Assignment_1: Anatomy of a Web Connection: A Brief Analysis (Individ. Work)

APSEI Assig_1

Anatomy of a Web Connection: A Brief Analysis

Framework:
The utilization of the web is currently present in many circumstances of our daily lives. When we sit in front of a computer and open a browser an immense cyberworld is opened in front of us. For that to be possible many technologies, processes and actors are involved. Also, behind of what we see, many other operations take place, some of them not perceived by the "common user". These operations might have profound social and economic implications.

Objectives:
In the context of the above framework, the objectives of this assignment are the following:
- To provide a plausible identification of the technologies, processes, actors and business models involved in an web connection.
- To identify possible social and economic implications associated with the identified technologies, processes, actors and business models.

Procedures:
The following procedures are recommended in the execution of this assignment:
- Open a "cmd" window (also known as "Command Prompt" or "cmd.exe").
This is the command-line interpreter on several Operating Systems including OS/2, Windows CE Windows NT, Windows 2000 and later.
- Perform the following "traceroute" command (1).
"C:\Users\your_user_name>tracert www.cmu.edu"

Do this in 2 situations:
a) Connecting from a computer inside UA campus.
b) From a machine outside UA campus, e.g., from home.
c) Repeat the above procedures at several different times and compare the obtained "traceroute" logs.
d) Take a record of the obtained "traceroute" logs. Are they always the same for each location?

Observation:
Nowadays, the obtained traceroutes might contain lines with the following aspect:
“ # * * * Request timed out”
This might be due to the following reasons:

a) Some nodes are programmed not to respond to traceroute requests (for example, due to security reasons).
b) Other nodes, although programmed to respond, might give the traceroute a very low priority. If the node is very busy at the time of being interrogated and will not respond during a set amount of time.

In case the traceroute that you get has too many “Request timed out” you might wish to use instead the following "traceroute" logs obtained by myself (18/02/2019):

Outside UA:
"...
C:\Users\duarte>tracert www.cmu.edu
Tracing route to WWW-CMU-PROD-VIP.ANDREW.cmu.edu [128.2.42.52] over a maximum of 30 hops:
1 4 ms 7 ms 4 ms dsldevice.lan [192.168.1.254]
2 14 ms 17 ms 15 ms 10.215.64.1
3 * 9 ms 9 ms telepac16-hsi.cprm.net [195.8.30.250]
4 15 ms 11 ms 34 ms dvs-cr1-bu10-200.cprm.net [195.8.30.249]
5 53 ms 50 ms 49 ms lon3-cr1-be3.cprm.net [195.8.1.6]
6 47 ms 47 ms 47 ms 195.66.224.130
7 129 ms 129 ms 130 ms 207.88.13.56.ptr.us.xo.net [207.88.13.56]
8 128 ms 128 ms 127 ms 207.88.12.211.ptr.us.xo.net [207.88.12.211]
9 130 ms 131 ms 135 ms 216.156.16.243.ptr.us.xo.net [216.156.16.243]
10 153 ms 687 ms 390 ms ip66-3-25-94.z25-3-66.customer.algx.net [66.3.25.94]
11 133 ms 153 ms 133 ms CORE0-POD-I-DCNS.GW.CMU.NET [128.2.0.193]
12 133 ms 133 ms 134 ms POD-D-DCNS-CORE0.GW.CMU.NET [128.2.0.210]
13 136 ms 133 ms 133 ms WWW-CMU-PROD-VIP.ANDREW.CMU.EDU [128.2.42.52]
Trace complete.
..."

Inside UA:
C:\Users\duarte>tracert www.cmu.edu
Tracing route to WWW-CMU-PROD-VIP.ANDREW.cmu.edu [128.2.42.52] over a maximum of 30 hops:
1 * * * Request timed out.
2 22 ms 25 ms 22 ms 10.1.0.44
3 22 ms 20 ms 24 ms gt1-vrfinternet-r.core.ua.pt [193.137.173.244]
4 22 ms 21 ms 22 ms nx2-ibgp.core.ua.pt [10.0.34.1]
5 21 ms 22 ms 21 ms Router42.Porto.fccn.pt [193.136.4.26]
6 22 ms 32 ms 22 ms Router23.Porto.fccn.pt [193.137.4.21]

7 27 ms 26 ms 28 ms Router13.20GE.DWDM.Backbone1.Lisboa.fccn.pt [193.136.1.1]
8 147 ms 29 ms 26 ms ROUTER1.10GE.CR1.Lisboa.fccn.pt [193.137.0.1]
9 28 ms 26 ms 26 ms fccn.mx2.lis.pt.geant.net [62.40.124.97]
10 40 ms 41 ms 39 ms ae0.mx1.mad.es.geant.net [62.40.98.107]
11 53 ms 52 ms 52 ms ae3.mx1.par.fr.geant.net [62.40.98.65]
12 143 ms 138 ms 138 ms et-3-1-0.102.rtsw.newy32aoa.net.internet2.edu [198.71.45.236]
13 141 ms 140 ms 140 ms et-4-0-0.4079.rtsw.phil.net.internet2.edu [162.252.70.103]
14 151 ms 140 ms 140 ms 204.238.76.33
15 148 ms 141 ms 140 ms 204.238.76.46
16 175 ms 154 ms 150 ms 162.223.17.79
17 151 ms 154 ms 152 ms CORE0-POD-I-DCNS.GW.CMU.NET [128.2.0.193]
18 161 ms 151 ms 150 ms POD-D-CYH-CORE0.GW.CMU.NET [128.2.0.202]
19 151 ms 161 ms 152 ms WWW-CMU-PROD-VIP.ANDREW.CMU.EDU [128.2.42.52]
Trace complete.
..."

What is your task?

Provide an interpretation for the result of the "traceroute" that you are considering:
a) What does each hop correspond to?
b) Are the "traceroute" logs always the same for each location? If not, what might be the reason?
c) Which operations are involved in each hop and which technologies are used?
- Attempt to make the sequential identification of operations, processes, techniques and technologies involved in each step (eg: applications, protocols, transmission, presentation and storage of information, etc),...
- Try to situate these processes, techniques and technologies in the framework of the ISO OSI model.
d) Which players are involved in each hop?
- eg: University communications center, telecom operator, content provider, content aggregator, hosting provider, etc).
e) Which are some of the possible social and economic implications triggered by the identified technologies, processes, actors and business models?

Important:
In terms of the social and economic implications, consider not only the result of the "traceroute" command that you are considering but also what typically happens during the web sessions that you made during the realization of this assignment. For example: advertisements appearing in the web pages, etc.

What do you have to deliver?

What do you have to submit:
- A written report (no more that 10 pages, please...)

Important note:
- Use the provided template (40386-APSEI > General Information > Templates) and give the following name to your file:
  ########_assign1_APSEI_1920>, where ######## is your mechanographic number at UA.

Deadline:

- 23h59, 3rd April 2021

Submission Process
- Via Moodle:

References
[1] Andrew S. Tanenbaum, “Computer Networks”, Prentice-Hall, 2002, ISBN 0-13-066102-3.
[2] The OSI Model's Seven Layers”,
http://www.inetdaemon.com/tutorials/basic_concepts/network_models/osi_model/osi_model_seven_layers.shtml,
Accessed on February, 14th , 2012.
[3] “How OSI Works”, http://computer.howstuffworks.com/osi.htm ,
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[4] “Understanding the Ping and Traceroute Commands”,
http://www.cisco.com/c/en/us/support/docs/ios-nx-os-software/ios-software-releases-121-mainline/12778-ping-traceroute.html
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[5] George Reynolds, "Ethics in Information Technology", Cengage Learning, 2015, ISBN-13: 9781285197159 / ISBN-10: 1285197151

Notes:
(1) The "traceroute" syntax used in this text is that of Windows. For other operating systems the syntax might be different. Refer to the appropriate literature on the subject.

Hope you find this assignment useful.
Regards.
Manuel de Oliveira Duarte

Submission status