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| Tercer control de Xarxes de Computadors (XC), Grau en Enginyeria Informàtica | | 10/1/2017 | Tardor 2016 |
| NAME: | SURNAME | GROUP | DNI |

Duration: 1h15m. The quiz will be collected in 25 minutes. Answer in the same questions sheet.

Test. (4 points) All questions are multiple choice: Count as half if there is one error, 0 if more.

1. About charsets:

- ☐ In ASCII the most significant bit is not used or is 0.
- ☐ The ISO 8859 family extends ASCII with tables of characters from other languages.
- ☐ In the ISO 8859 family a code can correspond to several characters (according to the table used).
- ☐ In UNICODE a code can correspond to several characters.

2. About Unicode:

- ☐ ASCII matches the first UNICODE values.
- ☐ Each character is encoded with 32 bits.
- ☐ Each character in UTF-8 must be encoded with a single byte.
- ☐ Each character in UTF-8 must be encoded with one to several bytes.

3. Which claims are true about DNS:

- ☐ The reverse resolution allows to obtain the name from an IP address.
- ☐ The answer to a query can be a value or a reference to another server.
- ☐ Two A records can not have the same address value.
- ☐ Each MX record must have a preference/priority value.

4. On a single SMTP protocol connection, the client:

- ☐ Can only deliver a single message.
- ☐ Can deliver one or several messages.
- ☐ Can only send messages to a single recipient.
- ☐ Can only deliver messages from a single originator.

5. When using a HTTP proxy:

- ☐ The proxy captures the HTTP connection (similar to NAT) transparently.
- ☐ The browser is configured to always connect to the proxy and ask for all URLs.
- ☐ The proxy can act as a shared cache for all connected browsers.
- ☐ The proxy replaces the browser cache.

6. When an object is in the browser's cache, it can:

- ☐ Visualize it after verifying its TTL.
- ☐ Visualize it after verifying its validity, with a conditional GET request.
- ☐ Use the "If-Modified-Since" header to verify its validity.
- ☐ Use the "If-None-Match" header (Etag) to verify its validity.

7. About an XML document:

- ☐ An element can contain zero or more elements.
- ☐ Its content can be validated according to a scheme.
- ☐ The document is a sequence of elements.
- ☐ The document is a tree with a root object.

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Question 1 (3 points)

We want to send an email including an object that contains 3 bytes with values 31 30 80 (base16).

Remember that SMTP is a text-based protocol. The object is encoded in base64 as the following 4 characters: MTCA

a) (0.5 points) Why does the base64 encoding of a 3-byte message result in 4 chars?

b) (0.5 points) Complete the encoding of the MIME message if it is transferred as image/png:

| | |
|----------------------------|--|
| Content-Type: | |
| Content-Transfer-Encoding: | |
| Cuerpo del mensaje | |

Briefly justify the answer:

The encoding of these three bytes in the ISO8859-15 character set corresponds to the 3 letters: 10€ (one, zero, euro)

c) (0.5 points) Complete the encoding of the MIME message if it is transferred as plain text:

| | |
|----------------------------|--|
| Content-Type: | |
| Content-Transfer-Encoding: | |
| Cuerpo del mensaje | |

Briefly justify the answer:

d) (1.5 points) Describe the SMTP dialog between a client and his SMTP server when sending 2 e-mail messages with 1 recipient each.

| Request (client) | Response (from the server) |
|------------------|----------------------------|
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Briefly justify the answer:

| | | | |
|--|----------|------------|-----------|
| Third Midterm Xarxes de Computadors (XC) Grau en Enginyeria Informàtica | | 10/01/2017 | Fall 2016 |
| Name: | Surname: | Group: | DNI: |

Question 2 (3 points)

A data terminal (client) accesses the website www.bentlu.com/index.html. The downloaded page only contains text (UTF-8) and it is displayed on the screen. The protocol is HTTP1.1. The contents of the page can be sent with a single TCP segment and afterwards the HTTP connection ends. Adapt your answers on the lines of the given table.

- a) Show all DNS steps needed to obtain the IP address of the destination website. There are no cached RRs in the Name Servers. Use the following naming for servers: NS XXX where XXX is the particular server (ie. NS local, NS com). (0.5 points).

| Step | Source | Destination | Transport Protocol/dest. port | Application Protocol | What do you get with communication? |
|------|--------|-------------|-------------------------------|----------------------|-------------------------------------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |

- b) Once the address of the destination server is known the client starts the process of accessing the web server. List the communication steps to download the requested page. The client does not have the page stored in the local cache. Show the TCP connection and disconnection in a single step each one. In the last column, put in the TCP and HTTP contents that you consider essential to understand what is being done. (0.5 points)

| Step | Source | Destination | Transport Protocol/dest.port.. | Application Protocol | Contents |
|----------|--------|-------------|--------------------------------|----------------------|----------|
| 1 (TCP) | | | | | |
| 2 (HTTP) | | | | | |
| 3 (HTTP) | | | | | |
| 4 (TCP) | | | | | |

- c) HTML src attribute indicates the URL of an image that must be downloaded when reading the HTML line. If in the case of paragraph b) the HTTP body contains: `` please show the global steps (DNS, TCP, and HTTP) that would make the client browser to display this HTML line. Local NS contains the cache of the web address. The image fits in a single TCP segment. (0.5 points)

| Step | Source | Destination | Transport Prot./dest. port | Application Protocol | What do you get with communication? |
|-----------------------|--------|-------------|----------------------------|----------------------|-------------------------------------|
| 1 (DNS) (two ways) | | | | | |
| 2 (TCP) | | | | | |
| 3 (HTTP) | | | | | |
| 4 (HTTP) | | | | | |
| 5 (TCP) | | | | | |

- d) HTML href attribute indicates a link (URL) that appears on the screen. If in the case of paragraph b) the HTTP body contains: `image`, what action would be done in this case? (0.5 points)

- e) Suppose that in the case of paragraph c) the client sends a HTTP request as follows:

| |
|---|
| GET /imag1.jpg HTTP/1.1 |
| HOST: www.repos.com |
| If-None-Match: "4567393a568902b57e2" |
| if-Modified-Since: January 9, 2017 20:57:10 GMT |

What is the client doing? (0.5 points)

- f) If the server HTTP answer is:

| |
|---|
| HTTP/1.0 304 Not Modified |
| Date: Tue, 10 Jan 2017 10:30:25 GMT |
| Last Modified: January 9, 2017 20:57:10 GMT |
| Etag: "4567393a568902b57e2" |
| Connection: Close |

What does it mean? (0.5 points)