ITONK - DNS Report

Handed in 25/4, 2014, by team no. TEAMNUMBER

Nikolaj Gustafsson	11517@iha.dk
Casper Hougaard	SOME
Christian Svejstrup	Email address

Electrical and Computer Engineering
Aarhus University
Finlandsgade 22, 8200 Aarhus N, Denmark

Abstract

Contents

Chapter 1

Introduction

The introduction of the Internet heralded an entirely new way of communication between humans. At an extreme pace, we are moving towards a world where every human being has access to an internet connection, to a point where several humanitarians and philanthropists perceive internet access as a big part of the solution towards poverty and human rights abuses.

But what binds this enormous web of people together? How do we 'find' each other on the World Wide Web?

This report will give an in-depth description of the Domain Name System (DNS), the technology responsible for translating *names* to *addresses*, making it possible to type in a human-readable domain name into a browser and have it translated to the specific address of a web server, anywhere in the world.

DNS servers act as the way-signs of the internet, directing the end user to the address of a desired server/domain. Thus, the end user really only needs to know the address of a DNS server, that can point him further in the right direction.

The report will focus on the technology from the case of a kindergarten teacher, Uffe, in need of setting up better DNS forwarding.

This is relevant because it shows a real life application of setting up a local DNS server with the BIND software. The actual tangible results of caching and forwarding to the optimal DNS server are shown in the results section.

The report is structured thus

1. Description of DNS
2. The role of DNS in the real-life case
3. Prototyping with BIND
4. Perspective and conclusion

As to first give a description of the basic theory before diving into a real-life application. To get an idea of the role of DNS, a section describing the role of the technology in the scope of the case is included before diving into the nitty gritty details of setting up a DNS server.

Chapter 2

Domain Name System

2.1 Overview

This section will describe the technological fundamentals of DNS, as well as related technologies like IP addressing. The technologies will be described along with example software used to display different parts of the theory.

The section will also contain a description of the BIND DNS software, along with installation and user guide.

This section will not focus on the chosen real-life case. This is a general description of the technology.

2.2 IP Addressing

2.2.1 IP overview

To access any resource on the internet (or LAN), be it a website or a specific device, a location is needed. When dealing with internet-related technologies, this location is specified by an *IP address*.

On any given network, an IP address should be unique to a specific device/server. However, local network routers generally have a private block of IP addresses for devices on that specific sub-net and a separate IP for the outside world (access to sub-net devices are forwarded to the specific devices by the router). The router then acts as the *gateway* to the outside world and should be accessible by an IP within the range of the sub-net.

To check the IP address of a device, the tool ifconfig (Linux) or ipconfig (windows) can be used

[Insert picture of ifconfig]

If the tool *nm-tool* is run (on a Linux machine) the output will look like this:

[Insert picture of nm-tool]

Where

Address Denotes the machines' IP on the local sub-net. Other devices on the sub-net will use this IP on to communicate with the device.

Prefix Denotes the

2.2.2 Checking IP and related

How to check IP (Linux) ifconfig

nm-tool

2.3 Name Resolution and forwarding

2.3.1 Iterative

2.3.2 Recursive

2.3.3 Caching

2.3.4 Security [DNSSEC]

2.4 BIND

2.4.1 Downloading

2.4.2 Configuration

2.4.3 Basic Use

Chapter 3

[Case Name]

3.1 Description

This is a brief description of the case, chosen to illustrate the possibilities and challenges of setting up ypur own DNS server.

The case is a kindergarten in Hellerup, Denmark has chosen to buy every third child an iPad Air 128 GB Wifi model. The rest of the kids get an Android Nexus 10, 32 GB Wifi model. Everything is going great until Christian, a 3 year old, gets fed up with absurdly long loading times. Christian checks out Google namebench and notices that all his DNS lookups take more than 100 ms!

Christian takes Uffe, the kindergarten teacher, by the hand and informs him of the problem. Uffe quickly realises, that the DNS lookup times could benefit from going to a more appropriate DNS server. To solve this problem for ALL the children, Uffe must find an appropriate DNS server, configure a local DNS server to forward to this server and configure the local DNS server for optimal caching.

3.2 DNS in [Case]

3.3 Requirements

Chapter 4

Prototyping in [Case]

4.1 System description

UML Diagrams etc.

4.2 BIND DNS server

4.3 Setup of BIND server

4.3.1 Choose DNS server to forward to

Using namebench etc.

4.4 Tests

RTT before and after/with without caching.

4.5 Results

Chapter 5

Conclusion

Approximately 1-2 pages covering conclusion, discussion, and perspectives.

5.1 Conclusion

Conclude on your investigations.

5.2 Discussion

Discuss your project work.

5.3 Perspectives

What are the perspectives on the technology and your prototype?

Bibliography

[1] R.L. Graham, D.E. Knuth, and O. Patashnik, *Concrete mathematics*, Addison-Wesley, Reading, MA, 1989.

[2] H. Simpson, *Proof of the Riemann Hypothesis*, preprint (2003), available at `http://www.math.drofnats.edu/riemann.ps`.