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Institut für Organisation und Management von
Informationssystemen

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Lecture Computer Networks

Domain Name System (DNS)

Domain Name System (DNS)

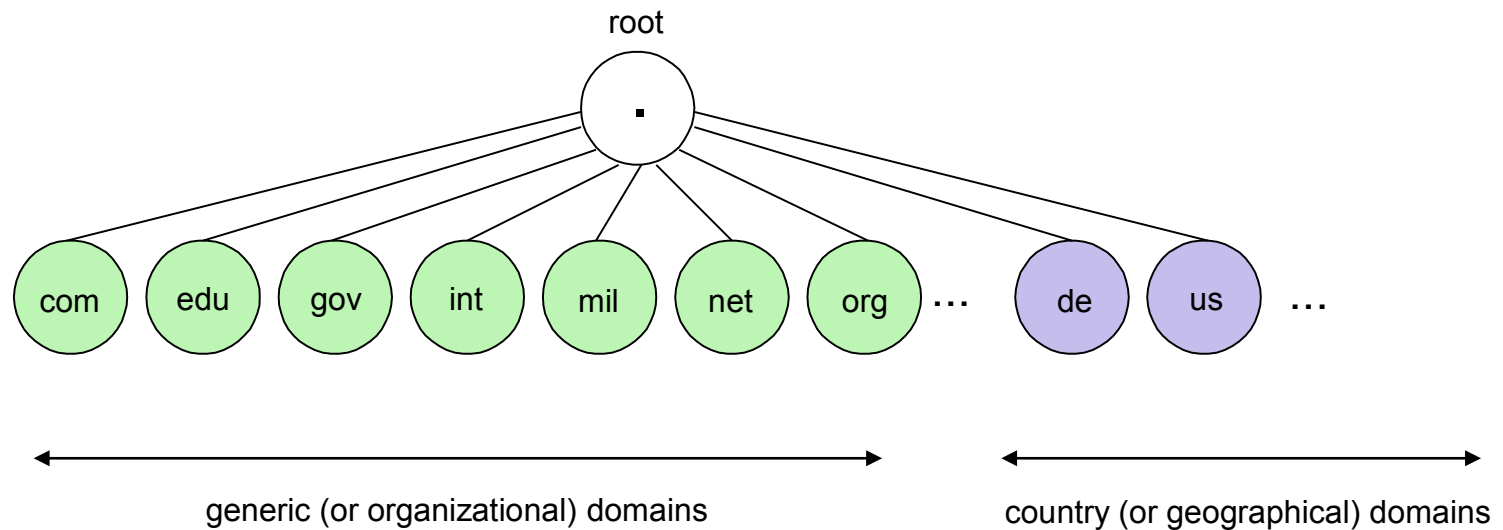
- A distributed database used by TCP/IP applications
 - translates between symbolic names and IP addresses
 - provides mail routing information

jedi.e-technik.uni-ulm.de ← 134.60.30.118

student.uni-ulm.de ← smtp.uni-ulm.de (example obsolete)

www.cs.ucla.edu ← pike.cs.ucla.edu

Top Level Domains (TLD)



Generic Domains

Domain Description

.aero	air transport industry
.arpa	infrastructure domain
.biz	business
.cat	Catalan linguistic and cultural community
.com	commercial organizations
.coop	cooperative associations
.edu	educational institutions
.gov	U.S. government
.info	information
.int	international treaty organizations
.jobs	human resource managers
.mil	U.S. military
.mobi	consumers and providers of mobile products and services
.museum	museums
.name	individuals
.net	major network support centers
.org	other organizations
.pro	credentialed professionals
.travel	entities with primary area of activity is in the travel industry

Source: <http://www.iana.org/gtld/gtld.htm>

Country Code Domains

Domain

.ar
.be
.cn
.cm
.de
.eg
.fr
.in
.mx
.tn
.us

.
.

Country

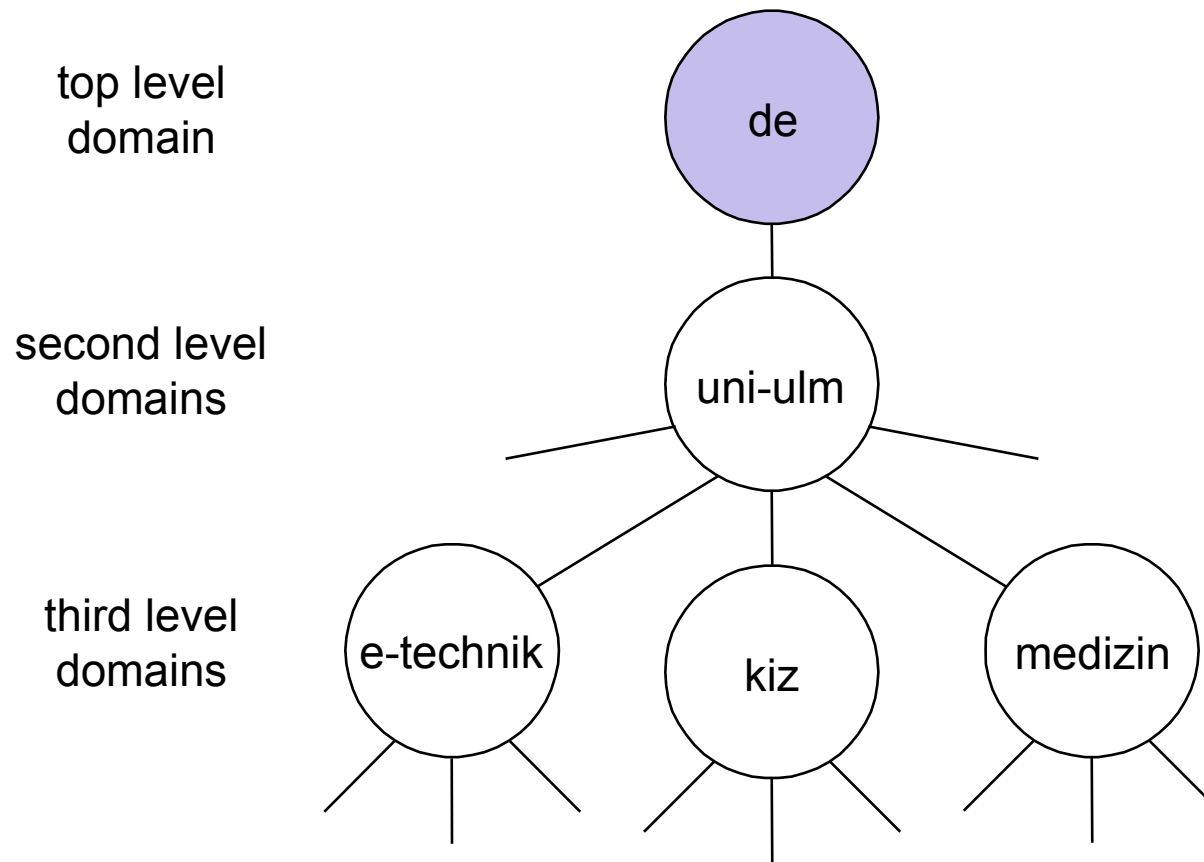
Argentina
Belgium
China
Cameroon
Germany
Egypt
France
India
Mexico
Tunisia
USA

.
.

Domain Names

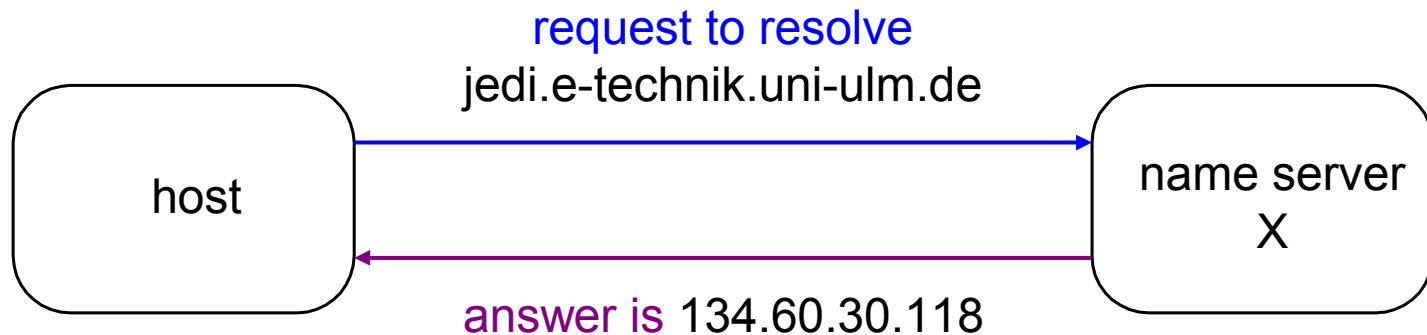
- Organizations apply for names within a top-level domain:
 - uni-ulm.de
 - unesco.org
 - hp.com
- Organizations determine their DNS structure
 - Flat namespace
 - uni-ulm.de, gmd.de, mwk.de, siemens.de, ...
 - Convenient and short
 - Hierarchical namespace
 - u-tokyo.ac.jp, e-technik.uni-ulm.de, cs.ncsu.edu, siemens.co.uk, ...
 - Delegating authorities
- Each organization runs its DNS and maintains its information database

Example of DNS Hierarchy



Name to Address Resolution

A host wants the IP address of jedi.e-technik.uni-ulm.de:

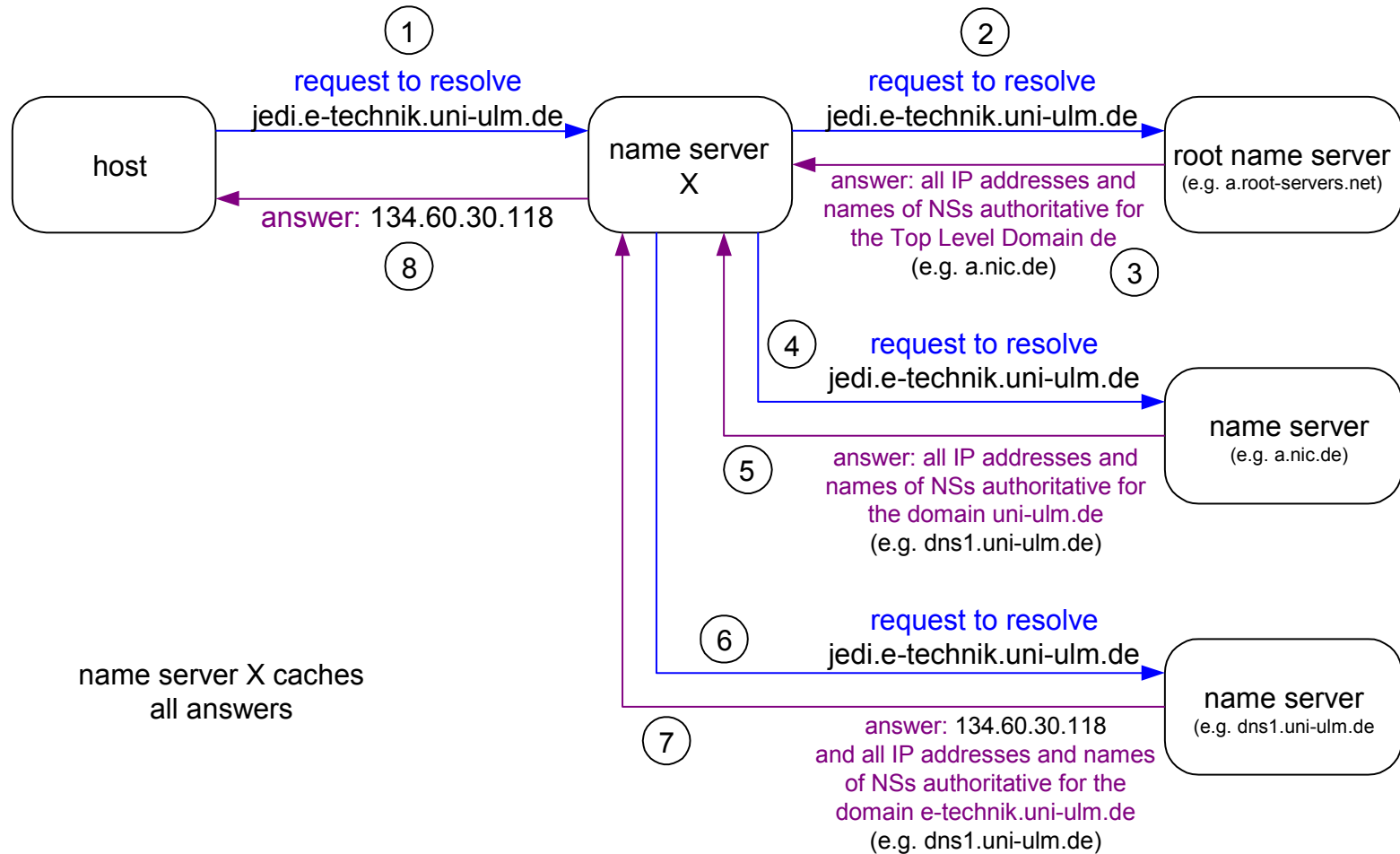


- What does a name server X do when it does not contain the requested information?
- ⇒ name server X contacts other name servers
- Each name server knows about the higher level name servers
 - The lowest level server knows the answer of the request (e.g. IP address)

Hierarchy of Name Servers

- root name servers (currently are 13)
 - a.root-servers.net ... m.root-servers.net
 - the authoritative name servers for root domain
 - know names and IP addresses of each authoritative name server for all the top level domains
- authoritative name servers for a top level domain (e.g. de - 6 at the moment)
 - know names and IP addresses of each authoritative name server for the second level domains
- authoritative name servers for a second level domain (e.g. uni-ulm.de - 4 at the moment)
 - ...

Domain Name Resolution



Resource Records (heavily used by Microsoft AD)

Examples of types of entries in the DNS database

Type	Meaning	Description
A	host address	IP address for a given name
NS	name server	NSs of a domain
PTR	pointer record	name for a given IP address
MX	mail exchanger	receiver of a mail address
SOA	start of authority	the server supplies the zone's data