

Dit document mag slechts op een stand-alone PC worden geïnstalleerd. Gebruik op een netwerk is alleen toestaan als een aanvullende licentieovereenkomst voor netwerkgebruik met NEN is afgesloten.  
This document may only be used on a stand-alone PC. Use in a network is only permitted when a supplementary license agreement for us in a network with NEN has been concluded.

Nederlandse norm

# **NEN-ISO/IEC 23360-4** (en)

Linux Standard Base (LSB) core specification  
3.1 - Part 4: Specification for AMD64  
architecture (ISO/IEC 23360-4:2006, IDT)

ICS 35.080  
januari 2007

Als Nederlandse norm is aanvaard:

- ISO/IEC 23360-4:2006, IDT

VOORBEELD  
Preview

Normcommissie 381 001 "JTC Algemeen"

---

Apart from exceptions provided by the law, nothing from this publication may be duplicated and/or published by means of photocopy, microfilm, storage in computer files or otherwise, which also applies to full or partial processing, without the written consent of the Netherlands Standardization Institute.

The Netherlands Standardization Institute shall, with the exclusion of any other beneficiary, collect payments owed by third parties for duplication and/or act in and out of law, where this authority is not transferred or falls by right to the Reproduction Rights Foundation.

---

Auteursrecht voorbehouden. Behoudens uitzondering door de wet gesteld mag zonder schriftelijke toestemming van het Nederlands Normalisatie-instituut niets uit deze uitgave worden verveelvoudigd en/of openbaar gemaakt door middel van fotokopie, microfilm, opslag in computerbestanden of anderszins, hetgeen ook van toepassing is op gehele of gedeeltelijke bewerking.

Het Nederlands Normalisatie-instituut is met uitsluiting van ieder ander gerechtigd de door derden verschuldigde vergoedingen voor verveelvoudiging te innen en/of daartoe in en buiten rechte op te treden, voor zover deze bevoegdheid niet is overgedragen c.q. rechtens toekomt aan de Stichting Reprorecht.

---

Although the utmost care has been taken with this publication, errors and omissions cannot be entirely excluded. The Netherlands Standardization Institute and/or the members of the committees therefore accept no liability, not even for direct or indirect damage, occurring due to or in relation with the application of publications issued by the Netherlands Standardization Institute.

---

Hoewel bij deze uitgave de uiterste zorg is nagestreefd, kunnen fouten en onvolledigheden niet geheel worden uitgesloten. Het Nederlands Normalisatie-instituut en/of de leden van de commissies aanvaardden derhalve geen enkele aansprakelijkheid, ook niet voor directe of indirecte schade, ontstaan door of verband houdend met toepassing van door het Nederlands Normalisatie-instituut gepubliceerde uitgaven.

Preview

---

---

**Linux Standard Base (LSB) core  
specification 3.1 —**  
**Part 4:  
Specification for AMD64 architecture**

*Spécifications 3.1 relatives au noyau de base normalisé Linux (LSB) —  
Partie 4: Spécifications pour l'architecture AMD64*

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

Copyright  
Preview

© ISO/IEC 2006

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 either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

**Linux Standard Base Core Specification for AMD64 3.1**

ISO/IEC 23360-4:2006(E)

Copyright © 2006 ISO/IEC

This standard includes material that has been provided by the Free Standards Group under the GNU Free Documentation License Version 1.1 published by the Free Software Foundation.

Portions of the text are copyrighted by the following parties:

- The Regents of the University of California
- Free Software Foundation
- Ian F. Darwin
- Paul Vixie
- BSDI (now Wind River)
- Andrew G. Morgan
- Jean-loup Gailly and Mark Adler
- Massachusetts Institute of Technology

These excerpts are being used in accordance with their respective licenses.

Linux is the registered trademark of Linus Torvalds in the U.S. and other countries.

UNIX is a registered trademark of The Open Group.

LSB is a trademark of the Free Standards Group in the United States and other countries.

AMD is a trademark of Advanced Micro Devices, Inc.

Intel and Itanium are registered trademarks and Intel386 is a trademark of Intel Corporation.

PowerPC is a registered trademark and PowerPC Architecture is a trademark of the IBM Corporation.

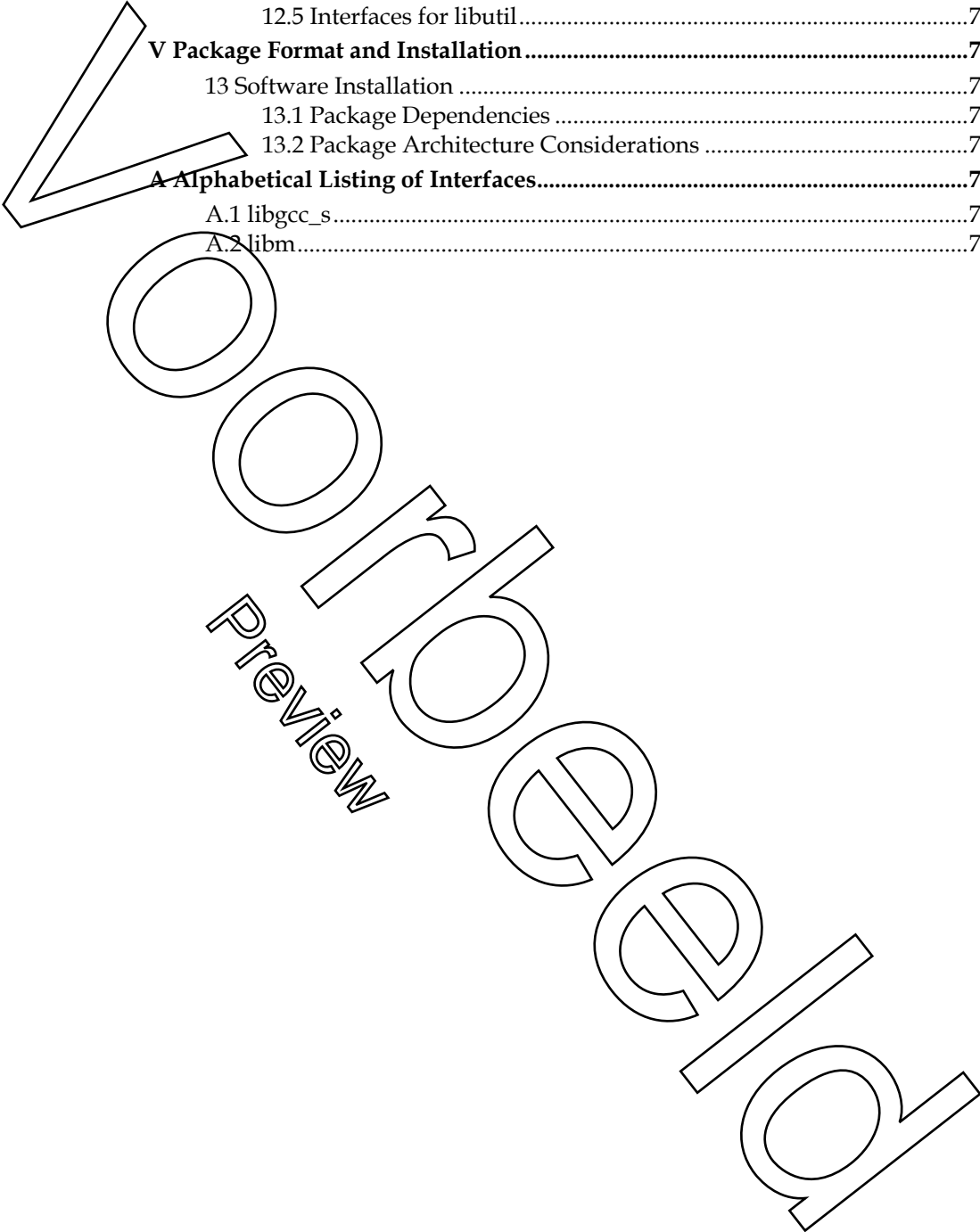
S/390 is a registered trademark of the IBM Corporation.

OpenGL is a registered trademark of Silicon Graphics, Inc.

## Contents

Foreword .....	vii
Introduction .....	viii
<b>I Introductory Elements .....</b>	<b>0</b>
1 Scope.....	1
1.1 General.....	1
1.2 Module Specific Scope.....	1
2 References.....	2
2.1 Normative References .....	2
2.2 Informative References/Bibliography .....	4
3 Requirements .....	7
3.1 Relevant Libraries .....	7
3.2 LSB Implementation Conformance .....	7
3.3 LSB Application Conformance.....	8
4 Definitions .....	10
5 Terminology .....	11
6 Documentation Conventions .....	13
<b>II Executable and Linking Format (ELF).....</b>	<b>14</b>
7 Introduction.....	15
8 Low Level System Information.....	16
8.1 Machine Interface.....	16
8.2 Function Calling Sequence.....	17
8.3 Operating System Interface.....	18
8.4 Process Initialization.....	18
8.5 Coding Examples.....	18
8.6 C Stack Frame.....	19
8.7 Debug Information.....	19
9 Object Format.....	20
9.1 Introduction.....	20
9.2 ELF Header.....	20
9.3 Sections.....	20
9.4 Symbol Table.....	21
9.5 Relocation.....	21
10 Program Loading and Dynamic Linking.....	22
10.1 Introduction.....	22
10.2 Program Header.....	22
10.3 Program Loading.....	22
10.4 Dynamic Linking.....	22
<b>III Base Libraries .....</b>	<b>24</b>
11 Libraries .....	25
11.1 Program Interpreter/Dynamic Linker .....	25
11.2 Interfaces for libc .....	25
11.3 Data Definitions for libc .....	40
11.4 Interfaces for libm .....	52
11.5 Data Definitions for libm.....	57
11.6 Interface Definitions for libm .....	58
11.7 Interfaces for libpthread.....	59
11.8 Data Definitions for libpthread .....	62
11.9 Interfaces for libgcc_s.....	62
11.10 Data Definitions for libgcc_s.....	63
11.11 Interface Definitions for libgcc_s.....	64
11.12 Interfaces for libdl .....	69
11.13 Data Definitions for libdl .....	70
11.14 Interfaces for libcrypt.....	70

<b>IV Utility Libraries.....</b>	<b>71</b>
12 Libraries .....	72
12.1 Interfaces for libz.....	72
12.2 Data Definitions for libz.....	72
12.3 Interfaces for libncurses.....	72
12.4 Data Definitions for libncurses.....	73
12.5 Interfaces for libutil.....	73
<b>V Package Format and Installation.....</b>	<b>75</b>
13 Software Installation .....	76
13.1 Package Dependencies .....	76
13.2 Package Architecture Considerations .....	76
<b>A Alphabetical Listing of Interfaces.....</b>	<b>77</b>
A.1 libgcc_s.....	77
A.2 libm.....	77



## List of Tables

2-1 Normative References .....	2
2-2 Other References .....	4
3-1 Standard Library Names.....	7
8-1 Non Conforming Instructions.....	16
9-1 ELF Special Sections .....	20
9-2 Additional Special Sections .....	21
11-1 libc Definition .....	25
11-2 libc - RPC Function Interfaces .....	25
11-3 libc - System Calls Function Interfaces .....	26
11-4 libc - Standard I/O Function Interfaces .....	28
11-5 libc - Standard I/O Data Interfaces .....	29
11-6 libc - Signal Handling Function Interfaces .....	29
11-7 libc - Signal Handling Data Interfaces .....	30
11-8 libc - Localization Functions Function Interfaces .....	30
11-9 libc - Localization Functions Data Interfaces .....	31
11-10 libc - Socket Interface Function Interfaces .....	31
11-11 libc - Wide Characters Function Interfaces.....	32
11-12 libc - String Functions Function Interfaces .....	33
11-13 libc - IPC Functions Function Interfaces .....	34
11-14 libc - Regular Expressions Function Interfaces .....	34
11-15 libc - Character Type Functions Function Interfaces.....	34
11-16 libc - Time Manipulation Function Interfaces .....	35
11-17 libc - Time Manipulation Data Interfaces .....	35
11-18 libc - Terminal Interface Functions Function Interfaces .....	36
11-19 libc - System Database Interface Function Interfaces.....	36
11-20 libc - Language Support Function Interfaces .....	37
11-21 libc - Large File Support Function Interfaces .....	37
11-22 libc - Standard Library Function Interfaces.....	38
11-23 libc - Standard Library Data Interfaces.....	40
11-24 libm Definition .....	52
11-25 libm - Math Function Interfaces .....	53
11-26 libm - Math Data Interfaces .....	57
11-27 libpthread Definition.....	59
11-28 libpthread - Realtime Threads Function Interfaces .....	59
11-29 libpthread - Posix Threads Function Interfaces .....	60
11-30 libpthread - Thread aware versions of libc interfaces Function Interfaces .....	61
11-31 libgcc_s Definition .....	62
11-32 libgcc_s - Unwind Library Function Interfaces .....	63
11-33 libdl Definition .....	69
11-34 libdl - Dynamic Loader Function Interfaces.....	69
11-35 libcrypt Definition.....	70
11-36 libcrypt - Encryption Function Interfaces .....	70
12-1 libz Definition.....	72
12-2 libncurses Definition .....	73
12-3 libutil Definition.....	73
12-4 libutil - Utility Functions Function Interfaces .....	74
A-1 libgcc_s Function Interfaces .....	77
A-2 libm Function Interfaces .....	77



## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 23360-4 was prepared by the Free Standards Group and was adopted, under the PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 22, *Programming languages, their environments and system software interfaces*.

ISO/IEC 23360 consists of the following parts, under the general title *Linux Standard Base (LSB) core specification 3.1*:

- *Part 1: Generic specification*
- *Part 2: Specification for IA32 architecture*
- *Part 3: Specification for IA64 architecture*
- *Part 4: Specification for AMD64 architecture*
- *Part 5: Specification for PPC32 architecture*
- *Part 6: Specification for PPC64 architecture*
- *Part 7: Specification for S390 architecture*
- *Part 8: Specification for S390X architecture*

## Introduction

The LSB defines a binary interface for application programs that are compiled and packaged for LSB-conforming implementations on many different hardware architectures. Since a binary specification includes information specific to the computer processor architecture for which it is intended, it is not possible for a single document to specify the interface for all possible LSB-conforming implementations. Therefore, the LSB is a family of specifications, rather than a single one.

This document should be used in conjunction with the documents it references. This document enumerates the system components it includes, but descriptions of those components may be included entirely or partly in this document, partly in other documents, or entirely in other reference documents. For example, the section that describes system service routines includes a list of the system routines supported in this interface, formal declarations of the data structures they use that are visible to applications, and a pointer to the underlying referenced specification for information about the syntax and semantics of each call. Only those routines not described in standards referenced by this document, or extensions to those standards, are described in detail. Information referenced in this way is as much a part of this document as is the information explicitly included here.

The specification carries a version number of either the form  $x.y$  or  $x.y.z$ . This version number carries the following meaning:

- The first number ( $x$ ) is the major version number. All versions with the same major version number should share binary compatibility. Any addition or deletion of a new library results in a new version number. Interfaces marked as deprecated may be removed from the specification at a major version change.
- The second number ( $y$ ) is the minor version number. Individual interfaces may be added if all certified implementations already had that (previously undocumented) interface. Interfaces may be marked as deprecated at a minor version change. Other minor changes may be permitted at the discretion of the LSB workgroup.
- The third number ( $z$ ), if present, is the editorial level. Only editorial changes should be included in such versions.

Since this specification is a descriptive Application Binary Interface, and not a source level API specification, it is not possible to make a guarantee of 100% backward compatibility between major releases. However, it is the intent that those parts of the binary interface that are visible in the source level API will remain backward compatible from version to version, except where a feature marked as deprecated in one release may be removed from a future release.

Implementors are strongly encouraged to make use of symbol versioning to permit simultaneous support of applications conforming to different releases of this specification.

This is version 3.1 of the Linux Standard Base Core Specification. This specification is part of a family of specifications under the general title "Linux Standard Base (LSB) core specification 3.1". Developers of applications or implementations interested in using the LSB trademark should see the Free Standards Group Certification Policy for details.

## I Introductory Elements

Preview

Voorbeeld  
Preview

# Bestelformulier

## Stuur naar:

NEN Standards Products & Services  
t.a.v. afdeling Klantenservice  
Antwoordnummer 10214  
2600 WB Delft



**NEN** Standards Products & Services

Postbus 5059  
2600 GB Delft

Vlinderweg 6  
2623 AX Delft

T (015) 2 690 390  
F (015) 2 690 271

[www.nen.nl/normshop](http://www.nen.nl/normshop)

## Ja, ik bestel

\_\_ ex. NEN-ISO/IEC 23360-4:2007 en Linux Standard Base (LSB) core specification 3.1 - Part 4: Specification for AMD64 architecture € 179.33

**Wilt u deze norm in PDF-formaat? Deze bestelt u eenvoudig via [www.nen.nl/normshop](http://www.nen.nl/normshop)**

### Gratis e-mailnieuwsbrieven

Wilt u op de hoogte blijven van de laatste ontwikkelingen op het gebied van normen, normalisatie en regelgeving? Neem dan een gratis abonnement op een van onze e-mailnieuwsbrieven. [www.nen.nl/nieuwsbrieven](http://www.nen.nl/nieuwsbrieven)

## Gegevens

Bedrijf / Instelling \_\_\_\_\_

T.a.v. \_\_\_\_\_ O M O V

E-mail \_\_\_\_\_

Klantnummer NEN \_\_\_\_\_

Uw ordernummer \_\_\_\_\_ BTW nummer \_\_\_\_\_

Postbus / Adres \_\_\_\_\_

Postcode \_\_\_\_\_ Plaats \_\_\_\_\_

Telefoon \_\_\_\_\_ Fax \_\_\_\_\_

**Factuuradres** (indien dit afwijkt van bovenstaand adres)

Postbus / Adres \_\_\_\_\_

Postcode \_\_\_\_\_ Plaats \_\_\_\_\_

Datum \_\_\_\_\_ Handtekening \_\_\_\_\_

### Retourneren

Fax: 015 2 690 271

E-mail: [klantenservice@nen.nl](mailto:klantenservice@nen.nl)

Post: NEN Standards Products & Services,

t.a.v. afdeling Klantenservice  
Antwoordnummer 10214,  
2600 WB Delft

(geen postzegel nodig).

### Voorwaarden

- De prijzen zijn geldig tot 31 december 2018, tenzij anders aangegeven.
- Alle prijzen zijn excl. btw, verzend- en handelingskosten en onder voorbehoud bij o.m. ISO- en IEC-normen.
- Bestelt u via de normshop een pdf, dan betaalt u geen handeling en verzendkosten.
- Meer informatie: telefoon 015 2 690 391, dagelijks van 8.30 tot 17.00 uur.
- Wijzigingen en typfouten in teksten en prijsinformatie voorbehouden.
- U kunt onze algemene voorwaarden terugvinden op: [www.nen.nl/leveringsvoorwaarden](http://www.nen.nl/leveringsvoorwaarden).