Active@ KillDisk for Linux (Console)

User Guide

Contents

1 Product Overview

Active@ KillDisk for Linux (Console) is a powerful utility that will:

- Wipe confidential data from unused space on your hard drive.
- Erase data from partitions or from an entire hard disk.
- Destroy data permanently.

Wiping the logical drive's deleted data does not delete existing files and folders. It processes all unoccupied drive space so that data recovery of previously deleted files becomes impossible. Installed applications and existing data are not touched by this process. Active@ KillDisk wipes unused data residue from file slack space, unused sectors, and unused space in system records or directory records.

When you erase data with Active@ KillDisk for Linux, you destroy data permanently by conforming to any one of more than twenty international data sanitizing standards or using your own custom settings.

Wiping drive space or erasing data can take a long time, so perform these operations when the system is not being otherwise utilized. For example, these operations may be run overnight. If you have several physical hard disk drives attached to the machine, KillDisk can erase or wipe them simultaneously (in multi-threaded mode), thus saving you time and work costs.

After erase or wipe actions are completed, KillDisk offers you the options of initializing erased disks, shutting down your computer, saving a log file and the certificate (XML or HTML). Custom erase or wipe certificates can be created using your company logo and attributes.

KillDisk supports command line parameters (what to erase, which method to use, etc…) and executable exit codes. Application can be run in batch mode, which is fully automated and requires no user interaction.

1.1 Erasing Confidential Data

Modern methods of data encryption are deterring network attackers from extracting sensitive data from stored database files. Attackers who want to retrieve confidential data are becoming more resourceful by looking into places where data might be stored temporarily. For example, a hard drive on a local network node can be a prime target for such a search. One avenue of attack is the recovery of data from residual data on a discarded hard drive. When deleting confidential data from hard drives, removable disks, or USB devices, it is important to extract all traces of the data so that recovery is not possible.

Most official guidelines regarding the disposal of confidential magnetic data do not take into account the depth of today's recording densities, nor the methods used by the operating system when removing data. For example,

Windows DELETE command merely changes the file name so that the operating system will not look for the file. The situation with NTFS is similar.

Removal of confidential personal information or company trade secrets in the past might have been performed using the FORMAT command or the FDISK command. Ordinarily, using these procedures gives users a sense of confidence that the data has been completely removed.

When using the FORMAT command, Windows displays a message like this:

Important: Formatting a disk removes all information from the disk.

The FORMAT utility actually creates new FAT and ROOT tables, leaving all previous data on the disk untouched. Moreover, an image of the replaced FAT and ROOT tables is stored so that the UNFORMAT command can be used to restore them.

FDISK merely cleans the Partition Table (located in the drive's first sector) and does not touch anything else.

1.1.1 Advanced Data Recovery Systems

Advances in data recovery have been made such that in many cases data can be reclaimed from hard drives that have been wiped and disassembled. Security agencies use advanced applications to find cybercrime-related evidence. There also are established industrial spy agencies adopting sophisticated channel coding techniques such as PRML (Partial Response Maximum Likelihood), a technique used to reconstruct the data on magnetic disks. Other methods include the use of magnetic force microscopy and recovery of data based on patterns in erase bands.

Although there are very sophisticated data recovery systems available at a high price, data can easily be restored with the help of an off-the-shelf data recovery utility like Active@ File Recovery, making your erased confidential data quite accessible.

Using our powerful and compact Active@ KillDisk for Linux utility, all data on your hard drive or removable device can be destroyed without the possibility of future recovery. After using Active@ KillDisk for Linux, disposal, recycling, selling, or donating your storage device can be done with peace of mind.

1.1.2 International Standards in Data Removal

Active@ KillDisk conforms to more than twenty international standards for clearing and sanitizing data (US DoD 5220.22-M, Gutmann and others). You can be sure that sensitive information is destroyed forever once you erase a

disk with Active@ KillDisk. Active@ KillDisk is a quality security application that destroys data permanently on any computer that can be started using a bootable CD/DVD-ROM or USB Flash Disk. Access to the drive's data is made on the physical level via the BIOS (Basic Input-Output Subsystem), bypassing the operating system's logical drive structure organization. Regardless of the operating system, file systems, or type of machine, this utility can destroy all data on all storage devices. It does not matter which operating systems or file systems are located on the machine.

1.2 Wiping Confidential Data from Unoccupied Disk's Space

You may have confidential data on your hard drive in spaces where data may have been stored temporarily. You may also have deleted files by using the Recycle Bin and then emptying it. While you are still using your local hard drive, there may be confidential information available in these unoccupied spaces.

Wiping the logical drive's deleted data does not delete existing files and folders. It processes all unoccupied drive space so that recovery of previously deleted files becomes impossible. Installed applications and existing data are not touched by this process.

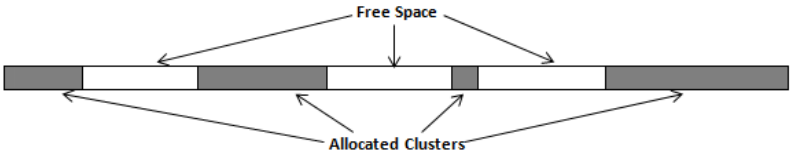
When you wipe unoccupied drive space, the process is run from the bootable CD/DVD operating system. As a result, the wipe or erase process uses an operating system that is outside the local hard drive and is not impeded by Operating System caching. This means that deleted system records can be wiped clean.

KillDisk wipes unused data residue from file slack space, unused sectors, and unused space in MTF records or directory records.

Wiping drive space can take a long time, so do this when the system is not being otherwise utilized. For example, this can be done overnight.

1.2.1 Wipe Algorithms

The process of deleting files does not eliminate them from the hard drive. Unwanted information may still be left available for recovery on the computer. A majority of software that advertises itself as performing reliable deletions simply wipes out free clusters. Deleted information may be kept in additional areas of a drive. KillDisk therefore offers extra steps to ensure secure deletion.



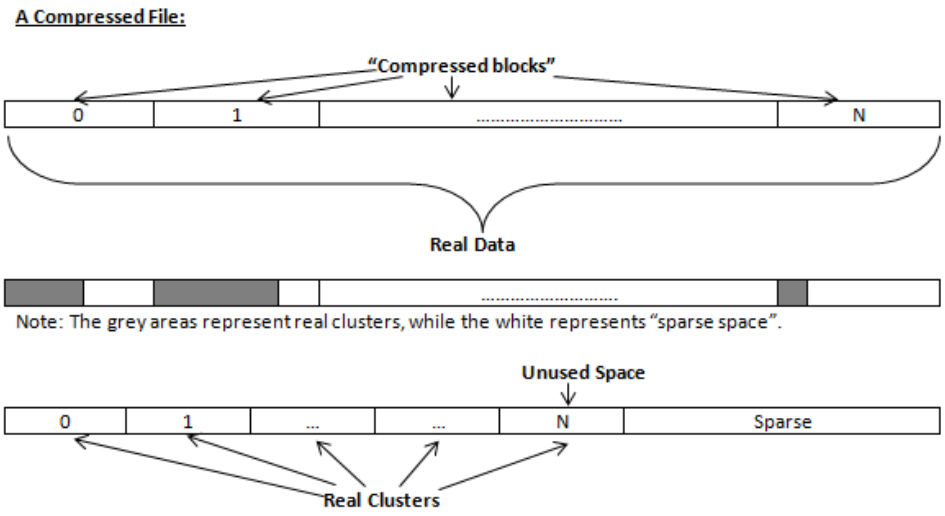
1.2.2 Specifics of Wiping for Different File Systems

1.2.2.1 NTFS File System

NTFS Compressed Files

Wiping free space inside a file:

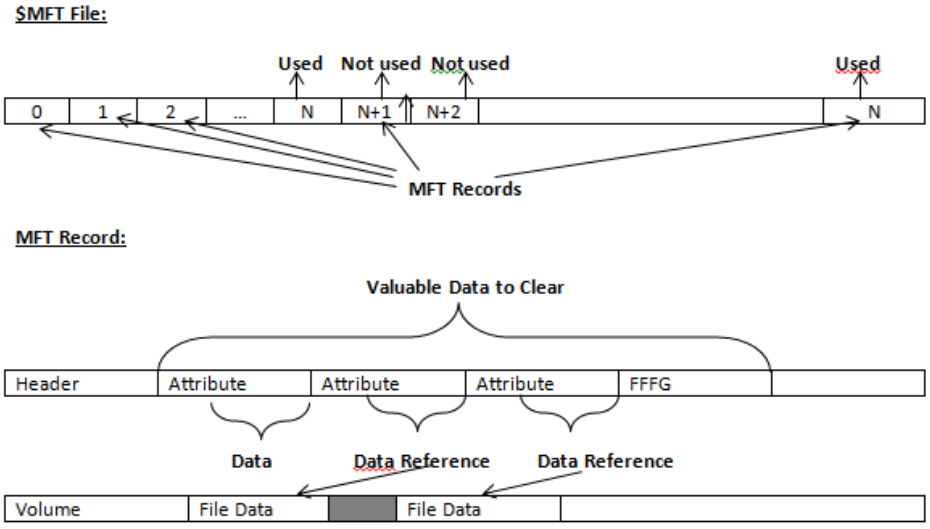
The algorithm NTFS has to compress a file it separates into compressed blocks (usually 64KB long). After it is processed, each of these blocks has been allocated a certain amount of space on the volume. If the compressed information takes up less space than the source file, then the rest of the space is labeled as sparse space and no space on the volume is allocated to it. Because the compressed data often doesn't have a size exactly that of the cluster, the end of each of these blocks stays as unusable space of significant size. Our algorithm goes through each of these blocks in a compressed file and wipes the unusable space, erasing previously deleted information that was kept in those areas.



The MFT (Master File Table) Area

Wiping the system information:

The $MFT file contains records describing every file on the volume. During the deletion of these files, the records of their deletion are left untouched -- they are simply recorded as "deleted". Therefore, file recovery software can use this information to recover anything from the name of the file and the structure of the deleted directories down to files smaller than 1KB that are able to be saved in the MFT directly. The algorithm used by KillDisk wipes all of the unused information out of the MFT records and wipes the unusable space, making a recovery process impossible.

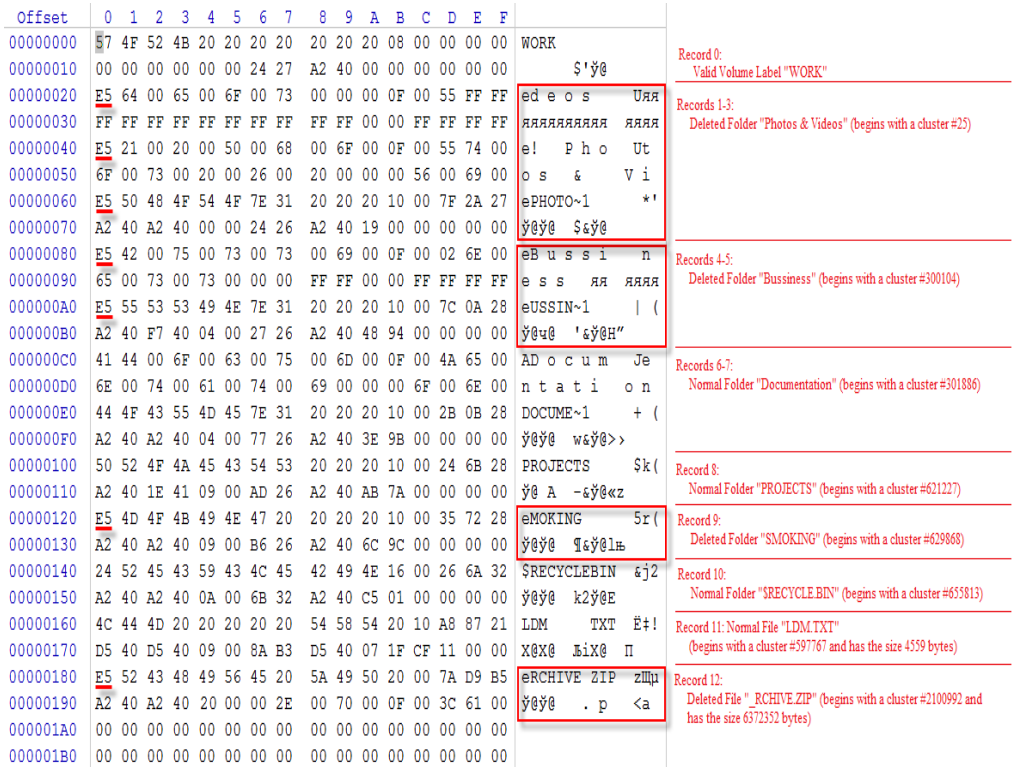


1.2.2.2 FAT/FAT32/exFAT File System

Wiping Directory Areas

Each directory on a FAT/FAT32 or an exFAT volume can be considered as a specific file describing the contents of the directory. Inside this descriptor there are many 32-byte records describing every file and other inner folders. When you delete files this data is not being fully erased. It is just marked as deleted (hex symbol **0xE5**). That's why data recovery software can detect and use these records to restore file names and full directory structures. In some cases, dependent on whether a space where an item is located has been overwritten yet or not, files and folders can be fully or partially recovered. Active@ KillDisk makes data recovery impossible by using an algorithm that wipes out all unused information from directory descriptors. Active@ KillDisk not only removes unused information but also **defragments** Directory Areas, thus speeding up directory access.

This is how Directory Area looks before Wiping, red rectangles display deleted records:



Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
00000000	57	4F	52	4B	20	20	20	20	20	20	20	08	00	00	00	00	WORK
00000010	00	00	00	00	00	00	24	27	A2	40	00	00	00	00	00	00	$'ў@
00000020	E5	64	00	65	00	6F	00	73	00	00	00	0F	00	55	FF	FF	ed e o s Uяя
00000030	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	00	00	FF	FF	FF	FF	яяяяяяяяяя яяяя
00000040	E5	21	00	20	00	50	00	68	00	6F	00	0F	00	55	74	00	e! P h o Ut
00000050	6F	00	73	00	20	00	26	00	20	00	00	00	56	00	69	00	o s & V i
00000060	E5	50	48	4F	54	4F	7E	31	20	20	20	10	00	7F	2A	27	ePHOTO~1 *'
00000070	A2	40	A2	40	00	00	24	26	A2	40	19	00	00	00	00	00	ў@ў@ $&ў@
00000080	E5	42	00	75	00	73	00	73	00	69	00	0F	00	02	6E	00	eB u s s i n
00000090	65	00	73	00	73	00	00	00	FF	FF	00	00	FF	FF	FF	FF	e s s яя яяяя
000000A0	E5	55	53	53	49	4E	7E	31	20	20	20	10	00	7C	0A	28	eUSSIN~1 | (
000000B0	A2	40	F7	40	04	00	27	26	A2	40	48	94	00	00	00	00	ў@ч@ '&ў@H”
000000C0	41	44	00	6F	00	63	00	75	00	6D	00	0F	00	4A	65	00	AD o c u m Je
000000D0	6E	00	74	00	61	00	74	00	69	00	00	00	6F	00	6E	00	n t a t i o n
000000E0	44	4F	43	55	4D	45	7E	31	20	20	20	10	00	2B	0B	28	DOCUME~1 + (
000000F0	A2	40	A2	40	04	00	77	26	A2	40	3E	9B	00	00	00	00	ў@ў@ w&ў@››
00000100	50	52	4F	4A	45	43	54	53	20	20	20	10	00	24	6B	28	PROJECTS $k(
00000110	A2	40	1E	41	09	00	AD	26	A2	40	AB	7A	00	00	00	00	ў@ A -&ў@«z
00000120	E5	4D	4F	4B	49	4E	47	20	20	20	20	10	00	35	72	28	eMOKING 5r(
00000130	A2	40	A2	40	09	00	B6	26	A2	40	6C	9C	00	00	00	00	ў@ў@ ¶&ў@lњ
00000140	24	52	45	43	59	43	4C	45	42	49	4E	16	00	26	6A	32	$RECYCLEBIN &j2
00000150	A2	40	A2	40	0A	00	6B	32	A2	40	C5	01	00	00	00	00	ў@ў@ k2ў@E
00000160	4C	44	4D	20	20	20	20	20	54	58	54	20	10	A8	87	21	LDM TXT Ё‡!
00000170	D5	40	D5	40	09	00	8A	B3	D5	40	07	1F	CF	11	00	00	X@X@ Љі X@ П
00000180	E5	52	43	48	49	56	45	20	5A	49	50	20	00	7A	D9	B5	eRCHIVE ZIP zЩµ
00000190	A2	40	A2	40	20	00	00	2E	00	70	00	0F	00	3C	61	00	ў@ў@ . p <a
000001A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
000001B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	

Record 0:
Valid Volume Label "WORK"

Records 1-3:
Deleted Folder "Photos & Videos" (begins with a cluster #25)

Records 4-5:
Deleted Folder "Bussiness" (begins with a cluster #300104)

Records 6-7:
Normal Folder "Documentation" (begins with a cluster #301886)

Record 8:
Normal Folder "PROJECTS" (begins with a cluster #621227)

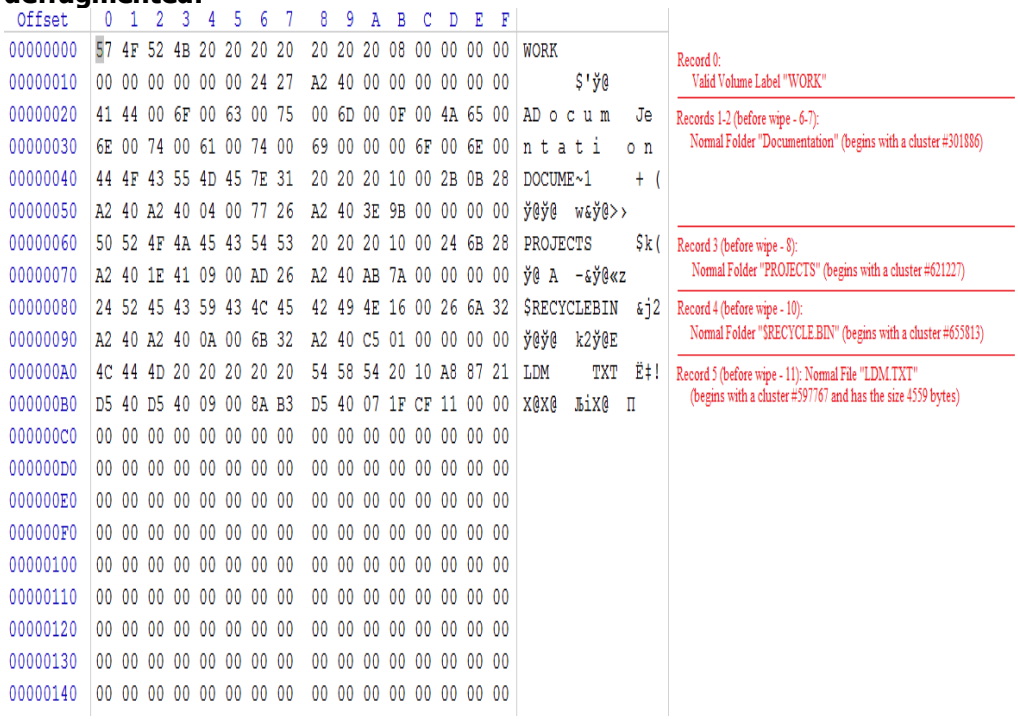
Record 9:
Deleted Folder "SMOKING" (begins with a cluster #629868)

Record 10:
Normal Folder "$RECYCLE.BIN" (begins with a cluster #655813)

Record 11: Normal File "LDM.TXT"
(begins with a cluster #597767 and has the size 4559 bytes)

Record 12:
Deleted File "_RCHIVE.ZIP" (begins with a cluster #2100992 and has the size 6372352 bytes)

This is how Directory Area looks after Wiping: all deleted records removed, root defragmented:



Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
00000000	57	4F	52	4B	20	20	20	20	20	20	20	08	00	00	00	00	WORK
00000010	00	00	00	00	00	00	24	27	A2	40	00	00	00	00	00	00	$'ў@
00000020	41	44	00	6F	00	63	00	75	00	6D	00	0F	00	4A	65	00	AD o c u m Je
00000030	6E	00	74	00	61	00	74	00	69	00	00	00	6F	00	6E	00	n t a t i o n
00000040	44	4F	43	55	4D	45	7E	31	20	20	20	10	00	2B	0B	28	DOCUME~1 + (
00000050	A2	40	A2	40	04	00	77	26	A2	40	3E	9B	00	00	00	00	ў@ў@ w&ў@››
00000060	50	52	4F	4A	45	43	54	53	20	20	20	10	00	24	6B	28	PROJECTS $k(
00000070	A2	40	1E	41	09	00	AD	26	A2	40	AB	7A	00	00	00	00	ў@ A -&ў@«z
00000080	24	52	45	43	59	43	4C	45	42	49	4E	16	00	26	6A	32	$RECYCLEBIN &j2
00000090	A2	40	A2	40	0A	00	6B	32	A2	40	C5	01	00	00	00	00	ў@ў@ k2ў@E
000000A0	4C	44	4D	20	20	20	20	20	54	58	54	20	10	A8	87	21	LDM TXT Ё‡!
000000B0	D5	40	D5	40	09	00	8A	B3	D5	40	07	1F	CF	11	00	00	X@X@ Љі X@ П
000000C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
000000D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
000000E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
000000F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
00000100	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
00000110	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
00000120	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
00000130	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
00000140	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	

Record 0:
Valid Volume Label "WORK"

Records 1-2 (before wipe - 6-7):
Normal Folder "Documentation" (begins with a cluster #301886)

Record 3 (before wipe - 8):
Normal Folder "PROJECTS" (begins with a cluster #621227)

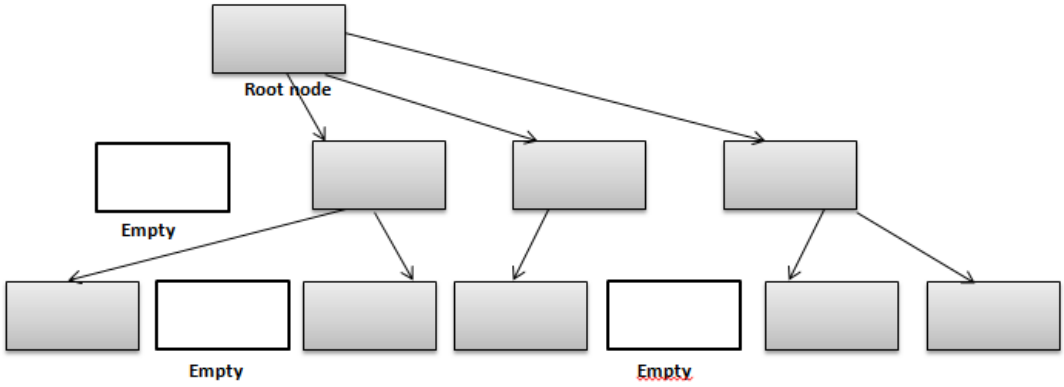
Record 4 (before wipe - 10):
Normal Folder "$RECYCLE.BIN" (begins with a cluster #655813)

Record 5 (before wipe - 11): Normal File "LDM.TXT"
(begins with a cluster #597767 and has the size 4559 bytes)

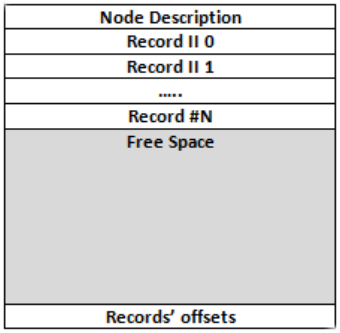
1.2.2.3 Wipe HFS+

HFS+ B-tree

A B-tree file is divided up into fixed-size nodes, each of which contains records consisting of a key and some data.

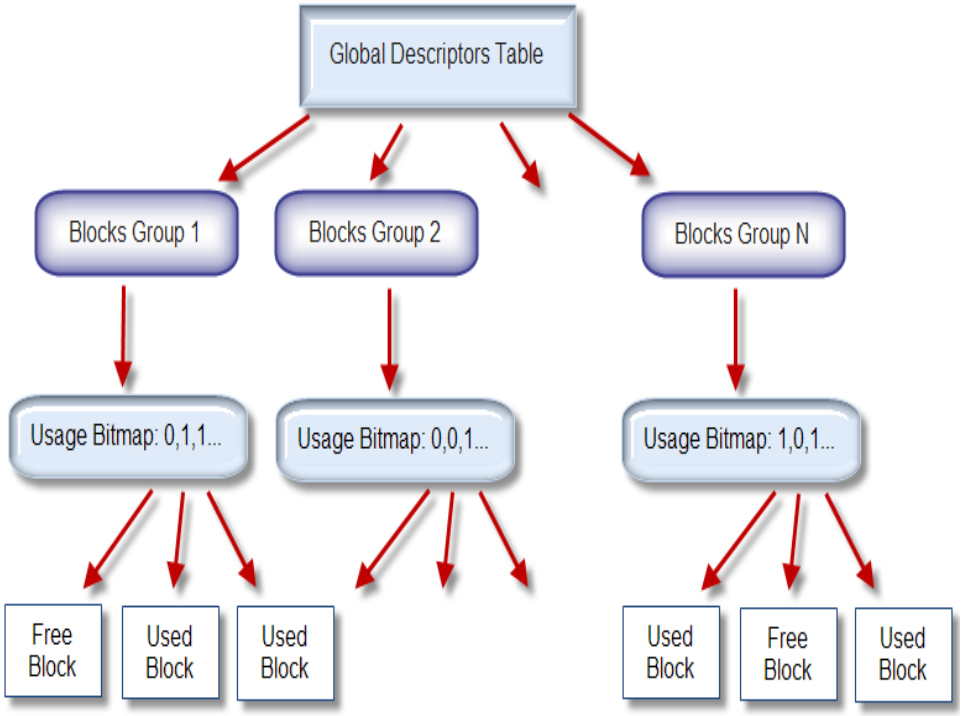


In the event of the deletion of a file or folder, there is a possibility of recovering the metadata of the file (such as its name and attributes), as well as the actual data that the file consists of. KillDisk's Wipe method clears out all of this free space in the system files.



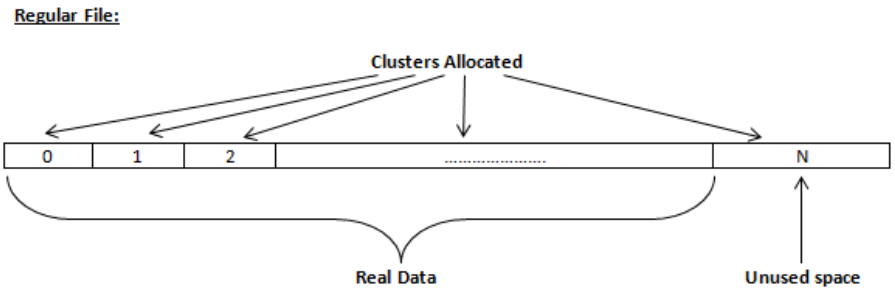
1.2.2.4 Wiping Ext2/Ext3/Ext4 file systems

A Linux **Ext** file system family (Ext2/Ext3/Ext4) volume has a global descriptors table. Descriptors table records are called group descriptors and describe each blocks group. Each blocks group has an equal number of data blocks. A data block is the smallest allocation unit; sizes vary from 1024 bytes to 4096 bytes. Each group descriptor has a blocks allocation bitmap. Each bit of the bitmap shows whether the block is allocated (1) or available (0). KillDisk software enumerates all groups and for each and every block within the group on the volume checks the related bitmap to define its availability. If the block is available, KillDisk wipes it using the method supplied by the user.



1.2.3 Wiping File Slack Space

This relates to any regular files located on any file system. Free space to be wiped is found in the tail end of a file because disk space is usually allocated in 4 KB clusters. Most files have sizes of more or less than 4KB and thus have slack space at their end.



2 System Requirements

This chapter outlines the minimum requirements for PCs using Active@ KillDisk for Linux (Console).

Personal Computer

IBM PC compatible machine

Intel 386 or higher (x86 or x64)

64 Mb of RAM

Video: VGA resolution (800x600 pixels, 100 columns x 42 rows)

Operating System: Console Linux of any brand (TinyCore supplied)

Drive Storage System

CD/DVD-ROM or Blu-Ray optical drive

USB 2.0 or USB 3.0 storage device (USB flash disk or external USB disk)

Removable media (memory stick, SD card, compact flash, floppy disk)

Hard Disk Drive types: IDE, ATA, SSD, SATA, eSATA or SCSI with controllers. Additional drivers can be loaded for RAIDs or non-standard controllers after the system is booted up.

Other Requirements

A blank CD/DVD/BD disc for burning an ISO image, or a USB flash card to prepare a bootable USB disk.

2.1 Active@ KillDisk for Linux (Console) Versions

The performance of Active@ KillDisk for Linux depends on the version of the application as displayed in the table below.

Table 2-1 Differences between Freeware and Professional Versions

Feature	Freeware Version	Professional Version
Securely overwrites and destroys all data on physical drive or logical partition	yes	yes
Erases partitions, logical drives and unused disk	yes	yes

Feature	Freeware Version	Professional Version
space		
Supports IDE / ATA / SATA / eSATA / SSD / SCSI / iSCSI disks, LUN / RAID Disk Arrays	yes	yes
Supports parallel erasing/wiping: two or more HDDs can be cleaned up simultaneously	yes	yes
Supports fixed disks, floppies, zip drives, USB Flash Cards and USB/USB3 external devices	yes	yes
Supports large-sized drives (more than 2 TB)	yes	yes
Supports Command Line parameters	yes	yes
Supports Batch Mode (can be run without of any user interaction)		yes
Operates from bootable CD/DVD/BD Disc or USB disk	yes	yes
Detects Hidden Areas (HPA/DCO) on the disks	yes	yes
Resets detected Disk Hidden Areas		yes
Erases with one-pass zeros	yes	yes
Erases with one-pass random characters		yes
Erases with user-defined number of passes		yes
US Department of Defense 5220.22 M compliant		yes
US Department of Energy M205.1-2		yes
US Army AR380-19 compliant		yes
US Air Force 5020 compliant		yes
German VISTR compliant		yes
Russian GOST p50739-95 compliant		yes
Canadian OPS-II compliant		yes
British HMG IS5 Baseline/Enhanced compliant		yes
Navso P-5329-26 (RL/MFM) compliant		yes

Feature	Freeware Version	Professional Version
NCSC-TG-025 & NSA 130-2 compliant		yes
NIST 800-88 compliant		yes
Peter Gutmann's method compliant		yes
Bruce Schneier's method compliant		yes
User defined erase method allows to specify custom pattern for each pass		yes
Supports erasing of all detected HDDs and USBs	yes	yes
Erasing report created and can be saved in file	yes	yes
Erasing report can be exported in XML file		yes
Displays detected drive and partition information	yes	yes
Scans NTFS/EFS, FAT/FAT32/exFAT, HFS+, Ext2/Ext3/Ext4, UFS volumes and displays existing and deleted files and folders	yes	yes
Data verification may be performed after erasing is completed		yes
Disk Viewer allows you to preview any sectors or file clusters on a drive	yes	yes
Displays Erase/Wipe certificate for printing	yes	yes
Saves Erase/Wipe certificate to HTML file	yes	yes
Certificate can be customized, technician info and company logo can be inserted		yes
Wipes out NTFS, FAT/exFAT, HFS+, Ext2/Ext3/Ext4, UFS volumes from areas containing deleted and unused data	yes	yes
Wipes out free clusters (unused by file data sectors)	yes	yes
Wipes out file slack space (unused bytes in the last cluster occupied by file)	yes	yes
Wipes out deleted MFT records on NTFS and Directory system records on FAT/exFAT	yes	yes

Feature	Freeware Version	Professional Version
Wipes out unused space in any MFT records and compressed clusters on NTFS	yes	yes

3 Running Active@ KillDisk for Linux

After you download Active@ KillDisk for Linux (Console), you will receive a zipped archive file named **KillDisk-LinuxConsole.zip**. This file contains everything you need to get started.

Unpack **KillDisk-LinuxConsole.zip** and read **!ReadMe.txt** to get understanding of files and utilities being supplied.

The application contains main components:

- **Active@ KillDisk for Linux (Console)** — file named **KillDisk**. You can copy and run this application from your Linux operating system under Super User account (sudo) to erase/wipe out your disks.
- **Bootable CD/DVD/BD ISO –** file named **KillDisk.iso**. Burn this file to blank CD/DVD/BD disc using any burning software to have bootable Linux (Console) media launching KillDisk at start.
- **USB Boot Disk Creator** — files named **ISOtoUSB.exe** (Windows executable) and **ISOtoUSB** (Linux executable). Run this utility to prepare bootable USB disk using supplied bootable ISO image file.

Using Active@ KillDisk this way allows you to wipe confidential data from the system cache while gaining exclusive use of a partition because the operating system runs outside the partition that you are securing.

3.1 Bootable Disk Creation

Boot Disk is a tiny bootable Linux (Console) on CD, DVD, Blu-ray or USB mass storage device that you may use to start a machine and destroy all data on the hard drives, or wipe out unused space.

To prepare a bootable CD, DVD, Blu-ray disc media:

Burn a supplied bootable ISO image file (**KillDisk.iso**) to a blank CD, DVD, Blu-ray disc using any tools provided by the operating system. For example, in Windows OS (Vista and later versions) you just double-click ISO file to launch built-in ISO burner and then click **Burn** button to start burning. On Linux (KDE) you can use, for example, K3B Burn Image tool.

To prepare a bootable USB Disk:

- Under Windows OS:

1. Make sure ISO file is in the same folder where ISOtoUSB.exe
2. Launch **ISOtoUSB.exe** utility with Administrator's rights
3. Select a proper USB disk from the list of detected disks
4. Click **Start** button

- Under Linux OS:
    1. Make sure ISO file is in the same folder where ISOtoUSB
    2. Launch **ISOtoUSB** utility under **sudo** account
    3. Select a proper USB disk from the list of detected disks and press **Enter**
    4. Confirm disk formatting by pressing **Y**

 **Note:** All existing data on USB Disk you selected will be lost, USB disk will be formatted and ISO image file will be written to a first bootable partition. Another partition of type FAT32 will be also created for all available space and you can use it later on for your data storage.

 **Note:** If you use older versions of Windows (XP and earlier) you can burn ISO to a disk using our free Active@ ISO Burner utility (www.ntfs.com/iso-burning.htm).

3.2 Interactive, Command Line and Batch Modes

Active@ KillDisk for Linux (Console) can be used two ways:

- Interactive Mode
- Command Line and Batch Mode

3.2.1 Interactive Mode

The steps for erasing data and wiping data are similar. Follow steps 1 through 10 and then click the link to complete either the erasing process or the wiping process.

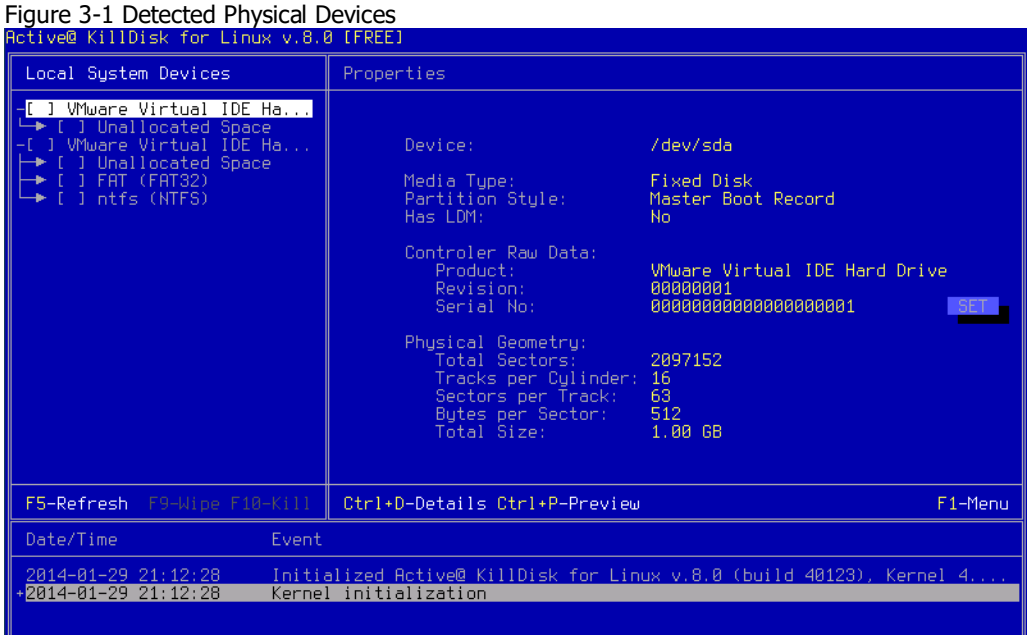
If you are booting from a CD/DVD-ROM drive, check that the drive has boot priority in the BIOS settings of your computer.

Steps for interactive operation:

Start Active@ KillDisk either from a bootable CD/DVD, a USB device, or the Start menu.

The **Local System Devices** screen appears.

Figure 3-1 Detected Physical Devices



All system physical devices and logical partitions are displayed in a list.

Hard drive devices are numbered by the system BIOS. A system with a single hard drive shows as number **/dev/sda**. Subsequent hard drive devices are numbered consecutively. For example the second device will be shown as **/dev/sdb**.

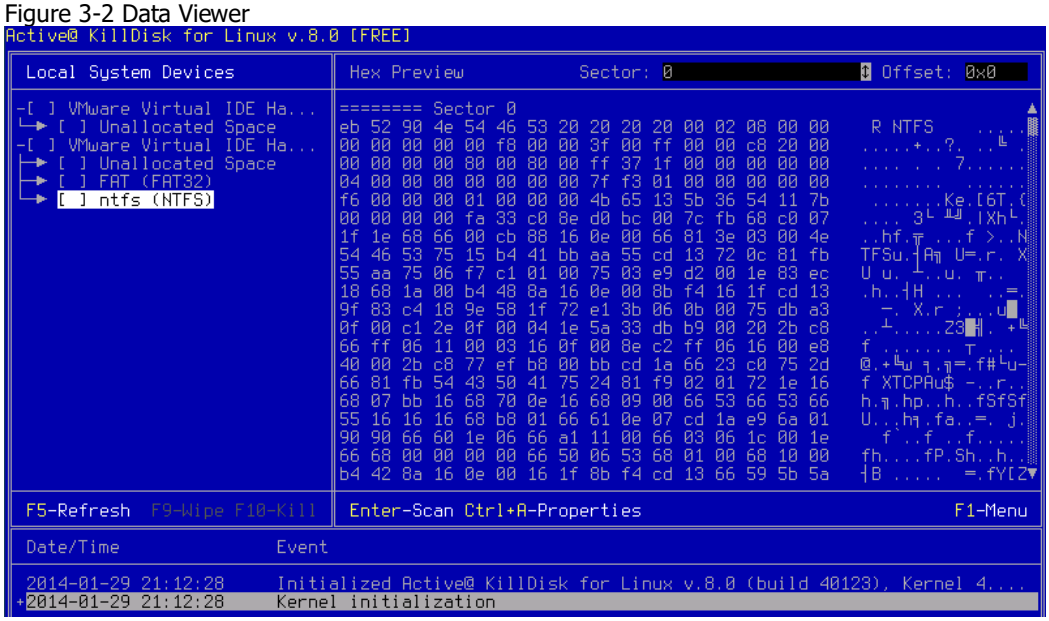
To move a focus between panels (Devices, Properties, Event Log) Use **TAB** and **ALT+TAB** keys. To display a menu, press **F1**. To refresh disks, press **F5**.

Select a device using arrows and read the detailed information about the device in the right pane. Below the device, select a logical partition. The information in the right pane changes.

Be certain that the drive you are selecting is the one that you want to erase or wipe. If you choose to erase, all data will be permanently erased with no chance for recovery.

To preview the sectors on a physical disk or on a volume (logical disk), select it and press **CTRL+P**, or choose **Hex Preview** from the **View** menu. The **Hex Preview** panel appears.

Figure 3-2 Data Viewer



To scroll up and down, use the keyboard navigation arrow keys **PAGE UP**, **PAGE DOWN**, **HOME** and **END**, or use the related buttons on the toolbar.

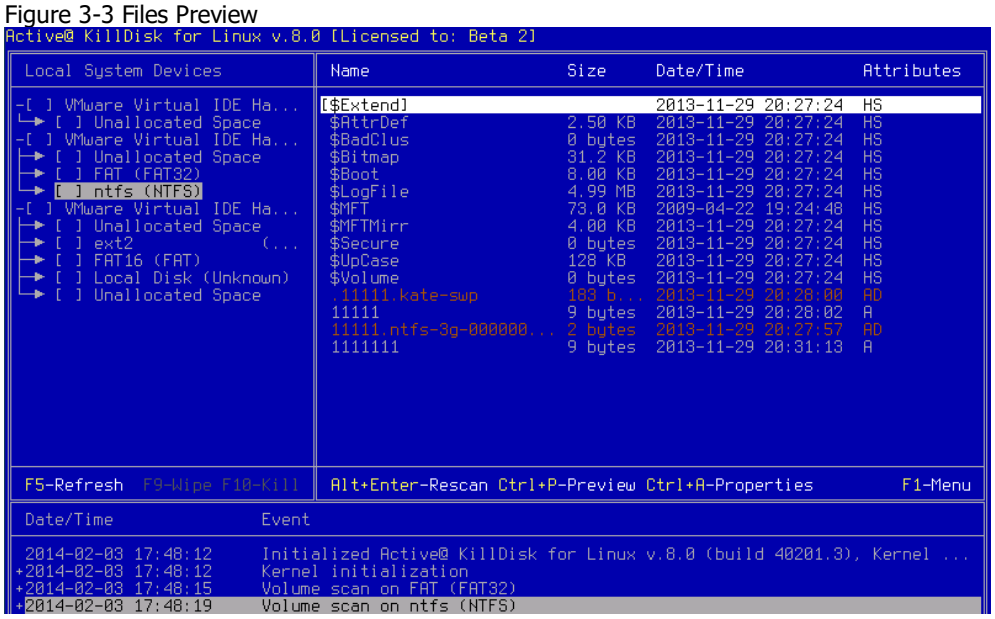
To jump to a specific sector, move a cursor to a Sector field and type the sector number, or use arrows.

When you are satisfied with the identification of the device, close the **Hex Preview** panel (**CTRL+P** or **CTRL+F**).

To preview the files in a logical disk, select the volume and press **ENTER**. KillDisk scans the directories for the partition. The **Folders and Files** screen appears.

To reset **Disk Hidden Areas** (this feature is available in commercial versions only), select a physical disk in the Local System Devices list, then click **Reset Hidden Areas...** from the Task menu. After reset, PC reboot is needed for any software to access these areas properly. After reboot, the number of Total Disk Sectors will be increased by number of HPA/DCO disk hidden sectors and these areas now ready for erasing by KillDisk.

Figure 3-3 Files Preview



Press **TAB** to move between panels.

To select an item in the list, use **PAGE DOWN, PAGE UP** or the up or down arrow keys.

To open a folder, select it and press **ENTER**. KillDisk scans the system records for this folder. The files in the folder appear in the right panel. Existing files and folders are displayed in grey color and deleted files and folders are displayed in black. If you are wiping data from unoccupied areas, the black -colored file names are removed after the wiping process completes. You may use the Hex Preview mode to inspect the work done by the wiping process. After wiping, the data in these areas and the places these files hold in the root records or other system records are gone.

3.2.1.1 Erase Data from a Device

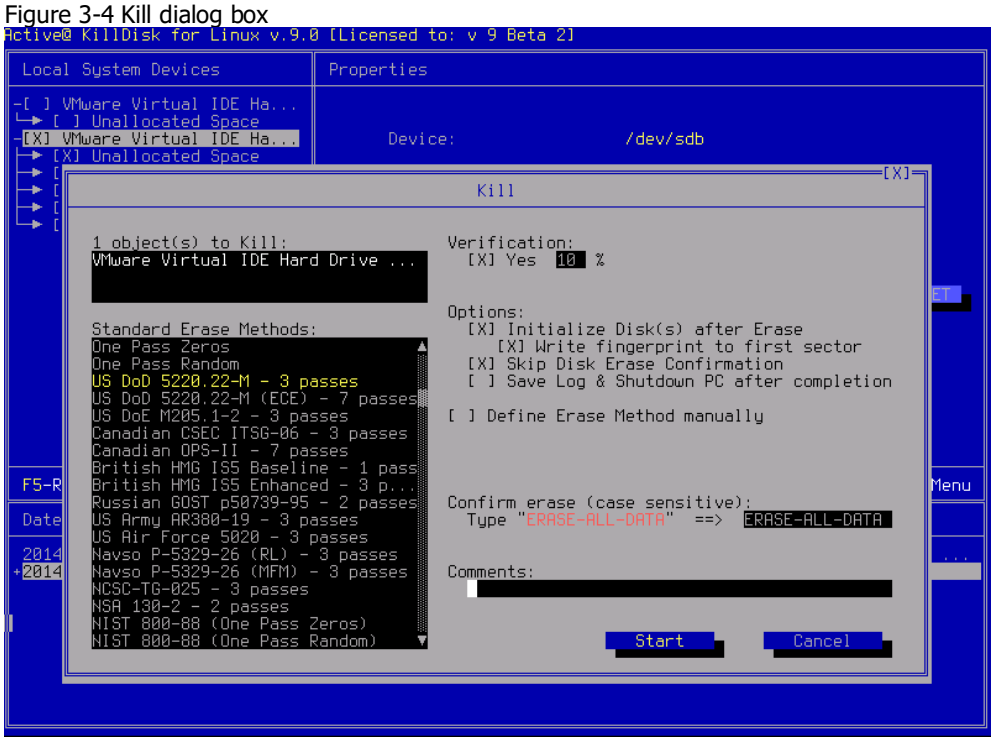
When you select a physical device (for example, **/dev/sdb**), the erase command processes partitions no matter what condition they are in. Everything is destroyed.

If you want to erase data on selected logical drives, follow the steps in 3.4 Erase or Wipe Logical Drives (Partitions).

To erase all data on the disk:

- Be certain that the drive you are pointing to is the one that you want to erase. All data will be permanently erased with no chance for recovery.
- When you have selected the device to erase, select the checkbox for this disk using **SPACE** key. You may select more than one physical disk for the erase action. In this case these disks will be erased simultaneously. To permanently erase all data on the selected disk(s), press **F10** or select **Kill** from a **Task** menu. The **Kill** dialog box appears.

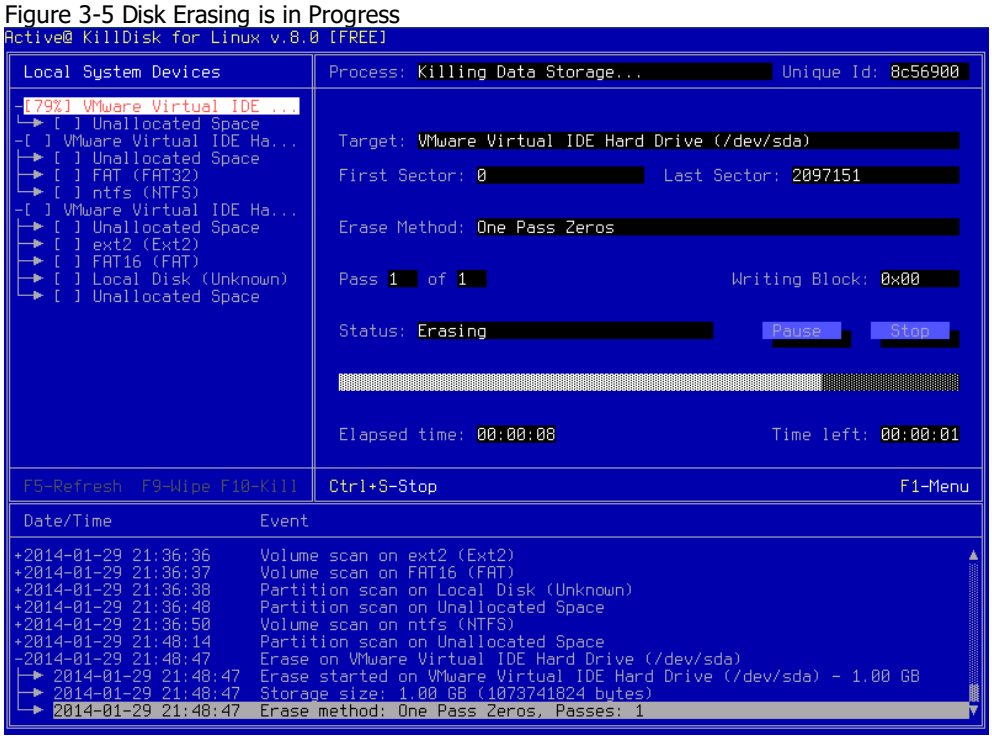
Figure 3-4 Kill dialog box



- Select an erase method from the list. Erase methods are described in Chapter 5 Erase/Wipe Parameters in this guide.
- Set other parameters for erasing, and write comments, if needed, to be displayed on a certificate. For information on settings, see Chapter 5 in this guide.
- If the **Skip Disk Erase Confirmation** check box is clear, you need to type **ERASE-ALL-DATA** in the text box and press **ENTER** or click **Start** button.
- The **Progress** panel appears, displaying the current progress. Progress is also displayed in Local System Devices panel, at the left side of the device name.

To stop the process at any time, press **Ctrl+S** for the particular disk. Note that data that has already been erased will not be recoverable.

Figure 3-5 Disk Erasing is in Progress



There is nothing more to do until the end of the disk erasing process. The application will operate on its own. You can still navigate Devices and Volumes, and even launch erase process for other disks.

If there are any errors, for example due to bad clusters, they will be reported on the Interactive screen and in the log. If such a message appears, you may cancel the operation (click **Abort**), or you may continue erasing data (click **Ignore** or **Ignore All**).

NOTE: Because of the BIOS restrictions of some manufacturers, a hard disk device that is larger than 300 MB must have an MBR (Master Boot Record) in sector zero. If you erase sector zero and fill it with zeros or random characters, you might find that you cannot use the hard drive after erasing the data. It is for this reason KillDisk creates an empty partition table and writes a typical MBR in sector zero (in case the **Initialize disk(s) after Erase** option is selected).

3.2.1.2 Wipe Data from a Device

When you select a physical device such as **/dev/sdb**, the wipe command processes all logical drives consecutively, deleting data in unoccupied areas. Unallocated space (where no partition exists) has been erased as well. If KillDisk detects that a partition has been damaged or that it is not safe to proceed, KillDisk does not wipe data in that area. The reason it does not proceed is that a damaged partition might contain important data.

There are some cases where partitions on a device cannot be wiped. Some examples are an unknown or unsupported file system, a system volume, or an application start up drive. In these cases the Wipe button is disabled. If you select a device and the Wipe button is disabled, select individual partitions (drives) and wipe them separately.

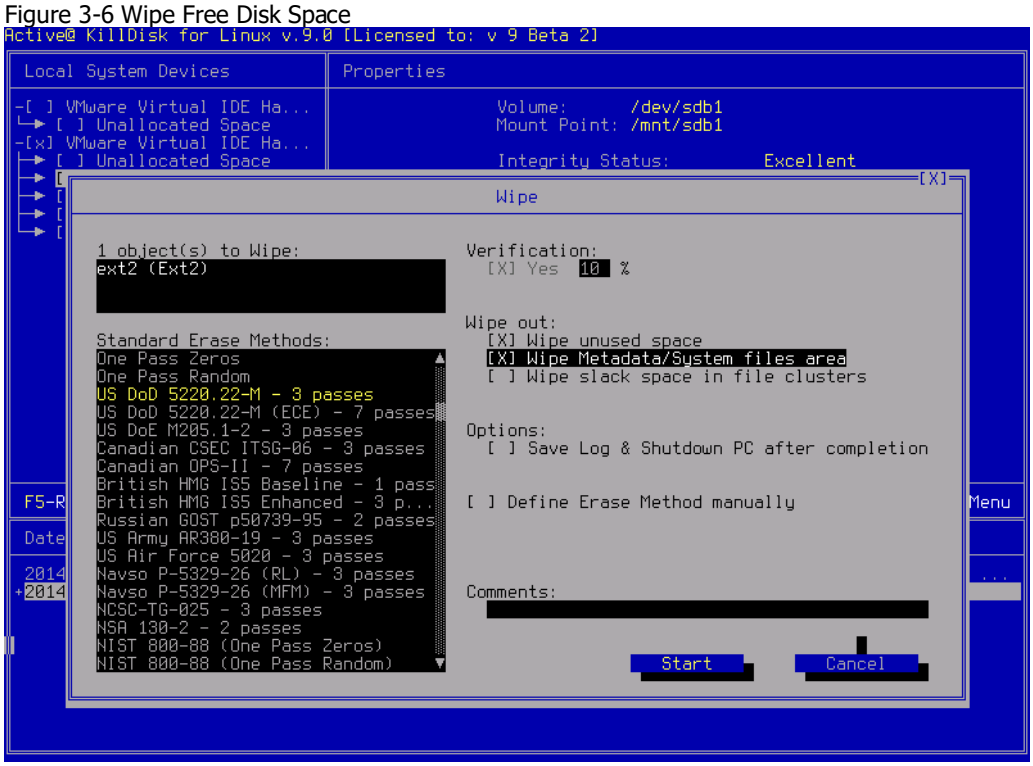
If you want to erase data from the hard drive device permanently, see 3.2.1.1 Erase Data.

If you want to wipe data in unoccupied areas on selected logical drives, follow the steps in 3.4 Erase or Wipe Logical Drives (Partitions).

To wipe deleted data from a device:

- To choose a device to wipe, select the check box next to the device name. You may select multiple devices. In this case these disks will be wiped out simultaneously
- To wipe out all data in unoccupied sectors on the selected partitions, press **F9** or choose the **Wipe** command from **Task** menu. The **Wipe Free Disk Space** dialog box appears.

Figure 3-6 Wipe Free Disk Space



- To select a wipe type, choose a method from the **Wipe Method** list. Wipe methods are described in Chapter 5 Erase/Wipe Parameters in this guide. You may change parameters in this dialog box. For information on these parameters, see Chapter 5 Erase/Wipe Parameters in this guide.

- To advance to the final step before erasing data, click **Start**. If the **Skip Confirmation** check box is clear, the **Confirm Action** dialog box appears. This is the final step before wiping data residue from unoccupied space on the selected drive.
- To confirm the wipe action, press **Yes** (**Enter**). The progress of the wiping procedure will be monitored in the **Disk Wiping** screen.
- To stop the process for any reason, press the **Ctrl+S**. Note that all existing applications and data will not be touched. Data that has been wiped from unoccupied sectors is not recoverable.

There is nothing more to do until the end of the disk wiping process. The application operates on its own.

If there are any errors, for example due to bad clusters, they will be reported on the Interactive screen and in the Log. If such a message appears, you may cancel the operation or continue wiping data.

After the wiping process is completed select the wiped partition and press **ENTER** or double-click it to inspect the work that has been done. KillDisk scans the system records or the root records of the partition. The **Folders and Files** tab appears.

Deleted file names and folder names appear in black color, and with a **D** (deleted) attribute at the right side of the panel. If the wiping process completed correctly, the data residue in these deleted file clusters and the place these files hold in the directory records or system records has been removed. You should not see any black -colored file names or folder names and having **D** (deleted) attribute on the wiped partition.

3.2.2 Command Line and Batch Mode

KillDisk can be executed with some settings pre-defined when started from a command prompt with specific command line parameters.

KillDisk can be also launched in fully automated mode (batch mode) which requires no user interaction and all messages, including errors will be stored in a log file.

KillDisk execution behavior depends on either command line parameters (highest priority), settings configured in interactive mode and stored in the **KillDisk.ini** file (lower priority), or default values (lowest priority).

3.2.2.1 Command Line Mode

To run Active@ KillDisk in command line mode, open a command prompt screen.

At the command prompt, start Active@ KillDisk for Linux (Console) by typing:

```
> KillDisk -?
```

A list of parameters appears. You can find explanations of them in the table below.

Table 3-2 Command Line Parameters

Parameter	Short	Default	Options
no parameter			With no parameter, the Interactive screens will appear.
-erasemethod=[0 - 22]	-em=	2	0 - One pass zeros (quick, low security) 1 - One pass random (quick, low security) 2 - US DoD 5220.22-M (slow, high security) 3 - US DoD 5220.22-M (ECE) (slow, high security) 4 - Canadian OPS-II (slow, high security) 5 - British HMG IS5 Baseline (slow, high security) 6 - British HMG IS5 Enhanced (slow, high security) 7 - Russian GOST p50739-95 (slow, high security) 8 - US Army AR380-19 (slow, high security) 9 - US Air Force 5020 (slow, high security) 10 - Navso P-5329-26 (RL) (slow, high security) 11 - Navso P-5329-26 (MFM) (slow, high security) 12 - NCSC-TG-025 (slow, high security) 13 - NSA 130-2 (slow, high security) 14 - German VSITR (slow, high security) 15 - Bruce Schneier (slow, high security) 16 - Gutmann (very slow, highest security) 17 - User Defined Method. Number of Passes and Overwrite Pattern supplied separately for each pass. Hex values can be used for pattern.

Parameter	Short	Default	Options
			18 - NIST 800-88 (1 pass zeros, quick) 19 - NIST 800-88 (1 pass random, quick) 20 - NIST 800-88 (3 pass zeros, slow, high security) 21 – Canadian CSEC ITSG-06 (3 passes, verify) 22 - US DoE M205.1-2 (3 passes ,verify)
-passes=[1 - 99]	-p=	3	Number of times the write heads will pass over a disk area to overwrite data with User Defined Pattern. Valid for User Defined Method only.
-verification=[0 - 100]	-v=	10	Set the amount of area the utility reads to verify that the actions performed by the write head comply with the chosen erase method (reading 10% of the area by default). Verification is a long process. Set the verification to the level that works for you better.
-retryattempts=[1 - 99]	-ra=	2	Set the number of times that the utility will try to rewrite in the sector when the drive write head encounters an error.
-erasehdd=[0…]	-eh=		Number in BIOS of the hard drive to be erased. First disk (/dev/sda) has a 0 (zero) number.
-eraseallhdds	-ea		Erase all hard disk drives.
-excluderemovable	-xr		Exclude all removable disks from erasing when erase all disks selected
-excludefixed	-xf		Exclude all fixed disks from erasing when erase all disks option selected
-excludedisk=[0,1..63]	-xd=		Exclude disk from erasing when erase all disks option selected
-ignoreerrors	-ie		Do not stop erasing each time a disk error is encountered. When you use this parameter, all errors are ignored and just placed to the application log.
-stopaftererrors=[1,2..]	-er=		Stop erasing process after specific

Parameter	Short	Default	Options
			number of writing errors encountered
-initdisk	-id		Initialize disk(s) after erase
-fingerprint	-fp		Initialize disk(s) and write fingerprint to the disk's first sector
-clearlog	-cl		Use this parameter to clear the log file before recording new activity. When a drive is erased, a log file is kept. By default, new data is appended to this log for each erasing process. By default the log file is stored in the same folder where the software is located.
-exportlog	-el		Export a log file as XML report
-logpath=["fullpath"]	-lp=		Path to save application log file. Can be either directory name or full file name. Use quotes if full path contains spaces.
-certpath=["fullpath"]	-cp=		Path to save erase/wipe certificate. Can be either directory name or full file name. Use quotes if full path contains spaces.
-inipath=["fullpath"]	-ip=		Path to the configuration file **KillDisk.ini** for loading the advanced settings. See table below.
-noconfirmation	-nc		Skip confirmation steps before erasing starts. By default, confirmation steps will appear in command line mode for each hard drive as follows: Are you sure?
-beep	-bp		Beep after erasing is complete.
-wipeallhdds	-wa		Wipe all hard drives.
-wipehdd = [0…]	-wh=		Number in BIOS of the hard drive to be wiped out. First disk (/dev/sda) has a 0 (zero) number.
-test=["fullpath"]			If you are having difficulty with Active@ KillDisk, use this parameter to create a hardware information file to be sent to our technical support specialists.
-batchmode	-bm		Execute in batch mode based on command line parameters and INI file

Parameter	Short	Default	Options
			settings (no user interaction).
-userpattern =["fullpath"]	-u		File to get user-defined pattern from. Applied to User Defined erase method.
-shutdown	-sd		Save log file and shutdown PC after completion.
-nostop	-ns		Prevent erase/wipe stop action, blocking user interaction
-help or -?			Display this list of parameters.

Note: Parameters -test and -help must be used alone. They cannot be used with other parameters.

Note: Commands –erasehdd, -eraseallhdds, -wipehdd and -wipeallhdds cannot be combined.

Type the command and parameters into the command prompt console screen at the prompt. Here is an example:

```
> sudo KillDisk -eh=0 -bm
```

In the example above, data on a first device (**/dev/sda)** will be erased using the default method (US DoD 5220.22-M) without confirmation and returning to the command prompt screen when complete.

Here is another example:

```
> sudo KillDisk -eh=0 -nc -em=2
```

In this example, all data on the device /dev/sda will be erased using US DoD 5220.22-M method without confirmation and showing a report at the end of the process.

After you have typed **KillDisk** and added command line parameters, press **ENTER** to complete the command and start the process.

Note, that KillDisk must be run with SuperUser rights, so **sudo** command prefix being used (or **su** prefix can be used for different linux versions)

Information on how drives have been erased is displayed on the screen when the operation has completed successfully. KillDisk execution behavior depends on either command line parameters (highest priority), settings configured in interactive mode and stored in the **KillDisk.ini** file (lower priority), or default values (lowest priority).

Note: If you use bootable disk creator (GUI application, supplied with some packages) to prepare bootable media launching KillDisk with some pre-defined command parameters, KillDisk will accept and use these parameters at startup. When you quit the application (**Ctrl+Q**) and return to the command prompt, you can launch it again by typing:

```
> sudo KillDisk
```

In this case KillDisk will be launched without any command line parameters.

However if you want to launch it again with all startup parameters, type:

```
> sudo KillDisk @
```

3.2.2.2 Batch Mode

This feature is intended for advanced users.

Batch mode allows KillDisk to be executed in fully automated mode without any user interaction. All events and errors (if any) will be placed in the log file. This allows system administrators and technicians to automate erase/wipe tasks by creating scripts (*.SH) for different scenarios that can be executed later on in different environments.

To start KillDisk in batch mode, add the **–bm** (or **-batchmode**) command line parameter to the other parameters and execute KillDisk either from the command prompt or by running a script.

Here is an example of batch mode execution with the wipe command:

```
> sudo KillDisk -wa -bm -em=16
```

This will, using Gutman's method and returning to the command prompt when complete, wipe all deleted data and unused clusters on all attached physical disks without any confirmations

If **–ns (-nostop)** command line parameter is specified, no user interaction is possible after erase/wipe action started, so user cannot cancel the command being executed (user interaction has been blocked).

After execution, application returns exit codes to the operating system environment: 0 (zero) if all disks being erased successfully, 1 (one) if errors occurred or nothing erased/wiped, and 2 (two) if minor warnings occurred.

3.3 Application settings (KillDisk.ini file)

When you start KillDisk, change its settings (erase method, certificate options, etc…) and close the application, all current settings are saved to the **KillDisk.ini** file. These settings will be used as default values the next time KillDisk is run.

KillDisk.ini is a standard text file possessing sections, parameter names and values. All KillDisk settings are stored in the **[General]** section.

For parameter storage the syntax being used is:

Parameter=**value**

Here is an example of an INI file:

```
[General]
logging=0
showCert=true
saveCert=false
initDevice=true
clearLog=false
ignoreErrors=false
skipConfirmation=true
retryAtt=2
certPath=/home/tc/
logPath=/home/tc/
logName=killdisk.log
...
```

When KillDisk is running in interactive mode, all these parameters can be configured from a settings dialog accessed by pressing **F2** or clicking the **Settings** menu item from the **View** menu. They also can be changed manually by editing the **KillDisk.ini** file in any text editor such as **vi**.

Here is an explanation of all settings:

Table 3-3 KillDisk settings in INI file

Parameter	Default	Options
showCert=	true	true/false – option of displaying the Erase/Wipe Certificate for printing after completion

Parameter	Default	Options
saveCert=	false	true/false – option of saving the Erase/Wipe Certificate after completion
certPath=		Full path to the location where Erase/Wipe Certificate will be saved. This is a directory name
logPath=		Full path to the location where log file will be saved. This is a directory name
logName=		Name of the log file where event log will be saved to
skipConfirmation=	false	true/false – whether to display or skip Erase/Wipe confirmation dialog, or not
ignoreErrors=	false	true/false – whether to display disk writing errors (bad sectors), or ignore them (just place them to the log file)
clearLog=	false	true/false – whether to truncate log file content before writing new sessions, or not (append to existing content)
initDevice=	true	true/false – whether to initialize disks after erasing complete, or not
fingerPrint=	false	true/false – whether to initialize disk(s) and write fingerprint to the disk's first sector, or not
hideDefaultLogo	false	true/false – whether to hide default KillDisk logo at the top-left corner of the certificate, or not
shutDown=	false	true/false – whether to shutdown PC after Erase/Wipe execution complete, or not
showLogo=	false	true/false – whether to display custom Logo (image) on a Certificate, or not
logoFile=		Full path to the file location where Logo image is stored
clientName=		Client Name - custom text to be displayed on a Certificate
technicianName=		Technician Name - custom text to be displayed on a Certificate

Parameter	Default	Options
companyName=		Company Name - custom text to be displayed on a Certificate
companyAddress=		Company Address - custom text to be displayed on a Certificate
companyPhone=		Company Phone - custom text to be displayed on a Certificate
logComments=		Any Comments - custom text to be displayed on a Certificate
killMethod=	2	[0-20] – Erase method to use for disk/volume erasing. See table of Erase Methods available. DoD 5220.22-M by default
killVerification=	true	true/false – whether to use data verification after erase, or not
killVerificationPercent=	10	[1-100] – verification percent, in case if data verification is used
killUserPattern=		ASCII text to be used for User Defined erase method as a custom pattern
killUserPasses=		[1-99] – number of overwrites to be used for User Defined erase method
wipeMethod=	2	[0-20] – Wipe method to use for volume wiping. See table of Erase Methods available. DoD 5220.22-M by default
wipeVerification=	true	true/false – whether to use data verification after wipe, or not
wipeVerificationPercent=	10	[1-100] – verification percent, in case if data verification is used
wipeUserPattern=		ASCII text to be used for User Defined wipe method as a custom pattern
wipeUserPasses=		[1-99] – number of overwrites to be used for User Defined wipe method
wipeUnusedCluster=	True	true/false – whether to wipe out all unused clusters on a volume, or not
wipeUnusedBlocks=	False	true/false – whether to wipe out all unused blocks in system records, or not

Parameter	Default	Options
wipeFileSlackSpace=	False	true/false – whether to wipe out all file slack space (in last file cluster), or not

You can find a more detailed explanation of each parameter in Chapter 5 - Erase/Wipe parameters.

When you start KillDisk with or without command line parameters, its execution behavior depends on either command line settings (highest priority), settings configured in interactive mode and stored in the **KillDisk.ini** file (lower priority), or default values (lowest priority).

Default value means that if the **KillDisk.ini** file is absent, or exists but contains no required parameter, the pre-defined (default) value will be used.

3.4 Erase or Wipe Logical Drives (Partitions)

In all previous examples in this chapter, the process has erased or wiped data from a physical drive. Using a similar method, you can erase or wipe logical disks and partitions. This includes damaged "Unallocated" areas where partitions used to exist and areas not visible to the current operating system.

The Wipe button is disabled when partitions cannot be wiped because of issues such as an unknown or unsupported file system. KillDisk must lock the partition before performing a Wipe or Erase action. A partition cannot be locked if it is in use by another user or application. In this case a dialog box appears with information that the disk is being used and you need to either skip it, or "force volume dismount". If you skip it, the wipe or erase operation is canceled for this drive. If you select "force dismount", some data in the drive's cache may be lost. This could affect other applications working with the same volume. If, for example, you made changes to a text document located on **/dev/sdb1** and haven't saved the file, a subsequent "forced dismount" for **/dev/sdb1** would likely result in the loss of the changes. The file's original version should be unaffected.

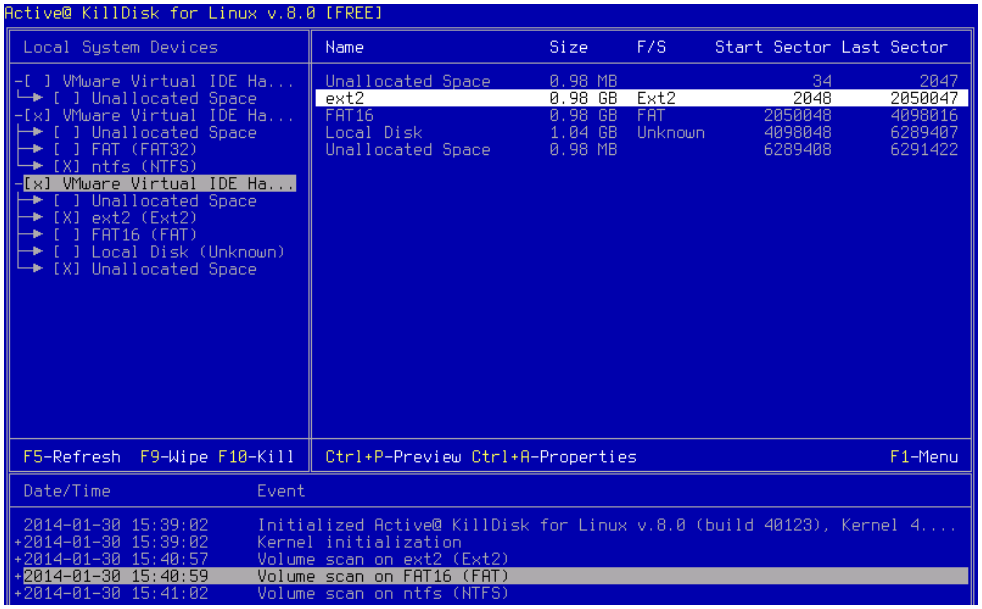
3.4.1 Erase Data from a Logical Drive

To erase data from a logical drive:

- Start Active@ KillDisk from a bootable device or from Start menu.
- The **Local System Devices** screen appears.

All system hard drives and removable drives are displayed in the left pane. System information is displayed in the right pane.

Figure 3-7 Local System Devices and Volumes



- Select logical disks/volumes or **Unallocated** areas using **SPACE** key
- Press **F10** or click **Kill** from the **Task** menu. The **Kill** dialog box appears.
- Set the erase method and other parameters for erasing. For information on these parameters, see Chapter 5 Erase/Wipe Parameters in this guide.
- Complete the process as you would for other devices.

3.4.2 Wipe Data from a Logical Drive

To wipe data from a logical drive:

- Start Active@ KillDisk from a bootable device or from the **Programs** menu.
- The **Local System Devices** screen appears.

  All system hard drives and removable drives will be displayed in the left pane along with their system information in the right pane.
- Select logical disks/volumes or **Unallocated** areas using **SPACE** key
- Press **F9** or click **Wipe** from the **Task** menu to wipe data from unoccupied areas. The **Wipe Free Disk Space** dialog box appears.
- Select a wipe method and set other parameters for wiping. For information on these parameters, see Chapter 5 Erase/Wipe Parameters in this guide.

- Complete the process as you would for other devices.

3.5 Completed Erase or Wipe Operation Information

After an operation is completed successfully, information on how drives have been erased or wiped is displayed in the Event Log at bottom of the screen. The text can be saved in a log file and as a certificate that can be printed or saved as a HTML file for future printing.

An example of an erase session saved in a Log file is displayed below.

```
2013-10-10 11:12:40 Initialized Active@ KillDisk for Linux v. 8.0.0, Kernel 3.10.10
----------------------------------------Erase Session Begin-----------------------------
2013-10-10 11:13:59 Active@ KillDisk for Linux v. 8.0.0 started
  Erase method: US DoD 5220.22-M (3 passes, verify) Passes: 3 [Verification 10%]
  Erase WDC WD1600YD-01NVB1 Fixed Disk (81h) (Serial Number: WD-WMANM1702217) - 153 GB
  Started: 2012-10-10 11:13:59
  Pass 1 - OK (0x0000000000000000)
  Pass 2 - OK (0xFFFFFFFFFFFFFFFF)
  Pass 3 - OK (Random)
  Verification passed OK
  Finished 2013-10-10 13:54:19
2013-10-10 13:54:28 Time taken: 02:40:21
2013-10-10 13:54:28 Erasing completed for 1 device
----------------------------------------Erase Session End-------------------------------
2013-10-10 13:54:28 Rescanned hardware
```

A summary of errors is presented in this report if the process encountered errors from, for example, bad clusters.

Details of this report are saved by default to a log file located in the folder from which you started Active@ KillDisk. Log file location can be changed in Settings.

If XML export option is turned on, log file can be exported, and look like:

```
<?xml version="1.0" encoding="utf-8" ?>
- <killdisk_log>
- <event>
  <type>Info</type>
  <time>2014-01-02 13:57:22</time>
  <text>Initialized Active@ KillDisk for Linux v. 8.0.0, Kernel 3.12.24</text>
     </event>
  <type>Info</type>
  <time>2014-01-02 14:08:52</time>
  <text>DOCS (K:) successfully locked</text>
     </event>
- <session>
  <action>Wipe</action>
  <started>2014-01-02 14:08:52</started>
- <event>
  <type>Info</type>
  <time>2014-01-02 14:08:52</time>
  <text>Wipe method: US DoD 5220.22-M (3 passes, verify) Passes: 3 [Verification 10%]</text>
     </event>

    ...

- <event>
  <type>Info</type>
```

```
  <time>2014-01-02 14:08:53</time>
  <text>Finished 2014-01-02 14:08:53</text>
     </event>
- <event>
</killdisk_log>
```

Example of an Erase Certificate that can be printed or saved as a HTML:

4 Common Questions

4.1 How does the licensing work?

The software is licensed on a per CD/DVD or USB media storage device basis. Each license allows you to use the program from a separate CD/DVD or USB device. For example, if you want to use the program to wipe five computers concurrently, you would need five CDs or DVDs or USB devices (or combination of the three not exceeding five), and therefore need a five-user license.

4.2 How is the data erased?

Active@ KillDisk communicates with the system hardware device directly. The Free version erases data by overwriting all addressable locations on the drive with zeros. Active@ KillDisk Professional version suggests several methods for data destruction. For example, in US DoD 5220.22-M method it overwrites all addressable storage and indexing locations on the drive three times with zeros (0x00), complement (0xFF), and random characters. It then verifies all writing procedures. This complies with the US DoD 5220.22-M security standard.

4.3 What is the difference between the Site and Enterprise license?

Site License means an unlimited usage of the program in one physical location; Enterprise License - in any company's locations.

4.4 Which operating systems are supported by Active@ KillDisk?

Active@ KillDisk for Linux can be launched and work under any Linux family operating system (Debian, Ubuntu, RedHat, Oracle, OpenSUSE, TinyCore, …) in console (non-graphical) mode. Active@ KillDisk for Linux (Console) can be also launched from a pre-installed on media storage device operating system (LiveCD). As it can be installed easily onto a bootable CD/DVD or USB card, it does not matter which operating system is installed on the machine's hard drive. If you can boot from the boot CD/DVD/USB, you can detect and erase any drives independent of the installed operating system. This way you can easily erase Windows (NTFS, FAT/exFAT), UNIX (UFS), Linux (Ext2/Ext3/Ext4) and MacOS X (HFS+) partitions and disks.

4.5 Is Active@ KillDisk for Linux compatible with Macintosh computers?

You cannot run Active@ KillDisk in the old Mac OS environment (based on PowerPC architecture). However, the most recent Apple computers (iMac running MacOS X) are based on the Intel architecture. In this case, it is possible to boot from a Bootable Disk using a CD, DVD or USB device. To do so, hold the **Option** key down when starting the computer.

4.6 Will I be able to use my Hard Disk Drive after Active@ KillDisk erase operation?

Yes. To be able to use the HDD again you need to:

- Repartition the hard drive using a standard utility like FDISK.
- Reformat partitions using a standard utility like FORMAT.
- Reinstall the Operating System using a bootable CD/DVD-ROM.

4.7 I cannot boot from the CD/DVD. What should I do next?

Your computer may have boot priority for Hard Disk Drives, or another device set higher than boot priority for CD/DVD device.

Parameters that are set in low-level setup are written to the machine's BIOS.

To change the boot priority:

- Open the low-level setup utility, usually by pressing **F1, F2, F10** or **ESC** on the keyboard during startup.
- Use the arrow keys to locate the section about **Boot device priority**. This section will allow you to set the search order for types of boot devices. When the screen opens, a list of boot devices appears. Typical devices on this list will be hard drives, CD or DVD devices, floppy drives and network boot option.
- If the CD or DVD device has been disabled, enable it (provided you have a device installed). The priority should indicate that the CD/DVD device is the number one device the BIOS consults when searching for boot instructions. If the CD/DVD device is at the top of the list that is usually the indicator.
- Save and exit the setup utility.

5 Erase/Wipe Parameters and Application Settings

Whether you choose to erase data from the drive or to wipe data from unoccupied drive space, the methods of overwriting these spaces are the same.

5.1 Erase/Wipe Methods

One Pass Zeros or One Pass Random

When using One Pass Zeros or One Pass Random, the number of passes is fixed and cannot be changed.

When the write head passes through a sector, it writes only zeros or a series of random characters.

User Defined

You indicate the number of times the write head passes over each sector. Each overwriting pass is performed with a buffer containing the pattern you specified (ASCII string or Hex values).

US DoD 5220.22-M

The write head passes over each sector three times. The first time is with zeros (0x00), the second time with 0xFF, and the third time with random characters. There is one final pass to verify random characters by reading.

US DoD 5220.22-M (ECE)

The write head passes over each sector seven times (0x00, 0xFF, Random, 0x96, 0x00, 0xFF, Random). There is one final pass to verify random characters by reading.

US DoE M205.1-2

The write head passes over each sector seven times (Random, Random, 0x00). There is one final pass to verify zeros by reading.

Canadian OPS-II

The write head passes over each sector seven times (0x00, 0xFF, 0x00, 0xFF, 0x00, 0xFF, Random). There is one final pass to verify random characters by reading.

Canadian CSEC ITSG-06

The write head passes over each sector three times (0xFF, 0x00, Random). There is one final pass to verify random characters by reading.

German VSITR

The write head passes over each sector seven times (0x00, 0xFF, 0x00, 0xFF, 0x00, 0xFF, 0xAA). There is one final pass to verify random characters by reading.

Russian GOST p50739-95

The write head passes over each sector two times (0x00, Random). There is one final pass to verify random characters by reading.

US Army AR380-19

The write head passes over each sector three times. The first time with 0xFF, the second time with zeros (0x00), and the third time with random characters. There is one final pass to verify random characters by reading.

US Air Force 5020

The write head passes over each sector three times. The first time with random characters, the second time with zeros (0x00), and the third time with 0xFF. There is one final pass to verify random characters by reading.

HMG IS5 (Baseline and Enhanced)

Baseline method overwrites disk's surface with just zeros (0x00).

Enhanced method - the write head passes over each sector three times. The first time with zeros (0x00), the second time with 0xFF, and the third time with random characters.

There is one final pass to verify random characters by reading.

Navso P-5329-26 (RL and MFM)

RL method - the write head passes over each sector three times (0x01, 0x27FFFFFF, Random).

MFM method - the write head passes over each sector three times (0x01, 0x7FFFFFFF, Random).

There is one final pass to verify random characters by reading.

NIST 800-88

Supported three NIST 800-88 media sanitization standards:

- The write head passes over each sector one time (0x00)
- The write head passes over each sector one time (Random)
- The write head passes over each sector three times (0x00, 0xFF, Random)

For details about this, the most secure data clearing standard, you can read the original article at the link below:

http://csrc.nist.gov/publications/nistpubs/800-88/NISTSP800-88_with-errata.pdf

NCSC-TG-025

The write head passes over each sector three times (0x00, 0xFF, Random). There is one final pass to verify random characters by reading.

NSA 130-2

The write head passes over each sector two times (Random, Random). There is one final pass to verify random characters by reading.

Bruce Schneier

The write head passes over each sector seven times (0xFF, 0x00, Random, Random, Random, Random, Random). There is one final pass to verify random characters by reading.

Gutmann

The write head passes over each sector 35 times. For details about this, the most secure data clearing standard, you can read the original article at the link below:

http://www.cs.auckland.ac.nz/~pgut001/pubs/secure_del.html

5.2 Erase/Wipe Options

In addition to the erase method, you can specify more options for erasing/wiping.

Verification

After erasing is complete you can direct the software to perform verification of the surface on the drive to be sure that the last overwriting pass was performed properly and data residing on the drive matches the data written by the erasing process.

Because verification is a long process, you may specify a percentage of the surface to be verified. You may also turn the verification off completely.

Wipe out Deleted/Unused data

This parameter appears only when you are wiping data from unused space on the hard drive. The wiping process clears data residue from unoccupied space on the hard drive and does not affect installed applications or existing data. This process contains three options:

- Wipe unused clusters
- Wipe unused space in MFT/Root area
- Wipe slack space in file clusters

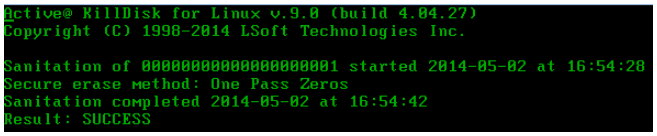
You may choose to run only one or two of these options in order to make the process complete more quickly. If you want a thorough wiping of unused space, then include all of the options.

Initialize Disk

Because of the BIOS restrictions of some manufacturers, a hard disk device that is larger than 300 MB must have an MBR (Master Boot Record) in sector zero. If you erase sector zero and fill it with zeros or random characters, you might find that you cannot use the hard drive after erasing the data. It is for this reason KillDisk creates an empty partition table and writes a typical MBR in sector zero. This is called disk initialization.

Write Fingerprint

If fingerprint has been written to the first disk's sector, next time you boot from this disk, you can see disk erase status, like this:



In case if errors occurred, or erasing stopped, status will be FAILED and displayed in red color.

Comments

If some comments added before erasing, these will be printed at the bottom of the certificate

5.3 General Settings

General parameters allow you to turn features on or off or change default settings when you are erasing or wiping data from unoccupied space. You can also change the look and feel of the application and its logging options. To view and change settings, press the **F2** key, or click the **Settings** from the View menu.

Read/Write Retry Attempts

If an error such as physical damage on the drive surface is encountered while writing data to the drive, Active@ KillDisk tries to perform the write operation again. You can specify the number of retries to be performed. Sometimes, if the drive surface is not completely destroyed, a damaged sector can be overwritten after several retries.

Ignore Disk Write Errors (bad sectors)

If this option is turned on, error messages will not be displayed while data erasing or verification is in progress. All information about errors is written to the **KillDisk.log** file. These messages are displayed in the final Erasing report after the process is complete.

Clear Log File before Start

If this option is turned on, the **killdisk.log** log file will be truncated before erasing starts. After erasing is completed, the log file will contain information only about the last session.

If this option is turned off, the **killdisk.log** log file will not be truncated and information about the last erasing session is appended to the end of the file.

Skip Disk Erase Confirmation

The confirmation screen is the final step before erasing data. In this screen, you type **ERASE-ALL-DATA** to confirm what is about to happen. If Skip Confirmation is turned on, this final safety request does not appear. This option is typically used with caution by advanced users in order to speed up the process. It is safer to run KillDisk with the default state of Skip Disk Erase Confirmation selected. You may want to use this as a safety buffer to ensure that data from the correct drive location is going to be erased completely with no possibility of future data recovery.

Save Log & Shutdown PC after completion

Erasing can take many hours. You can leave work with KillDisk running and set to turn the computer off when erasing is completed. A log file is saved and can be reviewed later on.

Event Logging

By default KillDisk does a Minimal logging. Information is placed in the Event Log view and saved to the **killdisk.log** log file. If more detailed information is required or execution errors occur, you can specify the Detailed logging option. The problem can then be more effectively analyzed.

Include Logo/Technician info into Certificate

After erasing/wiping, KillDisk can produce a certificate HTML file that can be printed later on. This certificate can include custom attributes, such as company logo (graphics) and company info (text). You can configure these parameters in the Logo/Technician Info tab. Turn on this option to include all supplied parameters in the Certificate.

This option is available only in the Professional version.

Hide certificate default logo

After erasing/wiping, KillDisk can produce a certificate HTML file that can be printed later on. This option directs whether to hide default KillDisk logo at the top-left corner of the certificate, or not.

This option is available only in the Professional version.Export log file as XML report

After erasing/wiping is complete and application exited, KillDisk can store the output report (contents of the log file) to XML file at the location of executable. Turn on this option to export report to XML.

This option is available in only in the Professional version.

Local Devices Support

Device initialization takes some time when application starts. For slow-performing devices (floppies, CD/DVD media, USB disks, etc..) this time could be significant. You can save some time by turning off non-important for you device types.

5.4 Certificate and Log File Settings

These settings allow configuration of the storage and display parameters for the certificate and log file.

Certificate options

These parameters allow display of the erase\wipe certificate and setting of its storage location as a HTML file for future printing.

Log file options

These parameters allow naming the log file and setting its storage location.

5.5 Logo and Technician Info Settings

These settings allow embedding custom information into the standard HTML certificate for printing.

These options can be configured in the Free version, but are useable only in the Professional version.

Logo

You can select a company logo from a graphics file (*.BMP, *.JPG, *.PNG). The image size must be 450 by 200 pixels to be printed properly. The company logo will be placed at the top of the certificate and will be embedded into a HTML file that you can print later on.

Technician Information

You can specify all or some of the fields being displayed on a certificate and embedded into a HTML file:

- Client Name
- Technician Name
- Company Name
- Company Address
- Company Phone
- Comments

6 Glossary of Terms

BIOS settings

Basic Input Output Subsystem. This programmable chip controls how information is passed to various devices in the computer system. A typical method to access the BIOS settings screen is to press F1, F2, F8, F10 or ESC during the boot sequence.

boot priority

BIOS settings allow you to run a boot sequence from a floppy drive, a hard drive, a CD/DVD-ROM drive or a USB device. You may configure the order that your computer searches these physical devices for the boot sequence. The first device in the order list has the first boot priority. For example, to boot from a CD/DVD-ROM drive instead of a hard drive, place the CD/DVD-ROM drive ahead of the hard drive in priority.

compressed cluster

When you set a file or folder property to compress data, the file or folder uses less disk space. While the size of the file is smaller, it must use a whole cluster in order to exist on the hard drive. As a result, compressed clusters contain "file slack space". This space may contain residual confidential data from the file that previously occupied this space. KillDisk can wipe out the residual data without touching the existing data.

cluster

A logical group of disk sectors, managed by the operating system, for storing files. Each cluster is assigned a unique number when it is used. The operating system keeps track of clusters in the hard disk's root records or MFT records.

free cluster

A cluster that is not occupied by a file. This space may contain residual confidential data from the file that previously occupied this space. KillDisk can wipe out the residual data.

file slack space

The smallest file (and even an empty folder) takes up an entire cluster. A 10-byte file will take up 2,048 bytes if that is the cluster size. File slack space is the unused portion of a cluster. This space may contain residual confidential data from the file that previously occupied this space. KillDisk can wipe out the residual data without touching the existing data.

deleted boot records

All disks start with a boot sector. In a damaged disk, if the location of the boot records is known, the partition table can be reconstructed. The boot record contains a file system identifier.

ISO

An International Organization for Standardization ISO-9660 file system is a standard CD-ROM file system that allows you to read the same CD-ROM whether you're on a PC, Mac, or other major computer platform. Disk images of ISO-9660 file systems (ISO images) are a common way to electronically transfer the contents of CD-ROMs. They often have the filename extension .ISO (though not necessarily), and are commonly referred to as "ISOs".

lost cluster

A cluster that has an assigned number in the file allocation table, even though it is not assigned to any file. You can free up disk space by reassigning lost clusters. In DOS and Windows, you can find lost clusters with the ScanDisk utility.

MFT records

Master File Table. A file that contains the records of every other file and directory in an NTFS-formatted hard disk drive. The operating system needs this information to access the files.

root records

File Allocation Table. A file that contains the records of every other file and directory in a FAT-formatted hard disk drive. The operating system needs this information to access the files. There are FAT32, FAT16 and FAT versions.

sector

The smallest unit that can be accessed on a disk. Tracks are concentric circles around the disk and the sectors are segments within each circle.

unallocated space

Space on a hard disk where no partition exists. A partition may have been deleted or damaged or a partition may not have been created.

unused space in MFT records

The performance of the computer system depends a lot on the performance of the MFT. When you delete files, the MFT entry for that file is not deleted, it is marked as deleted. This is called unused space in the MFT. If unused space is not removed from the MFT, the size of the table could grow to a point where it becomes fragmented, affecting the performance of the MFT and possibly the performance of the computer. This space may also contain residual confidential data (file names, file attributes, resident file data) from the files that previously occupied these spaces. KillDisk can wipe out the residual data without touching the existing data.