Tercer Control de Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		8/1/2017	Tardor 2017
Name:	**Surname:**	**Group**	**DNI**

Duration: 1hm. The quiz will be collected in 15 minutes. Answer in the same questions sheet.

Test. (3 points) All questions are multiple choice: Count as half if there is one error, 0 if more.

1. A local name server must resolve the name www.abc.com. Suppose that all name servers have empty caches and the name is successfully resolved. Say what statements are true:
- ☐ It will need to access a root-server.
- ☐ It will send at least 3 DNS request messages.
- ☐ In order to make the resolution it will have to send the messages with the flag of recursion desired activated.
- ☐ The response DNS message will bring a resource record of type A with the desired IP address.

2. Say which of the following statements are true regarding DNS:
- ☐ It is possible that when you resolve a name several times different IP addresses are obtained.
- ☐ It is possible that by solving different names you get the same IP address.
- ☐ A resource record of type CNAME has the IP address of a name.
- ☐ There is a well-known port reserved for the DNS service.

3. Say which answers are true regarding SMTP:
- ☐ UDP or TCP can be used indistinctly.
- ☐ The server only sends a response to the client when it sends the QUIT command.
- ☐ With the request command HELO it can be sent the name of the host of the client.
- ☐ In the same SMTP session, the client can send messages to different recipients.

4. Say which answers are true regarding the email application:
- ☐ One of the SMTP protocol commands allows you to specify the subject of the mail message.
- ☐ A webmail client sends messages with the HTTP protocol.
- ☐ A mail client must make the resolution of a MX resource record to be able to send the message to the local mail server.
- ☐ To download mail from the mailbox a mail client can use the SMTP protocol.

5. Say which answers are true about the web application:
- ☐ The javascript code is executed in the client's browser.
- ☐ The client can send the data that was added when filling an HTML form on the server with a POST.
- ☐ In some cases a web proxy can significantly reduce the download time.
- ☐ To send images embedded in a web page you can use MIME.

6. Say which answers are true about the HTTP protocol:
- ☐ It is possible to have a non-persistent connection with pipelining.
- ☐ It is possible to have a persistent connection without pipelining.
- ☐ At the beginning of the message sent by the server there is a 3-digit code indicating the result of the request sent by the client.
- ☐ The header of the HTTP message sent by the server begins at the second line of the HTTP message.

Third Midterm. Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		08/01/2018	Fall 2017
NAME (in CAPITAL LETTERS):	FAMILY NAME (in CAPITAL LETTERS):	GROUP:	DNI/NIE:

Time: 1 hour. The quiz will be collected in 15 minutes.

Problem 1 (4 points).

A user send the following electronic mail from the device client.upc.edu.
The email client uses the mail server mail.upc.edu and the DNS server ns.upc.edu.

From: usuari@upc.edu
To: soci@empresa.com
To: enginyer@startup.cat
Cc: administrador@upc.edu
Bcc: eljefe@ec.eu
Subject: new proposal
The message includes some text (about two lines) and a spreadsheet document as an attached file.

a) (1 point) Complete the sequence of SMTP commands and responses between the email client (MUA) and the email server (MTA).

client.upc.edu	Command Response	mail.upc.edu
→	HELO client.upc.edu	

b) (0.5 points) Is MIME needed for transferring the message? Why?

c) (0.5 points) Which coding (Content-transfer-encoding) will the email client use for including the spreadsheet file if the transfer uses ASCII characters (7 bits) only?

If the size of the file is 1MB, which is the estimated size of the complete email message?

The email server mail.upc.edu processes the commands and forwards the message to the different recipients.
d) (1 point) Complete the sequence of transactions between the server (mail.upc.edu) and the other servers required for the distribution of the email.
Specify the transport and application protocols and a generic description of the commands.
The email servers of the other domains are: mx.domain.tld

mail.upc.edu Protocols	**Description of the command / response**	**server**
TCP	Connection	mx.empresa.com
TCP SMTP	Commands to Transfer the message	mx.empresa.com
	Connection termination	

e) (1 point) Complete the sequence of DNS commands and responses the server ns.upc.edu will send and receive for finding out the IP address of the mail server of the domain startup.cat (consider that the cache is empty).

ns.upc.edu	**Command** **Response**	**server**
→	DNS query ...	

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First name:	Last name:

Problem 2 (3 points).

The client tercer.control.com wants to download the web www.upc.edu using HTTP. The web page contains an HTML document and 5 objects:

- 1 image Header stored in the same web server,
- 2 images Photo1 and Photo2 stored in the server imatges.fundacio.upc.edu,
- 1 video Advert and 1 audio Music stored in the server multimedia.google.com

Consider that:

- the RTT between the client and the server www.upc.edu and the server imatges.fundacio.upc.edu is 200 ms
- the RTT between the client and the server multimedia.google.com is 50 ms
- the time to establish the TCP connection is 1 RTT
- the time to close the TCP connection is 2 RTT
- the time to download the HTML is 1 RTT
- the time to download Header is 1 RTT
- the time to download Photo1 and Photo2 is 5 RTT
- the time to download Advert is 50 RTT
- the time to download Music is 20 RTT
- these times refers to the complete downloading of the object, from the first TCP segment sent containing data of the object to download, up to the reception of the last ack of this object.
- the client already knows the @IP of the servers

Determine:

a) the time needed to download the web page using HTTP/1.1 persistent (without pipelining) assuming the objects can be downloaded from different servers in parallel.
b) The number of TCP connections required in total.
c) If the connections were HTTP/1.0 non-persistent, the number of TCP connections required in this case (there is no need to determine the time to download the web page for this case, just the number of TCP connections)