



Towards a **Local-First** Desktop

with Modal,
p2panda,
and Reflection



Tim Cook
Apple



The President



Satya Nadella
Microsoft



Jeff Bezos
Amazon

In 2025 everyone
realized they're
utterly dependent
on the US

This could have
been our moment.

We weren't ready.

We don't currently have

Daily-drivable phone OS

iOS/GrapheneOS level security

Good collaborative tools (Google Docs et al)

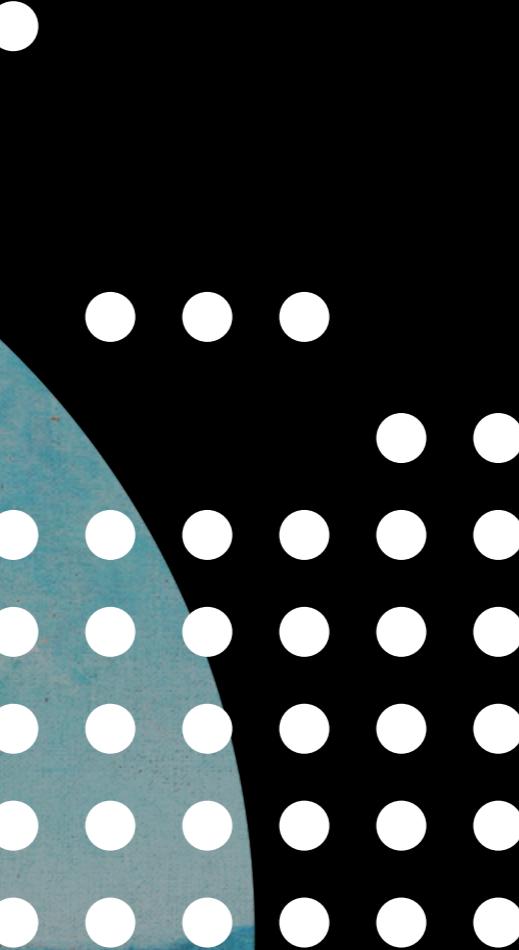
Multi-device sync

We need to be more
organized, focused,
and strategic

We also need to
build for a world that
is more uncertain
than ever



Modal
Collective



Emancipatory Computing

Software Freedom

Design-First

Respects your Attention

Adversarial Security

Hardware Longevity

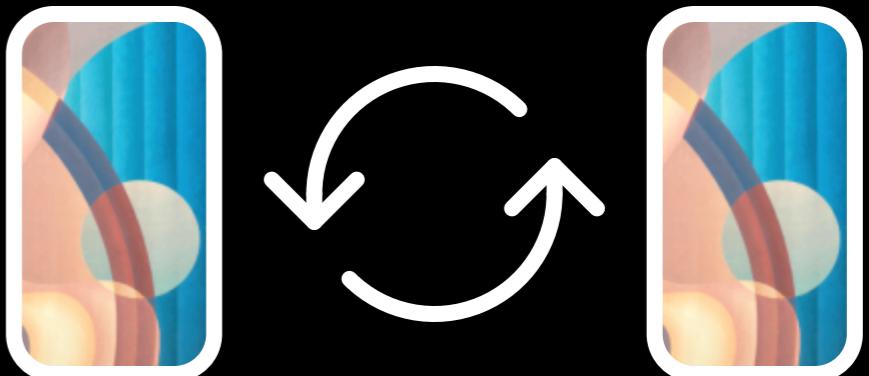
Post-Internet



Actually Secure



Daily-Drivable Phone



Local-First Sync



Image-Based

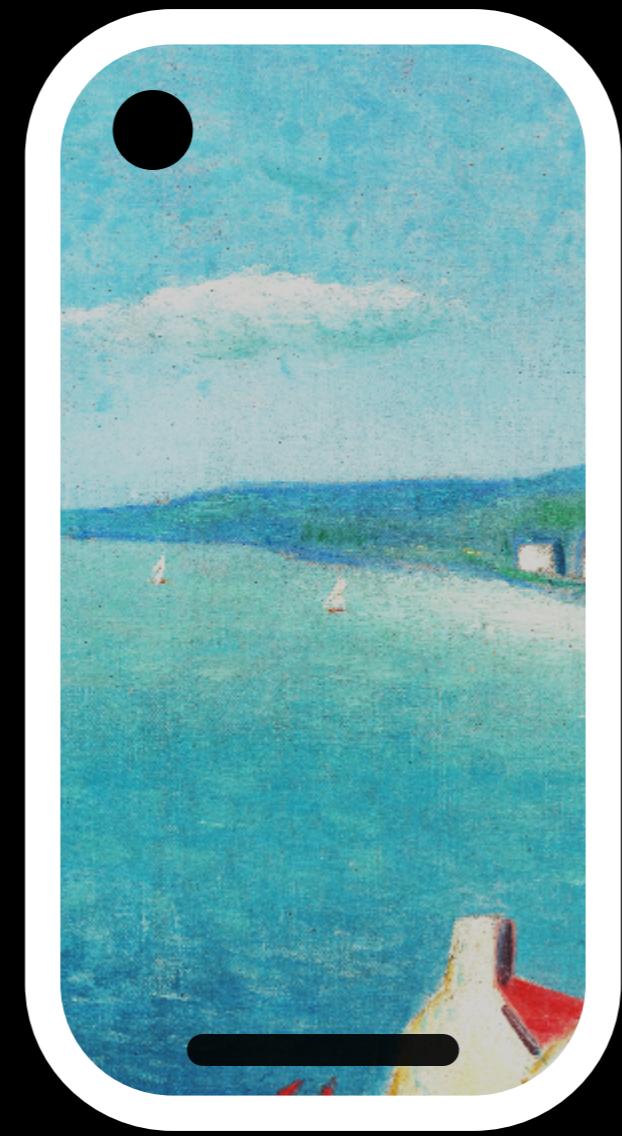


Hardware Longevity



App Ecosystem

**Development
Design
Organizing
Grant Writing
Policy Campaigning
More**



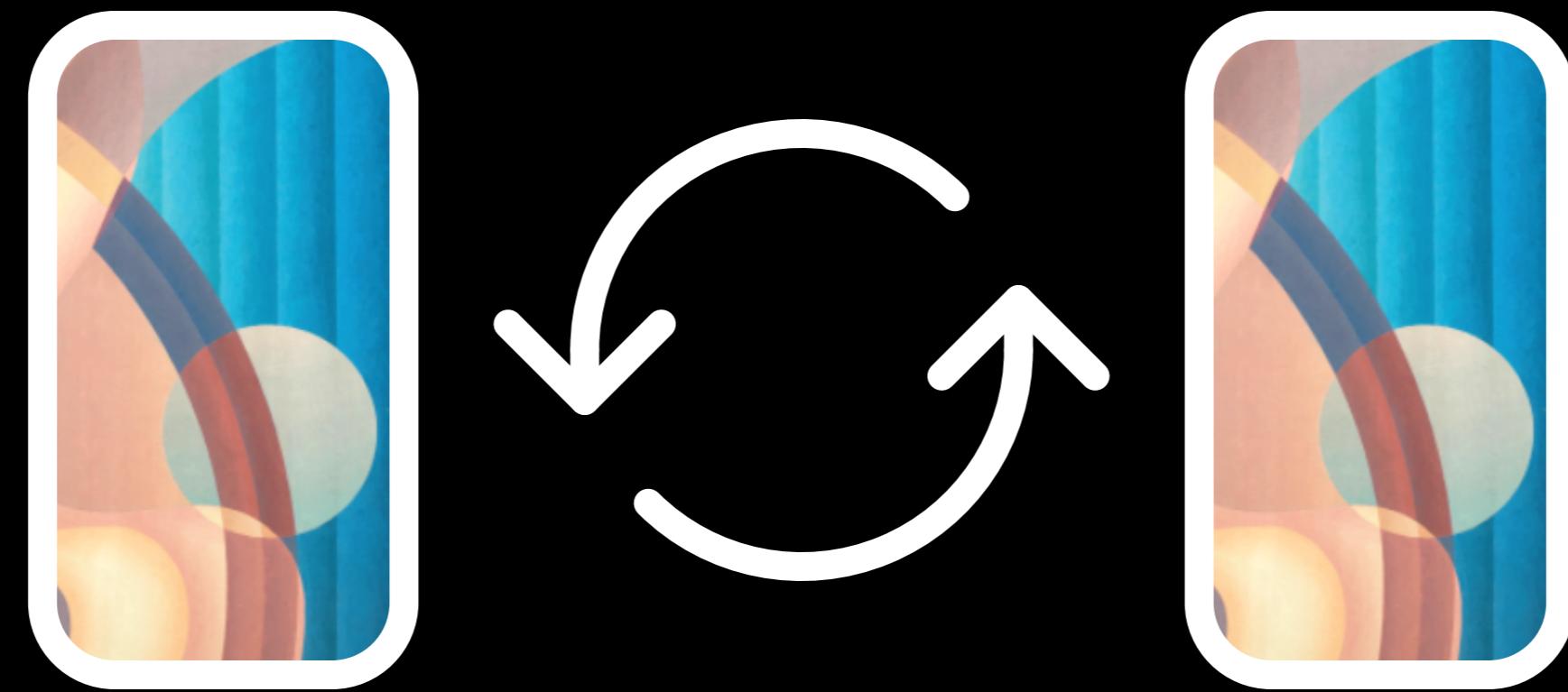
A free software iPhone

The Stack

Flatpak
p2panda
GTK+Adwaita
GNOME
Freedesktop
systemd
Linux

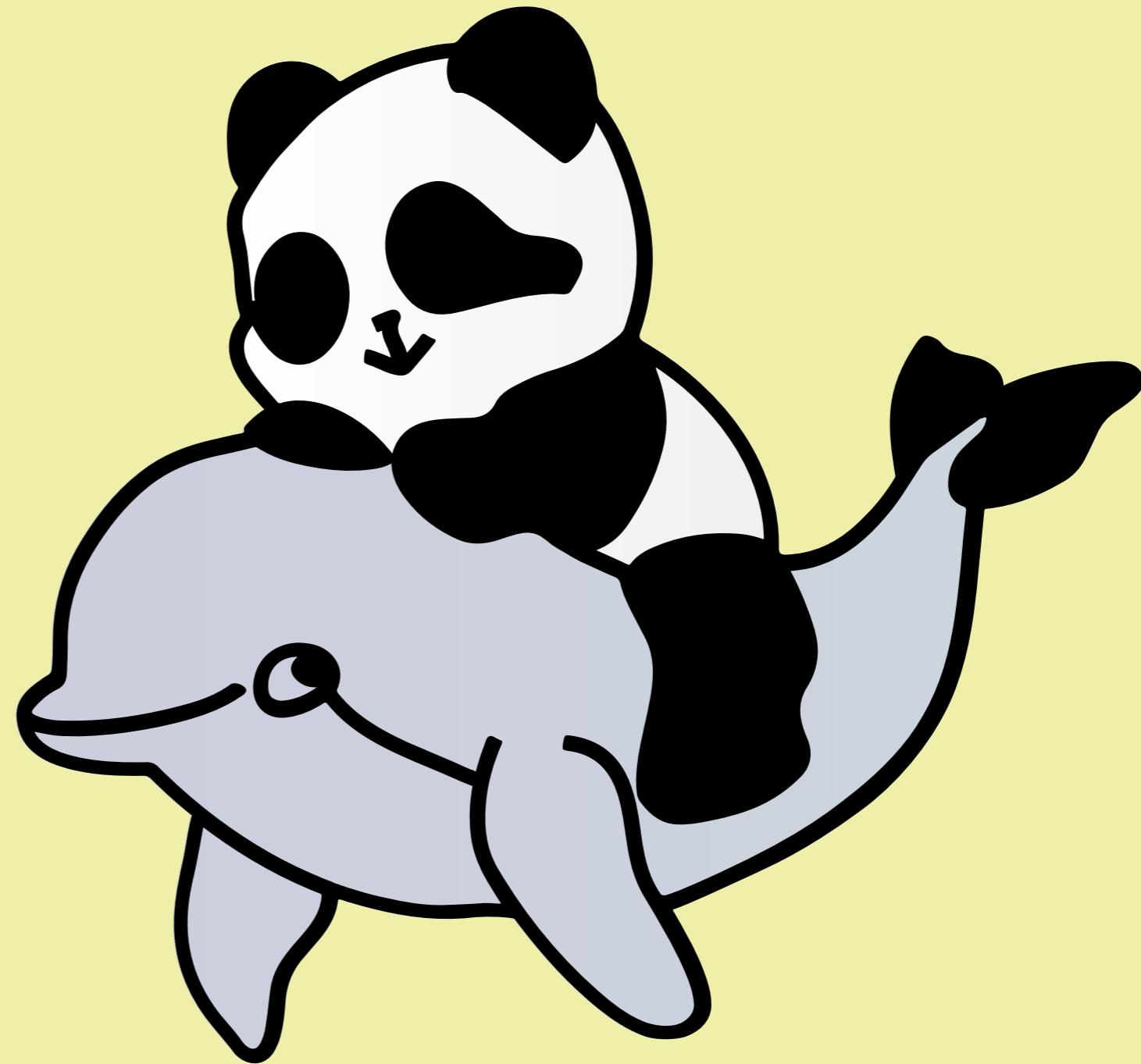
**Upstream work in
existing projects to
push things forward**

Where we're going
we'll need resilient
networking



Local-First Sync

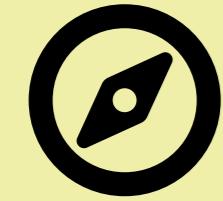
p2panda



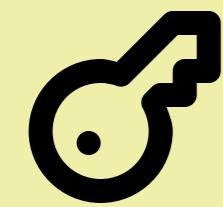
Team



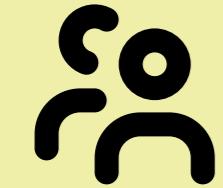
Building Blocks for P2P Applications



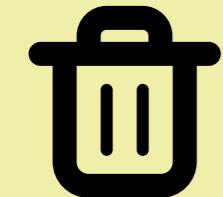
Confidential Discovery & Sync



**Key Agreement for Groups
(with Forward Secrecy)**



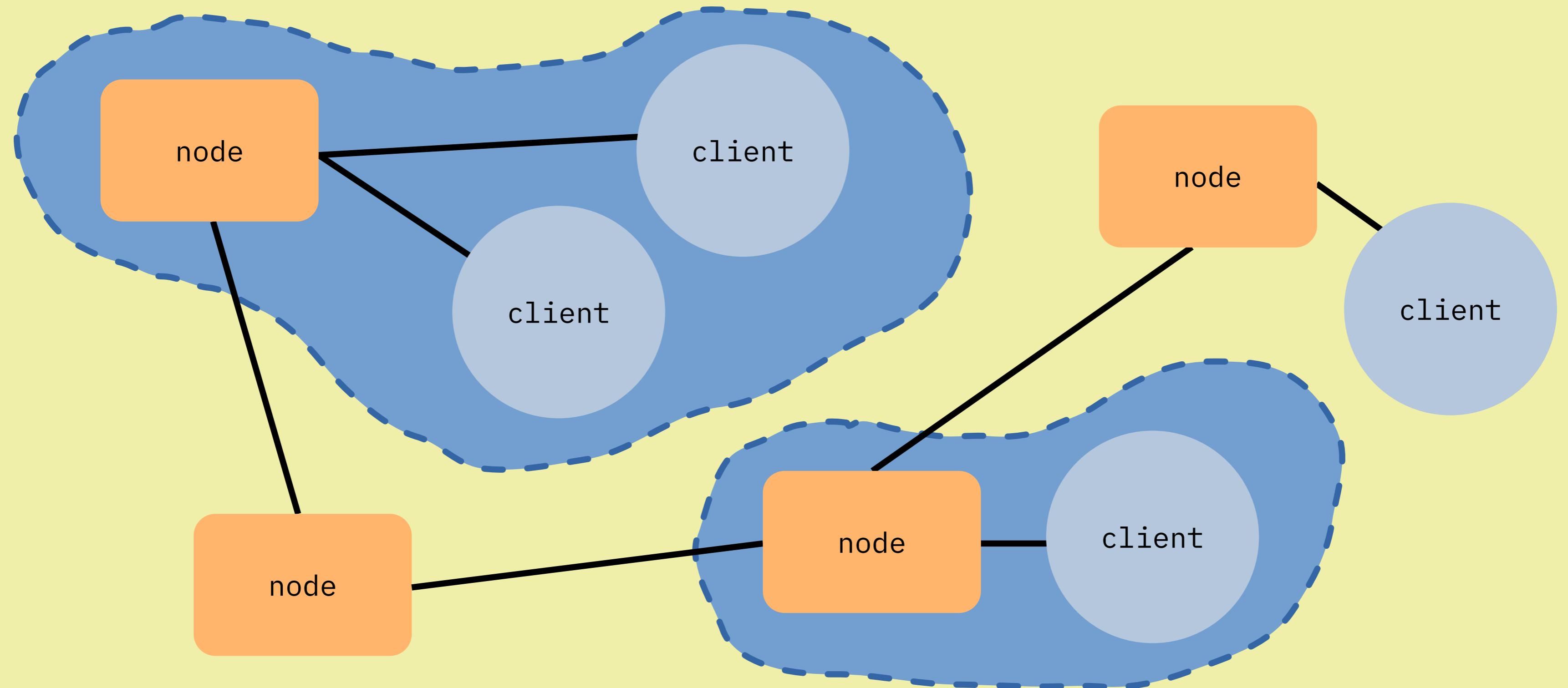
Group CRDT



Garbage Collection

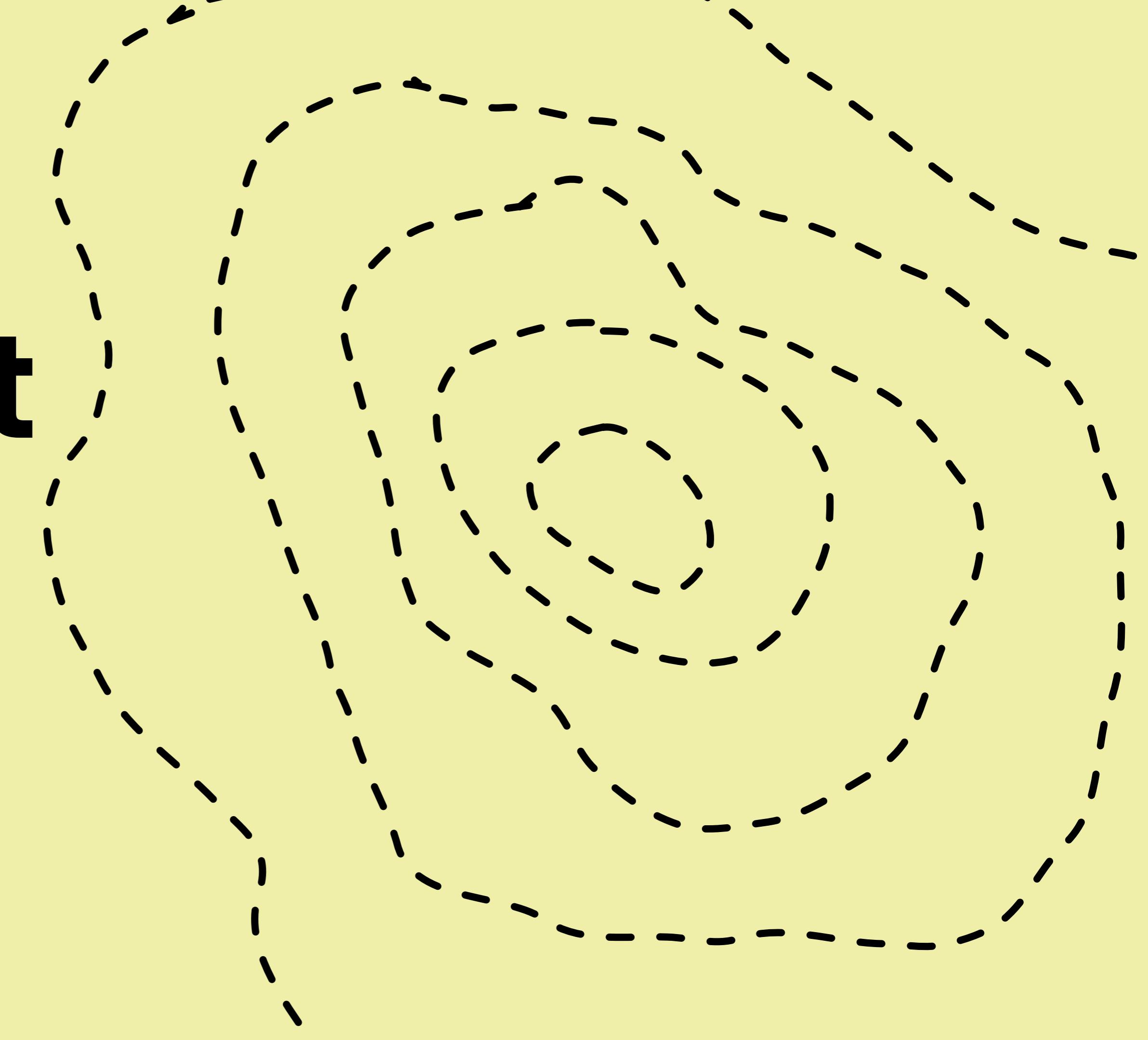


Introspection Tools

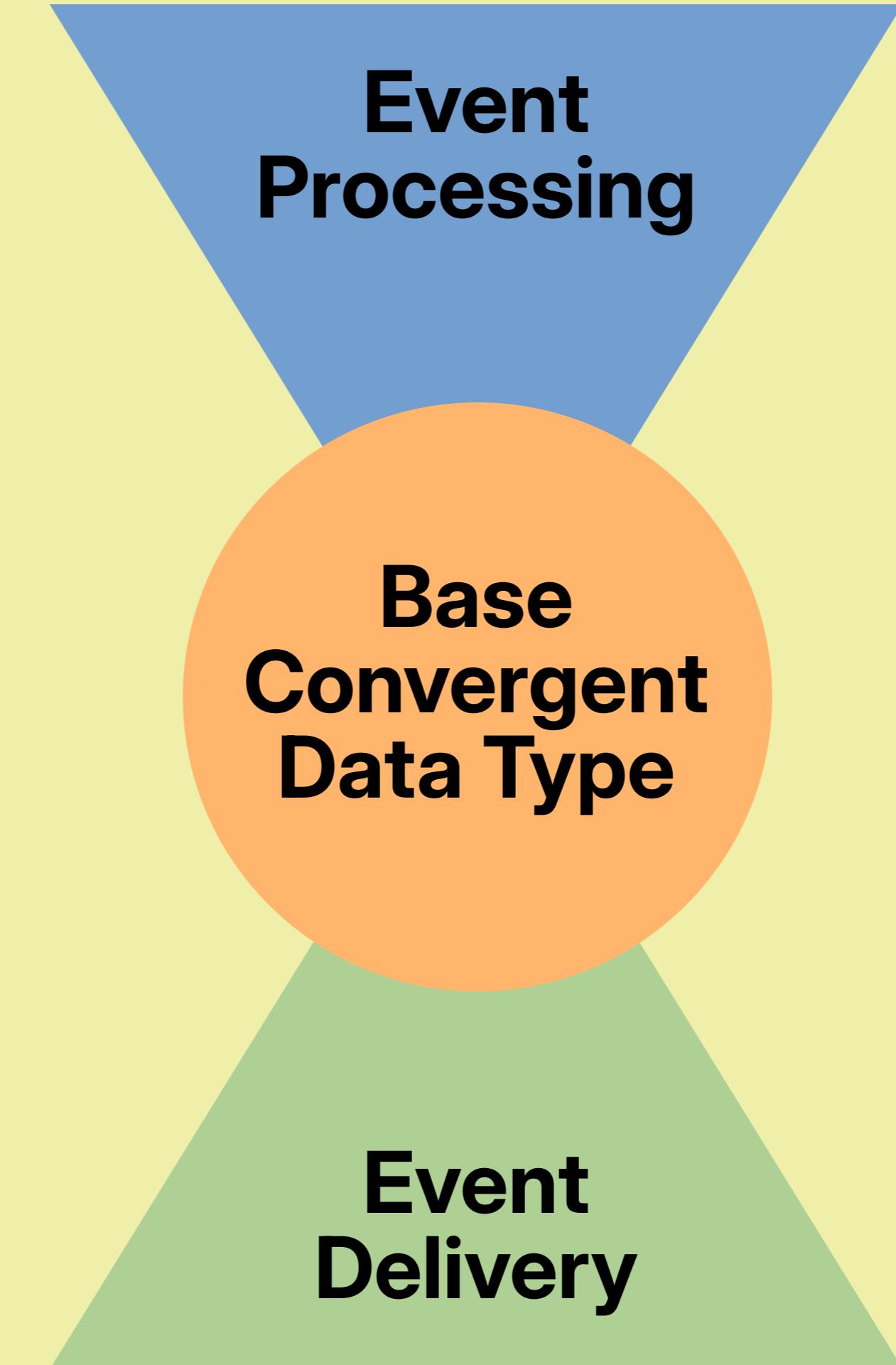


Federated, Decentralized or Both

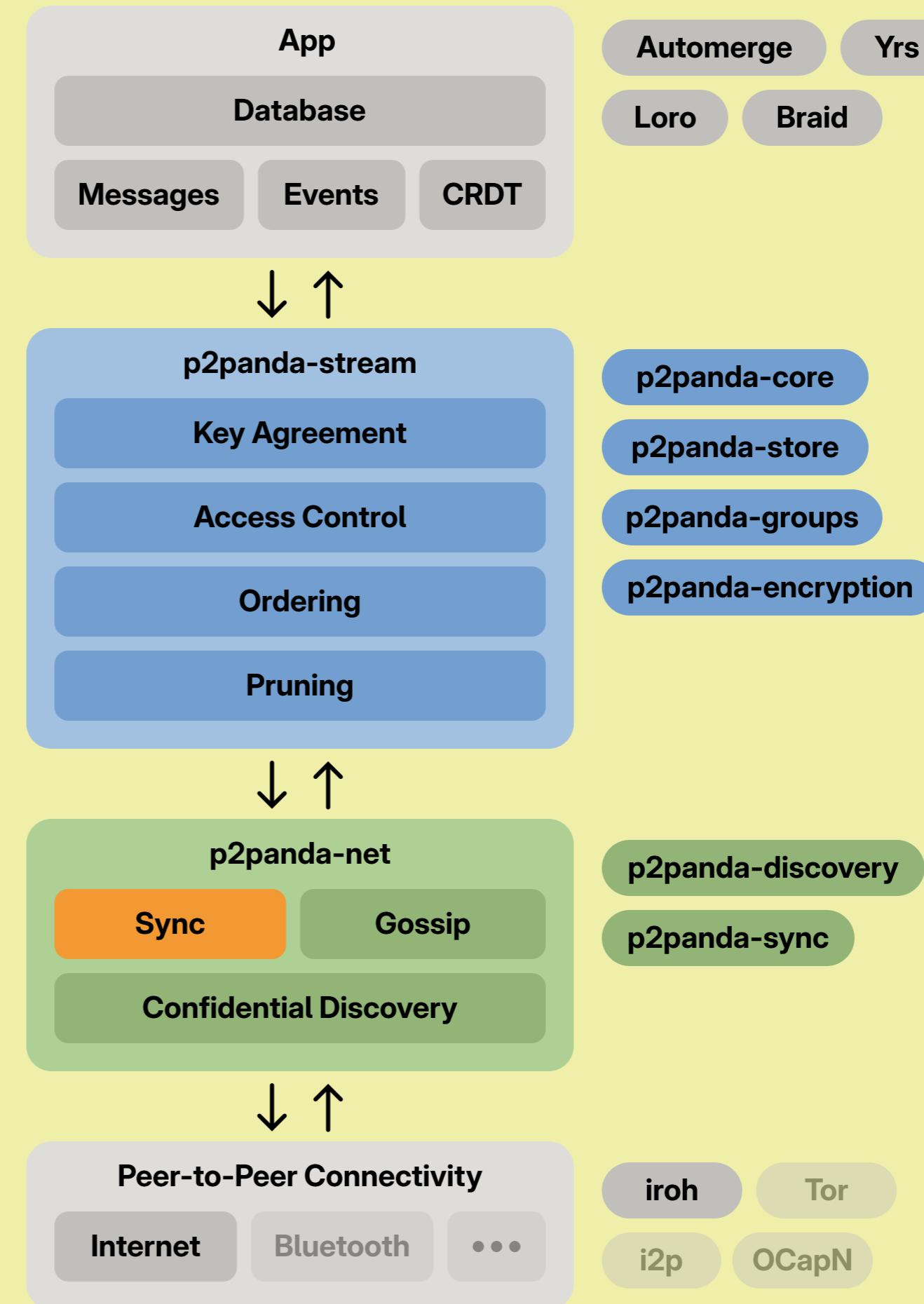
Post Internet



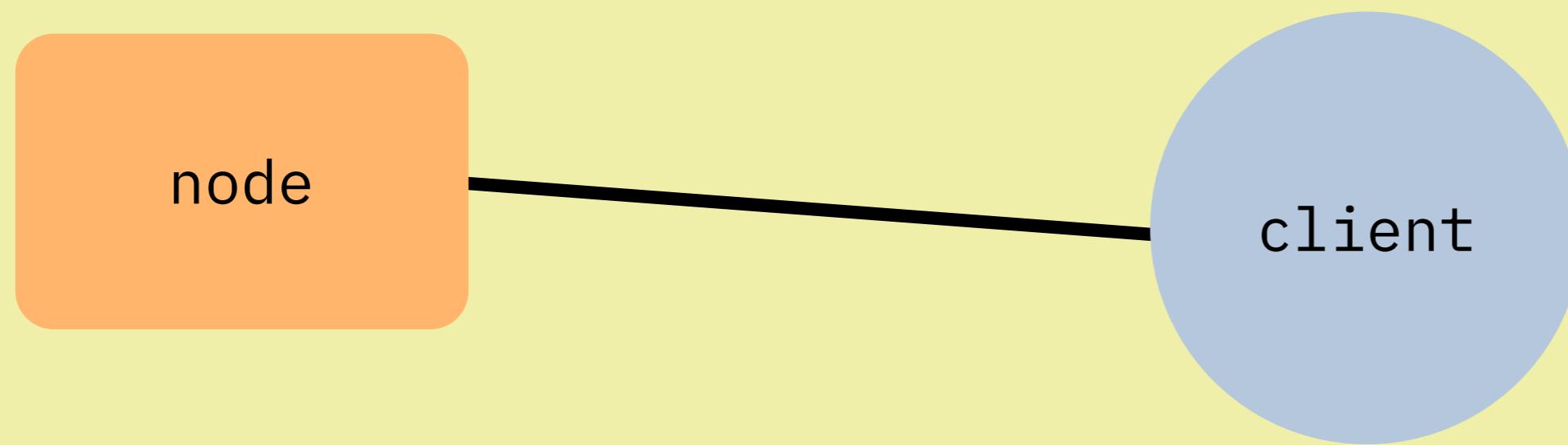
Walkaway Stack



p2panda Stack



High Level APIs



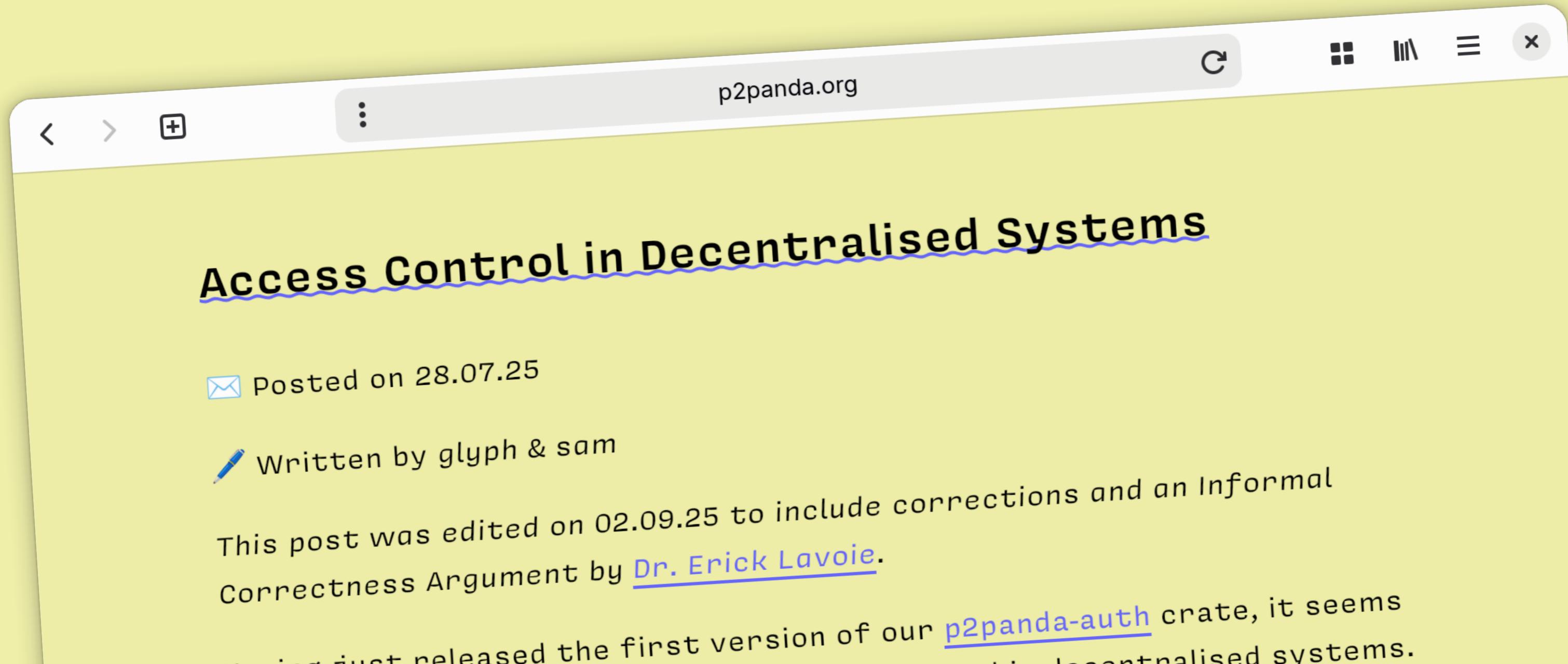
p2panda Node

- Publisher/subscriber pattern
- Eventually consistent
- “Scoped” event streams

p2panda Client

- Stateful stream consumers
- Composable event processors
- Crash resilience

Research Blog



Events

P2P Basel

P4P Unconference

DWeb Seminar

Walkaway Lectures

Collaborations

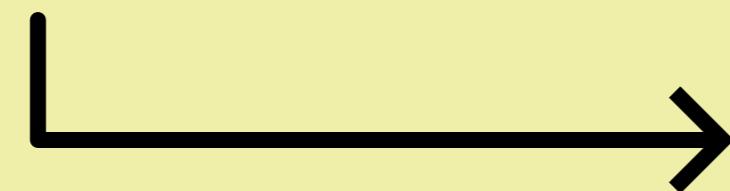
**Toolkitty
Dash Chat
Merri-bek Tech**



Putting it all together in a real app



Ecosystem of Local-First
GNOME Apps



Desktop Integration

ng The Ocean

er 29

unicorn, pig, beetle, crab, wh

cs

ow to communicate p2p threat mo
DG intents

local-first sync portal API

airphone 5 hacking

ersion control in non-programmi

cross-platform GTK

s

threat models

e advantages and risks compared

a is not all in one easy-to-compromised

your IP address is exposed to all peers

d to take care of data locally on your machine

of a problem in high-trust contexts

Reflection



Offline



Network



Green Sloth

This Device



Yellow Unicorn

Online



Blue Pig

Online



Silver Beetle

Online



Cyan Crab

Online



Pedo Whale



Reflection

Collaborative local-first
note taking

P PROTOTYPE
FUND

onnet
FOUNDATION

Today

**Native GTK
Local-First
Flathub Beta
macOS (experimental)**

Near Future

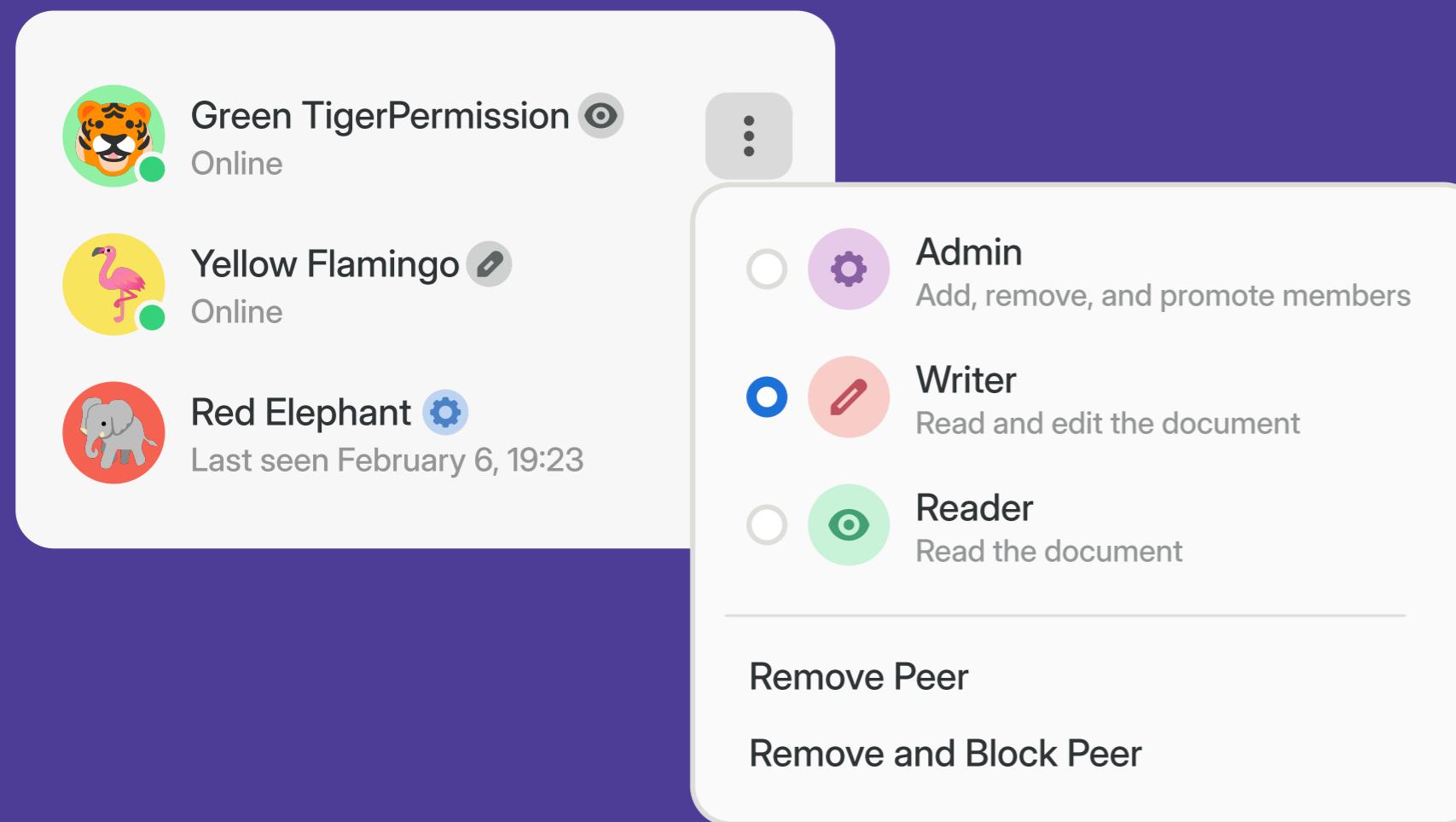
**Stability
User Testing
GObject Bindings
Documentation**

Reflection Developer Labs

Online
March 2026

User Interface Research

Permission Management

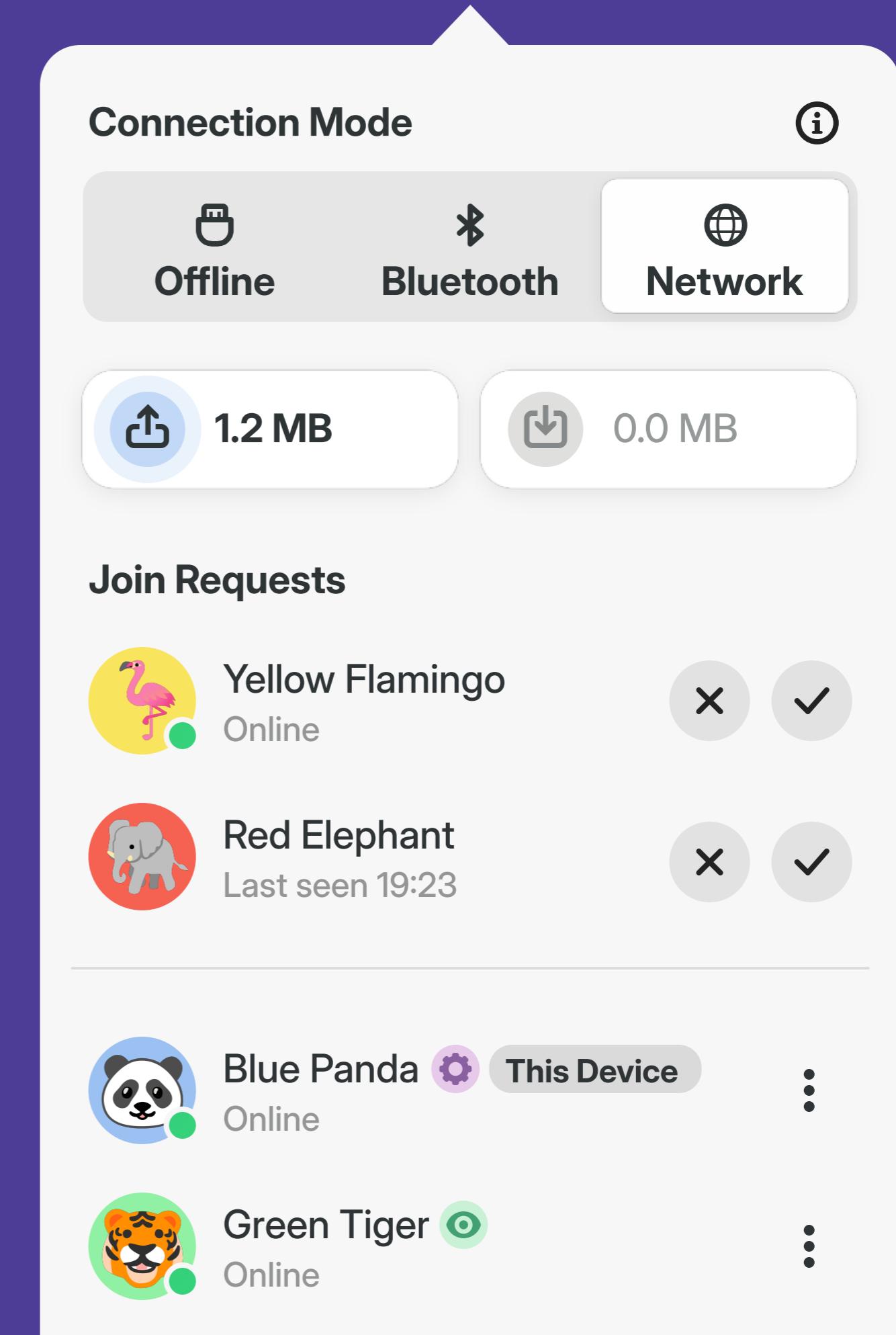


A screenshot of a mobile application interface showing a list of peers and their permissions. The peers listed are Green TigerPermission (Online), Yellow Flamingo (Online), and Red Elephant (Last seen February 6, 19:23). A context menu is open over the Red Elephant peer, displaying three permission levels: Admin, Writer, and Reader, each with a corresponding icon and a brief description. At the bottom of the menu are two buttons: 'Remove Peer' and 'Remove and Block Peer'.

- Green TigerPermission (Online)
- Yellow Flamingo (Online)
- Red Elephant (Last seen February 6, 19:23)
 - Admin: Add, remove, and promote members
 - Writer: Read and edit the document
 - Reader: Read the document

Remove Peer

Remove and Block Peer



A screenshot of a mobile application interface showing connection mode and join requests. At the top, there is a 'Connection Mode' section with three options: Offline (selected), Bluetooth, and Network. Below this are two status indicators: one for upload speed (1.2 MB) and one for download speed (0.0 MB). The main area is titled 'Join Requests' and lists three users:

- Yellow Flamingo (Online) with 'X' and checkmark buttons to accept/reject the request.
- Red Elephant (Last seen 19:23) with 'X' and checkmark buttons.
- Blue Panda (This Device Online) with a three-dot menu button.
- Green Tiger (Online) with a three-dot menu button.

Connection Mode

Offline Bluetooth Network

1.2 MB 0.0 MB

Join Requests

- Yellow Flamingo (Online)
- Red Elephant (Last seen 19:23)
- Blue Panda (This Device Online)
- Green Tiger (Online)

Revision Control

Latest Version

Local-first meetup

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliquam quaerat voluptatem. Ut enim aequae doleamus animo, cum corpore dolemus, fieri.

Dolor Sit

Ullus investigandi veri, nisi inveneris, et quaerendi defatigatio turpis est.

Cum esset accusata et vituperata ab Hortensio. Qtui liber cum et mortem contemnit, qua qui est imbutus quietus esse numquam potest. Praeterea bona praeterita grata recordatione renovata delectant. Est autem.

Qui Liber

Ullus investigandi veri, nisi inveneris, et

Revision History

+ 343 - 1.19K April 12, 20:39

Feb Mar Apr 12 Apr 19

Local-first meetup

Ullus investigandi veri, nisi inveneris, et quaerendi defatigatio turpis est.

Cum esset accusata et vituperata ab Hortensio. Qtui liber cum et mortem contemnit, qua qui est imbutus quietus esse numquam potest. Praeterea bona praeterita grata recordatione renovata delectant. Est autem.

Dolor Sit

Ullus investigandi veri, nisi inveneris, et

Qui Liber

Ullus investigandi veri, nisi inveneris, et

Zones



Spaces

| Space Name | Last Activity | Members | Actions |
|-------------------|-----------------|---------|---------|
| Design Team | ↓ 10 MB ↑ 34 MB | 8 | ⋮ |
| Boiling The Ocean | ↑ 22 MB | 22 | ⋮ |
| Alps Trip 2025 | | 3 | ⋮ |
| offline Book Club | | 36 | ⋮ |

+ Add



Design Team

Q Ⓜ

- Archive
- Blog Posts
- GNOME 50 Announcement
- Tips for Circle Apps
- GNOME Shell Ideas
- Introducing Test Ride
- Designing for Local-First
- TPM UX in GNOME OS
- Using Blender for Wallpapers
- Conference Talks
- Meeting Notes
- Meeting Chair Rotation

Design Team / Blog Posts / Designing ... ocal-First ⋮

Designing for Local-First

Lore ipsum dolor sit amet, do cupidatat qui laborum anim magna co
Voluptate laborum mollit dolor eu, laboris commodo ut nostrud ipsum
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Est quis quis enim in in. Nostrud eiusmod ex proident aliquip exercitat
esse id. Eu sunt tempor ea. Minim irure esse irure labore reprehenderi
esse do tempor.

Tempor deserunt nostrud eu mollit incididunt magna. Sint fugiat fugia
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dolor. Ipsum in quis aute. Sint sunt quis exercitation sunt cillum velit e
consectetur magna nulla consequat ea cupidatat. Nulla consectetur
sit est. Irure velit do eiusmod. Mollit incididunt voluptate nostrud non
Reprehenderit eu tempor exercitation eiusmod reprehenderit qui. Ad s
officia eiusmod culpa.

Most of this applies
to any app

Podium

☰

▶ | ▾

Podium

Local-First Collaboration

Demo Time

Local-First Collaborative Slides

Podium

These slides are being edited collaboratively by multiple people, and it even works without internet connection.

Local-First is dope

No gods, no servers

Demo time

Show off collaboration

Connection Mode

Offline Bluetooth Network

1.2 MB 0.0 MB

Blue Panda This Device
Online

Green Tiger
Online

Yellow Flamingo
Online

Local-First at the System Level



“Lazy” Identity

Key Management
Pet Name System
Multi-Device
Group Support

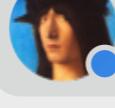


Save "Jan H" to Contacts

Add context for the new contact "Jan H" to prevent impersonation

Emoji:  How do you know them? **Boxing**

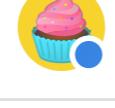
Save Contact

- Search Contacts... Y
- Recently Seen 6
-  Angela Avery You 2 devices • Online
 -  Marco 🏆 Pingpong 4 devices • Online
 -  Erzsébet 🎭 Amir 1 device • Online
 -  Jan H 🥊 Boxing 4 devices • Syncing
 -  Tuukka Katainen 🌱 Biology 1 device • Last seen Feb 1
 -  Sofia 🍉 Picnic 8 devices • Last seen Jan 22
 -  Amir Khan 🐔 France 2 devices • Last seen Jan 22
- +

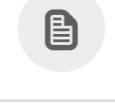
Contact Details

 **Jan H** 🥊 Boxing
4 devices • 4 shared documents
Syncing 2 devices

Devices

-  Green Pineapple 🍍 Directly Verified
Syncing ↑ 3.1 MB ↓ 1.6 MB
-  Yellow Cupcake
Syncing
-  Purple Watermelon
Online

Shared Documents

-  Local-first meetup
8 • Last updated 23:36 Admin
-  Design Meeting August 27
3 • Last updated August 28 Writer

Sync

**Sync Any Data
Manage Access
Support Nodes**

Support Nodes

Manage Support Nodes

Ensure your devices are always in sync by adding an always-online Support Node. These serve as an encrypted data backup and ensure sync works even if other devices are offline.

They can not see your data, but they can see your device's IP address and approximate location.

p2relay relay.p2panda.org

5/10 devices connected • Expires in 8 months



Anticloud ff783b40

2 devices connected



Compost Party bba3405e

Offline



+ Add Support Node



Blue Panda This Device

Online



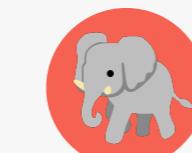
Green Tiger

Online



Yellow Flamingo

Online



Red Elephant

Last seen February 6, 19:23

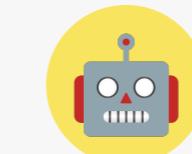


Support Nodes



p2relay relay.p2panda.org

Online



Anticloud ff783b40

Last seen 20:50



Multi-Transport

Internet
Bluetooth LE
USB Stick

Prototype as part of
NLnet grant

A vibrant, impressionistic-style painting of a landscape. In the foreground, several people are mounted on horses, appearing to be in motion. The middle ground shows rolling hills and fields with small clusters of trees and houses. In the background, a town with several buildings is nestled among hills under a bright sky.

**Now's the time to
get involved!**

February 13–15
Berlin

Boiling the ocean IX

**Peer-to-Peer Identity and
the Walkaway Stack**

Thanks



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modal.cx

hi@modal.cx