disc. 13
cs161 su23

intrusion detection, malware, tor

last discussion :(

slides
bit.ly/cs161-disc

feedback
bit.ly/abhifeedback

hack of the day

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    - all because of a bug in AnalyticDB and AsparaDB!
    - 58% of orgs don’t enforce MFA for root users

general questions, concerns, etc.

reminder

please fill out course evaluations!

course-evaluations.berkeley.edu

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  - overwhelm victim’s bandwidth/packet processing capacity
  - DDoS (distributed denial of service)

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  - not very effective against DDoS (many IPs)

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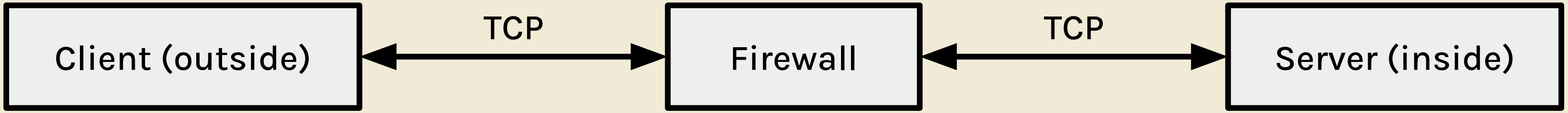
- stateless packet filter
  - no history of previous packets
- stateful packet filter
  - keeps track of history & inbound/outbound connections

proxy firewalls

- think of the firewall as a (helpful) MITM



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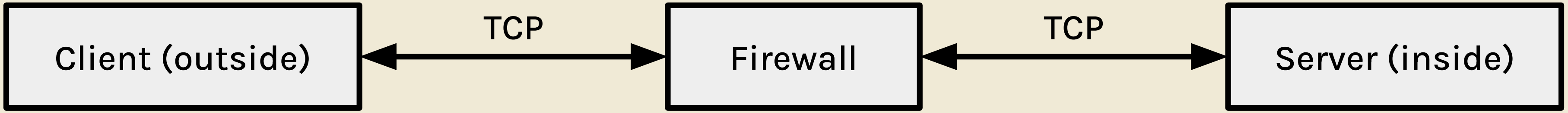

proxy firewalls

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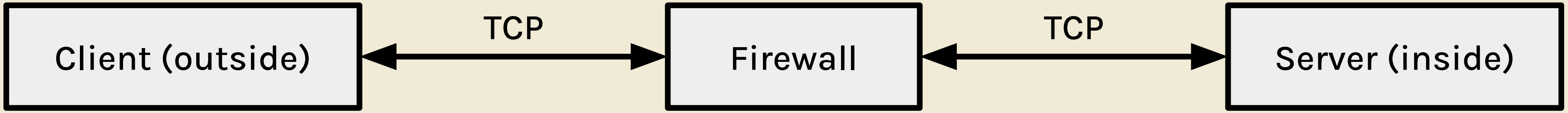
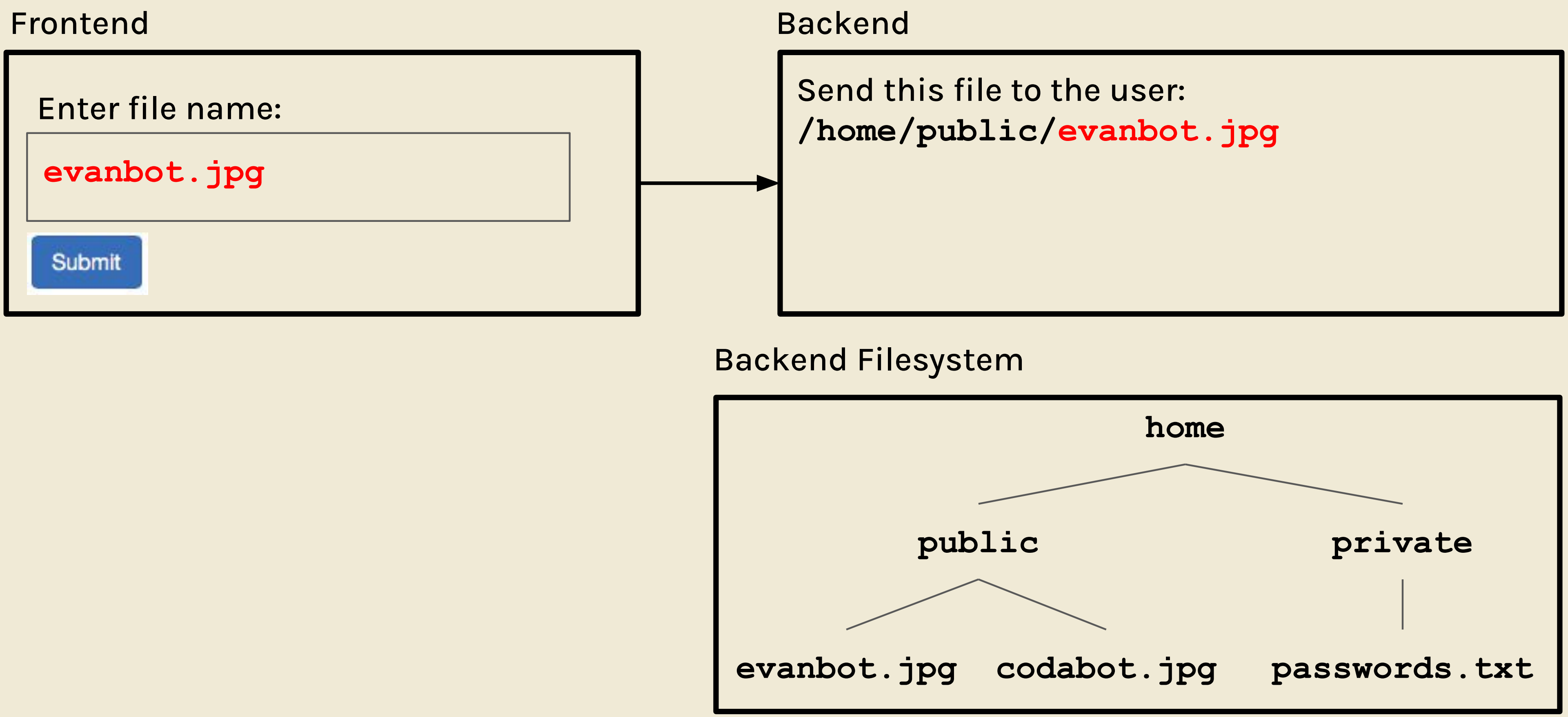
- has direct access to the TCP bytestreams
- proxy can spoof incoming/outgoing IPs



intrusion detection

detect if you can’t prevent

path traversal attack



Frontend

Enter file name:

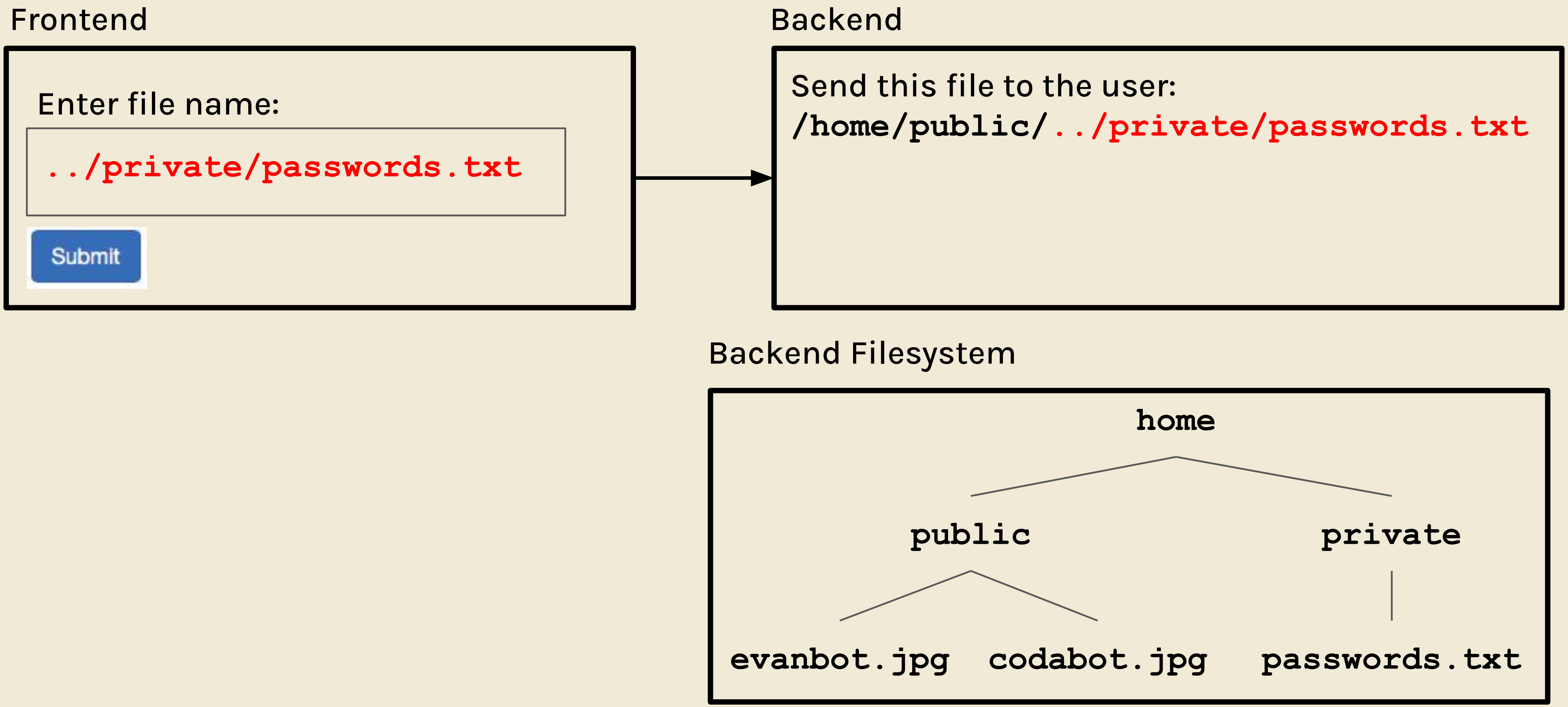
`evanbot.jpg`

Backend

Send this file to the user:
`/home/public/evanbot.jpg`

Backend Filesystem

path traversal attack



Frontend

Enter file name:

`../private/passwords.txt`

Submit

Backend

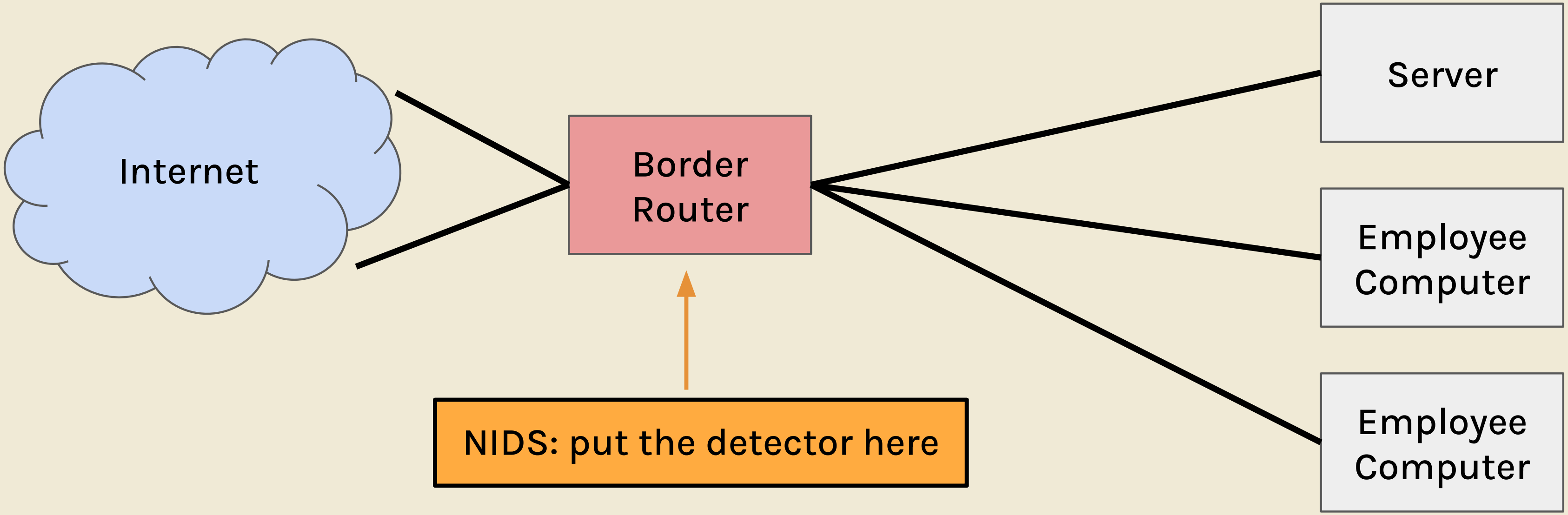
Send this file to the user:

`/home/public/../private/passwords.txt`

Backend Filesystem

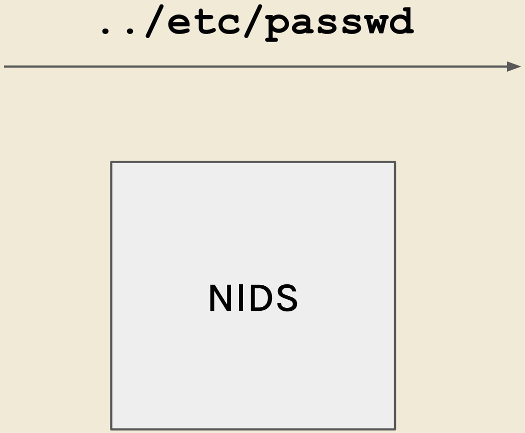
network intrusion detection system

- NIDS: monitors network traffic to detect attacks



NIDS drawback: inconsistency

- NIDS doesn’t know what to do if it sees ambiguous information



`../etc/passwd`

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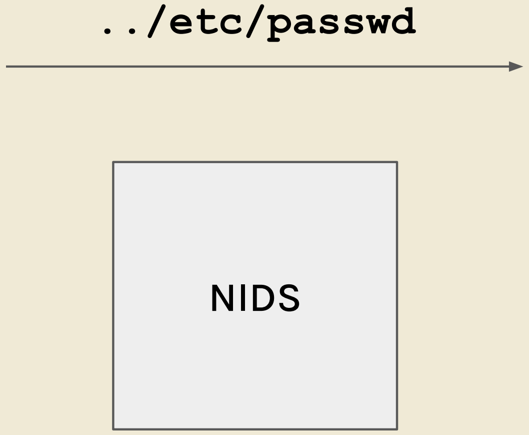

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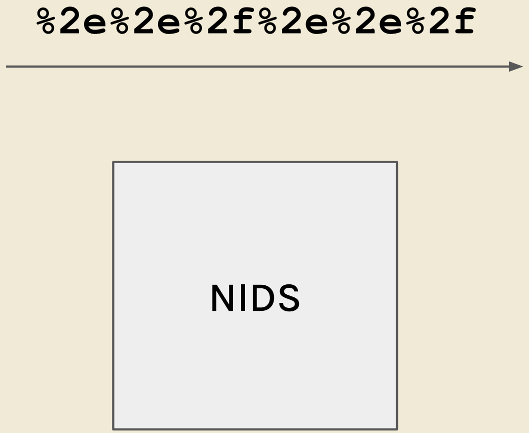

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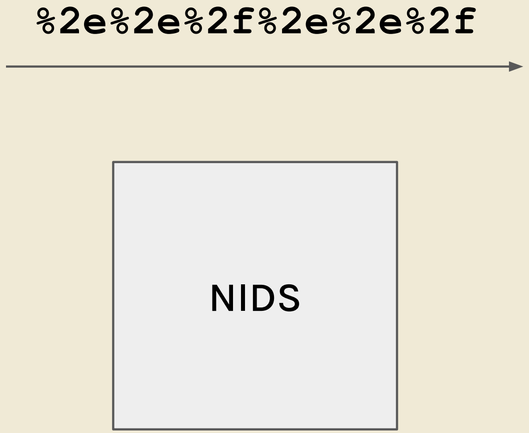

`%2e%2e%2f%2e%2e%2f`

NIDS

don’t alert, doesn’t look like path traversal

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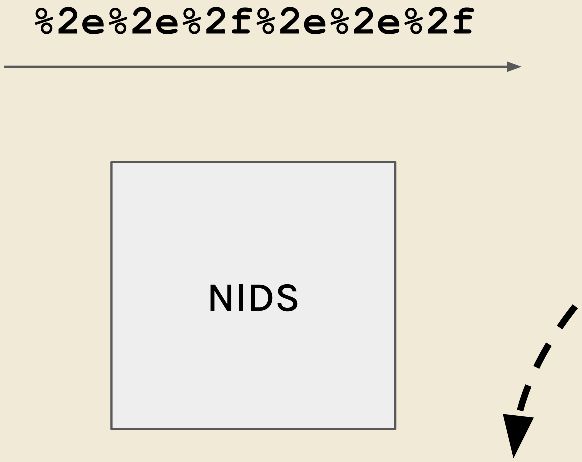

wrong, decodes to `../etc/passwd`! after URL percent decoding

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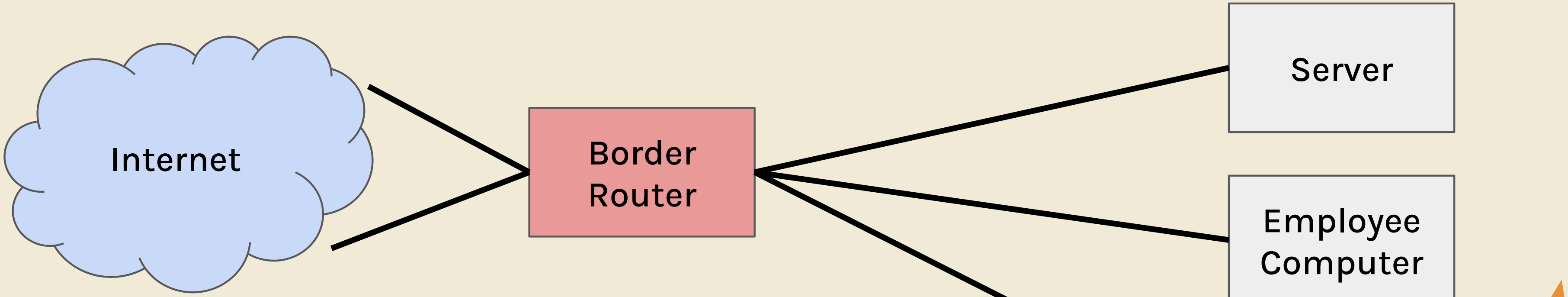
- encrypted traffic (TLS)
    - can just give NIDS all private keys on network
        - why is this unideal?

host-based intrusion detection system

- HIDS: detector installed on each end system



HIDS: put the detector here

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- drawbacks:
  - expensive—one detector per end host
  - evasion attacks still sometimes possible

logging

- analyze log files generated by end systems
  - likely overnight, less traffic
- detect **after** attacks have happened
- very cheap

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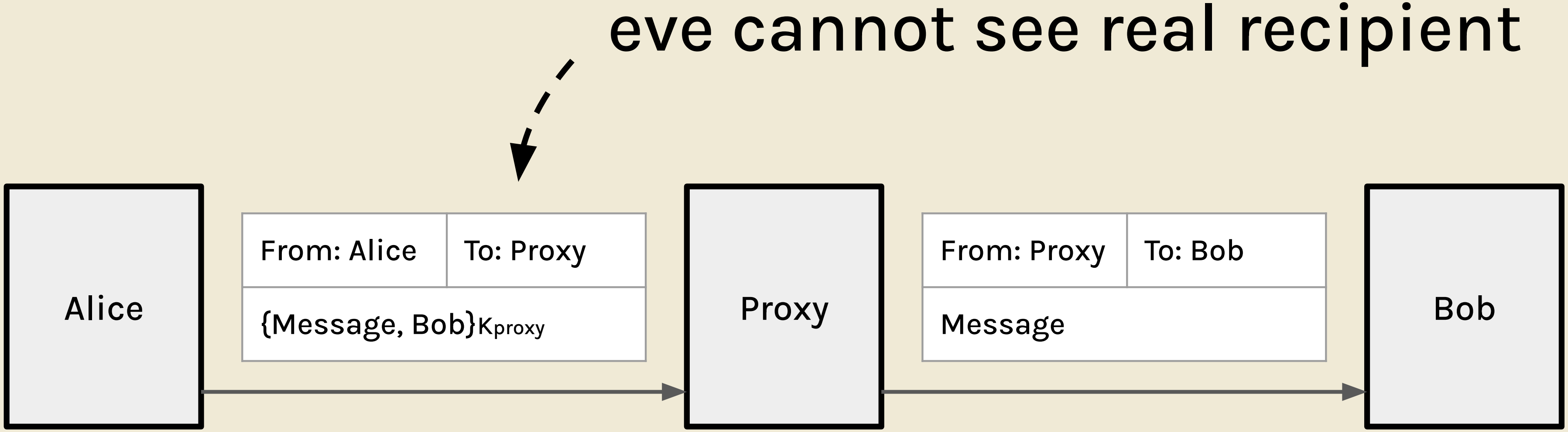
- **behavioral:** look for evidence of compromise
  - look at ~~input~~ *actions* triggered by input

worksheet

(on 161 website)

anonymity, tor

proxy recap



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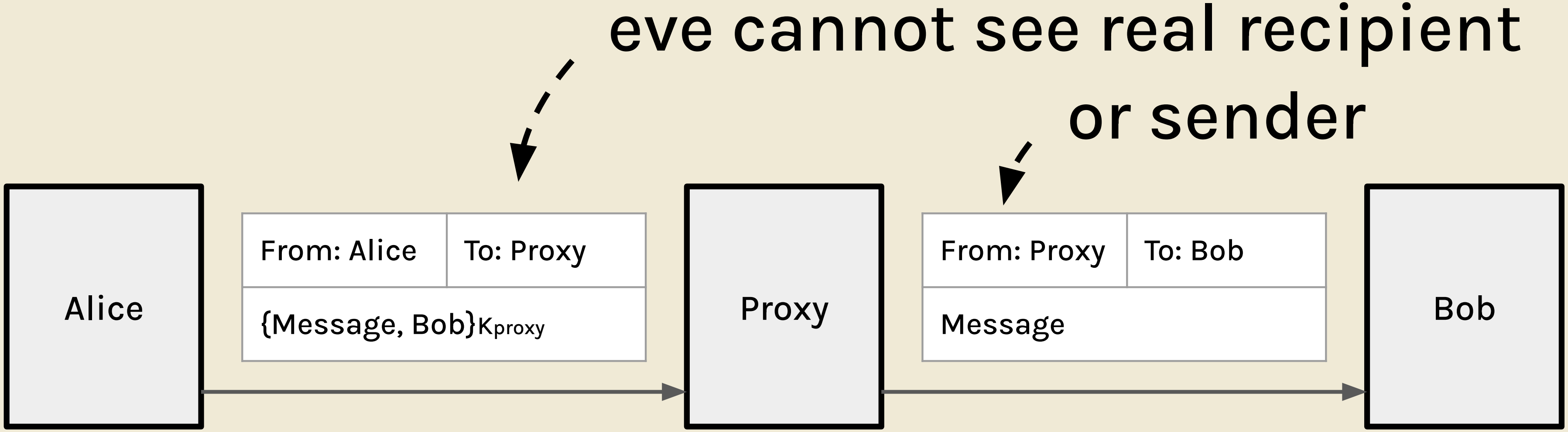
proxy recap



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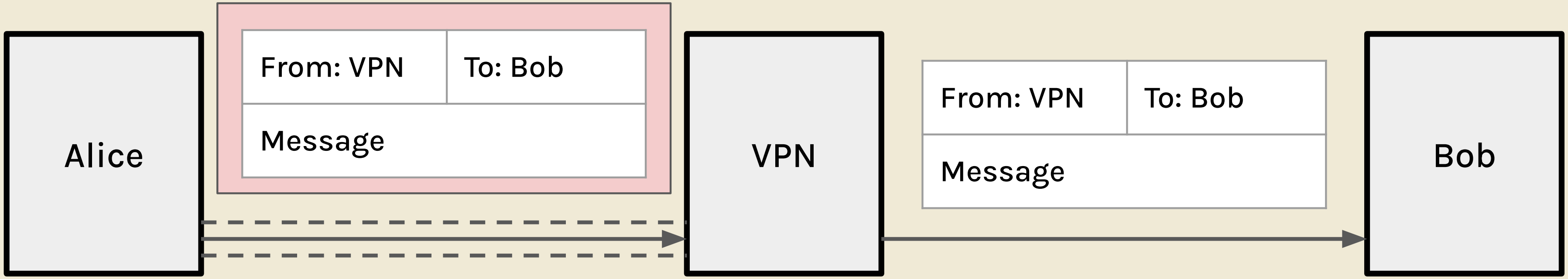
VPN



- access an internal network via a VPN
- send data as if from a different network

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- trusting the proxy (can see sender and recipient's identities, have to trust it won't be given out)

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    - call these **relays**

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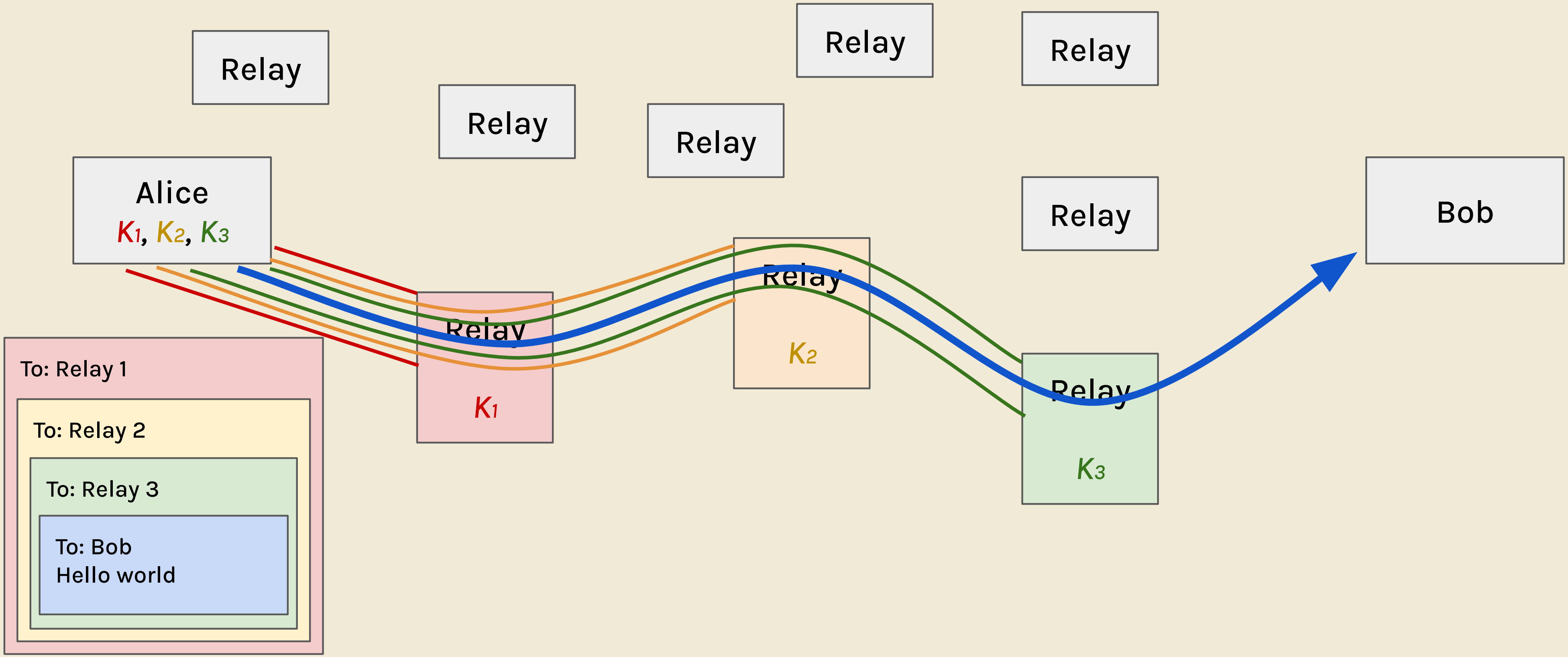
- **Tor browser:** browser based on Firefox

example Tor circuit



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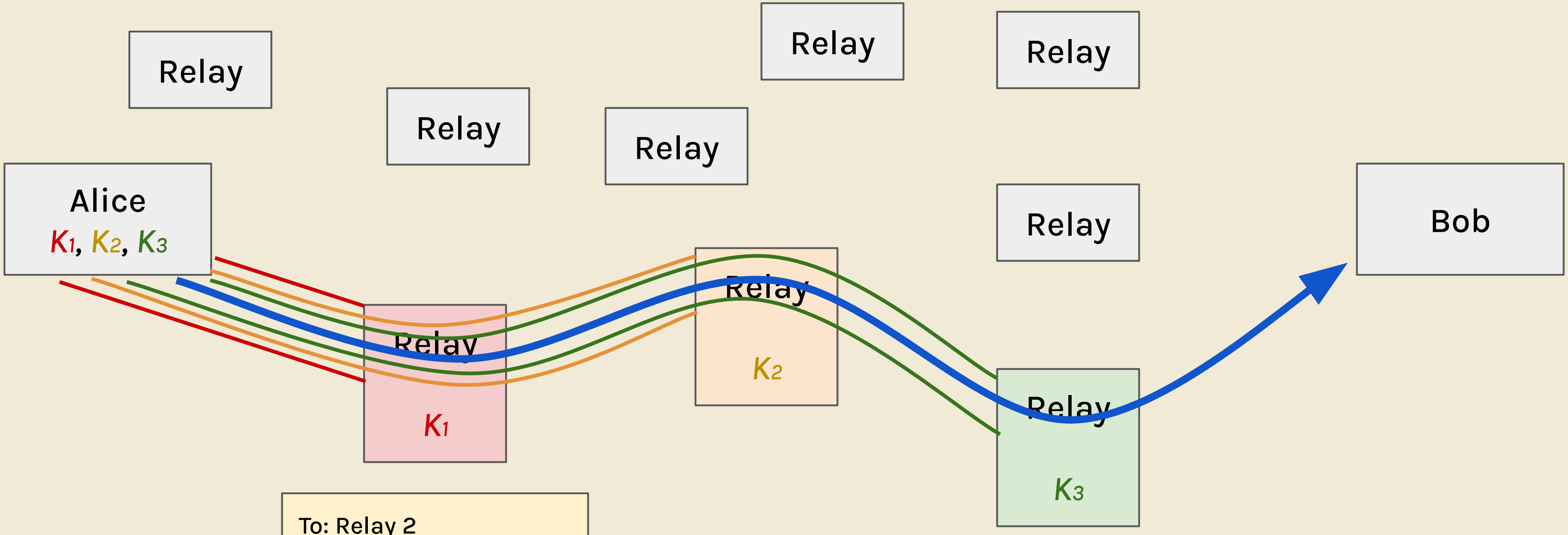

To: Relay 2

To: Relay 3

To: Bob
Hello world

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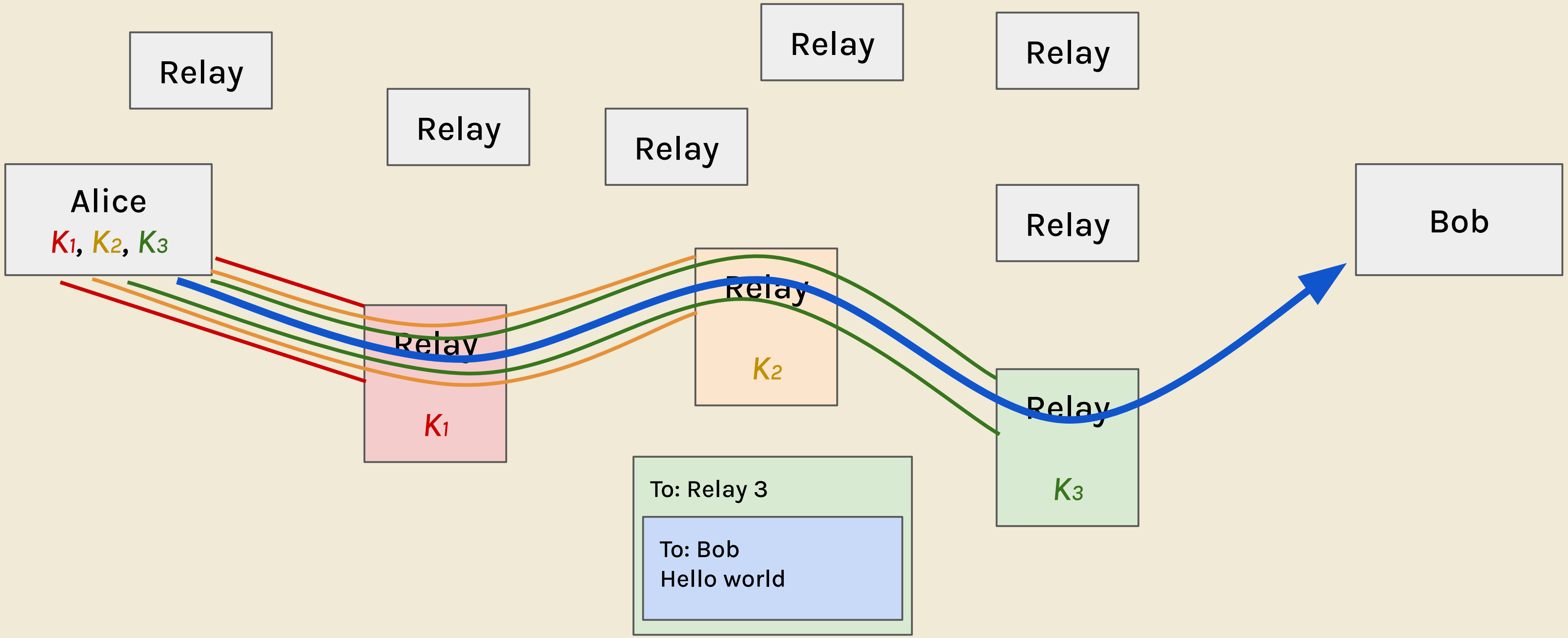

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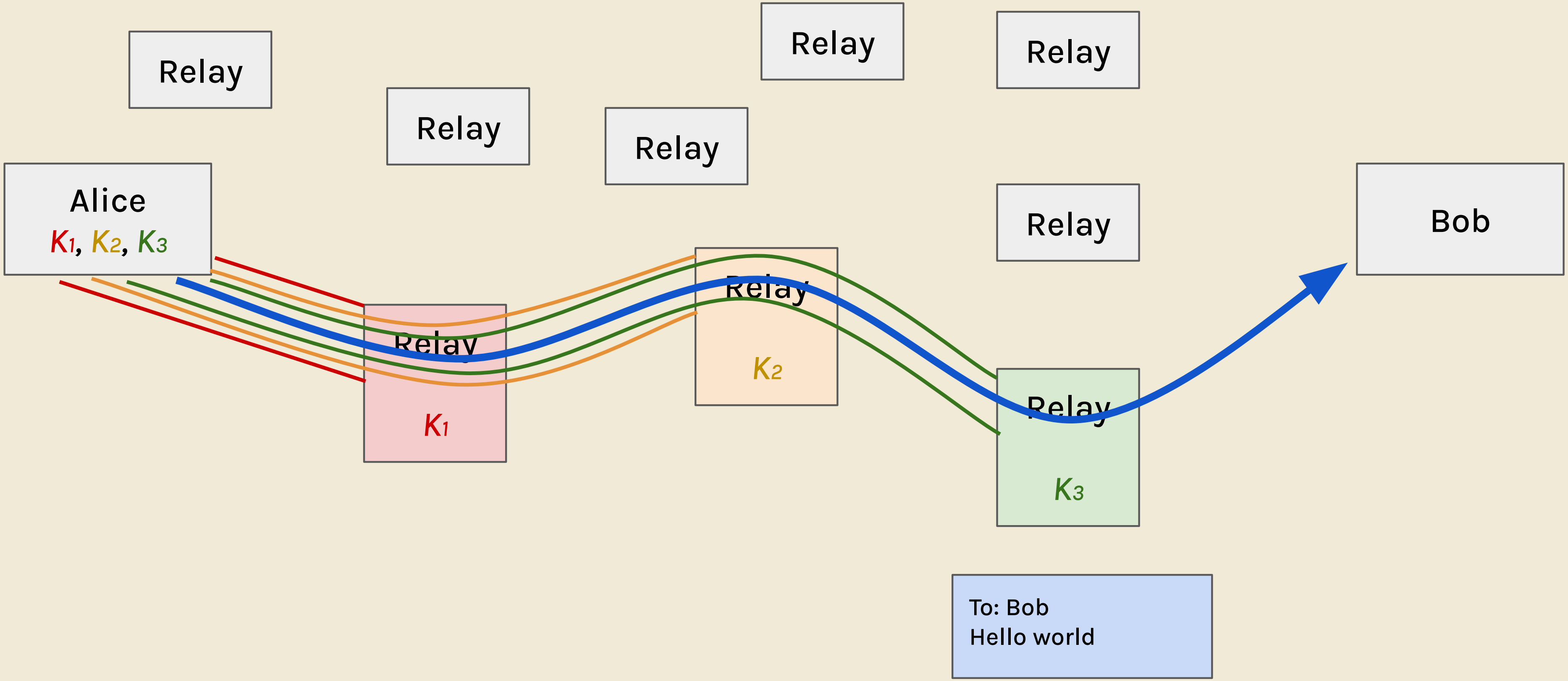

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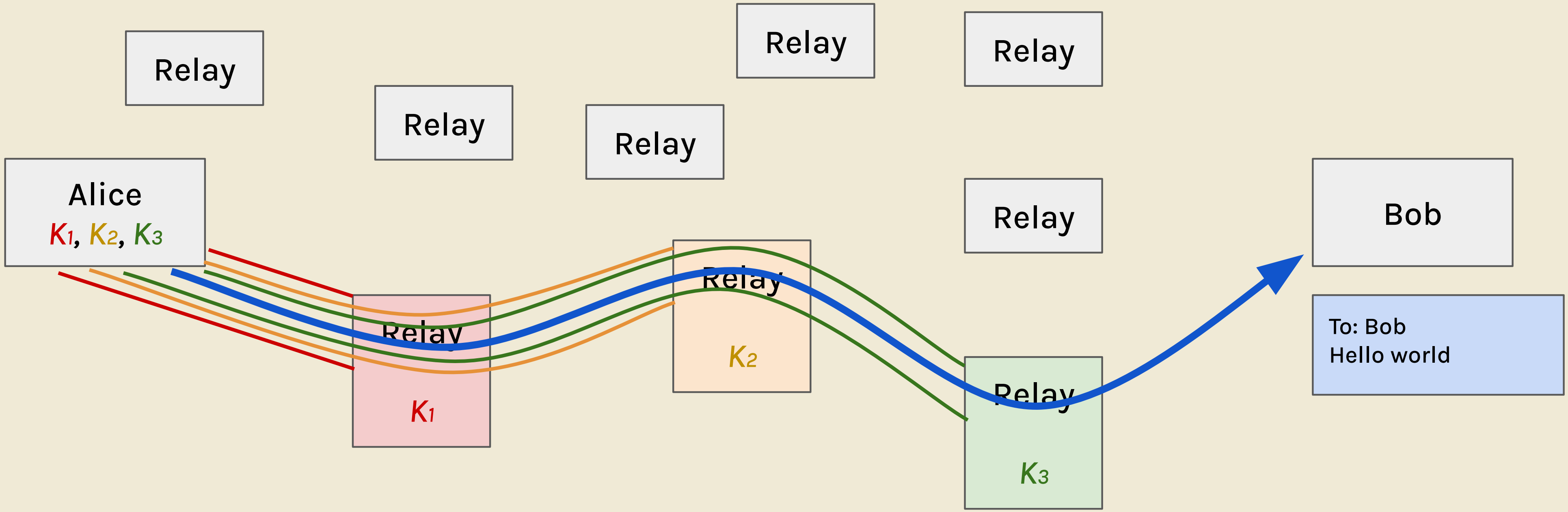

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  - use Tor bridges: non-public entry node

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    - communicate through rendezvous point

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    - hacker used SSL stripping to replace bitcoin addresses and redirect transactions to their wallets
    - Tor Project says to websites—enable HTTPS by default, deploy .onion sites

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