



# Hands on **DNS** Basics



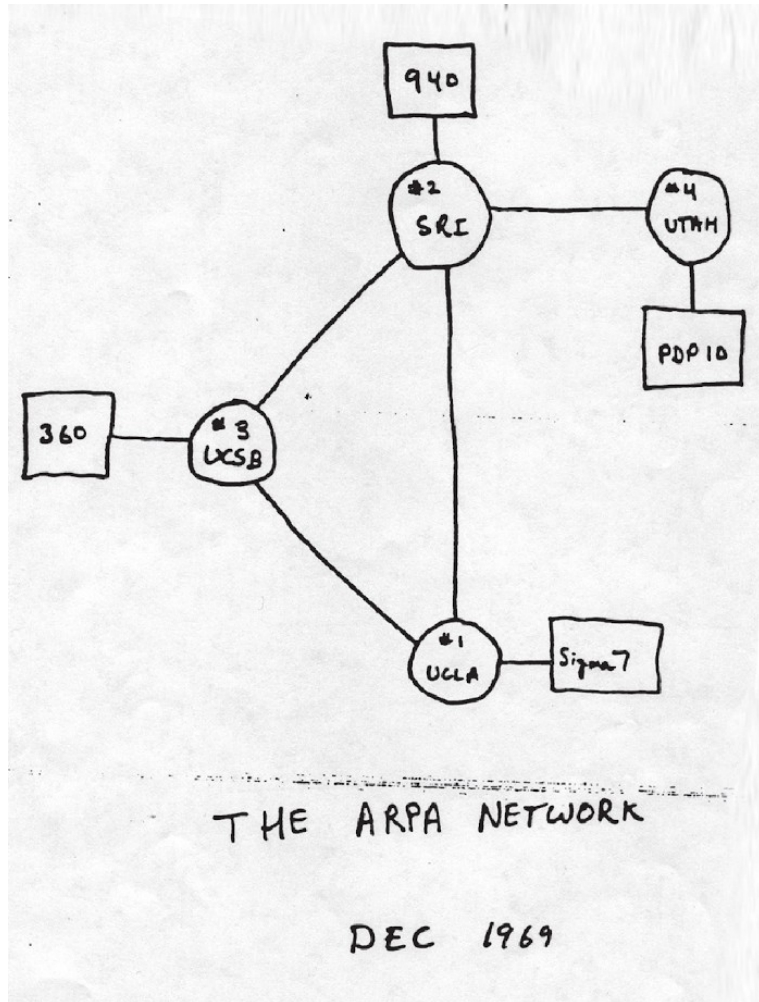
Online for **NOMINET**  
20-24 September 2021

# Name Space on the Internet

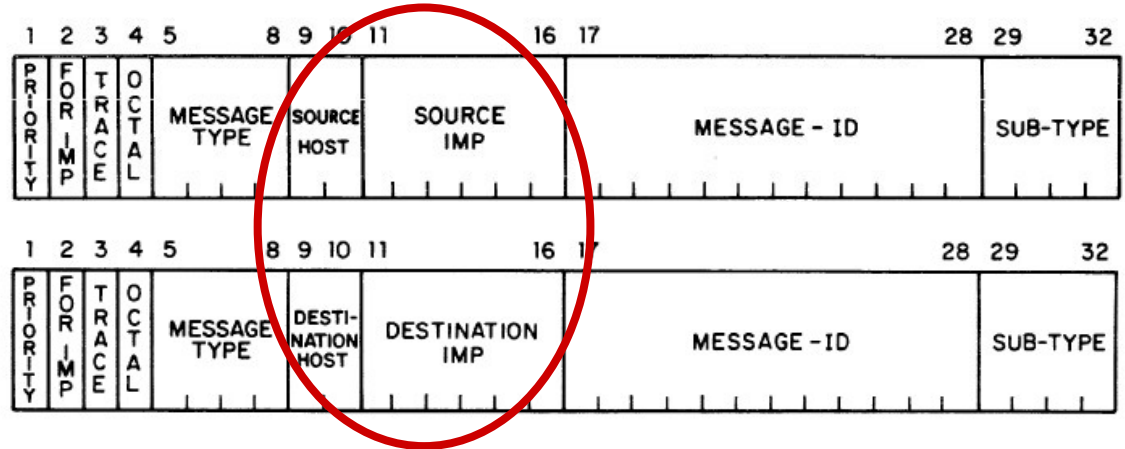


- Finding IP addresses
  - Start with a domain name (human form)
  - Translating to an IP address (machine form)
- What is the IP address of dnslab.uk?
  - Client asks server
  - Server responds with answer
  - ... case closed?

# Name Space on the Internet



## NCP (Network Control Program)



- December 1973  
HOSTS.TXT (RFC 606)

# Namespace on the Internet

## NCP (Network Control Program)

ARPANET DIRECTORY  
NIC 19275  
Jan. 1974

HOST NAMES

### HOST NAMES

HOSTNAME	HOST ADDR (Dec)	LIAISON	STATUS
AFWL-TIP	176	D Hyde (505)247-1711 x3803	TIP, Up 3-74
ALOHA-TIP	164	R Binder (808)948-7066	TIP
AMES-11	208	J Hart (415)965-5935	USER, up 12-73
AMES-67	16	W Hathaway (415)965-6033	SERVER
AMES-TIP	144	W Hathaway (415)965-6033	TIP
ANL	?	L Amiot (312)739-7711 x4309	SERVER, up 2-74
ARPA-DMS	28	S Crocker (202)694-5037	USER, Agency use only
ARPA-TIP	156	S Crocker (202)694-5037	TIP
BBN-11X	5	R Thomas (617)491-1850 x483	Peripheral processor for #69, up 12-73
BBN-1D	232	A McKenzie (617)491-1850 x441	USER
BBN-NCC	40	A McKenzie (617)491-1850 x441	USER
BBN-TENEX	69	R Thomas (617)491-1850 x483	SERVER
BBN-TENEXB	133	R Thomas (617)491-1850 x483	SERVER, Limited
BBN-TESTIP	158	A McKenzie (617)491-1850 x441	TIP (magtape)
BELVOIR	27	W Andrews (703)664-5511	USER, up 6-74
BRL	29	M Romanelli (301)278-4574	USER
CASE-10	13	J Calvin (216)368-2984	SERVER
CCA-TENEX	31	R Winter (617)491-3670	SERVER
CCA-TIP	159	R Winter (617)491-3670	TIP
CMU-10A	78	H Van Zoeren (412)621-2600 x160	SERVER

28	29	32
- ID	SUB-TYPE	

28	29	32
-ID	SUB-TYPE	

(RFC 606)



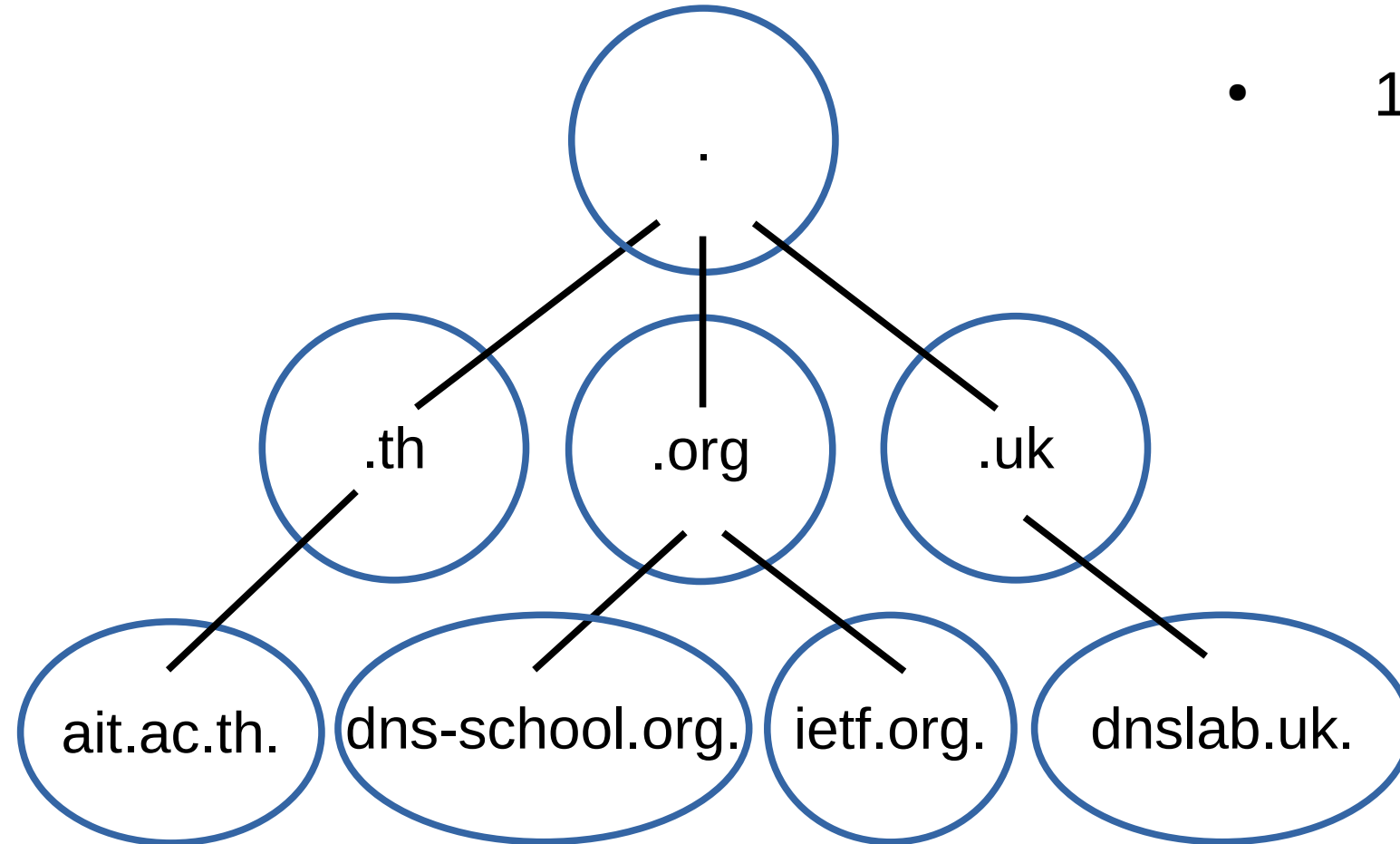
# Name Spaces on the Internet



- 1 January 1983 NCP → IP/TCP  
*flagday*
- max 256 → max 4.294.967.296 hosts
- November 1983 DNS (RFC 882)  
*Domain Name System*
- November 1987 STD13  
(RFC 1034 & RFC 1035)

# Domain Name Space – scale

- 13 root servers



# Domain Name Space – scale

.th

.org

ait.ac.th.

dns-school.org.

## Map of the Root Servers



*Map from 2001*

# Domain Name Space – scale

<b>A</b>	VeriSign	198.41.0.4 2001:503:BA3E::2:30	<b>H</b>	US Army	128.63.2.53 2001:500:1::803f:235
<b>B</b>	USC-ISI	192.228.79.201 2001:478:65::53	<b>I</b>	Netnod	192.36.148.17 2001:7fe::53
<b>C</b>	Cogent	192.33.4.12 2001:500:2::c	<b>J</b>	VeriSign	192.58.128.30 2001:503:C27::2:30
<b>D</b>	Uni Maryland	199.7.91.13 2001:500:2d::d	<b>K</b>	RIPE NCC	193.0.14.129 2001:7fd::1
<b>E</b>	NASA	192.203.230.10 2001:500:a8::e	<b>L</b>	ICANN	199.7.83.42 2001:500:3::42
<b>F</b>	ISC	192.5.5.241 2001:500:2f::f	<b>M</b>	WIDE Project	202.12.27.33 2001:dc3::35
<b>G</b>	DoD	192.112.36.4 2001:500:12::d0d			



# Domain Name Space – scale



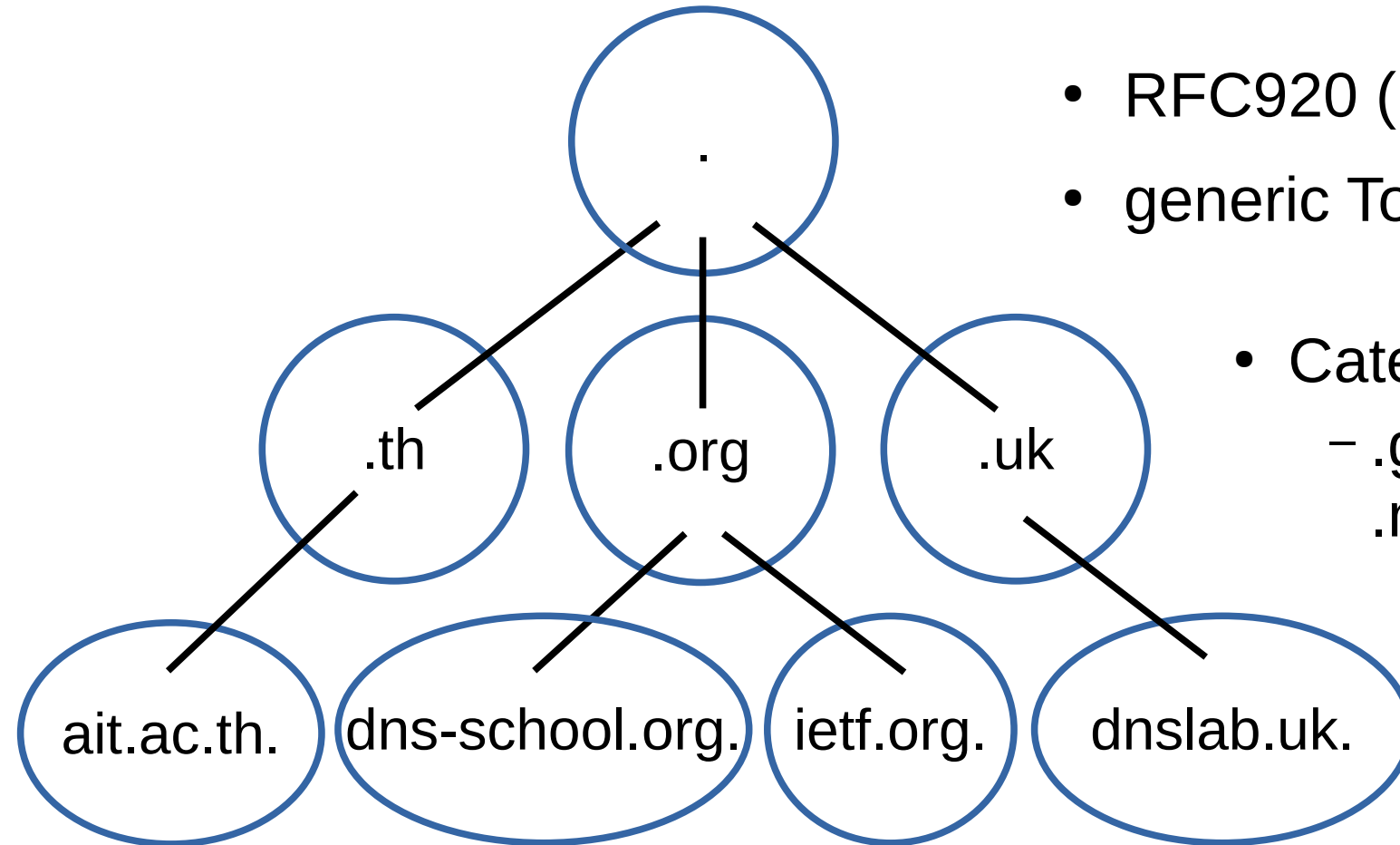
.th

ait.ac.th.

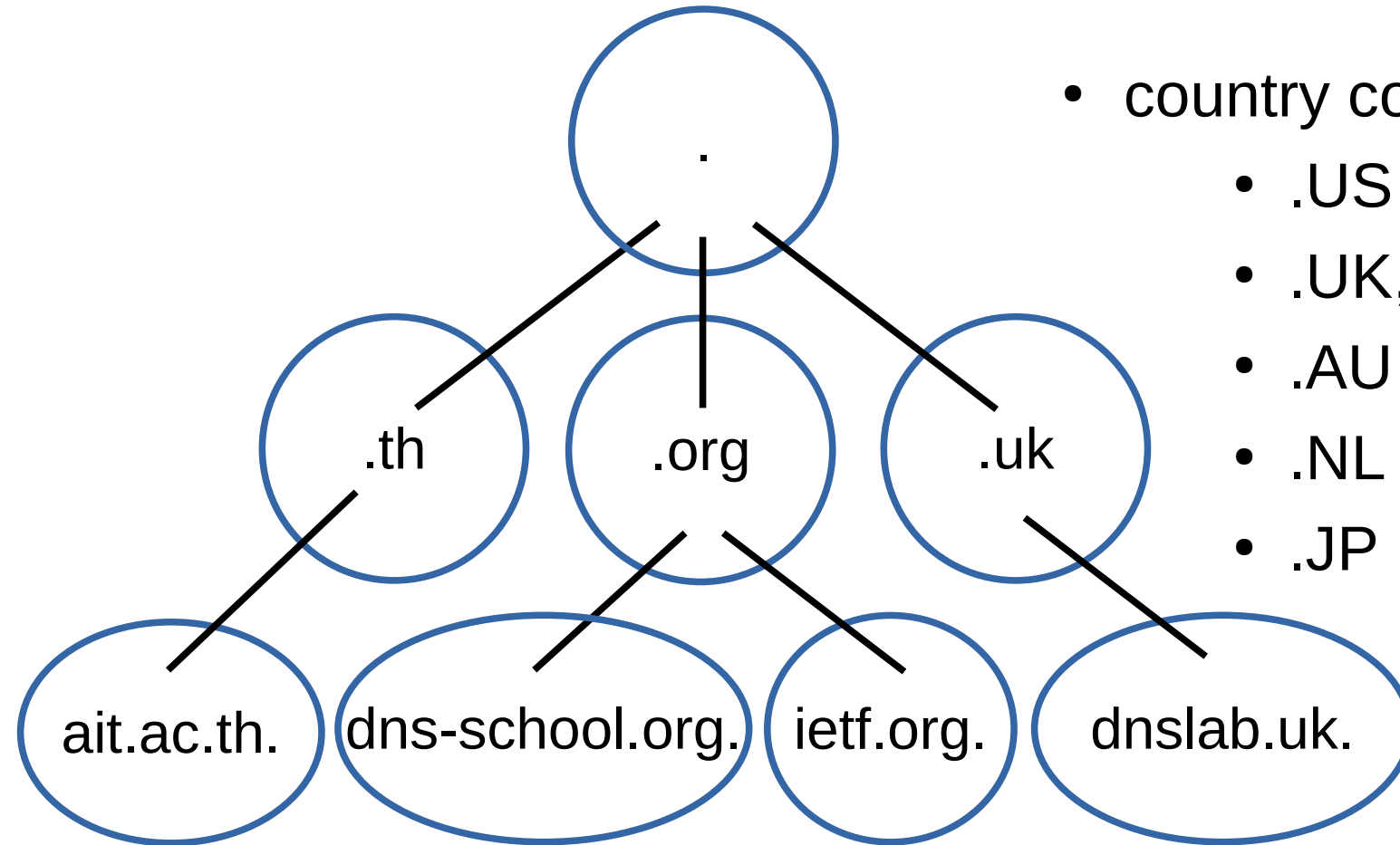
dns

# Domain Name Space – scale

- RFC920 (1984)
- generic Top Level Domains (gTLDs)
- Categories
  - .gov .edu .com
  - .mil .org *.net*

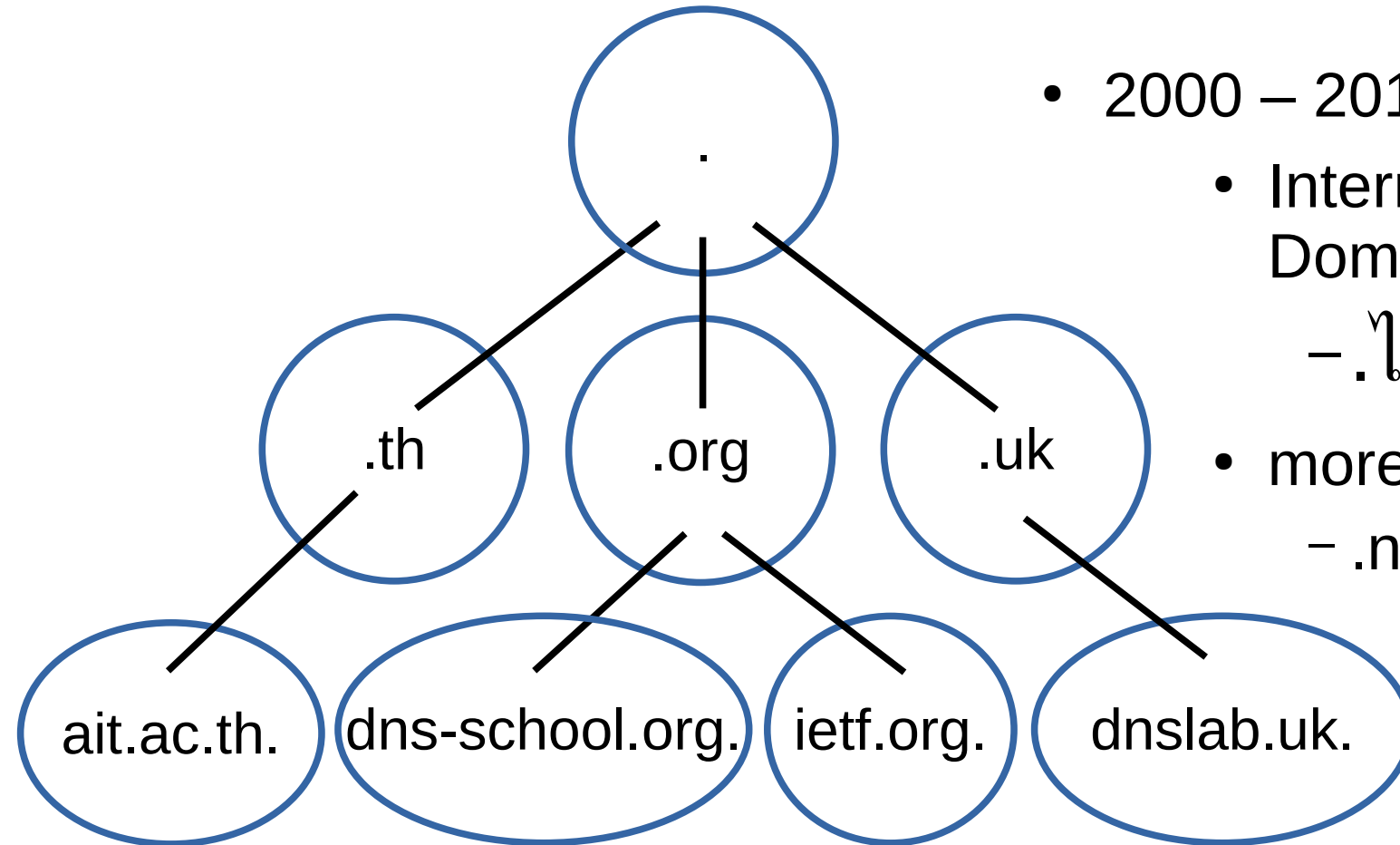


# Domain Name Space – scale



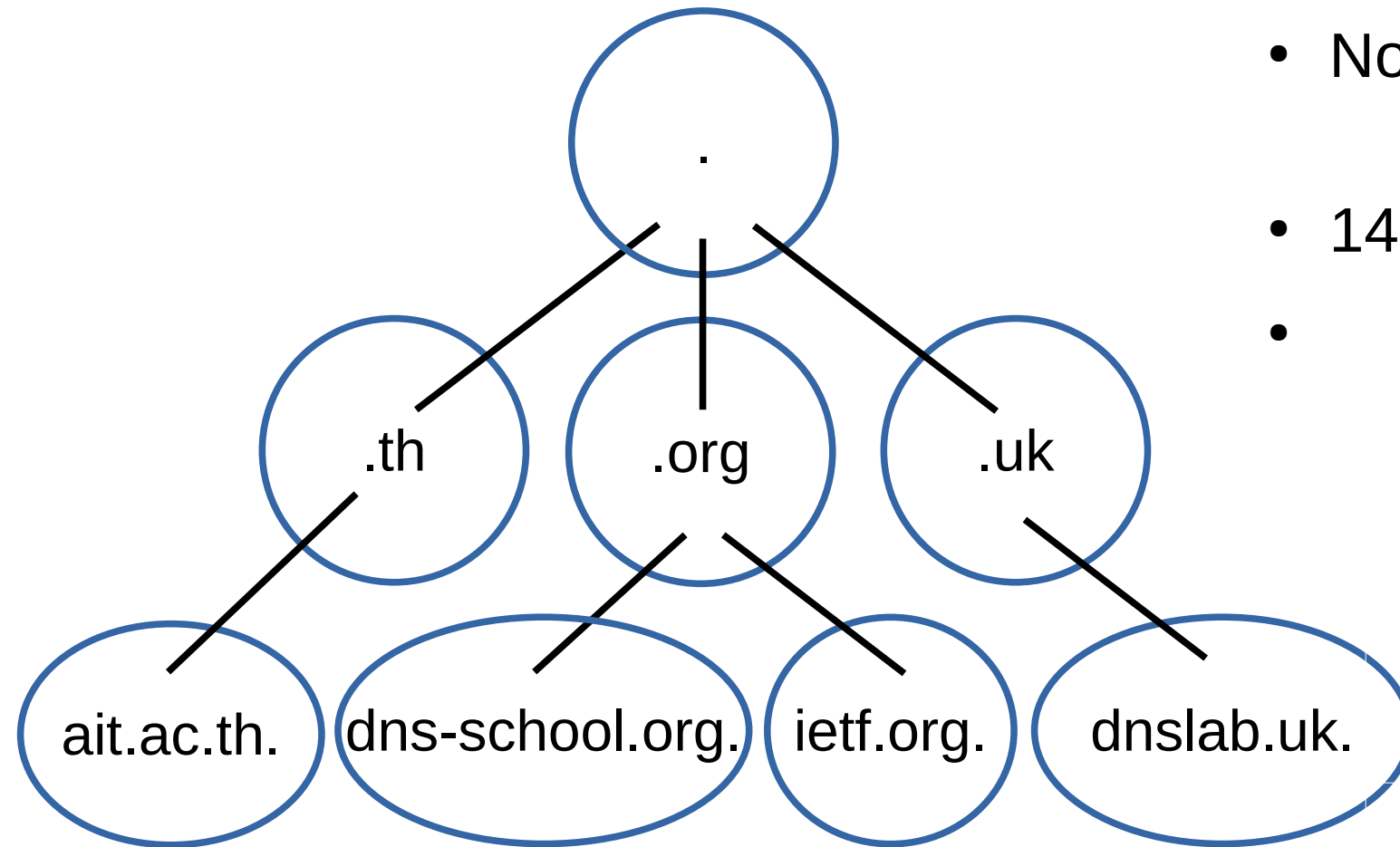
- country code TLD (ccTLD)
  - .US (15 Feb 1985)
  - .UK, GB (24 Jul '85)
  - .AU ( 5 Mar 1986)
  - .NL (25 Apr 1986)
  - .JP ( 5 Aug 1986)
  - .TH (1988)

# Domain Name Space – scale



- 2000 – 2012
  - Internationalized Domain Names
    - .ไทย
  - more gTLDs, including
    - .name .pro .biz (*restricted*)

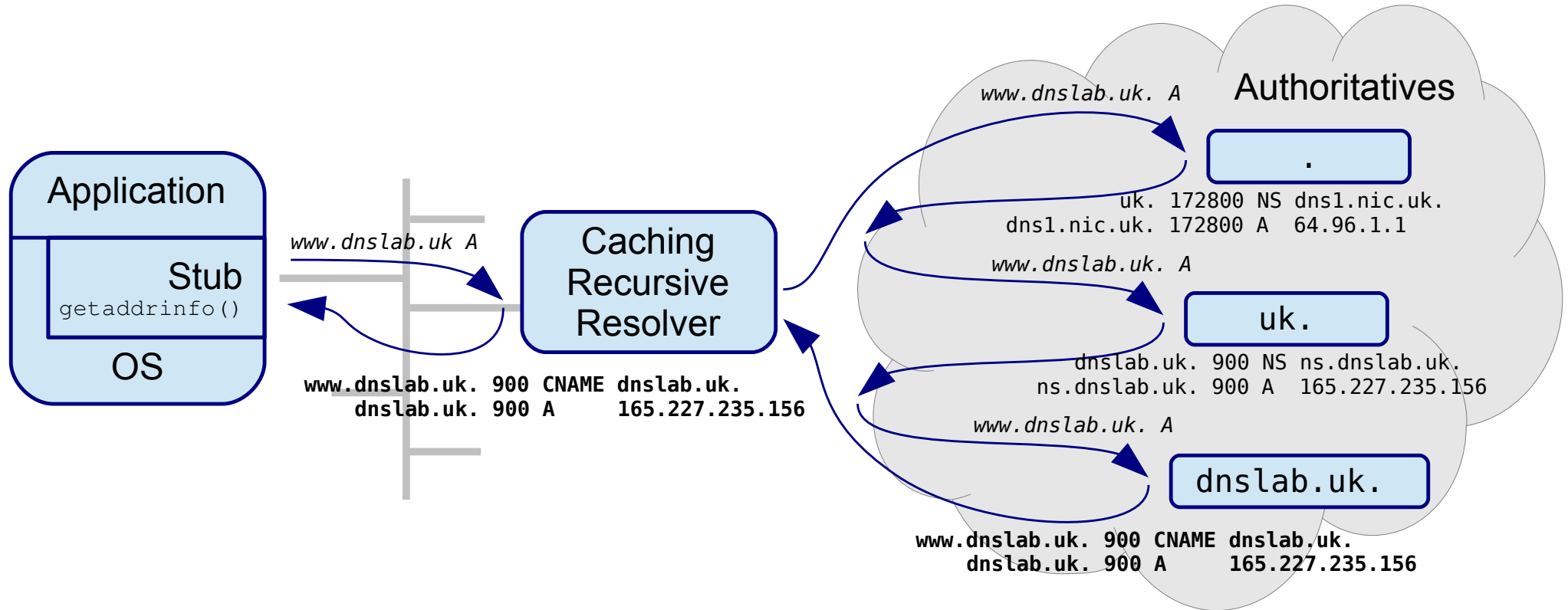
# Domain Name Space – scale



- Now: Unlimited  
\$185,000
- 1498 TLDs
- |      |        |
|------|--------|
| .com | 157.0M |
| .tk  | 24.7M  |
| .cn  | 20.7M  |
| .de  | 17.0M  |
| .net | 13.6M  |
| .uk  | 11.0M  |
| .org | 10.4M  |
| .nl  | 6.2M   |

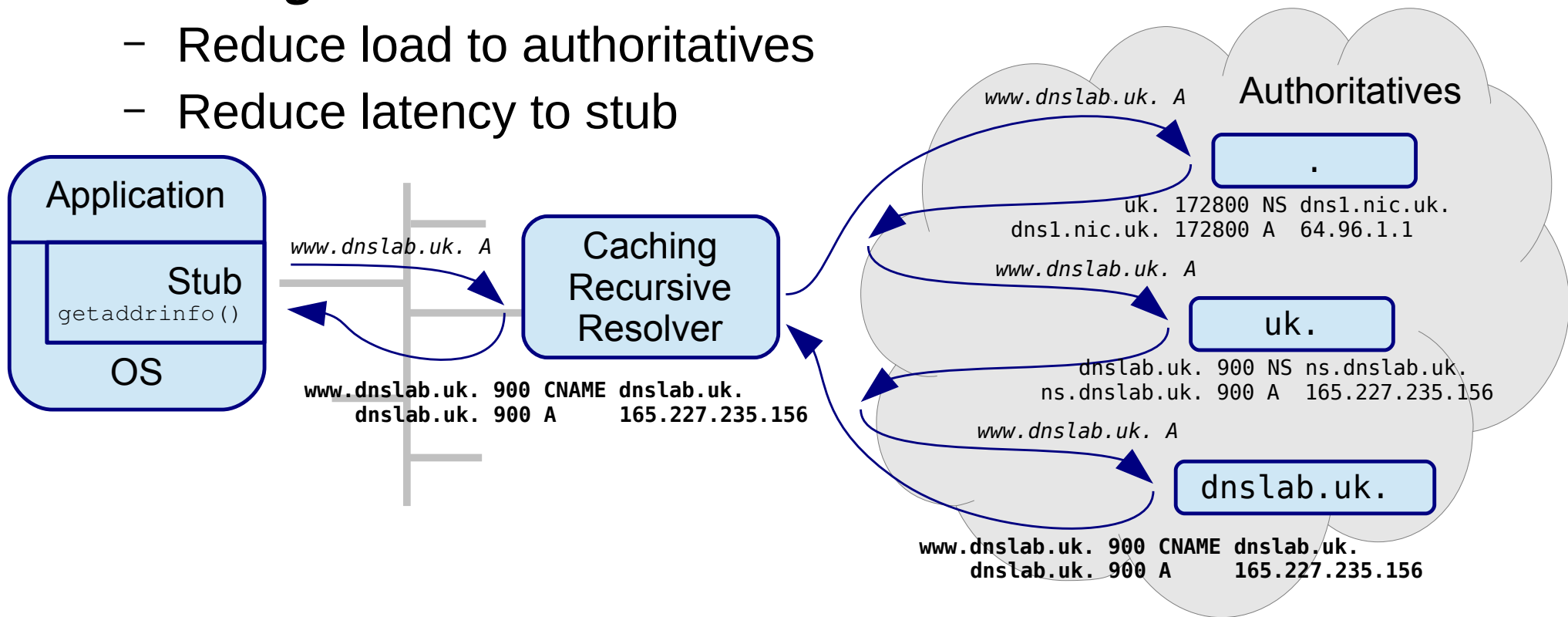


# Domain Name System - scale



# Domain Name System - scale

- **UDP** = No State on authoritatives
- **Caching** Recursive Resolvers:
  - Reduce load to authoritatives
  - Reduce latency to stub



# Lab time!



Photo by [Alex Kondratiev](#) on [Unsplash](#)

- Hands on: <https://dnslab.uk/>
- 1. Setup a Caching Recursive Resolver