Project 1 grading & midterm review

15-441 Computer Networks, Spring 2010
Recitation #8
Project 1 results

- Avg: 87
- Med: 98
- STD: 27.3
- Max: 100
- Min: 0
Project 1 grading rubric (1/2)

• Checkpoints – 15 points
  – Does it pass the tests in the checkpoint scripts?

• Server core networking – 20 points
  – Handling connections, concurrency, etc...

• Protocol implementation – 25 points
  – Does it implement the required commands
  – Some people had trouble with WHO and LIST
Project 1 grading rubric (2/2)

- Robustness – 25 points
  - Does it crash or segfault?
  - Specific tests:
    - Client disconnects without calling quit
    - Send unknown commands
    - Send long command with more than 512 bytes

- Style – 15 points
  - Documentation, code structure, command line options, etc
Midterm results

- Avg: 59.5
- Med: 59
- STD: 10.4
- Max: 78
- Min: 28
A – True or False

✓ For a bandwidth of \( t \) Hz, noise is \( 1/8 \)th of the received signal strength, can you get \( 2t \) bits per second?

✗ Both Manchester and NRZI can handle long strings of 1’s and long strings of 0’s

✓ UDP is a better choice than TCP for a real time voice application

✗ Modern high speed routers use shared busses to gain benefits from statistical multiplexing.

✓ Modern high speed routers use virtual output queues to avoid head-of-line blocking.
A – Longest prefix match implementations

• Binary trie (B) vs Patricia trie (P) vs direct high-radix trie (D)
• Fewest lookups needed? D because it is direct.
• Requires backtracking? P because you can take to big a leap while following a link.
• Most memory efficient? P because you compress nodes with a single child.
A – DNS (1/2)

• A asks for www.foo.com, nothing in cache:
  1. C asks L;
  2. L asks A_root;
  3. A_root tells L to ask A_com;
  4. L asks A_com, A com tells L to ask AFoo.com;
  5. L asks A_foo.com;
  6. A_foo.com answers to L;
  7. L answers to C.
A – DNS (2/2)

• A asks for ftp.foo.com, www.foo.com in cache:
  1. C asks L;
  2. L asks A_foo.com;
  3. A_foo.com answers to L;
  4. L answers to C.
B – Ethernet (1/4)

• 8 – Why 48 bit addresses if 16 would be enough?
• Gives us the uniqueness property, this means:
  – no configuration necessary for hooking up a new node;
  – separation of routing from addressing;
  – a basis for unique identification of files, programs and other objects on the networked hosts.
• Common mistakes: saying the addresses need to be unique in the whole world, they don’t. We were looking for the advantages that the uniqueness property gives.
B – Ethernet (2/4)

• 9 b) What to do to ensure collision detection when increasing the bandwidth 10 times?
  – Increase the minimum packet size x10
  – Decrease the wire length x10

• Common mistakes: optic fiber is not 10x faster, it won’t solve the problem!
B – Ethernet (3/4)

• 9 c) 1Gbps network. Node starts sending after hearing 100 bits and it collides with you after you send 700 bits. How far is he from you?
B – Ethernet (4/4)

• 9 c) continued

700 = 2x + 100 → x = 300 bits

Prop\_delay = 300/10^9 = 3 \times 10^{-7} s

Dist = Prop\_delay \times 1.8 \times 10^8 = 54 m

• Common mistakes: no calculations, using 600 or 100 bits instead of 300.
C – BGP Relationships (1/4)

Invalid – violates valley free routing on the P to Q link
C – BGP Relationships (2/4)

Valid!
Invalid – violates valley free routing on the Q to P link, Q is loosing
C – BGP Relationships (4/4)

• 11 a) Can AS Q prevent outbound traffic from going through AS R?
  – Yes, just announce routes through other ASs

• 11 b) Can AS R simply stop serving AS R’s costumers?
  – No, it needs to announce reachability to AS R to its costumers
D – Repeaters, Bridges, Routers and Tunneling (1/5)

Everyone will hear it!
D – Repeaters, Bridges, Routers and Tunneling (2/5)

A doesn’t forward to D!
D – Repeaters, Bridges, Routers and Tunneling (3/5)

No one overhears the packet!
D – Repeaters, Bridges, Routers and Tunneling (4/5)

13 a) A is a switch, B, C and D are hubs. A packet is sent from H1 to H4, what do the headers look like while crossing the B-A link?

<table>
<thead>
<tr>
<th>Header type</th>
<th>Source Address</th>
<th>Destination address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link-layer</td>
<td>MAC-H1</td>
<td>MAC-H4</td>
</tr>
<tr>
<td>IP</td>
<td>IP-H1</td>
<td>IP-H4</td>
</tr>
</tbody>
</table>

13 b) They are all routers.

<table>
<thead>
<tr>
<th>Header type</th>
<th>Source Address</th>
<th>Destination address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link-layer</td>
<td>MAC-B</td>
<td>MAC-A</td>
</tr>
<tr>
<td>IP</td>
<td>IP-H1</td>
<td>IP-H4</td>
</tr>
</tbody>
</table>
13 c) A, B, C and D are all routers. There is an IP-in-IP tunnel from B to C. A packet is sent from H1 to H4, what do the headers look like while crossing the B-A link?

<table>
<thead>
<tr>
<th>Header type</th>
<th>Source Address</th>
<th>Destination address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link-layer</td>
<td>MAC-B</td>
<td>MAC-A</td>
</tr>
<tr>
<td>IP</td>
<td>IP-B</td>
<td>IP-C</td>
</tr>
<tr>
<td>IP</td>
<td>IP-H1</td>
<td>IP-H4</td>
</tr>
</tbody>
</table>
Parting thoughts

• Still 62.5% of points up for grabs!
• Don’t forget to submit Project 2 CP2 today.
• Homework 3 is due Tuesday in class.