Abstraction & Composition in Networking

- Done with the midterm (hopefully)

- Today
  - We looked through a bunch of random topics
    - Flooding — Fixed Addressing
    - Shortest path routing
    - Topological addresses - LPM
    - Interdomain Routing — BGP
    - Reliability / Congestion Control

 Related but Orthogonal
Today: Design/Architectural concerns on how these fit together.

Why? Abstraction is one of the main tools that has allowed us to build large programs.

Barbara Liskov: ADTs + CLU:

- Reason about the behavior and correctness of little pieces of a program
- Combine together to build something bigger
- Same with networks?
Why are each of these useful:

- Flooding
- Shortest path routing
- Topological Addresses
- Best effort delivery (Drop packets when necessary)
- Interdomain Routing
- Reliability
- Congestion Control
Best effort: Expect minimal functionality from each participant.

End-to-End Principle:
Layering: Composition in networking

1. Reliability over any sort of routing

Diagram:

```
Packet

{Data

h0 ————> h1 ————> h2

Nodes and data structure diagram
```
Topological routing (IP addresses) over MAC addresses (names/fixed addresses)

Why?

How?
③ Interdomain Routing over Intradomain Routing
Encryption over congestion control over reliability over interdomain routing over...
5 An aside: Where we are today?