Demystifying Decentralization for Open Source

Paving the Way to Truly Sustainable Development

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The Internet is Decentralized. Why Not the Cloud?

Do you worry about which routers/bridges are used when you send or receive information?

Do you worry about which version/model/router?

Do you worry about some of those routers going down?

Do you worry about who operates those routers?

Do you care that your messages go across different routers each time you send them?

Do you want to go back to the days when communication networks were run by the large telcos?
All work better when conditions are:

- Open
- Decentralized
- Individually Empowering
- Economically Empowering
Overview

Intro: Sustainable Development

Sustainable Development in OSS

Decentralized Cloud

Example: Storj

Decentralized Cloud and OSS: A New Model for OSS Monetization & Sustainable Development

Some Announcements
A Personal Example
Nyeri Province, Kenya (~1990)

A loan to buy my own tractor.
This Turns Out To Be True On A Global Scale

<table>
<thead>
<tr>
<th>Metric</th>
<th>1960</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living in Extreme Poverty</td>
<td>50%</td>
<td>9%</td>
</tr>
<tr>
<td>Infant Mortality</td>
<td>19%</td>
<td>4%</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>52</td>
<td>72</td>
</tr>
<tr>
<td>People Living Under Democratic System</td>
<td>1.2B</td>
<td>4.1B</td>
</tr>
<tr>
<td>Literacy</td>
<td>58%</td>
<td>85%</td>
</tr>
<tr>
<td>Female Primary School Completion</td>
<td>68%</td>
<td>91%</td>
</tr>
</tbody>
</table>

Source: https://ourworldindata.org

Yes, we’ve got a long way to go

This isn’t true in every country
Charity?

One Large, Centralized Sector?
What’s the Difference?

Why OSS?

OSS development model is:

- Open
- Decentralized
- Individually empowering
How much more could we get out of open source if there was a direct connection between how broadly code was used and how the contributors were compensated?
What about OSS economic empowerment?

- Total OSS Developers: 24M
- Total Employees at Public OSS Companies: 17K
- Total Cloud Market: $180B
- Total Revenue at Public OSS Companies: $5B

Sources: LinuxFoundation Keynote 2017, Red Hat, Hortonworks, Cloudera, Mulesoft, MongoDB, and Gartner
A Personal Example

Gluster & Docker Talking to Large Infrastructure Players

We love your project and we’d like to partner to help you out.

No. Our margins are too thin.

No. Customers expect unified service.

No. Won’t work with our channels.

No. We’re planning a competing offer.

We’ll provide advice, cloud credits, and 2 part-time contributors

We’d love to partner too. Bundle?

Upsell service, subscription?

Co-sell?

Upsell to our premium features?

How exactly do you want to partner?
What we thought the path to glory was 10 years ago

Build a great community & project

Monetize through an XaaS service
Create sustainability through large number of small and mid-sized customers. No real competition.

Go after large enterprises
With on-premises solutions, potentially subscriptions, potentially value added product. Compete against incumbent proprietary companies.
Unfortunate Reality

Build a great Community & Project

Large cloud companies offer a free hosted version of your open source product as loss leader

Making XaaS model difficult.

Try to leap to servicing large enterprise customers early in the life cycle

Compete against both proprietary incumbents as well as traditional on-premises vendors using your project as a loss leader.
If cloud is the dominant computing model
If the dominant model for monetizing open source becomes “using open source as a loss leader for infrastructure,” and ...

Only a few large companies have the scale to operate centralized clouds and traditional infrastructure, and ...

Those same large companies also get a disproportionate amount of traffic, data, talent, economic returns....

...how will we drive economic growth and innovation from new open source projects?
What if the answer isn’t a new kind of license, but a new kind of cloud?
Decentralized Cloud

Fundamentally different technical and economic model for delivering cloud computing

Creates new model for monetizing open source
Let’s clear one thing up...

- Crypto Currencies
- Blockchain
- Decentralized Systems

very rich

wow

such coin
What is a decentralized application?

**Centralized Apps**
- Central Authority
- Single Point of Failure
- Opaque
- Security by People
- Trust Me

**Decentralized Apps**
- No Central Authority
- No Single Point of Failure
- Transparent - Open Source
- Security by Math
- “Trustless” (really, trust open code and large community)
<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payments</td>
<td>Bitcoin, Ethereum, ++</td>
</tr>
<tr>
<td>Compute</td>
<td>Dadi, Golem, Hypernet, SONM</td>
</tr>
<tr>
<td>Networking/CDN</td>
<td>Gladius, Orchid, NKN, Storj</td>
</tr>
<tr>
<td>Storage</td>
<td>Storj, Filecoin, Maidsafe, Sia</td>
</tr>
</tbody>
</table>
## Similar to Open Source

<table>
<thead>
<tr>
<th></th>
<th>Proprietary</th>
<th>Open Source</th>
<th>Decentralization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code Base</strong></td>
<td>Closed</td>
<td>Open</td>
<td>Open</td>
</tr>
<tr>
<td><strong>Decision Making</strong></td>
<td>Opaque</td>
<td>Transparent, open</td>
<td>Transparent, open, algorithmic</td>
</tr>
<tr>
<td><strong>Security Model</strong></td>
<td>Security through obscurity</td>
<td>Many eyes</td>
<td>Many eyes, many actors, no single point of failure</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>?</td>
<td>Critical to creating</td>
<td>Critical to creating, scaling, operating</td>
</tr>
</tbody>
</table>
Example of Storj: Our Goal

To create the world’s largest and most secure, resilient, performant, & economical cloud storage service - without owning or operating a data center.
1 Year, 125,000 Node Operators, and 150PBs Later...
Storj is a platform that delivers **Highly Distributed, Ridiculously Resilient** cloud storage

Delivered leveraging a global, **decentralized** network of **storage** nodes

**Easy to use**, 25-100% **faster**, more **secure**, more **durable**, at a **fraction of price** of traditional cloud storage
How Did We Do It?

- Being Open
- Being Decentralized
- Being Individually Empowering
- Economically Empowering our Communities
How It Works 1: Network Overview
How it Works 2: What Happens to Files?

Your files are encrypted and split into pieces client-side before being distributed across our network of high-performance storage nodes.
How it Works 3: Erasure Coding

Erasure Coding: Mathematical means of splitting file into $N$ pieces, of which any $k$ can be used to reconstitute file.

- **Encrypt**
- **Split**
  (each segment into 80+ pieces, of which any 30 needed to reconstitute)
- **Distribute**
  (each piece on different, independent drive in global network)
Why is decentralized better?

**Durability**
- No single point of failure
- Each drive independently operated, located, powered, networked
- 51 independent drives would have to fail simultaneously, before repair, to lose file # 1
- File # 2 is on 80 different drives

**Security**
- Client-side encryption by default, on every file
- Decentralized access control/sharing
- Storj can’t see/mine data
- Hackers must find, locate, compromise 30 drives out of 100Ks
- Even then, blobs encrypted
- Start over again to compromise file # 2

**Performance**
- Parallel uploads and downloads
- Erasure coding eliminates the long-tail of latency
- Streaming enabled out of the box
- Data served, stored at the edge
About the SNOs (Storage Node Operators)

Most SNOs are Good
- Must be vetted first
- Continual uptime monitoring
- Content audits
- Incent good behavior

Assume Some SNOs Are Bad
- Dis-incent bad behavior
- Encryption throughout
- Kick out bad actors
- Highly resilient to bad/incompetent SNOs

...but even Jon SNO knows nothing (everything encrypted)
All the normal, user economic benefits of traditional cloud (scaling, low fixed costs, etc.)

Plus great supply-side economics:
- Doesn’t take billions to build out data centers
- SNOs: Idle capacity, no extra power, non-peak network

Result: Much lower prices for users, and prices decrease over time, and...

A new economic model for open source
We’re in the Midst of a Major Transformation

“The network is the computer”

Scott McNealy, 1983
We’re in the Midst of a Major Transformation

The network is the marketplace
When We Set up Marketplaces, We Create New Dynamics

Supply

The people who bring supply to the network ("SNO") should be fairly incentivized & compensated, so they help build capacity

Demand

The people who bring demand to the network should be fairly incentivized & compensated, so they help drive usage

...If open source is the biggest driver of cloud usage, why not have decentralized networks programmatically pay open source projects to help drive growth?
We can’t see user data, and you can’t either. But, we can track how much storage and egress is associated with your connector.

Open Source Partner Program

Are you an OSS project that generates demand for object storage?

Build a connector that gives users option to store on the network

Network tracks usage and returns meaningful portion of revenue that your users generate to you

We can’t see user data, and you can’t either. But, we can track how much storage and egress is associated with your connector.

Sign up and start building today. V3 Beta Now. Launch Q4.
### Announcement: We’re in Beta!


<table>
<thead>
<tr>
<th>Phase</th>
<th>Current Status</th>
<th>Pioneer 1 Beta 1</th>
<th>Pioneer 2 Beta 2</th>
<th>Voyager Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Today</td>
<td>1-2 months</td>
<td>Q4</td>
<td></td>
</tr>
<tr>
<td><strong>Durability</strong></td>
<td>100%</td>
<td>99.999%</td>
<td>99.9999%</td>
<td>99.99999999%</td>
</tr>
<tr>
<td><strong>Retrievability</strong></td>
<td>99.93%</td>
<td>99.0%</td>
<td>99.9%</td>
<td>99.99%</td>
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<tr>
<td><strong>Upload (Median time)</strong></td>
<td>2.15s</td>
<td>1.25 AWS</td>
<td>ON PAR</td>
<td>.75 AWS</td>
</tr>
<tr>
<td><strong>Upload (95th percentile)</strong></td>
<td>2.24 s</td>
<td>1.25 AWS</td>
<td>ON PAR</td>
<td>.75 AWS</td>
</tr>
<tr>
<td><strong>Download (Median time)</strong></td>
<td>1.69 s</td>
<td>1.25 AWS</td>
<td>ON PAR</td>
<td>.75 AWS</td>
</tr>
<tr>
<td><strong>Download (95th percentile)</strong></td>
<td>1.82 s</td>
<td>1.25 AWS</td>
<td>ON PAR</td>
<td>.75 AWS</td>
</tr>
</tbody>
</table>
Durability = Segment health
(>30 pieces needed)

For more detail, visit https://storj.io/blog/2019/08/the-role-of-qualification-gates-in-getting-to-beta-and-beyond
Over 15 OSPP connectors in process

mongoDB  MariaDB  FZ

Come to our booth to see some live examples
Networks generate revenue for OSS

OSS innovates

Networks benefit from increased demand

OSS generates demand for networks

Virtuous Cycle
Thank you, OSS!

For more info:
OSPP: storj.io/partners
Contribute: github.com/storj/storj
Stats: bit.ly/2ZgB1QJ
White paper: storj.io/whitepaper/
Booth: #26