Digital Sovereignty

Collective + Personal

Autonomy + Control

over

Technologies - open hw+sw - study+modify

Infrastructure - autonomous networks

Data - replication for offline access

Algorithms - search+sort+display data

Identities - self-sovereign
Unikernels

specialised single address-space machine images
constructed by
library operating systems
such as
MirageOS (OCaml)

reduced complexity, attack surface, resource footprint
Solo5 - sandboxed execution environment for unikernels

Software layers

Configuration files
Application binary
Language runtime
Parallel threads
User processes
OS Kernel
Hypervisor
Hardware

Application code
Mirage runtime
Hypervisor
Hardware

specialised unikernel
Irmin

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

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
P2P among local nodes

NAT?
Resources?
References

p2pcolab.net
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