Lab Assignment 2
(Using March 2)

Objective. This lab assignment is designed to develop a deeper understanding of the HTTP and DNS protocols. You will also have more practice on the socket programming in this lab assignment.

Team. You can work in a team of no more than 3 students in this lab assignment. A description of each team member’s task in this lab assignment is required with your submission.

Submission. Electronic submission is accepted via email to yuan.xue@vanderbilt.edu and xujie.si@vanderbilt.edu. The submission package should include the following components: 1) document that provides the answers for question 1 and 2; 2) the source code for question 3; 3) team task assignment.

1. (5 pts) Get familiar with the following DNS commands/tools on your Windows system: “nslookup”, “ipconfig.” Answer the following questions and writing down what command(s) you’ve used to get the answer.

- What is the default DNS server for your computer?
- List the IP address(es) of www.google.com. What is the canonical name of www.google.com?
- How long the DNS record for www.google.com will live in your DNS cache? How about www.vanderbilt.edu?
- Now perform an iterative query yourself. Start from the root DNS server. Provide an IP address of a root server. Then list the TDL DNS servers that are used for interpreting www.google.com. Pick one TDL DNS server and find out the list of authoritative DNS servers for www.google.com. Perform the query again for www.vanderbilt.edu, starting from the root server. Record the list of TDL DNS servers and the authoritative DNS servers used for interpreting www.vanderbilt.edu.

2. (5 pts) Observe the DNS and the HTTP traffic for a website visit. Follow the following steps in this experiment.

1) Purge your local DNS resolver cache.
2) Start packet capturing using Wireshark
3) Visit the following URL in your browser: http://vanets.vuse.vanderbilt.edu/CS283_lab2/

For all the packets (DNS query and response, HTTP requests and responses) that are related to this URL visit, please record the following information 1) source and destination IP addresses, 2) UDP or TCP packet, 3) port numbers, 4) application layer messages.

3. (40 pts) Write a program to retrieve the HTML page and the images embedded in the page at the http://vanets.vuse.vanderbilt.edu/CS283_lab2/ without using a browser. Your program is expected to provide the following functions:

1) Basic file downloading via HTTP (25 pts)
2) Parallel image file downloading (15 pts)
Note: 1) You have the flexibility to choose the programming language and the operating system, though C/C++ over Linux platform is preferred. 2) You may get a clear idea on what HTTP GET message the program needs to send to the web server, and how to parse the server’s response based on the results from question 2.

**Reference.** The following information is provided as a reference for this lab assignment.

1. Wireshark. In Lab assignment 1, you’ve already got this software installed on your local computer and used it for packet analysis and format display. In this lab assignment, we will use this software to capture the traffic on your computer. Please refer to the Wireshark website for the tutorials of using this software. (Note: you may need to disable the “Capture packets in promiscuous mode” option before packet capture).

2. Socket programming.  

3. Thread library and multi-thread programming  
   [http://www.yolinux.com/TUTORIALS/LinuxTutorialPosixThreads.html](http://www.yolinux.com/TUTORIALS/LinuxTutorialPosixThreads.html)