



IPFS - The Practical Bits

Cody Zuschlag

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Cody Zuschlag

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University Instructor @ Université Savoie Mont Blanc

Annecy, France



InterPlanetary File System



Storage

69

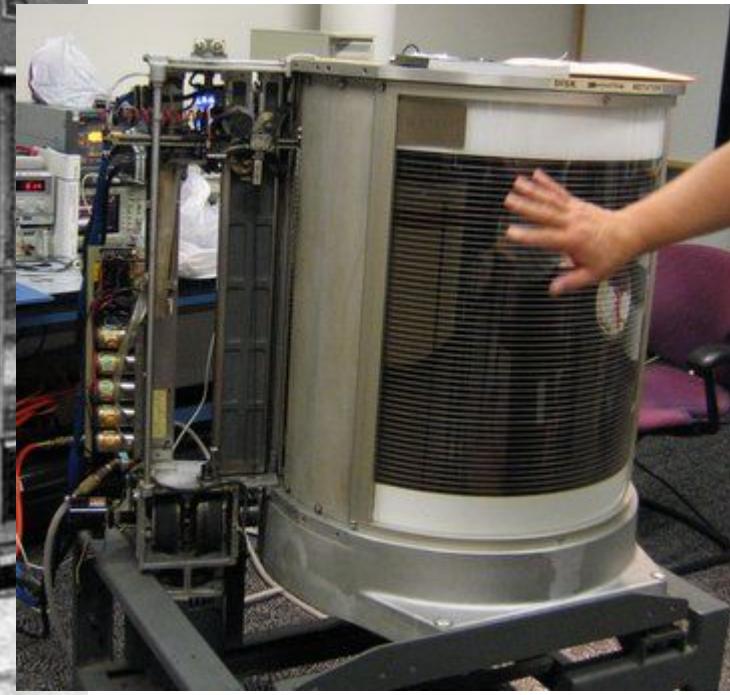
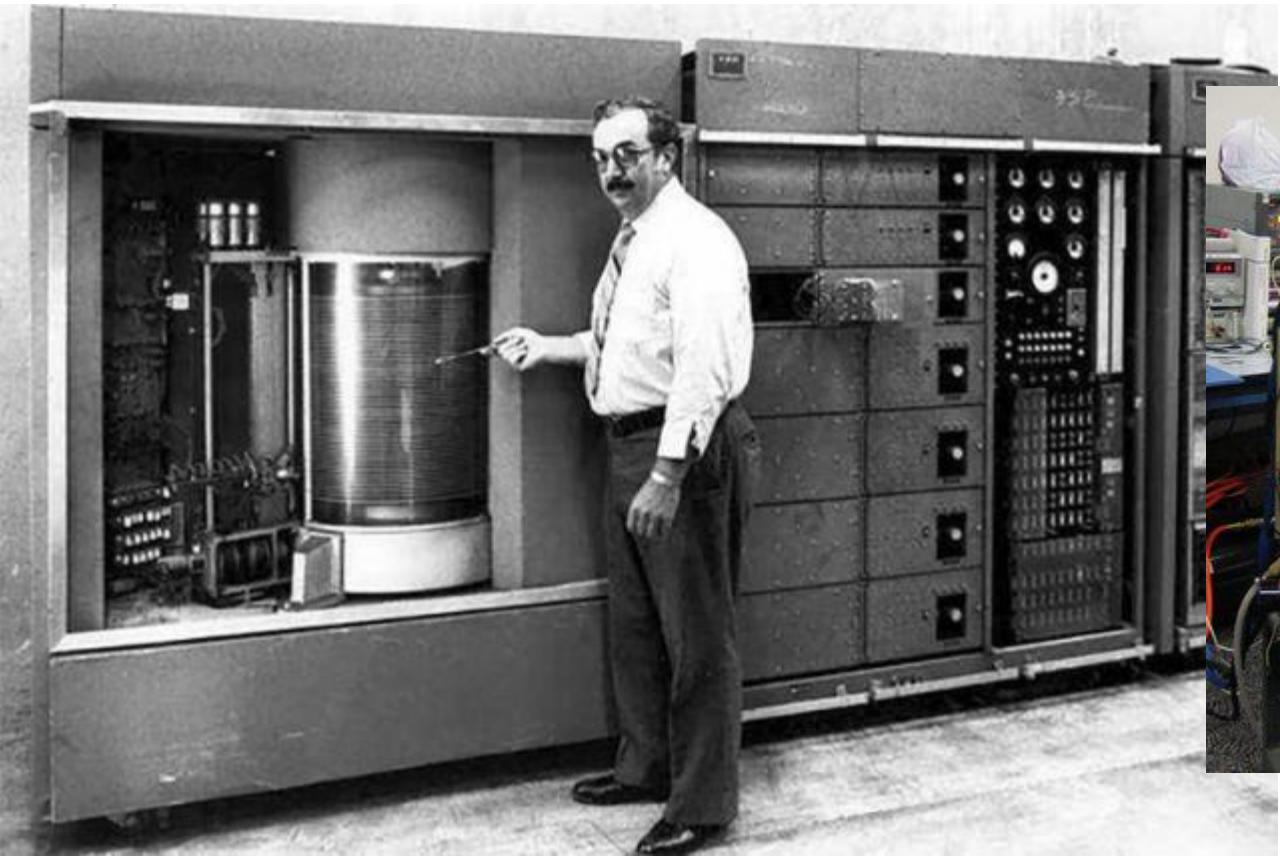
Storage

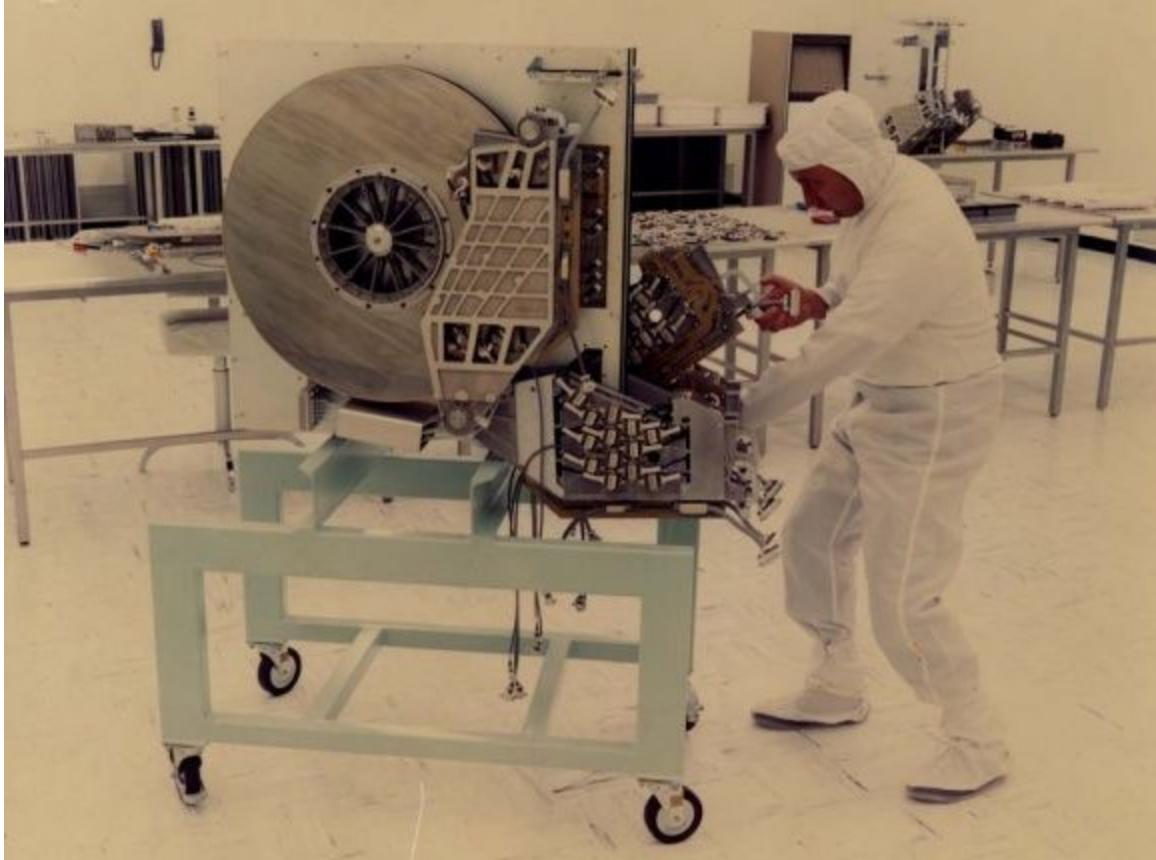
Storage





History



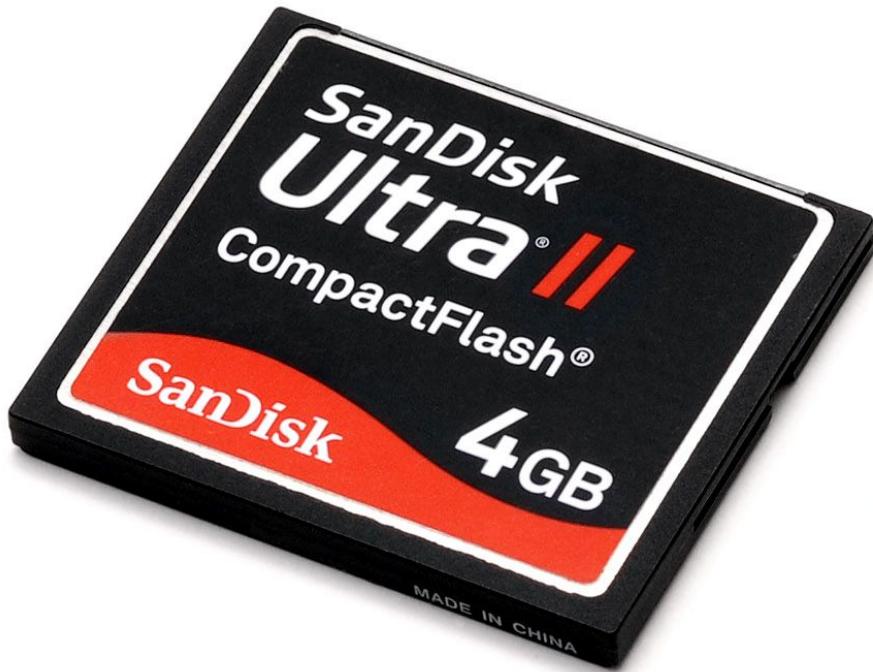


??? 250MB - 1979



HDDs got smaller





... and smaller

Storage

- Centralized: mainframes
- Decentralized: portable
- Centralized: cloud
- Decentralized: IPFS



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- Decentralized: portable
- Centralized: cloud
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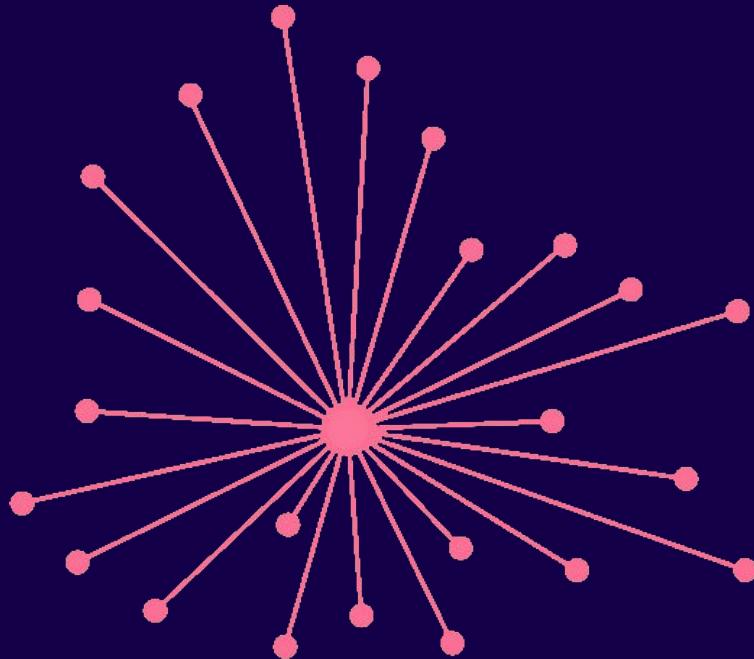
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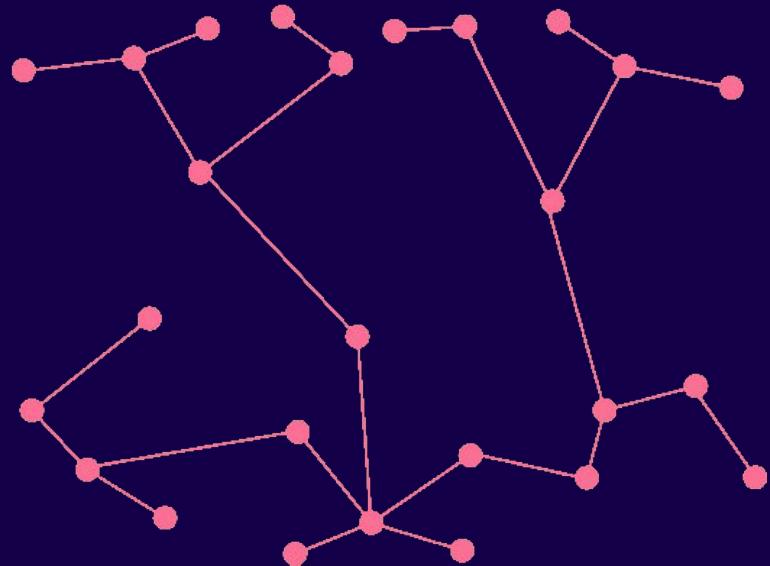
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Centralized



Decentralized



Distributed Storage

CAP Theorem



?



CAP Theorem



Eric Brewer - 1998

CAP Theorem

Consistency



Eric Brewer - 1998

CAP Theorem

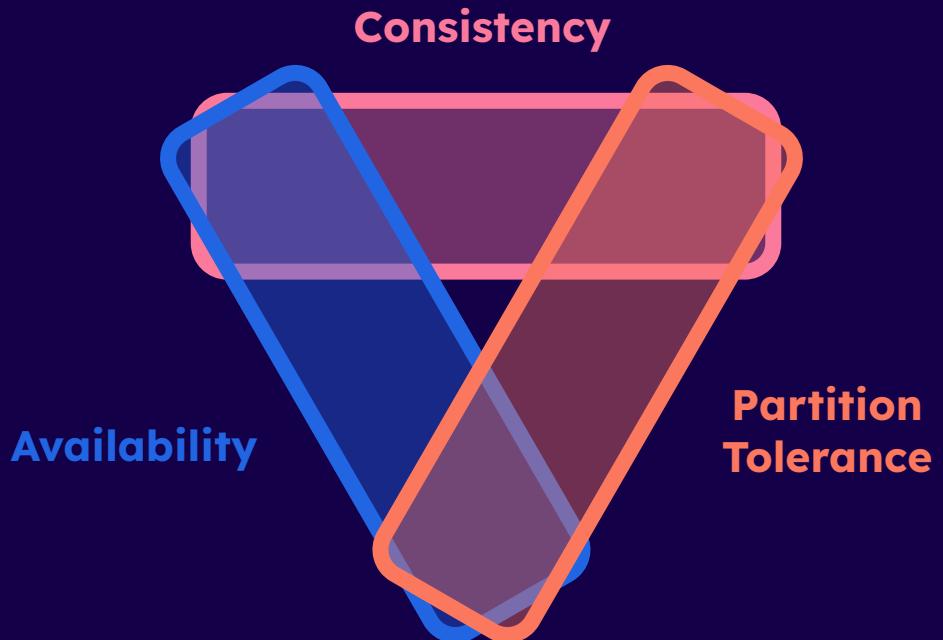
Consistency

Availability



Eric Brewer - 1998

CAP Theorem

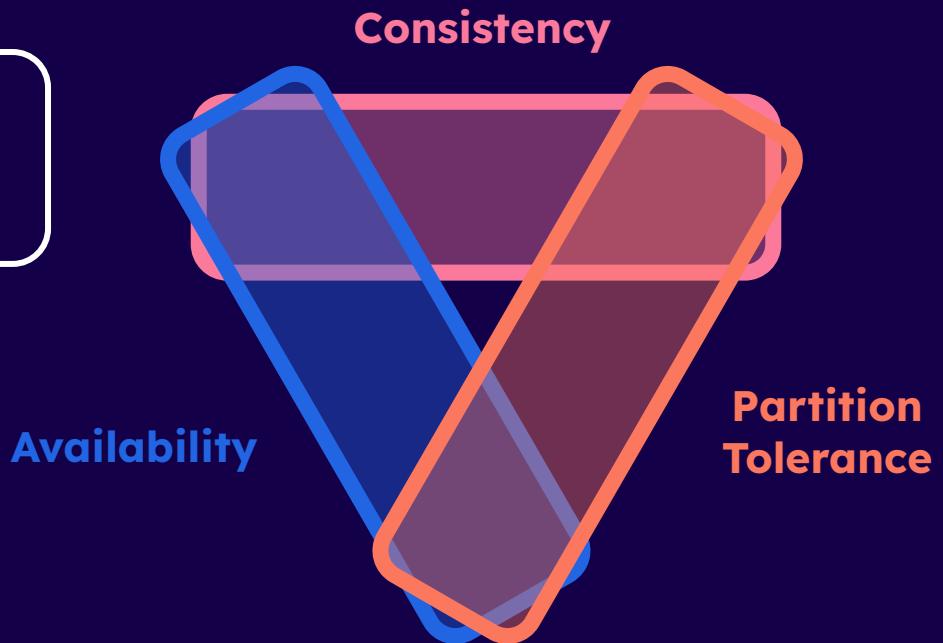


Eric Brewer - 1998

CAP Theorem



There can be
only 2!

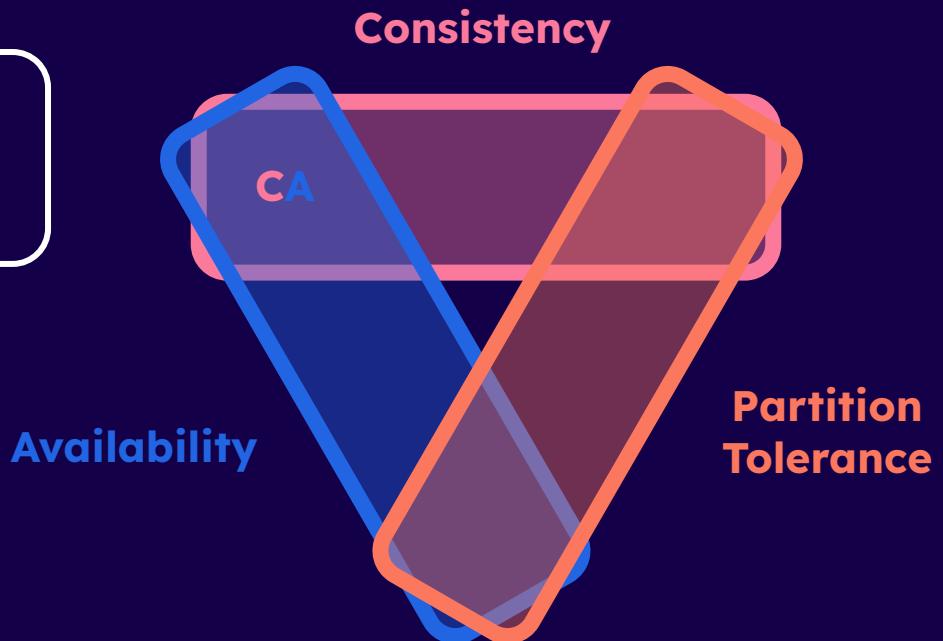


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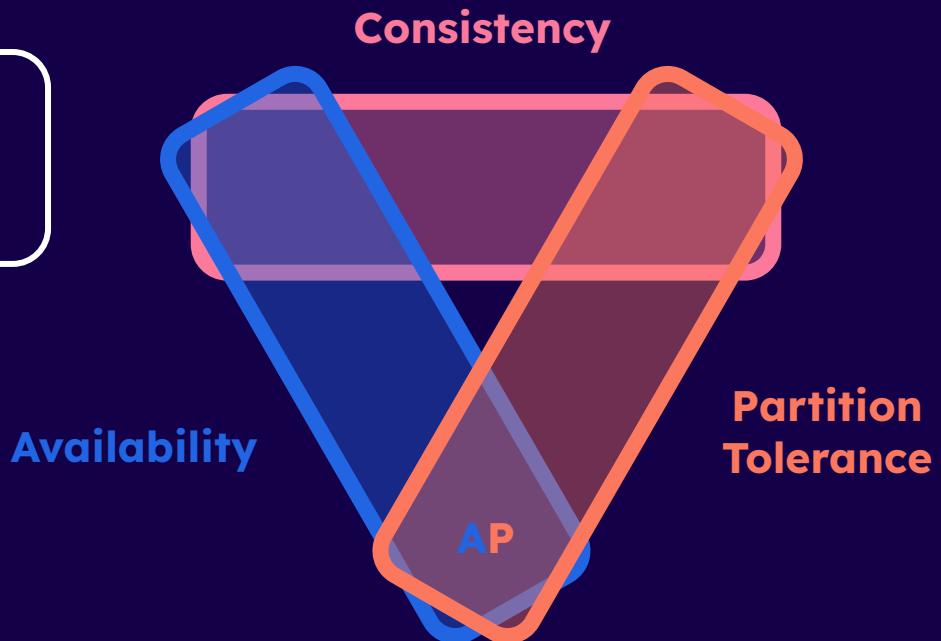


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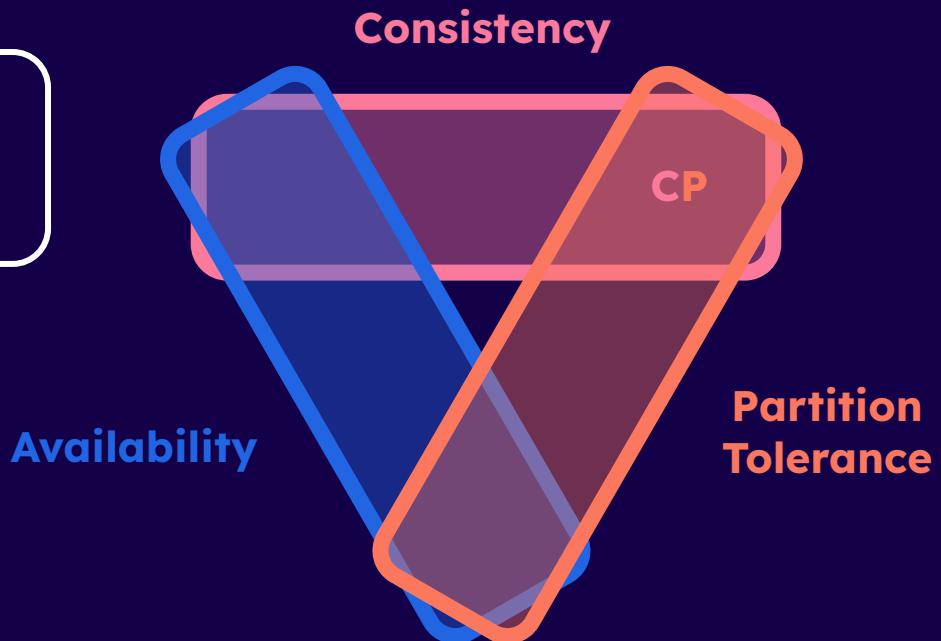


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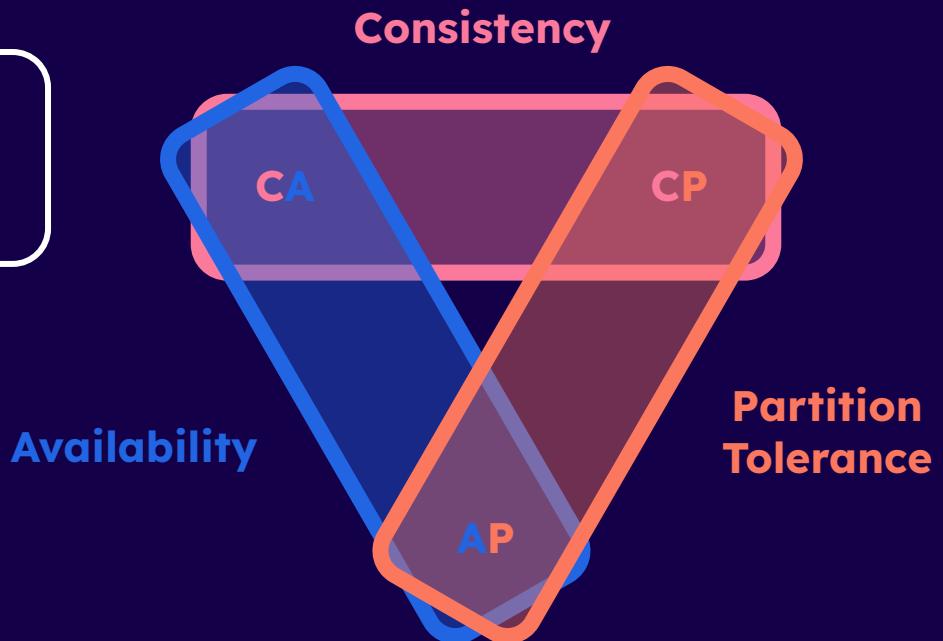


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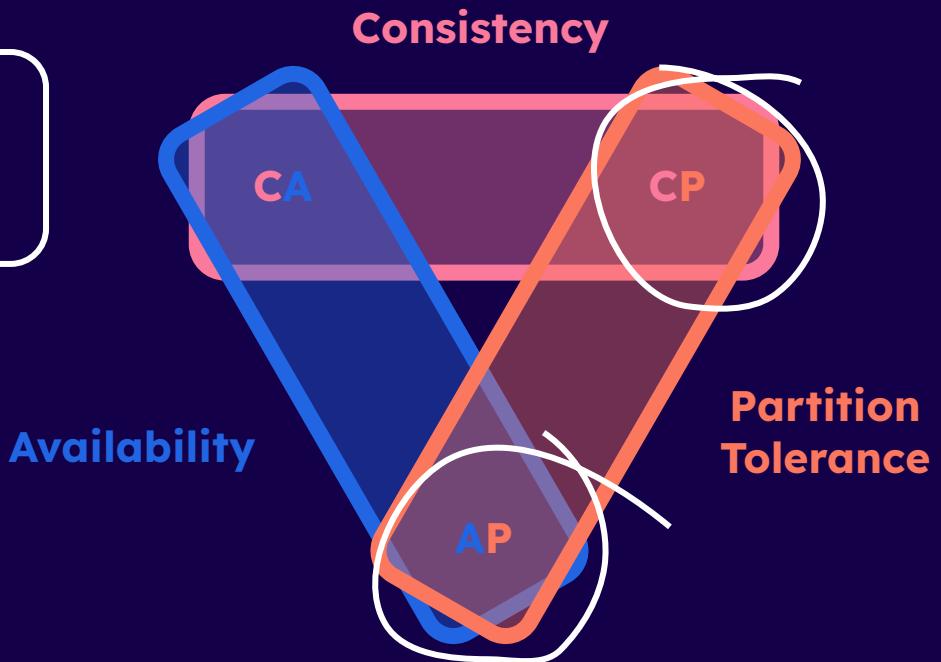


Eric Brewer - 1998

CAP Theorem



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Cloud Storage

Cloud

- Services such as Cloud Spanner
- Resilient network infrastructure
- 99.999%
- Partitioning is [nearly] eliminated



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Spanner

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Cloud
Spanner



IPFS

IPFS

- Decentralized
- Distributed
- P2P
- Content Addressable
- Immutable
- Distributed Hash Table
- Web 3.0
- Directed Acyclic Graph



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Content Addressable

- Web 2
 - <https://squirrels.com/peanut.jpg>
 - Centralized authority for hostname
 - URL is an abstraction (content could change)
- IPFS
 - CID
 - `/ipfs/bafybeigdyrzs...3lgtqy55fbzdi`
 - Hash derived from content
 - Don't care who hosts content



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Gateways

- Web “2.5”
- Bridges gap
- <https://web3.storage>
- Cloudflare, etc...



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Why???

Use Cases

- Website hosting
- Distributed package management
- Storage of publicly accessible records
- Distributed gaming
- NFTs



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Open Source

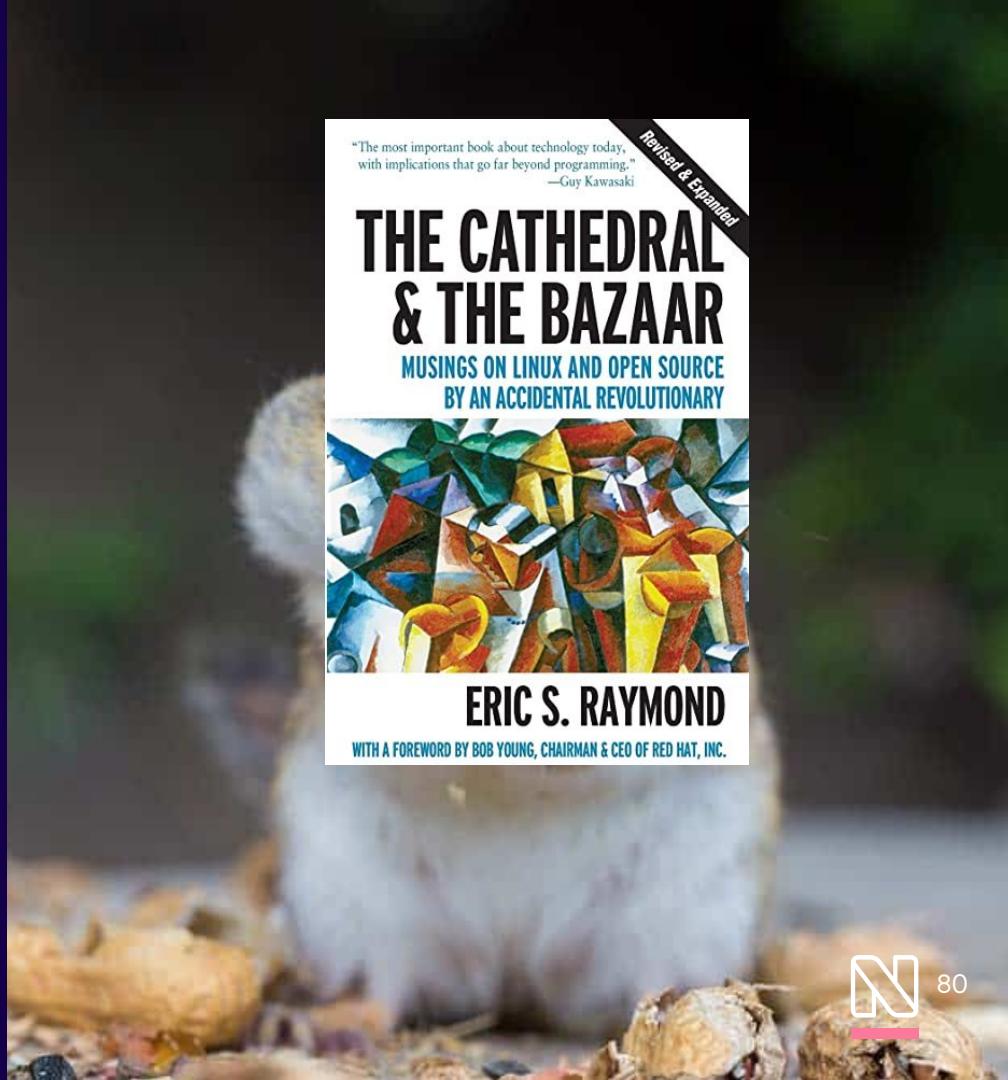
The Cathedral and the Bazaar

- Top down vs bottom up
- Cathedral
 - Top down
 - Source available upon release
 - Exclusive group of devs
- Bazaar
 - Bottom up
 - Developed via internet
 - Public
 - “Given enough eyeballs, all bugs are shallow”



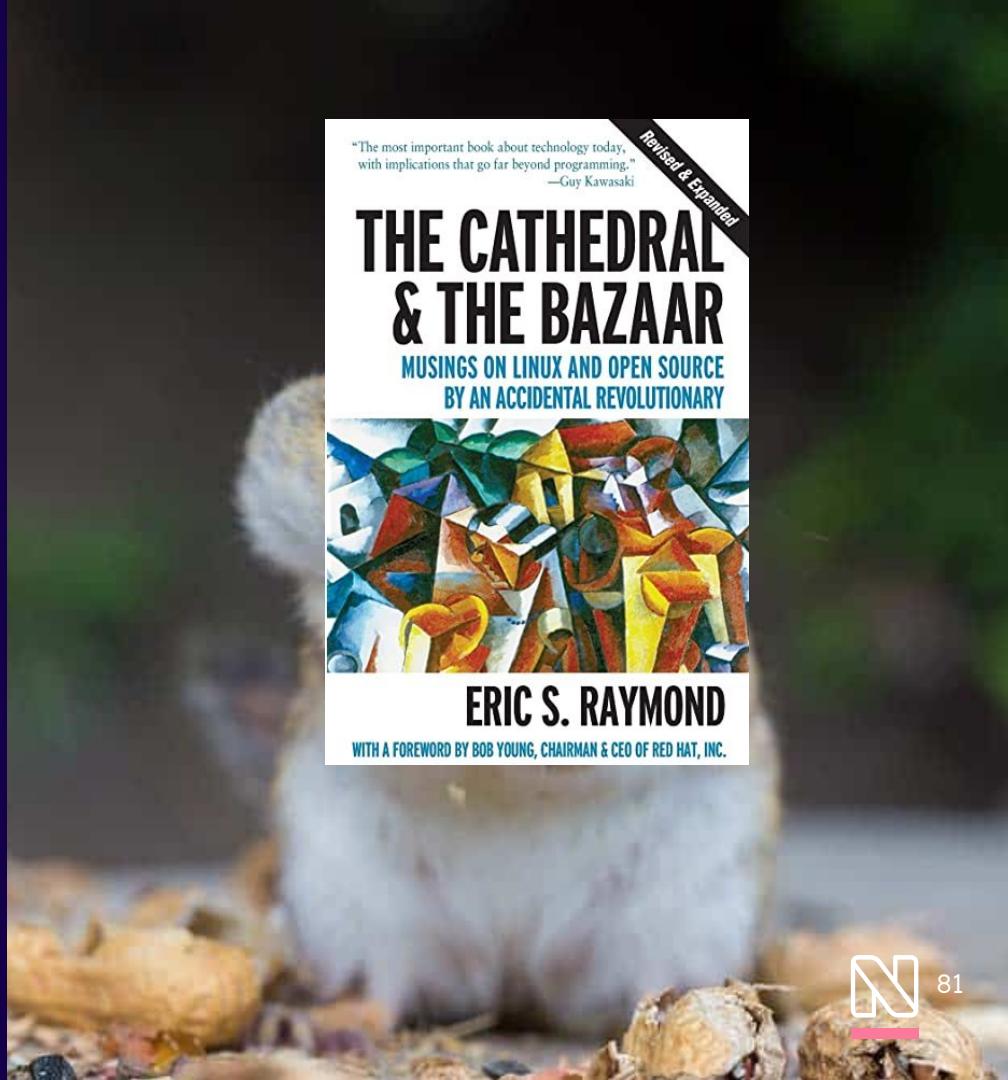
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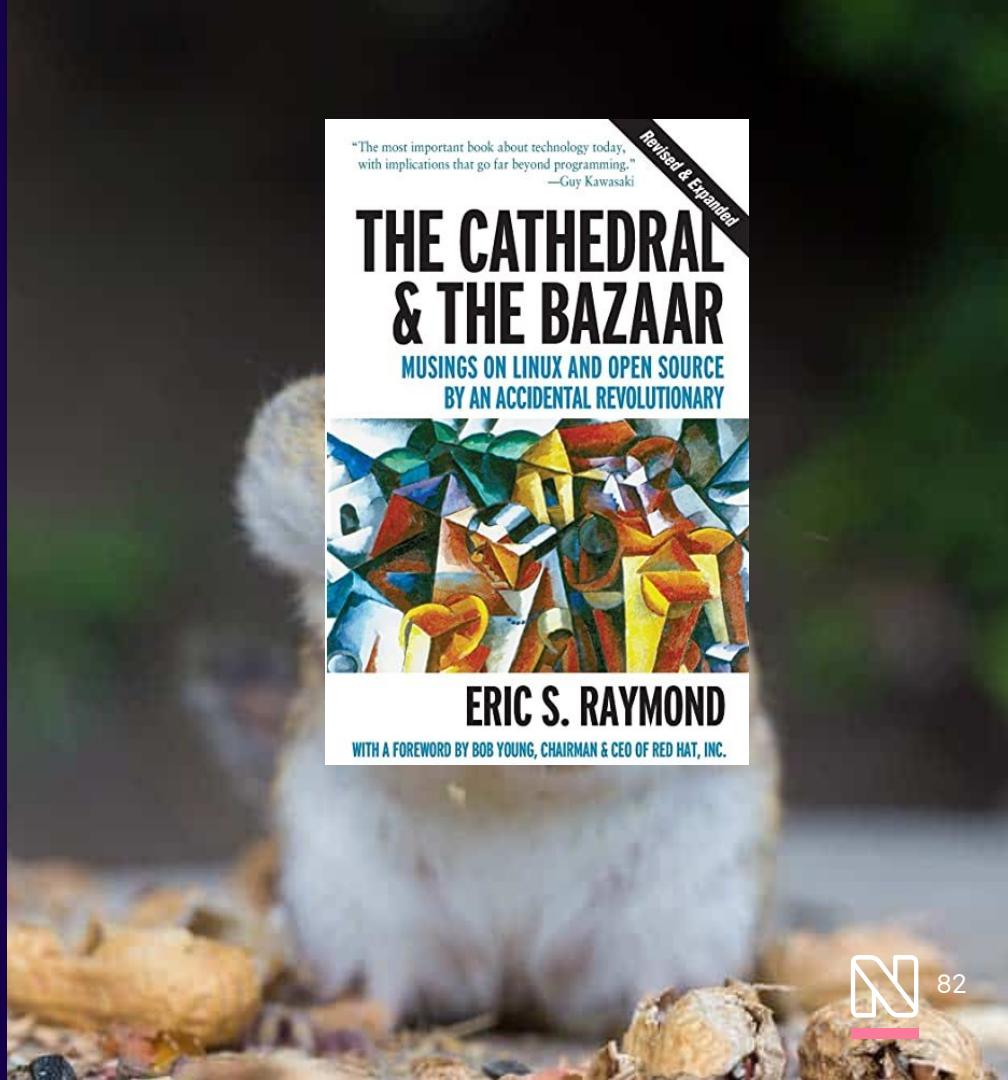
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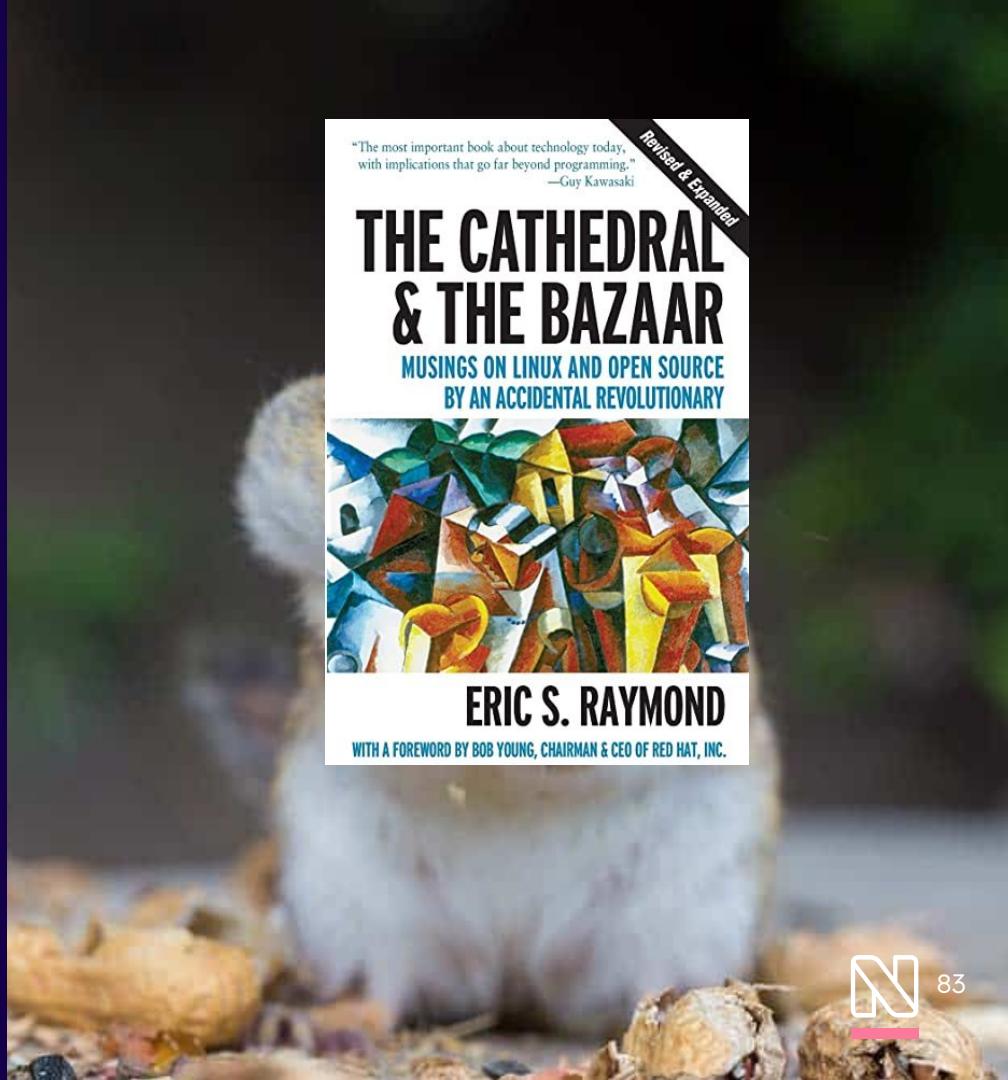
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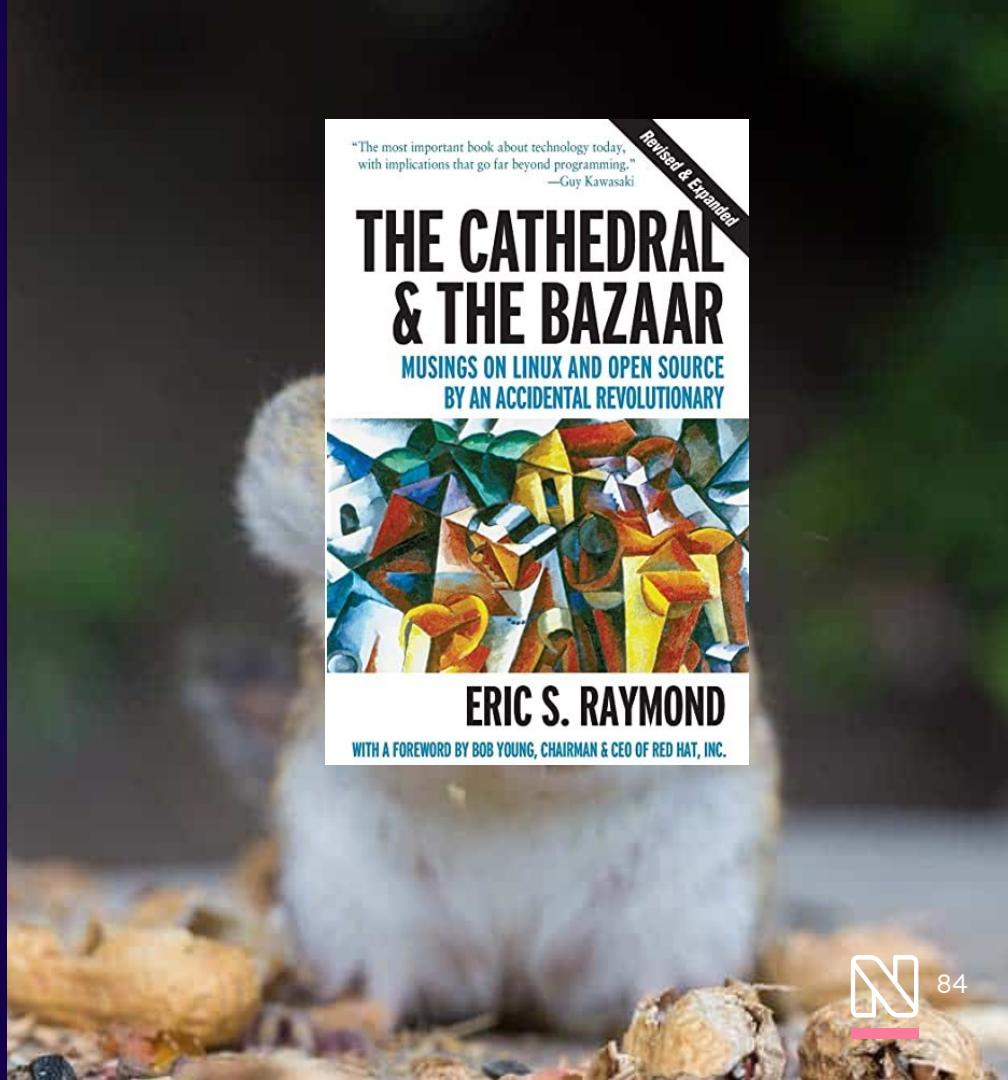
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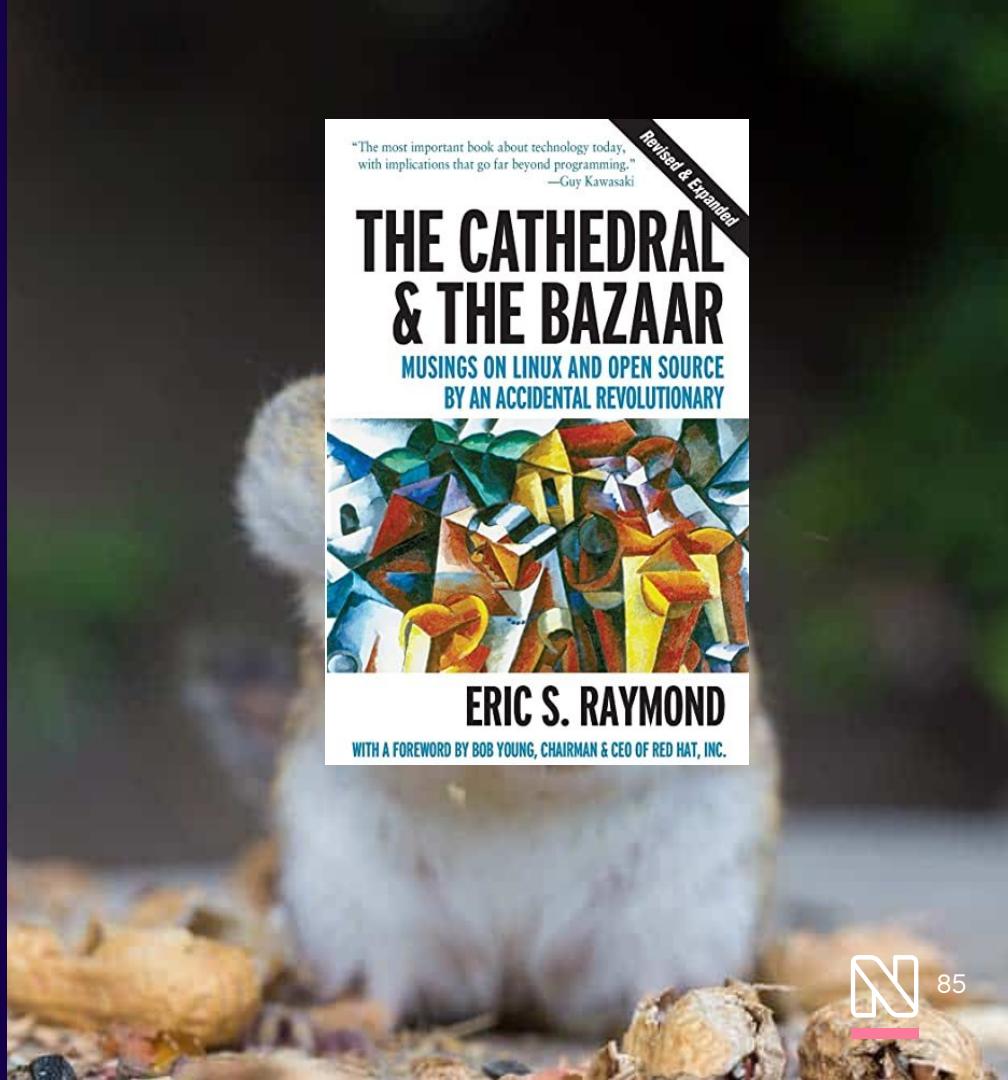
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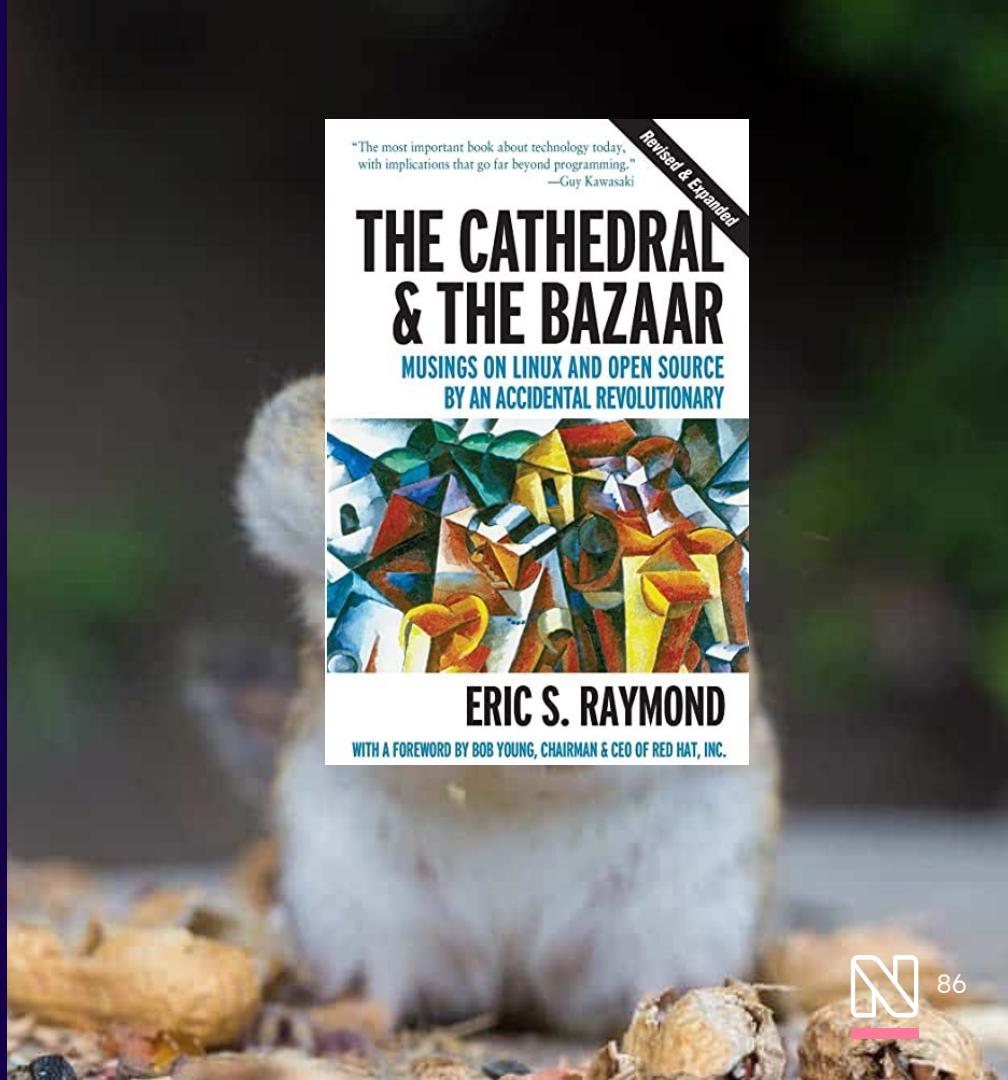
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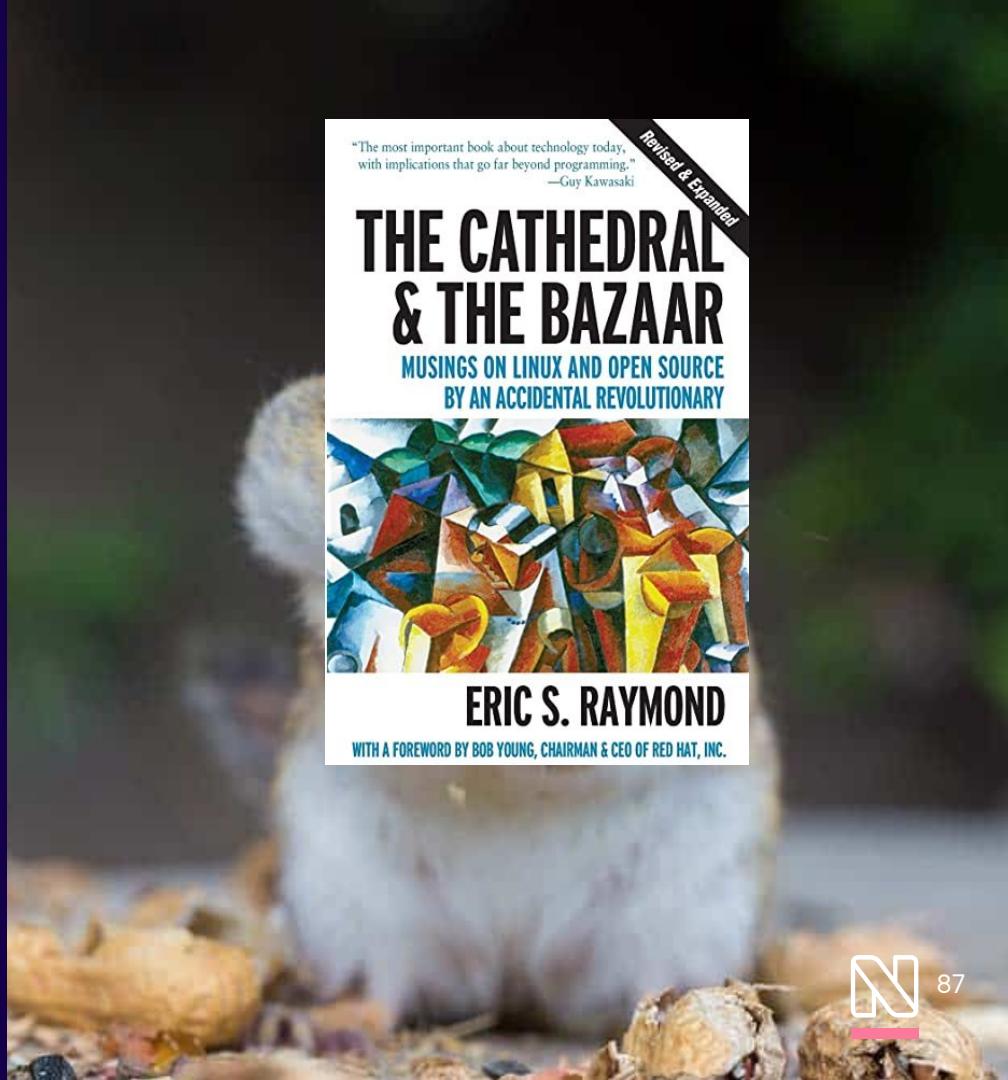
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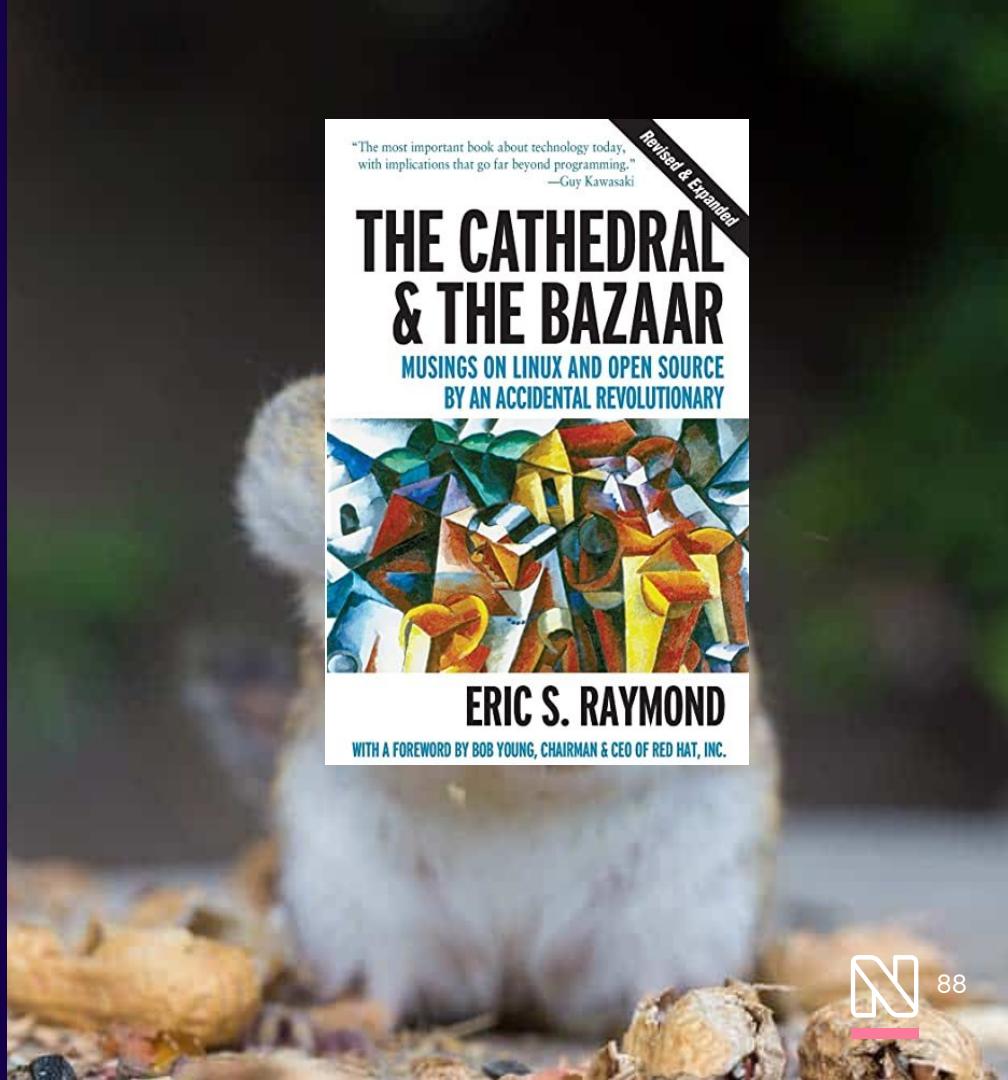
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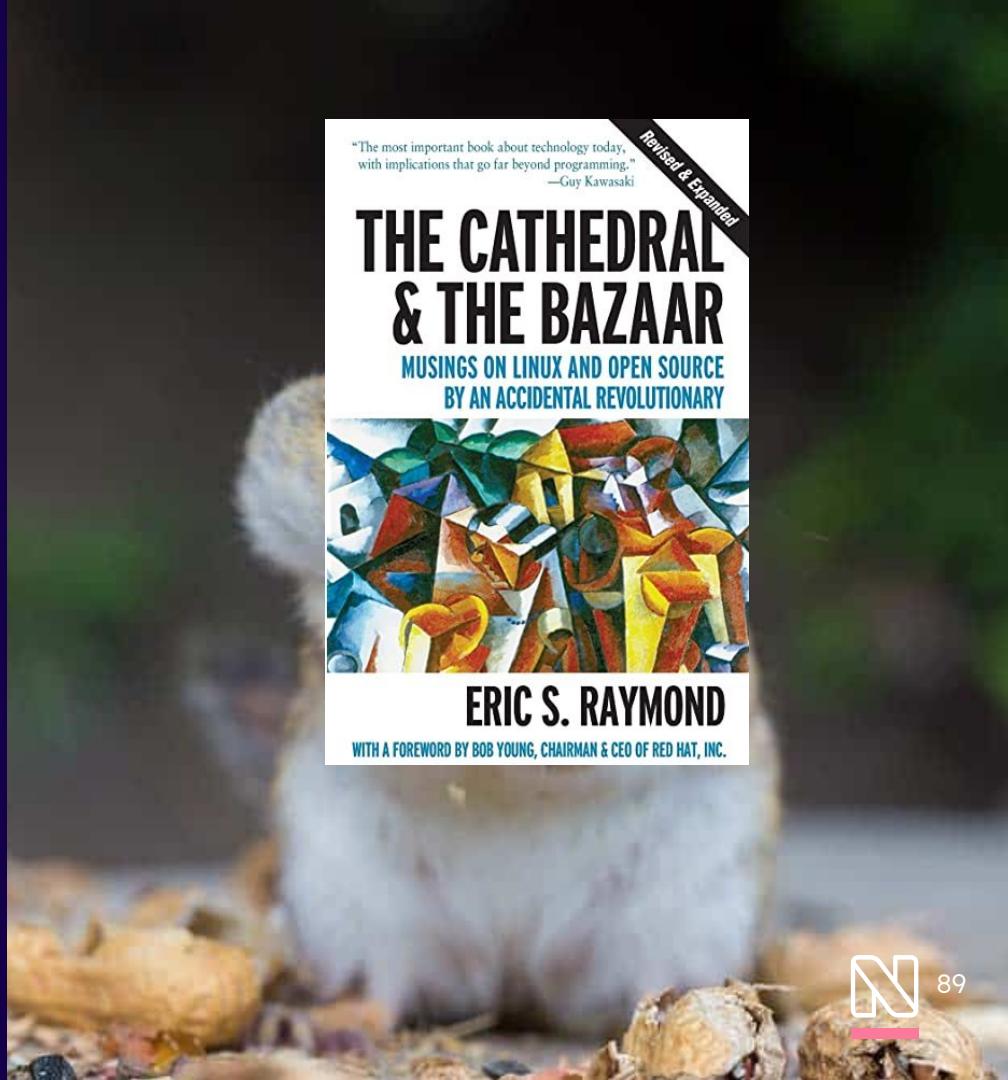
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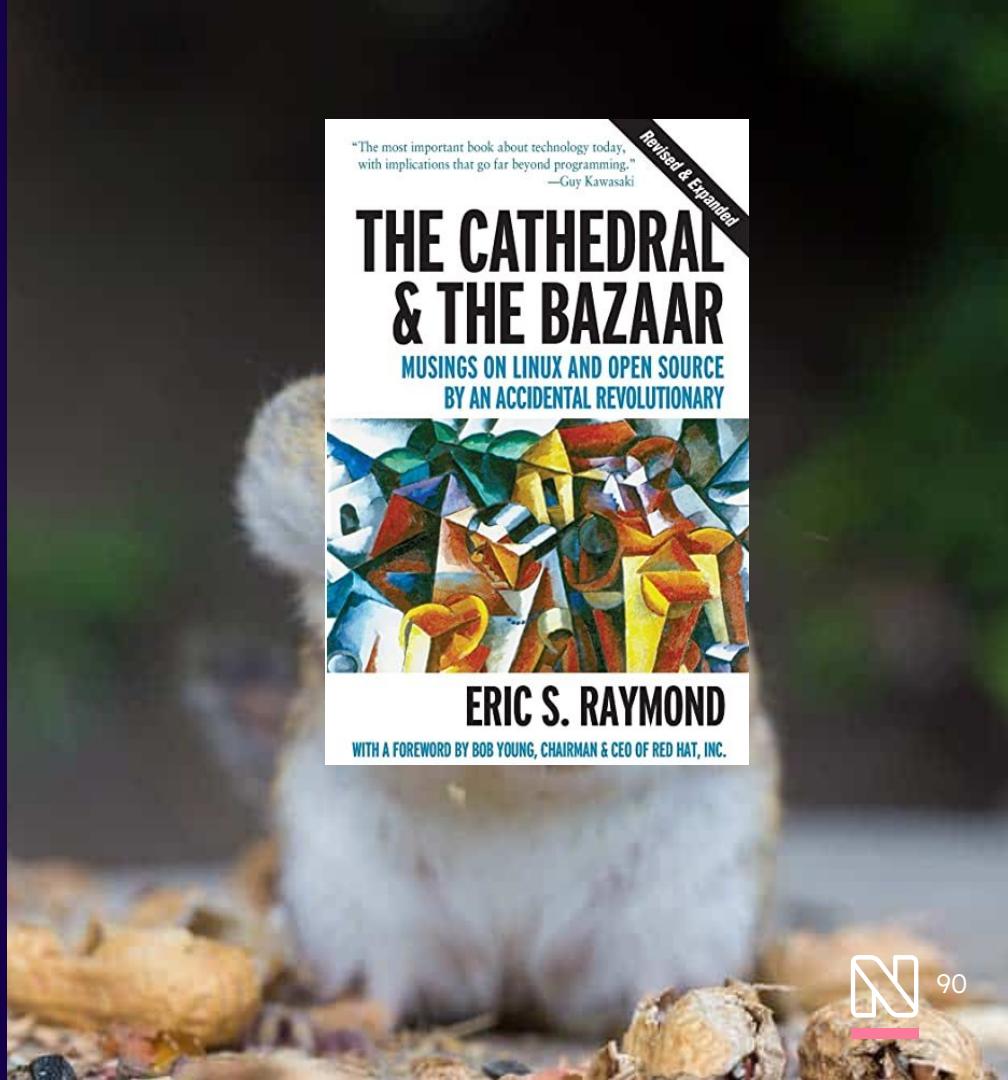
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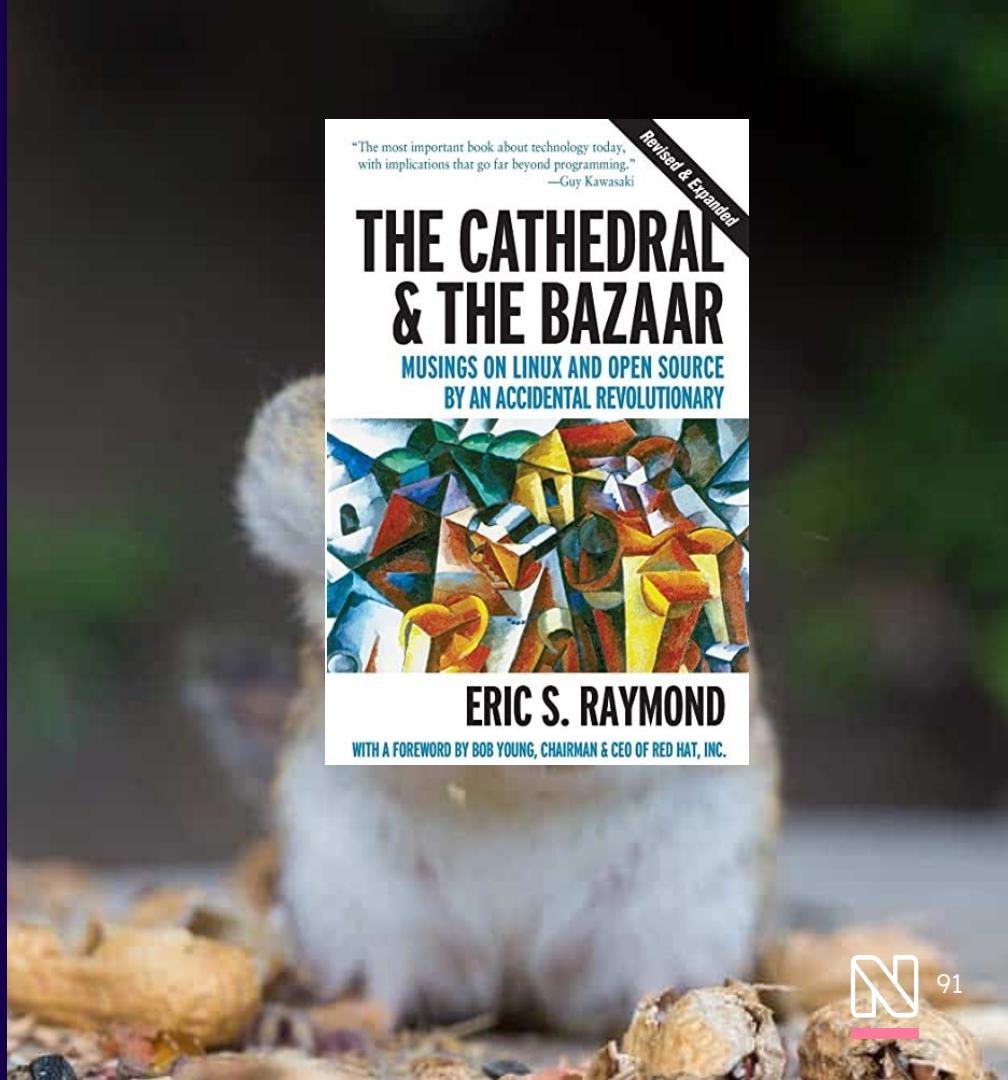
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The Battle

Distributed Storage

CAP Theorem

Opposing Forces

Centralized vs Decentralized

Cloud vs IPFS

Let someone else do it
vs
Do it myself



WE'RE BOLD
WE'RE FLEXIBLE
WE'RE OPEN
WE'RE EMPOWERING

Global Delivery Org with 300+ and counting

We are hiring!

**Major Contributors to the
Open Source Web Platform**

NPM monthly downloads

1B

Represents modules used globally

8%

Links

- Google White Paper on CAP Theorem and Google Cloud Spanner
 - Spanner, TrueTime & The CAP Theorem
 - <https://static.googleusercontent.com/media/research.google.com/en/pubs/archive/45855.pdf>
- Elastic IPFS
 - <https://github.com/elastic-ipfs/elastic-ipfs>



Questions?



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