ANNOUNCEMENTS

For Monday
  No in-class lecture, however please watch a recorded lecture on IP addresses

Readings due:
  Monday: Donahoo and Calvert, Chapter 3
  Wednesday: Donahoo and Calvert, Chapter 2

DISCUSSION ON THE READING

• ACM Queue Magazine
  • “The most expensive one-byte mistake”
  • Paul-Henning Kamp
FRAMING SCENARIO

• Consider the voting system from the book
• Each message is variable length
  • “Voting v 134” → [Vote for candidate 134]
  • “Voting i 19381”
    • → [Query candidate 19381’s vote count]
  • First is 12 characters, second is 14 characters
• Given a stream of vote operations, how to separate them?

FRAMING CHOICES

• Delimiter (in this case ‘$’)

Voting v 134$Voting v 2817$Voting i 9172651$Voting v 2$Voting i 1900$Voting v 32$Voting i 8

• Length + message

12Voting v 13413Voting v 281716Voting i 917265110Voting v 213Voting i 190011Voting v 3210Voting i 8
DYNAMIC ARRAYS REVIEW

- Growable array of bytes
  - Underpins classes like Vector, ArrayList, etc...
- State variables:
  - uint64_t capacity;
  - uint8_t buffer[capacity]
  - uint64_t size
- Appending item 'myItem':
  - size = size + 1
  - buffer[size] = myItem;
- Accessing item 'i':
  - return buffer[i];
- But what if array is full?
  - I.e., (size == capacity)?
- Doubling algorithm:
  - allocate newbuffer[2 * capacity];
  - copy buffer into newbuffer
  - Replace pointer in the data structure with a pointer to newbuffer
  - Free the original buffer
- Amortized cost to insert?
  - O(1)

READING REQUEST OF UNKNOWN SIZE INTO A DYNAMIC BUFFER

dynamic_buffer requestBuffer;
uint8_t readBuffer[512];
while(…) {
    read up to 512 bytes from client into readBuffer
    requestBuffer.append(readBuffer);
    Does requestBuffer contain a full request?
    If yes,(1) parse it, then (2) remove from requestBuffer
    Otherwise, keep reading from the client
}
HOW TO TELL IF BUFFER CONTAINS A COMPLETE REQUEST?

• This is the framing problem

• For length-based framing:

  • Keep reading until we have 12 bytes of request data

• For delimiter-based framing:

  • OK to simply scan for delimiters using e.g., a for() loop

    for(int i = 0; i < requestBuffer.size(); i++)
    
    if (requestBuffer[i] == '\r') ... 

IN-CLASS EXERCISE #1: FRAMING PRACTICE

• Groups of 1 or 2

  • Ideally your homework 1 / project 1 partner

• If you don’t have a laptop, pair up with someone who does

• Instructions linked off my web page

  • http://www.cs.ucsd.edu/~gmporter/

  • Click course, then find the blog post for today

  • Grade based on reasonable effort