

The Unicode Standard

Version 8.0 – Core Specification

To learn about the latest version of the Unicode Standard, see <http://www.unicode.org/versions/latest/>.

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.

Unicode and the Unicode Logo are registered trademarks of Unicode, Inc., in the United States and other countries.

The authors and publisher have taken care in the preparation of this specification, 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.

Copyright © 1991–2015 Unicode, Inc.

All rights reserved. This publication is protected by copyright, and permission must be obtained from the publisher prior to any prohibited reproduction. For information regarding permissions, inquire at <http://www.unicode.org/reporting.html>. For information about the Unicode terms of use, please see <http://www.unicode.org/copyright.html>.

The Unicode Standard / the Unicode Consortium ; edited by Julie D. Allen ... [et al.]. — Version 8.0

Includes bibliographical references and index.

ISBN 978-1-936213-10-8 (<http://www.unicode.org/versions/Unicode8.0.0/>)

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

QA268.U545 2015

ISBN 978-1-936213-10-8

Published in Mountain View, CA

August 2015

Contents

Figures	xxi
Tables	xxv
Preface	xxxi
Why Unicode?	xxxii
What's New?	xxxii
Organization of This Standard	xxxiii
Unicode Standard Annexes	xxxiii
The Unicode Character Database	xxxv
Unicode Code Charts	xxxv
Unicode Technical Standards and Unicode Technical Reports	xxxv
Updates and Errata	xxxvi
Acknowledgements	xxxvi
1 Introduction	1
1.1 Coverage	3
Standards Coverage	3
New Characters	3
1.2 Design Goals	4
1.3 Text Handling	6
Characters and Glyphs	6
Text Elements	6
2 General Structure	9
2.1 Architectural Context	10
Basic Text Processes	10
Text Elements, Characters, and Text Processes	10
Text Processes and Encoding	11
2.2 Unicode Design Principles	14
Universality	14
Efficiency	15
Characters, Not Glyphs	15
Semantics	18
Plain Text	18
Logical Order	19
Unification	21
Dynamic Composition	22
Stability	23
Convertibility	23

2.3	Compatibility Characters	25
	Compatibility Variants	26
	Compatibility Decomposable Characters	26
2.4	Code Points and Characters	29
	Types of Code Points	30
2.5	Encoding Forms	33
	UTF-32	35
	UTF-16	36
	UTF-8	36
	Comparison of the Advantages of UTF-32, UTF-16, and UTF-8	38
2.6	Encoding Schemes	40
2.7	Unicode Strings	43
2.8	Unicode Allocation	44
	Planes	44
	Allocation Areas and Character Blocks	45
	Assignment of Code Points	46
2.9	Details of Allocation	48
	Plane 0 (BMP)	49
	Plane 1 (SMP)	51
	Plane 2 (SIP)	52
	Other Planes	52
2.10	Writing Direction	53
2.11	Combining Characters	55
	Sequence of Base Characters and Diacritics	56
	Multiple Combining Characters	57
	Ligated Multiple Base Characters	59
	Exhibiting Nonspacing Marks in Isolation	60
	“Characters” and Grapheme Clusters	60
2.12	Equivalent Sequences	62
	Normalization	62
	Decompositions	63
	Non-decomposition of Certain Diacritics	65
2.13	Special Characters	67
	Special Noncharacter Code Points	67
	Byte Order Mark (BOM)	67
	Layout and Format Control Characters	68
	The Replacement Character	68
	Control Codes	68
2.14	Conforming to the Unicode Standard	69
	Characteristics of Conformant Implementations	69
	Unacceptable Behavior	70
	Acceptable Behavior	70
	Supported Subsets	71

3	Conformance	73
3.1	Versions of the Unicode Standard	74
	Stability	74
	Version Numbering	75
	Errata and Corrigenda	76
	References to the Unicode Standard	76
	Precision in Version Citation	77
	References to Unicode Character Properties	77
	References to Unicode Algorithms	78
3.2	Conformance Requirements	79
	Code Points Unassigned to Abstract Characters	79
	Interpretation	80
	Modification	81
	Character Encoding Forms	82
	Character Encoding Schemes	83
	Bidirectional Text	84
	Normalization Forms	84
	Normative References	84
	Unicode Algorithms	84
	Default Casing Algorithms	85
	Unicode Standard Annexes	85
3.3	Semantics	87
	Definitions	87
	Character Identity and Semantics	87
3.4	Characters and Encoding	90
3.5	Properties	94
	Types of Properties	94
	Property Values	95
	Default Property Values	96
	Classification of Properties by Their Values	97
	Property Status	98
	Context Dependence	101
	Stability of Properties	101
	Simple and Derived Properties	103
	Property Aliases	103
	Private Use	104
3.6	Combination	105
	Combining Character Sequences	105
	Grapheme Clusters	107
	Application of Combining Marks	109
3.7	Decomposition	115
	Compatibility Decomposition	115
	Canonical Decomposition	116

3.8	Surrogates	118
3.9	Unicode Encoding Forms	119
	UTF-32	123
	UTF-16	124
	UTF-8	124
	Encoding Form Conversion	126
	Constraints on Conversion Processes	126
3.10	Unicode Encoding Schemes	130
3.11	Normalization Forms	134
	Normalization Stability	134
	Combining Classes	135
	Specification of Unicode Normalization Forms	136
	Starters	136
	Canonical Ordering Algorithm	137
	Canonical Composition Algorithm	138
	Definition of Normalization Forms	140
3.12	Conjoining Jamo Behavior	142
	Definitions	142
	Hangul Syllable Decomposition	144
	Hangul Syllable Composition	146
	Hangul Syllable Name Generation	147
	Sample Code for Hangul Algorithms	148
3.13	Default Case Algorithms	152
	Definitions	152
	Default Case Conversion	154
	Default Case Folding	155
	Default Case Detection	156
	Default Caseless Matching	157
4	Character Properties	159
4.1	Unicode Character Database	161
4.2	Case	164
	Definitions of Case and Casing	164
	Case Mapping	166
4.3	Combining Classes	168
	Reordrant, Split, and Subjoined Combining Marks	168
4.4	Directionality	173
4.5	General Category	174
4.6	Numeric Value	177
	Ideographic Numeric Values	178
4.7	Bidi Mirrored	180

4.8	Name	182
	Unicode Name Property	185
	Code Point Labels	186
	Use of Character Names in APIs and User Interfaces	187
4.9	Unicode 1.0 Names	188
4.10	Letters, Alphabetic, and Ideographic	189
4.11	Properties Related to Text Boundaries	190
4.12	Characters with Unusual Properties	191
5	Implementation Guidelines	195
5.1	Data Structures for Character Conversion	196
	Issues	196
	Multistage Tables	196
5.2	Programming Languages and Data Types	199
	Unicode Data Types for C	199
5.3	Unknown and Missing Characters	201
5.4	Handling Surrogate Pairs in UTF-16	203
5.5	Handling Numbers	205
5.6	Normalization	206
5.7	Compression	208
5.8	Newline Guidelines	209
	Definitions	209
	Line Separator and Paragraph Separator	210
	Recommendations	211
5.9	Regular Expressions	214
5.10	Language Information in Plain Text	215
	Requirements for Language Tagging	215
	Language Tags and Han Unification	215
5.11	Editing and Selection	217
	Consistent Text Elements	217
5.12	Strategies for Handling Nonspacing Marks	219
	Keyboard Input	220
	Truncation	220
5.13	Rendering Nonspacing Marks	222
	Canonical Equivalence	225
	Positioning Methods	226
5.14	Locating Text Element Boundaries	228
5.15	Identifiers	229
5.16	Sorting and Searching	230
	Culturally Expected Sorting and Searching	230
	Language-Insensitive Sorting	230

	Searching	231
	Sublinear Searching	231
5.17	Binary Order	233
	UTF-8 in UTF-16 Order	233
	UTF-16 in UTF-8 Order	234
5.18	Case Mappings	236
	Titlecasing	236
	Complications for Case Mapping	237
	Reversibility	239
	Caseless Matching	240
	Normalization and Casing	242
5.19	Mapping Compatibility Variants	244
5.20	Unicode Security	246
5.21	Ignoring Characters in Processing	249
	Characters Ignored in Text Segmentation	249
	Characters Ignored in Line Breaking	250
	Characters Ignored in Cursive Joining	250
	Characters Ignored in Identifiers	250
	Characters Ignored in Searching and Sorting	251
	Characters Ignored for Display	251
5.22	Best Practice for U+FFFD Substitution	255
6	Writing Systems and Punctuation	257
6.1	Writing Systems	258
6.2	General Punctuation	263
	Blocks Devoted to Punctuation	264
	Format Control Characters	265
	Space Characters	266
	Dashes and Hyphens	267
	Paired Punctuation	269
	Language-Based Usage of Quotation Marks	270
	Apostrophes	274
	Other Punctuation	274
	Archaic Punctuation and Editorial Marks	279
	Indic Punctuation	282
	CJK Punctuation	284
	Unknown or Unavailable Ideographs	285
	CJK Compatibility Forms	286
7	Europe-I	289
	Modern and Liturgical Scripts	
7.1	Latin	291
	Letters of Basic Latin: U+0041–U+007A	295
	Letters of the Latin-1 Supplement: U+00C0–U+00FF	295
	Latin Extended-A: U+0100–U+017F	295

	Latin Extended-B: U+0180–U+024F	296
	IPA Extensions: U+0250–U+02AF	298
	Phonetic Extensions: U+1D00–U+1DBF	300
	Latin Extended Additional: U+1E00–U+1EFF	301
	Latin Extended-C: U+2C60–U+2C7F	301
	Latin Extended-D: U+A720–U+A7FF	302
	Latin Extended-E: U+AB30–U+AB6F	303
	Latin Ligatures: U+FB00–U+FB06	303
7.2	Greek	304
	Greek: U+0370–U+03FF	304
	Greek Extended: U+1F00–U+1FFF	308
	Ancient Greek Numbers: U+10140–U+1018F	309
7.3	Coptic	311
7.4	Cyrillic	314
	Cyrillic: U+0400–U+04FF	314
	Cyrillic Supplement: U+0500–U+052F	315
	Cyrillic Extended-A: U+2DE0–U+2DFF	315
	Cyrillic Extended-B: U+A640–U+A69F	316
7.5	Glagolitic	318
7.6	Armenian	319
7.7	Georgian	321
7.8	Modifier Letters	323
	Spacing Modifier Letters: U+02B0–U+02FF	324
	Modifier Tone Letters: U+A700–U+A71F	326
7.9	Combining Marks	327
	Combining Diacritical Marks: U+0300–U+036F	332
	Combining Diacritical Marks Extended: U+1AB0–U+1AFF	333
	Combining Diacritical Marks Supplement: U+1DC0–U+1DFF	333
	Combining Marks for Symbols: U+20D0–U+20FF	334
	Combining Half Marks: U+FE20–U+FE2F	335
	Combining Marks in Other Blocks	335
8	Europe-II	337
	Ancient and Other Scripts	
8.1	Linear A	339
8.2	Linear B	340
	Linear B Syllabary: U+10000–U+1007F	340
	Linear B Ideograms: U+10080–U+100FF	340
	Aegean Numbers: U+10100–U+1013F	340
8.3	Cypriot Syllabary	342

8.4	Ancient Anatolian Alphabets	343
	Lycian: U+10280–U+1029F	343
	Carian: U+102A0–U+102DF	343
	Lydian: U+10920–U+1093F	343
8.5	Old Italic	345
8.6	Runic	348
8.7	Old Hungarian	351
8.8	Gothic	352
8.9	Elbasan	353
8.10	Caucasian Albanian	354
8.11	Old Permic	355
8.12	Ogham	356
8.13	Shavian	357
9	Middle East-I	359
	Modern and Liturgical Scripts	
9.1	Hebrew	361
	Hebrew: U+0590–U+05FF	361
	Alphabetic Presentation Forms: U+FB1D–U+FB4F	365
9.2	Arabic	367
	Arabic: U+0600–U+06FF	367
	Arabic Cursive Joining	374
	Arabic Ligatures	377
	Arabic Joining Groups	379
	Arabic Supplement: U+0750–U+077F	386
	Arabic Extended-A: U+08A0–U+08FF	386
	Arabic Presentation Forms-A: U+FB50–U+FDFF	386
	Arabic Presentation Forms-B: U+FE70–U+FEFF	388
9.3	Syriac	389
	Syriac: U+0700–U+074F	389
	Syriac Shaping	393
9.4	Samaritan	398
9.5	Mandaic	400
10	Middle East-II	403
	Ancient Scripts	
10.1	Old North Arabian	405
10.2	Old South Arabian	406
10.3	Phoenician	408
10.4	Imperial Aramaic	410
10.5	Manichaean	412

10.6 Pahlavi and Parthian	416
Inscriptional Parthian: U+10B40–U+10B5F	416
Inscriptional Pahlavi: U+10B60–U+10B7F	416
Psalter Pahlavi: U+10B80–U+10BAF	417
10.7 Avestan	418
10.8 Nabataean	420
10.9 Palmyrene	421
10.10 Hatran	422
11 Cuneiform and Hieroglyphs	423
11.1 Sumero-Akkadian	424
Cuneiform: U+12000–U+123FF	424
Cuneiform Numbers and Punctuation: U+12400–U+1247F	427
Early Dynastic Cuneiform: U+12480–U+1254F	427
11.2 Ugaritic	428
11.3 Old Persian	429
11.4 Egyptian Hieroglyphs	430
11.5 Meroitic	434
11.6 Anatolian Hieroglyphs	436
12 South and Central Asia-I	439
Official Scripts of India	
12.1 Devanagari	441
Devanagari: U+0900–U+097F	441
Principles of the Devanagari Script	442
Rendering Devanagari	448
Devanagari Digits, Punctuation, and Symbols	457
Extensions in the Main Devanagari Block	458
Devanagari Extended: U+A8E0–U+A8FF	460
Vedic Extensions: U+1CD0–U+1CFF	461
12.2 Bengali (Bangla)	463
12.3 Gurmukhi	469
12.4 Gujarati	474
12.5 Oriya (Odia)	476
12.6 Tamil	479
Tamil: U+0B80–U+0BFF	479
Tamil Vowels	480
Tamil Ligatures	481
Tamil Named Character Sequences	485
12.7 Telugu	488
12.8 Kannada	491
Kannada: U+0C80–U+0CFF	491

	Principles of the Kannada Script	491
	Rendering Kannada	493
12.9	Malayalam	495
	Malayalam Orthographic Reform	495
	Rendering Malayalam	496
	Malayalam Numbers and Punctuation	501
13	South and Central Asia-II	503
	Other Modern Scripts	
13.1	Thaana	505
13.2	Sinhala	507
	Sinhala Archaic Numbers: U+111E0–U+111FF	508
13.3	Tibetan	509
13.4	Mongolian	521
13.5	Limbu	530
13.6	Meetei Mayek	534
13.7	Mro	536
13.8	Warang Citi	537
13.9	Ol Chiki	538
13.10	Chakma	540
13.11	Lepcha	541
13.12	Saurashtra	544
14	South and Central Asia-III	545
	Ancient Scripts	
14.1	Brahmi	546
14.2	Kharoshthi	550
	Kharoshthi: U+10A00–U+10A5F	550
	Rendering Kharoshthi	552
14.3	Phags-pa	556
14.4	Old Turkic	563
15	South and Central Asia-IV	565
	Other Historic Scripts	
15.1	Syloiti Nagri	567
15.2	Kaithi	569
15.3	Sharada	572
15.4	Takri	574
15.5	Siddham	576
15.6	Mahajani	578
15.7	Khojki	580
15.8	Khudawadi	582

15.9	Multani	584
15.10	Tirhuta	585
15.11	Modi	588
15.12	Grantha	591
	Rendering Behavior	591
15.13	Ahom	594
15.14	Sora Sompeng	596
16	Southeast Asia	597
16.1	Thai	599
16.2	Lao	603
16.3	Myanmar	606
	Myanmar: U+1000–U+109F	606
	Myanmar Extended-A: U+AA60–U+AA7F	610
	Khamti Shan	610
	Aiton and Phake	612
	Myanmar Extended-B: U+A9E0–U+A9FF	612
16.4	Khmer	613
	Khmer: U+1780–U+17FF	613
	Principles of the Khmer Script	613
	Khmer Symbols: U+19E0–U+19FF	623
16.5	Tai Le	624
16.6	New Tai Lue	626
16.7	Tai Tham	629
16.8	Tai Viet	632
16.9	Kayah Li	635
16.10	Cham	636
16.11	Pahawh Hmong	638
16.12	Pau Cin Hau	640
17	Indonesia and Oceania	641
17.1	Philippine Scripts	642
	Tagalog: U+1700–U+171F	642
	Hanunóo: U+1720–U+173F	642
	Buhid: U+1740–U+175F	642
	Tagbanwa: U+1760–U+177F	642
	Principles of the Philippine Scripts	642
17.2	Buginese	645
17.3	Balinese	647
17.4	Javanese	653
17.5	Rejang	657
17.6	Batak	658

17.7	Sundanese	659
	Sundanese: U+1B80–U+1BBF	659
	Sundanese Supplement: U+1CC0–U+1CCF	660
18	East Asia	661
18.1	Han	663
	CJK Unified Ideographs	663
	Blocks Containing Han Ideographs	664
	General Characteristics of Han Ideographs	666
	Principles of Han Unification	670
	Unification Rules	671
	Abstract Shape	672
	Han Ideograph Arrangement	674
	Radical-Stroke Indices	675
	Mappings for Han Ideographs	676
	CJK Unified Ideographs Extension B: U+20000–U+2A6D6	677
	CJK Unified Ideographs Extension C: U+2A700–U+2B734	677
	CJK Unified Ideographs Extension D: U+2B740–U+2B81D	677
	CJK Unified Ideographs Extension E: U+2B820–U+2CEA1	677
	CJK Compatibility Ideographs: U+F900–U+FAFF	677
	CJK Compatibility Supplement: U+2F800–U+2FA1D	678
	Kanbun: U+3190–U+319F	678
	Symbols Derived from Han Ideographs	679
	CJK and KangXi Radicals: U+2E80–U+2FD5	679
	CJK Additions from HKSCS and GB 18030	680
	CJK Strokes: U+31C0–U+31EF	680
18.2	Ideographic Description Characters	681
18.3	Bopomofo	685
18.4	Hiragana and Katakana	688
	Hiragana: U+3040–U+309F	688
	Katakana: U+30A0–U+30FF	688
	Katakana Phonetic Extensions: U+31F0–U+31FF	689
	Kana Supplement U+1B000–U+1B0FF	689
18.5	Halfwidth and Fullwidth Forms	690
18.6	Hangul	691
	Hangul Jamo: U+1100–U+11FF	691
	Hangul Jamo Extended-A: U+A960–U+A97F	692
	Hangul Jamo Extended-B: U+D7B0–U+D7FF	692
	Hangul Compatibility Jamo: U+3130–U+318F	692
	Hangul Syllables: U+AC00–U+D7A3	693
18.7	Yi	695
18.8	Lisu	698
18.9	Miao	701

19 Africa	703
19.1 Ethiopic	704
Ethiopic: U+1200–U+137F	704
Ethiopic Extensions	706
19.2 Osmanya	708
19.3 Tifinagh	709
19.4 N’Ko	712
19.5 Vai	717
19.6 Bamum	719
Bamum: U+A6A0–U+A6FF	719
Bamum Supplement: U+16800–U+16A3F	719
19.7 Bassa Vah	721
19.8 Mende Kikakui	722
20 Americas	725
20.1 Cherokee	726
20.2 Canadian Aboriginal Syllabics	728
Canadian Aboriginal Syllabics: U+1400–U+167F	728
Canadian Aboriginal Syllabics Extended: U+18B0–U+18FF	729
20.3 Deseret	730
21 Notational Systems	733
21.1 Braille	734
21.2 Western Musical Symbols	736
21.3 Byzantine Musical Symbols	741
21.4 Ancient Greek Musical Notation	742
21.5 Duployan	745
21.6 Sutton SignWriting	747
22 Symbols	749
22.1 Currency Symbols	751
22.2 Letterlike Symbols	754
Letterlike Symbols: U+2100–U+214F	754
Mathematical Alphanumeric Symbols: U+1D400–U+1D7FF	755
Mathematical Alphabets	756
Fonts Used for Mathematical Alphabets	758
Arabic Mathematical Alphabetic Symbols: U+1EE00–U+1EEFF	760
22.3 Numerals	761
Decimal Digits	761
Other Digits	763
Non-Decimal Radix Systems	765
Acrophonic Systems and Other Letter-based Numbers	766
Coptic Epact Numbers: U+102E0–U+102FF	767
Rumi Numeral Forms: U+10E60–U+10E7E	768

	CJK Numerals	768
	Fractions	770
	Common Indic Number Forms: U+A830–U+A83F	770
22.4	Superscript and Subscript Symbols	772
	Superscripts and Subscripts: U+2070–U+209F	772
22.5	Mathematical Symbols	774
	Mathematical Operators: U+2200–U+22FF	775
	Supplements to Mathematical Symbols and Arrows	778
	Supplemental Mathematical Operators: U+2A00–U+2AFF	778
	Miscellaneous Mathematical Symbols-A: U+27C0–U+27EF	778
	Miscellaneous Mathematical Symbols-B: U+2980–U+29FF	779
	Miscellaneous Symbols and Arrows: U+2B00–U+2B7F	779
	Arrows: U+2190–U+21FF	779
	Supplemental Arrows	780
	Standardized Variants of Mathematical Symbols	781
22.6	Invisible Mathematical Operators	782
22.7	Technical Symbols	783
	Control Pictures: U+2400–U+243F	783
	Miscellaneous Technical: U+2300–U+23FF	783
	Optical Character Recognition: U+2440–U+245F	787
22.8	Geometrical Symbols	788
	Box Drawing and Block Elements	788
	Geometric Shapes: U+25A0–U+25FF	789
	Geometric Shapes Extended: U+1F780–U+1F7FF	790
22.9	Miscellaneous Symbols	791
	Miscellaneous Symbols and Pictographs	792
	Emoticons: U+1F600–U+1F64F	795
	Transport and Map Symbols: U+1F680–U+1F6FF	795
	Dingbats: U+2700–U+27BF	795
	Ornamental Dingbats: U+1F650–U+1F67F	797
	Alchemical Symbols: U+1F700–U+1F77F	797
	Mahjong Tiles: U+1F000–U+1F02F	798
	Domino Tiles: U+1F030–U+1F09F	798
	Playing Cards: U+1F0A0–U+1F0FF	798
	Yijing Hexagram Symbols: U+4DC0–U+4DFF	799
	Tai Xuan Jing Symbols: U+1D300–U+1D356	800
	Ancient Symbols: U+10190–U+101CF	800
	Phaistos Disc Symbols: U+101D0–U+101FF	801
22.10	Enclosed and Square	802
	Enclosed Alphanumerics: U+2460–U+24FF	804
	Enclosed CJK Letters and Months: U+3200–U+32FF	804
	CJK Compatibility: U+3300–U+33FF	805
	Enclosed Alphanumeric Supplement: U+1F100–U+1F1FF	805
	Enclosed Ideographic Supplement: U+1F200–U+1F2FF	806

23	Special Areas and Format Characters	807
23.1	Control Codes	808
	Representing Control Sequences	808
	Specification of Control Code Semantics	809
23.2	Layout Controls	811
	Line and Word Breaking	811
	Cursive Connection and Ligatures	813
	Combining Grapheme Joiner	817
	Bidirectional Ordering Controls	819
	Stateful Format Controls	820
23.3	Deprecated Format Characters	822
23.4	Variation Selectors	824
23.5	Private-Use Characters	827
	Private Use Area: U+E000–U+F8FF	828
	Supplementary Private Use Areas	829
23.6	Surrogates Area	830
23.7	Noncharacters	831
23.8	Specials	833
	Byte Order Mark (BOM): U+FEFF	833
	Specials: U+FFF0–U+FFF8	835
	Annotation Characters: U+FFF9–U+FFFB	835
	Replacement Characters: U+FFFC–U+FFFD	837
23.9	Tag Characters	838
	Tag Characters: U+E000–U+E007F	838
	Deprecated Use for Language Tagging	838
	Syntax for Embedding Tags	838
	Working with Language Tags	840
	Unicode Conformance Issues	842
	Formal Tag Syntax	842
24	About the Code Charts	845
24.1	Character Names List	846
	Images in the Code Charts and Character Lists	846
	Special Characters and Code Points	848
	Character Names	850
	Informative Aliases	850
	Normative Aliases	850
	Cross References	850
	Information About Languages	851
	Case Mappings	851
	Decompositions	852
	Standardized Variation Sequences	853
	Subheads	854

24.2	CJK Ideographs	855
	CJK Unified Ideographs	855
	Compatibility Ideographs	856
24.3	Hangul Syllables	858
A	Notational Conventions	859
	Code Points	859
	Character Names	859
	Character Blocks	859
	Sequences	860
	Rendering	860
	Properties and Property Values	861
	Miscellaneous	861
	Extended BNF	861
	Operators	863
B	Unicode Publications and Resources	865
B.1	The Unicode Consortium	866
	The Unicode Technical Committee	866
	Other Activities	866
B.2	Unicode Publications	867
B.3	Unicode Technical Standards	868
	UTS #6: A Standard Compression Scheme for Unicode	868
	UTS #10: Unicode Collation Algorithm	868
	UTS #18: Unicode Regular Expressions	868
	UTS #22: Character Mapping Markup Language (CharMapML)	868
	UTS #35: Unicode Locale Data Markup Language (LDML)	868
	UTS #37: Unicode Ideographic Variation Database	868
	UTS #39: Unicode Security Mechanisms	868
	UTS #46: Unicode IDNA Compatibility Processing	869
B.4	Unicode Technical Reports	870
	UTR #16: UTF-EBCDIC	870
	UTR #17: Unicode Character Encoding Model	870
	UTR #20: Unicode in XML and Other Markup Languages	870
	UTR #23: The Unicode Character Property Model	870
	UTR #25: Unicode Support for Mathematics	870
	UTR #26: Compatibility Encoding Scheme for UTF-16: 8-Bit (CESU-8) ..	870
	UTR #33: Unicode Conformance Model	871
	UTR #36: Unicode Security Considerations	871
	UTR #50: Unicode Vertical Text Layout	871
	UTR #51: Unicode Emoji	871
B.5	Unicode Technical Notes	872
B.6	Other Unicode Online Resources	873
	Unicode Online Resources	873
	How to Contact the Unicode Consortium	874

C	Relationship to ISO/IEC 10646	875
C.1	History	876
C.2	Encoding Forms in ISO/IEC 10646	882
Zero Extending	882	
C.3	UTF-8 and UTF-16	883
UTF-8	883	
UTF-16	883	
C.4	Synchronization of the Standards	884
C.5	Identification of Features for Unicode	885
C.6	Character Names	886
C.7	Character Functional Specifications	887
D	Changes from Previous Versions	889
D.1	Versions of the Unicode Standard	890
D.2	Clause and Definition Updates	895
E	Han Unification History	897
E.1	Development of the URO	898
E.2	Ideographic Rapporteur Group	900
E.3	CJK Sources	902
F	Documentation of CJK Strokes	907
R	References	915
R.1	Source Standards and Specifications	916
R.2	Source Dictionaries for Han	925
R.3	Other Script Sources	926
R.4	Selected Resources: Technical	953
R.5	Selected Resources: Other	956
I	General Index	961

