Some ideas behind the workings of the internet
In the beginning there was one computer...
Now there are billions, each ‘talking’ to each other.

Have you done physics homework?
How do we send and receive data between any two devices?
How do we physically send data (between two computers)?
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Need a way to represent data - binary digits!

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How do we physically send data (between two computers)?

Need some physical medium to represent binary digits
How do we physically send data (between two computers)?

Need two nodes to be connected physically
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- Need a way to represent data - binary digits
- Need some physical medium to represent binary digits
- Need two nodes to be connected physically
How do we make sure everything sent from one node arrives at another?
How do we make sure everything sent from one node arrives at another?

Error detection/correction (when things go wrong)

1D parity bit  
11010110 1  
00110110 0  
00010010 0

2D parity bits  
11010110 1  
00110110 0  
00010010 0  
1111001
How do we make sure everything sent from one node arrives at another?

Resending data (when things go really wrong)
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Sharing links
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- Error detection/correction
- Resending data
- Sharing links
How do we get from one place on the internet to another?

Application
Transport
Network
Link
Physical
How do we get from one place on the internet to another?

Addressing - IP addresses

131.111.185.100
168.112.147.18
168.112.147.18
88.111.185.111
178.112.115.189
211.133.185.123
How do we get from one place on the internet to another?

Find a path (routing)
How do we get from one place on the internet to another?

Following data along a path (forwarding)
How do we get from one place on the internet to another?

- Addressing
- Routing
- Forwarding

![Network Levels Diagram]

- Application
- Transport
- Network
- Link
- Physical
How do we ensure everything sent from one place on the Internet arrives at the other place
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Flow control - sending speed, due to receiver conditions
How do we ensure everything sent from one place on the Internet arrives at the other place?

Congestion control - sending speed, due to network conditions.
How do we ensure everything sent from one place on the Internet arrives at the other place?

Multiple applications sharing a single node - ports!
How do we ensure everything sent from one place on the Internet arrives at the other place

- Flow control
- Congestion control
- Multiple applications sharing a single node
Recap - How do we send and receive data between any two devices?

<table>
<thead>
<tr>
<th>Layer</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>How do we ensure everything sent from one place on the Internet arrives at the other place?</td>
</tr>
<tr>
<td>Transport</td>
<td>How do we get from one place on the internet to another?</td>
</tr>
<tr>
<td>Network</td>
<td>How do we make sure everything sent from one end of a link arrives at the other end?</td>
</tr>
<tr>
<td>Link</td>
<td>How do we physically send data (between two nodes)?</td>
</tr>
</tbody>
</table>
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