Computer Systems Administration (IE2060)
2nd Year, Semester II
Assignment – "DNS Measurements and Inspection"

Learning Outcome:

- Administer networks, network services
- Install and troubleshoot system hardware
- Install, configure, and troubleshoot client software applications and operating systems
- Analyze how the use of domain names, cloud infrastructure, and content distribution networks (CDNs) affect web page load times
- Explain how the domain name system (DNS) works
- Perform help desk functions to answer user questions and provide user training on application software and fundamental operating systems functions
- Effectively communicate; orally and in writing
- Use proper computer system and networking terminology

Procedure:

Part 1

STEP 1.   Open a browser and navigate to -> https://www.pinterest.com/topics/education

STEP 2.   Under "Test a website's performance" you should provide a URL -> https://www.pinterest.com/topics/education

STEP 3.   Select "Mumbai –India" as the test location.

STEP 4.   Select the "Chrome" as the browser.

STEP 5.   Click on "Start Test" and obtain the test results.

STEP 6.   Take the "First view" to answer the question.

STEP 7.   Select the "Details" tab.

STEP 8.   Save the web page content and rename the file with your registration number.

STEP 9.   Upload the renamed web file content to the coursweb link provided. (You may compress the file if needed)

STEP 10. You will need this test results in answering the following questions.

Questions

1) According to the WebPagetest data, how many DNS lookups were performed by the client?
2) How many of the lookups were redundant?
3) Assuming no DNS records were cached at the local DNS server, what DNS queries did the local DNS server need to issue to satisfy the client's first lookup? Your answer should include what name server was queried and the received record with screenshots.

You can use the dig program (available on most Linux machines) to issue queries to DNS servers.

When running dig for this question, you can use the following format:

`dig +norecurse @name.of.dns.server record-type domain-name`

4) Assuming that the local DNS server cached all the records in the first lookup, what DNS queries did the local DNS server need to issue to satisfy the client's second lookup? Name what server was queried and the records received with screenshots.

Use the list of Amazon EC2 public IP ranges by region to help you answer the following question.

5) Which domain names (if any) resolved to a node in Amazon EC2?
6) In which EC2 region was the node located?
7) Which domain names (if any) resolved to a node in the Akamai or EdgeCast CDN?
8) According to the WebPagetest data, how many HTTP requests were issued to each CDN node?
9) Over how many connections were these requests issued?
10) How many of the requested web objects were already stored in the CDN's cache? (Hint: look at the X-Cache field in the HTTP response header)

Part 2

Guidelines

- Implement caching in your DNS server.
- Perform number of DNS queries as DNS lookups so that the DNS cache will be populated. (you should perform at least 5 dns queries)
- Issue the same DNS request queries again and using tcpdump utility show that the queries are resolved using the cached information in the DNS server.
- Finally flush the DNS cache.

Assignment Information

- ***This is an individual Assignment**
- You need to compile a detailed report on the steps concepts involved in the process including troubleshooting or debugging mechanisms included. Make sure that you include screenshots of all the steps or configuration involved.
- Use the "Cover page" uploaded to the coursweb as the first page and change your details in correct placeholders before uploading your report to the link provided.
- A viva session will be carried out to evaluate the configurations that has being done.
  - **In the viva session you have to demonstrate the following**
    - The DNS queries are going through your DNS server implemented and are being cached in the process.
    - Show that if the same query is issued the results is obtained via the cache content.
    - Flush the cache.
    - Students may have to use some tools such as tcpdum or wireshark or etc. to show the process.
  - **Important: You should aware regarding the important theory concepts of cache and cache poisoning.**
  - **You should remember the important configuration directives that you have used**

Deadline Submission: 26th September 2019

Viva : will be conducted in the lab sessions and schedule will be uploaded accordingly.

Marking Criteria:

Task	Marking (out of 100 weighted 10)
Part 1 (answers)	50
Configuring caching for DNS server	10
Showing that content is being cached	10
Showing that the second lookup results in a cache hit.	10
Flushing the cache	10
Viva and questions asked (based on Knowledge gathered)	10
Total	100