

IDNABIS
Internet-Draft
Intended status: Standards Track
Expires: March 7, 2010

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September 3, 2009

Mapping Characters in IDNA
draft-ietf-idnabis-mappings-04

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Internet-Draft

IDNA Mapping

September 2009

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Abstract

In the original version of the Internationalized Domain Names in Applications (IDNA) protocol, any Unicode code points taken from user input were mapped into a set of Unicode code points that "make sense", which were then encoded and passed to the domain name system (DNS). The current version of IDNA presumes that the input to the protocol comes from a set of "permitted" code points, which it then encodes and passes to the DNS, but does not specify what to do with the result of user input. This document describes the actions that can be taken by an implementation between user input and passing permitted code points to the new IDNA protocol.

1. Introduction

This document describes the operations that can be applied to user input in order to get it into a form acceptable by the Internationalized Domain Names in Applications (IDNA) protocol [[I-D.ietf-idnabis-protocol](#)]. A general implementation procedure for mapping is given in [section 2](#).

It should be noted that this document does not specify the behavior of a protocol that appears "on the wire". It describes an operation that is to be applied to user input in order to prepare that user input for use in an "on the network" protocol. As unusual as this may be for an IETF protocol document, it is a necessary operation to maintain interoperability.

2. The General Procedure

This section defines a general algorithm that applications ought to implement in order to produce Unicode code points that will be valid under the IDNA protocol. An application might implement the full mapping as described below, or can choose a different mapping. In fact, an application might want to implement a full mapping that is

substantially compatible with the original IDNA protocol instead of the algorithm given here.

The general algorithm that an application (or the input method provided by an operating system) ought to use is relatively

straightforward:

1. Upper case characters are mapped to their lower case equivalents by using the algorithm for mapping case in Unicode characters.
2. Full-width and half-width characters (those defined with Decomposition Types <wide> and <narrow>) are mapped to their decomposition mappings as shown in the Unicode character database.
3. All characters are mapped using Unicode Normalization Form C (NFC).
4. [[I-D.ietf-idnabis-protocol](#)] is specified such that the protocol acts on the individual labels of the domain name. If an implementation of this mapping is also performing the step of separation of the parts of a domain name into labels by using the FULL STOP character (U+002E), the following character can be mapped to the FULL STOP before label separation occurs:

* IDEOGRAPHIC FULL STOP (U+3002)

There are other characters that are used as "full stops" that one could consider mapping as label separators, but their use as such has not been investigated thoroughly.

Definitions for the rules in this algorithm can be found in [[Unicode51](#)]. Specifically:

- o Unicode Normalization Form C can be found in Annex #15 of [[Unicode51](#)].
- o In order to map upper case characters to their lower case equivalents (defined in section 3.13 of [[Unicode51](#)]), first map characters to the "Lowercase_Mapping" property (the "<lower>" entry in the second column) in

<<http://www.unicode.org/Public/UNIDATA/SpecialCasing.txt>>, if any. Then, map characters to the "Simple_Lowercase_Mapping" property (the fourteenth column) in <<http://www.unicode.org/Public/UNIDATA/UnicodeData.txt>>, if any.

- o In order to map full-width and half-width characters to their decomposition mappings, map any character whose "Decomposition_Type" (contained in the first part of the sixth column) in <<http://www.unicode.org/Public/UNIDATA/UnicodeData.txt>> is either "<wide>" or "<narrow>" to the "Decomposition_Mapping" of that character (contained in the second part of the sixth column) in <<http://www.unicode.org/Public/UNIDATA/UnicodeData.txt>>.

- o The <<http://www.unicode.org/Public/UNIDATA/UCD.html>> web page has useful descriptions of the contents of these files.

If the mappings in this document are applied to versions of Unicode later than Unicode 5.1, the later versions of the Unicode Standard should be consulted.

These form a minimal set of mappings that an application should strongly consider doing. Of course, there are many others that might be done.

[3.](#) IANA Considerations

This memo includes no request to IANA.

[4.](#) Security Considerations

This document suggests creating mappings that might cause confusion for some users while alleviating confusion in other users. Such confusion is not covered in any depth in this document (nor in the other IDNA-related documents).

[5.](#) Acknowledgements

This document is the product of the IDNAbis Working Group and contains contributions from many people in the Working Group.

6. Normative References

[I-D.ietf-idnabis-protocol]

Klensin, J., "Internationalized Domain Names in Applications (IDNA): Protocol",
[draft-ietf-idnabis-protocol-15](#) (work in progress),
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[Unicode51]

The Unicode Consortium, "The Unicode Standard, Version 5.1.0", 2008.

defined by: The Unicode Standard, Version 5.0, Boston, MA, Addison-Wesley, 2007, ISBN 0-321-48091-0, as amended by Unicode 5.1.0

(<<http://www.unicode.org/versions/Unicode5.1.0/>>).

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Expires March 7, 2010

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