INTERNATIONAL STANDARD

ISO/IEC 13346-4

Second edition
1999-04-01

Information technology — Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange —

Part 4: File structure

Technologies de l'information — Structure de volume et de fichier de moyens d'écriture unique et de réécriture utilisant un enregistrement non séquentiel pour l'échange d'information —

Partie 4: Structure de fichier

Reference number
ISO/IEC 13346-4:199(E)

Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialised system for worldwide standardisation. National Bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organisation to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organisations, governmental and non-governmental, in liaison with ISO and IEC, also take part in this work.

In the field of information technology, ISO and IEC have established a Joint Technical Committee, ISO/IEC JTC 1. Draft International Standards adopted by the Joint Technical Committee are circulated to National Bodies for voting. Publication of an International Standard requires approval by at least 75% of the national bodies casting a vote.

International Standard ISO/IEC 13346-4 was prepared by ECMA, (as Standard ECMA-167) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by National Bodies of ISO and IEC.

This second edition cancels and replaces the first edition (ISO/IEC 13346-4:1995), which has been technically revised.

ISO/IEC 13346 consists of the following parts, under the general title *Information technology — Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange*:

— *Part 1: General*

— *Part 2: Volume and boot block recognition*

— *Part 3: Volume structure*

— *Part 4: File structure*

— *Part 5: Record structure*

Annex A forms an integral part of this part of ISO/IEC 13346. Annex B is for information only.

Introduction

ISO/IEC 13346 is a volume and file structure standard for interchanging files and as such, it is a peer to existing volume and file structure standards such as ISO 9293 and ISO 9660. It is rather different from those standards in at least two important ways. Firstly, it offers much more functionality, mainly because of user needs for increased character set support and for more powerful file system features. Secondly, it acknowledges the separate concerns of booting, volume structure and file system structure. Rather than bundling these different functions together, ISO/IEC 13346 carefully segregates these functions into separate parts and describes in detail how those parts fit together. It is expected that future volume and file structure standards will fit into this framework, rather than building other distinct and incompatible formats.

ISO/IEC 13346 is published in five Parts. Part 1 - general - specifies references, definitions, notations and basic structures used in the other four Parts. Part 2 - volume and boot block recognition - specifies formats and system requirements for recognising the volume structures on a medium and booting from a medium. Part 3 - volume structure - specifies how to record various volume-related entities such as volumes, volume sets and logical volumes. Part 4 - file structure - specifies how to record and interpret files, both file data and file attributes, and file hierarchies within logical volumes. Part 5 - record structure - specifies how to record and interpret file data encoded as records.

Information technology — Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange —

Part 4:
File structure

1 Scope

ISO/IEC 13346 specifies a format and associated system requirements for volume and boot block recognition, volume structure, file structure and record structure for the interchange of information on media between users of information processing systems.

The media shall be recorded as if the recording of sectors may be done in any order.

Note 1 - The medium is not restricted to being of only one type; the type of medium may be either write once, or read only, or rewritable, or a combination of these types.

This International Standard consists of the following five Parts:

Part 1: General
Part 2: Volume and Boot Block Recognition
Part 3: Volume Structure
Part 4: File Structure
Part 5: Record Structure
Annex A - ICB Strategies, is part of this part of ISO/IEC 13346.

This part of ISO/IEC 13346 specifies a format and associated system requirements for file structure by specifying:

- the placement of files;
- the attributes of the files;
- the relationship among files of a logical volume;
- levels of medium interchange;
- requirements for the processes which are provided within information processing systems, to enable information to be interchanged between different systems; for this purpose, it specifies the functions to be provided within systems which are intended to originate or receive media which conform to this part of ISO/IEC 13346.

2 Parts references

The first digit of a reference within ISO/IEC 13346 identifies the Part, e.g. 2/5 refers to clause 5 in ISO/IEC 13346-2, and figure 4/3 refers to figure 3 in this part of ISO/IEC 13346.

3 Part interface

This clause specifies the interface of this part of ISO/IEC 13346 to other standards or Parts.

3.1 Input

This part of ISO/IEC 13346 requires the specification of the following by another standard or Part.

- Volume sets of one or more volumes.
- A means for assigning volume sequence numbers (see 4/8.1).
- Logical volumes composed of partitions.
- Numeric identification of the partitions within a logical volume..
- If the volume is recorded according to ISO/IEC 13346-3, the partitions shall be numbered according to 3/8.8.
- Identification of a logical volume on which one or more file sets may be recorded.
- Division of the partitions for a logical volume into fixed size logical blocks.
- Numeric identification of the logical blocks within a partition.
- The size of a logical block for a logical volume. This shall be an integral multiple of 512.
- A means for detecting if a logical block is unrecorded.

- If the volume is recorded according to ISO/IEC 13346-3, a logical block shall be unrecorded if all of the logical sectors comprising that logical block are unrecorded. A logical block should either be completely recorded or unrecorded.

- A means for identifying the first extent of the File Set Descriptor Sequence (see 4/8.3.1) of a logical volume;
- If the volume is recorded according to ISO/IEC 13346-3, the extent in which the first File Set Descriptor Sequence of the logical volume is recorded shall be identified by a long_ad (4/14.14.2) recorded in the Logical Volume Contents Use field (see 3/10.6.7) of the Logical Volume Descriptor describing the logical volume in which the File Set Descriptors are recorded.
- A means for specifying the Logical Volume Header Descriptor (see 4/14.15) of a logical volume.
- If the volume is recorded according to ISO/IEC 13346-3, the Logical Volume Header descriptor shall be recorded in the Logical Volume Contents Use field (see 3/10.10.5) of the prevailing Logical Volume Integrity Descriptor for the logical volume.
- A means for identifying the following for each partition of the logical volume on which a file set is recorded:

  - Unallocated Space Table and Unallocated Bit Map (see 4/10)
  - Freed Space Table and Freed Bit Map (see 4/10)
  - Partition Integrity Table (see 4/11)

If the volume is recorded according to ISO/IEC 13346-3, the Partition Contents Use field (see 3/10.5.6) of the Partition Descriptor (see 3/10.5) describing the partition shall be recorded as a Partition Header Descriptor (see 4/14.3). Such a Partition Descriptor shall have “+NSR03” recorded in the Partition Contents field.

3.2 Output

This part of ISO/IEC 13346 specifies the following which may be used by other standards or Parts.

- Data space of a file (see 4/8.8.2).
- Attributes of a file.

– Attributes of a directory.
– Attributes of a directory hierarchy.

4 Conformance

4.1 Conformance of a medium

A medium shall be in conformance with ISO/IEC 13346 when it conforms to a standard for recording (see 1/5.10) and information recorded on sectors of the medium conform to the specifications of ISO/IEC 13346-1 and one or more of ISO/IEC 13346-2, -3, -4 and -5. A statement of conformance shall identify the sectors of the medium on which information is recorded according to the specifications of ISO/IEC 13346, and the Parts and the levels of medium interchange (see 2/10, 3/11, and 4/15) to which the contents of those sectors of the medium conform.

4.2 Conformance of an information processing system

An information processing system shall be in conformance with ISO/IEC 13346 if it meets the requirements specified in ISO/IEC 13346-1 and one or more of ISO/IEC 13346-2, -3, -4 and -5 either for an originating system (see 2/12, 3/13, 4/17 and 5/11) or for a receiving system (see 2/13, 3/14, 4/18 and 5/12) or for both types of system. A statement of conformance shall identify the Parts, and the levels of the requirements for each of those Parts, which can be met by the system.

5 Definitions

In addition to the definitions of ISO/IEC 13346-1 (see 1/5), the following definitions apply for this part of ISO/IEC 13346.

5.1 Extent

A set of logical blocks, the logical block numbers of which form a continuous ascending sequence. The address, or location, of an extent is the number of the first logical block in the sequence.

5.2 File set

A collection of files and directories.

5.3 Group ID

An identification of a group of users.

5.4 Logical block

The unit of allocation of a logical volume.

5.5 Logical volume

A nonempty set of partitions over which one or more file sets are recorded.

5.6 Partition

An extent of logical blocks within a volume.

5.7 Stream

A data component of a file.

5.8 User ID

An identification of a user.

6 Notation

The notation of ISO/IEC 13346-1 (see 1/6) applies to this part of ISO/IEC 13346.