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Information technology — Specification methods for cultural conventions

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National foreword

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Information technology — Specification methods for cultural conventions

Technologies de l'information — Méthodes de spécification des conventions culturelles

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see http://patents.iec.ch).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 35, *User interfaces*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document defines general mechanisms to specify cultural conventions. It also defines formats for a number of specific cultural conventions in the areas of character classification and conversion, sorting, number formatting, monetary formatting, date formatting, message display, addressing of persons, postal address formatting, and telephone number handling.

The benefits from this document are:

Rigid specification Using this document, a user can rigidly specify a number of the cultural conventions that apply to their information technology environment.

Cultural adaptability If an application has been designed and built in a culturally neutral manner, the application can use the specifications as data to its application programming interfaces (APIs), and thus the same application can accommodate different users in a culturally acceptable way to each of the users, without change of the binary application.

Productivity This document specifies cultural conventions and how to specify data for them. With that data, an application developer is released from getting the different information to support all the cultural environments for the expected customers of the product. The application developer is assured of culturally correct behaviour as specified by the customer, and more markets can potentially be reached as customers can provide the data themselves for markets that were not targeted.

Uniform behaviour When a number of applications share one cultural specification, which may be supplied from the user or provided by the application or operating system, their behaviour for cultural adaptation becomes uniform.

The specification formats are independent of platforms and specific encoding and they are designed to be usable from a wide range of programming languages.

A number of cultural conventions, such as spelling, hyphenation rules and terminology, are not specifiable with this document, but the document provides mechanisms to define new categories and also new keywords within existing categories. An internationalized application can take advantage of information provided with the FDCC-set (such as the language) to provide further internationalized services to the user.

This document defines a format compatible with the one used in ISO/IEC 14651.

This document is upward compatible with elements of ISO/IEC/IEEE 9945, especially those on POSIX locales and charmaps – a locale or charmap conformant to POSIX specifications will also be conformant to specifications in this document, while the reverse condition will not hold. Some of the descriptions are intended to be coded in text files to be used via APIs developed for a number of systems which comply with ISO/IEC/IEEE 9945.

This document has enhanced functionality in a number of areas such as ISO/IEC 10646 support, more classification of characters, transliteration, dual (multi) currency support, enhanced date and time formatting, personal name writing, postal address formatting, telephone number handling, keyboard handling, and management of categories. There is enhanced support for character sets including ISO/IEC 2022 handling and an enhanced method to separate the specification of cultural conventions from an actual encoding via a description of the character repertoire employed. A standard set of values for all the categories has been defined covering the repertoire of ISO/IEC 10646.

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This document has been developed to align with ISO/IEC/IEEE 9945. The major extensions from ISO/IEC/IEEE 9945 are listed in Annex A.

A rationale for elements of this document is found in Annex B.

A BNF specification of the syntax for formats in this document is given in Annex C.

The relation to the taxonomy of ISO/IEC TR 24785 is listed in Annex D.

A listing of the implementation of the specifications of this document in the GNU libc compiler product is given in Annex E.

The relation between formats and APIs of this document is listed in Annex F.

A guideline for a method to bind APIs of other programming languages to APIs defined in this document is specified in Annex G.

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Information technology — Specification methods for cultural conventions

1 Scope

This document specifies description formats and functionality for the specification of cultural conventions, description formats for character sets, and description formats for binding character names to ISO/IEC 10646, as well as a set of default values for some of these items.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639 (all parts), *Codes for the representation of names of languages*

ISO/IEC 2022, *Information technology — Character code structure and extension techniques*

ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

ISO 4217, *Codes for the representation of currencies*

ISO 8601, *Date and time — Representations for information interchange*

ISO/IEC 9899, *Information technology — Programming languages — C*

ISO/IEC/IEEE 9945, *Information technology — Portable Operating System Interface (POSIX) Base Specifications, Issue 7*

ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*

ISO/IEC 14651, *Information technology — International string ordering and comparison — Method for comparing character strings and description of the common template tailorable ordering*

ISO/IEC 15897:2011, *Information technology — User interfaces — Procedures for the registration of cultural elements*

ISO 15924, *Information and documentation — Codes for the representation of names of scripts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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3.1 Bytes and characters

3.1.1
byte
individually addressable unit of data storage that is equal to or larger than an octet, used to store a character or a portion of a character

Note 1 to entry: A byte is composed of a contiguous sequence of bits, the number of which is implementation defined. The least significant bit is called the low-order bit; the most significant bit is called the high-order bit.

3.1.2
character
member of a set of elements used for the organization, control or representation of data

3.1.3
coded character
sequence of one or more bytes representing a single character

3.1.4
text file
file that contains characters organized into one or more lines

3.2 Cultural and other major concepts

3.2.1
cultural convention
data item for information technology that may vary dependent on language, territory, or other cultural habits

3.2.2
FDCC
formal definition of a cultural convention
cultural convention put into a formal definition scheme

3.2.3
FDCC-set
set of FDCCs
subset of a user's information technology environment that depends on language and cultural conventions

Note 1 to entry: The FDCC-set is a superset of the "locale" term in C and POSIX.

3.2.4
charmap
definition of a mapping between symbolic character names and character codes, plus related information

3.2.5
repertoiremap
definition of a mapping between symbolic character names and characters for the repertoire of characters used in a FDCC-set

Note 1 to entry: This is further described in Clause 7.

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3.3 FDCC-related categories

3.3.1
character class
named set of characters sharing an attribute associated with the name of the class

3.3.2
collation
logical ordering of strings according to defined precedence rules

3.3.3
collating element
smallest entity used to determine logical ordering

Note 1 to entry: See collating sequence. A collating element consists of either a single character, or two or more characters collating as a single entity. The LC_COLLATE category in the associated FDCC-set determines the set of collating elements.

3.3.4
multicharacter collating element
sequence of two or more characters that collate as an entity

Note 1 to entry: For example, in some languages two characters are sorted as one letter, as in the case for Danish and Norwegian "aa".

3.3.5
collating sequence
relative order of collating elements as determined by the setting of the LC_COLLATE category in the applied FDCC-set

3.3.6
equivalence class
set of collating elements with the same primary collation weight

Note 1 to entry: Elements in an equivalence class are typically elements that naturally group together, such as all accented letters based on the same letter. The collation order of elements within an equivalence class is determined by the weights assigned on any subsequent levels after the primary weight.

4 Notations

4.1 Notation for defining syntax

In this document, the description of an individual record in a FDCC-set is done using the syntax notation given in the following.

The syntax notation:

"<format>",[<arg1>,<arg2>,...,<argn>]

The <format> is given in a format string enclosed in double quotes, followed by a number of parameters, separated by commas. It is similar to the format specification defined in ISO/IEC/IEEE 9945 and the format specification used in C language printf() function. The format of each parameter is given by an escape sequence:

%s specifies a string

%d specifies a decimal integer

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%c specifies a character

%o specifies an octal integer

%x specifies a hexadecimal integer

A " " (an empty character position) in the syntax string represents one or more <blank> characters.

All other characters in the format string represent themselves, except:

%% specifies a single %

\n specifies an end-of-line

The notation "..." is used to specify that repetition of the previous specification is optional, and this is done in both the format string and in the parameter list.

4.2 Portable character set

A set of symbolic names for characters in Table 1, which is called the portable character set, is used in character description text of this specification. The first eight entries in Table 1 are defined in ISO/IEC 6429 and the rest are defined in ISO/IEC/IEEE 9945 with some additional definitions from ISO/IEC 10646.

Table 1 — Portable character set

Symbolic name	Glyph	UCS	Description
<NUL>		<U0000>	NULL (NUL)
<alert>		<U0007>	BELL (BEL)
<backspace>		<U0008>	BACKSPACE (BS)
<tab>		<U0009>	CHARACTER TABULATION (HT)
<carriage-return>		<U000D>	CARRIAGE RETURN (CR)
<newline>		<U000A>	LINE FEED (LF)
<vertical-tab>		<U000B>	LINE TABULATION (VT)
<form-feed>		<U000C>	FORM FEED (FF)
<space>		<U0020>	SPACE
<exclamation-mark>	!	<U0021>	EXCLAMATION MARK
<quotation-mark>	"	<U0022>	QUOTATION MARK
<number-sign>	#	<U0023>	NUMBER SIGN
<dollar-sign>	$	<U0024>	DOLLAR SIGN
<percent-sign>	%	<U0025>	PERCENT SIGN
<ampersand>	&	<U0026>	AMPERSAND
<apostrophe>	'	<U0027>	APOSTROPHE
<left-parenthesis>	(	<U0028>	LEFT PARENTHESIS
<right-parenthesis>	)	<U0029>	RIGHT PARENTHESIS
<asterisk>	*	<U002A>	ASTERISK
<plus-sign>	+	<U002B>	PLUS SIGN
<comma>	,	<U002C>	COMMA
<hyphen-minus>	-	<U002D>	HYPHEN-MINUS
<hyphen>	-	<U002D>	HYPHEN-MINUS
<full-stop>	.	<U002E>	FULL STOP
<period>	.	<U002E>	FULL STOP
<slash>	/	<U002F>	SOLIDUS
<solidus>	/	<U002F>	SOLIDUS
<zero>	0	<U0030>	DIGIT ZERO
<one>	1	<U0031>	DIGIT ONE
<two>	2	<U0032>	DIGIT TWO
<three>	3	<U0033>	DIGIT THREE

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<four>	4	<U0034>	DIGIT FOUR
<five>	5	<U0035>	DIGIT FIVE
<six>	6	<U0036>	DIGIT SIX
<seven>	7	<U0037>	DIGIT SEVEN
<eight>	8	<U0038>	DIGIT EIGHT
<nine>	9	<U0039>	DIGIT NINE
<colon>	:	<U003A>	COLON
<semicolon>	;	<U003B>	SEMICOLON
<less-than-sign>	<	<U003C>	LESS-THAN SIGN
<equals-sign>	=	<U003D>	EQUALS SIGN
<greater-than-sign>	>	<U003E>	GREATER-THAN SIGN
<question-mark>	?	<U003F>	QUESTION MARK
<commercial-at>	@	<U0040>	COMMERCIAL AT
<A>	A	<U0041>	LATIN CAPITAL LETTER A
<B>	B	<U0042>	LATIN CAPITAL LETTER B
<C>	C	<U0043>	LATIN CAPITAL LETTER C
<D>	D	<U0044>	LATIN CAPITAL LETTER D
<E>	E	<U0045>	LATIN CAPITAL LETTER E
<F>	F	<U0046>	LATIN CAPITAL LETTER F
<G>	G	<U0047>	LATIN CAPITAL LETTER G
<H>	H	<U0048>	LATIN CAPITAL LETTER H
<I>	I	<U0049>	LATIN CAPITAL LETTER I
<J>	J	<U004A>	LATIN CAPITAL LETTER J
<K>	K	<U004B>	LATIN CAPITAL LETTER K
<L>	L	<U004C>	LATIN CAPITAL LETTER L
<M>	M	<U004D>	LATIN CAPITAL LETTER M
<N>	N	<U004E>	LATIN CAPITAL LETTER N
<O>	O	<U004F>	LATIN CAPITAL LETTER O
<P>	P	<U0050>	LATIN CAPITAL LETTER P
<Q>	Q	<U0051>	LATIN CAPITAL LETTER Q
<R>	R	<U0052>	LATIN CAPITAL LETTER R
<S>	S	<U0053>	LATIN CAPITAL LETTER S
<T>	T	<U0054>	LATIN CAPITAL LETTER T
<U>	U	<U0055>	LATIN CAPITAL LETTER U
<V>	V	<U0056>	LATIN CAPITAL LETTER V
<W>	W	<U0057>	LATIN CAPITAL LETTER W
<X>	X	<U0058>	LATIN CAPITAL LETTER X
<Y>	Y	<U0059>	LATIN CAPITAL LETTER Y
<Z>	Z	<U005A>	LATIN CAPITAL LETTER Z
<left-square-bracket>	[	<U005B>	LEFT SQUARE BRACKET
<backslash>	\	<U005C>	REVERSE SOLIDUS
<reverse-solidus>	\	<U005C>	REVERSE SOLIDUS
<right-square-bracket>	]	<U005D>	RIGHT SQUARE BRACKET
<circumflex-accent>	^	<U005E>	CIRCUMFLEX ACCENT
<circumflex>	^	<U005E>	CIRCUMFLEX ACCENT
<low-line>	_	<U005F>	LOW LINE
<underscore>	_	<U005F>	LOW LINE
<grave-accent>	`	<U0060>	GRAVE ACCENT
<a>	a	<U0061>	LATIN SMALL LETTER A
<b>	b	<U0062>	LATIN SMALL LETTER B
<c>	c	<U0063>	LATIN SMALL LETTER C
<d>	d	<U0064>	LATIN SMALL LETTER D
<e>	e	<U0065>	LATIN SMALL LETTER E
<f>	f	<U0066>	LATIN SMALL LETTER F
<g>	g	<U0067>	LATIN SMALL LETTER G
<h>	h	<U0068>	LATIN SMALL LETTER H
<i>	I	<U0069>	LATIN SMALL LETTER I
<j>	j	<U006A>	LATIN SMALL LETTER J
<k>	k	<U006B>	LATIN SMALL LETTER K
<l>	l	<U006C>	LATIN SMALL LETTER L
<m>	m	<U006D>	LATIN SMALL LETTER M
<n>	n	<U006E>	LATIN SMALL LETTER N

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<o>	o	<U006F>	LATIN SMALL LETTER O
<p>	p	<U0070>	LATIN SMALL LETTER P
<q>	q	<U0071>	LATIN SMALL LETTER Q
<r>	r	<U0072>	LATIN SMALL LETTER R
<s>	s	<U0073>	LATIN SMALL LETTER S
<t>	t	<U0074>	LATIN SMALL LETTER T
<u>	u	<U0075>	LATIN SMALL LETTER U
<v>	v	<U0076>	LATIN SMALL LETTER V
<w>	w	<U0077>	LATIN SMALL LETTER W
<x>	x	<U0078>	LATIN SMALL LETTER X
<y>	y	<U0079>	LATIN SMALL LETTER Y
<z>	z	<U007A>	LATIN SMALL LETTER Z
<left-brace>	{	<U007B>	LEFT CURLY BRACKET
<left-curly-bracket>	{	<U007B>	LEFT CURLY BRACKET
<vertical-line>	|	<U007C>	VERTICAL LINE
<right-brace>	}	<U007D>	RIGHT CURLY BRACKET
<right-curly-bracket>	}	<U007D>	RIGHT CURLY BRACKET
<tilde>	~	<U007E>	TILDE

This document may use other symbolic character names than the above in examples, to illustrate the use of the range of symbols allowed by the syntax specified in subclause 4.1.

5 FDCC-set

5.1 General

A FDCC-set is the definition of the subset of a user's information technology environment that depends on language and cultural conventions. A FDCC-set is made up from one or more categories. Each category is identified by its name and controls specific aspects of the behaviour of components of the system. The functionality is implied by the description of the categories. This document defines the following categories.

LC_IDENTIFICATION	Versions and status of categories.
LC_CTYPE	Character classification, case conversion and code transformation.
LC_COLLATE	Collation order.
LC_TIME	Date and time formats.
LC_NUMERIC	Numeric, non-monetary formatting.
LC_MONETARY	Monetary formatting.
LC_MESSAGES	Formats of informative and diagnostic messages and interactive responses.
LC_XLITERATE	Character transliteration.
LC_NAME	Format of writing personal names.
LC_ADDRESS	Format of postal addresses.
LC_TELEPHONE	Format for telephone numbers, and other telephone information.
LC_PAPER	Paper format.

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LC_MEASUREMENT Information on measurement system.

LC_KEYBOARD Format for identifying keyboard.

Other category names beginning with the 3 characters "LC_" are reserved for future standardization, except for category names beginning with the five characters "LC_X_" which are not used for the future addition of categories specified in this document. An application may thus use category names beginning with the five characters "LC_X_" for application defined categories to avoid clashes with future standardized categories.

This document also defines an FDCC-set named "i18n" with values for some of the above categories in order to simplify FDCC-set descriptions for a number of cultures. The contents of "i18n" categories should not necessarily be considered as the most commonly accepted values; in many cases it could be the recommended values. The complete "i18n" FDCC-set is defined as the sum of the "i18n" categories specified in subclause 5.2. The "i18n" FDCC-set and its parts are released under the GNU public license, version 2, as it is taken from glibc sources.

5.2 FDCC-set description

5.2.1 General

FDCC-sets are described with the syntax presented in this subclause. For the purposes of this document, the text is referred to as the FDCC-set definition text or FDCC-set source text.

The **FDCC-set definition text** contains one or more FDCC-set category source definitions and does not contain more than one definition for the same FDCC-set category. If the text contains source definitions for more than one category, application-defined categories, if present, appear after the categories defined by this clause. A category source definition contains either the definition of a category or a copy directive. In the event that some of the information for a FDCC-set category (as specified in this document) is missing from the FDCC-set source definition, the behaviour of that category, if it is referenced, is unspecified. A FDCC-set category is the normal way of specifying a single FDCC.

There are no **naming conventions** for FDCC-sets specified in this document, but ISO/IEC 15897:2011, Clause 15 specifies naming rules for POSIX locales, charmaps and repertoiremaps, that may also be applied to FDCC-sets, charmaps and repertoiremaps specified according to this document.

A **category source definition** consists of a category header, a category body, and a category trailer. A category header consists of the character string naming of the category, beginning with the characters "LC_". The category trailer consists of the string "END", followed by one or more "blank"s and the string used in the corresponding category header.

The **category body** consists of one or more lines of text. Each line is one of the following:

— A line containing an identifier, optionally followed by one or more operands. Identifiers are either keywords, identifying a particular FDCC, or collating elements, or section symbols.

— One of the transliteration statements defined in subclause 5.10.

In addition to the keywords defined in this document, the source may contain application-defined keywords. Each **keyword** within a category has a unique name (i.e., two categories may have a commonly named keyword); no keyword starts with the characters "LC_". Identifiers are separated from the operands by one or more "blank"s.

Operands are characters, collating elements, section symbols, or strings of characters. Strings are enclosed in double-quotes. Literal double-quotes within strings are preceded by the <escape character>, described in subclause 5.2.5.3. When a keyword is followed by more than one operand, the operands are separated by semicolons; "blank"s are allowed before and/or after a semicolon.

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5.2.2 Character representation

Individual characters, characters in strings, and collating elements are represented using symbolic names, UCS notation or characters themselves, or as octal, hexadecimal or decimal constants as defined below. When constant notation is used, the resultant FDCC-set definitions need not be portable between systems.

(0) The left angle bracket (<) is a reserved symbol, denoting the start of a symbolic name; when used to represent itself outside a symbolic name it is preceded by the escape character.

(1) A character can be represented via a **symbolic name**, enclosed within angle brackets (< and >). The symbolic name, including the angle brackets, exactly matches a symbolic name defined in a charmap or a repertoiremap to be used, and is replaced by a character value determined from the value associated with the symbolic name in the charmap or a value associated via a repertoiremap. Repertoiremaps have predefined symbolic names for UCS characters, see Clause 6. A FDCC-set may also use the UCS notation of Clause 6 to represent characters, without a repertoiremap being defined for the FDCC-set. Use of the escape character or a right-angle bracket within a symbolic name is invalid unless the character is preceded by the escape character.

EXAMPLE <c>;<c-cedilla> "<M><a><y>"

The items (2), (3), (4) and (5) are deprecated and are retained for compatibility with ISO/IEC/IEEE 9945. FDCC-sets should be specified in a coded character set independent way, using symbolic names. To make actual use of the FDCC-set, it is used together with either charmaps or repertoiremaps or both, so that the symbolic character names can be resolved into the actual character encoding used.

(2) A character can be represented by the character itself, in which case the value of the character is application-defined. Within a string, the double-quote character, the escape character and the right-angle bracket character are escaped (preceded by the escape character) to be interpreted as the character itself. Outside strings, the characters:

, ; < > escape_char

are escaped by the escape character to be interpreted as the character itself.

EXAMPLE c ä "May".

(3) A character can be represented as an octal constant. An octal constant is specified as the escape character followed by two or more octal digits. Each constant represents a byte value.

EXAMPLE \143; \347; "\115".

(4) A character can be represented as a hexadecimal constant. A hexadecimal constant is specified as the escape character followed by an x followed by two or more hexadecimal digits. Each constant represents a byte value.

EXAMPLE \x63;\xe7.

(5) A character can be represented as a decimal constant. A decimal constant is specified as the escape character followed by a d followed by two or more decimal digits. Each constant represents a byte value.

EXAMPLE \d99; \d231;

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(6) Multibyte characters can be represented by concatenated constants specified in byte order with the last constant specifying the least significant byte of the character. Concatenated constants can include a mix of the above character representations.

EXAMPLE \143\xe7; "\115\xe7\d171"

Only characters existing in the character set for which the FDCC-set definition is created are specified, whether using symbolic names, the characters themselves, or octal, decimal or hexadecimal constants. If a charmap is present, only characters defined in the charmap can be specified using octal, decimal or hexadecimal constants. Symbolic names not present in the charmap may be specified and are ignored, as specified under item (1).

NOTE The <character> symbolic character notation is preferred for specifying all characters in a FDCC-set, to facilitate portability of the FDCC-sets, as the coded character set of the application of the FDCC-set could be different from the coded character set of the FDCC-set source. This is also preferred for format effectors in strings, such as in LC_DATE or LC_ADDRESS, where the format effectors are allowed to be stored together with the rest of the string, in a binary string with a different encoding from that of the source FDCC-set.

5.2.3 Continuation of lines

A line in a specification can be continued by placing an escape character as the last visible graphic character on the line; this continuation character is discarded from the input. The line is continued to the next non-comment line.

5.2.4 Names for copy keyword

In most of the categories a "copy" keyword is allowed. The name specified with this copy keyword is one of:

— "i18n" which indicate the "i18n" FDCC-set defined in this specification,

— the name of a FDCC-set or POSIX locale registered by the process defined in ISO/IEC 15897,

— any other name which may be recognized in some local context – not being recommended as an international specification.

5.2.5 Pre-category statements

5.2.5.1 General

In a FDCC-set the statements in subclauses 5.2.5.2 through 5.2.5.5 may precede category specifications, and they apply to all categories in the specified FDCC-set.

5.2.5.2 comment_char

The following line in a FDCC-set modifies the comment character. It has the following syntax, starting in column 1:

"comment_char %c\n", <comment_character>

The comment character defaults to the number-sign (#). All examples in this document use "%" as the <comment_character>, except where otherwise noted. Blank lines and lines containing the <comment_character> in the first position are ignored. In collating statements, a <comment_character> occurring where the delimiter ";" may occur, terminates the collating statement.

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5.2.5.3 escape_char

The following line in a FDCC-set modifies the escape character to be used in the text. It has the following syntax, starting in column 1:

"escape_char %c\n", <escape_character>

The escape character is used for representing characters in subclause 4.1 and for continuing lines.

The escape character defaults to backslash "\". All examples in this document uses "/" as the escape character, except where otherwise noted.

5.2.5.4 repertoiremap

The following line in a FDCC-set specifies the name of a repertoiremap used to define the symbolic character names in the FDCC-set. There may be at most one "repertoiremap" line. It has the following syntax, starting in column 1:

"repertoiremap %s\n", <repertoiremap>

The name is one of:

— "i18nrep" which indicates the "i18nrep" repertoiremap defined in this specification,

— the name of a <repertoiremap> registered by the process defined in ISO/IEC 15897,

— any other name which may be recognized in some local context – not being recommended as an international specification.

5.2.5.5 charmap

The following line in a FDCC-set specifies the name of a charmap which may be used with the FDCC-set. It has the following syntax, starting in column 1:

"charmap %s\n",<charmap>

This keyword gives a hint on which charmaps a FDCC-set is meant to be supported by. There may be more than one charmap specification useful with a FDCC-set. It is an application's responsibility to decide what charmap specification is to be used with that application.

The name is one of:

— the name of a <charmap> registered by the process defined in ISO/IEC 15897,

— any other name which may be recognized in some local context – not being recommended as an international specification.

5.3 LC_IDENTIFICATION

The LC_IDENTIFICATION category defines properties of the FDCC-set, and which specification methods the FDCC-set is conforming to. Values shall be supplied for all unless otherwise noted, and the operands are strings. The following keywords are defined.

title Title of the FDCC-set.

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source Organization name of provider of the source.

address Organization postal address.

contact Name of contact person. This keyword is optional.

email Electronic mail address of the organization or contact person. This keyword is optional.

tel Telephone number for the organization, in international format. This keyword is optional.

fax Fax number for the organization, in international format. This keyword is optional.

language Natural language to which the FDCC-set applies, as specified in ISO 639. If a two-letter code exists for this language, it is used, else the three-letter code is used. This keyword is optional.

territory The geographic area where the FDCC-set applies (where applicable), in two-letter form as specified in ISO 3166. This keyword is optional.

script Script that the FDCC-set especially uses, as defined by ISO/IEC 15924 and its registry. This keyword is optional.

audience If not for general use, an indication of the intended user audience. This keyword is optional.

application If for use of a special application, a description of the application. This keyword is optional.

abbreviation Short name for provider of the source. This keyword is optional.

revision Revision number consisting of digits and zero or more full stops (".").

date Revision date in the format according to this example: "1995-02-05" meaning 5 February 1995.

NOTE Only one language per territory can be addressed with a single FDCC-set; an additional FDCC-set is required for each additional language for that territory.

category Is used to define that a category is present and what specification the category is claiming conformance to. The first operand is a string in double-quotes that describes the specification that the category is claiming conformance to, and the following values are defined:
”i18n:2004”
"i18n:2012"
“i18n:2018”
"posix:1993"
The second operand is a string with the category name, where the category names of Clause 4 are defined. More than one "category" keyword may be given, but only one per category name.

The "i18n" LC_IDENTIFICATION category is:

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```
LC_IDENTIFICATION
 % This is the ISO/IEC 30112 "i18n" definition for
 % the LC_IDENTIFICATION category.
 %
 title                  "ISO/IEC 30112 i18n FDCC-set"
 source                 "ISO/IEC Copyright Office"
 address                "Case postale 56, CH-1211 Geneve 20, Switzerland"
 contact                ""
 email                  ""
 tel                    ""
 fax                    ""
 language               ""
 territory              ""
 revision               "1.2"
 date                   "2018-10-31"
  %
  category  "i18n:2004";LC_IDENTIFICATION
  category  "i18n:2012";LC_CTYPE
  category  "i18n:2004";LC_COLLATE
  category  "i18n:2004";LC_TIME
  category  "i18n:2004";LC_NUMERIC
  category  "i18n:2004";LC_MONETARY
  category  "i18n:2004";LC_MESSAGES
  category  "i18n:2004";LC_NAME
  category  "i18n:2004";LC_ADDRESS
  category  "i18n:2004";LC_TELEPHONE
  category  "i18n:2012";LC_PAPER
  category  "i18n:2012";LC_MEASUREMENT
  category  "i18n:2012";LC_KEYBOARD

  END LC_IDENTIFICATION
```

5.4 LC_CTYPE

5.4.1 General

The LC_CTYPE category defines character classification, case conversion, character transformation, and other character attribute mappings. Support for the portable character set is required.

A series of characters in a specification can be represented by the hexadecimal symbolic ellipsis symbol ".." (two dots), the decimal symbolic ellipses symbols "...." (4 dots), the double increment hexadecimal symbolic ellipses "..(2)..", or the absolute ellipses "..." (3 dots).

The **hexadecimal symbolic ellipsis** ("..") specification is only valid between symbolic character names. The symbolic names consists of zero or more nonnumeric characters from the set shown with visible glyphs in Table 1, followed by an integer formed by one or more hexadecimal digits, using uppercase letters only for the range "A" to "F". The characters preceding the hexadecimal integer are identical in the two symbolic names, and the integer formed by the hexadecimal digits in the second symbolic name are identical to or greater than the integer formed by the hexadecimal digits in the first name. This is interpreted as a series of symbolic names formed from the common part and each of the integers in hexadecimal format using uppercase letters only between the first and the second integer, inclusive, and with a length of the symbolic names generated that is equal to the length of the first (and also the second) symbolic name. As an example, <U010E>..<U0111> is interpreted as the symbolic names <U010E>, <U010F>, <U0110>, and <U0111>, in that order.

The **decimal symbolic ellipsis** ("....") specification is only valid between symbolic character names. The symbolic names consist of zero or more nonnumeric characters from the set shown with visible glyphs in Table 1, followed by an integer formed by one or more decimal digits. The characters preceding the

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decimal integer are identical in the two symbolic names, and the integer formed by the decimal digits in the second symbolic name is identical to or greater than the integer formed by the decimal digits in the first name. This is interpreted as a series of symbolic names formed from the common part and each of the integers in decimal format between the first and the second integer, inclusive, and with a length of the symbolic names generated that is equal to the length of the first (and also the second) symbolic name. As an example, <j0101>....<j0104> is interpreted as the symbolic names <j0101>, <j0102>, <j0103>, and <j0104>, in that order.

The **double increment hexadecimal symbolic ellipses** ("..(2)..") works like the hexadecimal symbolic ellipses, but generates only every other of the symbolic character names. As an example. <U01AC>..(2)..<U01B2> is interpreted as the symbolic character names <U01AC>, <U01AE>, <U01B0>, and <U01B2>, in that order.

The **absolute ellipsis** specification is only valid within a single encoded character set. An ellipsis is interpreted as including in the list all characters with an encoded value higher than the encoded value of the character preceding the ellipsis and lower than the encoded value of the character following the ellipsis. The absolute ellipsis specification is deprecated, as this is only relevant to FDCC-sets not using symbolic characters.

As an example, \x30;...;\x39 includes in the character class all characters with encoded values between the endpoints.

5.4.2 Character classification keywords

The following keywords are recognized. In the descriptions, the term "automatically included" means that it is not an error to either include the referenced characters or to omit them; the interpreting system provides them if missing and accept them silently if present.

copy Specify the name of an existing FDCC-set to be used as the source for the definition of this category. If this keyword is specified, no other keyword is specified.

upper Define characters to be classified as uppercase letters. No character specified for the keywords "cntrl", "digit", "punct", or "space" is specified. The uppercase letters A through Z of the portable character set automatically belong to this class, with application-defined character values. The keyword may be omitted.

lower Define characters to be classified as lowercase letters. No character specified for the keywords "cntrl", "digit", "punct", or "space" is specified. The lowercase letters a through z of the portable character set, automatically belong to this class, with application-defined character values. The keyword may be omitted.

alpha Define characters to be classified as used to spell out the words for natural languages; such as letters, syllabic or ideographic characters. No character specified for the keywords "cntrl", "digit", "punct", or "space" is specified. In addition, characters classified as either "upper" or "lower" automatically belong to this class. The keyword may be omitted.

digit Define the characters to be classified as decimal digits. Digits corresponding to the values 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 can be specified in groups of 10 digits, and in ascending order of the values they represent. The digits of the portable character set are automatically included. If this

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keyword is not specified, the digits 0 through 9 of the portable character set automatically belong to this class, with application-defined character values. The "digit" keyword is used to specify which characters are accepted as digits in input to an application, such as characters typed in or scanned in from an input text file and should list digits used with all the scripts supported by the FDCC-set. The keyword may be omitted.

alnum Define the characters to be classified as used to spell out the words for natural languages, and numeric digits. The characters of the "alpha" and "digit" classes are automatically included in this class. The keyword may be omitted.

outdigit Define the characters to be classified as decimal digits for output from an application, such as to a printer or a display or a output text file. Decimal digits corresponding to the values <0>, <1>, <2>, <3>, <4>, <5>, <6>, <7>, <8>, and <9> can be specified, and in ascending order of the values they represent. The intended use is for all places where decimal digits are used for output, including numeric and monetary formatting, and date and time formatting. Only one set of 10 decimal digits may be specified. If this keyword is not specified, the decimal digits 0 through 9 of the portable character set automatically belong to this class, with application-defined character values. The keyword may be omitted.

blank Define characters to be classified as "blank" characters. If this keyword is unspecified, the characters <space> and <tab>, with application-defined character values, belong to this character class.

space Define characters to be classified as white-space characters, to find syntactical boundaries. No character specified for the keywords "upper", "lower", "alpha", "digit", "graph", or "xdigit" is specified. If this keyword is not specified, the characters <space>, <form-feed>, <newline>, <carriage-return>, <tab>, and <vertical-tab>, automatically belong to this class, with application-defined character values. Any characters included in the class "blank" are automatically included. The class should not include the NO-BREAK spaces characters <U00A0>, <U2007>, <UFEFF>, as these characters should not be used for word boundaries. The keyword may be omitted.

cntrl Define characters to be classified as control characters. No character specified for the keywords "upper", "lower", "alpha", "digit", "punct", "graph", "print", or "xdigit" is specified. The keyword is specified.

punct Define characters to be classified as punctuation characters. No character specified for the keywords "upper", "lower", "alpha", "digit", "cntrl", "xdigit", or as the <space> character is specified. The keyword is specified.

xdigit Define the characters to be classified as hexadecimal digits. Only the characters defined for the class "digit" are specified, in ascending sequence by numerical value, followed by sets of six characters representing the hexadecimal digits 10 through 15 in ascending order (for example <A>, <B>, <C>, <D>, <E>, <F>, <a>, <b>, <c>, <d>, <e>, <f>). The digits <0> through <9>, the uppercase letters <A> through <F>, and the lowercase letters <a> through <f>, automatically belong to this class, with application-defined character values.

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graph Define characters to be classified as printable characters, not including the <space> character. If this keyword is not specified, characters specified for the keywords "upper", "lower", "alpha", "digit", "xdigit", and "punct" belong to this character class. No character specified for the keyword "cntrl" is specified.

print Define characters to be classified as printable characters, including the <space> character. If this keyword is not provided, characters specified for the keywords upper, lower, alpha, digit, xdigit, punct, graph, and the <space> character belong to this character class. No character specified for the keyword "cntrl" is specified.

toupper Define the mapping of lowercase letters to uppercase letters. The operand consists of character pairs, separated by semicolons. The characters in each character pair are separated by a comma and the pair enclosed by parentheses. The first character in each pair is the lowercase letter, the second the corresponding uppercase letter. Only characters specified for the keywords "lower" and "upper" are specified. If this keyword is not specified, the lowercase letters <a> through <z>, and their corresponding uppercase letters <A> through <Z>, are automatically included, with application-defined character values.

tolower Define the mapping of uppercase letters to lowercase letters. The operand consists of character pairs, separated by semicolons. The characters in each character pair are separated by a comma and the pair enclosed by parentheses. The first character in each pair is the uppercase letter, the second the corresponding lowercase letter. Only characters specified for the keywords "lower" and "upper" are specified. If this keyword is specified, the uppercase letters <A> through <Z>, and their corresponding lowercase letter, are specified. If this keyword is not specified, the mapping is the reverse mapping of the one specified for toupper.

class Define characters to be classified in the class with the name given in the first operand, which is a string. This string only contains characters of the portable character set that either has the string "LETTER" in its description or is a digit or <hyphen-minus> or <low-line>. The following operands are characters. This keyword is optional. The keyword may only be specified once per named class. The following class names are recognized:

combining Characters to form composite graphic symbols.

combining_level3 Characters to form composite graphic symbols, that may also be represented by other characters.

The class names "upper", "lower", "alpha", "digit", "space", "cntrl", "punct", "graph", "print", "xdigit", and "blank" are taken to mean the classes defined by the respective keywords.

width Define the column width of characters, for example for use of the C function wcwidth(). The operands are first a list for characters, possibly using various ellipses, and semicolon separated, then a <colon>, and then the width of these characters given as an unsigned positive integer. Such width-lists separated by <semicolon> may be given for the various widths. The default value of width of characters in class "cntrl" and class

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"combining" is 0, else the default value of width is 1. A width for a character may be overridden by a WIDTH specification in a charmap. This keyword is optional.

map Define the mapping of characters to other characters. The first operand is a string, defining the name of the mapping. The string only contains letters, digits and <hyphen-minus> and <low-line> from the portable character set. The following operands consist of character pairs, separated by semicolons. The characters in each character pair are separated by a comma and the pair enclosed by parentheses. The first character in each pair is the character to map from, the second the corresponding character to map to. This keyword is optional. The keyword may only be specified once per named mapping. The following mapping names are recognized:

The mapping names "toupper", and "tolower" are taken to mean the mapping defined by the respective keywords.

Example of use of the "map" keyword:

map "kana",(<U30AB>,<U304B>);(<U30AC>,<U304C>);(<U30AD>,<U304D>)

This example introduces a new mapping "kana" that maps three Katakana characters to corresponding Hiragana characters.

Table 2 shows the allowed character class combinations.

Table 2 — Valid Character Class Combinations

Class	upper	lower	alpha	digit	space	cntrl	punct	graph	print	xdigit	blank
upper		+	A	x	x	x	x	A	A	+	x
lower	+		A	x	x	x	x	A	A	+	x
alpha	+	+		x	x	x	x	A	A	+	x
digit	x	x	x		x	x	x	A	A	A	x
space	x	x	x	x		+	[a]	[a]	[a]	x	+
cntrl	x	x	x	x	+		x	x	x	x	+
punct	x	x	x	x	+	x		A	A	x	+
graph	+	+	+	+	+	x	+		A	+	+
print	+	+	+	+	+	x	+	+		+	+
xdigit	+	+	+	+	x	x	x	A	A		x
blank	x	x	x	x	A	+	[a]	[a]	[a]	x	

Key
A automatically included
+ permitted
X mutually exclusive

[a] The <space> character, which is part of the "space" and "blank" class, cannot belong to "punct" or "graph", but automatically belong to the "print" class. Other "space" or "blank" characters can be classified as "punct", "graph", and/or "print".

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5.4.3 Character string transliteration

The following keywords may be used to transliterate strings. The transliteration may for example be from the Cyrillic script to the Latin script. Transliteration is often language dependent, and the language to be transliterated to is identified with the FDCC-set, which may also be used to identify a specific language to be transliterated from. Transliteration of an incoming character string to a character string in a FDCC-set can be specified with the following keywords and transliteration statements.

translit_start The "translit_start" keyword is followed by one or more transliteration statements assigning character transliteration values to transliterating elements, and include statements copying transliteration specifications from other FDCC-sets.

translit_end The end of the transliteration statements.

NOTE For other keywords and transliteration statements, see subclause 5.10 on LC_XLITERATE.

5.4.4 "i18n" LC_CTYPE category

The "i18n" FDCC-set for the LC_CTYPE is defined as follows:

```
LC_CTYPE
% The following is the ISO/IEC 30112 i18n fdcc-set LC_CTYPE category.
% It covers ISO/IEC 10646
 collection 307 (Unicode version 5.0.0).
% The character classes and mapping tables were automatically generated
% using the gen-unicode-ctype.c program from the glibc project.
% This data reflects data from glibc version 2.14.1.
%
% The plan is to update this information to be aligned with a newer
% version of ISO/IEC 14651 and specification of the Unicode Standard.

% The "upper" class reflects the uppercase characters of class "alpha"
upper /
% BASIC LATIN/
   <U0041>..<U005A>;/
% LATIN-1 SUPPLEMENT/
   <U00C0>..<U00D6>;<U00D8>..<U00DE>;/
% LATIN EXTENDED-A/
   <U0100>..(2)..<U0136>;/
   <U0139>..(2)..<U0147>;/
   <U014A>..(2)..<U0178>;/
   <U0179>..(2)..<U017D>;/
% LATIN EXTENDED-B/
   <U0181>;<U0182>..(2)..<U0186>;<U0187>;/
   <U0189>..<U018B>;<U018E>..<U0191>;<U0193>;<U0194>;/
   <U0196>..<U0198>;<U019C>;<U019D>;<U019F>;/
   <U01A0>..(2)..<U01A4>;/
   <U01A6>;<U01A7>;<U01A9>;<U01AC>;<U01AE>;<U01AF>;<U01B1>..<U01B3>;/
   <U01B5>;<U01B7>;<U01B8>;<U01BC>;<U01C4>;<U01C5>;<U01C7>;<U01C8>;/
   <U01CA>;<U01CB>;/
   <U01CD>..(2)..<U01DB>;/
   <U01DE>..(2)..<U01EE>;/
   <U01F1>;<U01F2>;<U01F4>;<U01F6>..<U01F8>;<U01FA>..(2)..<U01FE>;/
   <U0200>..(2)..<U0232>;/
   <U023A>;<U023B>;<U023D>;<U023E>;/
   <U0241>;<U0243>..<U0246>;<U0248>;<U024A>;<U024C>;<U024E>;/
% BASIC GREEK/
   <U0370>;<U0372>;<U0376>;/
   <U0386>;<U0388>..<U038A>;<U038C>;<U038E>;<U038F>;<U0391>..<U03A1>;/
   <U03A3>..<U03AB>;<U03D8>..(2)..<U03DE>;/
% GREEK SYMBOLS AND COPTIC/
   <U03E0>..(2)..<U03EE>;<U03F4>;/
```

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```
   <U03F7>;<U03F9>..<U03FA>;<U03FD>..<U03FF>;/
% CYRILLIC/
   <U0400>..<U042F>;<U0460>..(2)..<U047E>;/
   <U0480>;<U048A>..(2)..<U04BE>;<U04C0>;<U04C1>..(2)..<U04CD>;/
   <U04D0>..(2)..<U04FE>;/
% CYRILLIC SUPPLEMENT/
   <U0500>..(2)..<U0522>;/
% ARMENIAN/
   <U0531>..<U0556>;/
% GEORGIAN/
% is not addressed as the letters does not have a uppercase/lowercase relation/
% well, there are three georgian blocks defined; one caseless (the one usually/
% used), one defined as uppercase and one as lowercase. defining the uppercase one here/
   <U10A0>..<U10C5>;/
% LATIN EXTENDED ADDITIONAL/
   <U1E00>..(2)..<U1E7E>;/
   <U1E80>..(2)..<U1E94>;<U1E9E>;/
   <U1EA0>..(2)..<U1EFE>;/
% GREEK EXTENDED/
   <U1F08>..<U1F0F>;<U1F18>..<U1F1D>;<U1F28>..<U1F2F>;<U1F38>..<U1F3F>;/
   <U1F48>..<U1F4D>;<U1F59>..(2)..<U1F5F>;<U1F68>..<U1F6F>;/
   <U1F88>..<U1F8F>;<U1F98>..<U1F9F>;<U1FA8>..<U1FAF>;<U1FB8>..<U1FBC>;/
   <U1FC8>..<U1FCC>;<U1FD8>..<U1FDB>;<U1FE8>..<U1FEC>;<U1FF8>..<U1FFC>;/
% LETTERLIKE SYMBOLS/
   <U2126>;<U212A>..<U212B>;/
   <U2132>;/
% NUMBER FORMS/
   <U2160>..<U216F>;/
   <U2183>;/
% ENCLOSED ALPHANUMERICS/
   <U24B6>..<U24CF>;/
% GLAGOLITIC/
   <U2C00>..<U2C2E>;/
% LATIN EXTENDED-C/
   <U2C60>;<U2C62>..<U2C64>;<U2C67>..(2)..<U2C6B>;<U2C6D>..<U2C6F>;/
   <U2C72>;<U2C75>;<UA78B>;/
% COPTIC/
   <U2C80>..(2)..<U2CE2>;/
% CYRILLIC SUPPLEMENT 2/
   <UA640>..(2)..<UA65E>;<UA662>..(2)..<UA66C>;<UA680>..(2)..<UA696>;/
% LATIN EXTENDED-D/
   <UA722>..(2)..<UA72E>;<UA732>..(2)..<UA76E>;<UA779>..(2)..<UA77D>;/
   <UA77E>..(2)..<UA786>;/
% HALFWIDTH AND FULLWIDTH FORMS/
   <UFF21>..<UFF3A>;/
% DESERET/
   <U00010400>..<U00010427>

% The "lower" class reflects the lowercase characters of class "alpha"
lower /
% BASIC LATIN/
   <U0061>..<U007A>;/
% LATIN-1 SUPPLEMENT/
   <U00B5>;<U00DF>..<U00F6>;<U00F8>..<U00FF>;/
% LATIN EXTENDED-A/
   <U0101>..(2)..<U0137>;<U013A>..(2)..<U0148>;/
   <U014B>..(2)..<U0177>;<U017A>..(2)..<U017E>;<U017F>;/
% LATIN EXTENDED-B/
   <U0180>;<U0183>;<U0185>;<U0188>;<U018C>;<U0192>;<U0195>;/
   <U0199>;<U019A>;<U019E>;<U01A1>;<U01A3>;<U01A5>;<U01A8>;<U01AD>;/
   <U01B0>;<U01B4>;<U01B6>;<U01B9>;<U01BD>;<U01BF>;<U01C5>;<U01C6>;/
   <U01C8>;<U01C9>;<U01CB>;<U01CC>..(2)..<U01DC>;/
   <U01DD>..(2)..<U01EF>;<U01F2>;<U01F3>;<U01F5>;<U01F9>..(2)..<U01FF>;/
   <U0201>..(2)..<U021F>;<U0223>..(2)..<U0233>;/
   <U023C>;<U0242>;<U0247>..(2)..<U024F>;/
% IPA EXTENSIONS/
   <U0253>;<U0254>;<U0256>;<U0257>;<U0259>;<U025B>;<U0260>;<U0263>;<U0268>;/
   <U0269>;<U026B>;<U026F>;<U0272>;<U0275>;<U027D>;<U0280>;<U0283>;<U0288>..<U028C>;/
   <U0292>;/
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```
% COMBINING DIACRITICAL MARKS/
   <U0345>;/
% BASIC GREEK/
   <U0371>;<U0373>;<U0377>;/
   <U037B>..<U037D>;/
   <U03AC>..<U03AF>;<U03B1>..<U03CE>;/
% GREEK SYMBOLS AND COPTIC/
   <U03D0>;<U03D1>;<U03D5>;<U03D6>;<U03D9>..(2)..<U03EF>;<U03F0>..<U03F2>;/
   <U03F5>;<U03F8>;<U03FB>;/
% CYRILLIC/
   <U0430>..<U045F>;<U0461>..(2)..<U047F>;/
   <U0481>;<U048B>..(2)..<U04BF>;<U04C2>..(2)..<U04CE>;/
   <U04CF>;/
   <U04D1>..(2)..<U0523>;/
% ARMENIAN/
   <U0561>..<U0586>;/
% PHONETIC EXTENSIONS/
   <U1D7D>;/
% LATIN EXTENDED ADDITIONAL/
   <U1E01>..(2)..<U1E95>;<U1E9B>..<U1E9D>;<U1E9F>;<U1EA1>..(2)..<U1EFF>;/
% GREEK EXTENDED/
   <U1F00>..<U1F07>;<U1F10>..<U1F15>;<U1F20>..<U1F27>;<U1F30>..<U1F37>;/
   <U1F40>..<U1F45>;<U1F51>..(2)..<U1F57>;<U1F60>..<U1F67>;<U1F70>..<U1F7D>;/
   <U1F80>..<U1F87>;<U1F90>..<U1F97>;<U1FA0>..<U1FA7>;<U1FB0>;<U1FB1>;/
   <U1FB3>;<U1FBE>;<U1FC3>;<U1FD0>;<U1FD1>;<U1FE0>;<U1FE1>;<U1FE5>;/
   <U1FF3>;/
% LETTERLIKE SYMBOLS/
   <U214E>;/
% NUMBER FORMS/
   <U2170>..<U217F>;<U2188>;/
% ENCLOSED ALPHANUMERICS/
   <U24D0>..<U24E9>;/
% GLAGOLITIC/
   <U2C30>..<U2C5E>;/
% LATIN EXTENDED-C/
   <U2C61>;<U2C65>;<U2C66>..(2)..<U2C6C>;<U2C71>;<U2C73>;<U2C74>;/
   <U2C76>..<U2C7A>;/
% COPTIC/
   <U2C81>..(2)..<U2CE3>;/
% GEORGIAN SUPPLEMENT/
% well, there are three georgian blocks defined; one caseless (the one usually/
% used), one defined as uppercase and one as lowercase. defining the lowercase one here/
   <U2D00>..<U2D25>;/
% CYRILLIC SUPPLEMENT 2/
   <UA641>..(2)..<UA65F>;<UA663>..(2)..<UA66D>;<UA681>..(2)..<UA697>;/
% LATIN EXTENDED-D/
   <UA723>..(2)..<UA72F>;<UA730>;<UA731>..(2)..<UA76F>;<UA771>..<UA778>;/
   <UA77A>..(2)..<UA77C>;<UA77F>..(2)..<UA787>;<UA78C>;/
% HALFWIDTH AND FULLWIDTH FORMS/
   <UFF41>..<UFF5A>;/
% DESERET/
   <U00010428>..<U0001044F>

% The "alpha" class of the "i18n" FDCC-set is reflecting
% the recommendations in TR 10176 annex A
alpha /
% BASIC LATIN/
   <U0041>..<U005A>;<U0061>..<U007A>;/
% LATIN-1 SUPPLEMENT/
   <U00AA>;<U00B5>;<U00BA>;<U00C0>..<U00D6>;<U00D8>..<U00F6>;/
   <U00F8>..<U00FF>;/
% LATIN EXTENDED-A/
   <U0100>..<U017F>;/
% LATIN EXTENDED-B/
   <U0180>..<U024F>;/
% IPA EXTENSIONS/
   <U0250>..<U02AF>;/
% SPACING MODIFIER LETTERS/
   <U02B0>..<U02C1>;<U02C6>..<U02D1>;<U02E0>..<U02E4>;/
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```
   <U02EE>;/
% COMBINING DIACRITICAL MARKS/
   <U0345>;/
% BASIC GREEK/
   <U0370>..<U0373>;<U0376>..<U0377>;<U037A>..<U037D>;<U0386>;/
   <U0388>..<U038A>;<U038C>;<U038E>..<U03A1>;/
   <U03A3>..<U03CE>;/
% GREEK SYMBOLS AND COPTIC/
   <U03D0>..<U03F5>;<U03F7>..<U03FF>;/
% CYRILLIC/
   <U0400>..<U0481>;<U048A>..<U04FF>;/
% CYRILLIC SUPPLEMENT/
   <U0500>..<U0523>;/
% ARMENIAN/
   <U0531>..<U0556>;<U0559>;<U0561>..<U0587>;/
% HEBREW/
   <U05D0>..<U05EA>;<U05F0>..<U05F2>;/
% ARABIC/
   <U0621>..<U064A>;<U066E>..<U066F>;<U0671>..<U06D3>;/
   <U06D5>;<U06E5>..<U06E6>;<U06EE>..<U06EF>;<U06FA>..<U06FC>;<U06FF>;/
% SYRIAC/
   <U0710>;<U0712>..<U072F>;<U074D>..<U074F>;/
% ARABIC SUPPLEMENT/
   <U0750>..<U077F>;/
% THAANA/
   <U0780>..<U07A5>;<U07B1>;/
% NKO/
   <U07C0>..<U07EA>;<U07F4>..<U07F5>;<U07FA>;/
% - All Matras of Indic and Sinhala are moved from punct to alpha class/
% - Added Unicode 5.1 charctares of Indic scripts/
% DEVANAGARI/
   <U0901>..<U0939>;<U093C>..<U094D>;/
   <U0950>..<U0954>;<U0958>..<U0961>;/
   <U0962>;<U0963>;<U0972>;<U097B>..<U097F>;/
% TABLE 18 BENGALI/
   <U0981>..<U0983>;<U0985>..<U098C>;<U098F>;<U0990>;<U0993>..<U09A8>;/
   <U09AA>..<U09B0>;<U09B2>;<U09B6>..<U09B9>;<U09BC>..<U09C4>;/
   <U09C7>;<U09C8>;<U09CB>..<U09CE>;<U09D7>;/
   <U09DC>;<U09DD>;<U09DF>..<U09E3>;<U09F0>..<U09FA>;/
% GURMUKHI/
   <U0A01>..<U0A03>;<U0A05>..<U0A0A>;<U0A0F>;<U0A10>;<U0A13>..<U0A28>;/
   <U0A2A>..<U0A30>;<U0A32>;<U0A33>;<U0A35>;<U0A36>;<U0A38>;<U0A39>;/
   <U0A3C>;<U0A3E>..<U0A42>;<U0A47>;<U0A48>;<U0A4B>..<U0A4D>;<U0A51>;/
   <U0A59>..<U0A5C>;<U0A5E>;<U0A70>..<U0A75>;/
% GUJARATI/
   <U0A81>..<U0A83>;/
   <U0A85>..<U0A8D>;<U0A8F>..<U0A91>;<U0A93>..<U0AA8>;/
   <U0AAA>..<U0AB0>;<U0AB2>;<U0AB3>;<U0AB5>..<U0AB9>;<U0ABC>..<U0AC5>;/
   <U0AC7>..<U0AC9>;<U0ACB>..<U0ACD>;/
   <U0AD0>;<U0AE0>..<U0AE3>;<U0AF1>;/
% ORIYA/
   <U0B01>..<U0B03>;<U0B05>..<U0B0C>;<U0B0F>;<U0B10>;<U0B13>..<U0B28>;/
   <U0B2A>..<U0B30>;<U0B32>;<U0B33>;<U0B35>..<U0B39>;<U0B3C>..<U0B44>;/
   <U0B47>..<U0B48>;<U0B4B>..<U0B4D>;<U0B56>..<U0B57>;<U0B5C>;<U0B5D>;/
   <U0B5F>..<U0B63>;<U0B70>;<U0B71>;/
% TAMIL/
   <U0B82>;<U0B83>;<U0B85>..<U0B8A>;<U0B8E>..<U0B90>;<U0B92>..<U0B95>;<U0B99>;/
   <U0B9A>;<U0B9C>;<U0B9E>;<U0B9F>;<U0BA3>;<U0BA4>;<U0BA8>..<U0BAA>;/
   <U0BAE>..<U0BB9>;<U0BBE>..<U0BC2>;<U0BC6>..<U0BC8>;<U0BCA>..<U0BCD>;/
  <U0BD0>;<U0BD7>;<U0BF0>..<U0BFA>;/
% TELUGU/
   <U0C01>..<U0C03>;<U0C05>..<U0C0C>;<U0C0E>..<U0C10>;<U0C12>..<U0C28>;/
   <U0C2A>..<U0C33>;<U0C35>..<U0C39>;<U0C3D>..<U0C44>;<U0C46>..<U0C48>;/
   <U0C4A>..<U0C4D>;<U0C55>..<U0C56>;<U0C58>..<U0C59>;<U0C60>..<U0C63>;/
% KANNADA/
   <U0C82>..<U0C83>;<U0C85>..<U0C8C>;<U0C8E>..<U0C90>;<U0C92>..<U0CA8>;/
   <U0CAA>..<U0CB3>;<U0CB5>..<U0CB9>;<U0CBC>..<U0CC4>;<U0CC6>..<U0CC8>;<U0CCA>..<U0CCD>;/
   <U0CD5>..<U0CD6>;<U0CDE>;<U0CE0>..<U0CE3>;<U0CF1>;<U0CF2>;/
% MALAYALAM/
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   <U0D02>..<U0D03>;<U0D05>..<U0D0C>;<U0D0E>..<U0D10>;<U0D12>..<U0D28>;/
   <U0D2A>..<U0D39>;<U0D3D>..<U0D44>;/
   <U0D46>..<U0D48>;<U0D4A>..<U0D4D>;<U0D57>;/
   <U0D60>..<U0D63>;<U0D79>..<U0D7F>;/
% SINHALA/
   <U0D82>..<U0D83>;<U0D85>..<U0D96>;<U0D9A>..<U0DB1>;<U0DB3>..<U0DBB>;<U0DBD>;/
   <U0DC0>..<U0DC6>;<U0DCA>;/
   <U0DCF>..<U0DD4>;<U0DD6>;<U0DD8>..<U0DDF>;<U0DF2>..<U0DF4>;/
% THAI/
   <U0E01>..<U0E2E>;<U0E30>..<U0E3A>;<U0E40>..<U0E45>;<U0E47>..<U0E4E>;/
% LAO/
   <U0E81>..<U0E82>;<U0E84>;<U0E87>..<U0E88>;<U0E8A>;<U0E8D>;/
   <U0E94>..<U0E97>;<U0E99>..<U0E9F>;<U0EA1>..<U0EA3>;<U0EA5>;<U0EA7>;/
   <U0EAA>..<U0EAB>;<U0EAD>..<U0EB0>;<U0EB2>..<U0EB3>;<U0EBD>;/
   <U0EC0>..<U0EC4>;<U0EC6>;<U0EDC>..<U0EDD>;/
% TIBETAN/
   <U0F00>;<U0F40>..<U0F47>;<U0F49>..<U0F6C>;<U0F88>..<U0F8B>;/
% MYANMAR/
   <U1000>..<U102A>;<U1050>..<U1055>;<U105A>..<U105D>;<U1061>;<U0165>;/
   <U1066>;<U106E>..<U1070>;<U1075>..<U1081>;<U108E>;/
% GEORGIAN/
   <U10A0>..<U10C5>;<U10D0>..<U10FA>;<U10FC>;/
% HANGUL JAMO/
   <U1100>..<U1159>;<U115F>..<U11A2>;<U11A8>..<U11F9>;/
% ETHIOPIC/
   <U1200>..<U1248>;<U124A>..<U124D>;/
   <U1250>..<U1256>;<U1258>;<U125A>..<U125D>;<U1260>..<U1288>;/
   <U128A>..<U128D>;<U1290>..<U12B0>;<U12B2>..<U12B5>;/
   <U12B8>..<U12BE>;<U12C0>;<U12C2>..<U12C5>;<U12C8>..<U12D6>;/
   <U12D8>..<U1310>;/
   <U1312>..<U1315>;<U1318>..<U135A>;/
% ETHIOPIC EXTENDED/
   <U1380>..<U138F>;/
% CHEROKEE/
   <U13A0>..<U13F4>;/
% UNIFIED CANADIAN ABORIGINAL SYLLABICS/
   <U1401>..<U166C>;<U166F>..<U1676>;/
% OGHAM/
   <U1681>..<U169A>;/
% RUNIC/
   <U16A0>..<U16EA>;<U16EE>..<U16F0>;/
% TAGALOG/
   <U1700>..<U170C>;<U170E>..<U1711>;/
% HANUNOO/
   <U1720>..<U1731>;/
% BUHID/
   <U1740>..<U1751>;/
% TAGBANWA/
   <U1760>..<U176C>;<U176E>..<U1770>;/
% KHMER/
   <U1780>..<U17B3>;<U17D7>;<U17DC>;/
% MONGOLIAN/
   <U1820>..<U1877>;<U1880>..<U18A8>;<U18AA>;/
% LIMBU/
   <U1900>..<U191C>;<U1946>..<U194F>;/
% TAI LE/
   <U1950>..<U196D>;<U1970>..<U1974>;/
% NEW TAI LUE/
   <U1980>..<U19A9>;<U19C1>..<U19C7>;<U19D0>..<U19D9>;/
% BUGINESE/
   <U1A00>..<U1A16>;/
% BALINESE/
   <U1B05>..<U1B33>;<U1B45>..<U1B4B>;<U1B50>..<U1B59>;/
% SUNDANESE/
   <U1B83>..<U1BA0>;<U1BAE>..<U1BAF>;/
% LEPCHA/
   <U1C00>..<U1C23>;<U1C4D>..<U1C4F>;/
% OL CHIKI/
   <U1C5A>..<U1C7D>;/
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```
% PHONETIC EXTENSIONS/
   <U1D00>..<U1DBF>;/
% LATIN EXTENDED ADDITIONAL/
   <U1E00>..<U1E9F>;<U1EA0>..<U1EFF>;/
% GREEK EXTENDED/
   <U1F00>..<U1F15>;<U1F18>..<U1F1D>;<U1F20>..<U1F45>;<U1F48>..<U1F4D>;/
   <U1F50>..<U1F57>;<U1F59>;<U1F5B>;<U1F5D>;<U1F5F>..<U1F7D>;/
   <U1F80>..<U1FB4>;<U1FB6>..<U1FBC>;<U1FBE>;<U1FC2>..<U1FC4>;/
   <U1FC6>..<U1FCC>;<U1FD0>..<U1FD3>;<U1FD6>..<U1FDB>;<U1FE0>..<U1FEC>;/
   <U1FF2>..<U1FF4>;<U1FF6>..<U1FFC>;/
% SUPERSCRIPTS AND SUBSCRIPTS/
   <U2071>;<U207F>;<U2090>..<U2094>;/
% LETTERLIKE SYMBOLS/
   <U2102>;<U2107>;<U210A>..<U2113>;<U2115>;<U2119>..<U211D>;<U2124>;/
   <U2126>;<U2128>..<U212D>;<U212F>..<U2139>;/
   <U213C>..<U213F>;<U2145>..<U2149>;<U214E>;/
% NUMBER FORMS/
   <U2160>..<U2188>;/
% ENCLOSED ALPHANUMERICS/
   <U249C>..<U24E9>;/
% GLAGOLITIC/
   <U2C00>..<U2C2E>;<U2C30>..<U2C5E>;/
% LATIN EXTENDED-C/
   <U2C60>..<U2C6F>;<U2C71>..<U2C7D>;/
% COPTIC/
   <U2C80>..<U2CE4>;/
% GEORGIAN SUPPLEMENT/
   <U2D00>..<U2D25>;/
% TIFINAGH/
   <U2D30>..<U2D65>;<U2D6F>;/
% ETHIOPIC EXTENDED/
   <U2D80>..<U2D96>;<U2DA0>..<U2DA6>;<U2DA8>..<U2DAE>;<U2DB0>..<U2DB6>;/
   <U2DB8>..<U2DBE>;<U2DC0>..<U2DC6>;<U2DC8>..<U2DCE>;<U2DD0>..<U2DD6>;/
   <U2DD8>..<U2DDE>;/
% CJK SYMBOLS AND PUNCTUATION/
   <U3005>..<U3007>;<U3021>..<U3029>;<U3031>..<U3035>;<U3038>..<U303C>;/
% HIRAGANA/
   <U3041>..<U3096>;<U309D>..<U309F>;/
% KATAKANA/
   <U30A1>..<U30FA>;<U30FC>..<U30FF>;/
% BOPOMOFO/
   <U3105>..<U312D>;/
% HANGUL COMPATIBILITY JAMO/
   <U3131>..<U318E>;/
% BOPOMOFO EXTENDED/
   <U31A0>..<U31B7>;/
% KATAKANA PHONETIC EXTENSIONS/
   <U31F0>..<U31FF>;/
% CJK UNIFIED IDEOGRAPHS EXTENSION/
   <U3400>..<U4DB5>;/
% CJK UNIFIED IDEOGRAPHS/
   <U4E00>..<U9FBB>;/
% YI SYLLABLES/
   <UA000>..<UA48C>;/
% VAI SYLLABLES/
   <UA500>..<UA60B>;<UA610>..<UA61F>;<UA62A>..<UA62B>;/
% CYRILLIC SUPPLEMENT 2/
   <UA640>..<UA65F>;<UA662>..<UA66E>;<UA680>..<UA697>;/
% LATIN EXTENDED-D/
   <UA717>..<UA71F>;<UA722>..<UA78C>;<UA7FB>..<UA7FF>;/
% SYLOTI NEGRI/
   <UA800>;<UA801>;<UA803>..<UA805>;<UA807>..<UA80A>;<UA80C>..<UA822>;/
% PHAGS PA/
   <UA840>..<UA873>;/
% SAURASHTRA/
   <UA882>..<UA8B3>;/
% KAYAH LI/
   <UA90A>..<UA92D>;/
% REJANG/
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   <UA930>..<UA946>;/
% CHAM/
   <UAA00>..<UAA28>;<UAA40>..<UAA42>;<UAA44>..<UAA4B>;/
% HANGUL SYLLABLES/
   <UAC00>..<UD7A3>;/
% CJK COMPATIBILITY IDEOGRAPHS/
   <UF900>..<UFA2D>;<UFA30>..<UFA6A>;/
   <UFA70>..<UFAD9>;/
% ALPHABETIC PRESENTATION FORMS/
   <UFB00>..<UFB06>;<UFB13>..<UFB17>;<UFB1D>;<UFB1F>..<UFB28>;/
   <UFB2A>..<UFB36>;<UFB38>..<UFB3C>;<UFB3E>;<UFB40>;<UFB41>;<UFB43>;/
   <UFB44>;<UFB46>..<UFB4F>;/
% ARABIC PRESENTATION FORMS-A/
   <UFB50>..<UFBB1>;<UFBD3>..<UFD3D>;<UFD50>..<UFD8F>;<UFD92>..<UFDC7>;/
   <UFDF0>..<UFDFB>;/
% ARABIC PRESENTATION FORMS-B/
   <UFE70>..<UFE74>;<UFE76>..<UFEFC>;/
% HALFWIDTH AND FULLWIDTH FORMS/
   <UFF21>..<UFF3A>;<UFF41>..<UFF5A>;<UFF66>..<UFFBE>;<UFFC2>..<UFFC7>;/
   <UFFCA>..<UFFCF>;<UFFD2>..<UFFD7>;<UFFDA>..<UFFDC>;/
% LINEAR B SYLLABARY/
   <U00010000>..<U0001000B>;<U0001000D>..<U00010026>;/
   <U00010028>..<U0001003A>;<U0001003C>..<U0001003D>;/
   <U0001003F>..<U0001004D>;<U00010050>..<U0001005D>;/
% LINEAR B IDEOGRAMS/
   <U00010080>..<U000100FA>;/
% ANCIENT GREEK NUMBERS/
   <U00010140>..<U00010174>;/
% LYCIAN/
   <U00010280>..<U0001029C>;/
% CARIAN/
   <U000102A0>..<U000102D0>;/
% OLD ITALIC/
   <U00010300>..<U0001031E>;/
% GOTHIC/
   <U00010330>..<U0001034A>;/
% UGARITIC/
   <U00010380>..<U0001039D>;/
% OLD PERSIAN/
   <U000103A0>..<U000103C3>;<U000103C8>..<U000103CF>;/
   <U000103D1>..<U000103D5>;/
% DESERET/
   <U00010400>..<U0001044F>;/
% SHAVIAN/
   <U00010450>..<U0001047F>;/
% OSMANYA/
   <U00010480>..<U0001049D>;<U000104A0>..<U000104A9>;/
% CYPRIOT SYLLABARY/
   <U00010800>..<U00010805>;<U00010808>;<U0001080A>..<U00010835>;/
   <U00010837>..<U00010838>;<U0001083C>;<U0001083F>;/
% PHOENICIAN/
   <U00010900>..<U00010915>;<U00010A00>;<U00010A10>..<U00010A13>;/
% KHAROSHTI/
   <U00010A15>..<U00010A17>;<U00010A19>..<U00010A33>;/
% CUNEIFORM/
   <U00012000>..<U0001236E>;/
% CUNEIFORM NUMBERS AND PONCTUATION/
   <U00012400>..<U00012462>;/
% BYZANTINE MUSICAL SYMBOLS/
% MATHEMATICAL ALPHANUMERIC SYMBOLS/
   <U0001D400>..<U0001D454>;<U0001D456>..<U0001D49C>;/
   <U0001D49E>..<U0001D49F>;<U0001D4A2>;<U0001D4A5>..<U0001D4A6>;/
   <U0001D4A9>..<U0001D4AC>;<U0001D4AE>..<U0001D4B9>;<U0001D4BB>;/
   <U0001D4BD>..<U0001D4C3>;<U0001D4C5>..<U0001D505>;/
   <U0001D507>..<U0001D50A>;<U0001D50D>..<U0001D514>;/
   <U0001D516>..<U0001D51C>;<U0001D51E>..<U0001D539>;/
   <U0001D53B>..<U0001D53E>;<U0001D540>..<U0001D544>;<U0001D546>;/
   <U0001D54A>..<U0001D550>;<U0001D552>..<U0001D6A5>;/
   <U0001D6A8>..<U0001D6C0>;<U0001D6C2>..<U0001D6DA>;/
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   <U0001D716>..<U0001D734>;<U0001D736>..<U0001D74E>;/
   <U0001D750>..<U0001D76E>;<U0001D770>..<U0001D788>;/
   <U0001D78A>..<U0001D7A8>;<U0001D7AA>..<U0001D7C2>;/
   <U0001D7C4>..<U0001D7CB>;<U0001D7CE>..<U0001D7FF>;/
% CJK UNIFIED IDEOGRAPHS EXTENSION/
   <U00020000>..<U0002A6D6>;/
% CJK COMPATIBILITY IDEOGRAPHS SUPPLEMENT/
   <U0002F800>..<U0002FA1D>;/
% The non-ASCII number characters are included here because ISO C 99    /
% forbids us to classify them as digits; however, they behave more like /
% alphanumeric than like punctuation.                                   /
% ARABIC/
   <U0660>..<U0669>;<U06F0>..<U06F9>;/
% DEVANAGARI/
   <U0966>..<U096F>;/
% BENGALI/
   <U09E6>..<U09EF>;/
% GURMUKHI/
   <U0A66>..<U0A6F>;/
% GUJARATI/
   <U0AE6>..<U0AEF>;/
% ORIYA/
   <U0B66>..<U0B6F>;/
% TAMIL/
   <U0BE6>..<U0BEF>;/
% TELUGU/
   <U0C66>..<U0C6F>;<U0C78>..<U0C7F>;/
% KANNADA/
   <U0CE6>..<U0CEF>;/
% MALAYALAM/
   <U0D66>..<U0D75>;<U0D70>..<U0D75>;/
% THAI/
   <U0E50>..<U0E59>;/
% LAO/
   <U0ED0>..<U0ED9>;/
% TIBETAN/
   <U0F20>..<U0F29>;/
% MYANMAR/
   <U1040>..<U1049>;/
% KHMER/
   <U17E0>..<U17E9>;/
% MONGOLIAN/
   <U1810>..<U1819>;/
% SUNDANESE/
   <U1BB0>..<U1BB9>;/
% LEPCHA/
   <U1C40>..<U1C49>;/
% OL CHIKI/
   <U1C50>..<U1C59>;/
% VAI/
   <UA620>..<UA629>;/
% SAURASHTRA/
   <UA8D0>..<UA8D9>;/
% KAYAH LI/
   <UA900>..<UA909>;/
% CHAM/
   <UAA50>..<UAA59>;/
% HALFWIDTH AND FULLWIDTH FORMS/
   <UFF10>..<UFF19>

% The "digit" class must only contain the BASIC LATIN digits, says ISO C 99
% (sections 7.25.2.1.5 and 5.2.1).
digit /
   <U0030>..<U0039>

% The "outdigit" information is by default "0" to "9".  We don't have to
% provide it here since localedef will fill in the bits and it would
% prevent locales copy-ing this file define their own values.
```


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```
% outdigit <U0030>..<U0039>

space /
% ISO/IEC 6429/
   <U0009>..<U000D>;/
% BASIC LATIN/
   <U0020>;/
% OGHAM/
   <U1680>;/
% MONGOL/
   <U180E>;/
% GENERAL PUNCTUATION/
   <U2000>..<U2006>;<U2008>..<U200A>;<U2028>;<U2029>;<U205F>;/
% CJK SYMBOLS AND PUNCTUATION, HIRAGANA/
   <U3000>

cntrl /
   <U0000>..<U001F>;<U007F>..<U009F>;/
% Treat the Line/Paragraph Separators as control characters, like Line Feed./
   <U2028>;<U2029>

punct /
   <U0021>..<U002F>;<U003A>..<U0040>;<U005B>..<U0060>;<U007B>..<U007E>;/
   <U00A0>..<U00A9>;<U00AB>..<U00B4>;<U00B6>..<U00B9>;<U00BB>..<U00BF>;/
   <U00D7>;<U00F7>;<U02C2>..<U02C5>;<U02D2>..<U02DF>;<U02E5>..<U02ED>;/
   <U02EF>..<U0344>;<U0346>..<U036F>;<U0374>..<U0375>;<U037E>;/
   <U0384>..<U0385>;<U0387>;<U03F6>;<U0482>..<U0486>;<U0488>..<U0489>;/
   <U055A>..<U055F>;<U0589>..<U058A>;<U0591>..<U05C7>;<U05F3>..<U05F4>;/
   <U0600>..<U0603>;<U060B>..<U061B>;<U061E>..<U061F>;/
   <U064B>..<U065E>;<U066A>..<U066D>;<U0670>;<U06D4>;<U06D6>..<U06E4>;/
   <U06E7>..<U06ED>;<U06FD>..<U06FE>;<U0700>..<U070D>;<U070F>;<U0711>;/
   <U0730>..<U074A>;<U07A6>..<U07B0>;<U07EB>..<U07F3>;<U07F6>..<U07F9>;/
   <U0964>;<U0965>;/
   <U0E2F>;/
   <U0E3F>;<U0E46>;<U0E4F>;<U0E5A>..<U0E5B>;<U0EB1>;<U0EB4>..<U0EB9>;/
   <U0EBB>..<U0EBC>;<U0EC8>..<U0ECD>;<U0F01>..<U0F1F>;<U0F2A>..<U0F3F>;/
   <U0F71>..<U0F87>;<U0F90>..<U0F97>;<U0F99>..<U0FBC>;<U0FBE>..<U0FCC>;/
   <U0FCE>..<U0FD4>;<U102B>..<U103F>;<U104A>..<U104F>;<U1056>..<U1059>;/
   <U105E>..<U1060>;<U1062>..<U1064>;<U1067>..<U106D>;<U1071>..<U1074>;/
   <U1082>..<U108D>;<U108F>..<U1099>;<U109E>;<U109F>;/
   <U10FB>;<U135F>..<U137C>;<U1390>..<U1399>;/
   <U166D>..<U166E>;<U169B>..<U169C>;<U16EB>..<U16ED>;<U1712>..<U1714>;/
   <U1732>..<U1736>;<U1752>..<U1753>;<U1772>..<U1773>;<U17B4>..<U17D6>;/
   <U17D8>..<U17DB>;<U17DD>;<U17F0>..<U17F9>;<U1800>..<U180D>;<U18A9>;/
   <U1920>..<U192B>;<U1930>..<U193B>;<U1940>;<U1944>..<U1945>;/
   <U19B0>..<U19C0>;<U19C8>..<U19C9>;<U19DE>..<U19FF>;<U1A17>..<U1A1B>;/
   <U1A1E>..<U1A1F>;<U1B00>..<U1B04>;<U1B34>..<U1B44>;<U1B5A>..<U1B7C>;/
   <U1B80>..<U1B82>;<U1BA1>..<U1BAA>;<U1C24>..<U1C37>;<U1C3B>..<U1C3F>;/
   <U1C7E>..<U1C7F>;/
   <U1DC0>..<U1DE6>;<U1DFE>..<U1DFF>;<U1FBD>;<U1FBF>..<U1FC1>;/
   <U1FCD>..<U1FCF>;<U1FDD>..<U1FDF>;<U1FED>..<U1FEF>;<U1FFD>..<U1FFE>;/
   <U2007>;<U200B>..<U2027>;<U202A>..<U205E>;<U2060>..<U2064>;/
   <U206A>..<U2070>;<U2074>..<U207E>;<U2080>..<U208E>;<U20A0>..<U20B5>;/
   <U20D0>..<U20F0>;<U2100>..<U2101>;<U2103>..<U2106>;<U2108>..<U2109>;/
   <U2114>;<U2116>..<U2118>;<U211E>..<U2123>;<U2125>;<U2127>;<U212E>;/
   <U213A>..<U213B>;<U2140>..<U2144>;<U214A>..<U214D>;<U2153>..<U215F>;/
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   <U24EA>..<U269D>;<U26A0>..<U26C3>;<U2701>..<U2704>;<U2706>..<U2709>;/
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   <U27C0>..<U27CA>;<U27CC>;<U27D0>..<U27EF>;<U27F0>..<U2B4C>;/
   <U2B50>..<U2B54>;<U2DE0>..<U2DFF>;/
   <U2CE5>..<U2CEA>;<U2CF9>..<U2CFF>;<U2E00>..<U2E30>;/
   <U2E80>..<U2E99>;<U2E9B>..<U2EF3>;<U2F00>..<U2FD5>;<U2FF0>..<U2FFB>;/
   <U3001>..<U3004>;<U3008>..<U3020>;<U302A>..<U3030>;<U3036>..<U3037>;/
   <U303D>..<U303F>;<U3099>..<U309C>;<U30A0>;<U30FB>;<U3190>..<U319F>;/
   <U31C0>..<U31CF>;<U3200>..<U321E>;<U3220>..<U3243>;<U3250>..<U32FE>;/
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   <UA66F>..<UA673>;<UA67C>..<UA67F>;<UA700>..<UA716>;/
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   <UFDFC>..<UFDFD>;<UFE00>..<UFE19>;<UFE20>..<UFE26>;<UFE30>..<UFE52>;/
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   <U00010A3F>..<U00010A47>;<U00010A50>..<U00010A58>;/
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   <U000E0001>;<U000E0020>..<U000E007F>;<U000E0100>..<U000E01EF>;/
   <U000F0000>..<U000FFFFD>;<U00100000>..<U0010FFFD>

graph /
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   <U0384>..<U038A>;<U038C>;<U038E>..<U03A1>;<U03A3>..<U0486>;/
   <U0488>..<U0523>;<U0531>..<U0556>;<U0559>..<U055F>;/
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   <U097B>..<U097F>;<U0981>..<U0983>;<U0985>..<U098C>;<U098F>..<U0990>;/
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   <U0B66>..<U0B71>;<U0B82>..<U0B83>;<U0B85>..<U0B8A>;<U0B8E>..<U0B90>;/
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   <U0BC6>..<U0BC8>;<U0BCA>..<U0BCD>;<U0BD0>;<U0BD7>;<U0BE6>..<U0BFA>;/
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   <U0C66>..<U0C6F>;<U0C78>..<U0C7F>;/
   <U0C82>..<U0C83>;<U0C85>..<U0C8C>;<U0C8E>..<U0C90>;<U0C92>..<U0CA8>;/
   <U0CAA>..<U0CB3>;<U0CB5>..<U0CB9>;<U0CBC>..<U0CC4>;<U0CC6>..<U0CC8>;/
   <U0CCA>..<U0CCD>;<U0CD5>..<U0CD6>;<U0CDE>;<U0CE0>..<U0CE3>;/
   <U0CE6>..<U0CEF>;<U0CF1>..<U0CF2>;<U0D02>..<U0D03>;<U0D05>..<U0D0C>;/
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   <U0D66>..<U0D75>;<U0D79>..<U0D7F>;<U0D82>..<U0D83>;<U0D85>..<U0D96>;/
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   <U0E47>..<U0E4E>;<U0EB1>;<U0EB4>..<U0EB9>;<U0EBB>..<U0EBC>;/
   <U0EC8>..<U0ECD>;<U0F18>..<U0F19>;<U0F35>;<U0F37>;<U0F39>;/
   <U0F3E>..<U0F3F>;<U0F71>..<U0F84>;<U0F86>..<U0F87>;<U0F90>..<U0F97>;/
   <U0F99>..<U0FBC>;<U0FC6>;<U102B>..<U103F>;/
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   <U1071>..<U1074>;<U1082>..<U108D>;<U108F>;/
   <U135F>;<U1712>..<U1714>;<U1732>..<U1734>;/
   <U1752>..<U1753>;<U1772>..<U1773>;<U17B6>..<U17D3>;<U17DD>;/
   <U180B>..<U180D>;<U18A9>;<U1920>..<U192B>;<U1930>..<U193B>;/
   <U19B0>..<U19C0>;<U19C8>..<U19C9>;<U1A17>..<U1A1B>;<U1B00>..<U1B04>;/
   <U1B34>..<U1B44>;<U1B6B>..<U1B73>;<U1DC0>..<U1DE6>;<U1DFE>..<U1DFF>;/
   <U20D0>..<U20F0>;<U2DE0>..<U2DFF>;<U302A>..<U302F>;<U3099>..<U309A>;/
   <UA66F>..<UA672>;<UA67C>;<UA67D>;<UA802>;<UA806>;/
   <UA80B>;<UA823>..<UA827>;<UFB1E>;<UFE00>..<UFE0F>;<UFE20>..<UFE26>;/
   <U00010A01>..<U00010A03>;<U00010A05>..<U00010A06>;/
   <U00010A0C>..<U00010A0F>;<U00010A38>..<U00010A3A>;<U00010A3F>;/
   <U0001D165>..<U0001D169>;<U0001D16D>..<U0001D172>;/
   <U0001D17B>..<U0001D182>;<U0001D185>..<U0001D18B>;/
   <U0001D1AA>..<U0001D1AD>;<U0001D242>..<U0001D244>;/
   <U000E0100>..<U000E01EF>


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   <U05C1>..<U05C2>;<U05C7>;<U064B>..<U0652>;<U0670>;<U06DE>;<U0711>;/
   <U07A6>..<U07B0>;<U0901>..<U0903>;<U093C>;<U093E>..<U094D>;/
   <U0962>..<U0963>;<U0981>..<U0983>;<U09BC>;<U09BE>..<U09C4>;/
```

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