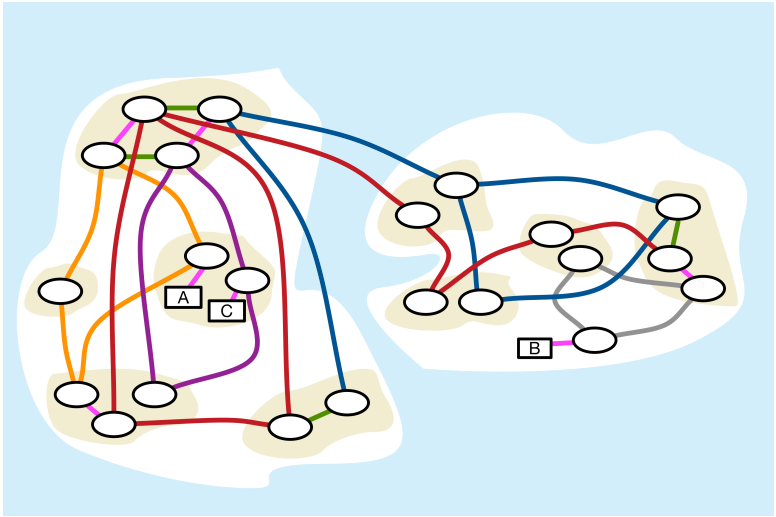
Week 2: Topology and routes

1. Introduction and questions
2. BGP updates
3. Traceroutes
4. **Conclusion**

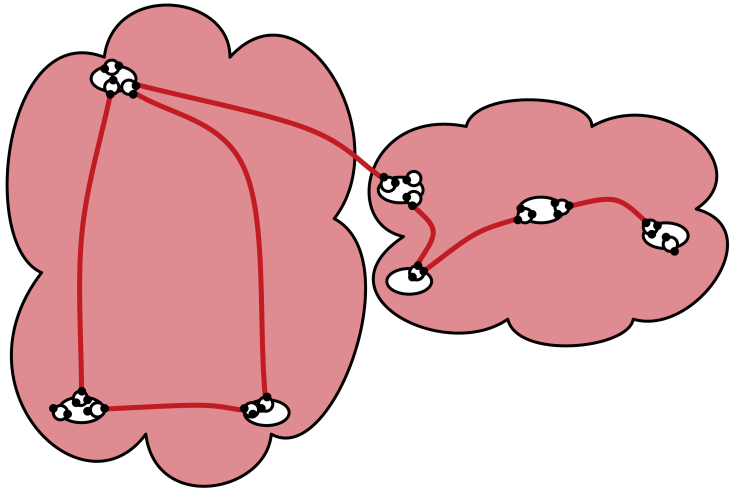
Week 2: Topology and routes

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   B. Questions
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   A. Basics
   B. Limits
   C. Load Balancing
   D. The tool
4. Conclusion



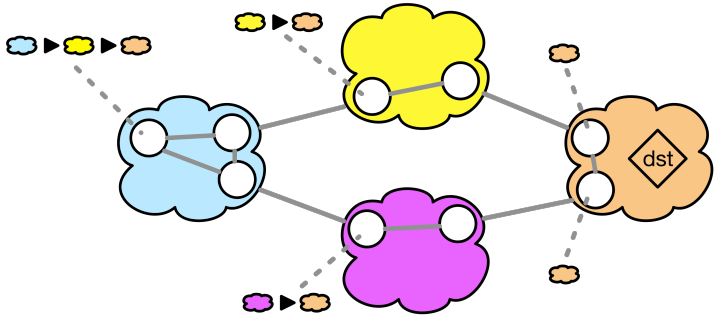
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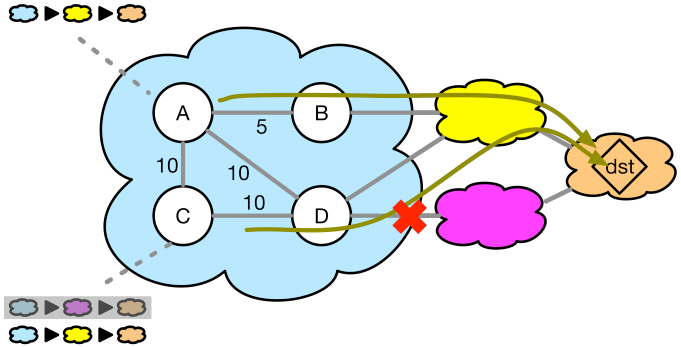
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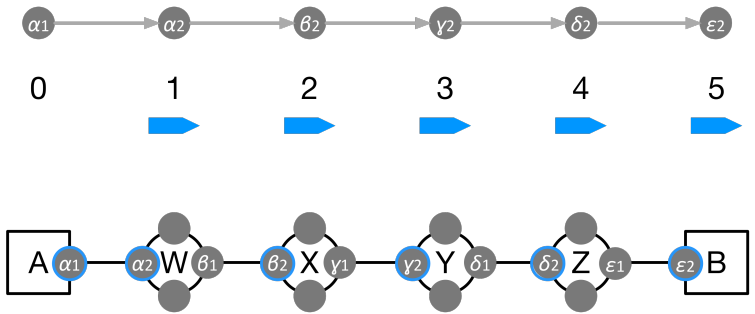
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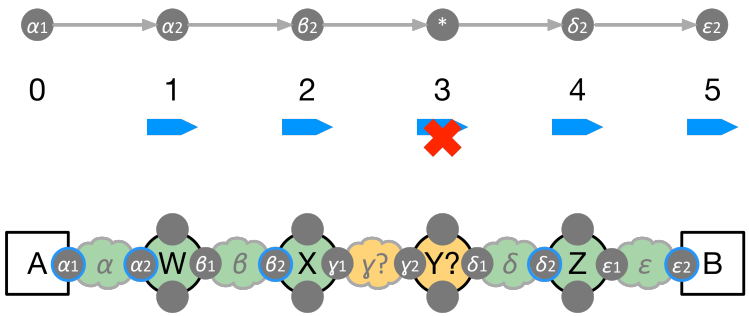
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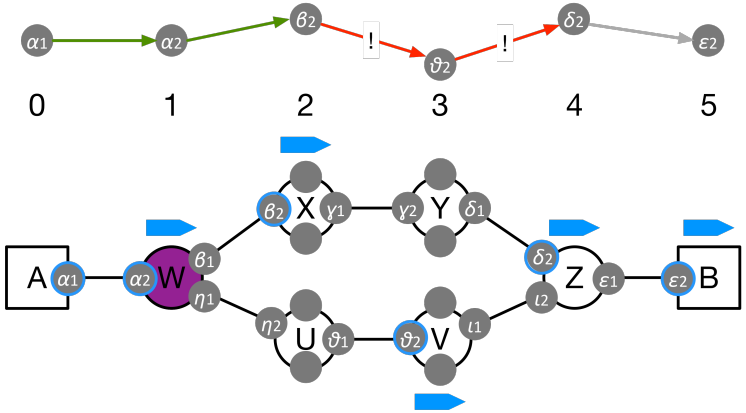
Week 2: Topology and routes

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Week 2: Topology and routes

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Week 2: Topology and routes

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```
$ traceroute www.example.com
traceroute to www.example.com (93.184.216.34), 64 hops max, 52 byte packets
 1  livebox (192.168.1.1)  3.079 ms  5.188 ms  1.411 ms
 2  80.10.237.102 (80.10.237.102)  3.999 ms  137.773 ms  6.387 ms
 3  ncidf104.paris.ft.net (193.253.80.126)  3.849 ms  4.992 ms  3.695 ms
 4  niaub102.lyon.ft.net (193.252.159.46)  13.845 ms  15.477 ms  16.557 ms
 5  193.252.137.70 (193.252.137.70)  15.627 ms  18.621 ms  14.790 ms
 6  tengige0-29.ot.net (193.251.240.179)  20.478 ms  16.633 ms  23.926 ms
 7  telia.gw.ot.net (193.251.248.70)  14.067 ms  34.980 ms  19.455 ms
 8  93.184.216.34 (93.184.216.34) 20.619 ms  16.659 ms  15.259 ms
$
```

Autonomous systems and prefixes

IPv4

- 53,000 ASes advertising 590,000 address prefixes
- AS path length*: mean 5.7, maximum 14

IPv6

- 11,000 ASes advertising 27,000 address prefixes
- AS path length*: mean 5.5, maximum 13

Source: CIDR Report for 11 February 2016

*without prepending

Traceroutes

IPv4 route lengths

- Mean: 15-16 hops
- Roughly normal distribution of hop lengths
- Few routes shorter than 6 hops
- Few routes longer than 25 hops
- Routes longer than 30 hops extremely rare

Source: presenter's own work with Leguay, Latapy, Salamatian (2005)

The internet as a small world

Small world

- Short path length
- But low degree of clustering (probability that two neighbors are also each other's neighbors)

