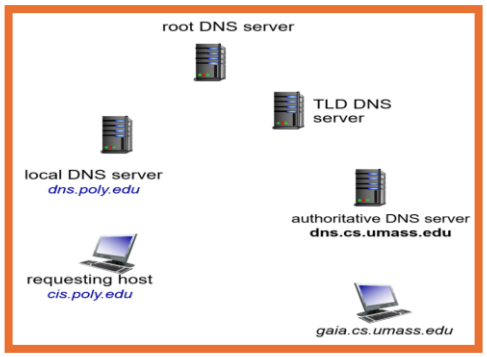
CMSC3180: Data Communication and Networking
Assignment 3 Due Wednesday (10/09) midnight to D2L

Policies:

1. Discussions on these questions are welcomed and encouraged. However, you should NOT ask any other person to write solution for you or copy solutions from any other person directly. You should write the names from whom you received help and cite the references used if any.
2. Late turn in will cause a 10% deduction on your grade for each late day.
3. Either turn in hard-copy in class or submit e-copy to D2L dropbox.



Question 1. (**10 points**) Consider figure on the right. Suppose within the Web browser on cis.poly.edu you click on a link to obtain a Web page on cs.gaia.umass.edu. The IP address of cs.umass.edu only exists in the authoritative DNS (dns.cs.umass.edu), not cached in any other DNS server, nor cis.poly.edu. Thus a DNS lookup is necessary for cis.poly.edu to obtain the IP address. Assume that it will use iterated DNS queries. Also assume the round-trip-time (RTTs) between any two machines in the figure are the same, denoted as *t.* Further suppose that the requested Web HTML page contains exactly five image objects. Assume zero transmission time of the object.

1. **How much time elapses from when you click on the link until cis.poly.edu receives the HTML page?**
   -DNS lookup time = t+t+t+t =4RTT
   -TCP connection = 1 RTT
   - Request/receive HTML = 1 RTT
   Total time: 4RTT + 1RTT + 1RTT = 6RTT
2. Refer to the HTTP Delay applet https://media.pearsoncmg.com/ph/esm/ecs_kurose_compnetwork_8/cw/content/interactiveanimations/http-delay-estimation/index.html. Based on this estimation, how much time elapses from when you click on the link until cis.poly.edu

receives the HTML page **and all the five image objects,**

a. When non-persistent connections is used; and

- Non persistent requires separate TCP connections to be established for each object:
  2RTT per image, 5 objects
  5 x 2t = 10t
- 6t to get HTML, 5images =10t
  6t+10t= 16RTT non-persistent delay

b. When persistent connections without pipeline is used?

- ~~6t for DNS lookup/HTML, 2t for Request/response, 5images~~
  ~~5 x 2t = 10t~~
  ~~6t +10t =16RTT~~

- 6t for DNS lookup/HTML, 1t for Request/response, 5images
- 5 x 1t = 5t
- 6t + 5t = 11RTT

Question 2. (**10 points**)

a) What is a *whois* database?

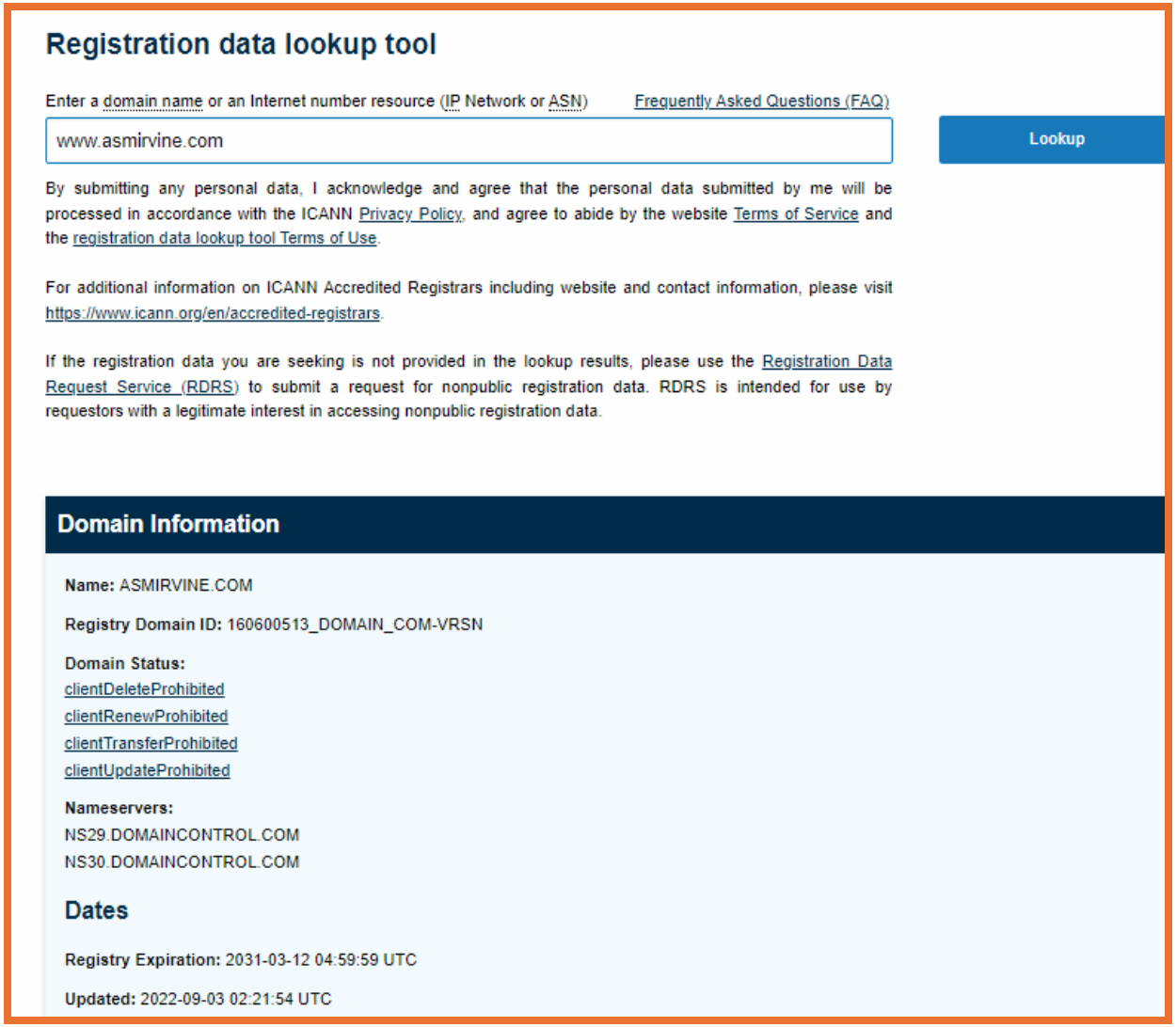
- A WHOIS database stores public information on who owns domain names, their registration, and contact info.

b) Use various whois databases on the Internet to obtain the names of two DNS servers. Indicate which whois databases you used.

-ICANN WHOIS: https://lookup.icann.org/en => Site: www.asmirvine.com, DNS: NS29.DOMAINCONTROL.COM

-WHOIS : https://www.whois.com/ =>Site: google.com, DNS: NS1.GOOGLE.COM,

=>Site: pennwest.edu, DNS: NS3-35.AZURE-DNS.ORG



Registration data lookup tool

Enter a domain name or an Internet number resource (IP Network or ASN) Frequently Asked Questions (FAQ)

www.asmirvine.com

Lookup

By submitting any personal data, I acknowledge and agree that the personal data submitted by me will be processed in accordance with the ICANN Privacy Policy, and agree to abide by the website Terms of Service and the registration data lookup tool Terms of Use.

For additional information on ICANN Accredited Registrars including website and contact information, please visit https://www.icann.org/en/accredited-registrars.

If the registration data you are seeking is not provided in the lookup results, please use the Registration Data Request Service (RDRS) to submit a request for nonpublic registration data. RDRS is intended for use by requestors with a legitimate interest in accessing nonpublic registration data.

Domain Information

Name: ASMIRVINE.COM

Registry Domain ID: 160600513_DOMAIN_COM-VRSN

Domain Status:
clientDeleteProhibited
clientRenewProhibited
clientTransferProhibited
clientUpdateProhibited

Nameservers:
NS29.DOMAINCONTROL.COM
NS30.DOMAINCONTROL.COM

Dates

Registry Expiration: 2031-03-12 04:59:59 UTC

Updated: 2022-09-03 02:21:54 UTC

Enter a domain name or an Internet number resource (IP Network or ASN) Frequently Asked Questions (FAQ)

google.com

Lookup

By submitting any personal data, I acknowledge and agree that the personal data submitted by me will be processed in accordance with the ICANN Privacy Policy, and agree to abide by the website Terms of Service and the registration data lookup tool Terms of Use.

For additional information on ICANN Accredited Registrars including website and contact information, please visit https://www.icann.org/en/accredited-registrars.

If the registration data you are seeking is not provided in the lookup results, please use the Registration Data Request Service (RDRS) to submit a request for nonpublic registration data. RDRS is intended for use by requestors with a legitimate interest in accessing nonpublic registration data.

Domain Information

Name: GOOGLE.COM

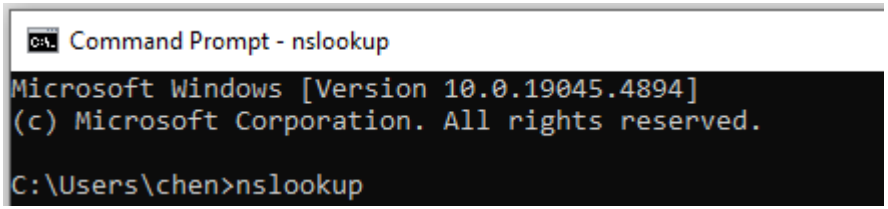
Registry Domain ID: 2138514_DOMAIN_COM-VRSN

Domain Status:
clientDeleteProhibited
clientTransferProhibited
clientUpdateProhibited
serverDeleteProhibited
serverTransferProhibited
serverUpdateProhibited

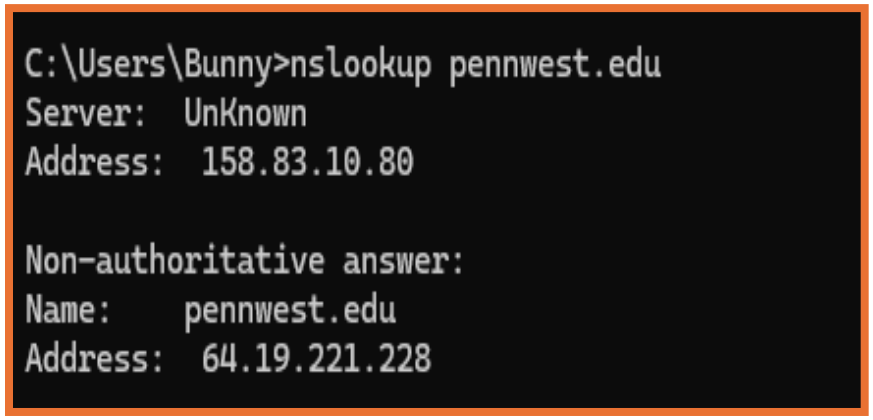
Nameservers:
NS1.GOOGLE.COM
NS2.GOOGLE.COM
NS3.GOOGLE.COM
NS4.GOOGLE.COM

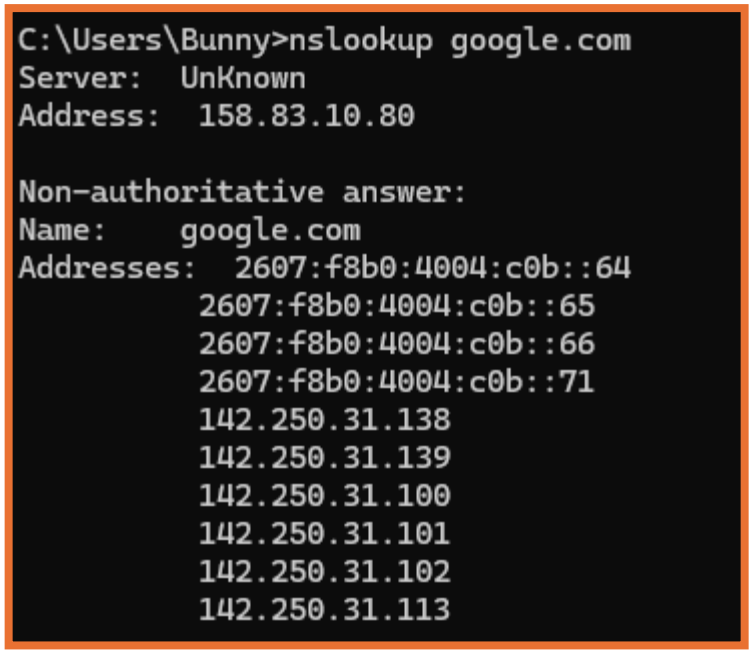
```
---------------------------------------------------------------------

Domain Name: PENNWEST.EDU

Registrant:
          California University of Pennsylvania
          250 University Avenue
          California, PA 15419-1394
          USA

Administrative Contact:
          Domain Admin
          Pennsylvania Western University
          250 University Avenue
          California, PA 15419-1394
          USA
          +1.7249385911
          donain-admin@pennwest.edu

Technical Contact:
          Domain Tech
          Pennsylvania Western University
          250 University Avenue
          California, PA 15419-1394
          USA
          +1.8143932640
          donain-tech@pennwest.edu

Name Servers:
          NS3-35.AZURE-DNS.ORG
          NS4-35.AZURE-DNS.INFO
          NS1-35.AZURE-DNS.COM
          NS2-35.AZURE-DNS.NET
```

c) Use nslookup (Command Line in Windows and type nslookup) to find a Web server that has multiple IP addresses. Does PennWest.edu have multiple IP addresses?



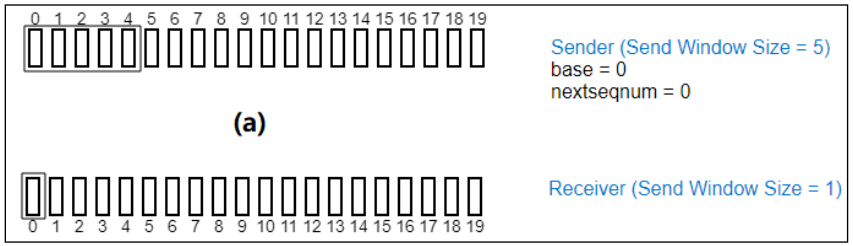
-Pennwest.edu has a single IP address, however google.com has several.



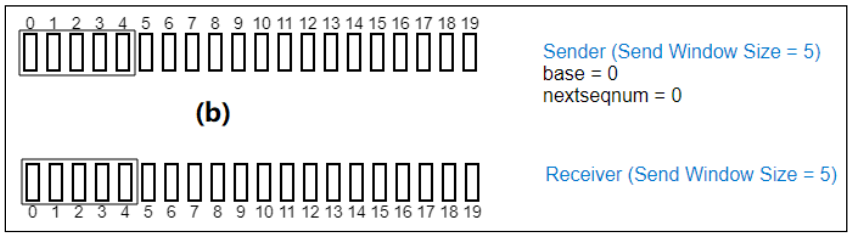


Question 3. (**10 points**) Visit the two interactive Applets "Go-Back-N" and "Selective Repeat" and answer the following questions.

1. From the following two screenshots (a) and (b), can you tell which one is for "Go-Back-N" and which one is "Selective Repeat"? Why?

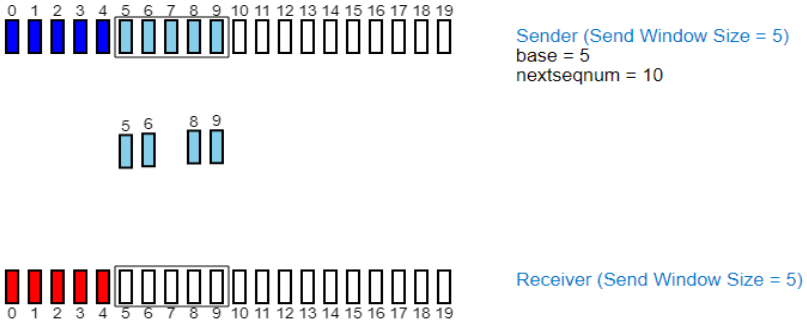


A = Go-Back-N, the sender window size is n = 5 and the receiver window size is 1. Discards out of order packets.



B = Selective Repeat, the sender window and receiver window sizes are both n = 5. Buffers out of order packets.

2. In this scenario on the right, packet 7 is lost. What is the ACK number when the receiver receives packet 5 and what is the ACK number when receives packet 9? When the timer of packet 7 expires, which packet(s) will be resent by the sender?

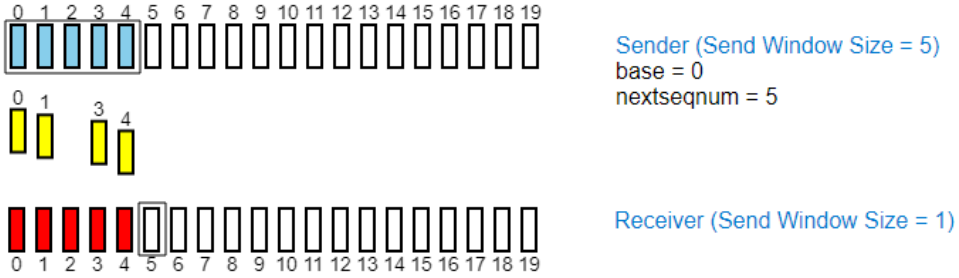


-Packet 7 is out of order, therefore it affects the other packet ACKs. ACK number for packet 5 is ACK6 since it is expecting the next packet.

- When packet 9 is received the ACK number is ACK7 because it is still waiting for packet 7.

-Only packet 7 will be resent when the timer runs out, this is because the out of order packet have been buffered and don't need to be resent, rather placed in their appropriate spots.

3. In this scenario on the right, ACK 2 is lost. Will the sender resend packet 2? Why?



-Packet 2 will be resent because with Go-Back Protocol packets can't be received out of order, this means that packets 3 and 4 were dropped. To enable the packets to be received, packet2 will be resent, accepted, allowing 3 and 4 to be resent and accepted as well.