the left side in Builder.

After having created a USB thumb drive with Builder, copy **hdclone.exe** into the thumb drive's root folder. In case of a CD/DVD, select *Finals* ► *Create ISO* on the left side in builder before creating the ISO. The button *Put Files for 'RootCD' Here* will open a folder where you can copy **hdclone.exe** to, in order to have it included with the ISO image to be created.

Hint: You may also include device drivers, especially for RAIDs, with Windows PE. This will make them accessible from HDClone. For this purpose, the desired drivers have to already be installed on the system you are using. Select on the left side in Builder *Drivers* ► *Driver Integration* then. Click on *Double Driver Export Host Drivers*, to have the installed drivers included 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** to obtain a independently bootable Windows, for example to use special Windows drivers for RAIDs or SCSI/SAS. Simply create a temporary clone of an existing Windows Installation. Install additionally required drivers before or after creating the clone. This clone then offers you a Windows that can

be booted independent from the installed operating system and start HDClone/W there, similar to a BartPE or Windows PE.

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 medium (CD/DVD or USB key) as **hdclone.iso**.

It can be used to create a bootable HDClone CD/DVD in any operating system using any 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 (not just drag-and-drop it).
3. Insert a blank CD /DVD into the drive and start the burning process.

After having accomplished these steps you 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 of creating a bootable CD under Linux is using the software tool **cdrecord** with the following syntax:
cdrecord hdclone.iso

6 Program startup

6.1 Windows – HDClone/W

After installing (▸ 5.1 Setup for Windows), you may start HDClone from the Windows start menu under *Program* ▸ *HDClone 6...* ▸ *Start HDClone*. Alternatively HDClone can be started by invoking the file **hdclone.exe** from the genuine HDClone medium or directly from the software package (ZIP archive).

6.2 Self-booting – HDClone/S

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

Note: In case your PC does not boot from the HDClone boot medium, press F8, F11 or F12 (BIOS dependent) immediately after turning on the PC to enter the boot menu and select the bootmedium.

Symobi 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 for closing the application (in HDClone/W) or for powering off the PC (in HDClone/S). Click on the particular symbol or press the Esc key to quit HDClone.

If there is still a program function open, you can return to the main screen by clicking on the Menu-symbol ( ) in the lower left corner of the system bar or pressing the Esc key. A process still running has to be finished or cancelled at first.

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

7 Inline help

7.1 General

HDClone contains an inline help system, allowing you to get a detailed description of the program functions and controls as well as their mode of operation to be called right within the program. You can access inline help using the question-mark symbol (?) on the system bar in the lower left of the screen, or by pressing the F1 key. In many cases, help will already show a page with the current program context when opening. In case there is no context available, the help's starting page will be displayed, allowing you to use the table of contents or the search function to open the desired topic,

Generally, inline help has the same contents for HDClone/W and HDClone/S. But there are 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 be using the Windows help system, meaning help will open in a separate window.

In this case, you can also open help independent from the program under the HDClone entry in the Windows start menu (▸ fig. 7).

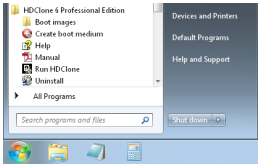

fig. 7: Windows start menu

When HDClone/W has been started without previously installing it 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.

7.3 Self-booting (HDClone/S)

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

8 Troubleshooting

This paragraph describes possible problems when using HDClone and offers proposals for a solution. If there not a proposal given for a solution to a problem, you can gladly contact our ▸ 10.4 Support.

8.1 General

8.1.1 Retry

In case that something does not run as expected or desired at the first attempt, a trivial but often effective solution is to give it a second try. Especially in case of hardware issues this saves time, as many problems will be gone when connecting hardware a second time or using a different port.

8.1.2 System-Log

In case of any problems, but especially when contacting our ▸ 10.4 Support, please create a System Log first and attach it. Just like a flight recorder, it contains information about internal program activities, which will help us – and you as well – finding a solution much faster. Store the System Log as follows:

1. HDClone/S: If you have not booted HDClone from a USB key, please connect one to store the System Log to.
2. Klick 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 key, the System Log will be stored to it automatically. Otherwise, a popup will open and prompt you to select a storage medium.
   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 appears, showing the storing 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 is always the one with the highest number.

Hint: In case it is not possible trigger storing the System Log, you can have the log stored automatically right from when HDClone is starting up. Use the Startup option **System Log: <Startup>** (HDClone/S) to have the log stored to the HDClone bootable disk or start **hdclone.exe log** (HDClone/W) to have the log stored to the Public Desktop automatically.

8.2 Create a bootable HDClone medium

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

8.2.1 USB key not working

If creating a bootable USB key or booting from this USB key fails, the USB key may lack a partition table. In this case, start ▸ **5.2 Boot-Setup**, use the option **Format medium** and create the bootable USB key again. All data stored on the USB key will get lost irrecoverable.

8.2.2 CD/DVD writer not selectable

In no drive is 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 reason. 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

If there are issues when booting HDClone from USB key or CD/DVD (for example black screen or startup screen freezes), the following chapters provide suitable solutions.

8.3.1 BIOS-USB-Boot

If the HDClone bootable medium (USB key 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 is to be found under different names and menu items, depending on the BIOS version. In most cases it is to be found under labels like **USB**, **Boot** and **Legacy**. In BIOS setup you can also select 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. In case there is an issue when booting with SecureBoot, deactivate SecureBoot while using HDClone/S. You can activate SecureBoot again afterwards. In case there is an issue when booting with UEFI, create the HDClone bootable medium again (▸ 5.2 Boot-Setup). with the **Include UEFI boot support** option disabled. Start HDClone/S again from this bootable medium.

8.3.3 Extended Boot Options

The boot settings of HDClone/S are optimized for fast booting. In case of problems with booting, they can be changed on the boot screen (▸ fig. 8) press the M key for **More Options**. This will display the Extended Boot Options.

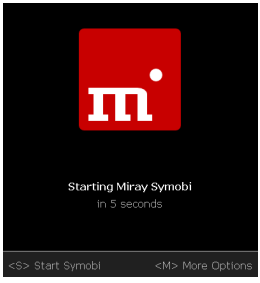

fig. 8: Boot screen

Startup modes

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

- **Start Symobi**: Starting the system normally.
- **Single Core Mode**: Recommended in case of booting issues.
- **Safe Mode**: Recommended in case of issues with connected devices, especially mass storage and 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 in case of any hardware problems (passive device access).
- **SATA & Parallel ATA (AHCI/IDE)**: Deactivate to eliminate interference caused by SATA and IDE devices.
- **SATA PortMultiplier: extended detection**: Activate in case of disks connected over a PortMultiplier are not being detected properly.
- **USB 1.0/1.1/2.0 (UHCI/OHCI/EHCI)**: Deactivate to eliminate interference caused by devices connected to normal USB ports (connect input devices to USB 3 or PS/2 then!).
- **USB 3.0 (XHCI)**: Deactivate to eliminate interference caused by devices con-

nected to USB-3-Ports.

- Advanced input device drivers + Bluetooth: Deactivate in case of issues with input devices.
- SCSI & Firewire (IEEE1394): Deactivate to eliminate interference caused by SCSI or Firewire devices.
- Advanced bootloading: Deactivate in case of booting issues.
- Video mode: The default **auto** selects 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 case 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 mouse or keyboard input after starting HDClone/S, the following subchapters render further information and a solution.

8.4.1 General

A solution that is generally very successful 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. In case a Bluetooth input device is not recognized, please connect an alternative USB device of the same type.

8.4.3 Problem devices

Few input devices contain a flawed implementation of the standard. Those devices may though work with Windows, since vendors usually test against Windows, but will not work with other operating systems. In this case, please use a different USB device temporarily. Create a ▸ 8.1.2 System-Log and send it, together with information about vendor and device type of the non-working device to our ▸ 10.4 Support.

8.5 Copied disk

8.5.1 Clone not booting

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

- Does the source boot correctly? If not, the problem is located here,
- Ensure that the automatic boot data adjustment is applied to the target after the copying process has been finished.
- Is the file system of the source defective? Check this before creating a copy by running chkdsk /f on the source. Errors on the source file system may yield problems on the target, even if the source seems 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. Change the BIOS setting as required in this case.
- Usually, Windows is not able 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 again and ensure 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, this usually results from defective areas on the corresponding disk. General hardware problems can also cause read and write errors, usually indicated by a very high number of errors. In this case, cancel the copying process, connect the affected disk to another port or check if it may be defective. Restart the copying process then.

Note: In case of disks connected over USB, use a different USB port and ensure the power supply is sufficient. When using USB cases for SATA or

IDE hard disks, please check if the case is working properly first.

8.6.2 Copying performance

If the copying performance of HDClone does not achieve the expected value, please consider the following notes:

- Does the disk work without an issue? Please use the SpeedTest function to check if source and target achieve the expected speed or which of them probably shows a lack of transfer speed.
- When using USB cases for SATA and IDE hard disks, please consider 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). In fact USB3 devices are downward-compatible, but only run at USB2 speed when plugged to a USB2 connector (black).
- Also consider that creating a SmartCopy or images will usually not achieve the nominal transfer speed of a FullCopy or BitCopy. This has technical reasons and therefore is normal.

8.7 Mass storage

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

8.7.1 SCSI

When using SCSI devices, please ensure that they are configured correctly and connected to one of the supported SCSI controllers. A list of supported SCSI controllers is to be found at ▸ 3.3 Compatibility.

HDClone supports even more controllers, either as onboard chipset (AIC) or as addon card (AHA, ASC). They are determinable by their respective vendor and device IDs which are listed in the following table.

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

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

Vendor	Model	Device
9004h	AIC-7870	7078h
9004h	AHA-2940(W)	7178h
9004h	AHA-3940(W)	7278h
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	AHA-3940/50U2x	0050h
9005h	AHA-3950 U2x	0051h
9005h	AIC-7896/7 U2	005Fh
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	00Fxh
9005h	AHA-2930U2	0180h

8.8 USB hubs

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

8.8.1 USB 3 devices

Always ensure that you connect USB3 devices 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, HDClone may not find the mapped drives in some cases, since HDClone is running 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. But you can also make the change manually, as described 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 the changes, simply delete the registry value.

9 Miray Virtual Disk

HDClone contains the **Miray Virtual Disk** software, which allows to mount 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 on demand or automatically at system start-up. File images may be mounted either just 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 with the ▸ **5.2 Boot-Setup**. During setup (▸ **5.1 Setup for Windows**), you can choose to install **Miray Virtual Disk**. It will be installed to a separate location in the **Program Files** directory.

9.2 Program startup

You will find **Miray Virtual Disk** in the Windows Start menu in the HDClone folder. At startup, the program window will appear. 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 you close the program window. You can open the program window again using the **System Tray** icon.

9.2.1 Inline help

Miray Virtual Disk contains an inline help, that can be opened from within the program using the context menu in SystemTray or the F1 key. The help for Miray Virtual Disk can also be opened independent from the program under 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 works licensed under the GNU General Public License (GPL). The appropriate license is to be found at http://www.gnu.org/copyleft/gpl.html. On request to support@miray.de we will send you a copy of the source code.

Although HDClone was programmed and tested with the largest possible caution, please understand that we cannot assume any liability for the proper functionality of the program and that we are not liable for damages resulting from its usage, subject to gross negligence and intention.

10.2 Licensing

10.2.1 License types

HDClone is offered under different license types, which are designed to satisfy various kinds of use.

- **Workplace License**: Permanent installation on up to two PCs of the licensee, typically PC and laptop.
- **Technician License**: Usable on arbitrary PCs with the associated USB token. Additionally, permanent installation on up to two PCs of the licensee.
- **Volume License**: Permanent use on a specific 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 arbitrary PCs with the associated USB token. Extending existing Technician Licenses.
- **One-time License**: Contingent of individual starts of the software. Usable with arbitrary PCs. Also suitable for simultaneous usage and for remotely operated systems. Extending existing Technician Licenses.

We offer further licensing options on demand, for example in local networks or as a Corporate or Site License.

10.2.2 Activation

Some license types require activation mandatory (Workplace License, Volume License, One-time License) or as an option (Technician License). Activations divide into Single Activation (SA) and Permanent Activation (PA). They are performed automatically when installing or starting the program. In case 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, intended for emergencies. Therefore, please always use PAs or the USB key (Technician License) in the first place.

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

Note: When using a Technician License, take care to connect the USB key to the PC before installing or starting the program. Software then will recognize automatically there is no activation required in this case.

10.3 Feedback

We are highly interested in your feedback. If you encounter any program errors or if you have any improvement ideas, we will always try to fix the errors and implement or integrate your ideas. If you only want to tell us your opinions on this software, we would look forward to receiving such information from you.

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10.4 Support

If you encounter any problems with one of our products, our support team is gladly at your disposal. Please send us your inquiry through our homepage at miray-software.com/support or email us at support@miray.de.