Socket Programming 2

Sharan Narasimhan, CS20MTECH14003

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# 1.Foreword to Evaluators:

Please find the code for Filter and PTL lock in *‘filter\_lock.cpp’* and *‘ptl\_lock.cpp’* respectively. Links to references have been added in the form of comments where ever relevant.

For Task 1, I had to refer to online resources for the theory about DNS headers, Request sending and Response parsing and have used the two links the TA provided us. I also had to refer to few DNS tutorials in order to understand certain code segments. All these sources have been referenced wherever needed. I have briefly documented whatever I have learnt from these online tutorials as well.

# 2. Simple DNS Client using UDP

A DNS packet consists of 5 sections, Header, Question, Answer (also contains ‘Response’), Authority and Additional.

Header:

The header consists of three lines: Random Identifier/ XID (2 Bytes), OPCODE (2 Bytes) and Question Field (2 Bytes).

The XID is a randomly generated 16 bit field created by the client that is used to identify the particular DNS query/response. In the response from DNS Server, the XID should match the sending XID to convey that the response is for the particular query.

The OPCODE is a 16 bit field that consists of various flags/options available for the DNS query. Only the ‘RD’ flag was set to 1, to denote that Recursion method is desired over the iterative method. Thus the corresponding hex code is 0100.

Lastly, the question field conveys how many IPs we want to resolve. So in this case the corresponding 16 bit code is: 0001 0000 0000 0000.

Question:

The question consists 2 sections: QNAME (variable length), QCLASS (1 Byte) and QTYPE (1 Byte).

The QNAME consists of the name of the domain (e.g. “facebook” in “www.facebook.com” in ASCII form followed by a field with 3 characters corresponding to .COM and continues till the first 00 is read. This QNAME field first needs to be pre-processed to the DNS name format

QCLASS is set to IN meaning “Internet” and QTYPE corresponds to 1 of the 4 types of record responses requested, ‘A’ in this case for Authoritative. The final 16 bit code is 0001 0001.

The online tutorial that was mainly used: <https://w3.cs.jmu.edu/kirkpams/OpenCSF/Books/csf/html/UDPSockets.html>.

For more theory on the DNS header and its corresponding flags I used: https://www2.cs.duke.edu/courses/fall16/compsci356/DNS/DNS-primer.pdf