Announcements

- Exams: Pick up from Gates 284
- Lab 3: Late Date 8.59PM Saturday
- Lab 4: Due Nov 16
- Choose and complete two writing assignments
Outline

- Writing assignments
- Challenging quiz problems
Writing assignments

- Structure
- Substantiate claims
Structure

• Introduction (1-2 paragraphs):
  - What is the problem/what are you addressing
  - What is my recommendation
  - High level, why am I recommending the above
  - How will rest of document be structured
Structure

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• Supporting arguments
  – What are benefits of recommendation/what are drawbacks
    • QUANTIFY: X will be Y% faster.
  – Why is what you recommend better than alternatives
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  – What are benefits of recommendation/what are drawbacks
    • QUANTIFY: X will be Y% faster.
  – Why is what you recommend better than alternatives

• Conclusion (1-2 paragraphs):
  – Reiterate recommendation
  – Highlight main arguments, citing reasoning
You're developing a piece of software that lets users share large files, similar to Dropbox. A big concern is TCP transfer performance (speed). Someone on your team proposes the idea of changing the TCP stack so it always sends an acknowledgment on every segment. As the TCP expert in the group, it's your job to consider the change, explain its possible repercussions, and make a recommendation to the development group. While currently your group writes the software on both ends of the TCP connection, a near term goal is to allow third-party tools to interact with your service.
Structure

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  – How will rest of document be structured
Structure

• Introduction (1-2 paragraphs):
  - What is the problem/what are you addressing
    Should we ack every segment to increase transfer of large files over TCP?
  - What is my recommendation
  - High level, why am I recommending the above
  - How will rest of document be structured
Structure

- **Introduction (1-2 paragraphs):**
  - What is the problem/what are you addressing
    Should we ack every segment to increase transfer of large files over TCP?
  - What is my recommendation
    No.
  - High level, why am I recommending the above
  - How will rest of document be structured
Introduction (1-2 paragraphs):

- What is the problem/what are you addressing
  Should we ack every segment to increase transfer of large files over TCP?

- What is my recommendation
  No.

- High level, why am I recommending the above
  Changing the TCP stack only marginally increases transfer rates for large files, increases network overhead, and cannot be accomplished for third-party machines.

- How will rest of document be structured
Structure

• Introduction (1-2 paragraphs):
  - What is the problem/what are you addressing
    Should we ack every segment to increase transfer of large files over TCP?
  - What is my recommendation
    No.
  - High level, why am I recommending the above
    Changing the TCP stack only marginally increases transfer rates for large files, increases network overhead, and cannot be accomplished for third-party machines.
  - How will rest of document be structured
    Quantify potential performance gain
    Highlight drawbacks of proposal
    Conclude
Example introduction

To increase the speed of TCP transfers of large files between clients, an engineer has recommended acking every segment. This proposal should not be adopted. It only marginally increases transfer rates for large files while increasing overhead by approximately doubling the number of acks sent by a receiver. Additionally, because the proposal cannot be implemented on machines outside of the company's administrative domain, adopting it will require the company to support multiple implementations, making our product more difficult to build and debug.
What were three claims the above introduction made?
Substantiate claims

What were claims the above introduction made?

- Not very much faster
- Increased overhead
- Multiple implementations harder to support
Substantiate claims

Example submissions:

\textit{Acknowledging on every ack makes TCP go faster, but not by much, so we shouldn't do it.}
Substantiate claims

Example submissions:

Acknowledging on every ack makes TCP go faster, but not by much, so we shouldn't do it.

Why?
Who says?
What evidence supports this?
Substantiate claims

Example submissions:

*Acknowledging on every ack makes TCP go faster, but not by much, so we shouldn't do it.*

Why?
Who says?
What evidence supports this?

“Because...” / “As a result of...” / “Since ...”
Citation
Simulation
Calculation
Example introduction

To increase the speed of TCP transfers of large files between clients, an engineer has recommended acking every segment. This proposal should not be adopted. It only marginally increases transfer rates for large files while increasing overhead by approximately doubling the number of acks sent by a receiver. Additionally, because the proposal cannot be implemented on machines outside of the company's administrative domain, adopting it will require the company to support multiple implementations, making our product more difficult to build and debug.
Adding support

TCP goes faster, but not by much
Adding support

TCP goes faster, but not by much

According to the TCP standard, a receiver can delay an ack for every other packet it receives. For thin packet streams, this can mean that a receiver frequently waits for a timeout before sending an acknowledgment. In contrast, because our product transfers large files over mostly-reliable links, the receiver receives packets in quick succession and currently only rarely must wait for a timeout before sending an ack. Even overestimating our packet drop rate to be 1% and with a conservative congestion window size of 200 packets, the expected delay from delaying every other ack is XXXXX.
Quiz problems

REDACTED FOR POSTING ONLINE. SEE SECTION VIDEOS.