

CSC 102 ♦ HOW THE INTERNET WORKS  
TAKE-HOME EXAMINATION  
DUE THURSDAY, 11 MARCH

Quiz rules are in effect for this exam: You may not consult any person other than the professor when completing the exam, but you may use references online and in print. Wherever you use external sources, leave me a URL. And don't forget to use quotation marks when copying from a source. There will be a certain amount of Web searching necessary to respond to several of the questions. Wikipedia will be accepted as a source of answers. You may also have to use Google or its equivalent intelligently, and some of the other tools we have studied. Items below indicated as [Challenge] questions may be more difficult to complete, or take multiple steps to arrive at an answer, and thus should be approached with care.

**Protocols** (12 points)

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The Data Link Layer of the Network Hierarchy uses an addressing scheme in its "frames" different from IP addresses. Each piece of hardware on a local area network has such an address. We did not focus on this layer in class, but you should have sufficient background knowledge at this point to investigate and answer the following questions.

- a.) What is the addressing system called? What is its acronym?
- b.) How many bits does it use for the address?
- c.) When you purchase a laptop today, does it (normally) already have such an address "in it" in some sense, or does the address get assigned in some other manner? Explain briefly.
- d.) [Challenge] Find the precise Data Link Layer address of some machine (your own or a campus machine), and tell me how you found it.

**Attachments** (10 points)

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Suppose that a friend sends you an email with a file attachment. However, the file name does not indicate its contents or type. Describe any potential hazards in this situation, and appropriate precautions to take. Assuming that you are using the GroupWise email client, explain how you could figure out what sort of file the attachment is, without activating it in any way.

## Email (20 points)

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Consider the email below, and answer the questions that follow. If for some reason you cannot determine the answer to one section, then show how you tried.

```
Return-path: <info@fedex.com>
Received: from cs.smith.edu (scinix.smith.edu [131.229.72.8])
    by gwemail.smith.edu with ESMTTP; Sat, 07 Nov 2009 16:30:41 -0500
Received: by cs.smith.edu (Postfix)
    id 2D78AEEAE1; Sat, 7 Nov 2009 16:30:41 -0500 (EST)
Delivered-To: nhowe@cs.smith.edu
Received: from mscreen4.smith.edu (mscreen4.smith.edu [131.229.64.70])
    by cs.smith.edu (Postfix) with SMTP id 25D23EEA6D
    for <nhowe@scinix.smith.edu>; Sat, 7 Nov 2009 16:30:41 -0500 (EST)
Received: from scmapp2.smith.edu (scmapp2.smith.edu [131.229.64.145])
    by mscreen4.smith.edu (8.13.8/8.13.8) with SMTP id nA7LUfRC013483
    for <nhowe@scinix.smith.edu>; Sat, 7 Nov 2009 15:30:41 -0600
Received: from (unknown [193.204.68.3]) by scmapp2.smith.edu with smtp
    id 2964_2e09_cbc98036_cbe4_11de_89ab_001422144a36;
    Sat, 07 Nov 2009 16:30:40 -0500
Received: from ateneo.unile.it (localhost.localdomain [127.0.0.1])
    by ateneo.unile.it (Postfix) with ESMTTP id 6204F4F70787;
    Sat, 7 Nov 2009 21:54:52 +0100 (CET)
Received: from 196.1.177.14
    (SquirrelMail authenticated user thomas.christiansen)
    by ateneo.unile.it with HTTP;
    Sat, 7 Nov 2009 21:54:52 +0100 (CET)
Message-ID: <47217.196.1.177.14.1257627292.squirrel@ateneo.unile.it>
Date: Sat, 7 Nov 2009 21:54:52 +0100 (CET)
Subject: Your unclaimed parcel.
From: "FedEx" <info@fedex.com>
Reply-To: fedex.courier4@live.com
User-Agent: SquirrelMail/1.4.10a
MIME-Version: 1.0
Content-Type: text/plain; charset=iso-8859-1
X-Priority: 3 (Normal)
Importance: Normal
To: undisclosed-recipients;
```

We have been waiting for you to contact us for your Package that has been registered with us for shipping to your residential location. The content of your parcel includes a Bank Draft worth of \$688,000.00 (Two Hundred and Eighty Eight Thousand US Dollars).

You are required to send your Complete Name, Country, Address and Phone Number to our Customer Care Officer: Mr. Anderson Cole. E-mail Address: fedex.courier4@live.com, Phone-Number: +2347059833193.

- a.) In what country did this email come from just before arriving at Smith?
- b.) What was the IP address of the originating host?
- c.) [Challenge] What is the IP address of ateneo.unile.it?
- d.) If I hit the **Reply** button on the Groupwise email client (or most other email programs), to what address will I be sending a message?

### **Bandwidth** (18 points)

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You are downloading a 3.6 GB movie file, a process which takes 5 hours using your home connection.

- a.) What is the average data transfer rate, in **kilobits per second**? Show your work.
- b.) [Challenge] Suppose that the movie is two hours long when played. How much of the total file (in GB) would you have to download before beginning playback, if you wanted the movie to play as soon as possible but without interruption? (In other words, you want to start playing the movie such that both the download and the playback finish at the same time.) Show your work.
- c.) Suppose that you find the file available for download from a new site that is located exactly half the distance away (in miles) compared to the original download site. All other things being equal, how long would you expect the download to take from the new site?

### **Web Styles** (10 points)

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Type a simple CSS style rule that would create the following styles. (You may assume that your answer is within a `<style>...</style>` pair. I just want the rule.)

- a.) All text in the document appears in navy blue.
- b.) The background of any `h1` tag is red.
- c.) Paragraphs in the document are centered on the page.
- d.) All ordered lists are numbered using lower case letters (a, b, c, etc.).
- e.) [Challenge] All images have a 3 pixel wide gray inset-style border. (Note: An inset border looks like the image is recessed in a beveled frame.)

### **Domain Information** (10 points)

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[Challenge] The address `northpole.com` is a real registered domain, but probably not located at the north pole. Try to find out where in the world that domain name is physically located, or at least the Internet Service Provider that supports that domain name. Explain to me how you found out whatever you discovered.

## HTML (20 points)

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Identify the outright errors in the web page source below, as well as instances where it departs from the "best practices" taught in class.

```
<html>
<title>Test Document</title>
<head>
<style>
p {
  background-color: blue
  color: silver
}
</style>
</head>

<body>
<span style="font-size:xx-large">Test Item</span>

<p>This is an item in the <em><strong>CSC 102 take-home
exam</em></strong>.
<p><span style="color: yellow">It contains many <font
color="red">errors</font> and <b>bad practices</b>.</span></p>
<li>Don't write pages like this!</li>
<LI>Ever!</LI>
</body>
```