

Unanimous

The Pursuit of Edge Network Consensus

SRG Talklet Series
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Motivation

Individuals need a viable alternative to 3rd party centralised services.

Why?

- opaque terms of service
- data breaches
- government surveillance and censorship
- content manipulation
- no service guarantees
- increasing intimate data generated from IoT and wearables
- need for low latency services
- reliance on full connectivity

Problem

Developing fault-tolerant applications for the edge network is hard.

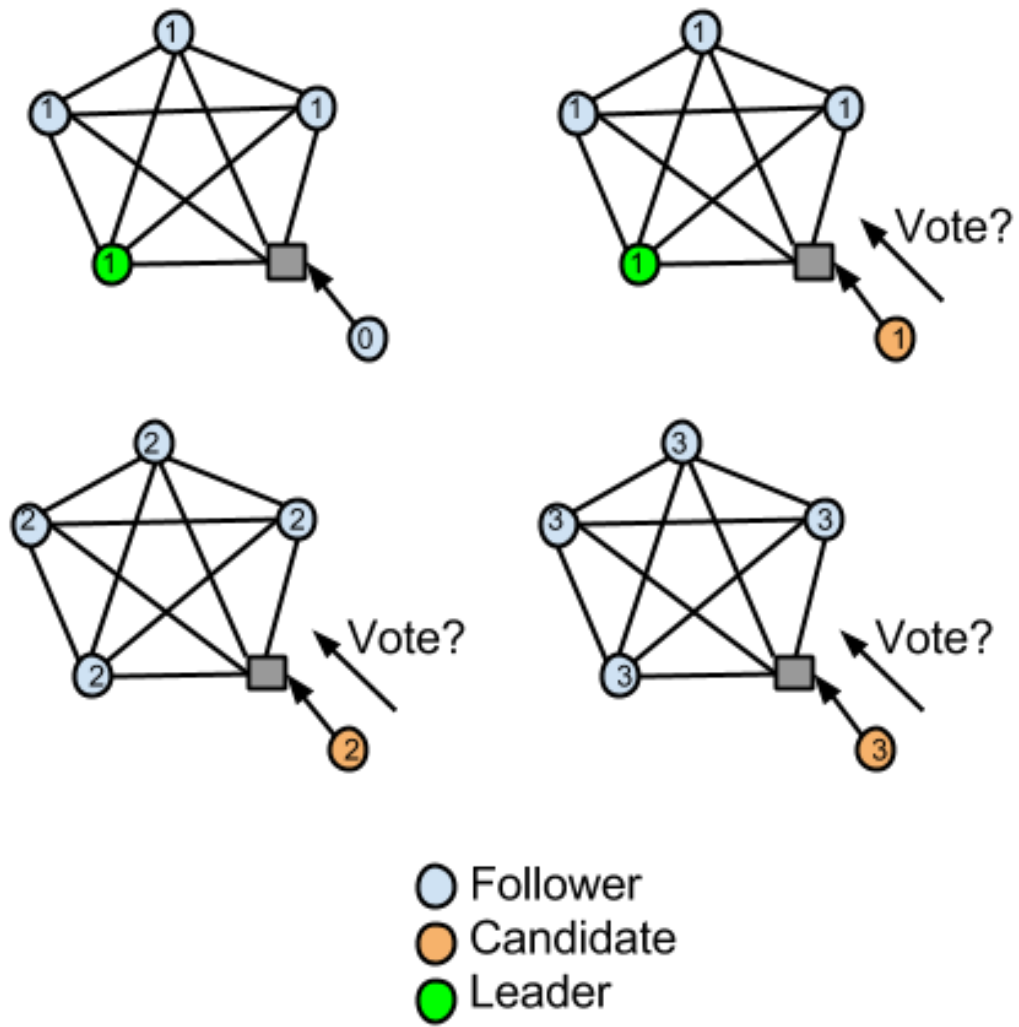
Why?

- heterogeneous, resource constrained hosts.
- unreliable mobile hosts & networks.
- heterogeneous network topologies.
- asymmetric and nontransitive reachability.
- diverse and unpredictable link characteristics.
- poorly understood middleboxes.
- difficult to establish trust

State of the art

3 key issues:

1. **Protocol underspecification** - the limited scope of consensus protocols means that actual implementations violate safety guarantees.
2. **Limited configuration** - consensus protocols are not sufficiently flexible to handle do not handle real world constraints and application needs.
3. **Outdated assumptions** - consensus protocols are (still!) built upon decade old assumptions



raft made unavailable by asymmetric reachability

Approach

1. designed for developer usability and performance, not just understandability
2. based on the reality of the modern internet, not Paxos's model assumptions
3. conservative leader election with smart failure detectors, converging towards the most reliable and highly connected nodes
4. complete yet flexible specification with extensions for dynamic membership, load balancing, semi-passive participates and address discovery

Progress so far

Signposts - authenticated identifiers and transitive reachability for the edge network
[see draft on netos List/FOCI'13]

Databox - manifesto on case for an alternative to 3rd party centralised services *[arXiv: 1501.04737]*

Raft Refloated - reproduction study in simulation of the Raft paper
[SIGOPS OSR Jan '15]

Comments & Questions

“In my experience, all distributed consensus algorithms are either:

1: Paxos,

2: Paxos with extra unnecessary cruft, or

3: broken.” - Mike Burrows

let's continue the discussion:

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I'll be giving a 15 min version of this talk 1pm on 14/5, for the women@cl

talklets: SRG session