



Sharding in Blockchain Protocols

Enabling Open Web

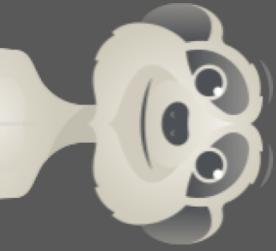
@nearprotocol | near.org



About NEAR

- Developer platform for Open Web powered by layer 1 protocol
- Developer and user friendly
- Scalable blockchain
 - Sharded state
 - Sharded processing
- “ICPC-coin”: 6 ICPC gold medals, 12 ICPC finals
- ex-MemSQL, ex-Google
- Investors include Metastable, Multicoin, Pantera, Coinbase, IOSG and more





Scaling Blockchains

near.org



How you cannot scale

By changing consensus algorithm



How you cannot scale

By changing underlying data structure

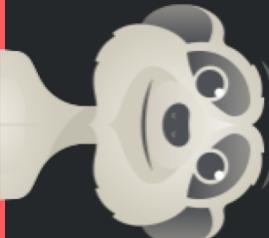


How you cannot scale

By switching to Proof of X



The bottleneck



33	Syncing	#5251832	0x42cb_0d0d	2.00	blk/s	203.6	tx/s	13.2	Mgas/s
18	Syncing	#5251845	0x743c_e0a7	2.40	blk/s	216.7	tx/s	14.0	Mgas/s
23	Syncing	#5251860	0x0a39_4a27	3.20	blk/s	256.7	tx/s	19.0	Mgas/s
28	Syncing	#5251874	0xffff_5fdb	2.80	blk/s	300.8	tx/s	16.4	Mgas/s
33	Syncing	#5251888	0x1dd7_962c	2.80	blk/s	263.6	tx/s	14.5	Mgas/s
39	Syncing	#5251899	0x93ef_0c15	2.20	blk/s	238.4	tx/s	14.7	Mgas/s
44	Syncing	#5251910	0x79fe_c6d5	2.20	blk/s	147.5	tx/s	13.5	Mgas/s
49	Syncing	#5251918	0x76c1_c5ac	1.60	blk/s	170.4	tx/s	10.5	Mgas/s
53	Syncing	#5251935	0x665c_0cd9	3.20	blk/s	274.5	tx/s	15.3	Mgas/s
57	Syncing	#5251950	0x37db_fd61	3.20	blk/s	246.0	tx/s	18.8	Mgas/s
	Syncing	#5251969	0x7d73_cd1d	3.60	blk/s	270.6	tx/s	14.4	Mgas/s
	Syncing	#5251984	0xf84a_ee25	3.20	blk/s	209.5	tx/s	16.2	Mgas/s
	Syncing	#5251994	0x0e52_576e	1.80	blk/s	168.0	tx/s	10.2	Mgas/s
	Syncing	#5252004	0xd93e_99fd	2.20	blk/s	187.8	tx/s	8.0	Mgas/s
	Syncing	#5252015	0x9da0_ba6b	2.00	blk/s	229.8	tx/s	13.4	Mgas/s
	Syncing	#5252031	0xeb72_119f	3.40	blk/s	250.8	tx/s	13.0	Mgas/s
	Syncing	#5252046	0x4840_dba9	2.80	blk/s	285.6	tx/s	14.5	Mgas/s
	Syncing	#5252060	0x0960_b062	3.00	blk/s	236.9	tx/s	16.4	Mgas/s
	Syncing	#5252073	0x2ec2_34b5	2.65	blk/s	236.5	tx/s	12.3	Mgas/s
	Syncing	#5252083	0x422d_137e	1.80	blk/s	202.4	tx/s	13.1	Mgas/s
	Syncing	#5252094	0x0527_ae9d	2.40	blk/s	194.8	tx/s	14.8	Mgas/s
	Syncing	#5252107	0x874a_aa3c	2.60	blk/s	272.6	tx/s	16.8	Mgas/s
	Syncing	#5252125	0x7540_d5a1	2.60	blk/s	240.7	tx/s	17.5	Mgas/s

How you CAN scale

By **significantly** optimizing
transaction processing



How you CAN scale

By **significantly** optimizing
transaction processing

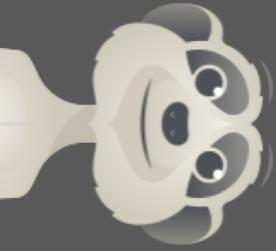


Works well for homogeneous workloads

How you CAN scale

By splitting the work between
nodes in the network



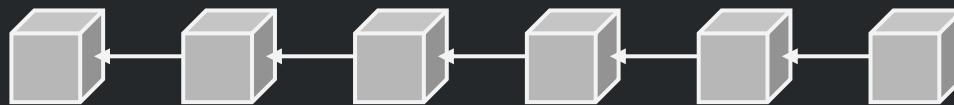


Sharding

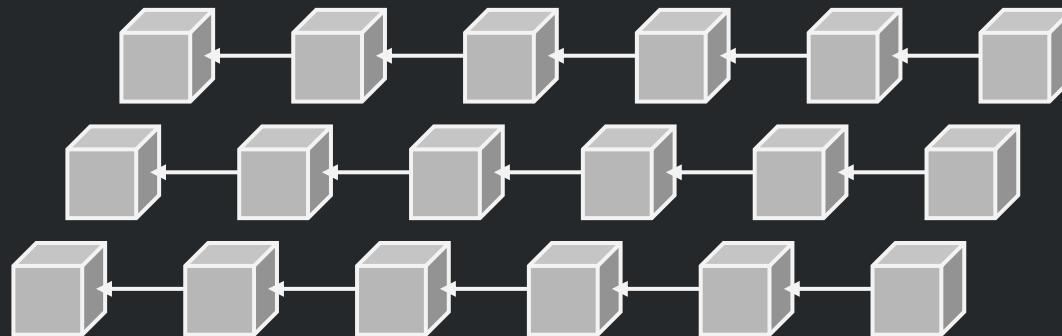
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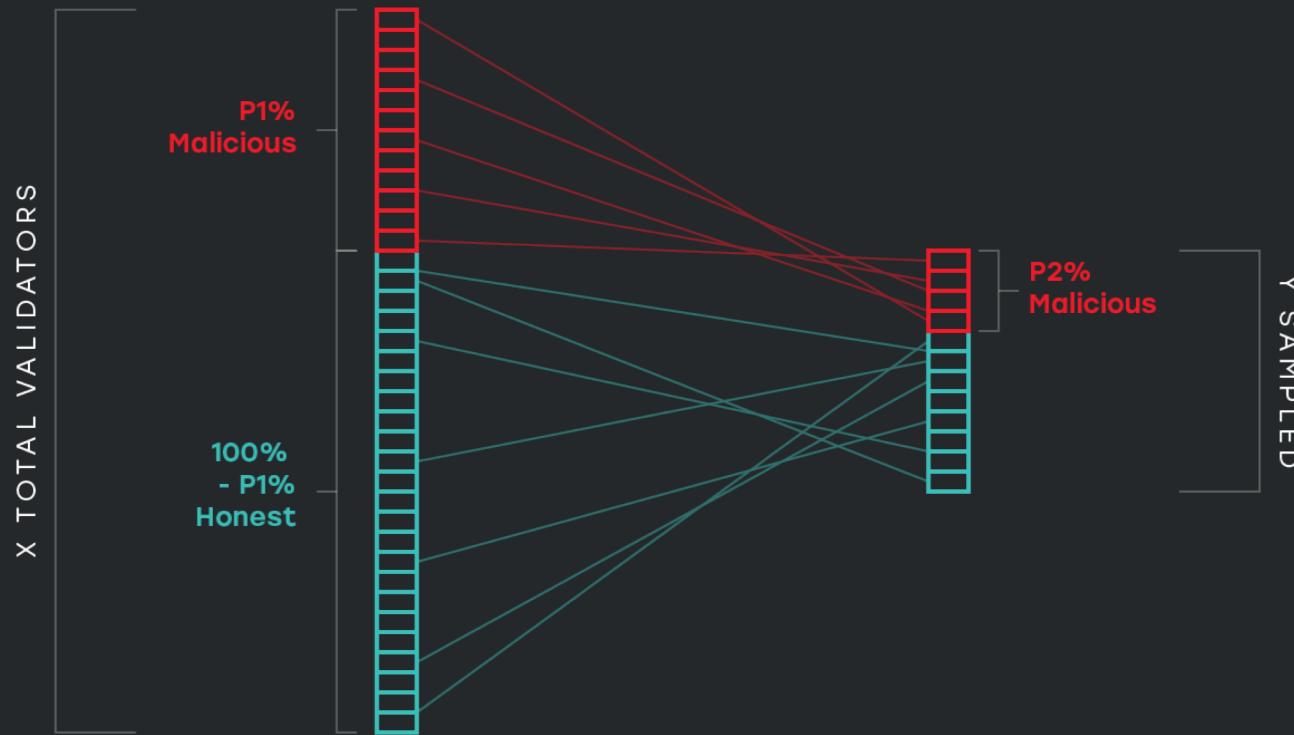
Sharding Overview



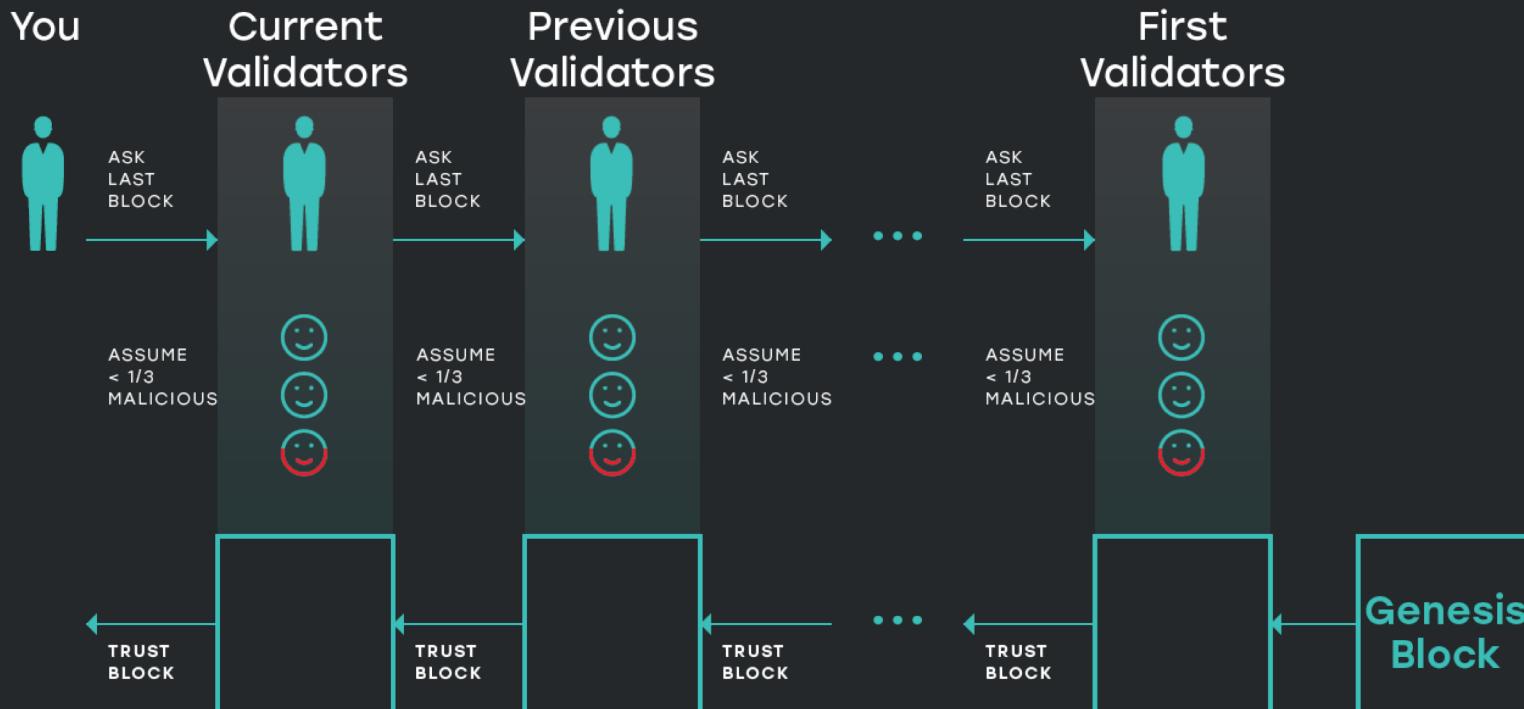
Sharding Overview



Validator Rotation

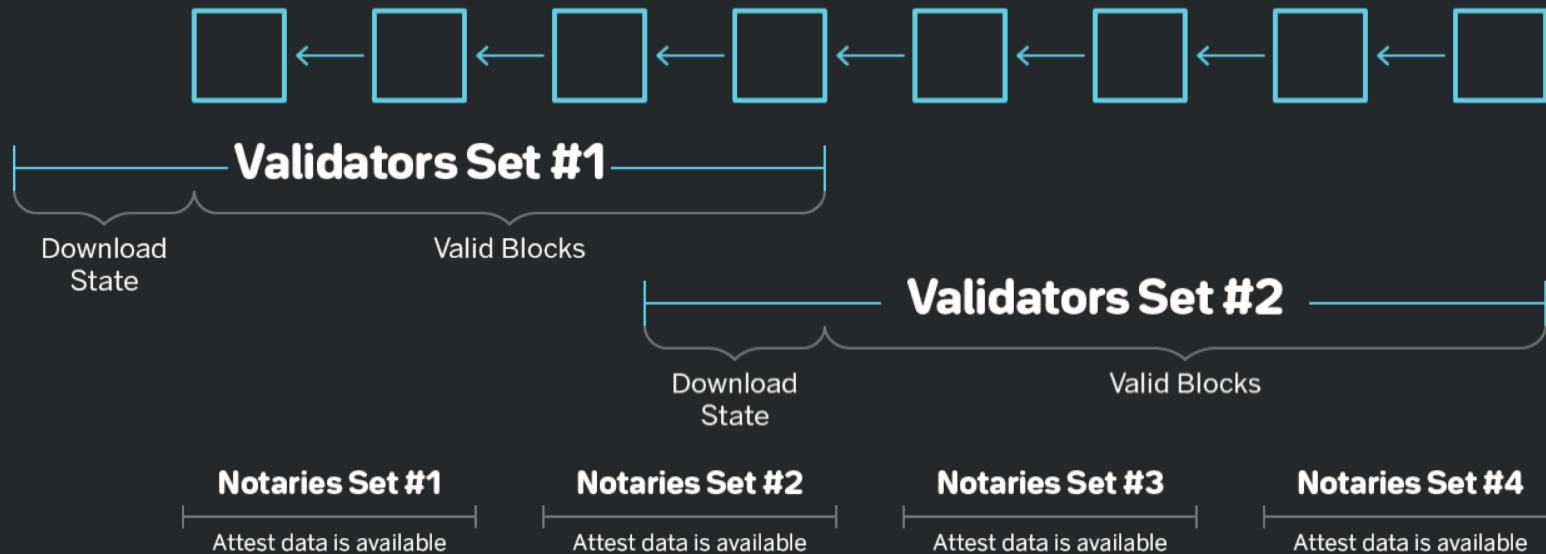


Validator Rotation

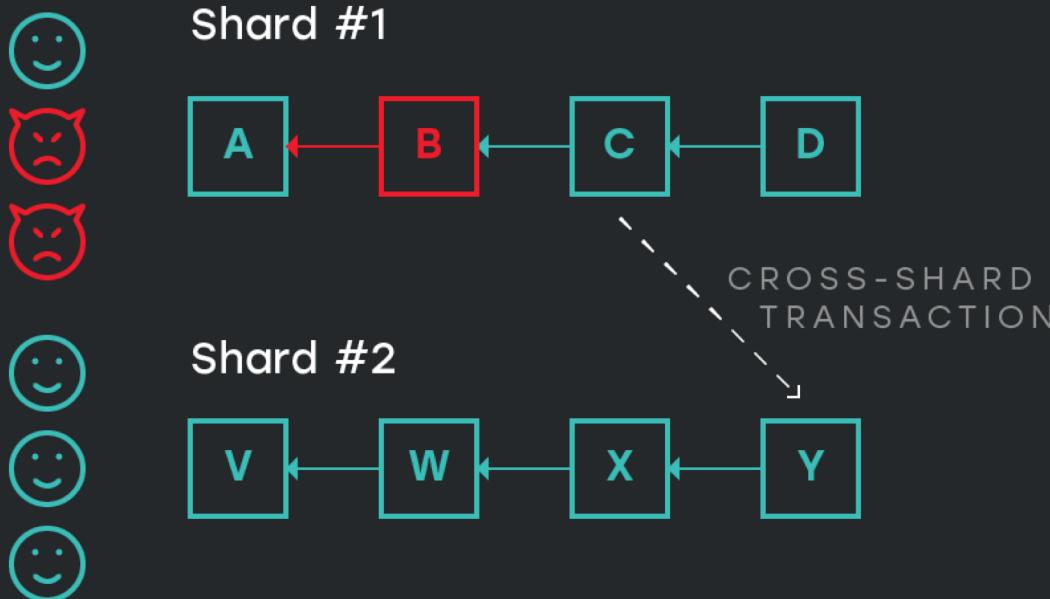


Validator Rotation

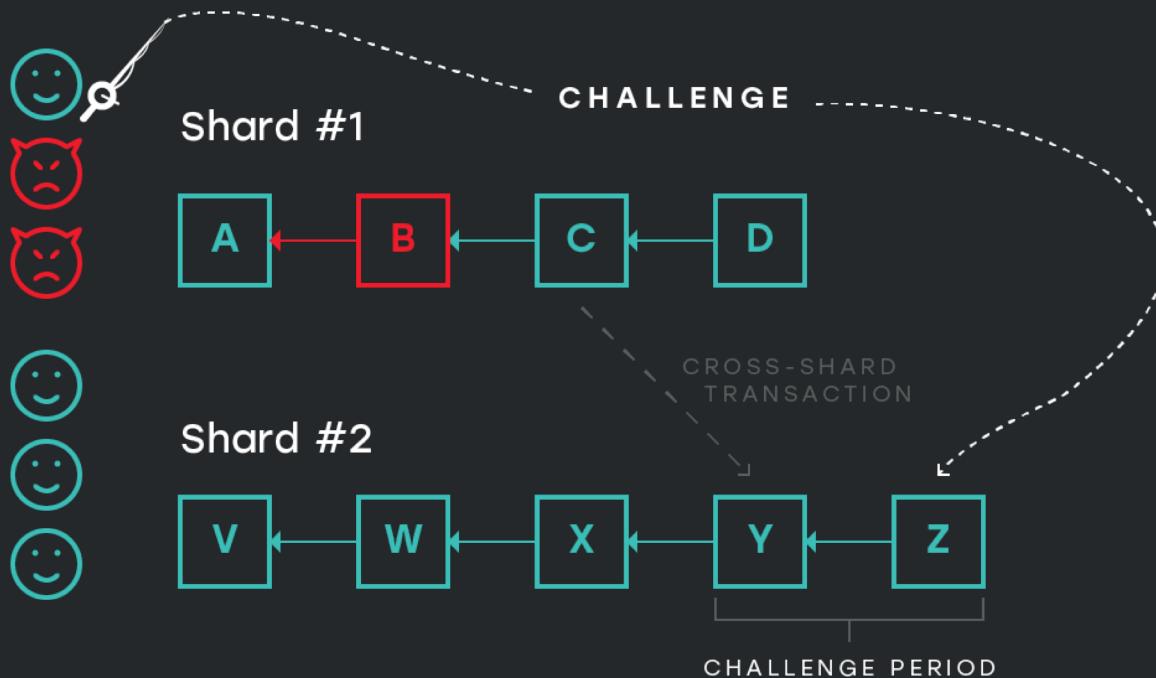
Shard Chain



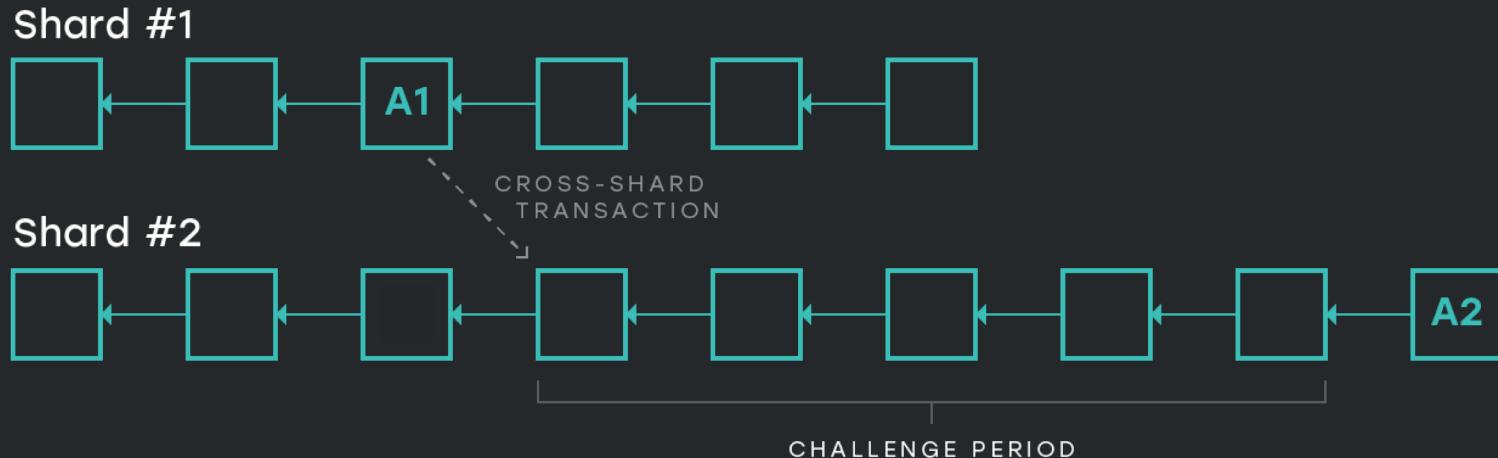
Invalid State Transition



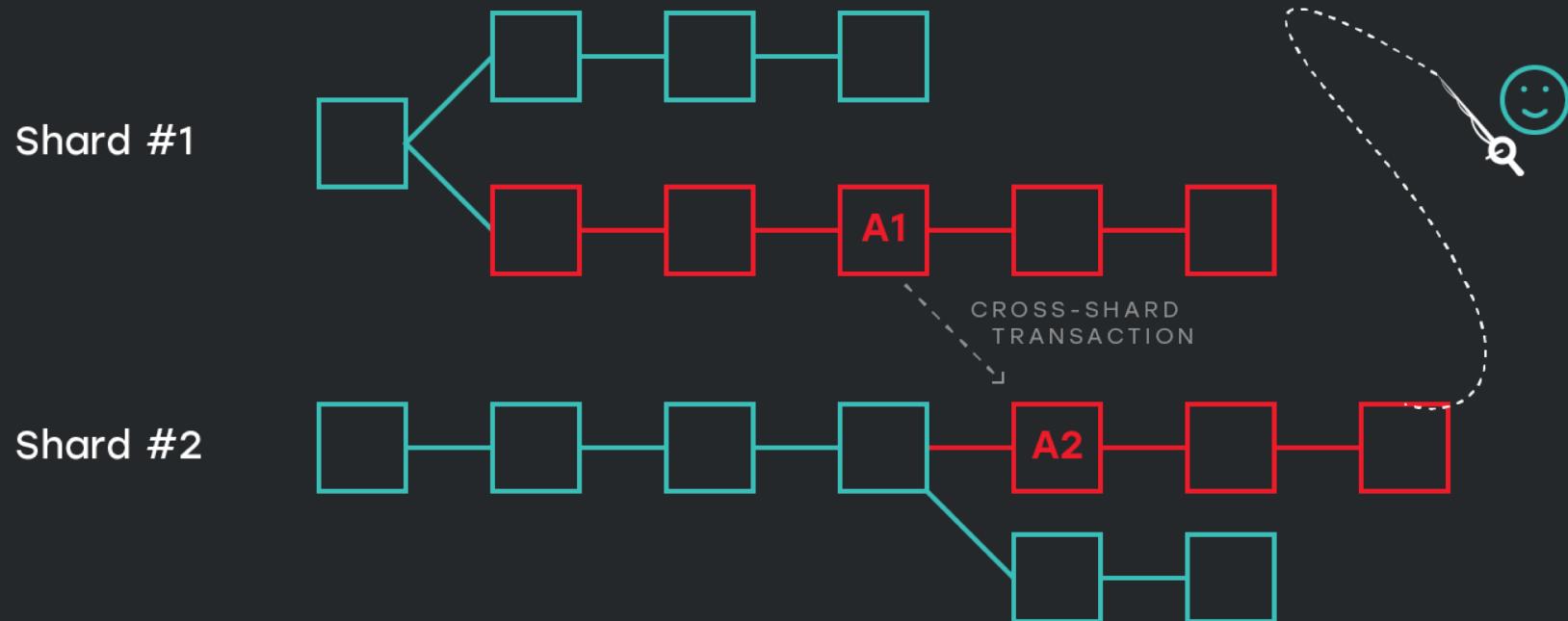
Fisherman



Fisherman Finality



Fisherman Finality



What we didn't cover

- Beacon chain / Relay Chain / Hub;
- Cross-shard transactions;
- Consensus between multiple chains;
- Data availability;

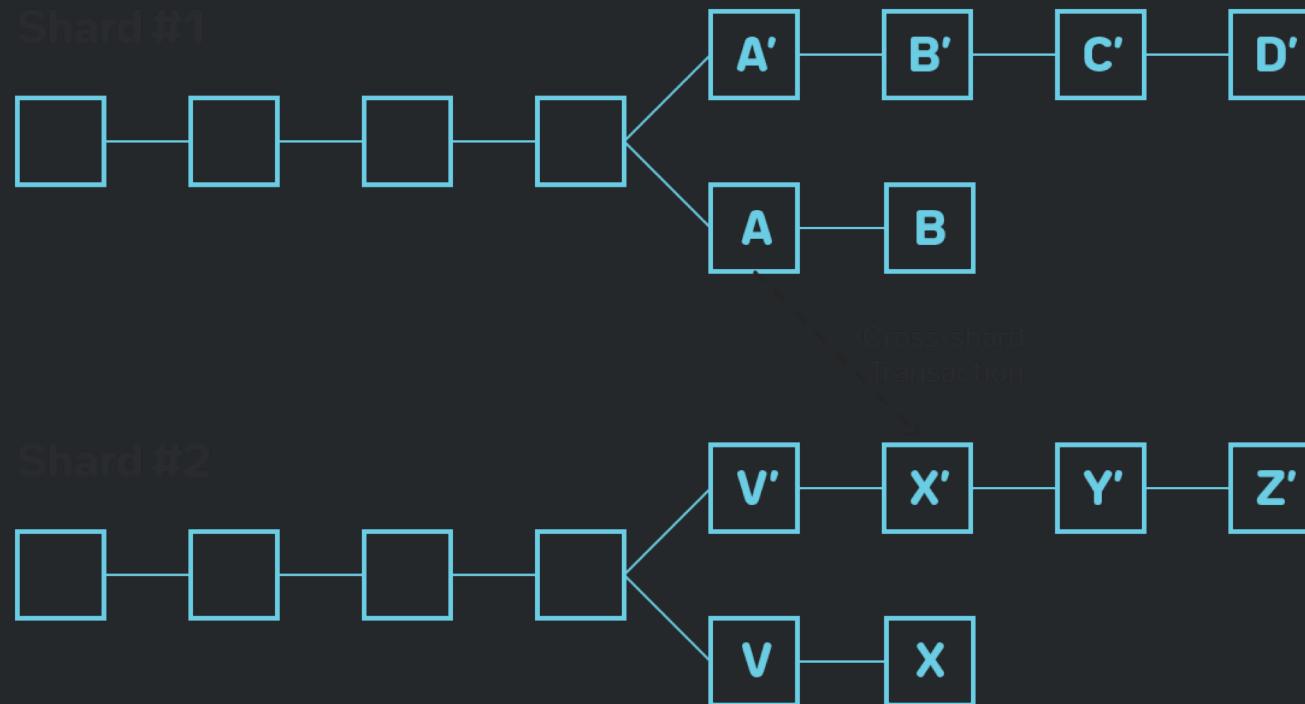


Nightshade

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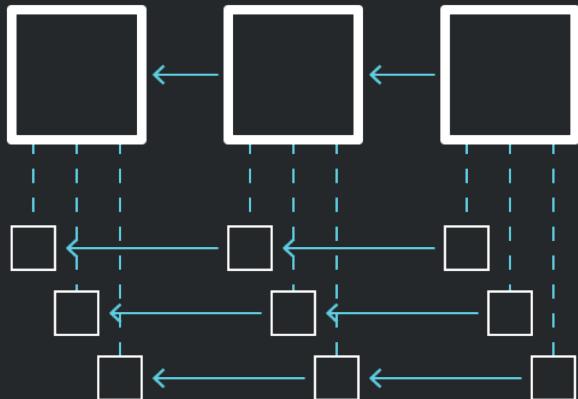


From Shard Chains to Shard Chunks

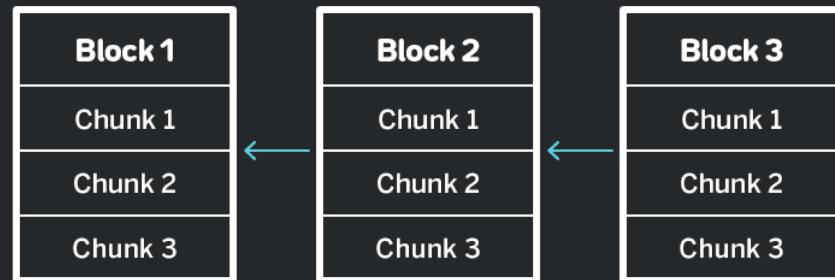


From Shard Chains to Shard Chunks

Beacon Chain

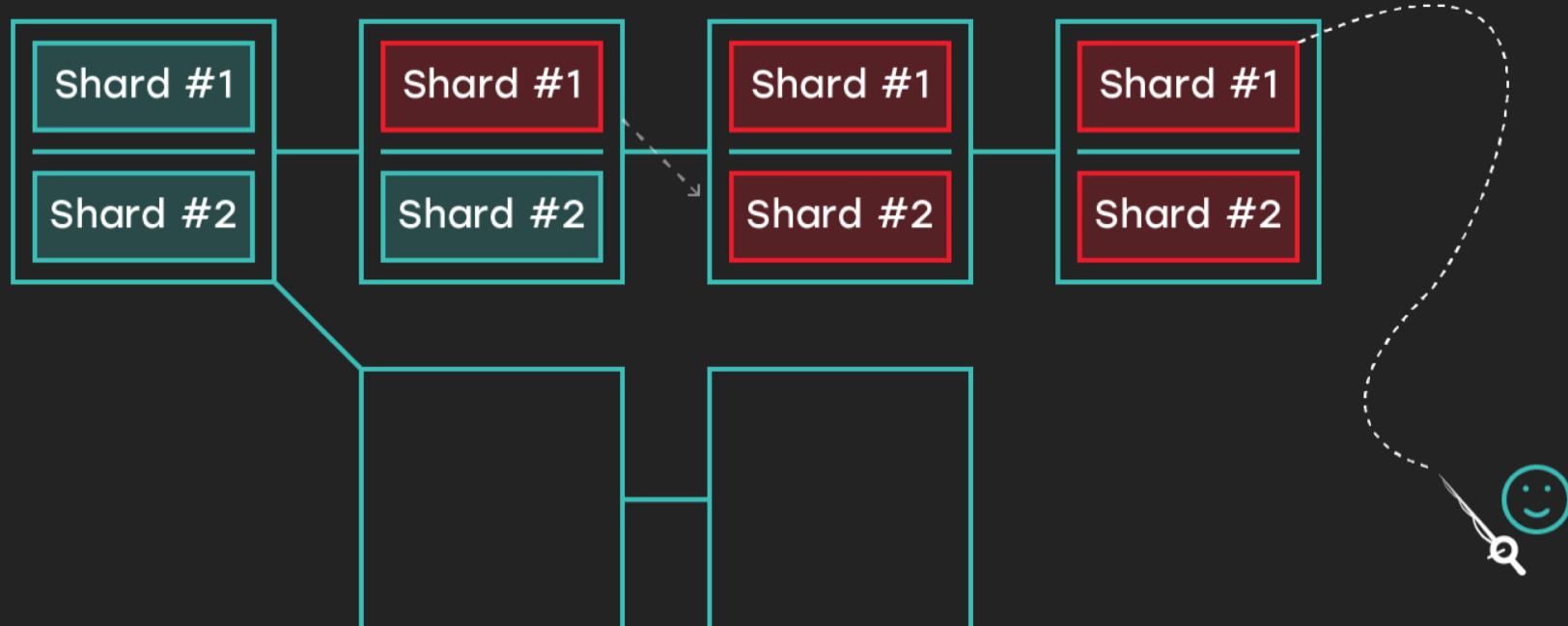


Nightshade

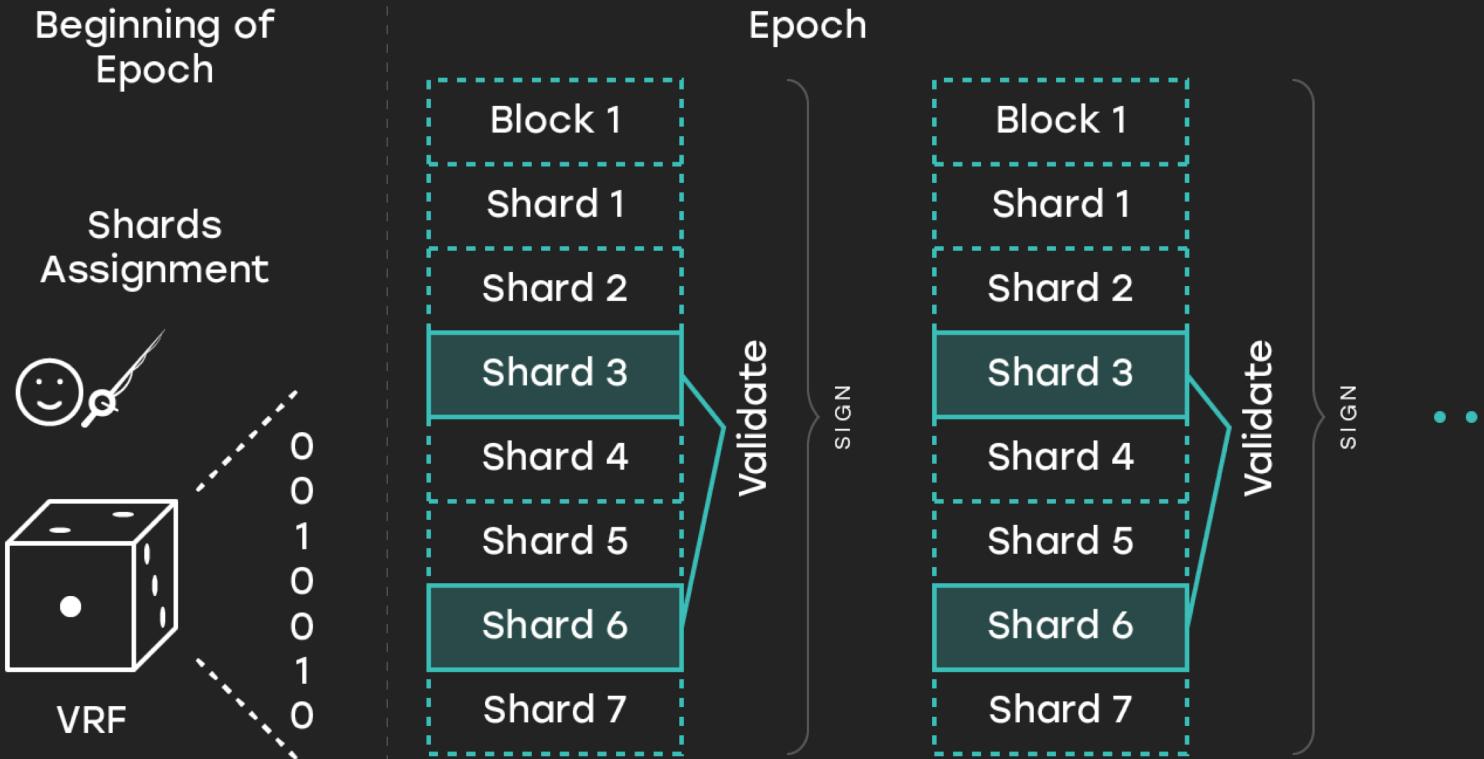


Shard Chains

From Shard Chains to Shard Chunks

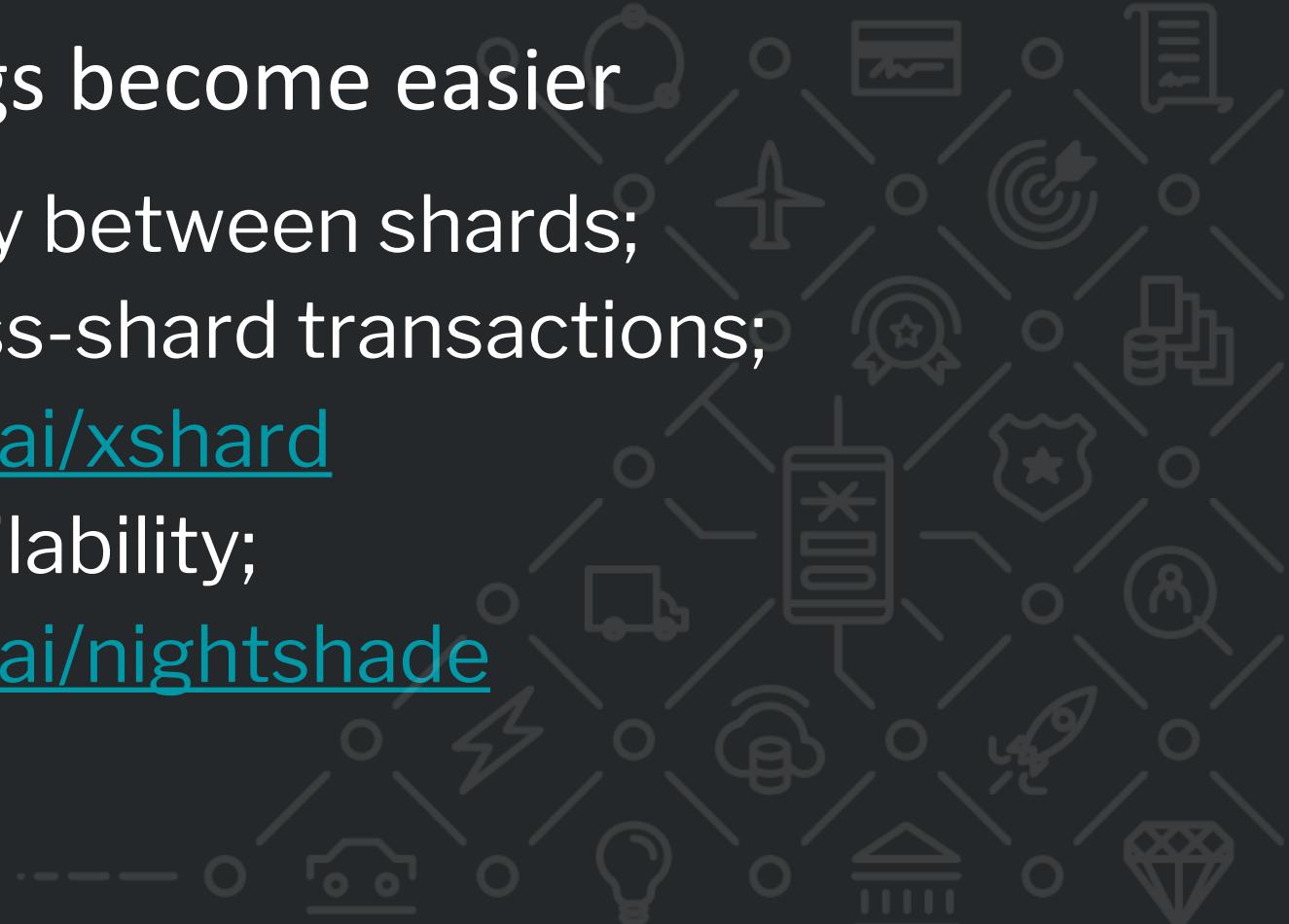


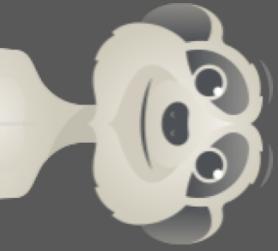
Concealing Validators



Many things become easier

- Atomicity between shards;
- Fast cross-shard transactions;
see near.ai/xshard
- Data availability;
see near.ai/nightshade





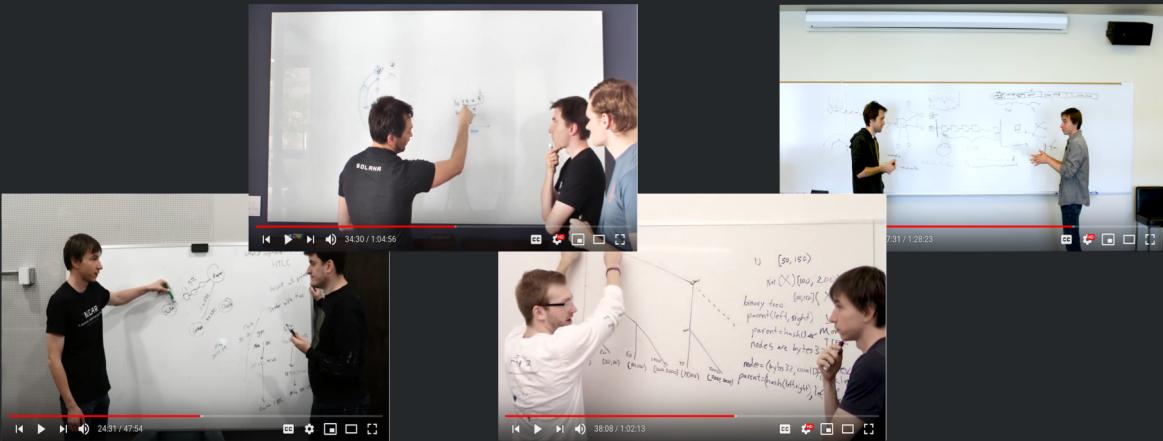
Outro

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near.ai/wbs





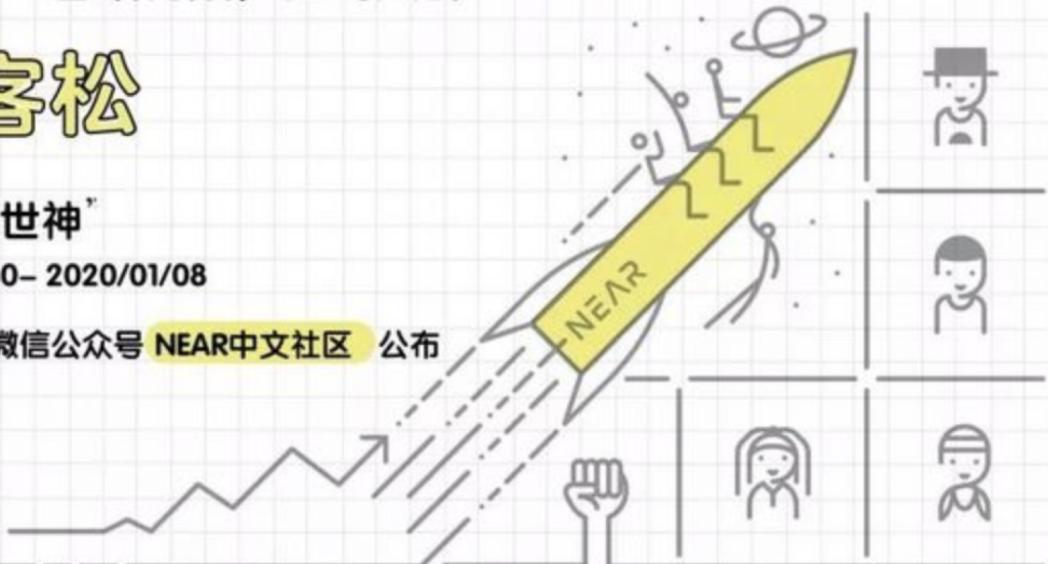
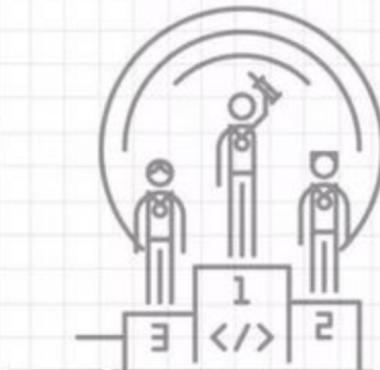
名额有限，扫码入群

黑客松

代号“创世神”

2019/12/30 - 2020/01/08

详情将在微信公众号 **NEAR中文社区** 公布



Shanghai Meetup Jan 9





NEAR

near.ai/wbs

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