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Nameprep: A Stringprep Profile for Internationalized Domain Names (IDN)

Abstract

This document describes how to prepare internationalized domain name (IDN) labels in order to increase the likelihood that name input and name comparison work in ways that make sense for typical users throughout the world. This profile of the stringprep protocol is used as part of a suite of on-the-wire protocols for internationalizing the Domain Name System (DNS).

1. Introduction

This document specifies processing rules that will allow users to enter internationalized domain names (IDNs) into applications and have the highest chance of getting the content of the strings correct. It is a profile of stringprep [[STRINGPREP](#)]. These processing rules are only intended for internationalized domain names, not for arbitrary text.

This profile defines the following, as required by [[STRINGPREP](#)].

- The intended applicability of the profile: internationalized domain names processed by IDNA.
- The character repertoire that is the input and output to stringprep: Unicode 3.2, specified in [section 2](#).
- The mappings used: specified in [section 3](#).
- The Unicode normalization used: specified in [section 4](#).
- The characters that are prohibited as output: specified in [section 5](#).
- Bidirectional character handling: specified in [section 6](#).

1.1 Interaction of protocol parts

Nameprep is used by the IDNA [[IDNA](#)] protocol for preparing domain names; it is not designed for any other purpose. It is explicitly not designed for processing arbitrary free text and SHOULD NOT be used for that purpose. Nameprep is a profile of Stringprep [[STRINGPREP](#)]. Implementations of Nameprep MUST fully implement Stringprep. Specifically, Nameprep mandates a set of steps that

must be executed in the same manner and the same order as they are described in Stringprep.

- 1) Map
- 2) Normalize
- 3) Prohibit
- 4) Check bidi

Nameprep is used to process domain name labels, not domain names. IDNA calls nameprep for each label in a domain name, not for the whole domain name.

1.2 Terminology

The key words "MUST", "MUST NOT", "SHOULD", "SHOULD NOT", and "MAY" in this document are to be interpreted as described in [BCP 14](#), [RFC 2119](#) [[RFC2119](#)].

2. Character Repertoire

This profile uses Unicode 3.2, as defined in [[STRINGPREP](#)] [Appendix A](#).

3. Mapping

This profile specifies mapping using the following tables from [[STRINGPREP](#)]:

Table B.1
Table B.2

4. Normalization

This profile specifies using Unicode normalization form KC, as described in [[STRINGPREP](#)].

5. Prohibited Output

This profile specifies prohibiting using the following tables from [[STRINGPREP](#)]:

Table C.1.2
Table C.2.2
Table C.3
Table C.4
Table C.5
Table C.6
Table C.7
Table C.8
Table C.9

IMPORTANT NOTE: The IDNA protocol has additional prohibitions that are checked outside of this profile.

6. Bidirectional characters

This profile specifies checking bidirectional strings as described in [\[STRINGPREP\] section 6](#).

7. Unassigned Code Points in Internationalized Domain Names

If the processing in [\[IDNA\]](#) specifies that a list of unassigned code points be used, the system uses table A.1 from [\[STRINGPREP\]](#) as its list of unassigned code points.

8. References

8.1 Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [STRINGPREP] Hoffman, P. and M. Blanchet, "Preparation of Internationalized Strings ("stringprep")", [draft-hoffman-rfc3454bis](#).
- [IDNA] Faltstrom, P., Hoffman, P. and A. Costello, "Internationalizing Domain Names in Applications (IDNA)", [draft-hoffman-rfc3490bis](#).

8.2 Informative references

- [STD13] Mockapetris, P., "Domain names - concepts and facilities", STD 13, [RFC 1034](#), and "Domain names - implementation and specification", STD 13, [RFC 1035](#), November 1987.

9. Security Considerations

The Unicode and ISO/IEC 10646 repertoires have many characters that look similar. In many cases, users of security protocols might do visual matching, such as when comparing the names of trusted third parties. Because it is impossible to map similar-looking characters without a great deal of context such as knowing the fonts used, stringprep does nothing to map similar-looking characters together nor to prohibit some characters because they look like others.

Security on the Internet partly relies on the DNS. Thus, any change to the characteristics of the DNS can change the security of much of the Internet.

Domain names are used by users to connect to Internet servers. The security of the Internet would be compromised if a user entering a single internationalized name could be connected to different servers based on different interpretations of the internationalized domain name.

Current applications might assume that the characters allowed in domain names will always be the same as they are in [\[STD13\]](#). This document vastly increases the number of characters available in domain names. Every program that uses "special" characters in conjunction with domain names may be vulnerable to attack based on the new characters allowed by this specification.

[10.](#) IANA Considerations

This is a profile of stringprep. It has been registered by the IANA in the stringprep profile registry (www.iana.org/assignments/stringprep-profiles).

Name of this profile:

Nameprep

RFC in which the profile is defined:

This document.

Indicator whether or not this is the newest version of the profile:

This is the first version of Nameprep.

[11.](#) Acknowledgements

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A. Changes from [RFC 3491](#)

This document is a revision of [RFC 3491](#). None of the changes affect the protocol described in [RFC 3491](#); that is, all implementations of [RFC 3491](#) will be identical with implementations of the specification in this document. The items that have changed [RFC 3491](#) document are:

- In [section 1.1](#), a sentence was added to the end of the first paragraph to make it clear that implementations must follow the same steps in Stringprep, not just use the tables from Stringprep. The numbered list added as well.
- In [section 5](#), removed "This profile MUST be used with the IDNA protocol" because it is expected that other protocols might use this profile as well.