

Week 3: Connectivity, losses, latency, and geolocation

1. Introduction - Ping
2. Connectivity
3. Losses
- 4. Latency**
 - A. Introduction**
 - B. Components
 - C. Clocks
 - D. Tools
5. Geolocation
6. Conclusion

Latency - Introduction

- **Latency matters**
 - Web
 - CDNs
 - Financial transactions
 - Voice over IP and interactive video
 - Online games, peer-to-peer
- Two definitions of latency
 - One-way delay
 - Round-trip times (RTTs)

Latency matters

Comparing a 0.4 second page load to a 0.9 second page load:

*Half a second delay
caused a 20% drop in
traffic. Half a second delay
killed user satisfaction...
Being fast really matters...
"Users really respond to
speed."*



Marissa Meyer, VP Google in 2006

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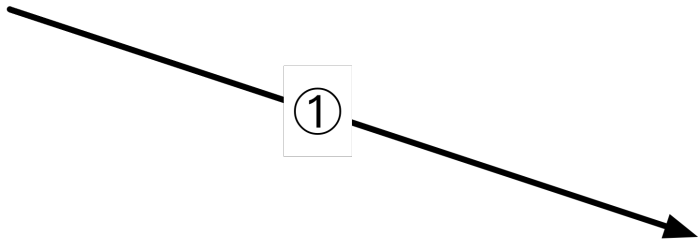
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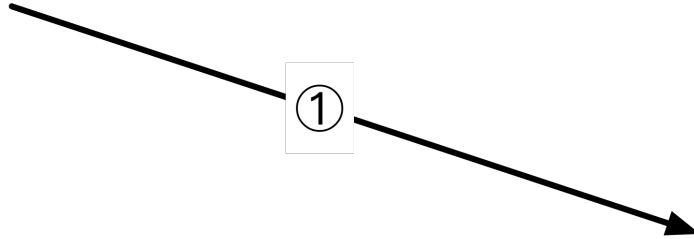
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$$L_1 = 30 \text{ ms} - 10 \text{ ms} = 20 \text{ ms}$$

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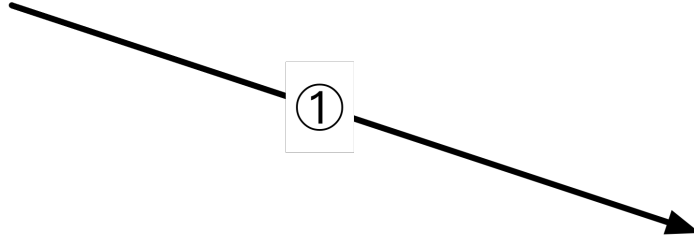
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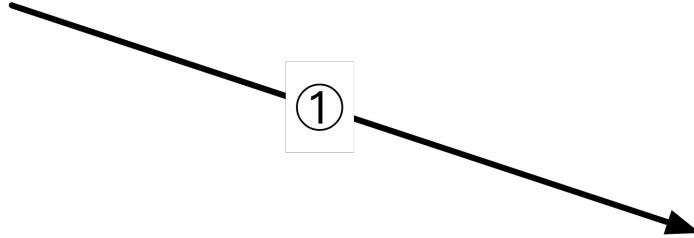
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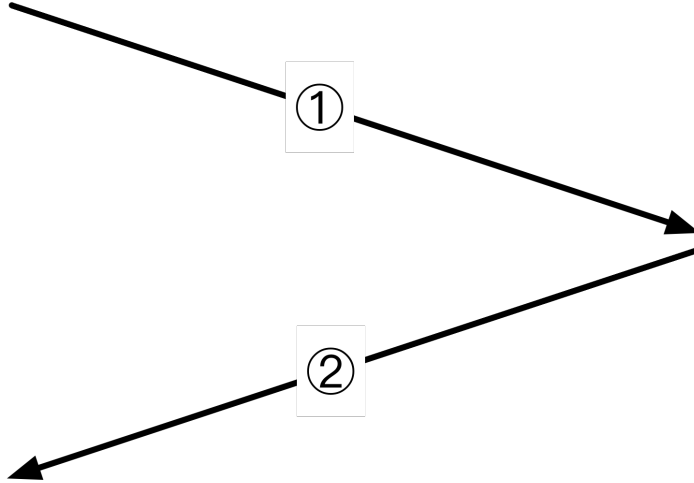
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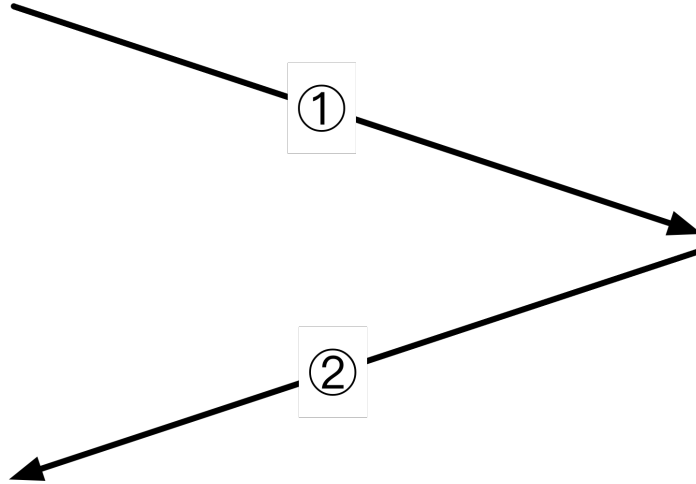
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$$(L_1 = 30 \text{ ms} - 10 \text{ ms} = 20 \text{ ms})$$

$$L_1 = \frac{1}{2}(50 \text{ ms} - 10 \text{ ms}) = 20 \text{ ms?}$$

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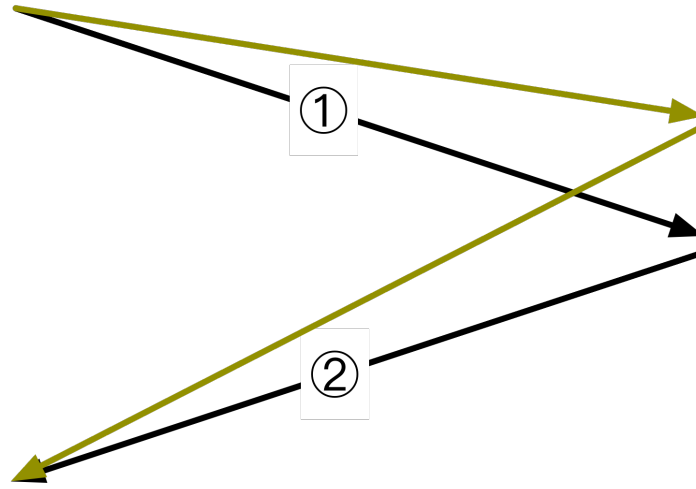
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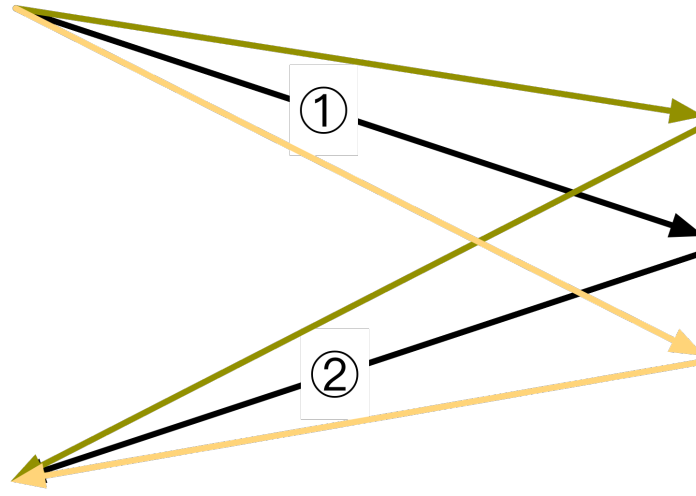
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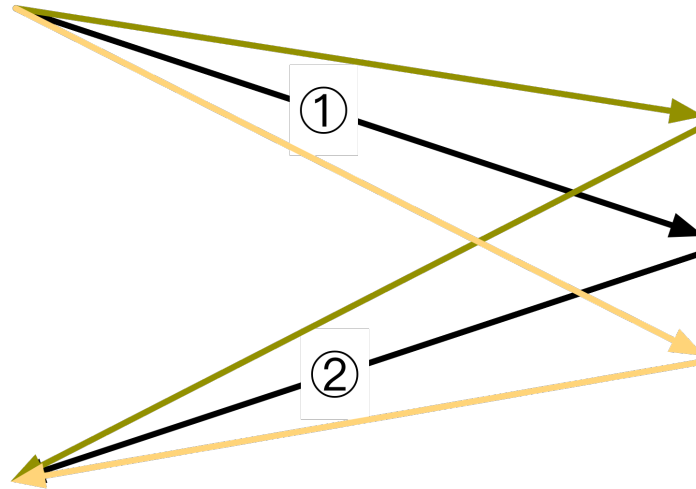
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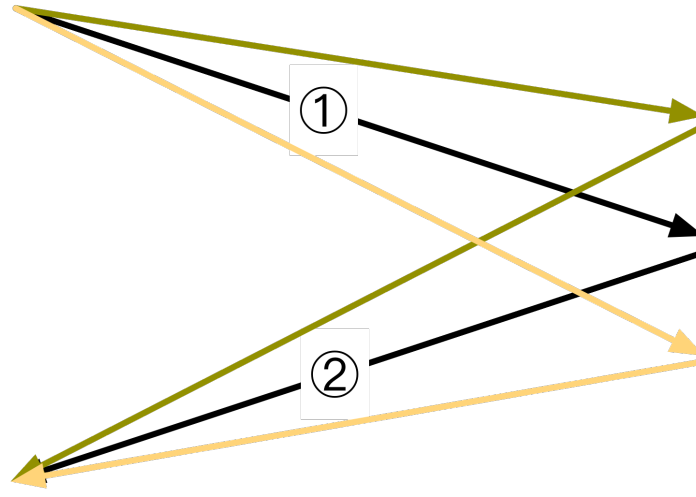
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~~$$L_1 = \frac{1}{2}(50 \text{ ms} - 10 \text{ ms}) = 20 \text{ ms?}$$~~

20

$$\text{RTT} = 50 \text{ ms} - 10 \text{ ms} = 40 \text{ ms}$$

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Picture credits:

- Slide 3: Photo by Magnus Höij, cropped, license: [CC BY 2.0](#)