Challenges in the Decentralised Web

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It’s damn hard to decentralise the web
“A push towards decentralization...in the end, [became] an extension of centralization”
How did the web work?

• More symmetrical power structures?
• More resilient?
• No central points of failure?
• Superior privacy?
How *does* the web work?

- Critical mass of user?
- Orchestrated deployments?
- Economies of scale?
Can we get the best of both worlds?!
The “Decentralised Web” has many open-source implementations.

Federated versions of popular services like Facebook, Twitter and YouTube.
How does Mastodon work?
Great!!!
We have decentralised!

No you’ve not!
Let’s measure Mastodon!

- Around 4K servers (aka “instances”)
- 67M Mastodon tweets (aka “toots”)

- What pressures towards centralisation exist?
Found a growing system!

- Helped along by things like the #DeleteFacebook campaign
Let’s go through a thought experiment...
Where would you host your server?!

Half of users are reliant on just 3 networks!

...and 2/3 of content
Which instance would you join?!

90% of users join top 5% of the instances

Top 5% of instances have 95% of content!
But at least decentralised == reliable, right?
Hmmm, not quite...

11% instances inaccessible for half of time

Only 5% have 99.5%+ uptime
Hmmm, not quite...

11% instances inaccessible for half of time

...still has central dependencies!

6 entire network outages

85% of instances use one Certificate Authority
And you folks don’t help with this
Who you gonna follow?

The top 5% accumulate the majority of followers

What if Grumpy Cat’s server goes offline?!
And this is more complicated than it looks
And this is more complicated than it looks
This isn’t localised! It can be very damaging!

Most instances depend on ‘foreign’ content
Let’s test this...

- Removing top 1% of **accounts** decreases the LCC to 26.38%
- Removing the top 5 **Ases** shatters the social graph into 272 components
And what happens to the content?
And what happens to the content?
How can we improve this?

Random replication achieves 99% availability
It’s damn hard to decentralise the web!