

DECENTRALIZED SOCIAL NETWORKS

PROS AND CONS OF THE MASTODON PLATFORM

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18 04 2020

We see a lot of the same
problems on social networks,
trolling, spam, deplatforming,
changing terms of service...

Under the hood, these networks
are all very similar,
and so end up with the same
problems.

Is this the only way to build
social networks?

OUTLINE

- What is Mastodon?
 - ▶ Decentralization
 - ▶ Federation
- What makes it different?
 - ▶ Benefits
 - ▶ Differences
 - ▶ Drawbacks
 - ▶ Mitigation
- What have we learned?

WHAT IS MASTODON?

Mastodon is

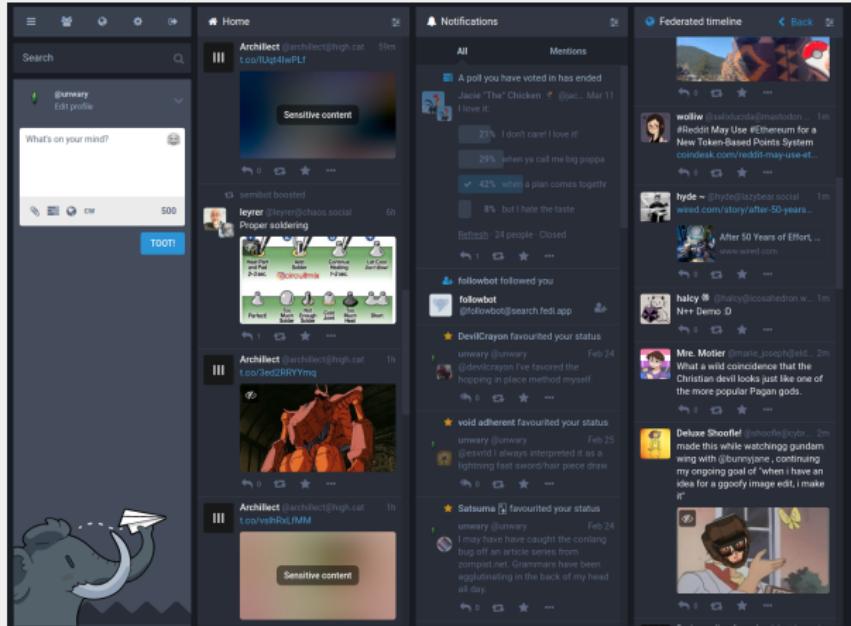
- A social network
- Open source
- Decentralized & Federated
- Compatible with W3C standards [1]



WHAT IS MASTODON?

Here we see from left to right

- The toot editor
- The toots from those I follow
- Notifications
- The federated timeline



DECENTRALIZATION: NOBODIES IN CHARGE HERE

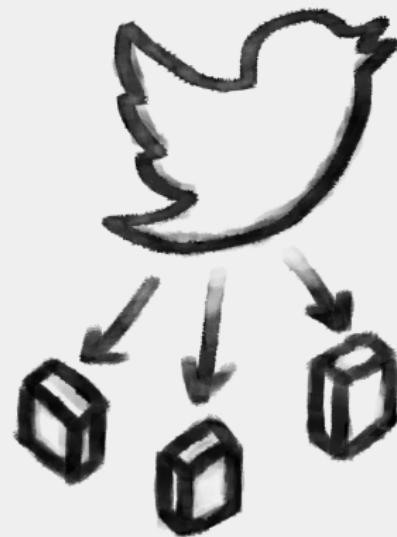
DECENTRALIZATION



Let's start with Twitter

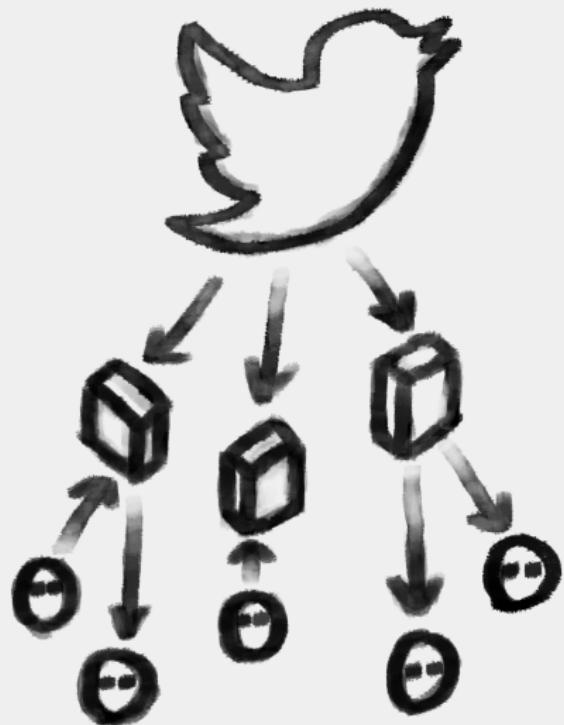
DECENTRALIZATION

Twitter Inc. runs the servers that run Twitter



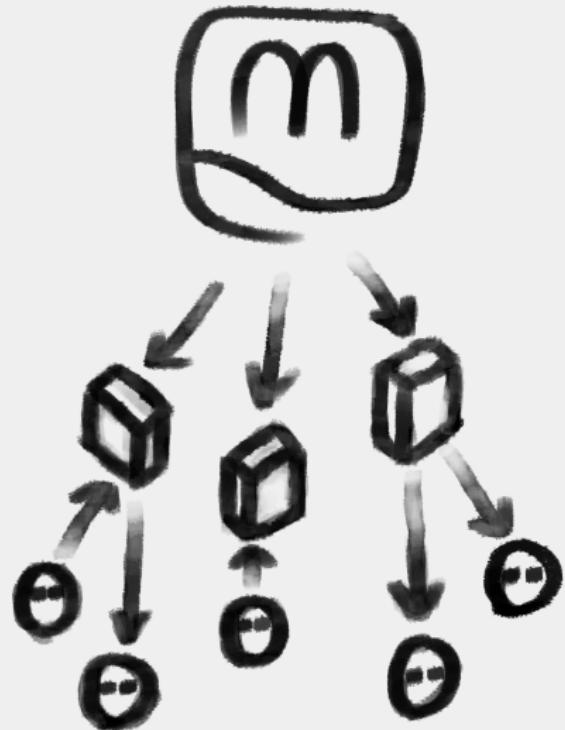
DECENTRALIZATION

Users connect to those servers, and post their tweets, read their feeds, etc.



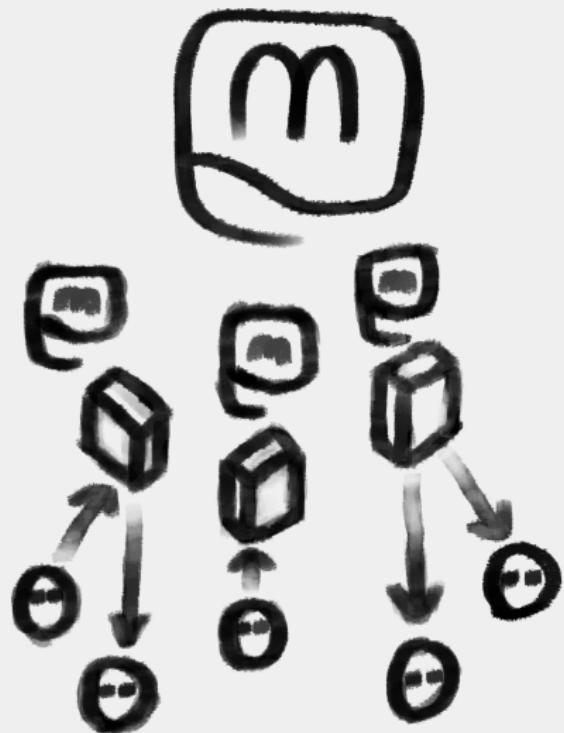
DECENTRALIZATION

In Mastodon, things are different



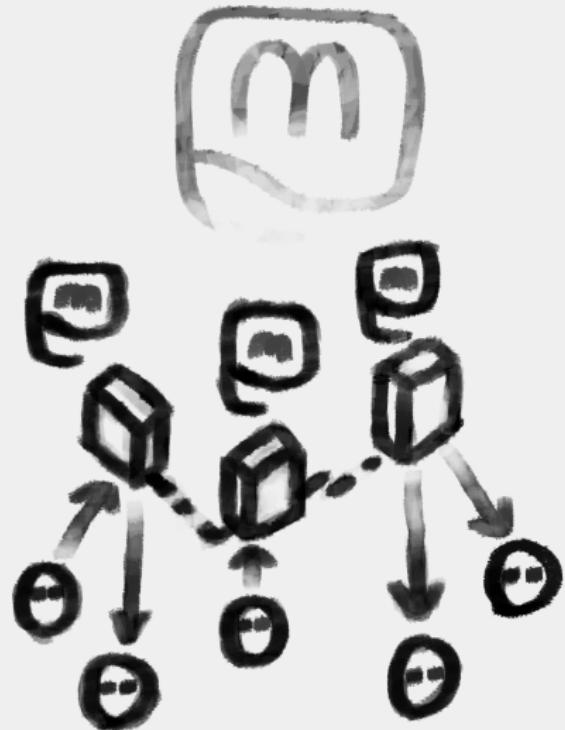
DECENTRALIZATION

Each server independently runs Mastodon software



DECENTRALIZATION

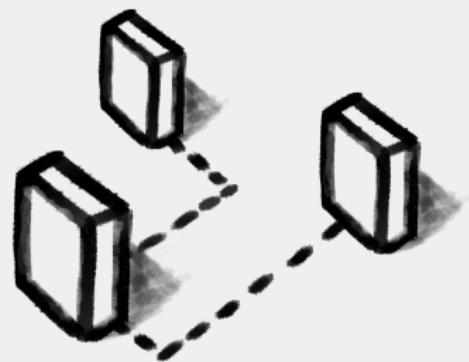
Servers interconnect to handle requests, and don't need a central authority



FEDERATION: MORE THAN THE SUM OF ITS PARTS

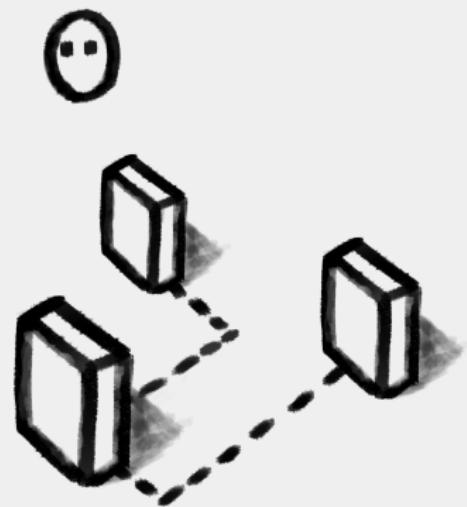
FEDERATION

We have three Mastodon servers, and some are already connected



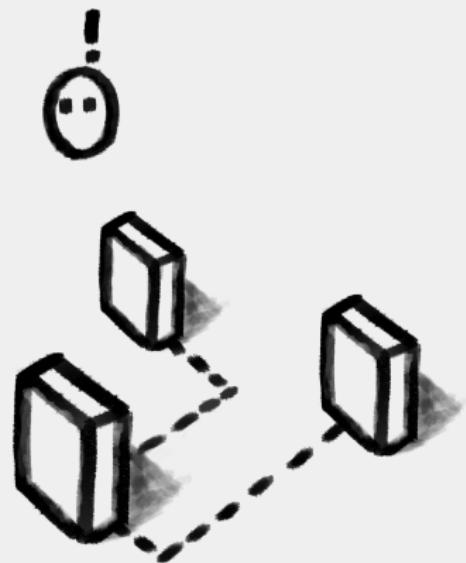
FEDERATION

Alice is a user on the first server.



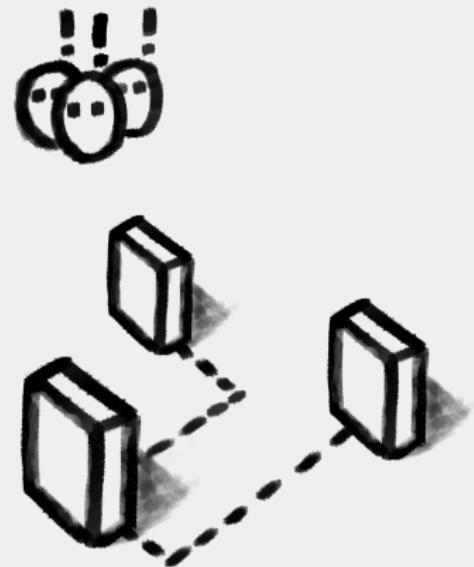
FEDERATION

She posts a public message.



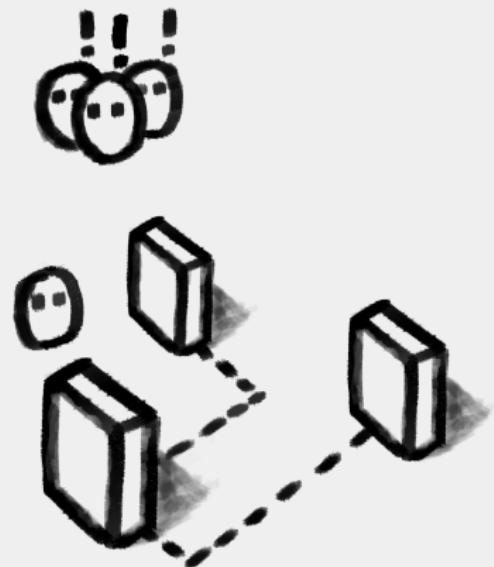
FEDERATION

As a local, public message,
everyone on her server sees it.



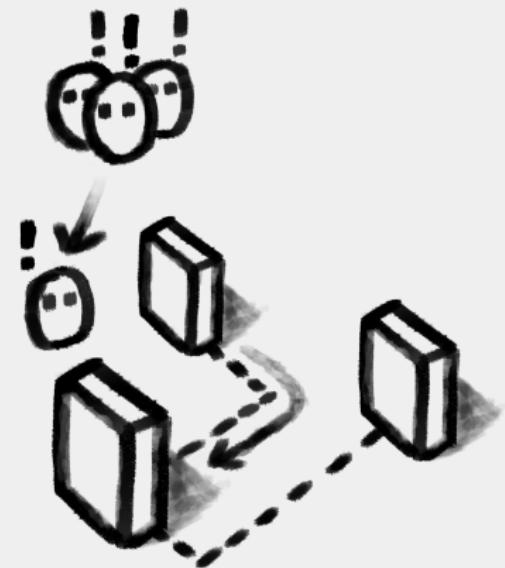
FEDERATION

Bob is a user on a different server than Alice.



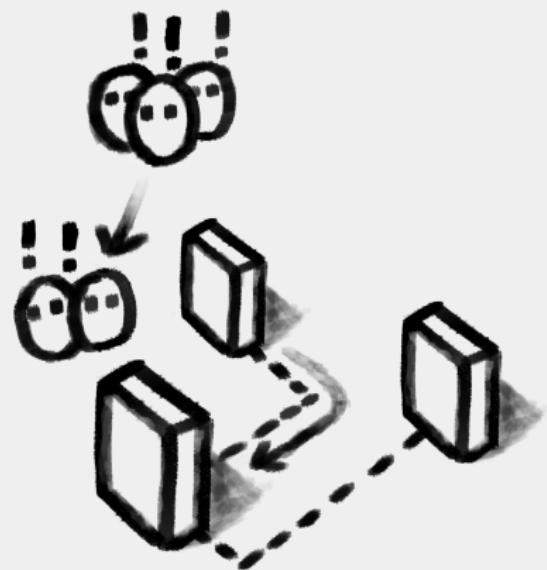
FEDERATION

As Bob is a follower of Alice,
Alice's server sends his server a
copy of her public message.



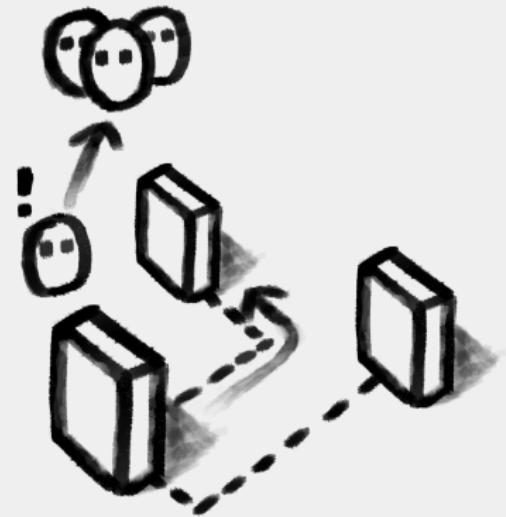
FEDERATION

All the other users in Bob's server see a copy of Alice's public message in their federated timelines.



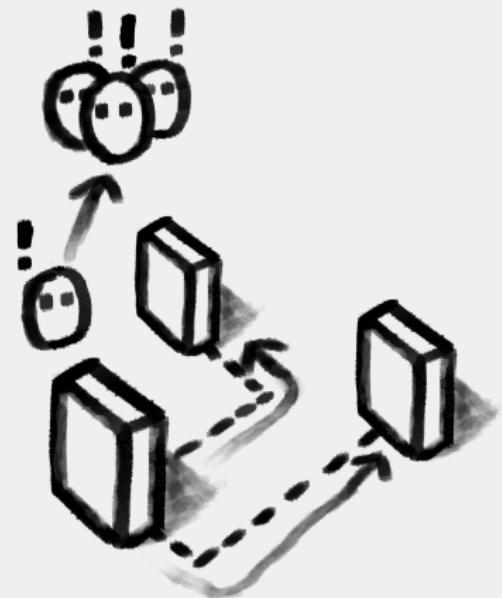
FEDERATION

Bob publicly posts a reply to Alice's message.



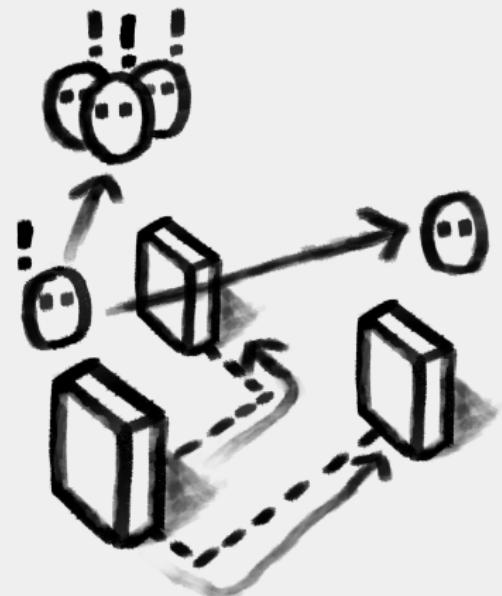
FEDERATION

Bob's public response goes out to all his followers.



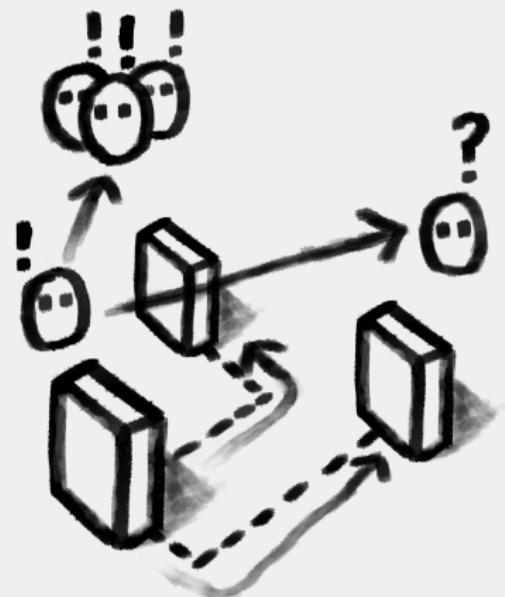
FEDERATION

Charlie is a follower of Bob, so his server gets sent a copy, and it's shown to him.



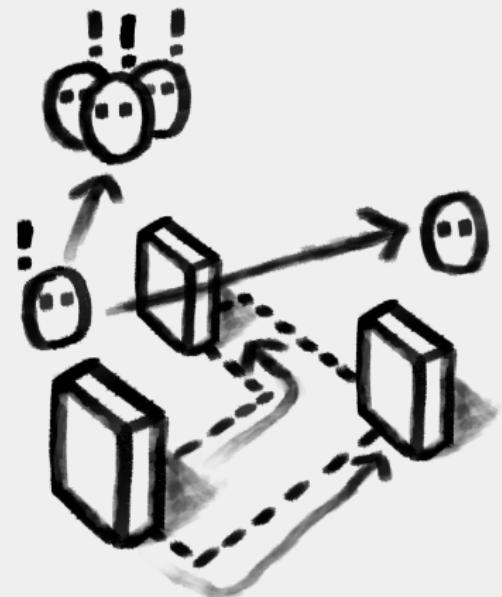
FEDERATION

Charlie however, has never heard of Alice.



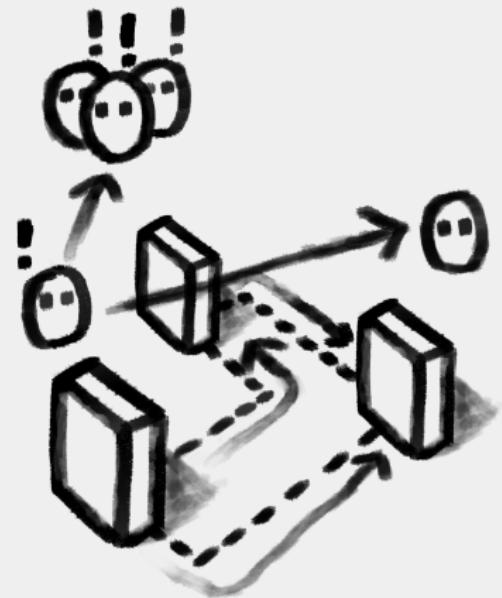
FEDERATION

Behind the scenes, Charlie's server opens a connection to Alice's.



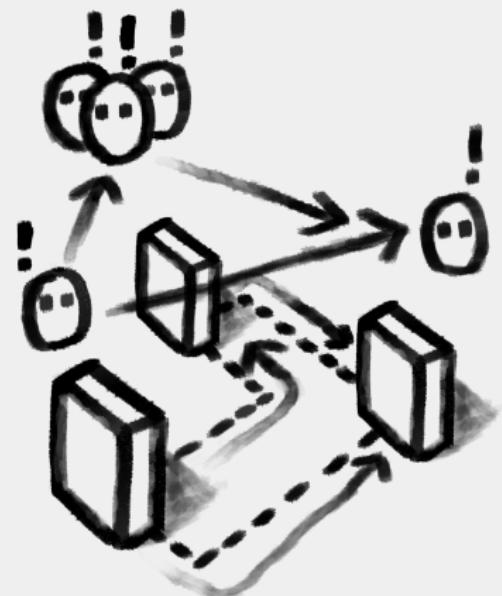
FEDERATION

It asks for Alice initial post by ID.



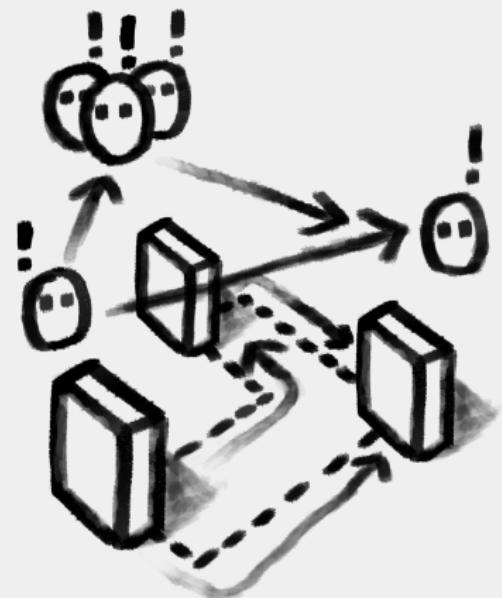
FEDERATION

Charlie can now see Alice's post,
direct from her server.



FEDERATION

Charlies enjoys Alice's post, and becomes a follower of hers. Their two servers work to maintain the connection in the future.

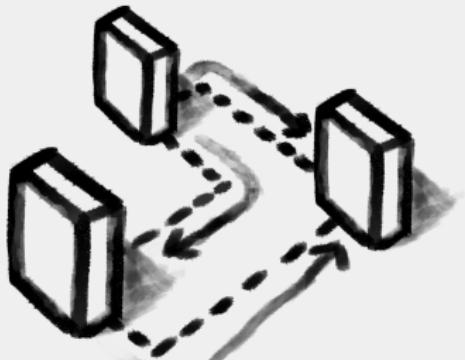


The takeaway:

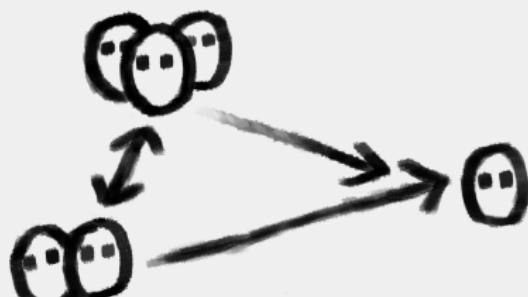
Mastodon operates on two intertwined layers.

FEDERATION

The network graph, directly driven by the users social actions.



The social graph, shaped in subtle ways by the network graph that underpins it.

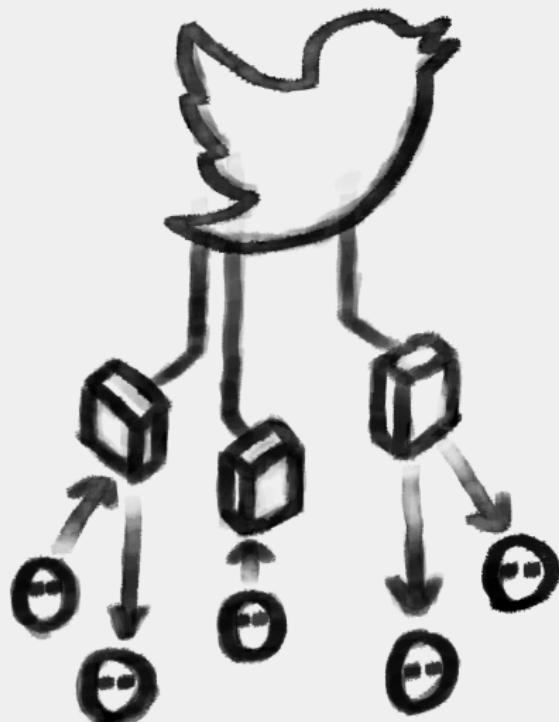


BENEFITS: TRIUMPH OF THE COMMONS

BENEFITS: A PUBLIC SPACE

Twitter isn't a public space [2]

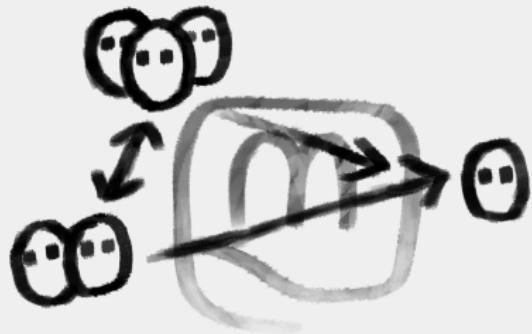
- Run for profit
- Geared towards engagement
- Monitors and controls



BENEFITS: A PUBLIC SPACE

Mastodon gets closer to a public space

- Open source
- Network of independents
- Not predicated on profit



BENEFITS: DIVERSITY

Mastodon supports a diverse set of communities

- Instances are independent
- No need for one-size-fits-all moderation
- Instances can specialize if they wish

BENEFITS: PRIVACY

Mastodon encourages good privacy

- Explicit and incremental setting for toots
- No singular group in charge of all data
- Host your own server for maximum control

DIFFERENCES: WHEN IN ROME...

DIFFERENCES: TOPIC

Different instance can declare their topics of interest



[3]

DIFFERENCES: TOPIC

Some topics have many smaller servers focused on them

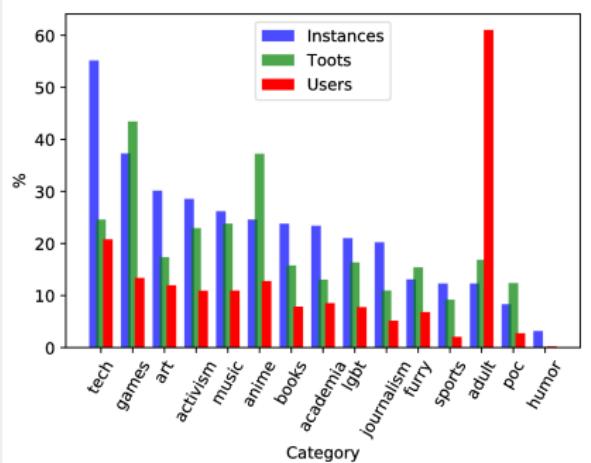
- General
- Journalism

Other topics have fewer servers, but more users in them

- Gaming
- Anime

DIFFERENCES: TOPIC

Breaking it down by category



[4]

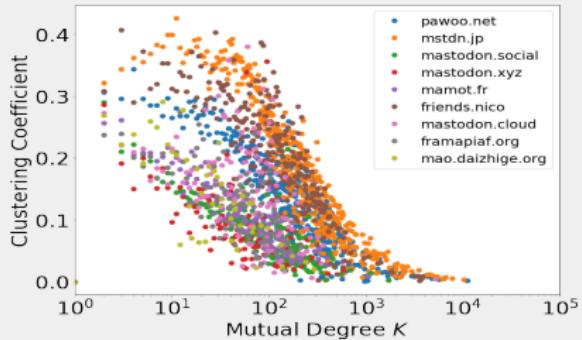
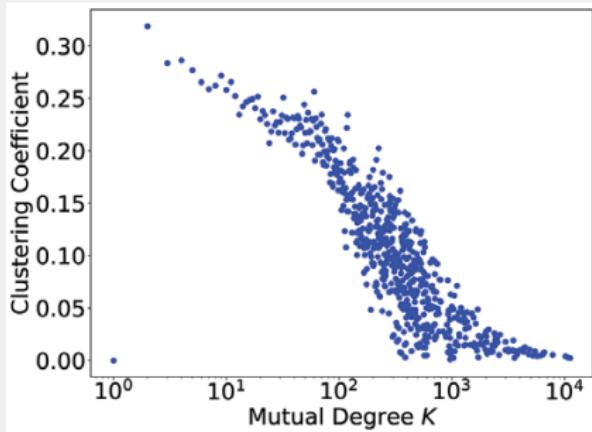
DIFFERENCES: CLUSTERING

Users also show differing behavior patterns in different instances

- Following users on same instance
- Following users on different instances
- Following someone back

DIFFERENCES: CLUSTERING

How clustered users are across the whole network, versus on the four biggest instances



DIFFERENCES: NATIONALITY

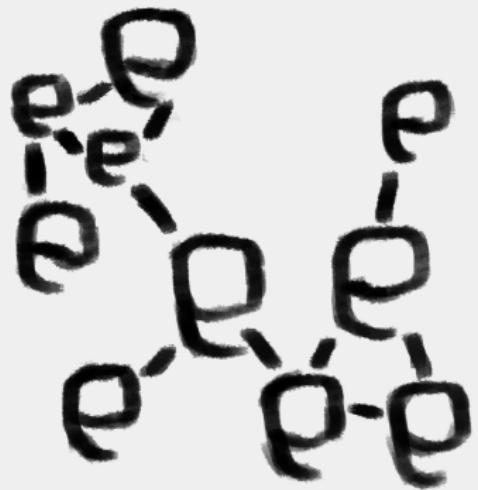
Users overwhelmingly connect to users in the same country [4]

DRAWBACKS:

DIVIDED WE STAND...

DRAWBACKS

A healthy Mastodon network



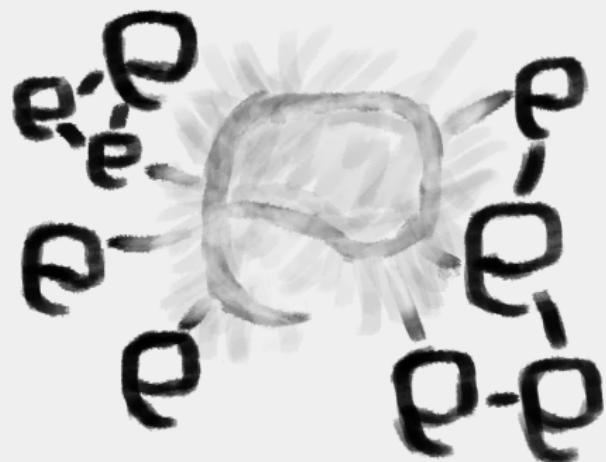
DRAWBACKS

One node gains unbalanced prominence



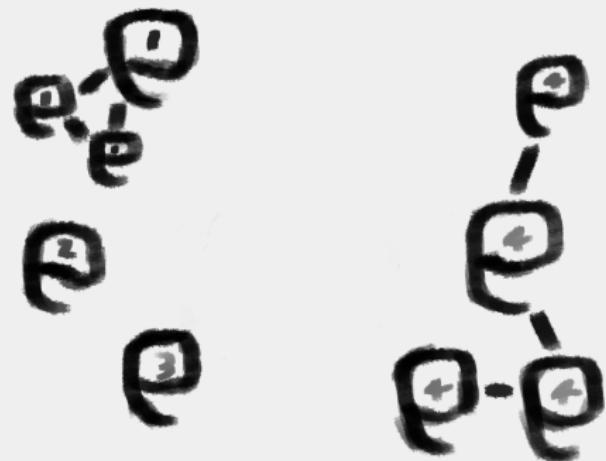
DRAWBACKS

If that node fails, the network is damaged



DRAWBACKS

- 1s are strongly interconnected
- 2 is isolated
- 3 is also isolated
- 4s are the largest group, but weakly connected



DRAWBACKS

There are many ways towards failure

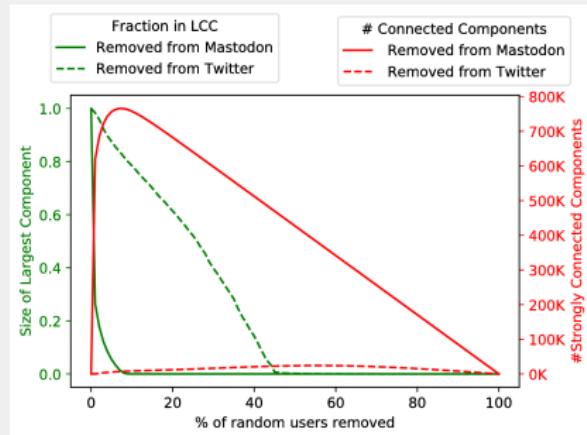
- Celebrity Users
- Large Instances
- Unstable Servers
- Common Infrastructure

DRAWBACKS: USER ABANDONMENT

Users find each other, through
users

DRAWBACKS: USER ABANDONMENT

Users find each other, through
users



[4]

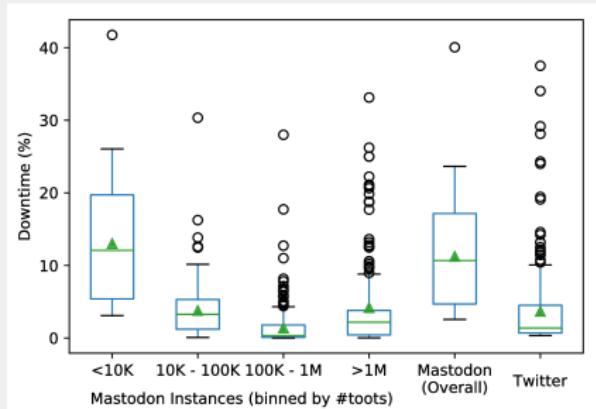
DRAWBACKS: LARGE INSTANCES

Massive servers have undue influence

10% of servers host 52% of all users[4]

DRAWBACKS: UNRELIABLE SERVERS

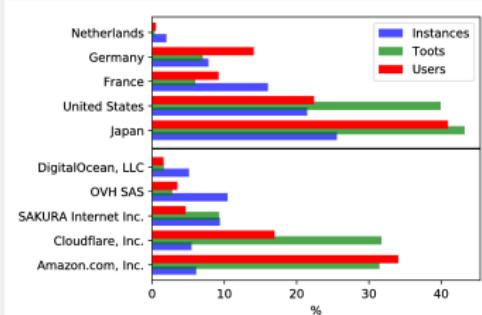
A robust network tends to be imperfect



[4]

DRAWBACKS: COMMON INFRASTRUCTURE

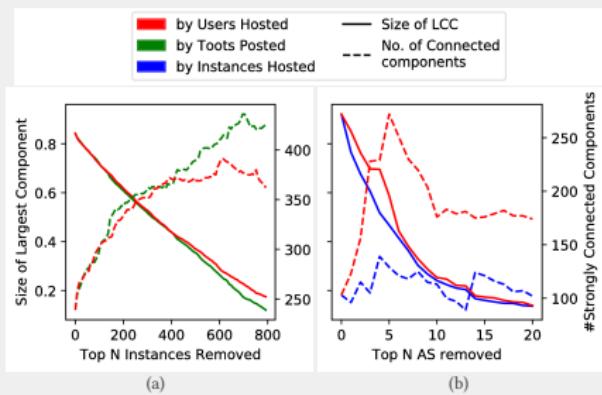
Mastodon servers are often run as cheaply as possible



[4]

DRAWBACKS: COMMON INFRASTRUCTURE

Anything that effects many, many servers is concerning



[4]

MITIGATION:
AS LONG AS ONE STILL STANDS...

MITIGATION: REPLICATION

Replication has copies of every message that get saved to other servers

MITIGATION: REPLICATION

Subscription based replication stores copies of subscribed messages on subscribers servers

MITIGATION: REPLICATION

Removing the top ten servers by toots loses 62.69% of all toots

The same scenario with subscription replication loses only 2.1%

MITIGATION: REPLICATION

There are downsides

- 23% of toots have 10+ replicas
- 9.7% of toots have none

MITIGATION: REPLICATION

Randomized replication places the copies on random servers, to avoid clustering

MITIGATION: REPLICATION

Removing the top 25 servers by number of toots loses 5% of all toots

The same scenario with a single random replication loses only 0.8%

MITIGATION: REPLICATION

Still have downsides

- Need a common index of all instances
- Potential for abuse
- Hosting random data on behalf of others

CONCLUSIONS: THEORY MEETS PRACTICE

CONCLUSIONS

Mastodon offers a public space, with a diverse set of communities, and mechanisms to protect that diversity.

CONCLUSIONS

Although these are serious scenarios, they are hypothetical at present.

Mastodon is growing steadily, with over a million users, and eight hundred contributors. [5]

CONCLUSIONS

Questions?



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Charlot is interested in making technology that is fundamentally equitable, and belongs to the users. This includes open source, indie and distributed web technology.

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