



LTAT.06.007 Distributed Systems

Practical Seminar 8

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Tartu, Estonia 30/03/2021

Recap



- To Understand Election Algorithms Need for Vector Clocks
 - Basic Assumptions in Election Algorithms
 - Need for Election Algorithms
 - Types of Election Algorithms
 - Bully Algorithm
 - Bully Algorithm Explained

Agenda

- **Goal:** Explore the Hierarchy of DNS Servers using DIG Tool
- **Content:**
 - To use the functionality of **DIG** Tool in exploring the hierarchy of DNS Servers
 - Use **DIG** tool's *trace* functionality to create iterative queries.
- **Quiz**

After this lecture, you should be able to:

- Understand how to use DIG Tool

Session Content



Description

- To understand how to use DIG Tool
- Explore the Hierarchy of DNS Servers using DIG Tool
- Use DIG Tool's trace functionality to create iterative queries

Observation

Instructions to complete this practical session can be found in the course website: <https://courses.cs.ut.ee/2021/ds/spring/Main/Instructions4>

DIG Tool

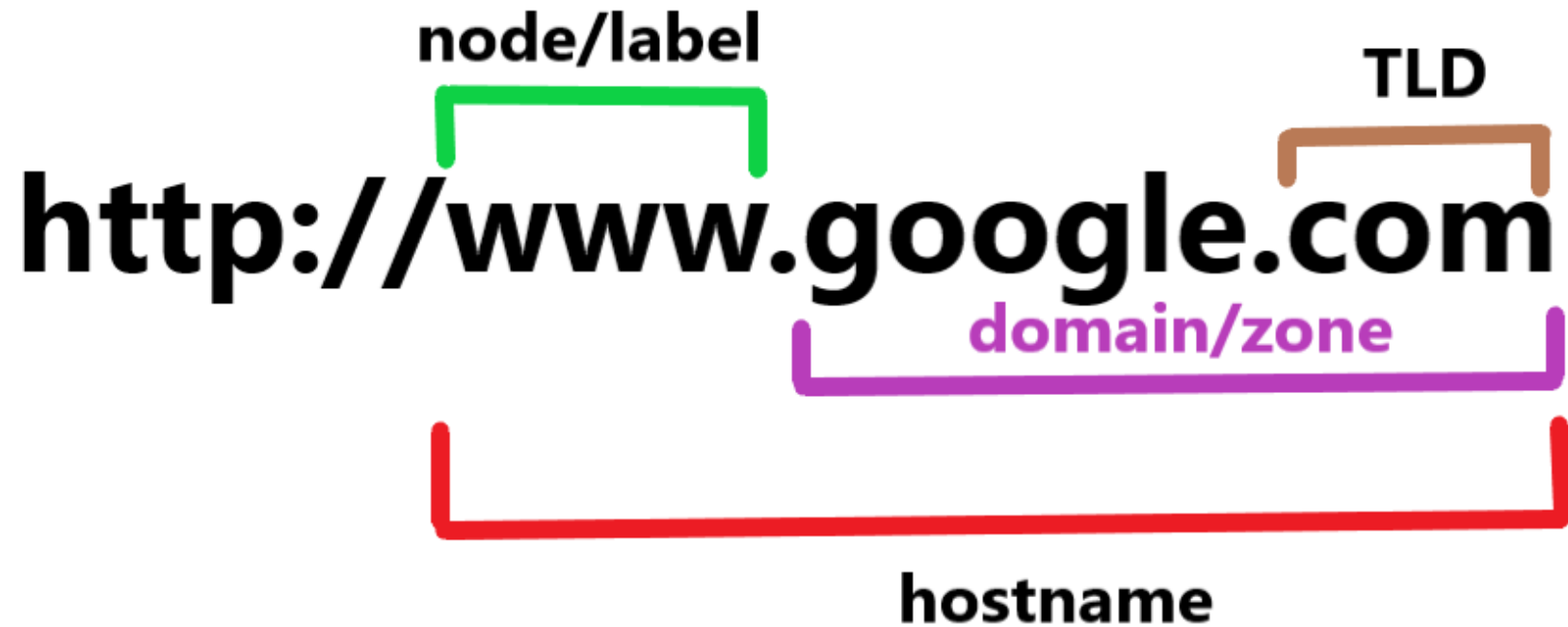
- DIG (Domain Information Groper) is a robust command-line tool for querying DNS nameservers.
- It can identify IP address records, record the query route as it obtains answers from an authoritative nameserver and diagnose other DNS problems.
- It performs DNS lookups and displays the answers that are returned from the name server(s) that were queried.
- Most DNS administrators use dig to troubleshoot DNS problems because of its flexibility, ease of use and clarity of output. Other lookup tools tend to have less functionality than dig.

INSTALL DIG

Given on Course Instructions page

- <https://courses.cs.ut.ee/2021/ds/spring/Main/Instructions4>

ANATOMY OF A HOSTNAME



HOW TO USE DIG

- **Open Terminal (Mac and Linux) or Command Prompt (Windows).**
- **Type in dig (any hostname) and press enter.**
 - *\$ dig google.com*
- **Several pieces of information will be returned.**

DIG USAGE

QUESTION SECTION: Query made to the DNS. In this example, we asked for the first available A record for the hostname, google.com.

ANSWER SECTION: The first available answer for the query made to the DNS. In this example, we received the A record for the IP address 142.250.185.78.

```
ca: Command Prompt
Microsoft Windows [Version 10.0.19042.867]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\dar>dig google.com

; <<>> DiG 9.11.29 <<>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10772
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; COOKIE: a6cccc84c21c203664806fc4606349c62d1c52c655254358 (good)
;; QUESTION SECTION:
;google.com.                IN      A

;; ANSWER SECTION:
google.com.                102     IN      A      142.250.185.78

;; AUTHORITY SECTION:
google.com.                144276  IN      NS     ns4.google.com.
google.com.                144276  IN      NS     ns2.google.com.
google.com.                144276  IN      NS     ns1.google.com.
google.com.                144276  IN      NS     ns3.google.com.

;; ADDITIONAL SECTION:
ns3.google.com.           76547   IN      A      216.239.36.10
ns4.google.com.           76547   IN      A      216.239.38.10
ns2.google.com.           84357   IN      A      216.239.34.10
ns1.google.com.           342843  IN      A      216.239.32.10
ns3.google.com.           76547   IN      AAAA   2001:4860:4802:36::a
ns4.google.com.           76547   IN      AAAA   2001:4860:4802:38::a
ns2.google.com.           328737  IN      AAAA   2001:4860:4802:34::a
ns1.google.com.           342843  IN      AAAA   2001:4860:4802:32::a

;; Query time: 3 msec
;; SERVER: 193.40.5.99#53(193.40.5.99)
;; WHEN: Tue Mar 30 18:54:45 FLE Summer Time 2021
;; MSG SIZE rcvd: 331
```

DIG USAGE

AUTHORITY SECTION: The authoritative nameservers from which the answer to the query was received. These nameservers house the zones for a domain.

ADDITIONAL SECTION: Additional information the resolver may need but not the answer to the query.

```
ca: Command Prompt
Microsoft Windows [Version 10.0.19042.867]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\dar>dig google.com

; <<>> DiG 9.11.29 <<>> google.com
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;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; COOKIE: a6cccc84c21c203664806fc4606349c62d1c52c655254358 (good)
;; QUESTION SECTION:
google.com.                IN      A

;; ANSWER SECTION:
google.com.                102     IN      A      142.250.185.78

;; AUTHORITY SECTION:
google.com.                144276  IN      NS      ns4.google.com.
google.com.                144276  IN      NS      ns2.google.com.
google.com.                144276  IN      NS      ns1.google.com.
google.com.                144276  IN      NS      ns3.google.com.

;; ADDITIONAL SECTION:
ns3.google.com.           76547   IN      A      216.239.36.10
ns4.google.com.           76547   IN      A      216.239.38.10
ns2.google.com.           84357   IN      A      216.239.34.10
ns1.google.com.           342843  IN      A      216.239.32.10
ns3.google.com.           76547   IN      AAAA   2001:4860:4802:36::a
ns4.google.com.           76547   IN      AAAA   2001:4860:4802:38::a
ns2.google.com.           328737  IN      AAAA   2001:4860:4802:34::a
ns1.google.com.           342843  IN      AAAA   2001:4860:4802:32::a

;; Query time: 3 msec
;; SERVER: 193.40.5.99#53(193.40.5.99)
;; WHEN: Tue Mar 30 18:54:45 FLE Summer Time 2021
;; MSG SIZE rcvd: 331
```

Some DIG commands

COMMAND	DESCRIPTION	EXAMPLE
dig [hostname]	Returns any A record found within the queried hostname's zone.	dig google.com
dig [hostname] [record type]	Returns the records of that type found within the queried hostname's zone.	dig google.com MX
dig [hostname] +short	Provides a terse answer, usually just an IP address.	dig google.com +short
dig @[nameserver address] [hostname]	Queries the nameserver directly instead of your ISP's resolver.	dig @ns2.ut.ee cs.ut.ee
dig [hostname] +trace	Adding +trace instructs dig to resolve the query from the root nameserver downwards and to report the results from each query step.	dig google.com +trace
dig -X [IP address]	Reverse lookup for IP addresses.	dig -X 204.13.248.106
dig [hostname] any	Returns all records for a hostname.	dig google.com any

Query Options

dig provides a number of query options which affect the way in which lookups are made and the results displayed.

- *+`[no]trace` - Toggle tracing of the delegation path from the root name servers for the name being looked up. Tracing is disabled by default. When tracing is enabled, dig makes iterative queries to resolve the name being looked up. It will follow referrals from the root servers, showing the answer from each server that was used to resolve the lookup.*
- *+`[no]all` - Set or clear all display flags.*

Session Instructions at Course Page

Quiz



Content

- Lecture 8 (Naming, identifiers and addresses)
- Two attempts
 - One in Seminar Session
 - Next available until Monday 23:59 (Deadline)
- Open Quiz in Moodle
- Total Quiz Points = 100

Observation

Quiz review is available after the quiz is closed



Questions?

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