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 – LEM
- Interdomain Routing – BNP
- 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 + CLUs:

- 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
- Interdomain Routing
- Reliability
- Congestion Control
- Best effort delivery (Drop packets when necessary)
Best effort: Expect minimal functionality from each participant.

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

1. **Reliability** over any sort of routing

Packet

Routing

Reliability

-> $BEED$

Data
2) Topological routing (IP addresses) over MAC addresses (names/fixed addresses)

Why?

How?

PKT

DHCP

10.0.0.2

aabb:cc:dd:ee:ff
Interdomain Routing over Intradomain Routing
Encryption over congestion control over interdomain routing.
A5 An aside: Where we are today?