CS 499 – Distributed Systems  
Monday, November 02, 2009

TODO:

* Read the book for the topic, “Consensus” - page 499

Class Notes:

* Quiz Wednesday
  + Covers the Consensus topic from book
  + Page 499
* (Group) Presentation for the presentation will be Monday.
* Veteran’s Day Wednesday (no classes)
* (Grad) Presentation will be Friday

Lecture Notes:

* Bully Algorithm
  + can only send messages to higher ID processes
  + Highest ID basically is the bully
* // Done with Election and Concurrency
* Consensus
  + What kind of system do we have?
    - // two fundamental systems
    - (1) Synchronous System;
      * can make assumptions on max/min time of message transfer
      * (i.e.; wait until message has left local buffer and has transferred on the wire)
    - (2) Asynchronous System
      * (“Hey I’m here, I will do what you need but in the mean time I will doing this…”)
    - // (Note: This is not directly related to synchronous and asynchronous communication.)
    - Do we have upper bounds on…?:
      * Message Transfer Time
      * Process Execution Time
      * Clock Drift
  + Fun thinking exercise
    - * Oranges and Apples are two divisions in Pepperland
      * Reside on two different hilltops, separated by a canyon
      * In the blue canyon live the Blue Meanies
      * Apples and Oranges can send messages to each other, by sending messengers
    - Question: can they reach an agreement on:
      * Who leads the charge?
      * When to charge?
    - Case 1:
      * Messengers don’t get lost, but can take forever
      * It’s possible to reach an agreement on who leads the charge
      * They cannot agree on when to charge
    - Case 2:
      * Messengers can deliver within a given aount of time
      * synchronous system, reliable message transfer
      * We can also agree on when to charge
        + Minimum and Maximum time
      * The leader would send message “Charge” and then wait for minimum time
      * On reception of message the counterpart waits for X, then charge
      * The counterpart would join the attack not later than:
        + max-min+X
    - Case 3:
      * reliable message transfer, but blue Meanies can defeat either Oranges or Apples (processes can fail)
      * Asynchronous System: you cannot distinguish whether
        + counterpart was defeated
        + message is just slow
      * (assume) Synchronous System: (processes can fail but the processes …)
        + “we can say for sure, whether the counterpart system failed or not”
    - Case 4:
      * Unreliable message transfer (messengers are caught or can be caught.), no process failure
      * task: to agree on charge or surrenders
      * Consistency matters
      * example
        + Apples 🡪 “Charge” 🡪 Oranges
        + However the message could almost get in a circular loop between Oranges and Apples.
  + What make our modern day Internet usable
    - timeouts
    - assume its synchronous
      * for the most part we are justified for our assumptions
    - our system is based on send, fail, send again, full fail.