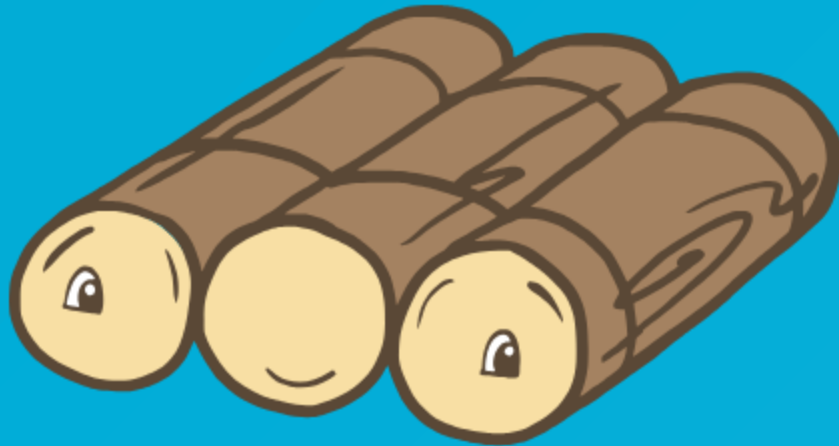


Using HashiCorp Raft to distribute data between nodes when a database server is not an option

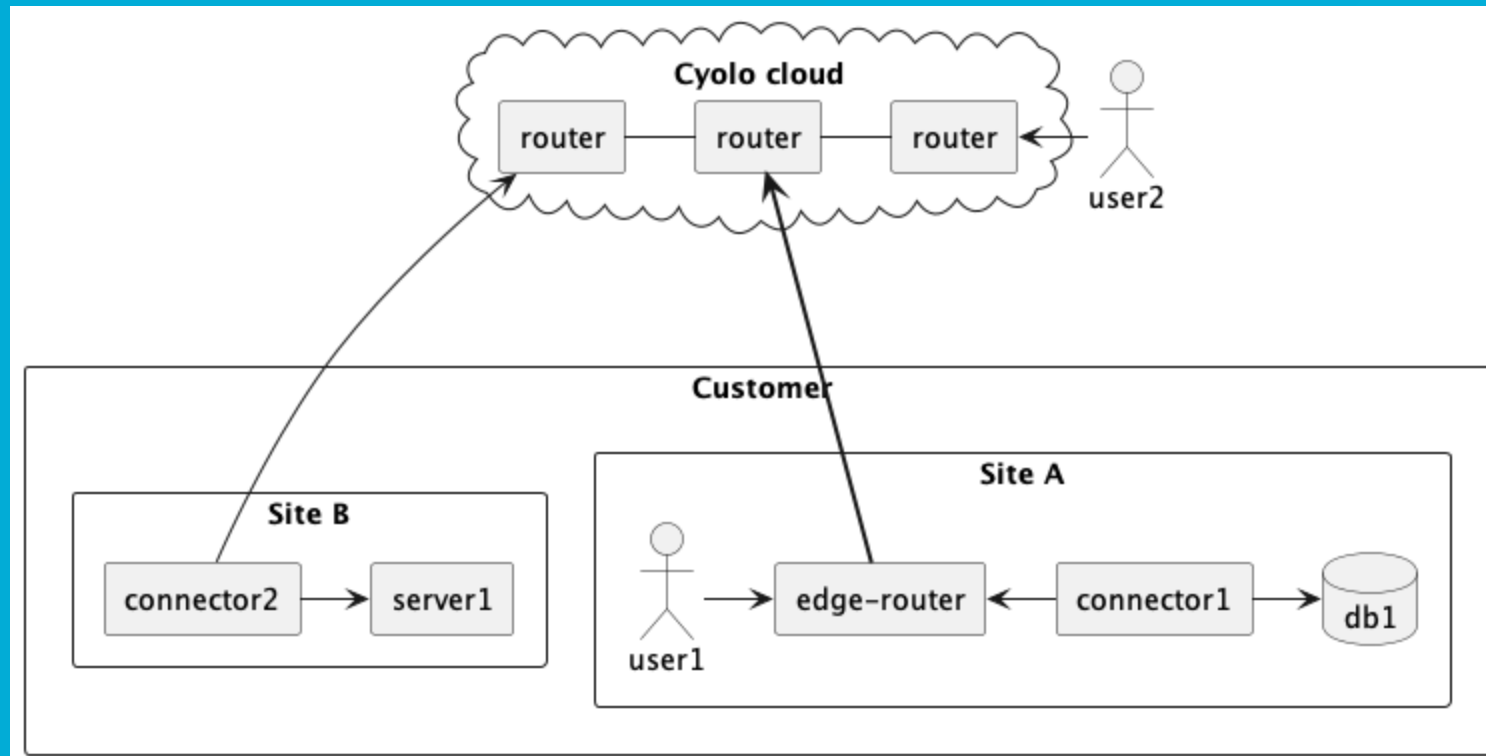


Who are these guys and why can't they use a database server

- We are a Zero Trust Network Access (ZTNA) company
- Our mission is to isolate our customers' private networks and provide network access to it by identifying objects only

Total isolation - the only solution

- Requires no inbound connection to your subnets
- Can operate in air-gapped networks
- Add no latency



Problems we face

- Customer may have multiple networks (which means we need multiple connectors)
- Customer may want HA (which means we need multiple connectors per network)
- Customer networks are not always inter-connected (which means we cannot just use a shared database)

Session Management

- problem:
 - users need to be authenticated and have their session state needs to be maintained across nodes
- solution:
 - encrypted state tokens allow each node to read and modify the session state securely
 - encryption keys need to be pre-shared among the nodes (we can also leverage PKI)
 - encrypted tokens are stored within the client side (we use cookies) and are tamper-proof

```
Set-Cookie: cyolo-sid=VAH8r2eySD52xC08X62_4JSb-f02L6XZp-  
8rZIKS1N9fdX9pqKutENoNAH1rzX6urxp1MKrUi3jpCKEu4oop9IXMcx5BI_r-  
mbclDAMi6IBX34Io2NpVZVrml_56faOQR7ZnKjCtu23Nzaxks6lPwz8-  
vJy6cflFfLvY76fzQCpODFhI0mTLL0xkOZYkAOID6h5jAAXBUNUXNswF5WAMvQ2zB5wBusy5rG0w6kcqU23HwSr7gS  
0nSQxbuoVtH9czTcqJW_YkBteil8yWwApMrazoV-bCguelch48ikkov9_exJo4yw2JD1UINty-Thkp_X1ibL-x-5mJdgQ-p-
```

Rendezvous Points

- problem:
 - some transactions require interaction between multiple actors
 - examples: MFA links, workflows and things that start in a browser and end in a different client
- solution:
 - sticky routing
 - host identifiers may be used as keys for sticky routing ("app-1.cyolo.io" or "app-2.cyolo.io" vs "app.cyolo.io")

Raft-based data replication

- Highly consistent, highly available
- Can be used in our network infrastructure
- Allows us to use embedded, disk or in-mem storage



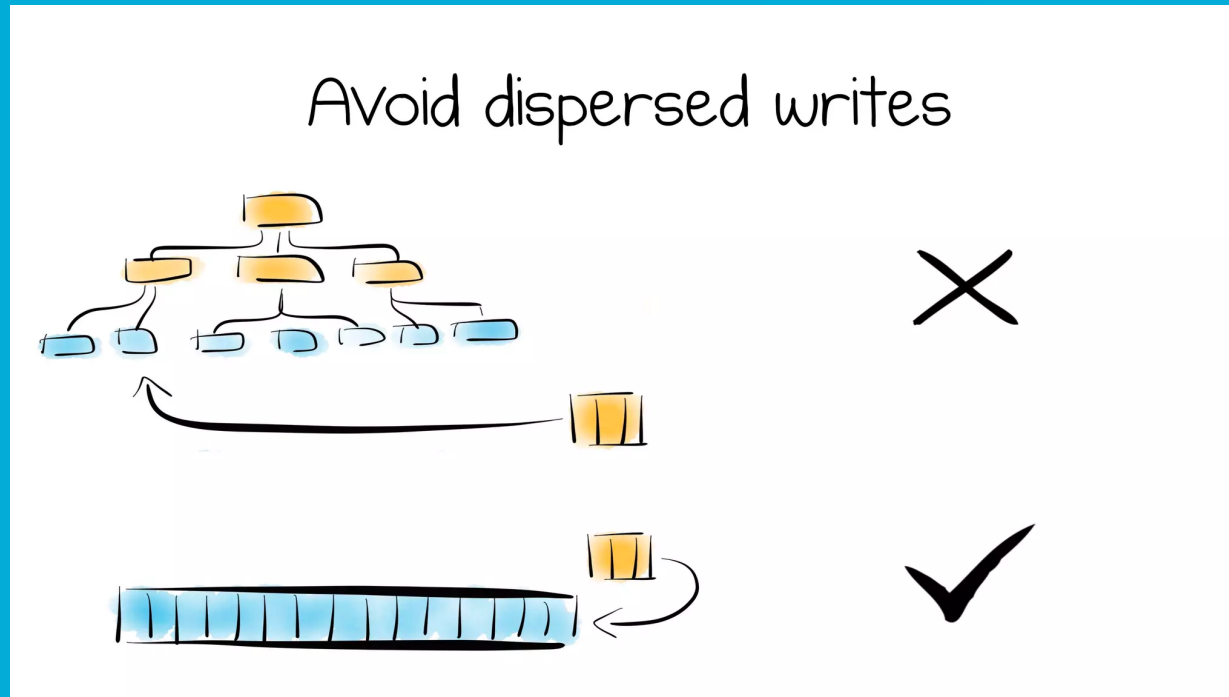
Demo

Increment the counter



What is Raft and how does it succeed so well?

- A log data structure is the easiest to replicate
- It leaves it up to you to implement the state machine that applies the transactions it replicates for you



Q&A

Thank you <3