DNS: Domain Name System

an overview

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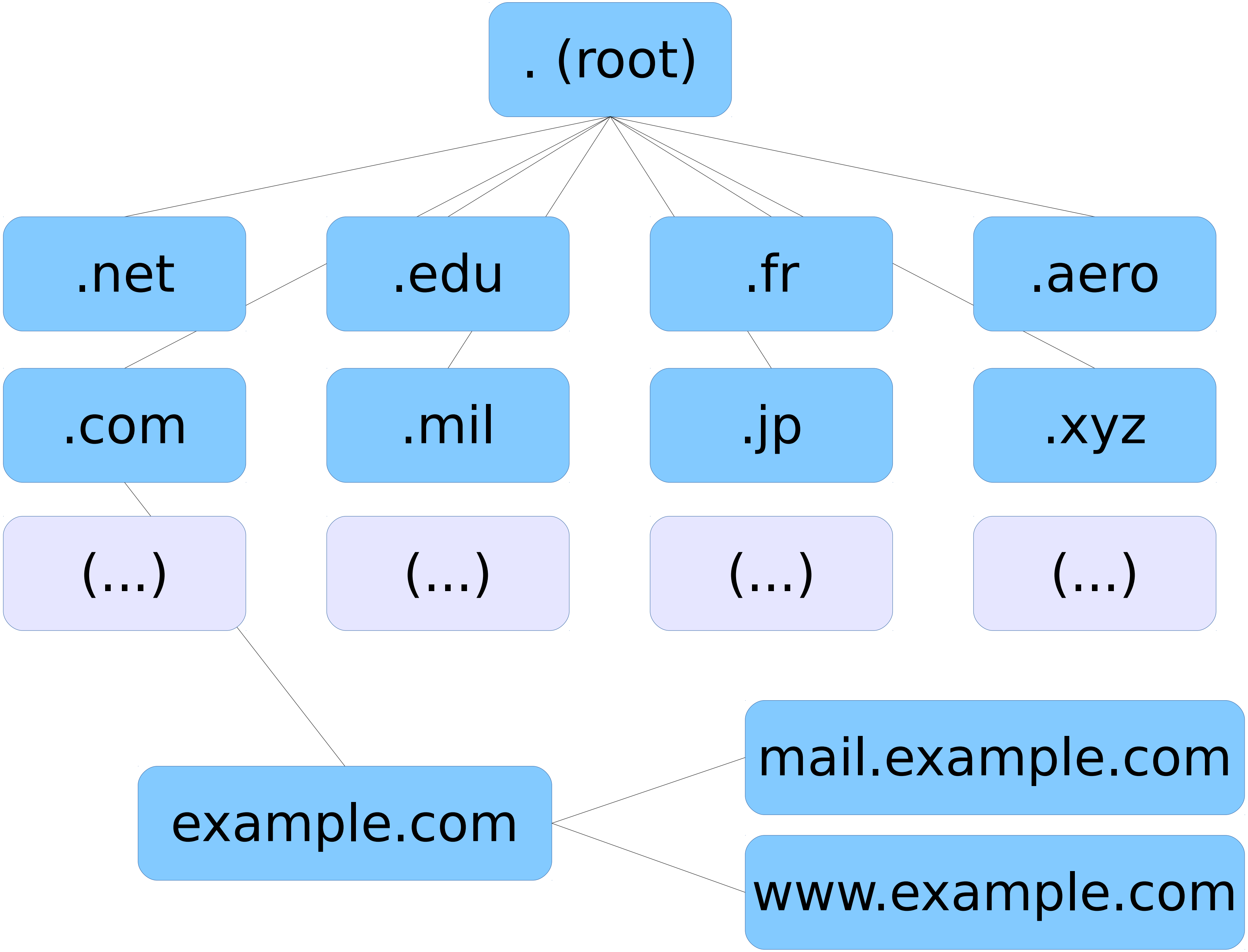
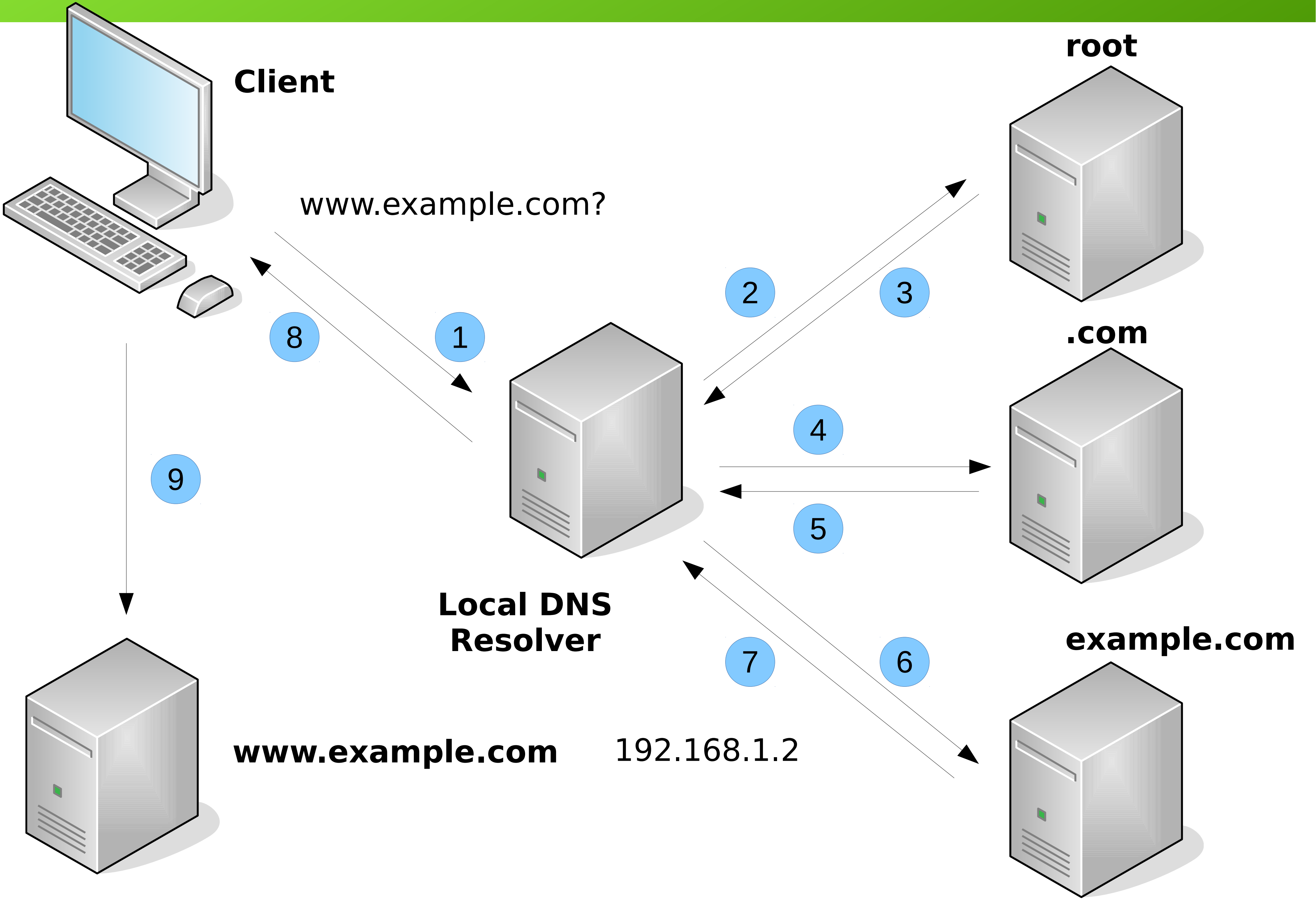
Why do we need DNS?

- Computers can talk to each other by using the Internet Protocol (IP), relying on IP addresses.
- Humans beings are not very good at working with IP addresses:
  - IPv4 address example: 192.168.44.237
  - IPv6 address example: 2001:0db8::ca45:56b6:20fa
- Some servers are used to host many services for different uses, each one needs a different name (the server will still use only one IP address). Also some services are hosted by more than one server.


. (root)
.net
.edu
.fr
.aero
.com
.mil
.jp
.xyz
(...)
(...)
(...)
(...)
mail.example.com
example.com
www.example.com

How does DNS work?

- Your computer (the client) asks the local DNS resolver: “*I need to reach example.com do you know his IP address?*”
- If the local resolver doesn’t know, then it will ask the root. From the response the resolver will ask other servers, and get a response.
- Then your computer knows where to go.
- All of this in few milli-seconds on average.


Client
root
www.example.com?
2
3
8
1
.com
4
5
9
Local DNS Resolver
7
6
example.com
www.example.com
192.168.1.2

DNS is more than that...

- Other services rely on DNS:
  - Email (including various antispam tools)
  - Server authentication
  - Services localization
  - ...
- And there is DNSSEC: cryptography is used to check on data authenticity: a local resolver can check a signature to verify that is the real thing. This require DNSSEC-aware systems.

What are the limits?

- It is possible to attack a DNS server, and then affect all the clients.
- Clients can be redirected to a rogue DNS server and get wrong answers.
- Servers operators can see all DNS queries and trace network activity; they can also block access to some domain names.
- **Breaking news: NSA MoreCowBell**

Some solutions

- Check the DNS servers that your computer is using: are they trustworthy?
- Use some DNS public servers (there is still some downsides).
- Run (and manage) your own DNS local resolver.

And if I want to have my own domain name?

- Contact a Domain Name Registrar, and you should be able to register a domain name for a fee, and for a specific time period.
- A domain name doesn’t give you any service by itself: you will still need to contact a hosting provider to run a mail server, a web server, etc. (many companies provide a registration service with hosting services).

Resources

- **DNS for Rocket Scientists**
  http://www.zytrax.com/books/dns
- **Google Public DNS Servers**
  https://developers.google.com/speed/public-dns
- **Google Apps Toolbox**
  https://toolbox.googleapps.com/apps/dig
- **Unbound**
  http://www.unbound.net/

Resources

- Extensions for Mozilla Firefox:
  - **Domain Details**
  - **DNSSEC/TLSA Validator**
- https://addons.mozilla.org/

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  - *Source Sans Pro Semibold* for the titles
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- Icons from *VRT Systems*:

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