DNS development

How the DNS Adapts to the Growth and Development of the Internet and Other Related Technologies

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LAC Domains Name Week
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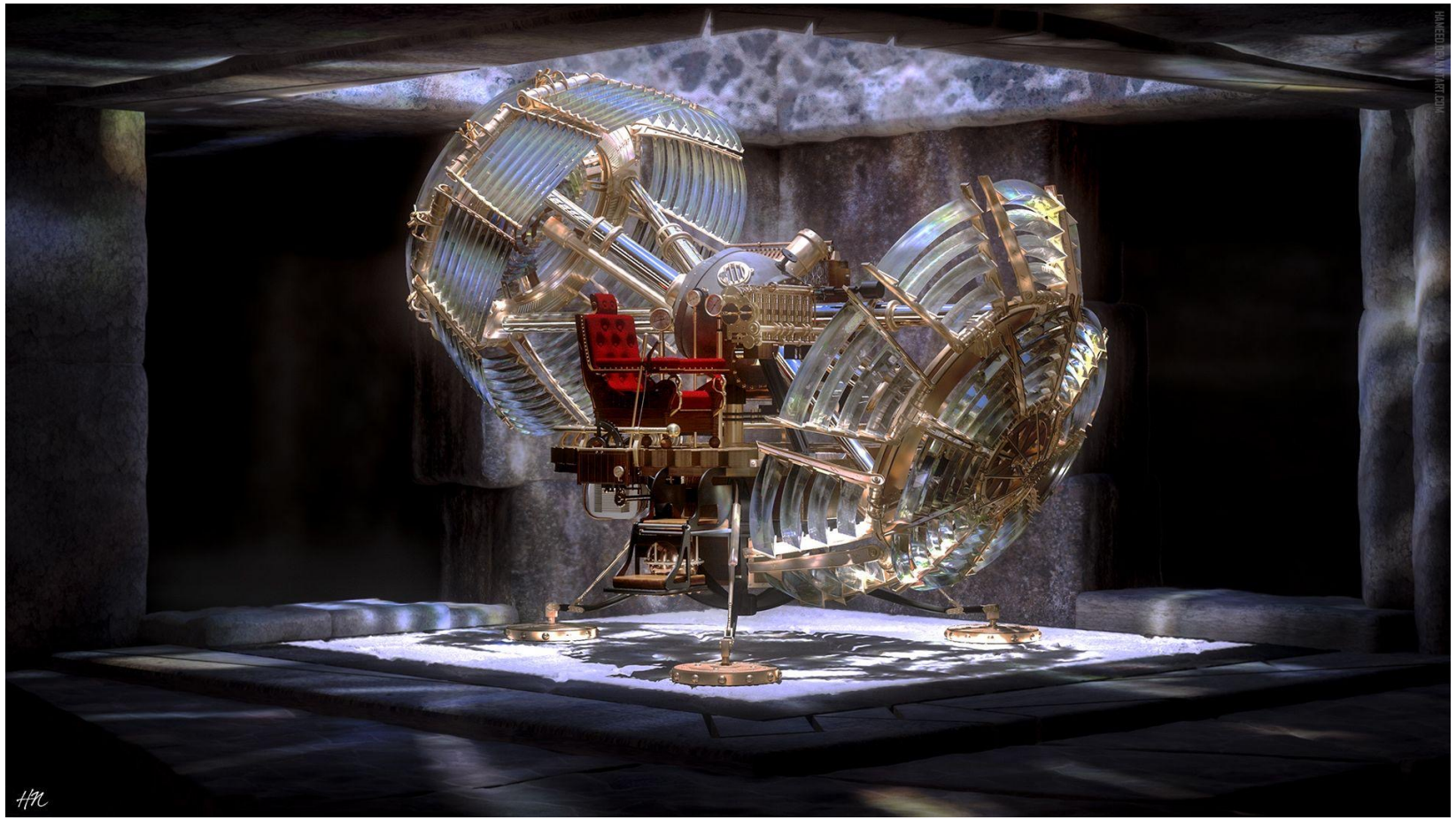
- Scalability
- Security
- Privacy
- Usability

To look a why the DNS has been so succesful we need to take a trip

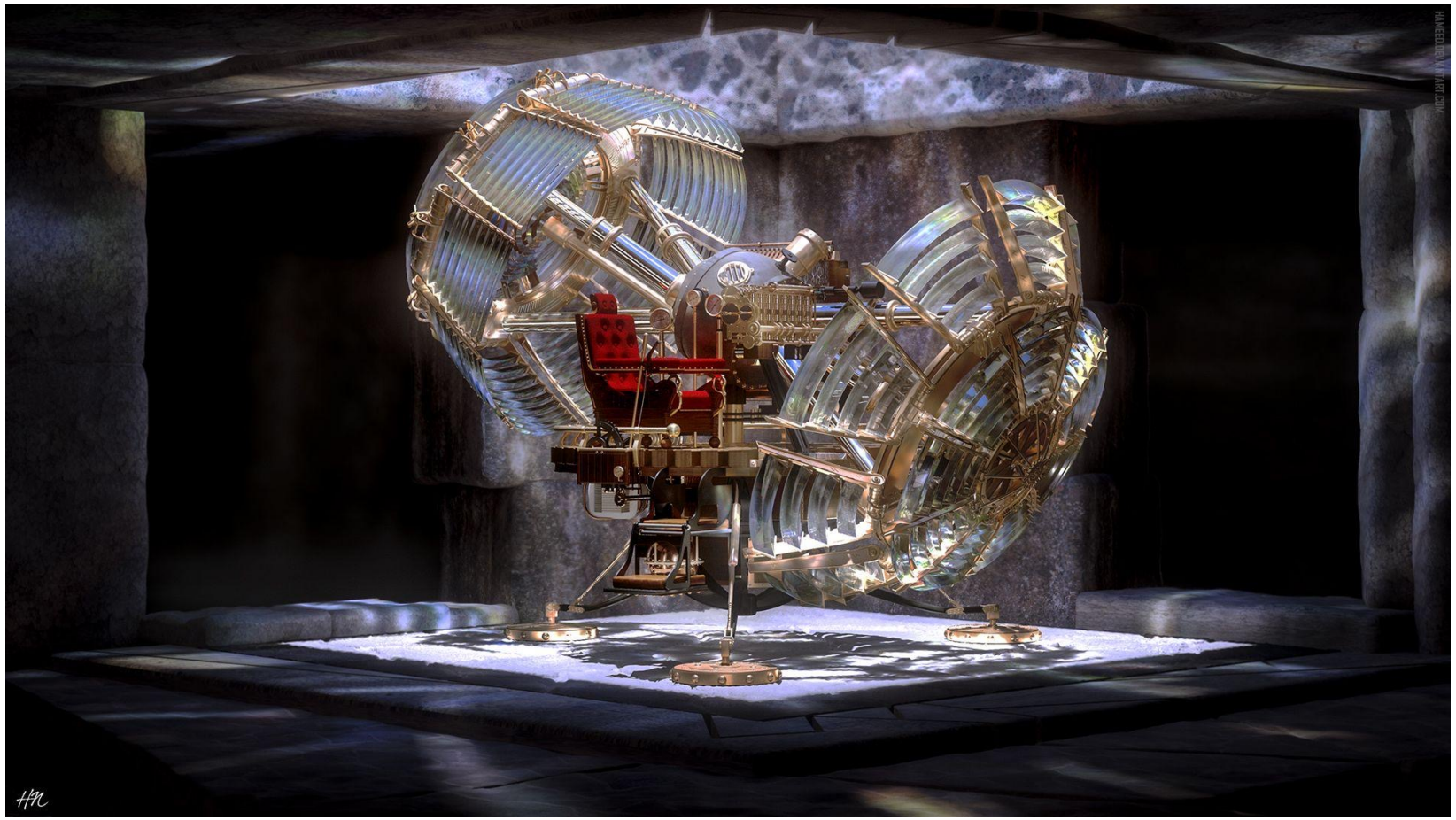
To look a why the DNS has been so prevalent we need to take a trip

Back in time!



To look a why the DNS has been so prevalent we need to take a trip

Back to the 1980's



To look a why the DNS has been so prevalent we need to take a trip

So maybe this is better?

1983 – Was a big year for the Internet

More than seventy sites connected to The Computer Sciences Network (CSNET)

The ARPANET moved from the Network Control Protocol (NCP) to Transmission Control Protocol/Internet Protocol (TCP/IP)

We had already been giving machines names to identify them but the HOSTSFILE had to be updated via FTP or Email. This was not scalable!

Nov 1983 - RFC882 “DOMAIN NAMES - CONCEPTS and FACILITIES”

https://www.computerhistory.org

1984 – The initial addition of Top Level Domains

RFC920 – “Domain Requirements”

ARPA = The current ARPA-Internet hosts.

GOV = Government related domains.
EDU = Education related domains.
COM = Commercial related domains.
MIL = Military related domains.
ORG = Organization, any other domains.

Also introduces the concept of two letter codes for country TLDS

1985 –

Release of ”Back to the future”

1985 – The NSFNET

Also the year that the Network Science Foundation Network or the NSFNET was launched allowing connection by non computer science researchers.

1990 – Things are about to change

By 1990 the ARPANET no longer existed and Tim Berners Lee had invented HTTP and the World Wide Web (Both in 1989) and the first Web Browser was about to be released

The organization managing the Internets global numbers and numbers resources has a name. The Internet Assigned Numbers Authority (IANA) (First used in 1988)

Estimates of Internet usage in 1990 indicate that less that 0.5% of the worlds population had access to the Internet.

By 1990 Steve Bellovin at Columbia university had published “Security Problems in the TCP/IP Protocol Suite”

Security was about to become more of a topic

1993 – Shrinking computers

Often quoted as the year that commercial Internet Service Providers (ISPS) began.

Also the year hand held computers became a thing

1997 – Early Security solutions

RFC 2065 was an early specification for
Domain Name System Security Extensions (DNSSEC)

It was part of the work being carried out in the
Internet Engineering Task Force (IETF) to better
secure the Domain Name System

1998 – NewCo

Throughout 1998 discussions were held and papers were published concerning the need for a new and global way to manage the Internet's unique identifiers.

A concept called "NewCo"

The Internet Corporation for Assigned Names and Numbers (ICANN) founded on Nov 21 1998

On Nov 25th the USDOC signed an MoU recognizing ICANN as that "NewCo"

2000 – Expanding the TLD space

In 2000 seven new TLDs were selected

.biz,
.info
.name
.pro.
.aero
.coop
.museum

2003 – Expanding the TLD space

In 2003 ICANN started a process in which six new “sponsored” TLDs were selected

.asia
.cat
.jobs
.mobi
.tel
.travel

2007 – That security issue is still there

RFC5074 DNSSEC Lookaside Validation (DLV)

This allows DNS operators to sign their zones prior to the root of DNS being ready to accept keys

In 2007 more than 1.3 Billion people were using the Internet (and the DNS)

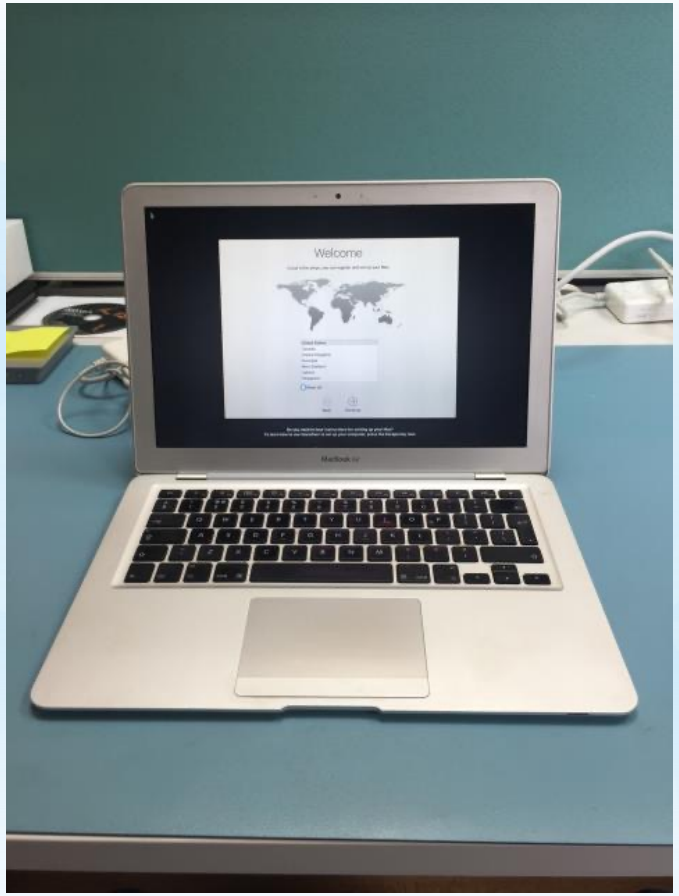
2009 – Scripts in the DNS?

ICANN launched a program to include the use of non ASCII scripts in the DNS. CcTLDs got to go first in a fast track program

Using the Unicode standard it allowed for the display in browsers of TLD such as:

تونس.

Tunisia

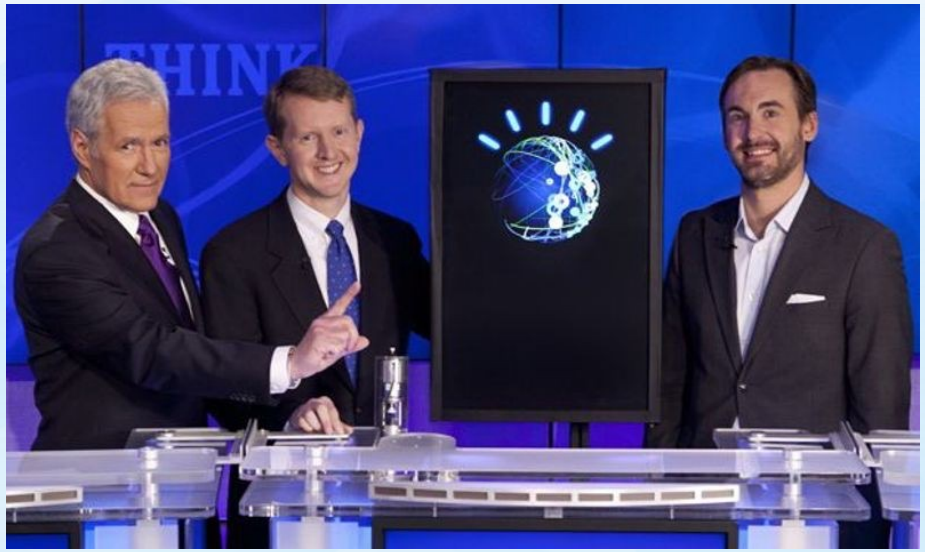


2010 – Signing the root

July 15th 2010

ICANN signed the root and allows TLD operators to place their Key Signatures in the DNS Root.

DNSSEC is a reality



2011 – More TLDs

Application guidebook for new TLDs publish in June 2011

This leads the way to hundreds of new TLDs being available. Many in non ASCII scripts

2012 – Certifying Keys in the DNS

RFC6698

The DNS-Based Authentication of Named Entities (DANE)

Allows for the use of DNS to specify the keys used for Transport Layer Security.

Providing an alternative to the Public Certificate Authority (CA) Model

2014 – Privacy is now also a concern

RFC7258

"Pervasive Monitoring Is an Attack"

Leads to the formation of the DNS PRIVate Exchange working group in the IETF (DPRIVE)

2016 – DoT for privacy?

RFC7858

Specification for DNS over Transport Layer Security (TLS)

Uses the security features of TLS to provide encryption and protect DNS traffic.

2018 – DoH for privacy?

RFC 8484

DNS queries over HTTPS

Uses the security features of HTTPS to provide encryption and protect DNS traffic

RFC7858

2023 – Where are we now?

Scalability - we are about to launch into a program expanding the TLD name space

Security – DNSSEC is slow going but it's getting there

Also look at KINDNS (http://www.kindns.org)

Privacy – Encryption is becoming ubiquitous not just in the DNS

Usability – IDNs allowing other scripts work in the DNS and other applications are also improving.

The future – What next?

?

Engage with ICANN

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