How packets find their way across the Internet
Routers forward IP datagrams one at a time

1. Routers use IP address as a key into a forwarding table, then
2. Sends datagram to a router closer to the destination.
The Internet forwards datagrams **hop-by-hop**
How do the routers **know** what forwarding table to use?

What techniques can you think of?
Here are three ways

1. **Flooding**: Every router sends arriving packet to every neighbor
2. **Source Routing**: End host lists the routers to visit along the way (in each packet)
3. **Distributed Algorithm**: Routers talk to each other and construct forwarding tables using a clever algorithm

You are going to figure this out on your own!!!
Game: Routing Competition
Task 1
Your router ID

The IDs of your neighbors

5
12, 19
Task 2
Find the shortest path
Task 3
In a real network, the routers don’t know what the network looks like.

This time, *I won’t show you the network.*
Rules

You may not

- Pass your card to anyone else
- Leave your seat
- Write anything down

You may

- Ask nearby friends (in your group) for advice
- Shout to other participants (anything you want!!!)
- Say bad things about Nick

You must: *Participate*
Task 3

Find the shortest path from Node 1 to Node 40.

When you are done, you must be able to repeat it correctly.

The first group to finish is the champion!!
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Go!
An algorithm to find the shortest path
“You can reach node 2 in 1 hop from node 22”
What if each link has a “cost”?
"Expensive link":
It might be very long. e.g. a link from Europe to USA.
Or it might be very busy. e.g. it connects to Google or CNN.
Or it may be very slow. e.g. 1Mb/s instead of 100Mb/s.
Find lowest cost path to H
Find lowest cost path to H
Find the lowest cost path

Router 4 tells its neighbors: “I can reach 2 with a cost of 15”
Solution

Cost = 22

…and so on!