What is Universal Acceptance (UA) of domain names?

Universal Acceptance is the state where all valid domain names and email addresses are accepted, validated, stored, processed and displayed correctly and consistently by all Internet-enabled applications, devices and systems. Due to the rapidly changing domain name landscape, many systems do not recognize or appropriately process new domain names, primarily because they may be more than three characters in length or in a non-ASCII format. The same is true for email addresses that incorporate these new extensions.

The Internet Corporation for Assigned Names and Numbers (ICANN) Universal Acceptance Steering Group (UASG), a community-led, industrywide initiative, is working on creating awareness, identifying and resolving problems associated with Universal Acceptance of Domain Names to help ensure a consistent and positive experience for Internet users globally.

What is a domain name?

A domain name is a text string used as a human-friendly identifier for Internet systems (e.g. www. domain.tld). The top-level domain (TLD), often called "suffix" or "extension," immediately follows the final dot in a domain name (".tld" in the above example). Domain names are also used in email addresses (e.g. user@domain.tld). An email address contains two parts, the local part that is directly before the "@" sign, followed by the domain name after the "@" sign.

Why is Universal Acceptance an issue now?

In the 1980s and 90s, the technical coordination of the Domain Name System (DNS) root zone – where all TLDs are recorded – followed a relatively simple pattern. General use top-level domain names, known as generic top-level domains (gTLDs), were limited to a small number of three-character strings such as ".com" and ".edu." Top-level domains representing countries or territories, known as country code top-level domains (ccTLDs), were limited to two letters. For example, the ccTLD for Japan is ".jp."

> The addition of new top-level domains has shown that developers frequently make over-simplified assumptions when processing domain names.

Beginning in 2001, the Internet community directed ICANN to facilitate the introduction of new TLDs into the DNS root zone, many of which were longer than three characters. In addition, TLDs in different scripts, called Internationalized Domain Names (IDNs), were added to the DNS root zone starting in 2010. An example of an IDN is ".рф" for "Russia" in the Cyrillic script. In 2011, the New gTLD Program was launched, attracting hundreds of applications for new gTLDs (including IDN gTLDs). As of December 2015, over 800 new gTLDs had been added to the root zone, 63 of which were IDNs.

While Universal Acceptance issues are not new, the addition of new TLDs has shown that developers frequently make over-simplified assumptions when processing domain names. This is analogous to the Y2K scenario that faced the technology industry in the late 1990s in that problems existed but were ignored until the potential consequences became too great to do so. Today, advancements in the DNS and the lack of Universal Acceptance are constraining Internet growth, consumer choice and consumer trust of the DNS. The UASG and Internet community must take action now to enable all valid domain names to function properly and support the continued expansion of the Internet.

What advancements in the Domain Name System do developers need to be aware of?

Several changes have occurred that require developers to modify their assumptions about domain names:

- *The set of TLDs changes over time*: Many developers assume that the list of TLDs is relatively static. In reality, this list is changing rapidly and there are now over 1,000 valid TLDs in the root zone.

  Design consideration: Do your systems hard-code a list of valid TLDs? Or do they update periodically from an authoritative source such as IANA? Visit https://www.iana.org/.

- *The length of TLDs varies*: General use TLDs may now be longer than two or three characters in length. In fact, TLDs can be anywhere from two to 63 characters long.

  Design consideration: Do your systems assume that all valid domain names and email addresses have a TLD length of three characters or fewer?

- *Multilingual domain names*: Prior to the introduction of IDNs, the character repertoire for valid domain names was limited to a subset of ASCII (e.g. a-z, 0-9 and hyphen '-').

  Design consideration: Fields that accept domain names as input, such as URLs, email addresses and nameservers, need to accept domain names in different scripts, languages and writing systems (left to right and right to left). Does your software accept, validate, store, process, and display domain names with internationalized characters?

How are domain names verified?

If an application has access to the Internet, a straightforward way to verify domain names is simply to perform a DNS query. No filtering is required. This ensures the most accurate and up-to-date data is returned from the most authoritative source – the Domain Name System itself.

If it's not possible to use the DNS directly for validation, ICANN provides guidance on alternative methods. For example, the program could use a regularly updated list of valid top-level domains to perform the check. ICANN offers sample programming code that software developers can use for this purpose under an open source license at: https://github.com/icann.

What are some Do's & Don'ts developers should be aware of?

- *DO* use an IDN library to properly identify and handle Internationalized Domain Names. IDN support requires the application of specific algorithms to convert between an ASCII-encoded version of the name (A-Label) and a Unicode version (U-Label). There are many software libraries that can be used to implement this functionality. Make sure the library supports the most current standards (e.g. IDNA2008), as older standards introduce compatibility issues.

- *DO* make sure TLD lists are updated at least once per week using appropriate methodology. ICANN provides an authoritative source at: http://www.iana.org/domains/root/db.

- *DO* avoid over-simplification of assumptions. The Universal Acceptance Steering Group can provide advice to software developers and implementers on what is needed. Contact us at: tld-acceptance@icann.org or join the discussion at https://mm.icann.org/mailman/listinfo/ua-discuss.

- DO NOT use a hard-coded list of TLDs in the application. The recommended practice to verify the existence of a domain name is to query the DNS directly. A live DNS query happens very quickly and will provide the most accurate data available.

- *DO NOT* rely on the length of a domain to determine validity. Strings can be up to 63 characters long.

More information

To learn more about the effort, visit us at: http://www.icann.org/universalacceptance.
To share your ideas and suggestions on the topic email us at: tld-acceptance@icann.org.