
**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

Contents

1 Scope	1
2 Parts references	1
3 Part interface	2
3.1 Input	2
3.2 Output	2
4 Conformance	3
4.1 Conformance of a medium	3
4.2 Conformance of an information processing system	3
5 Definitions	3
5.1 Extent	3
5.2 File set	3
5.3 Group ID	3
5.4 Logical block	3
5.5 Logical volume	3
5.6 Partition	3
5.7 Stream	3
5.8 User ID	3
6 Notation	3
7 Basic types	4
7.1 Recorded address	4
7.1.1 Logical Block Number (RBP 0)	4

© ISO/IEC 1999

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

7.1.2 Partition Reference Number (RBP 4)	4
7.2 Descriptor Tag	4
7.2.1 Tag Identifier (RBP 0)	4
7.2.2 Descriptor Version (RBP 2)	5
7.2.3 Tag Checksum (RBP 4)	5
7.2.4 Reserved (RBP 5)	5
7.2.5 Tag Serial Number (RBP 6)	5
7.2.6 Descriptor CRC (RBP 8)	6
7.2.7 Descriptor CRC Length (RBP 10)	6
7.2.8 Tag Location (RBP 12)	6
8 File structure	6
8.1 Volume set	6
8.2 Arrangement of information on a volume set	6
8.3 Arrangement of information on a logical volume	6
8.3.1 File Set Descriptor Sequence	6
8.4 Arrangement of information on a partition	7
8.5 File set	7
8.6 Directories	7
8.6.1 Order of directory descriptors	8
8.6.2 Directory hierarchy size restrictions	9
8.7 Pathname	9
8.7.1 Resolved pathname	9
8.8 Files	9
8.8.1 Attributes of a file	10
8.8.2 Data space of a file	10
8.8.3 Streams of a File	11
8.9 Record structure	11
8.10 Information Control Block (ICB)	11
8.10.1 ICB hierarchy	12
9 Additional File Data	12

9.1 Extended attributes	12
9.2 Stream Directory	14
10 Partition space management	14
10.1 Space sets	14
11 Partition integrity	15
12 Allocation descriptors	15
12.1 Description of Files	16
13 Recording of descriptors	16
14 File Data Structures	16
14.1 File Set Descriptor	16
14.1.1 Descriptor Tag (BP 0)	17
14.1.2 Recording Date and Time (BP 16)	17
14.1.3 Interchange Level (BP 28)	17
14.1.4 Maximum Interchange Level (BP 30)	17
14.1.5 Character Set List (BP 32)	17
14.1.6 Maximum Character Set List (BP 36)	17
14.1.7 File Set Number (BP 40)	18
14.1.8 File Set Descriptor Number (BP 44)	18
14.1.9 Logical Volume Identifier Character Set (BP 48)	18
14.1.10 Logical Volume Identifier (BP 112)	18
14.1.11 File Set Character Set (BP 240)	18
14.1.12 File Set Identifier (BP 304)	18
14.1.13 Copyright File Identifier (BP 336)	18
14.1.14 Abstract File Identifier (BP 368)	18
14.1.15 Root Directory ICB (BP 400)	19
14.1.16 Domain Identifier (BP 416)	19
14.1.17 Next Extent (BP 448)	19
14.1.18 System Stream Directory (BP 464)	19
14.1.19 Reserved (BP 480)	19
14.2 Terminating Descriptor	19

14.2.1 Descriptor Tag (BP 0)	19
14.2.2 Reserved (BP 16)	19
14.3 Partition Header Descriptor	19
14.3.1 Unallocated Space Table (RBP 0)	20
14.3.2 Unallocated Space Bitmap (RBP 8).....	20
14.3.3 Partition Integrity Table (RBP 16).....	20
14.3.4 Freed Space Table (RBP 24)	20
14.3.5 Freed Space Bitmap (RBP 32)	20
14.3.6 Reserved (RBP 40).....	20
14.4 File Identifier Descriptor	20
14.4.1 Descriptor Tag (RBP 0)	21
14.4.2 File Version Number (RBP 16).....	21
14.4.3 File Characteristics (RBP 18).....	21
14.4.4 Length of File Identifier (=L_FI) (RBP 19).....	22
14.4.5 ICB (RBP 20).....	22
14.4.6 Length of Implementation Use (=L_IU) (RBP 36).....	22
14.4.7 Implementation Use (RBP 38).....	22
14.4.8 File Identifier (RBP [L_IU+38])	23
14.4.9 Padding (RBP [L_FI+L_IU+38]).....	23
14.5 Allocation Extent Descriptor	23
14.5.1 Descriptor Tag (BP 0)	23
14.5.2 Previous Allocation Extent Location (BP 16).....	23
14.5.3 Length of Allocation Descriptors (=L_AD) (BP 20)	23
14.6 ICB Tag	23
14.6.1 Prior Recorded Number of Direct Entries (RBP 0)	24
14.6.2 Strategy Type (RBP 4)	24
14.6.3 Strategy Parameter (RBP 6).....	24
14.6.4 Maximum Number of Entries (RBP 8).....	24
14.6.5 Reserved (RBP 10).....	24
14.6.6 File Type (RBP 11)	24

14.6.7 Parent ICB Location (RBP 12)	25
14.6.8 Flags (RBP 18).....	25
14.7 Indirect Entry.....	27
14.7.1 Descriptor Tag (BP 0)	27
14.7.2 ICB Tag (BP 16).....	27
14.7.3 Indirect ICB (BP 36)	27
14.8 Terminal Entry.....	27
14.8.1 Descriptor Tag (BP 0)	27
14.8.2 ICB Tag (BP 16).....	27
14.9 File Entry.....	27
14.9.1 Descriptor Tag (BP 0)	28
14.9.2 ICB Tag (BP 16).....	28
14.9.3 Uid (BP 36).....	28
14.9.4 Gid (BP 40).....	28
14.9.5 Permissions (BP 44)	28
14.9.6 File Link Count (BP 48)	30
14.9.7 Record Format (BP 50).....	30
14.9.8 Record Display Attributes (BP 51)	30
14.9.9 Record Length (BP 52)	31
14.9.10 Information Length (BP 56).....	31
14.9.11 Logical Blocks Recorded (BP 64)	31
14.9.12 Access Date and Time (BP 72)	31
14.9.13 Modification Date and Time (BP 84).....	31
14.9.14 Attribute Date and Time (BP 96).....	32
14.9.15 Checkpoint (BP 108).....	32
14.9.16 Extended Attribute ICB (BP 112)	32
14.9.17 Implementation Identifier (BP 128).....	32
14.9.18 Unique Id (BP 160)	32
14.9.19 Length of Extended Attributes (=L_EA) (BP 168)	32
14.9.20 Length of Allocation Descriptors (=L_AD) (BP 172).....	32

14.9.21 Extended Attributes (BP 176)	32
14.9.22 Allocation Descriptors (BP [L_EA+176])	32
14.10 Extended Attributes.....	32
14.10.1 Extended Attribute Header Descriptor	33
14.10.2 Generic format	33
14.10.3 Character Set Information.....	34
14.10.4 Alternate Permissions	35
14.10.5 File Times Extended Attribute	38
14.10.6 Information Times Extended Attribute	39
14.10.7 Device Specification.....	40
14.10.8 Implementation Use Extended Attribute	41
14.10.9 Application Use Extended Attribute.....	42
14.11 Unallocated Space Entry.....	43
14.11.1 Descriptor Tag (BP 0)	43
14.11.2 ICB Tag (BP 16).....	43
14.11.3 Length of Allocation Descriptors (=L_AD) (BP 36)	43
14.11.4 Allocation Descriptors (BP 40)	43
14.12 Space Bitmap Descriptor	44
14.12.1 Descriptor Tag (BP 0)	44
14.12.2 Number of Bits (=N_BT) (BP 16).....	44
14.12.3 Number of Bytes (=N_B) (BP 20).....	44
14.12.4 Bitmap (BP 24)	44
14.13 Partition Integrity Entry.....	44
14.13.1 Descriptor Tag (BP 0)	44
14.13.2 ICB Tag (BP 16).....	45
14.13.3 Recording Date and Time (BP 36).....	45
14.13.4 Integrity Type (BP 48).....	45
14.13.5 Reserved (BP 49)	45
14.13.6 Implementation Identifier (BP 224)	45
14.13.7 Implementation Use (BP 256)	45

14.14 Allocation descriptors	45
14.14.1 Short Allocation Descriptor	45
14.14.2 Long Allocation Descriptor	46
14.14.3 Extended Allocation Descriptor	46
14.15 Logical Volume Header Descriptor	47
14.15.1 Unique Id (RBP 0)	47
14.15.2 Reserved (RBP 8)	48
14.16 Pathname	48
14.16.1 Path Component	48
14.17 Extended File Entry	49
14.17.1 Descriptor Tag (BP 0)	49
14.17.2 ICB Tag (BP 16)	50
14.17.3 Uid (BP 36)	50
14.17.4 Gid (BP 40)	50
14.17.5 Permissions (BP 44)	50
14.17.6 File Link Count (BP 48)	50
14.17.7 Record Format (BP 50)	50
14.17.8 Record Display Attributes (BP 51)	50
14.17.9 Record Length (BP 52)	50
14.17.10 Information Length (BP 56)	50
14.17.11 Object Size (BP 64)	50
14.17.12 Logical Blocks Recorded (BP 72)	50
14.17.13 Access Date and Time (BP 80)	50
14.17.14 Modification Date and Time (BP 92)	50
14.17.15 Creation Date and Time (BP 104)	50
14.17.16 Attribute Date and Time (BP 116)	51
14.17.17 Checkpoint (BP 128)	51
14.17.18 Extended Attribute ICB (BP 136)	51
14.17.19 Stream Directory ICB (BP 152)	51
14.17.20 Implementation Identifier (BP 168)	51

14.17.21 Unique Id (BP 200)	51
14.17.22 Length of Extended Attributes (=L_EA) (BP 208)	51
14.17.23 Length of Allocation Descriptors (=L_AD) (BP 212)	51
14.17.24 Extended Attributes (BP 216)	51
14.17.25 Allocation Descriptors (BP [L_EA+216])	51
15 Levels of medium interchange	51
15.1 Level 1	51
15.2 Level 2	52
15.3 Level 3	52
16 Requirements for the description of systems	53
17 Requirements for an originating system	53
17.1 General	53
17.2 Mandatory access by user	53
17.2.1 Files	53
17.2.2 File set	53
17.2.3 Descriptors	53
17.3 Optional access by user	54
17.3.1 Records	55
17.3.2 File types	55
17.3.3 Permissions	55
17.4 Restrictions	55
17.4.1 Multivolume volume sets	55
17.4.2 Record length	55
17.4.3 File Times	55
17.4.4 Information Times	55
17.4.5 Alternate Permissions	55
18 Requirements for a receiving system	56
18.1 General	56
18.2 Files	56
18.2.1 File types	56

18.2.2 Permissions.....	56
18.3 Mandatory access by user	56
18.3.1 Descriptors	56
18.4 Restrictions	57
18.4.1 Record length.....	57
18.4.2 File Times	57
18.4.3 Information Times.....	57
18.4.4 Alternate Permissions.....	57
Annex A (normative) ICB Strategies	58
Annex B (informative) Changes from ISO/IEC 13346-4:1995 to this second edition	62

This document is a preview generated by EVS

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.