

# Digital Sovereignty

Collective + Personal

Autonomy + Control  
over

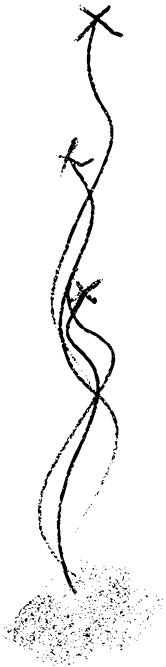
Technologies = open hw+sw - study + modify  
bounding complexity )

Infrastructure - autonomous { servers, networks

Data - replication for offline access  
sync + merge for collaboration

Algorithms - search + sort + display data

Identities - self-sovereign



# Unikernels

unikernel.org

specialised single address-space machine images

constructed by

library operating systems

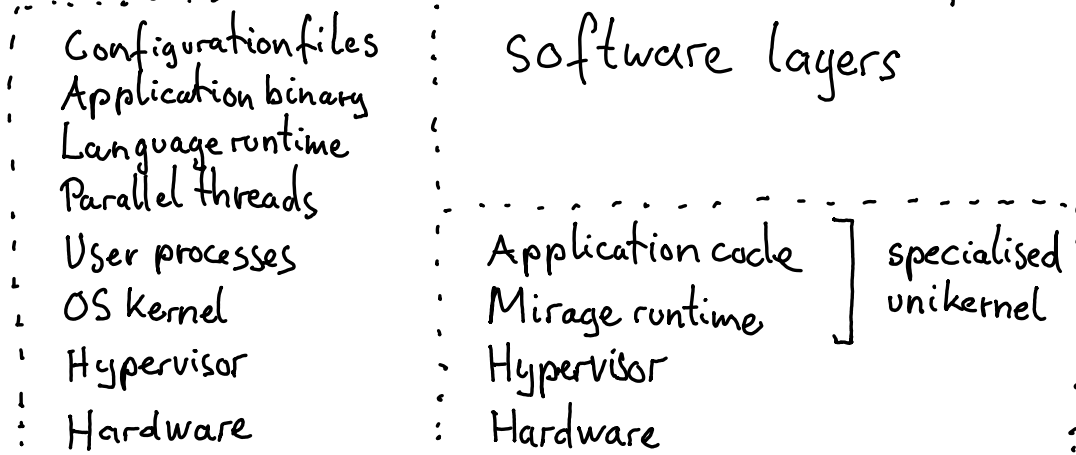
such as

MirageOS (OCaml)

mirage.io

reduced complexity, attack surface, resource footprint

solos - sandboxed execution environment for unikernels



# Irmin

irmin.io

distributed database based on the principles of Git  
implemented as  
OCaml library  
for building  
mergeable persistent data structure stores  
accessible via HTTP and GraphQL  
with  
Mirage OS compatibility

key-value store - content-addressable block store + mutable tag store  
history, branches, trees - like Git

built-in + custom data types + 3-way merge functions

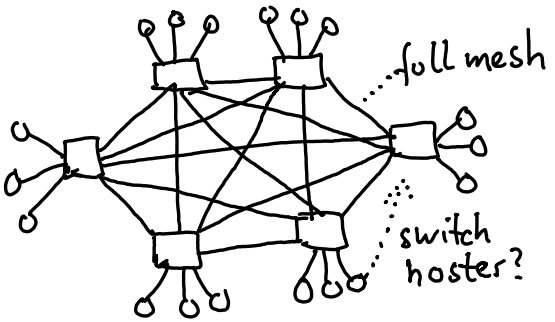
counter, multi-set, set, map

↳ CRDTs - conflict-free merge

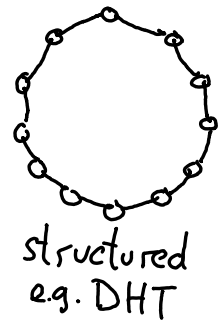
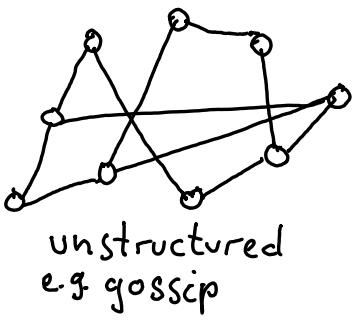
backends: mem, chunk, git

# Network Architecture

## Federated servers



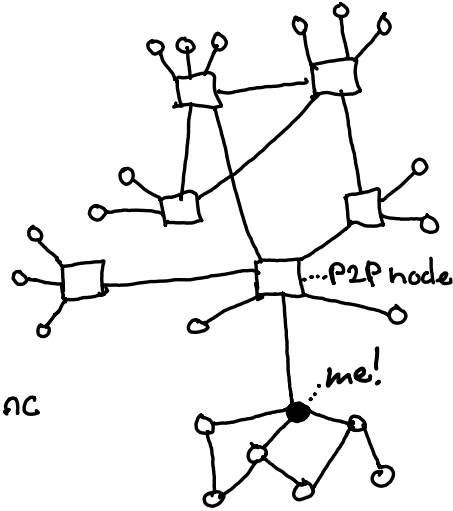
## P2P network



NAT?  
resources?

## Two-tier P2P

resilient infrastructure  
replication  
offline/local use  
opportunistic sync



P2P among proxy servers

- pub/sub + data replication
- search + discovery
- collaborative filtering
- news dissemination

linbox + storage - encrypted

P2P among local nodes

P2P network

P2P Proxy

encrypted content-addressed object store

DB: sync+pubsub encrypted access control

Apps: self-contained sandboxed local offline access+search

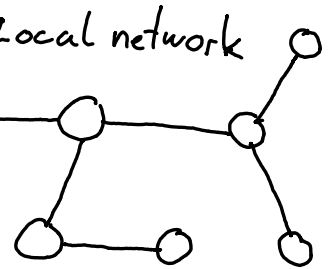
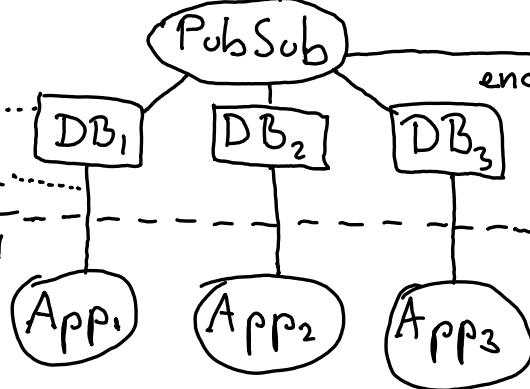
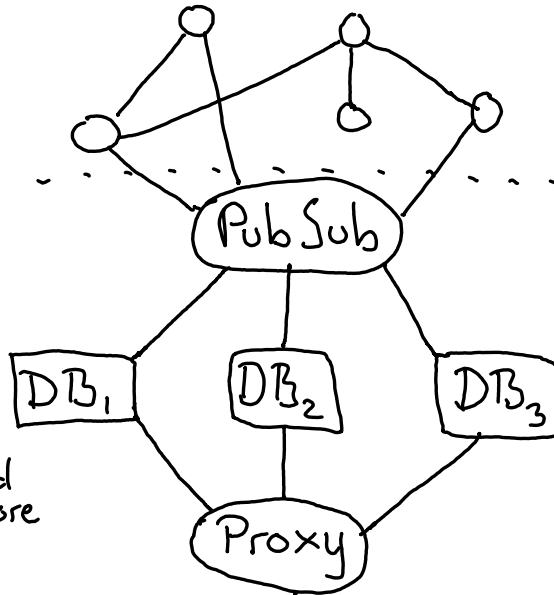
User device

Irmin + App Graph QL

UI

encryption keys

Local network



# References

p2pcollab.net { research  
development  
discussion  
contact

mirage.io

irmin.io

unikernel.org

## Technological sovereignty

### Review Article:

What does the notion of "sovereignty" mean  
when referring to the digital?  
S. Couture, S. Toupin - 2019

### Book:

[gitlab.com/sobteclib](https://gitlab.com/sobteclib)

