6.033 Lecture 12 – TCP details & Intro to Internet Routing

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Key ideas:
slow start
reordering buffer
path vector routing

Hands-on 3 due tomorrow; DP1 due Thursday

http://mit.edu/6.033/www/assignments/lec12.ppt (or .pdf)
Congestion collapse

Latency

Goodput

Offered Load

Ideal

Congestion collapse
Basic TCP Protocol

\[ \text{timeout} = b \times \text{RTT} \text{ (or RTT} + b \times \text{stddev)} \]
\[ \text{wsize} = 1 \] \# window size in \# outstanding TCP segments

\text{on ack:}
\[ \text{wsize} = \min(\text{wsize} + \frac{1}{\text{wsize}}, \text{receiver window}) \]
\[ \text{timeout} = b \times \text{RTT} \]

\text{on retry timer timeout:}
\[ \text{timeout} = \text{timeout} \times 2 \]
\[ \text{wsize} = \max(1, \text{wsize}/2) \]

Note that the algorithm presented in class (and previous version of these slides) omitted the \( /wsize \) erroneously.
TCP with Slow Start

timeout = b * RTT
wsize = 1
starting = true

on ack:
  if (starting)
    wsize = min(wsize + 1, receiver window)
  else
    wsize = min(wsize + 1/wsize, receiver window)
timeout = b * RTT

on retry timer timeout:
  timeout = timeout * 2
  wsize = max(1, wsize/2)
  starting = false

Note that the algorithm presented in class (and previous version of these slides) omitted the /wsize erroneously.

Receiver can also control rate of sender
recv(p):

slot = p.sno - head

if (slot > head + size):
    drop
else:
    new = isempty(slot)
    if (new)
        add p to slot
    ack p
    if (slot == head and new)
        deliver prefix to app
    head = head + len(prefix)
recv(p):
  slot = p.sno - head
  if (slot > head + size):
    drop
  else:
    new = isempty(slot)
    if (new) add p to slot
    ack p
    if (slot == head and new)
      deliver prefix to app
    head = head+ len(prefix)

head : sno of last delivered packet
size: length of reordering queue
slot: position to insert new packet