# Networks - Topology

- Graph Properties
  - Diameter
  - Bisection bandwidth
  - Cost (wires, switches)
- Key Characteristics:
  - Scalability
  - Worst case communication pattern
  - Potential for deadlock

# Networks - Protocol

- Message passing mechanism (packet switched, circuit switched, wormhole)
  - For what kinds of systems is a mechanism well suited?
  - How does a mechanism affect performance?
- Who is responsible for ensuring delivery?
  - sender (short haul or long haul)
  - network (short haul only!!!)
- Congestion avoidance
  - When can I inject a message into the network?
  - What route should the message take?

# Active vs. Passive Networks

- Active: Network performs computation
  - Combining, splitting
  - NYU Ultracomputer

- Passive: Network just delivers messages

"The computer is the computer, the network is the network, we apologize for any inconvenience"

# Papers

- Kai Hwang
  - Bread and butter: common topologies & mechanisms
- NYU Ultracomputer
  - Short paper describing combining switches
- Deadlock avoidance
  - When deadlock can occur using wormhole routing and how to avoid it
- Congestion avoidance and control
  - Excellent and readable paper on TCP/IP