Emacs for P2P deliberation

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USHIN

Small nonprofit whose mission is to promote personal, community, and global health through free and open Universal SHared INformation for everybody.

- ▶ Joseph Turner (`breatheoutbreathein`) - coordinator
- ▶ Mauve Signweaver (`rangermauve`) - Agregore creator
- ▶ Adam Porter (`alphapapa`) - Emacs package author
- ▶ Protesilaos Stavrou (`protesilaos`) - philosopher
- ▶ Paula Maas, Steve Nash - USHIN founders

What is deliberation?

- ▶ Freedom to communicate on a neutral platform
- ▶ Process for trusting sources and information
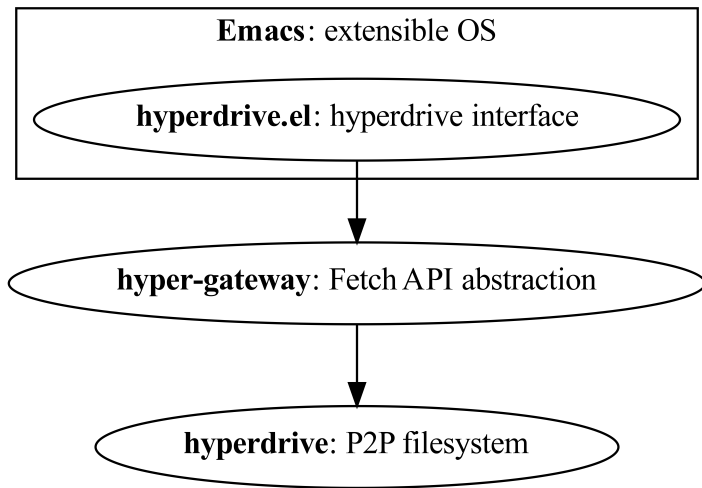- ▶ Thorough consideration from all angles and perspectives
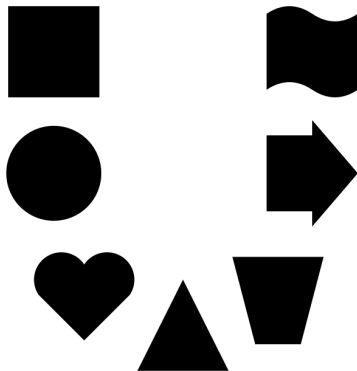
From centralization to P2P

Problem	Approach
Internet/server outages	Local-first (works offline too)
Censorship/data loss	Data distributed among peers
Propaganda/advertisements	Subjective trust

- ▶ Federation tends toward centralized hubs

P2P filesystem in Emacs

Hyperdrive

- Secure, P2P, real-time, local-first, versioned file system
- Sparsely replicated (synergy with indexing)
- Built on top of Hypercore protocol
- Developed by the Holepunch team

Hyperdrive for deliberation

- Offline, local network, Distributed Hash Table (DHT)
- Stable API
- Fast load times
- Familiar file system abstraction
- Handles mutable data
- Comparison to other P2P protocols below

Hyper-gateway

- ▶ Handles P2P interactions under the hood
- ▶ Exposes Fetch API for controlling the hyperdrive node

Emacs

- Quickly build new packages
- Mostly technical community
- Org-mode (simple, powerful plain text format)
  - Tags, heading ids, timestamps, TODOs...
- Embodies free software principles
- Portable, runs on all OSs

hyperdrive.el

- Directory view
- Remembers visited hyperdrives
- Link support (org links too)
- Stream audio/video with external programs

Next hyperdrive.el features

- ▶ Explore/diff versions
- ▶ Public names
- ▶ DNSLink
- ▶ Indices (synergy with sparse replication)
  - ▶ Org-mode tags, timestamps... (SQLite like Org-roam?)
  - ▶ Backlinks
- ▶ Topic-based peer discovery
  - ▶ UX like Jitsi: enter the same phrase to find others
- ▶ Backup/restore

Subjective trust

Subjective	You decide whom to ignore
Crowd-sourced	Moderation work is distributed
Transparent	Explore the trust graph

▶ Inspired by Alex Cobleigh's TrustNet

Sources, Blockers, Blocked

- ▶ Sources: trusted to recommend peers (per-topic)
- ▶ Blockers: trusted to block on your behalf
- ▶ Blocked: spammers, bad actors
    - ▶ Synergy with peer discovery

trust.el

- ▶ Manage trust relationships in Emacs
- ▶ Graph visualization
- ▶ Integrate with hyperdrive.el, other projects?

Roadmap

- ⊟ hyperdrive.el
    - ☒ basic functionality
    - ☐ indexing
    - ☐ peer discovery
    - ☐ backup/restore
- ⊟ trust.el
    - ☒ Design + JS POC
    - ☐ Elisp implementation
- ⊟ GUI applications
    - ☒ Agregore
    - ☐ Agregore mobile/org-mode support

Actions

- Try out hyperdrive.el
  - `https://git.sr.ht/~ushin/hyperdrive.el`
- Join the public conference room
  - `xmpp:discuss@conference.ushin.org`
  - `#xmpp_discuss_conference.ushin.org:matrix.org`
- Visit the USHIN Website
  - `https://ushin.org`

P2P comparison

- Hypercore
- BitTorrent
- IPFS
- Secure Scuttlebutt
- Earthstar

Criteria

- ▶ Connection Type - How is data shared?
- ▶ P2P Connectivity - Can peers reliably find one another?
- ▶ Stability - Is the protocol changing?
- ▶ Download Speed - How fast is data transfer?
- ▶ Mutability - Can it handle data that changes?
- ▶ Data Model - What kind of data can peers share?
- ▶ Centralization - What are the central points of failure?
- ▶ Sparse Replication - Can peers download partial datasets?

Hypercore

Connection Type	DHT+local
P2P Connectivity	Reliable
Stability	Stable (no backwards compatibility)
Download Speed	Fast
Mutability	Fast/Reliable
Data Model	Logs (Filesystem/Key-Value)
Centralization	DHT Bootstrap
Sparse	Yes

BitTorrent

Connection Type	Trackers+DHT+local
P2P Connectivity	Reliable
Stability	Stable
Download Speed	Fast
Mutability	None (for now)
Data Model	Folders+files
Centralization	DHT Bootstrap/Trackers
Sparse	Yes

IPFS

Connection Type	DHT+local
P2P Connectivity	NAT unreliable
Stability	Stable (backwards compatibility)
Download Speed	Slow
Mutability	Slow/Unreliable
Data Model	Folders+Files / Merkle DAG
Centralization	DHT Bootstrap
Sparse	Yes

Secure Scuttlebutt

Connection Type	Local, Pubs, Rooms
P2P Connectivity	Mostly local P2P (no DHT)
Stability	Stable (for now)
Download Speed	Very Slow
Mutability	Medium/Reliable
Data Model	Logs + Social
Centralization	Pubs (sync) Rooms (find peers)
Sparse	No

Earthstar

Connection Type	Sync Servers
P2P Connectivity	None (soon local)
Stability	Active Dev
Download Speed	Fast
Mutability	Fast
Data Model	KV+CRDT
Centralization	Sync Servers
Sparse	Yes*

Points of Centralization

- ▶ Trackers and SSB rooms
  - ▶ Central servers route connections between peers
- ▶ SSB pubs and Earthstar sync servers
  - ▶ Central servers replicate data
- ▶ DHT Bootstrap nodes
  - ▶ Nodes hardcoded in protocol for initial connection
  - ▶ Mitigation: more bootstrap nodes
    - ▶ Hardcoded in application layer
    - ▶ Found on DHT/local network

Agregore web browser

- ▶ Multiple protocols: Hypercore, IPFS, BitTorrent, SSB. . .
- ▶ Potential to add support for Org-mode (Organice?)
- ▶ Mobile version WIP

How is development funded?

- ▶ 501(c)(3) nonprofit: anyone can donate
- ▶ Independently funded by individuals, no grant funding

Viva LibrePlanet!

- Thank you Free Software Foundation!