Third exam of Computer Networks (XC), Degree in Informatics Engineering		19/12/2019		Fall 2019
NAME:	SURNAME:	GRUP	ID	

Duration: 1hm. The test will be collected in 20 minutes. Please use the tick boxes for your answers.

Test. (3 points) Each question counts 0.5 points if no error, 0.25 if one error, 0 if more than one error.

1. About name resolution:
☐ When a DNS resolver queries a NS for a record for which the server is authoritative, the NS server answers it without querying other servers.
☐ A DNS resolver might force to get authoritative answers only.
☐ A NS which provides for iterative resolution, performs resolution using the information within its own configuration file.
☐ A NS which provides for recursive resolution might query other NSs for the answer.
2. About DNS:
☐ Hostnames and IP addresses are not required to match one-to-one.
☐ The DNS consists of a hierarchy of domains with a common root distributed in several servers.
☐ NSs do not require DNS root server configuration provided that they perform iterative resolution only.
\square NSs do require DNS root server configuration whenever they perform recursive or iterative resolution.
3. An email server is sending messages in its output queue. One of the messages is sent TO two users, in CC to other 3 users, and in BCC to another user, all six recipients are in the same domain. How many SMTP transactions needs the email server to perform?
☐ Three SMTP transactions, one for the users in the TO field, another for the users in the CC field, and another for the user in the BCC field.
☐ Six SMTP transactions, one for every recipient.
☐ One single SMTP transaction for all the recipients.
☐ Always two SMTP transactions, as recipients in the TO and in the CC fields with those in the BCC field cannot be mixed.
4. An email server is sending messages in its output queue. There are ten messages pending to send to recipients of two different domains. Which of the following statements are true?
☐ The email server resolves the IP address of the email server from one of the domains and perform one single SMTP transaction for all the messages.
\square The email server resolves the IP address of the two email servers and perform two SMTP transactions.
☐ The email server always resolves the IP address of each email server and perform one SMTP transaction for every message to be sent.
\square The email server resolves the IP address of the two email servers and perform ten SMTP transactions.
5. In HTTP:
☐ The GET method is mainly used to retrieve meta-data in response headers as not response body is sent.
☐ The POST method is used to apply modifications to an existing object/entity in the server.
☐ The POST method is used to send a new object/entity to the server.
☐ The PUT method is used to send a new object/entity or to apply modifications to an existing object/entity in the server.
6. In HTTP/1.1: Persistent connections with pipelining:
☐ The client might issue new requests even if previous objects have been not completely downloaded.
☐ The client issues a new request after the previous object has been completely downloaded.
☐ The client always creates a TCP connection for every object.
\square The server closes the TCP connections after every object has been downloaded.

Third exam of Computer Networks (XC), Degree in Informatics Engineering		19/12/2019		Fall 2019
NAME:	SURNAME:	GRUP	ID	

Duration: 1h. The test will be collected in 20 minutes. Please use the tick boxes for your answers.

Test. (3 points) Each question counts 0.5 points if no error, 0.25 if one error, 0 if more than one error.

1. About DNS:	
☐ Hostnames and IP addresses are not required to match one-to-one.	
☐ The DNS consists of a hierarchy of domains with a common root distributed in several servers.	
□ NSs do not require DNS root server configuration provided that they perform iterative resolution only.	
\square NSs do require DNS root server configuration whenever they perform recursive or iterative resolution.	
2. About name resolution:	
☐ When a DNS resolver queries a NS for a record for which the server is authoritative, the NS server answers it without querying other servers.	
☐ A DNS resolver might force to get authoritative answers only.	
☐ A NS which provides for iterative resolution, performs resolution using the information within its own configuration file.	
\square A NS which provides for recursive resolution might query other NSs for the answer.	
3. An email server is sending messages in its output queue. There are ten messages pending to send to recipients of two different domains. Which of the following statements are true?	
☐ The email server resolves the IP address of the email server from one of the domains and perform one single SMTP transaction for all the messages.	
\square The email server resolves the IP address of the two email servers and perform two SMTP transactions.	
\Box The email server always resolves the IP address of each email server and perform one SMTP transaction for every message to be sent.	
\square The email server resolves the IP address of the two email servers and perform ten SMTP transactions.	
4. An email server is sending messages in its output queue. One of the messages is sent TO two users, in CC to other 3 users, and in BCC to another user, all six recipients are in the same domain. How many SMTP transactions needs the email server to perform?	
\Box Three SMTP transactions, one for the users in the TO field, another for the users in the CC field, and another for the user in the BCC field.	
☐ Six SMTP transactions, one for every recipient.	
☐ One single SMTP transaction for all the recipients.	
\square Always two SMTP transactions, as recipients in the TO and in the CC fields with those in the BCC field cannot be mixed.	
5. In HTTP/1.1: Persistent connections with pipelining:	
☐ The client might issue new requests even if previous objects have been not completely downloaded.	
☐ The client issues a new request after the previous object has been completely downloaded.	
☐ The client always creates a TCP connection for every object.	
$\ \square$ The server closes the TCP connections after every object has been downloaded.	
6. In HTTP:	
☐ The GET method is mainly used to retrieve meta-data in response headers as not response body is sent.	
☐ The POST method is used to apply modifications to an existing object/entity in the server.	
☐ The POST method is used to send a new object/entity to the server.	
☐ The PUT method is used to send a new object/entity or to apply modifications to an existing object/entity in the server.	

Third midterm, Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		19/12/2019	Tardor 2019
FIRST NAME (UPPER CASE):	LAST NAME (UPPER CASE):	GROUP:	ID:

Time: 1hour. The quiz will be collected in 20 minutes.

- Problem 1 (3.5 points)
 In view of the message on the back, answer the following questions:

 A) (0.75 points) What mail protocols and role can have mail.isoc.org, mx1.upc.es, mbox.upc.es?

 B) (0.5 points) Which DNS records did the mail client resolve to send it (the first transfer of the submission)?

 C) (0.75 points) List the MIME parts, indicating Type and Boundary, indented with "." and "()" to group them:
 multipart/mixed 16A5 (
 .multipart/alternative 65E8 (
 ..text/plain
- D) (0.5 points) What effect does "multipart / alternative" have?
- E) (0.5 points) What effect can "Content-Transfer-Encoding: quoted-printable" have on the content?

F) (0.5 points) How many bytes will the file "1x1.png" have? (if there are 128 letters in the encoded content)

```
Return-Path: <sender@isoc.org>
Received: from mx1.upc.es by mbox.upc.es with SMTP id AAXY3
     for <dest@upc.edu>; Wed, 11 Dec 2019 15:25:03
Received: from mail.isoc.org by mx1.upc.es with SMTP id xBBEP1
     for <dest@upc.edu>; Wed, 11 Dec 2019 15:25:01
Received: from dync-3.isoc.org by mail.isoc.org with SMTP id C8413
     for <dest@upc.edu>; Wed, 11 Dec 2019 15:15:25
To: dest@upc.edu
From: The sender <sender@isoc.org>
Subject: test
Message-ID: <5aedea3f@isoc.org>
Date: Wed, 11 Dec 2019 15:15:25
MIME-Version: 1.0
Content-Type: multipart/mixed; boundary="16A5"
This is a multi-part message in MIME format.
Content-Type: multipart/alternative; boundary="65E8"
--65E8
Content-Type: text/plain; charset=utf-8
Content-Transfer-Encoding: quoted-printable
A _test_
--65E8
Content-Type: multipart/related; boundary="ECB3"
--ECB3
Content-Type: text/html; charset=utf-8
Content-Transfer-Encoding: 8bit
<html><body>A <u>test</u> <img src="cid:part1.29EE"></body> </html>
--ECB3
Content-Type: image/png
Content-Transfer-Encoding: base64
Content-ID: <part1.29EE>
Content-Disposition: inline; filename="1x1.png"
iVBORw0KGqoAAAANSUhEUqAAAAEAAAABAOMAAAAl21bKAAAAA1BMVEUAAACnej3aAAAAAXRS
TlMAQObYZgAAAApJREFUCNdjYAAAAAIAAeIhvDMAAAAASUVORK5CYII=
--ECB3--
--65E8--
Content-Type: application/pdf
Content-Transfer-Encoding: base64
Content-Disposition: attachment; filename="test.pdf"
JVBERi0xLjUKJc0kw7zDts0fCjIMCBvYmoKPDwvTGVuZ3RoIDMaMCB0ZpbHRMQolJUVPRqo=
--16A5--
```

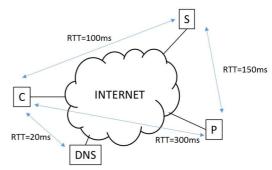
Third Midterm. Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		19/12/2019	Fall 2019
NAME (in UPPER-CASE LETTERS):	FAMILY NAME (in UPPER-CASE LETTERS):	GROUP:	DNI/NIE:

Time: 1hour. The guiz will be collected in 20 minutes.

Problem 2 (3.5 points)

An HTTP client C connects to server S and downloads a web page. The web page (index.html) contains a "logo" as an embedded image and 2 images that are hosted in server P. The figure shows the RTT ("round-trip time") between the devices. To simplify, let's consider that the TCP connection setup takes one RTT.

The download time for each object, once the TCP connection is established, includes sending the GET command and the transmission time of the corresponding file and is: home page (index.html) 300ms, image of the logo 150ms, and 2000ms for each external image. The downloading time includes the TCP termination of the connection, if needed. The client only supports one TCP connection with S and one with P simultaneously.



The DNS server contains all the required information needed to resolve the queries. Let's assume that the client starts sending commands once it has received the "index.html" file completely. Calculate the total downloading time for the complete page including the images for the following cases. Complete the following tables including the sequence of the protocols and connections (DNS, TCP and HTTP) together with their corresponding time. In column "Q/GET" put the name of the server for the DNS "Query" or the name of the corresponding file for the GET command (i.e.: index, logo, img1, img2).

- A) (1 point) The client uses non persistent HTTP.
- B) (1 point) The client uses persistent HTTP (with *pipelining*).
- C) (1 point) The client uses non persistent HTTP but it may establish up to 8 TCP connections in parallel.

Α				
Protocol	Q/GET	Time		
DNS	S?	20		
TCP		100		
HTTP	Index	300		
		·		
Total time:				

В			
Protocol	Q/GET	Time	
Total t	ime.		

C				
Protocol	Q/GET	Time		
Total t	ime:			

D) (0.5 points) If each image is stored in a different server (img1 in P1 and img2 in P2, and both servers are co-located), comment on the changes in total downloading time in the previous three cases.