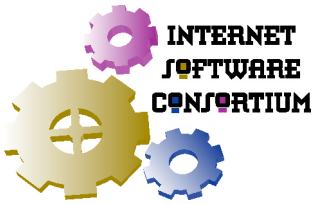
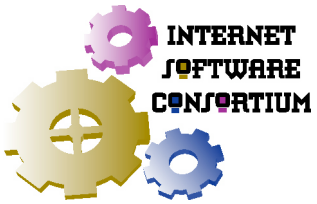


The root server system

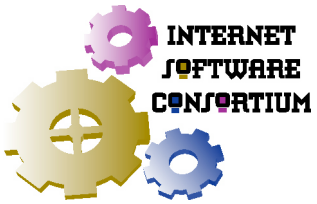
João Damas

ISC



Overview

- What is it?
- How is it setup?
- The root server operators
- Response to an evolving Internet
- Not to confuse
- Questions

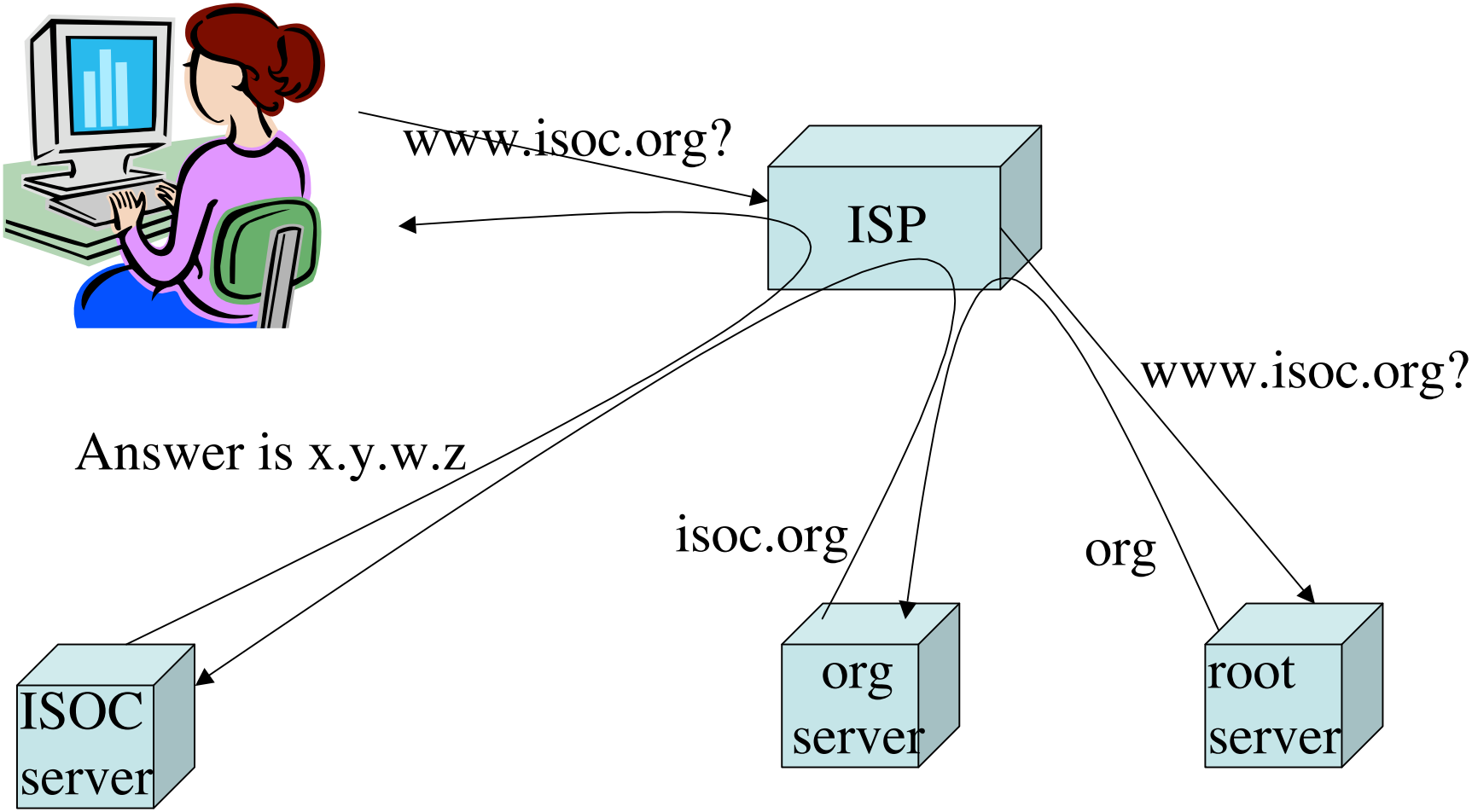


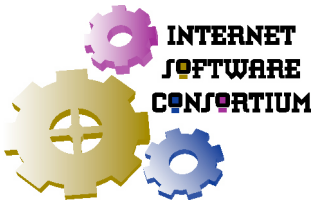
What is it?

The DNS

- A tree-like lookup system
- Converts human readable tokens into machine usable identifiers
- Root servers are the entry point to the system
- Caching is used throughout to avoid repetitive queries

What is it? (2)

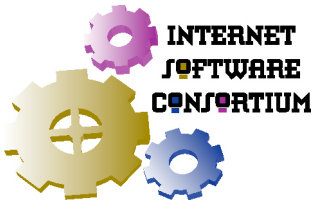

www.isoc.org?
ISP
www.isoc.org?
Answer is x.y.w.z
isoc.org
org
ISOC server
org server
root server



What is it? (3)

Notice that:

- root servers only know who you need to ask next.
  - .com -> list of servers
  - .net -> list of servers
  - .ch -> list of servers
  - .ug -> list of servers
  - .br -> list of servers
- Caching of previous answers means there is less need to query the root servers after the first question.



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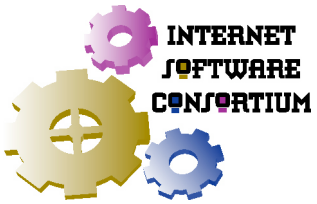
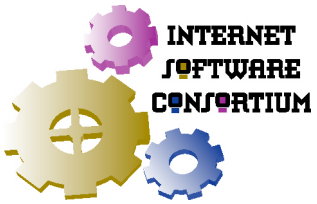


How is it setup?

- root servers
  - Provide the service
  - Currently limited to 13 distinct entries in the list
    - a.root-servers.net,…,m.root-servers.net
    - Purely technical role. Responsibility of the root server operators
- root zone
  - Is the information itself
  - Created by IANA. Currently distributed by Verisign to all root servers.



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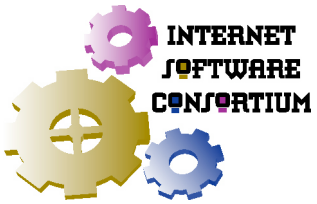
The root server operators

12 different professional engineering groups focused on

- Reliability and stability of the service
- Accessibility to all Internet users
- Technical cooperation
- Professionalism



The root server operators (2)

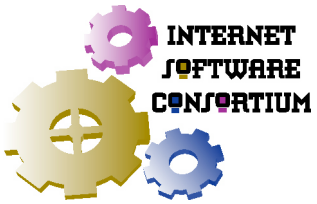
- The operators are not involved in:
  - Policy making
  - Data modification
    - Publishers, not authors or editors.
- The operators are involved in:
  - Careful operational evaluation of suggested technical modifications
  - Making every effort to ensure stability and robustness

The root server operators (3)

One of the strongest points of operators is diversity

- Diversity of organisational structure
- Diversity of operational history
- Diversity of hardware and software in use

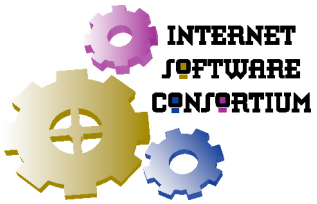
- Common best practices refer to minimum levels of
  - Physical system security
  - Overprovisioning of capacity
  - Professional and trusted staff



The root server operators (4)

The other strong point is cooperation and coordination

- Within the diversity, cooperation takes place at industry meetings (IETF, RIPE, NANOG, APNIC, ARIN, AFNOG,…) and use of the Internet itself.
- There is permanent infrastructure to respond to possible emergencies (telephone bridges, mailing lists, exchange of secure credentials)
- Coordination within established Internet bodies (RSSAC within ICANN)



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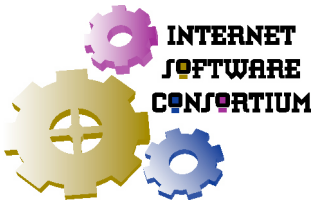
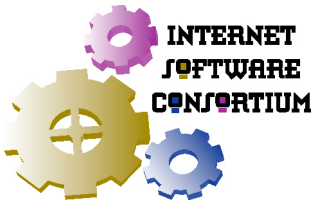


Response to an evolving Internet

As the Internet evolves new requirements are put on the DNS System

- Root server operators analyse the impact of new uses and protocol extensions on the service
  - IDNS, DNSSEC, IPv6,…
- Increasing robustness and responsiveness, as well as resilience
  - Wide deployment of distributed anycast



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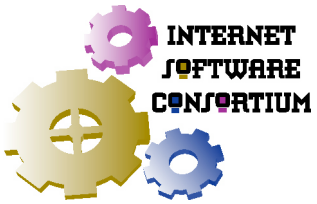
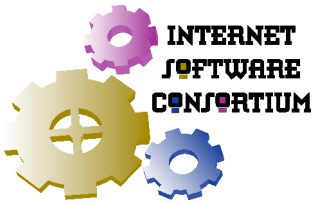


Not to confuse

- root servers do not control where Internet traffic goes, routers do.
- Not every DNS query is handled by a root server
- Administration of the root zone is separate from service provision
- a.root is not special
- root server operators are not hobbyists
- More than 13 servers. Only 13 technical entities.
- No single organisation controls the whole system. Emphasis on coordination over governance.



Questions?
Comments