

Electronic Edition

This file is part of the electronic edition of *The Unicode Standard, Version 5.0*, provided for online access, content searching, and accessibility. It may not be printed. Bookmarks linking to specific chapters or sections of the whole Unicode Standard are available at

<http://www.unicode.org/versions/Unicode5.0.0/bookmarks.html>

Purchasing the Book

For convenient access to the full text of the standard as a useful reference book, we recommend purchasing the printed version. The book is available from the Unicode Consortium, the publisher, and booksellers. Purchase of the standard in book format contributes to the ongoing work of the Unicode Consortium. Details about the book publication and ordering information may be found at

<http://www.unicode.org/book/aboutbook.html>

Joining Unicode

You or your organization may benefit by joining the Unicode Consortium: for more information, see [Joining the Unicode Consortium](http://www.unicode.org/consortium/join.html) at

<http://www.unicode.org/consortium/join.html>

This PDF file is an excerpt from *The Unicode Standard, Version 5.0*, issued by the Unicode Consortium and published by Addison-Wesley. The material has been modified slightly for this electronic edition, however, the PDF files have not been modified to reflect the corrections found on the Updates and Errata page (<http://www.unicode.org/errata/>). For information on more recent versions of the standard, see <http://www.unicode.org/versions/enumeratedversions.html>.

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed with initial capital letters or in all capitals.

The Unicode® Consortium is a registered trademark, and Unicode™ is a trademark of Unicode, Inc. The Unicode logo is a trademark of Unicode, Inc., and may be registered in some jurisdictions.

The authors and publisher have taken care in the preparation of this book, but make no expressed or implied warranty of any kind and assume no responsibility for errors or omissions. No liability is assumed for incidental or consequential damages in connection with or arising out of the use of the information or programs contained herein.

The *Unicode Character Database* and other files are provided as-is by Unicode®, Inc. No claims are made as to fitness for any particular purpose. No warranties of any kind are expressed or implied. The recipient agrees to determine applicability of information provided. *Dai Kan-Wa Jiten*, used as the source of reference Kanji codes, was written by Tetsuji Morohashi and published by Taishukan Shoten.

Cover and CD-ROM label design: Steve Mehallo, www.mehallo.com

The publisher offers excellent discounts on this book when ordered in quantity for bulk purchases or special sales, which may include electronic versions and/or custom covers and content particular to your business, training goals, marketing focus, and branding interests. For more information, please contact U.S. Corporate and Government Sales, (800) 382-3419, corpsales@pearsoned.com. For sales outside the United States please contact International Sales, international@pearsoned.com

Visit us on the Web: www.awprofessional.com

Library of Congress Cataloging-in-Publication Data

The Unicode Standard / the Unicode Consortium ; edited by Julie D. Allen ... [et al.]. — Version 5.0.
p. cm.

Includes bibliographical references and index.

ISBN 0-321-48091-0 (hardcover : alk. paper)

1. Unicode (Computer character set) I. Allen, Julie D.

II. Unicode Consortium.

QA268.U545 2007

005.7'22—dc22

2006023526

Copyright © 1991–2007 Unicode, Inc.

All rights reserved. Printed in the United States of America. This publication is protected by copyright, and permission must be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permissions, write to Pearson Education, Inc., Rights and Contracts Department, 75 Arlington Street, Suite 300, Boston, MA 02116. Fax: (617) 848-7047

ISBN 0-321-48091-0

Text printed in the United States on recycled paper at Courier in Westford, Massachusetts.

First printing, October 2006

Acknowledgments

The production of *The Unicode Standard, Version 5.0*, is due to the dedication of many people over several years. We would like to acknowledge the following individuals, whose major contributions were central to the design, authorship, and review of this book.

Julie D. Allen was responsible for the editing of the book. As Senior Editor and Project Manager, she contributed to the rewriting of many of the script descriptions and managed the general project schedule for the completion of the book. Julie led the updating of the glossary and the coordination with the publisher, graphic artist, and other contributors.

Joe Becker created the original Unicode prospectus and continued as contributing editor for this version.

Richard Cook contributed to maintaining and updating the UniHan database and its documentation. He also served as a Unicode Consortium representative to the IRG.

Mark Davis was essential to the development of Version 5.0. Mark led many aspects of overall design of the Unicode Standard. He contributed significant revisions and enhancements to the statement of conformance, casing behavior, the stability of programmatic identifiers, text boundaries, bidirectional behavior, implementation guidelines, normalization, and the addition of properties to the Unicode Character Database. Mark is the author of three of the Unicode Standard Annexes, is a co-author of two others, and was a major contributor in defining Unicode security mechanisms.

Michael Everson was the driving force behind encoding many of the minority and historic scripts that were added in Version 5.0 and was a major contributor to their script descriptions. These scripts include Balinese, Coptic, Glagolitic, N’Ko, New Tai Lue, Old Persian, Phoenician, and Sumero-Akkadian Cuneiform. Michael provided many of the fonts used in this standard and extensively reviewed code charts, character names, and annotations.

Asmus Freytag made significant contributions to the general structure and property chapters, and continued his focus on symbols. He led the updates to punctuation, symbols, and special areas and format characters, and he also made contributions to European alphabetic scripts, bidirectional behavior, and line breaking properties. He designed a number of additional figures and suggested improvements to many others. Asmus drove the effort to define the Unicode character property model, was the author of two Unicode Standard Annexes, and is a co-author of one other. He was instrumental in incorporating the annexes into the book. He also created custom formatting software, negotiated font donations, and produced the code charts.

John H. Jenkins, as Unicode Consortium representative to the IRG, contributed to the maintenance and extension of the Unihan database, extended the Han radical-stroke index to the ideographic content of the standard, and prepared the radical-stroke index of the IICore Han subset. John was also responsible for maintaining the Han cross-reference tables and contributed fonts for KangXi and CJK radicals.

Mike Ksar, as Convener of JTC1/SC2/WG2 and SC2 liaison, led the effort to synchronize Version 5.0 and ISO/IEC 10646:2003 Amendments 1 and 2. He contributed to Middle Eastern scripts, *Appendix C*, and he thoroughly reviewed all of the newly added scripts and ensured they were well documented in both standards.

Rick McGowan coordinated the work to encode new scripts and contributed to the editing of many of the new script descriptions. He revised or drew more than 100 figures in the book and was responsible for mastering and producing the CD-ROM.

Lisa Moore, as Chair of the Unicode Technical Committee, oversaw the content of Version 5.0. She edited the Kharoshthi description, rewrote *Appendix D* and much of the front matter, and contributed to the general editing of the text.

Eric Muller thoroughly reviewed all chapters of the book, making many improvements in the clarity and consistency of the text. He contributed to the validation of Unihan data and provided critical PDF expertise.

Markus Scherer thoroughly reviewed the general structure and conformance chapters of Unicode Version 5.0, contributed significant updates to the implementation guidelines found in the standard, and provided a painstakingly thorough verification of properties.

Michel Suignard was a leader in the synchronization of Unicode and ISO/IEC 10646 through his role as Project Editor for 10646. He was responsible for editing ISO/IEC 10646:2003, Amendments 1 and 2, and thus provided the foundation for the seamless coordination with the publication of Unicode Versions 4.1 and 5.0. Michel added IRG sources to Unihan and was a major contributor in defining Unicode security mechanisms.

Ken Whistler was the managing editor of Version 5.0. He led the effort to redesign the book to a smaller size while including expanded script descriptions and all of the Unicode Standard Annexes. He had responsibility for all aspects of production and verified the accuracy and quality of all updates to the text. Ken meticulously updated the Unicode Character Database, adding all of the new characters and some of their properties. He also maintained the Character Names List and supplied many of the annotations. Ken led the rewriting of the parts of the general structure and conformance chapters related to combining classes and the application of combining marks, as well as the renumbering of conformance clauses and definitions.

Fonts were essential for the production of this book. Asmus Freytag worked to acquire and organize the font collection with support from Michael Everson, further developing the original collection of fonts for Unicode 2.0 assembled by John Jenkins. In addition to the individuals mentioned previously, and the companies and organizations named in the col-

ophon, fonts were contributed by Patrick Andries (Tifinagh), Cora Chang (Braille), Oliver Corff (Yi), Anton Dumbadze and Irakli Garibashvili (Georgian), Andrew Glass (Kharoshthi), Yannis Haralambous (Greek, Syriac, and Thai), George Kiraz (Syriac), Svante Lagman (Runic), Raymond Mercier (Greek zero), Stephen Morey and Michael Everson (Tai Le), Paul Nelson and Sarmad Hussain (Syriac and Sindhi/Urdu numbers), David Perry and James Kass (Greek musical symbols), Peter Martin (Phonetic Additions), Hector Santos (Philippine scripts), Yayasan Bali Simbar (Balinese), Ngakham Southichack (Lao), Michael Stone (Armenian), Steve Tinney and Michael Everson (Cuneiform), Dirk VanDamme (Coptic), Al Webster (Cherokee), Andrew West (Phags-pa), and K. Yarang, J. R. Pandhak, Y. Lawoti, and Y. P. Yakwa (Limbu).

Michael Everson (Everttype) provided fonts for Canadian Syllabics, Osmanya, many historic scripts (including Kharoshthi, Linear B, Ogham, and Old Persian), symbols, and Latin, Greek, and Cyrillic characters. John M. Fiscella (Production First Software) designed fonts for symbols and many of the alphabetic scripts. Yang Song Jin of the Pyongyang Informatics Centre (DPR of Korea) provided the CJK compatibility symbols. Thomas Milo (DecoType) designed the Arabic font. SIL contributed several fonts designed by Jonathan Kew (Arabic Additions), Peter Martin (Phonetic Additions), as well as Victor Gaultney (New Tai Lue). The fonts for CJK Extensions A and B were provided by Beijing Zhong Yi (Zheng Code) Electronics Company. Extension A was designed by Technical Supervisor Zheng Long and Hua Weicang. Asmus Freytag created many individual glyphs for symbols or special characters.

Critical comments and work on fonts are due to Heidi Jenkins, Dr. Virach Sornlertlamvanich (Thai), Dr. Sarmad Hussain (Urdu), Roozbeh Pournader (Farsi), Barbara Beeton and Patrick Ion (Mathematical Symbols), and many others. Many individuals and organizations provided additional fonts used during the development of Version 5.0.

New figures enhanced the text significantly. Grenfel (1921), Austin (1973), and Allen (1931) were used as sources to draw the large figure for Greek editorial marks. Parisian Schola Cantorum and Hymns of Faith were the sources used for Arabic musical passages. The Kharoshthi map in *Figure 10-5* was adapted from Glass (2000).

Steve Mehallo designed the cover for the book. He also updated existing chapter divider artwork and designed additional new artwork for Version 5.0. Kamal Mansour was instrumental in the graphic design process and continued his longstanding support in coordinating the cover design of this book. Monotype Imaging generously sponsored the cost of the cover design, the CD-ROM design, and updates to the chapter divider artwork for Version 5.0.

The development of this book would not have been possible without the support of the office staff of Unicode, Inc., and the work of Mike Kernaghan, as operational manager of the Unicode office. We thank Magda Danish, who helped with Version 5.0 in countless ways, including assistance in editing of the Unicode Standard Annexes, painstaking proofing of Pinyin data for the Unihan database, and additions and corrections for the technical references. We also thank Sarasvati, who minded the mailing lists. We especially wish to thank Microsoft for its generous support in providing office space.

The text, code charts, and data were reviewed critically by experts. The Editorial Committee appreciates the expert contributions and feedback provided for specific scripts: Barbara Beeton (mathematical symbols), Peter Constable (New Tai Lue and phonetic extensions), Roozbeh Pournader (Arabic), Lorna Priest (Cyrillic), Andrew West (Phags-pa, Mongolian and Yi), and the members of the International Forum for Information Technology in Tamil, INFITT (Tamil), in addition to Kent Karlsson and many others. Thomas Bishop checked the data for CJK ideographs and contributed stroke data for sorting the radical-stroke index. We also wish to acknowledge the inestimable contribution by Patrick Andries for the French translation of the character chart annotations for Unicode 4.1, along with help from François Yergeau, Alain LaBonté, Jacques André, and other reviewers.

A number of individuals contributed to the better representation of Indic scripts in Version 5.0: Stefan Baums (Devanagari), Gihan Dias (Sinhala), Naga Ganesan (Malayalam), Manoj Jain (improvement of the overall Indic text), Gautam Sengupta (Bengali), Sukhjinder Sidhu (Gurmukhi), K. G. Sulochana (Malayalam), and Om Vikas (improvement of the overall Indic text). New characters were added, script descriptions were improved, many annotations were added, and a systematization of the approach to encoding was established.

The work to develop and verify the consistency of many of the character properties and algorithms was a significant contribution to Version 5.0. An important role in this effort was played by the International Components for Unicode (ICU) team, including the following individuals: Min Cui, Mark Davis, John Emmons, Doug Felt, Deborah Goldsmith, Andy Heninger, Qian Jing, Yan Xuan Liang, Alan Liu, Steven Loomis, Eric Mader, George Rhoten, Markus Scherer, Bei Shu, William Sullivan, Raghuram Viswanadha, and Vladimir Weinstein. In addition, Kent Karlsson carefully reviewed properties.

The growth of the synchronized character repertoires of the Unicode Standard and International Standard ISO/IEC 10646 reflects a worldwide effort conducted over a number of years. For Version 5.0, a number of universities and research institutes contributed many excellent proposals for the encoding of minority and historic scripts. The Script Encoding Initiative, University of California at Berkeley, led by Deborah Anderson with the assistance of Rick McGowan, secured funding and created proposals for many historic and minority scripts. Major funders of this effort include the National Endowment for the Humanities, the N’Ko Institute of America and Mamady Doumbouya, the Society of Biblical Literature, Association Manden, and UNESCO (Communication & Information Sector, Initiative B@bel). Other universities and research institutes to which the Unicode Consortium is much indebted include Thesaurus Linguae Graecae Project, University of California, Irvine, the Initiative for Cuneiform Encoding (ICE), Johns Hopkins University, and the International Association for Coptic Studies.

With Version 5.0, the Unicode Standard encodes all of the major modern scripts and a significant number of historic and minority scripts. We express deep appreciation to the following experts who shared their specialized knowledge to bring about this achievement:

- For Arabic additions: Jonathan Kew, Michael Everson, and Roozbeh Pournader.
- For Balinese: Michael Everson, Made Suatjana, also thanks are due to Ida Bagus Adi Sudewa, I Nyoman Suarka, Donny Harimurti, Tudy Harimurti, and Nyoman Sugiarta. Unicode gratefully acknowledges support from UNESCO, the National Endowment for the Humanities, and the Yayasan Bali Galang (Bright Bali Foundation), which organized the technical discussion sessions in Bali.
- For Buginese: Michael Everson.
- For CJK ideographs, symbol, and mark additions: China National Information Technology Standardization Technical Committee, Christopher Cullen, Deborah Goldsmith, John Jenkins, Eric Muller, Michel Suignard, and Andrew West.
- For Coptic: Michael Everson, Gerald Browne, Stephen Emmel, and the International Association for Coptic Studies.
- For Cyrillic additions: Lorna Priest.
- For Ethiopic additions: Daniel Jacob.
- For Georgian additions: Michael Everson, Georgian State Department of Information Technology, David Tarkhan-Mouravi (Chair), and Jost Gippert.
- For Glagolitic: Michael Everson and Ralph Cleminson.
- For Greek: Maria Pantelia, Deborah Anderson, Nick Nicholas, and Richard Peever.
- For Hebrew additions: Peter Constable, Michael Everson, Peter Kirk, and Mark Shoulson.
- For Indic additions: Government of India, Ministry of Information Technology, Om Vikas and Manoj Jain, INFITT, Michael Kaplan, and Peter Constable.
- For Kannada and Devanagari additions: Michael Everson.
- For Kharoshthi: Andrew Glass, Stefan Baums, and Richard Salomon.
- For Latin additions: Peter Constable, Mark Davis, Michael Everson, Chris Harvey, Jonathan Kew, and Lorna Priest.
- For Mongolian: Andrew West.
- For New Tai Lue: China National Information Technology Standardization Technical Committee and Michael Everson.
- For N’Ko: Michael Everson, Mamadi Doumbouya, Mamadi Baba Diané, and Karamo Kaba Jammeh. Unicode gratefully acknowledges support from UNESCO Initiative B@bel, N’Ko Institute of America and Mamady Doumbouya, and Association Manden.
- For Old Persian: Michael Everson.

- For Phags-pa: China National Information Technology Standardization Technical Committee, Mongolian Agency for Standardization and Metrology, Andrew West, and Chris Fynn.
- For Phoenician: Michael Everson.
- For phonetic extensions: Peter Constable, Mark Davis, Michael Everson, and Lorna Priest.
- For Sumero-Akkadian Cuneiform: Michael Everson, Karljürgen Feuerherm, Steve Tinney, Madeleine Fitzgerald, and Cale Johnson. This script addition was aided in part by funds made available to participants by Johns Hopkins University through the Initiative for Cuneiform Encoding, by the National Science Foundation through the Digital Hammurabi Project, by the Society of Biblical Literature, and by the Script Encoding Initiative, University of California Berkeley. Special thanks are due to Dean Snyder and Jerrold S. Cooper of Johns Hopkins University for their leading roles in organizing and hosting two ICE conferences that were crucial to progress on the encoding.
- For Syloti Nagri: Peter Constable, James Lloyd-Williams and Sue Lloyd-Williams, Shamsul Islam Chowdhury, Asaddar Ali, Mohammed Sadique, and Matiar Rahman.
- For symbol additions: Asmus Freytag, Barbara Beeton, Michael Everson, Murray Sargent, and Andreas Stötzner.
- For Tifinagh: Patrick Andries, François Yergeau, and Alain LaBonté.
- For Unihan: Dr. George Bell, Joy Zhao Rouxer, and Steve Mann for donation to the Unihan Database of the complete electronic data from their book *Quick and Easy Index of Chinese Characters* (formerly *Alphanumeric Identification of Chinese Characters*), and many contributions by Ken Lunde.

The technical content of the Unicode Standard is determined by the Unicode Technical Committee (UTC), which was chaired during the development of Version 5.0 by Lisa Moore, was vice-chaired by Cathy Wissink and Eric Muller, and had Rick McGowan as recording secretary. Contributors to the work of the UTC include representatives of Full, Institutional, Supporting, and Associate Members, Individual Members, and Unicode Officers, as well as invited experts and liaisons. Version 5.0 would not have been possible without the creative work and critical thinking over the past three years by all member representatives: Mujahid Agha (Pakistan, NLA), Joan Aliprand (formerly of RLG), Deborah Anderson (UC Berkeley, Department of Linguistics), Rick Andrews (VeriSign), Takeshi Asano (Sun), Andreas Bäß (Denic), Christopher Chapman (Monotype Imaging), Daniel Chen (IBM), Steve Cohen (Basis), Peter Constable (Microsoft), Richard Cook (UC Berkeley, Department of Linguistics), Mark Davis (Google, formerly of IBM), Sabine Dolderer (Denic), Attash Durrani (Pakistan, NLA), Peter Edberg (Apple), Asmus Freytag (for Basis Technology), Deborah Goldsmith (Apple), Geoffry Greve (Monotype Imaging), Hideki Hiura (Justsystem, formerly of Sun), Takahiro Imai (formerly of Peoplesoft), Manoj Kumar Jain (India, MIT), John Jenkins (Apple), Bob Jung (Google), Susan Kline (HP), Tatsuo

Kobayashi (Justsystem), Gary Krall (VeriSign), Hirobumi Kurosu (formerly of PeopleSoft), Swaran Lata (India, MIT), Ken Lunde (Adobe), Ian Macleod (Sybase), Kamal Mansour (Monotype Imaging), Benson Margulies (Basis), Shinobu Matsuzuka (Sun), Matthias Mittelstein (SAP), Lisa Moore (IBM), Nobuyoshi Mori (SAP), Eric Muller (Adobe), Mihai Nita (Adobe), Sandra Martin O'Donnell (formerly of Compaq, HP), Dave Opstad (Monotype Imaging), Pierre Ouédraogo (Agence Intergouvernementale de la Francophonie), Shripad Patki (Sun), Addison Phillips (Yahoo!), Toby Phipps (formerly of Peoplesoft), Gabriel Plumlee (formerly of Peoplesoft), Erik van der Poel (Google), Wendy Rannenberg (Compaq, then HP), Mike Van Riper (VeriSign), Lynn Ruggles (HP), Marcos Sanz (Denic), Murray Sargent (Microsoft), Bernhard Schilling (SAP), Karen Smith-Yoshimura (RLG), Michel Suignard (Microsoft), Ienup Sung (Sun), Tex Texin (Yahoo!), V. S. Umamaheswaran (IBM), Om Vikas (India, MIT), Ken Whistler (Sybase), Cathy Wissink (Microsoft), Jianping Yang (Oracle), Michael Yau (Oracle), and Weiran Zhang (Oracle).

Other members and experts who have contributed to the work of the Unicode Technical Committee include Mati Allouche, Harald Alvestrand, Barbara Beeton, Peter Constable, James Do, Martin Dürst, Behdad Esfahbod, Patrik Fältström, John M. Fiscella, Paul Hoffman, Michael Kaplan, Jonathan Kew, Kamal Mansour, Thomas Milo, Paul Nelson, Nick Nicholas, Roozbeh Pournader, Jonathan Rosenne, and Zhang Zhoucai.

The Unicode Technical Committee has worked closely with Technical Committee L2 of the International Committee for Information Technology Standards (INCITS). We appreciate the cooperation of Chairs Cathy Wissink and Eric Muller, and Vice-Chair Lisa Moore. Rick McGowan efficiently maintained the Web-based archive of L2 documents so crucial to the development of Version 5.0.

The Unicode Consortium continues to maintain mutually beneficial relationships with international standards organizations. We appreciate the efforts and support of the members of ISO/IEC JTC1/SC2/WG2 and the members of the Ideographic Rapporteur Group toward the common goal of keeping both standards synchronized. We would particularly like to thank the Convener of WG2, Mike Ksar; the Rapporteur of the IRG, Dr. Lu Qin, and its former Rapporteur, Zhang Zhoucai; and the Editors and Contributing Editors of WG2, Michel Suignard, Asmus Freytag, Michael Everson, and Ken Whistler. We also thank Asmus Freytag for his effective representation of the Unicode Consortium at WG2 meetings. We would like to thank the collation ad hoc members of ISO/IEC JTC1/SC2, especially Alain LaBonté and Ken Whistler, for their work with the Consortium on a common collation definition.

During the development of Version 5.0, we benefited greatly from close collaboration with the Internationalization Working Group of the W3C. We appreciate its many contributions and especially wish to thank Martin Dürst, Richard Ishida, Addison Phillips, Felix Sasaki, Tex Texin, Misha Wolf, and François Yergeau for timely and thorough review of and improvements to new proposals.

The IETF has contributed greatly to the adoption of Unicode in worldwide Internet applications. We appreciate its efforts and effective collaboration with the Consortium, and we

would particularly like to thank Harald Alvestrand, Patrik Fältström, and Paul Hoffman for their efforts to help us improve the stability of the standard.

The support of member companies has been crucial to *The Unicode Standard, Version 5.0*. Adobe Systems, Inc., generously supplied the license for the Minion fonts, Adobe® Frame-maker® 7.2, and Adobe® Creative Suite 2 Premium, which were used to create the text and graphics of this book. In addition, particular thanks for facilities, equipment, and resources are owed to Apple Computer, Inc., Microsoft Corporation, and Monotype Imaging. PdfLib GmbH donated PDFlib+PDI 6.0.3 for Microsoft Windows and PDFlib TET (Text Extraction Toolkit) 2.1.0 for Microsoft Windows, plus custom-built software for post-production processing of PDFs for the code charts and the Unicode Standard Annexes.

The Unicode Standard, Version 5.0, would not have been possible without those who made important contributions to earlier versions: Glenn Adams, Joan Aliprand, Avery Bishop, Lori Brownell, Lee Collins, Andy Daniels, Burwell Davis, Bill English, Edwin Hart, Masami Hasegawa, Lloyd Honomichl, Liao Huan-Mei, Eric Mader, Dave Opstad, Hugh McGregor Ross, Isai Scheinberg, Ed Smura, Alan Tucker, Bill Tuthill, and J. G. Van Stee.

While we gratefully acknowledge the contributions of all persons named in this section, any errors or omissions in this work are the responsibility of the Unicode Consortium.

Unicode Consortium Members

While Version 5.0 of the Unicode Standard was under development, the following companies and governments were members of Unicode. Some members changed their level of membership during this time period and are listed twice.

Full Members

Adobe Systems, Inc.	Microsoft Corporation
Agence Intergouvernementale de la Francophonie	Monotype Imaging
Apple Computer, Inc.	Oracle Corporation
Basis Technology Corporation	Pakistan, National Language Authority
Denic e.G.	Peoplesoft
Google, Inc.	RLG
Hewlett-Packard Company	SAP AG
IBM Corporation	Sun Microsystems, Inc.
India, Ministry of Information Technology	Sybase, Inc.
Justsystem Corporation	VeriSign, Inc.
	Yahoo! Inc.

Institutional Members

India, Ministry of Information Technology	The University of California at Berkeley
Pakistan, National Language Authority	

Current Supporting Members

Basis Technology Corporation	Monotype Imaging
------------------------------	------------------

Current Associate Members

Adams Globalization	LIB-IT GmbH Bibliotheks EDV-Systeme
AOL	The Library Corporation
Beijing Founder Electronic Company	Linotype Library GmbH
Beijing Zhong Yi Electronics Co.	NCR Corporation
Bibliothèque universitaire des langues et civilisations	Nokia
Booz, Allen & Hamilton, Inc.	OCLC, Inc.
The Church of Jesus Christ of Latter-day Saints	The Perl Foundation
Columbia University	RLG
DecoType, Inc.	SAS Institute, Inc.
Edgenet, Inc.	SIL International
Endeavor Information Systems, Inc.	SIRSI Corporation
Evertype	Sony Ericsson
Ex Libris Ltd.	Symbian, Ltd.
Google, Inc.	Talis Information, Ltd.
The Government of Tamil Nadu and Tamil Virtual University, India	United Bible Societies
Innovative Interfaces, Inc.	Utilika Foundation
Language Analysis Systems, Inc.	VeriSign, Inc.
	Vernacular Information Society Project
	VTLS, Inc.

Current Individual Members

James Agenbroad, Matthew Y. Ahn, Harald Alvestrand, Lloyd Anderson, Patrick Andries, Scott Atwood, Charles W. Bishop, Philip Blair, Bert Blodau, Anthony Bova, Kevin Brown, Pierre Cadieux, John Cain, Christian Carey, Marco Cimarosti, John Clay, John Cowan, Mark Crispin, Paul Deuter, Martin Dürst, Patrick Durusau, David W. Edwards, Yutaka Emura, Doug Ewell, James M. Farrow, John Fay, Allen Fisher, Naga Ganesan, Richard A. Gard, Debbie Garside, Thomas Gewecke, Daniel Goldschmidt, Adam Goode, Jennifer Goodman, Kenneth Gorman, Tim Greenwood, William Hall, Martin Heijdra, Andrew Hodgson, Paul Hoffman, Robert Hoshide, John Hudson, Charles Husbands, Laurențiu Iancu, Anne Ingram, Reto Jeger, Michael Johnson, Simon Josefsson, Bohdan Kantor, Kent Karlsson, Cary Karp, James Kass, Wolfgang Keber, Brendan Kehoe, Daphne Khoury, Erkki I. Kolehmainen, Alain LaBonté, Julie Maitra, Yuko Miyata, Ben Monroe, Tag Young Moon, K. S. Nagarajan, Htoo Myint Naung, Andrew Neilson, Sandra O'Donnell, Karl Pentzlin, Åke Persson, Ghulam Quader, Omar Rabbolini, Jason Reed, Arthur Reutenauer, Charles Riley, Richard Rosenbaum, Jonathan Rosenne, Christopher Scholten, Ron Schwartz, Sukhjinder Sidhu, Javier Sola, Andreas Stötzner, Ferdinand Susi, Paul Timperman, Benjamin Titze, Herbert E. Unger, Jr., Andrew West, Grace Wiersma, Mark Wilson, Arnold Winkler, Joan M. Winters, Richard Wordingham, Daniel Yacob, François Yergeau, Foster Zhang.

Unicode Consortium Liaison Members

Center of Computer and Information Development (CCID), Beijing
CEN/ISSS Cultural Diversity Focus Group (CDFG)
Free Standards Group Open Internationalization Initiative (OpenI18n.org)
High Council of Informatics (HCI), Iran
Information and Communication Technology Agency of Sri Lanka (ICTA)
Institute for the Languages and Cultures of Asia and Africa (ILCAA)
International Forum for Information Technology in Tamil (INFITT)
International Telecommunication Union (ITU)
Internet Engineering Task Force (IETF)
ISO/IEC JTC1/SC2 and its working group WG2
ISO/TC 37/SC 2 Terminography and Lexicography
Linguistic Society of America (LSA)
National Endowment for the Humanities (NEH)
National Information Standards Organization (NISO)
NSAI/ICTSCC/SC4: Subcommittee for Irish standardization in the field of Codes, Character Sets, and Internationalization
Object Management Group (OMG)
Research Institute for the Languages of Finland (RILF)
Special Libraries Association (SLA)
Standard Norge
Swedish Standards Institute (SIS/TK 445)
Technical Committee on Information Technology (TCVN/TC1), Hanoi, Viet Nam
United Nations Group of Experts on Geographical Names (UNGEGN)
World Wide Web Consortium (W3C) I18N Core Working Group

Unicode Consortium Board of Directors

Current Members of the Board of Directors

Harald Tveit Alvestrand (Cisco Systems)
Lori Brownell (Microsoft Corporation)
Carl Hoffman (Basis Technology)
Tatsuo L. Kobayashi (Justsystem Corporation)
Marypat Meuli (Microsoft Corporation)
David R. Richards (RLG)
William J. Sullivan (IBM Corporation)
Celia Vigil (Apple Computer, Inc.)

Former Members of the Board of Directors

Jerry Barber (Aldus Corporation)
Wayne R. Boyle (NCR Corporation)
Janet Buschert (Hewlett-Packard Company)
Brian E. Carpenter (IBM Corporation & Internet Architecture Board)
Robert M. Carr (Go Corporation)
Kevin Cavanaugh (Lotus Development Corporation)
John Gage (Sun Microsystems, Inc.)
Paul Hegarty (NeXT Software, Inc.)
Gary C. Hendrix (Symantec Corporation)
Richard J. Holleman (IBM Corporation)
Charles Irby (Metaphor, Inc.)
Jay E. Israel (Novell, Inc.)
Mike Ksar (Microsoft Corporation)
Ilene H. Lang (Digital Equipment Corporation)
Paul Maritz (Microsoft Corporation)
Susan Pond Mills (IBM Corporation)
Elizabeth G. Nichols (IBM Corporation)
Stephen P. Oksala (Unisys Corporation)
Mike Potel (Taligent, Inc.)
Chris Pratley (Microsoft Corporation)
Wendy Rannenber (Compaq Computer Corporation)
Franz G. Rau (Microsoft Corporation)
Bertrand Serlet (Apple Computer, Inc.)
Rick Spitz (Apple Computer, Inc.)
Lawrence Tesler (Apple Computer, Inc.)
Guy “Bud” Tribble (NeXT Software, Inc.)
Kazuya Watanabe (Novell KK)
Gayn B. Winters (Digital Equipment Corporation)