Distributed Storage Comparison Matrix

Draft v1

	Amazon S3 (x3)	Filecoin (Ipfs)	Sia	Storj	0Chain				
EC (Erasure Coding) Configuration *(1)	1/3 *(1)	1/5 *(1)	10/30	29/80	1/2	4/6	6/9	10/15	20/30
Block size	4KB	4KB	4MB	4KB ?	64KB				
Min. file use	12KB	20KB	120MB	320KB	128KB	384KB	576KB	960KB	1920KB
Efficiency							*(2)		
5KB	20.83%	12.50%	0.00%	1.56%	3.91%	1.30%	0.87%	0.52%	0.26%
50KB	32.05%	19.23%	0.04%	15.63%	39.06%	13.02%	8.68%	5.21%	2.60%
500KB	33.33%	20.00%	0.41%	31.25%	48.83%	65.10%	43.40%	52.08%	26.04%
5MB	33.33%	20.00%	4.17%	35.56%	50.00%	66.67%	63.49%	66.67%	66.67%
50MB	33.33%	20.00%	20.83%	36.20%	50.00%	66.67%	66.33%	66.67%	66.67%
500MB	33.33%	20.00%	32.05%	36.25%	50.00%	66.67%	66.63%	66.67%	66.67%
EC User Configurable	n/a	n/a	YES	NO	YES				
Method	n/a	n/a	CLI (Technical)	Satellite controlled	GUI (Simple)				
SLA (Service Level Agreement) *(3)									
Availability	4 9s	n/a	n/a	16 9s	2 9s	6 9s	8 9s	14 9s	24 9s
SLA (Claimed)	99.9	n/a	n/a	99.95	n/a (*3)				
SLA Features	Credit			?	Configurable Challenge Completion 20s-5min				
SLA Exclusions				Planned maint *(3)					
Integrity	User	Challenge	User	Satellite	Challenge				
Encryption									
Native Support	NO	NO	YES	YES	YES				
Encryption Keys	n/a	n/a	Wallet	Per file	Wallet				
Private Sharing									
Proxy Re Encryption (PRE)	n/a	n/a	NO	NO	YES				
Blockchain									
Tokens	n/a	Own chain	Own chain	Ethereum based	Own chain @mainnet				
Consensus	n/a	PoST + PoW	PoW	n/a	DPoS				
Block Time	n/a	~ 25 Seconds	~ 10 Minutes	~ 10 Minutes	<2 Seconds				
Finality	n/a	~ 10 Minutes	~ 10 Minutes	~ 10 Minutes	< ~6 Seconds				
Performance									
Testing method	CLI (aws)	CLI (lotus)	CLI + GUI (siac)	CLI (uplink)	CLI (zboxcli)				
Upload									
vs AWS	=	<<	<>	>>	>	>>	>>	>>	>>
Download									
vs AWS	=	<	>>	>>	>	>>	>>	>>	>>
Pricing *(4)									
Currency	USD	FIL	SIAcoin	STORJ (erc20)	ZCN				
Control	Fixed USD	Variable	Variable	Fixed USD	Variable				
Entity	Amazon	Storage Miners	Storage Miners	Tardigrade	Storage Miners				
Term used	-	Storage Miners	Hosts	-	Blobbers				
Writes Charged	NO	YES?	YES	NO	YES *(5)				
Other Write Charges	-	-	(Sector price)	-	(min. e.g. 10%)				
Storage Charged	YES	YES	YES	YES (50%AWS)	NO *(5)				
Other Storage Charges	-	-	(tx fees) + *(4)	-	(tx fees)				
Reads Charged	YES	YES	YES	YES (50%AWS)	YES				
Other Read Charges	-	-	-	^ +30% *(7)	(inc. redundancy)				
System requirements									
Chain miner									
RAM / CPU	n/a	V.Hi 128GB+ GPU	ASICs	n/a	Low 8GB+ 2CPU				
Storage	-	512GB+ SSD	SSD	n/a	HDD				
Secured By	n/a	?	?	n/a	Stake				
Delegation Possible	n/a	?	NO	NO	YES				
Storage Miner									
RAM / CPU	n/a	V.Hi 128GB+ GPU	Low	Low 4GB+ 1CPU	Low 4GB+ 1CPU				
Cache	n/a	SSD 512GB+	n/a	n/a	n/a				
Data Storage (Range)	?	HDD 100TB+	HDD 0.5TB-20TB	HDD 0.5TB-20TB	HDD 1TB-720TB				
Secured By	n/a	Collateral	Collateral	Escrow :15M	Stake				
Delegation Possible	n/a	?	NO	NO	YES				
Client									
RAM / CPU	Minimal	8GB+ 4vCPU	Moderate	Minimal	Minimal				
OS Recommended	Minimal	SSD 160GB	SSD 50GB	Minimal	Minimal				
Sync Storage (@Jul '20)	n/a	SSD 50GB++	SSD 20GB+	n/a	n/a				
Sync time (best)	n/a	12hours++	8hours+	n/a	n/a				
Sync time increase	n/a	Rapid	Moderate	n/a	n/a				
Apps									
Desktop GUI	YES (3rd Party)	?	YES	NO	YES				
Mobile Apps	YES (3rd Party)	?	NO (abandoned)	NO	YES				
AWS S3 layer	YES	NO	NO (abandoned)	YES	WIP				
Constraints									
Centralization									
Storage	DataCenter	n/a	n/a	Satellites	n/a				
Account Admin	Amazon .com	n/a	n/a	Tardigrade .io	n/a				
Integrity Checking									
Responsibility Of	?	Miner Challenges	User	Satellites	Miner Challenges (Unbiased, Random)				
Frequency	?	24hr	User	? Internal	Frequent *(5)				
Enterprise features	?	?	n/a	?	Configurable Completion time				
Audit	?	?	End of contract	? Internal	Frequent				
Repair by	?	ot yet implemented	User	Satellites	User				
Management									
Bandwidth	Amazon .com	On-chain	On-chain	Tardigrade .io	On-chain				
Storage	Amazon .com	On-chain	On-chain	Tardigrade .io	On-chain				
Transparency	High	?	High	Low	High				
Auditability	High	?	Low	Low	High				
Budget *(6)									
Accuracy	High	?	Low	Medium	High				
Transparency	High	?	Medium	Medium	High				

Red Estimate only, unable to give accurate figures until mainnet,.

Green << - much slower, < - slower, <> - variable, - Faster, >> - Much Faster

***(1)** Use Replication instead of EC, so typical figures used.
Filecoin 5x replication used as example, still gives less avalability than all EC offerings
Amazon typical DCs use 3x replication

***(2)** 0Chain Easily configurable EC including preferred Blobber selection gives unlimited scope of Availability & Redundancy
e.g. EC10/20 gives max. 50% Efficiency with approx 24 9s Availability
e.g. EC24/30 gives max. 80% Efficiency with 16 9s Availability
NOTE: Higher EC values use more blobbers and create more repair/connections and also increase read costs

***(3)** 0chain avoids this meaningless term because everyone has their own definition / criteria.
Instead, the configurable challenge completion time plus EC allow complete balanced control to the user
Storj recent planned maintenance announced with 4 hour window, approx lasted 12 hours.
Users complained of being unaware since they don't monitor announcements, plus estimate exceeded 3x
AWS Offer compensation for not meeting stated SLA. (e.g. a complete days downtime only qualifies for a 25% credit for that month)
Uptime - 99%-99.9% - 10% credit, 95-99% - 25% credit, <95% - 100% credit.

***(4)** Different price models are difficult to compare directly
0Chain writes equate to storage for comparison purposes.
AWS (and other big cloud providers) give free uploads (writes), low cost storage but expensive reads
Storj mirrors AWS free upload / cheap storage / expensive read model
Other platforms have charges for uploads but less expensive storage / reads

***(5)** Storj consistently charges more than expected for reads
Storj charges approx 35% extra for spare redundant reads EC29/80 actually reads and charges for 39
Surplus writes are also performed (37.5%) to 110 nodes, the fastest 80 forming the contract

***(6)** From limited testing experience
0chain gives excellent detail and traceability through miner stats, api and cli give potential for further analysis/ enhancement
Storj gives poor transparency with its centralized portals and see *(6)
Sia consistently exceeds budget or fails to maintain contracts due to high node churn, difficult to understand
Filecoin should provide detail but due to huge complexity, it is unlikely to be user friendly.