

Optical disc image

An **optical disc image** (or **ISO image**, from the [ISO 9660](#) file system used with [CD-ROM](#) media) is a [disk image](#) that contains everything that would be written to an [optical disc](#), [disk sector](#) by [disc sector](#), including the [optical disc file system](#).^[2] ISO images are expected to contain the binary image of an optical media [file system](#) (usually [ISO 9660](#) and its extensions or [UDF](#)), including the data in its files in binary format, copied exactly as they were stored on the disc. The data inside the ISO image will be structured according to the file system that was used on the optical disc from which it was created.

ISO images can be created from optical discs by [disk imaging software](#), or from a collection of [files](#) by [optical disc authoring software](#), or from a different [disk image file](#) by means of [conversion](#). Software distributed on bootable discs is often available for download in ISO image format. And like any other ISO image, it may be written to an optical disc such as CD, DVD and Blu-Ray.

ISO 9660 image

Filename extensions	.iso , .udf
Internet media type	application/x-iso9660-image
Uniform Type Identifier (UTI)	public.iso-image
Magic number	Volume descriptor: CD001 at 32769. NSR0 at 38913 or 32769 for UDF . ^[1]
Type of format	Disk image
Standard	ISO 9660 , UDF

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Description

Optical disc images are uncompressed and do not use a particular container format; they are a [sector-by-sector](#) copy of the data on an optical disc, stored inside a binary file. Other than ISO 9660 media, an ISO image might also contain a [UDF](#) ([ISO/IEC 13346](#)) file system (commonly used by [DVDs](#) and [Blu-ray Discs](#)), including the data in its files in binary format, copied exactly as they were stored on the disc. The data inside the ISO image will be structured according to the [file system](#) that was used on the optical disc from which it was created.

The [.iso file extension](#) is the one most commonly used for this type of disc images. The [.img](#) extension can also be found on some ISO image files, such as in some images from Microsoft [DreamSpark](#); however, [IMG files](#), which also use the [.img](#) extension, tend to have slightly different contents. The [.udf](#) file extension is sometimes used to indicate that the file system inside the ISO image is actually UDF and not ISO 9660.

ISO files store only the user data from each sector on an optical disc ignoring the control headers and error correction data, and are therefore slightly smaller than a raw disc image of optical media. Since the size of the user data portion of a sector (logical sector) in data optical discs is 2,048 bytes, the size of an ISO image will be a multiple of 2,048.

Any single-track CD-ROM, DVD or Blu-ray disc can be archived in ISO format as a true digital copy of the original. Unlike a physical optical disc, an image can be transferred over any data link or removable storage medium. An ISO image can be opened with almost every multi-format file archiver. Native support for handling ISO images varies from operating system to operating system.

An ISO can be "mounted" with suitable driver software, i.e. treated by the operating system as if it were a physical optical disc. Most Unix-based operating systems, including Linux and macOS, have built-in capability to mount an ISO. Versions of Windows beginning with Windows 8 also have such capability.^[3] For other operating systems software drivers can be installed to achieve the same objective.

Multiple-track images

A CD can have multiple tracks, which can contain computer data, audio, or video. File systems such as ISO 9660 are stored inside one of these tracks. Since ISO images are expected to contain a binary copy of the file system and its contents, there is no concept of a "track" inside an ISO image, since a track is a container for the contents of an ISO image. This means that CDs with multiple tracks can't be stored inside a single ISO image; at most, an ISO image will contain the data inside one of those multiple tracks, and only if it is stored inside a standard file system.

This also means that audio CDs, which are usually composed of multiple tracks, can't be stored inside an ISO image. Furthermore, not even a single track of an audio CD can be stored as an ISO image, since audio tracks do not contain a file system inside them, but only a continuous stream of encoded audio data. This audio is stored on sectors of 2352 bytes different from those that store a file system and it is not stored inside files; it is addressed with *track numbers*, *index points* and a *CD time code* that are encoded into the lead-in of each session of the CD-Audio disc.

Video CDs and Super Video CDs require at least two tracks on a CD, so it is also not possible to store an image of one of these discs inside an ISO image file, however an .IMG file can achieve this.

Formats such as CUE/BIN, CCD/IMG and MDS/MDF formats can be used to store multi-track disc images, including audio CDs. These formats store a raw disc image of the complete disc, including information from all tracks, along with a companion file describing the multiple tracks and the characteristics of each of those tracks. This would allow an optical media burning tool to have all the information required to correctly burn the image on a new disc. For audio CDs, one can also transfer the audio data into uncompressed audio files like WAV or AIFF, optionally reserving the metadata (see CD ripping).

Most software that is capable of writing from ISO images to hard disks or recordable media (CD / DVD / BD) is generally not able to write from ISO disk images to flash drives. This limitation is more related to the availability of software tools able to perform this task, than to problems in the format itself. However, since 2011, various software has existed to write raw image files to USB flash drives.^{[4][5]}

Uses

.ISO files are commonly used in emulators to replicate a CD image. Emulators such as Dolphin and PCSX2 use .iso files to emulate Wii and GameCube games, and PlayStation 2 games, respectively.^{[6][7]} They can also be used as virtual CD-ROMs for hypervisors such as VMware Workstation or VirtualBox. Other uses are burning disk images of operating systems to physical install media.

See also

- Comparison of disc image software
- Live USB
- No-disc crack

References

1. "File Signatures" (https://www.garykessler.net/library/file_sigs.html). *www.garykessler.net*.
2. Fisher, Tim (24 April 2018). "What Is an ISO File?" (<https://www.lifewire.com/iso-file-2625923>). *Lifewire*.
3. "Windows 8 Explorer will support native mounting of ISO and VHD" (<http://www.extremetech.com/computing/94370-windows-8-explorer-will-support-native-mounting-of-iso-and-vhd>). *ExtremeTech*. Retrieved 2012-05-21.
4. "ISO image to USB conversion" (<https://web.archive.org/web/20150215102916/http://imagetousb.com/iso-image-to-usb-conversion/>). ISO to USB burning tool. Archived from the original (<http://imagetousb.com/iso-image-to-usb-conversion/>) on 15 February 2015. Retrieved 15 February 2015.
5. "How to Setup Windows 7 or Windows 8 from USB drive?" (<http://www.poweriso.com/tutorial/s/how-to-make-win7-bootable-usb-drive.htm>). *PowerISO*. Retrieved 15 February 2015.
6. "What dump formats are supported by Dolphin?" (<https://dolphin-emu.org/docs/faq/#what-dump-formats-are-supported-dolphin>). *Dolphin Emulator Project*. Retrieved 11 March 2021.
7. "So how do I use it? - PCSX2" (<https://pcsx2.net/getting-started.html>). *PCSX2 Team*. Retrieved 11 March 2021.

External links

- How to write ISO files to CD, DVD, and BD with Linux using genisoimage, wodim, growisofs, etc. (https://wiki.archlinux.org/index.php/Optical_disc_drive)

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This page was last edited on 20 May 2022, at 03:19 (UTC).

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