Outline for June 4, 1997

1. Greetings and Felicitations
2. Example Analysis: NTP v 2
   a. Protocol to synchronize clocks on the Internet
   b. Primary time servers: synced to an external time system (eg, atomic clocks)
   c. Go through cloud hierarchy (and cohorts), stratum layer (distance from primary) , synchronization
   d. Association modes: client (sends message to peer, can reset time), server (replies to sent message), broadcast (send out periodic messages); higher up, symmetric active and symmetric passive: association periodically sends out broadcast messages; on arrival, symmetric passive association is created, looks at source; if source at higher stratum, reply and terminate; otherwise, reply, and source synchronizes itself to peer. Also, allow control messages.
   e. Selection of source peer, smoothing of data: retains last 8 values of (delay, clock offset), and chooses point with lowest delay, and sets dispersion. Best source chosen from the sets (one per possible source).
   f. Packet receipt, sending: on receipt, if connections compatible, checks not a duplicate by looking at transmit times, checks the last packet received by peer was the last one sent; on failure, set sanity check **but continue**. Update association to reflect data in newly-0arrived packet; check peer clock, stratum level, validate 2-way communication. If sanity check set, exit. Else estimate delay, clock offset, dispersion, and update local clock.
   g. Delay compensation: statistical in nature, calculates delay and clock offset relative to peer
   h. Access Control: trusted (can synchronize to), friendly (can synchronize), all others (ignore) -- relies on unauthenticated source information in packet
   i. Authentication: optional, uses pairwise secret keys. Authenticator excluded from integrity checking; no key distribution mechanism.