

DECENTRALIZED SOCIAL NETWORKS

PROS AND CONS OF THE MASTODON PLATFORM

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WHAT IS MASTODON?

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

WHAT IS MASTODON?

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

WHAT IS MASTODON?

Is this the only way to build social networks?

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

WHAT IS MASTODON?

Mastodon is

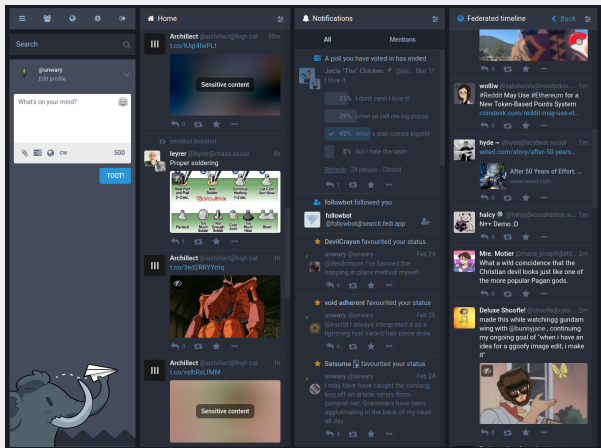
- A social network
- Open source
- Decentralized & Federated
- Compatible with W3C standards [1]



WHAT IS MASTODON?

Here we see from left to right

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



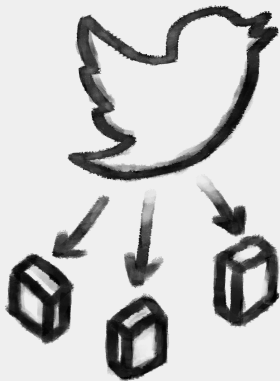
**DECENTRALIZATION:
NOBODIES IN CHARGE HERE**



Let's start with Twitter

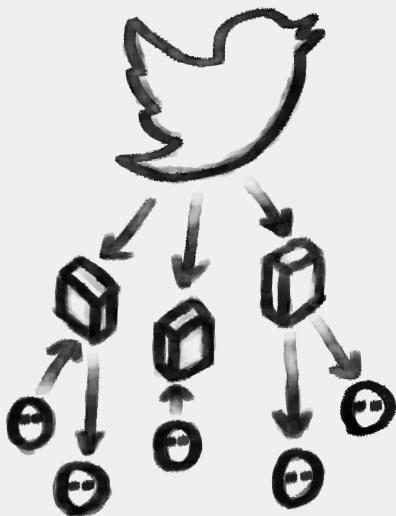
DECENTRALIZATION

Twitter Inc. runs the servers that run Twitter



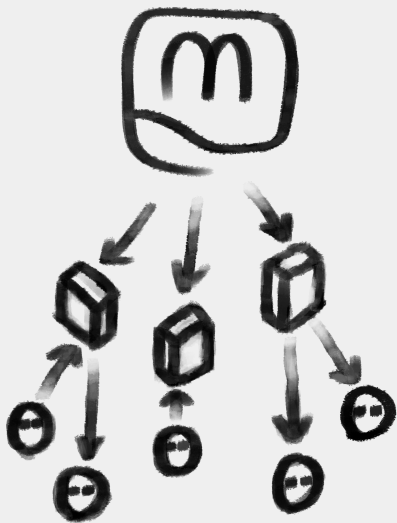
DECENTRALIZATION

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



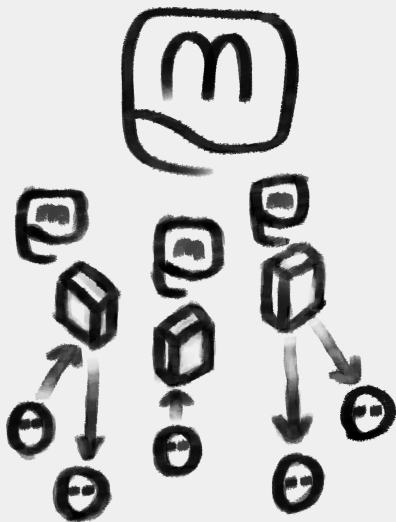
DECENTRALIZATION

In Mastodon, things are different



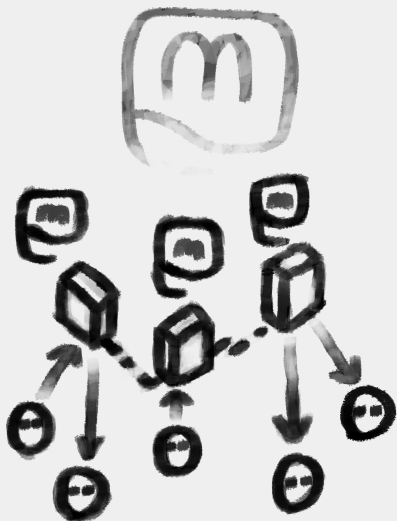
DECENTRALIZATION

Each server independently runs Mastodon software



DECENTRALIZATION

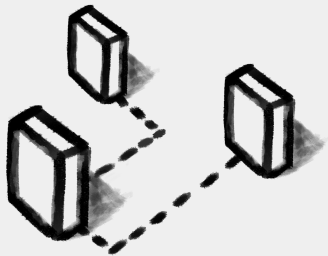
Servers interconnect to handle requests, and don't need a central authority



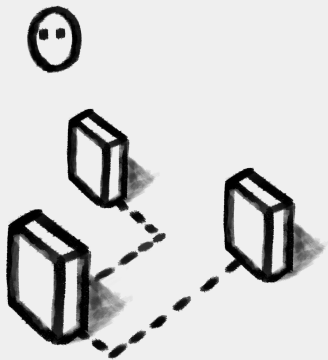
**FEDERATION:
MORE THAN THE SUM OF ITS PARTS**

FEDERATION

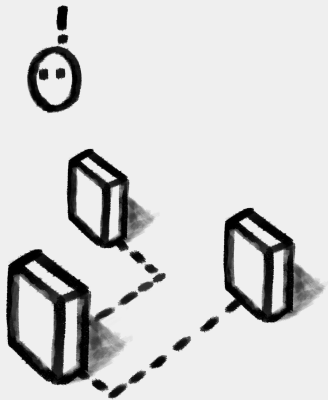
We have three Mastodon servers, and some are already connected



Alice is a user on the first server.

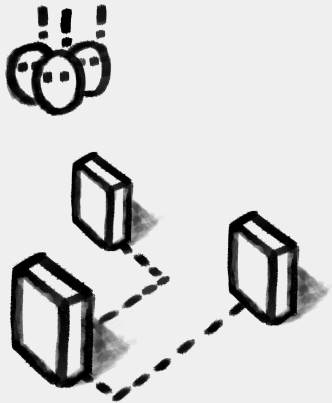


She posts a public message.



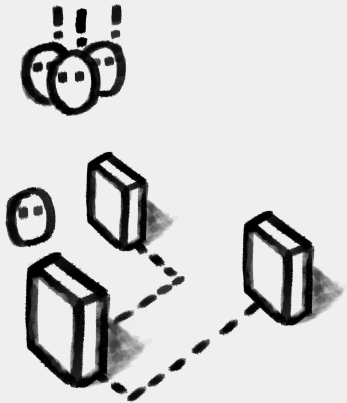
FEDERATION

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



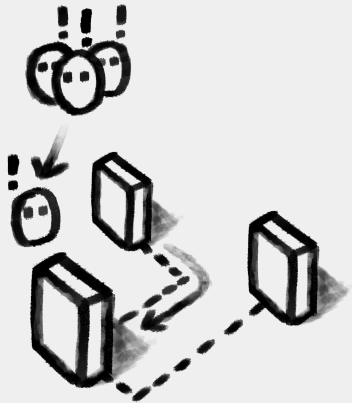
FEDERATION

Bob is a user on a different server than Alice.



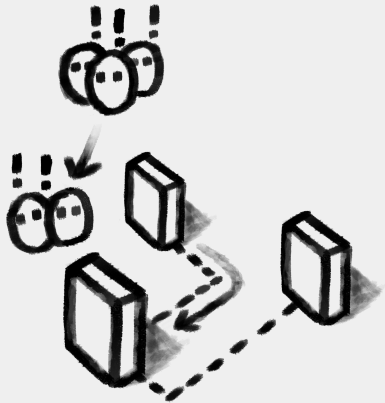
FEDERATION

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

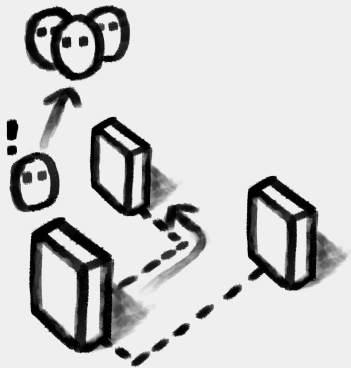


FEDERATION

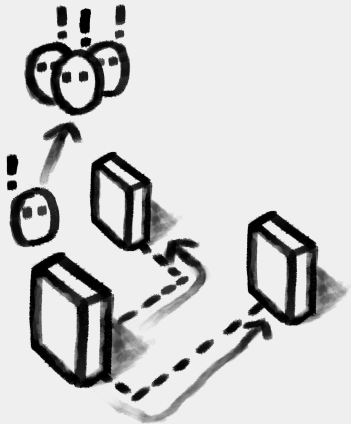
All the other users in Bob's server see a copy of Alice's public message in their federated timelines.



Bob publicly posts a reply to Alice's message.

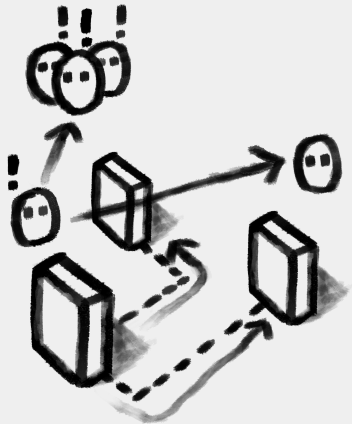


Bob's public response goes out to all his followers.



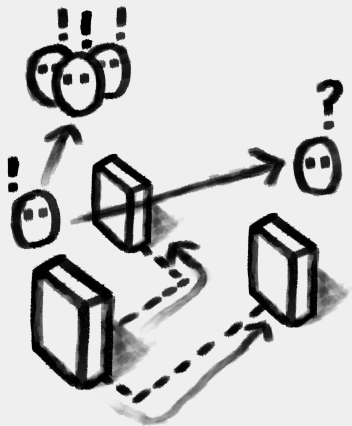
FEDERATION

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



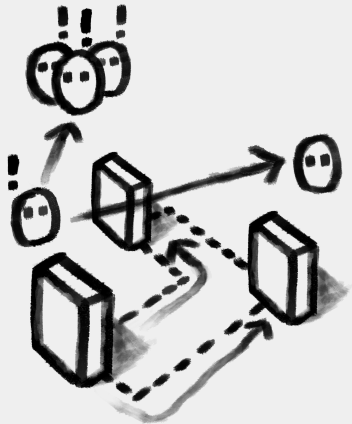
FEDERATION

Charlie however, has never heard of Alice.



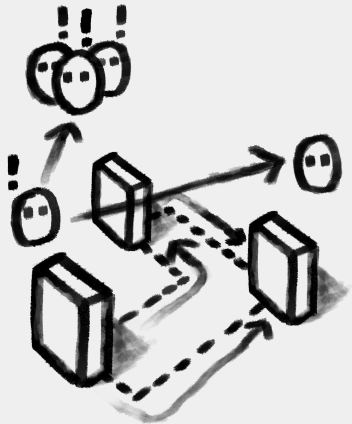
FEDERATION

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



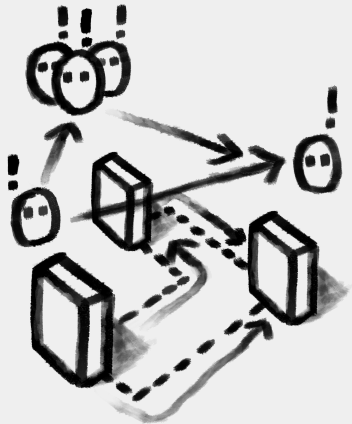
FEDERATION

It asks for Alice initial post by ID.



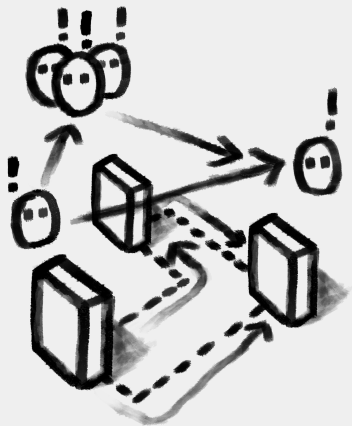
FEDERATION

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.

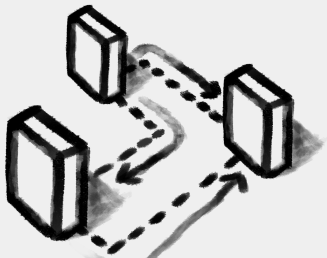


The takeaway:

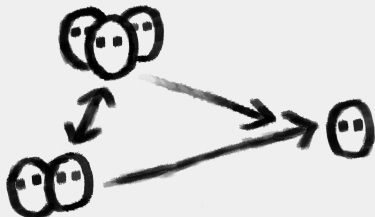
Mastodon operates on two intertwined layers.

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.

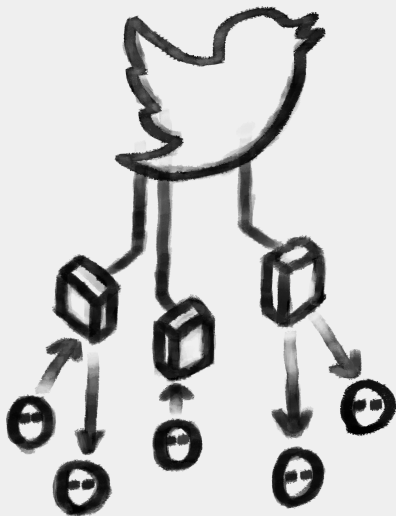


**BENEFITS:
TRIUMPH OF THE COMMONS**

BENEFITS: A PUBLIC SPACE

Twitter isn't a public space [2]

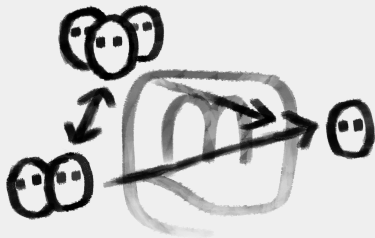
- Run for profit
- Geared towards engagement
- Monitors and controls



BENEFITS: A PUBLIC SPACE

Mastodon gets closer to a public space

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



Mastodon supports a diverse set of communities

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

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...

Some topics have many smaller servers focused on them

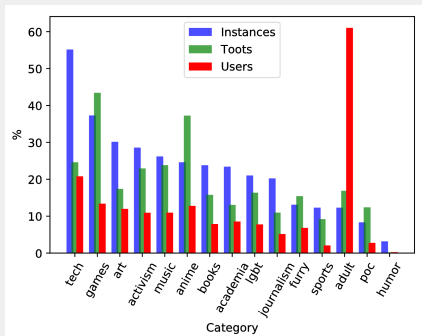
- General
- Journalism

Other topics have fewer servers, but more users in them

- Gaming
- Anime

DIFFERENCES: TOPIC

Breaking it down by category



[4]

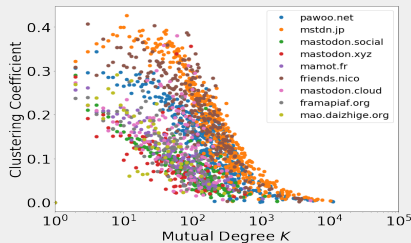
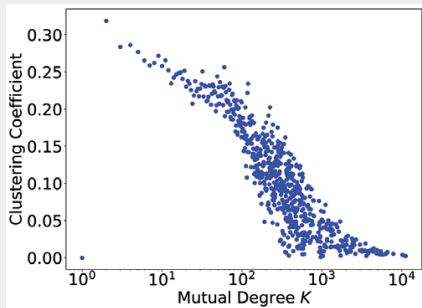
DIFFERENCES: CLUSTERING

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

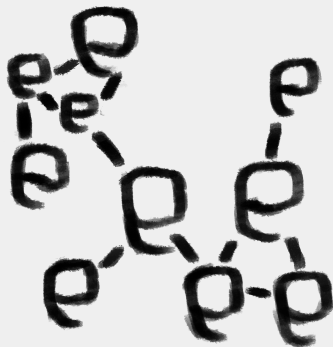


Users overwhelmingly connect to users in the same country [4]

**DRAWBACKS:
DIVIDED WE STAND...**

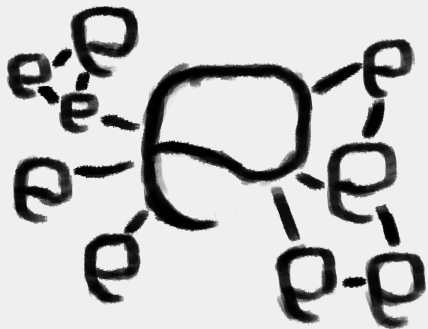
DRAWBACKS

A healthy Mastodon network



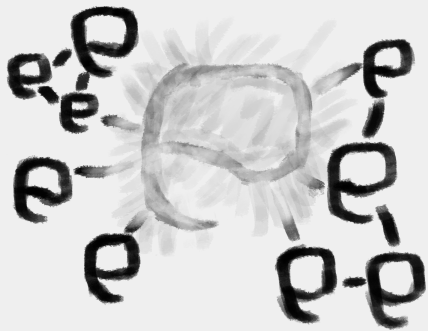
DRAWBACKS

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



There are many ways towards failure

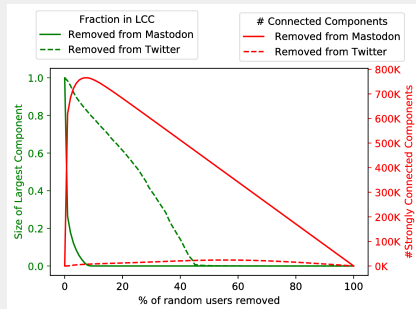
- Celebrity Users
- Large Instances
- Unstable Servers
- Common Infrastructure

DRAWBACKS: USER ABANDONMENT

Users find each other, through users

DRAWBACKS: USER ABANDONMENT

Users find each other, through users



[4]

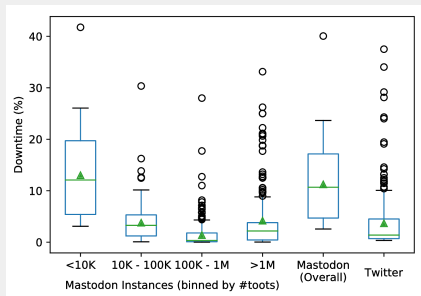
DRAWBACKS: LARGE INSTANCES

Massive servers have undue influence

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

DRAWBACKS: UNRELIABLE SERVERS

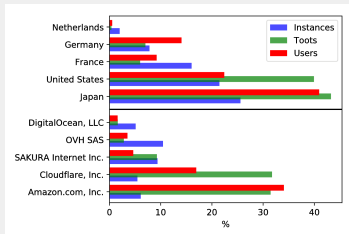
A robust network tends to be imperfect



[4]

DRAWBACKS: COMMON INFRASTRUCTURE

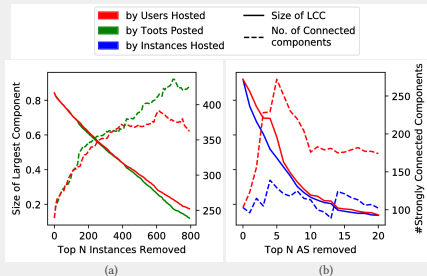
Mastodon servers are often run as cheaply as possible



[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

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%

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%

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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