Assignment 1

Recommended readings:
https://developers.google.com/web/tools/chrome-devtools/#discover
http://httpd.apache.org/docs/2.4/getting-started.html
https://www.apachefriends.org/de/index.html
https://docs.microsoft.com/en-us/windows-server/administration/windows-commands/nslookup
https://docs.oracle.com/javase/7/docs/api/java/net/Socket.html

Exercise 1 – Domain Name Service

Explain the idea of DNS record types and the difference between A, MX, NS, and TXT records. Use `nslookup` command line tool to find out the following information:

a) The IP address of the server with the domain name www.uibk.ac.at. Additionally, find out how long your currently cached version of the corresponding record with this information is still valid and which DNS server is responsible for this zone.
b) A list of all root name servers.
c) A list of all name servers responsible for zone '`at`' (top-level domain for Austria) – by asking one specific root name server.
d) The domain names of the DNS servers that are responsible for www.aau.at and the final IP address of the web server. Use iterative DNS resolution for this task, starting from any root DNS.

Exercise 2 – HTTP Requests

a) Use the *Developer Tools* of your web browser (e.g., Chrome) to inspect the HTTP requests when opening the website of www.berkeley.edu and answer the following questions:
    - How many requests are sent, how much data is transferred, and how long does it take to load the site from the server?
    - What is the *response status code* of the first request?
    - Which web server is serving this website?
    - Which resources are requested?
    - Which request is the slowest?
b) Repeat the procedure and answer the same questions for www.aau.at
c) Open up www.google.at, clear the content of the network inspection window and enter the word "Klagenfurt" into the search field. During entering the word look at the network requests and explain what happens?

Exercise 3 – HTTP Client

Implement a simple HTTP client with Java sockets, which performs the following steps:

a) It opens a TCP socket for a specified URL at port 80.
b) It sends an HTTP GET request via that stream (see slide 18 and 24 in the lecture). It is sufficient to simply request the root resource (i.e. `GET / HTTP/1.1`) and to specify the *Host* field. Please note that a double-CRLF (*carriage-return line-feed*) is needed at the end of the request!
c) It received the HTTP Response and writes everything to standard out.

Test your implementation with the following URLS:
www.abc.net.au
www.aau.at
de.wikipedia.org

Explain why for the 2nd URL there is so few HTML code, and why for the 3rd URL there is none at all?

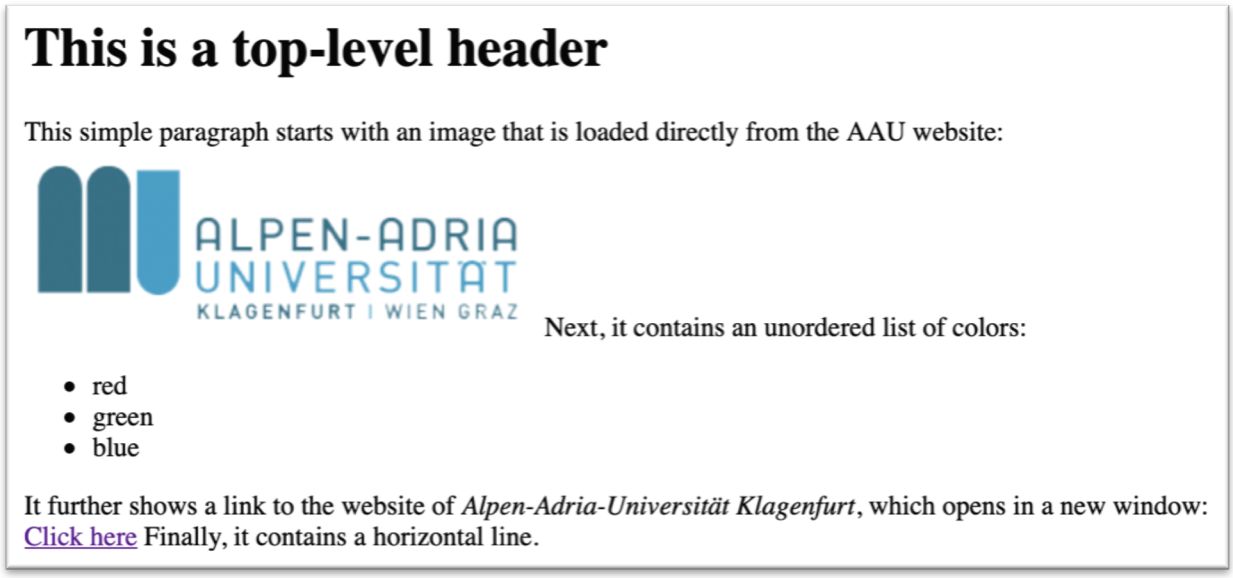
Exercise 4

Setup a recent version of XAMPP on your computer and test the installation (start Apache and open the root website). Describe the purpose of `httpd.conf` and explain the meaning of the following terms:

a) ServerRoot
b) DocumentRoot
c) VirtualHost

Exercise 5

Write an HTML page that looks as follows (please note that you shouldn't use any CSS code for this exercise):



Save your HTML file in a file called `mypage.htm` and place it in your apache document root folder. Type http://127.0.0.1/mypage.htm in your browser to test the file with Apache.