IDN and applications

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IDN is the first step

- IDN solves a DNS limitation by carrying extended domain entities within the existing framework
- But most users interact with resources, not host names: IRI anyone?
- Resource naming policies
- Legacy support
- Security

Resource Identification today is:

- URI (universal Resource Identifier)
    - ASCII only
    - Weak escaping mechanism (No or limited escaping reversibility)
    - No full interoperability for charset escaping
- De facto Internationalized URI
    - Non IDN conformant (lack of filters, case folding not addressed)
    - Bidirectional rules not addressed
    - No rules for conversion between ASCII and larger repertoires

Internationalized Resource Identifiers (IRI)

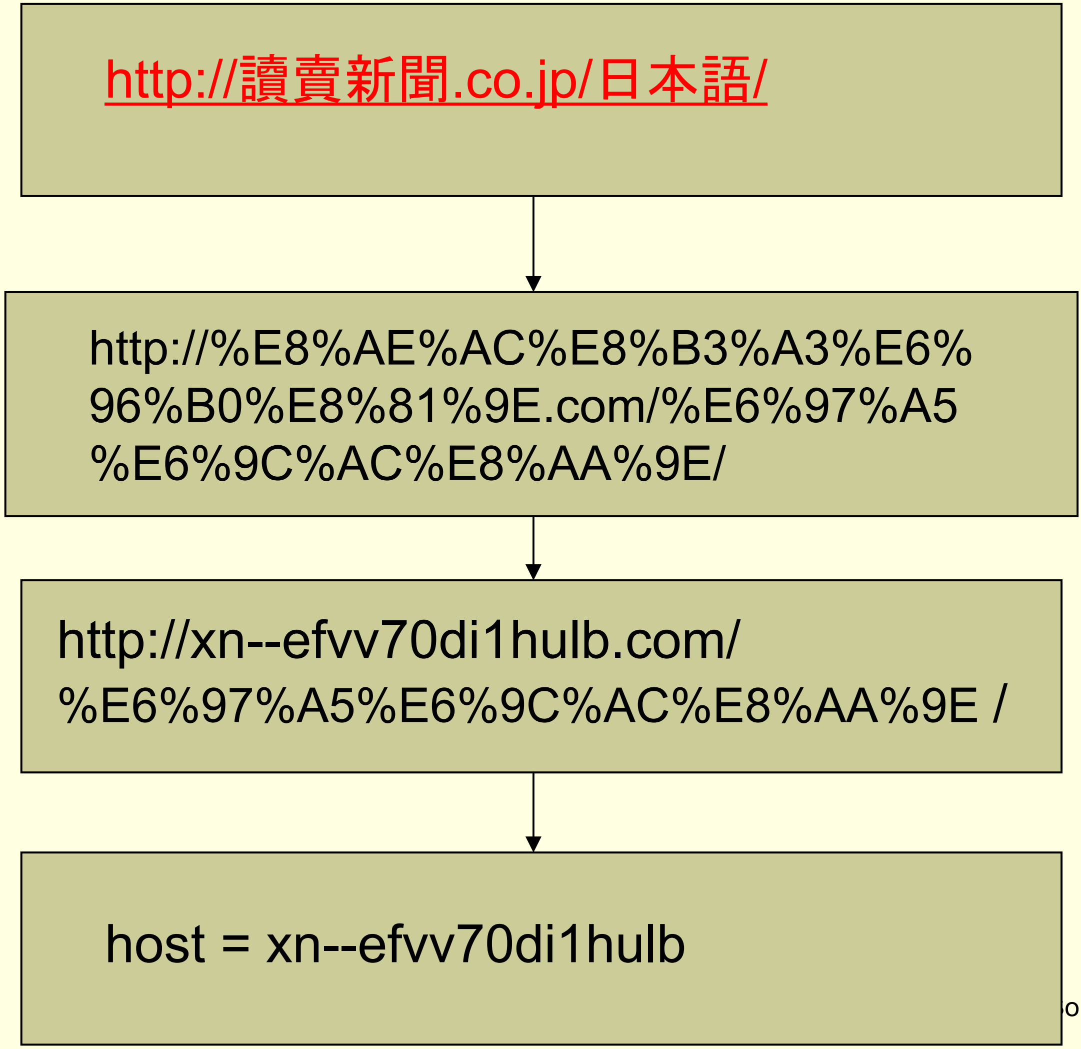
- Specifies internationalized protocol element
- Covers character encoded and un-encoded scenarios (side of the Bus case, movie credit, etc…)
- Fully specified mapping to URI
- Support Bidirectional (Hebrew-Arabic) scenarios
- Anchored on Unicode 4.0 / ISO/IEC 10646:2003
- Unicode Normalized (more for host)
- Related to IDN through the ‘authority’ component

http://讀賣新聞.co.jp/日本語/

IRI usage

- Existing schemes (http, ftp, mailto) should not use it directly
- Protocol element for new protocol or presentation element for presentation layer of existing protocols
- De facto usage in Browser address bars (URI presentation layer)
- Already implied by many XML languages/protocols (anyURI schema type)

Usage scenario for http



http://讀賣新聞.co.jp/日本語/

Presentation layer

http://%E8%AE%AC%E8%B3%A3%E6%96%B0%E8%81%9E.com/%E6%97%A5%E6%9C%AC%E8%AA%9E/

http protocol layer
(utf-8 escaped host)

http://xn--efvv70di1hulb.com/%E6%97%A5%E6%9C%AC%E8%AA%9E /

http protocol layer
(Punycode encoded host)

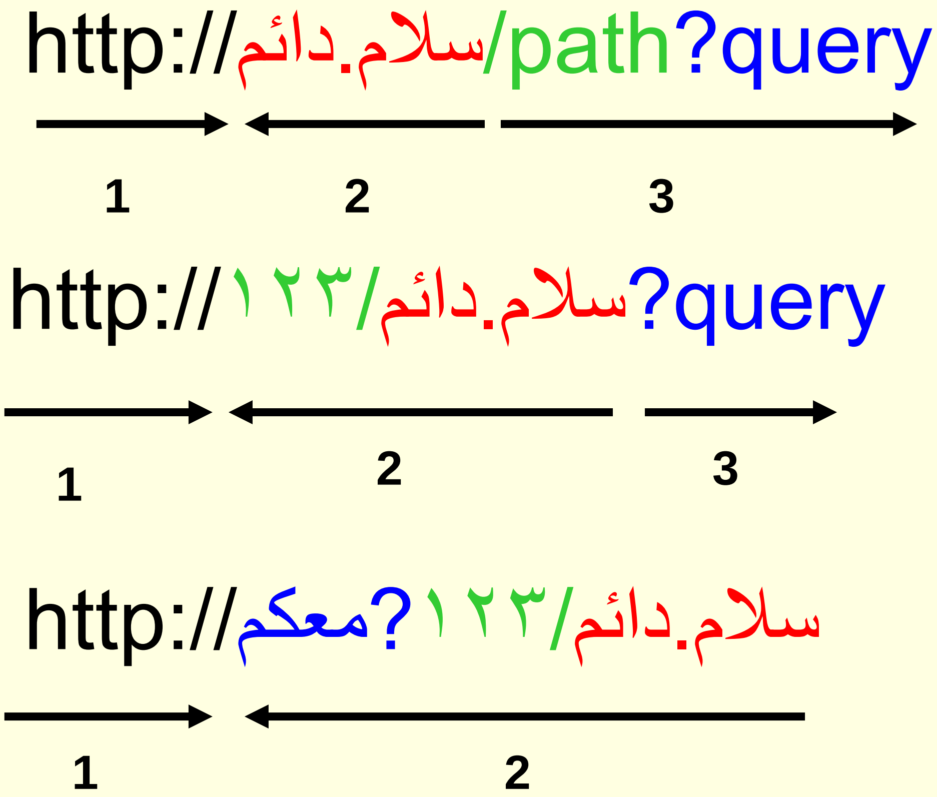
host = xn--efvv70di1hulb

DNS Resolver

Bidirectional IRIs

- Use logical order (not visual order)
- Presented as if embedded Left to Right
  - Avoid reordering interaction with characters preceding and following the IRI
- Restrictions on host names:
  - Label cannot use both RtL and LtR characters,
  - Label using Rtl Characters must start and end with them.
- Same restrictions should be applied to other IRI components, exceptions:
  - Opaque IRIs (never seen by users)
  - Query components (may be free format)

Bidirectional examples



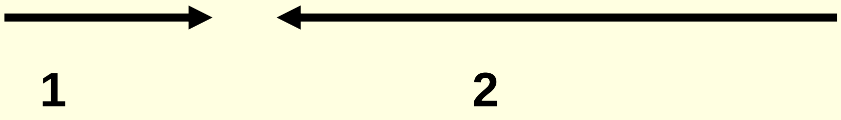
http://سلام.دائم/path?query

http://سلام.دائم/١٢٣?query

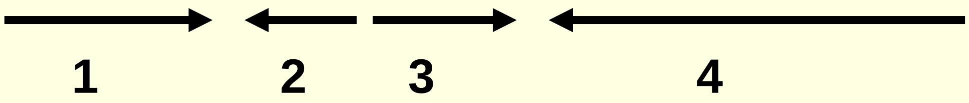
http://سلام.دائم/١٢٣?معكم

Bidirectional examples (continued)

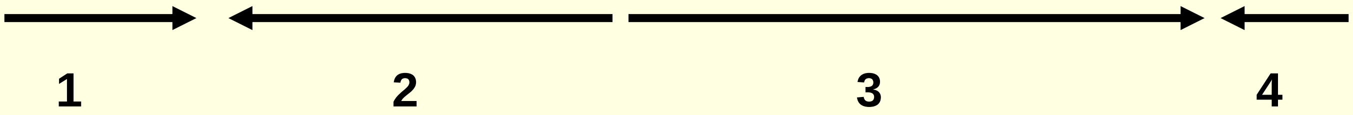
http://سلام.دائم/١٢٣?معكم



http://سلام.abc.دائم/١٢٣?معكم



http://سلام.دائم/سلام/Path-part/١٢٣? معكم



Resource naming policies

- Internationalized host names should obey a language based name policy
    - i.e. A Polish name is not supposed to contain Arabic characters or even some other Latin based characters
    - Can be enforced by NICs, not necessarily by software
    - Existing rules for CJK characters: RFC 3743
    - May not be enforced/enforceable in sub-zones
- Multi-script registration should be rare, especially among Latin, Greek and Cyrillic

Legacy

- For good or bad reasons there is a large body of non ASCII DNS deployment in private Internet networks
- UTF-8 is widely used in these private networks
- Collision with the Punycode rule, especially when the internal DNS structure is mirrored in the public DNS structure (common scenario)

山田.株式会社.co.jp

å±±ç”° . æ ªå¼ä¼šç¤¾ .co.jp

xn--rhtu98c.xn--6oqv20b1zgzxr.co.jp

å±±ç”° .xn--6oqv20b1zgzxr.co.jp

Security issues

Which one is the resource locator I trust?

http://한국일보/사회면 or

http://xn--3e0bm80ac2h5no/%EC%82%AC%ED%9A%8C%EB%A9%B4 ?

http://Ṱahe-Aḓirese.com or

http://ṱahe-aḓirese.com or

http://xn--ahe-airese-v81ep5b .com ?

- Within these two groups all names locate the same resource
- For security reason it is important to pick one as the canonical representation
- If the Unicode name is selected, it **must** be normalized

Name spoofing

- Not a new concern
  - already exist in ASCII with 0, O, 1, l
- Much worse with Unicode repertoire
  - Cyrillic ‘Latin’ look alike: ABCEHIJKMOPY
  - Greek ‘Latin’ look alike: ABEHIKMNOPTXYZ
  - Cherokee ‘Latin’ look alike: ABCEGHJKLMPRSTYVWZ
- Cannot be fully solved by restricting to a single script/language
- Identity crisis: how do I know who you really are?

www.example.org

is in fact:

www. xn--ml-6kctd8d6a.org

User Interface limitations

- Ubiquity versus Market adaptation
  - ASCII digits and letters have widespread adoption (example: phone number)
  - Market customization creates solutions that are opaque to most
- Often difficult to display and enter resource identifiers outside of the customer language usage area

한국일보/사회면

讀賣新聞.co.jp/日本語/

What applications/middleware can do?

- Implement IRI now
- Validate IRI and Punycode host names early on
- Consistent rules about Punycode and native Unicode display
  - Favor Unicode display
  - Discourage Punycode value direct input
- Provide display capability for all IDNA character repertoire
- Enforce IDNA and IRI Bidirectional string rules
- Help users determine resource identity
  - Language, script filters
  - Do not try to resolve ill formed host names
- Make trustworthiness the highest priority

Where is Microsoft?

- IDNA basic functions implemented in the next .Net Framework release (code Whidbey)
  - System.Globalization.IdnMapping class
  - GetUnicode and GetAscii members provide host name conversion between native Unicode and Punycode
- Equivalent native versions (Win32) planned for next version of Windows:
  - ASCIIToIDN()
  - IDNToASCII()

Internet Explorer status

- Its presentation layer already uses IRI (address bar, status bar)
- Its URI layer needs to be updated to map IRI to URI according to the IRI specification
- Non ASCII host names still need to be converted according to IDNA specification
- Some remaining issues:
  - What to do with illegal IRIs/host names?
  - UTF-8 legacy
  - Proxy protocol (UTF-8 or Punycode)
  - Security impact

Questions?