Homework for Chapter 7

1. Which DNS record verifies the signature of the DNS records for an authoritative name server?

   Solution:

   The RRSIG record.

2. Can a machine with a single DNS name have multiple IP addresses? How could this occur?

   Solution:

   Yes.
   It can have multiple network interfaces, thus multiple IP addresses.

3. Can a computer have two DNS names that fall in different top-level domains? If so, give a plausible example. If not, explain why not?

   Solution:

   Possible.
   www.SomeChineseCompany.com, www.SomeChineseCompany.com.cn.

4. A 100 byte ASCII string is encoded using base64. How long is the resulting string?

   Solution:

   Base64 encoding yields four bytes of output for every three bytes of input.
   The first 99 bytes of input give 132 bytes of output.
   The remaining byte, or eight bits, are encoded as two characters, padded with "==" to indicate a single input byte. 136 bytes in total.

5. Suppose that you want to send an MP3 file to a friend, but your friend's ISP limits the size of each incoming message to 1 MB and the MP3 file is 4 MB. Is there a way to handle this situation by using RFC 5322 and MIME?

   Solution:

   Yes.
   Use the message/external-body subtype and just send the URL of the file instead of the actual file.

6. Imagine that someone in the math department at Stanford has just written a new document including a proof that he wants to distribute by FTP for his colleagues to review. He puts the program in the FTP directory ftp/pub/forReview/newProof.pdf. What is the URL for this program likely to be?

   Solution:

   Protocol: ftp.
   Server name: ftp.math.stanford.edu
   URL: `ftp://ftp.math.stanford.edu/ftp/pub/forReview/newProof.pdf`.

7. For each of the following applications, tell whether it would be (1) possible and (2) better to use a PHP script or JavaScript, and why:

   a. Displaying a calendar for any requested month since September
   b. Displaying the schedule of flights from Amsterdam to New York.
   c. Graphing a polynomial from user-supplied coefficients.

   Solution:

   (a) A PHP script could also be used, but it would be slower.
   (b) This requires a large database. It must be done on the server using PHP (or CGI).

(c) Both work, but JavaScript is faster.

8. Does it make sense for a single ISP to function as a CDN? If so, how would that work? If not, what is wrong with the idea?

   Solution:

   Sure.

   The ISP goes to a number of content providers and gets their permission to replicate their content on the ISP's site.

   The content provider might even pay for this service.

   The disadvantage is that it is a lot of work for the ISP to contact many content providers.

   It is easier to let a CDN do this.

9. Under what conditions is using a CDN a bad idea?

   Solution:

   It is a bad idea if the content changes rapidly. Pages full of up-to-the second sports results or stock quotes are not good candidates, for example. Pages that are generated dynamically are not suitable.

10. One of the advantages of peer-to-peer systems is that there is often no central point of control, making these systems resilient to failures. Explain why BitTorrent is not fully decentralized.

    Solution:

    Bootstrapping still requires central control.

    The torrent file needs to be obtained from somewhere. Typically these are obtained through a select number of Web pages that host these files. After obtaining the torrent file, the BitTorrent client locates the tracker, a central point that informs the new peer of the current peers in the swarm. Without the tracker, new peers would not be able to join the network.