What's Sui?
General Overview and Intro to Sui Network

February 8, 2023


encode
CLUB
sui

About Me

Agenda

01 **What is Sui?**
Just what is the Sui Network?

02 **Traditional Blockchain Architecture**
How do legacy blockchains operate?

03 **Sui Blockchain Architecture**
How does the Sui Network operate, and what pain points does it solve?

What is Sui?

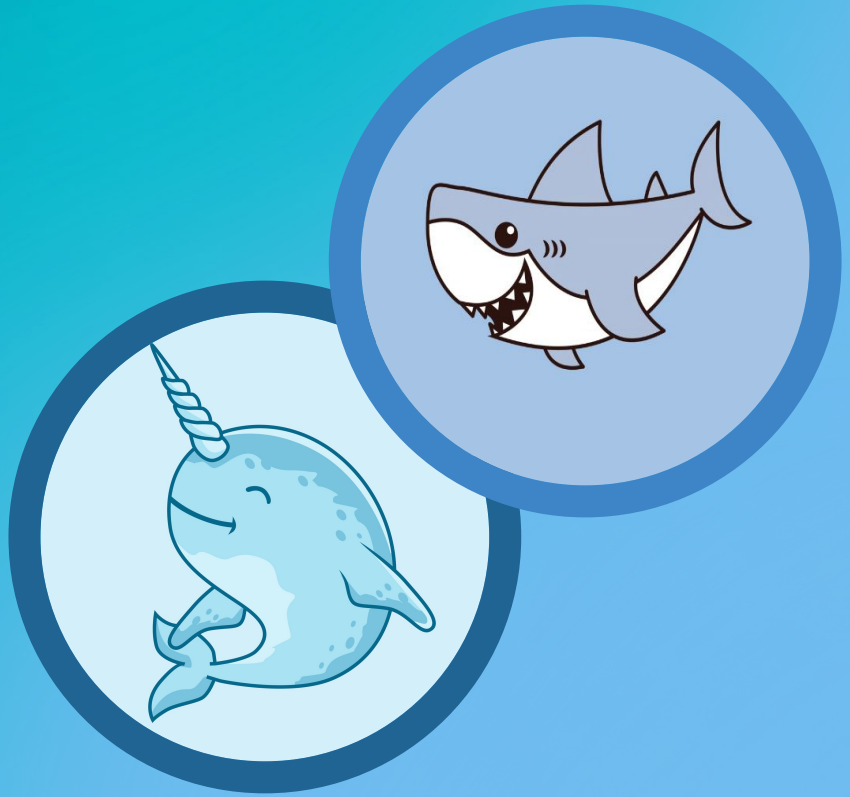
About Sui

Sui is the first permissionless Layer 1 blockchain designed from the ground up to enable creators and developers to build experiences that cater to the next billion users in web3. Sui is horizontally scalable to support a wide range of application development with unrivaled speed at low cost.

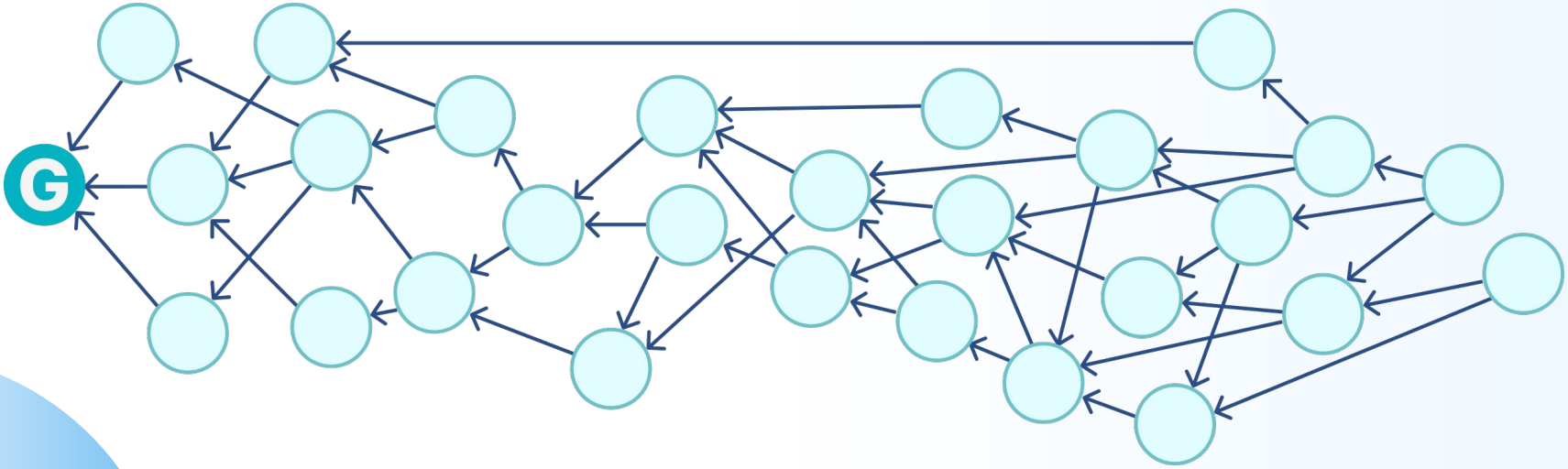
Transactions and Consensus

Simple vs. complex transactions

Narwhal and Bullshark



Directed Acyclic Graph
(DAG)



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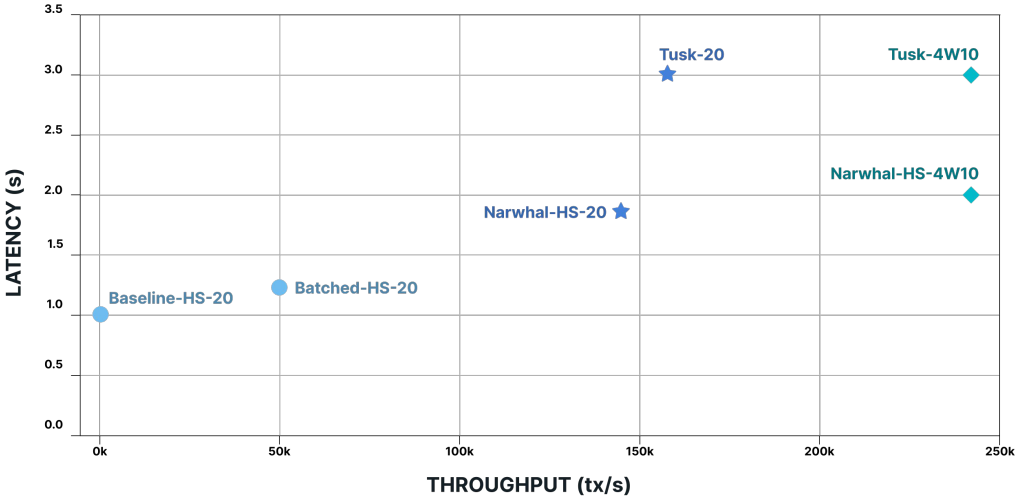
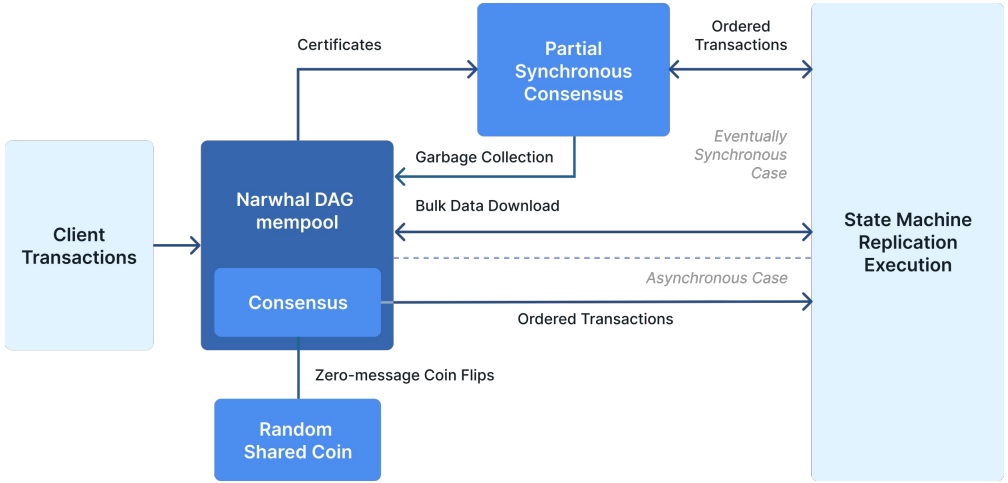
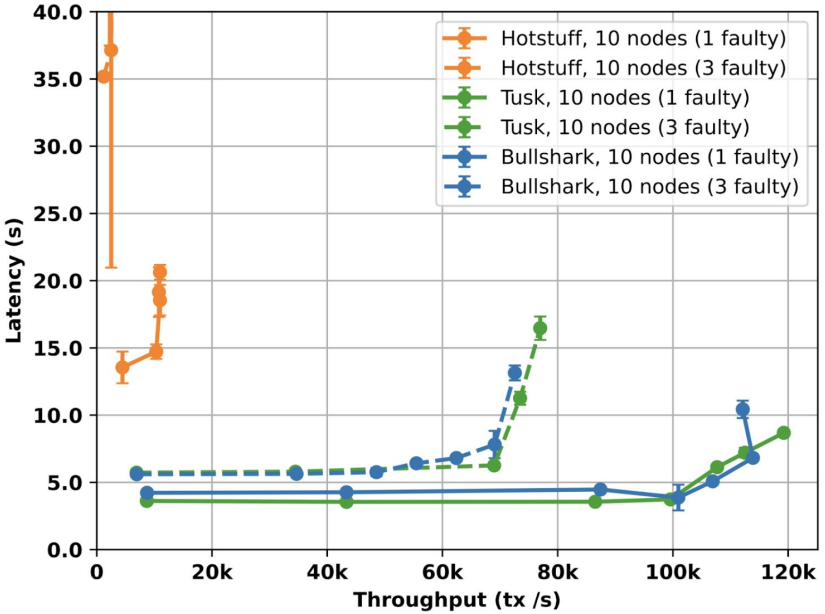
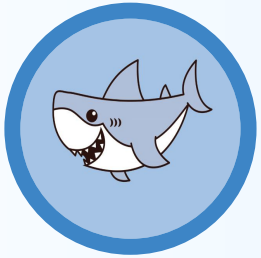

LATENCY (s)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0k
50k
100k
150k
200k
250k
THROUGHPUT (tx/s)
Tusk-20
Tusk-4W10
Narwhal-HS-20
Narwhal-HS-4W10
Batched-HS-20
Baseline-HS-20


Certificates
Partial Synchronous Consensus
Ordered Transactions
Eventually Synchronous Case
Garbage Collection
Client Transactions
Narwhal DAG mempool
Bulk Data Download
State Machine Replication Execution
Asynchronous Case
Consensus
Ordered Transactions
Zero-message Coin Flips
Random Shared Coin

Narwhal





Bullshark

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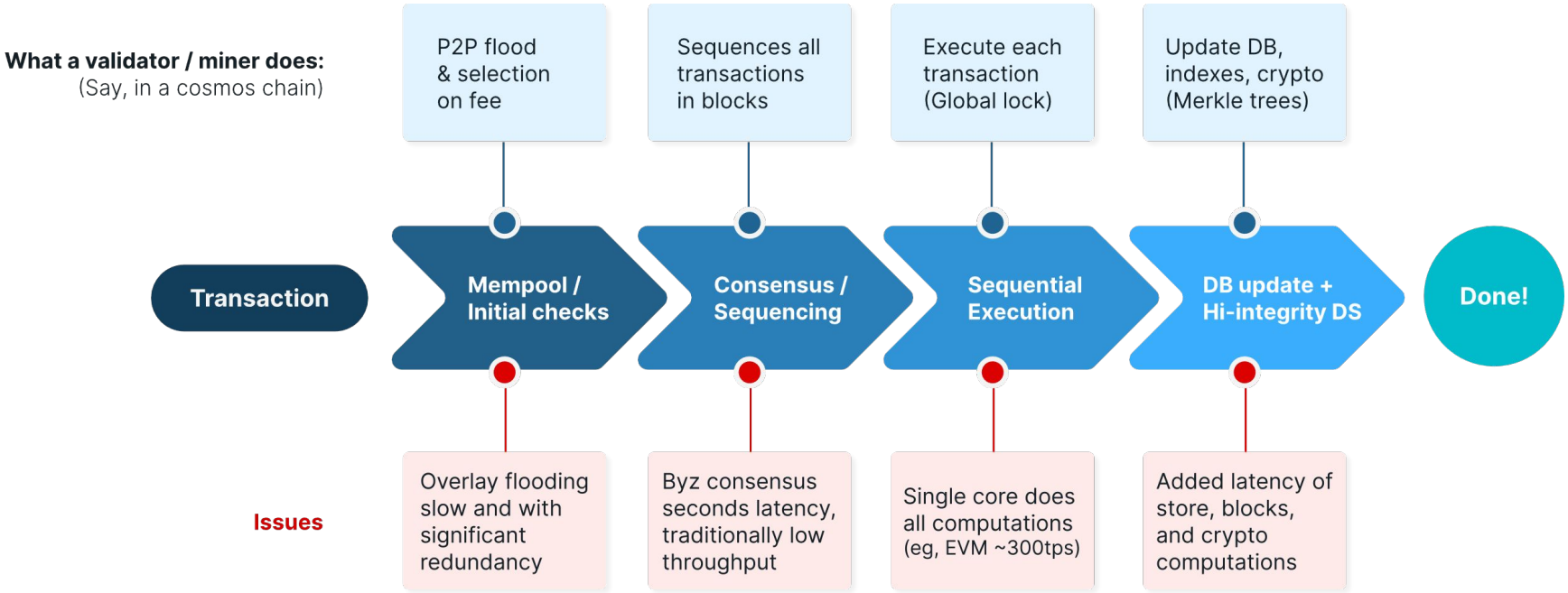
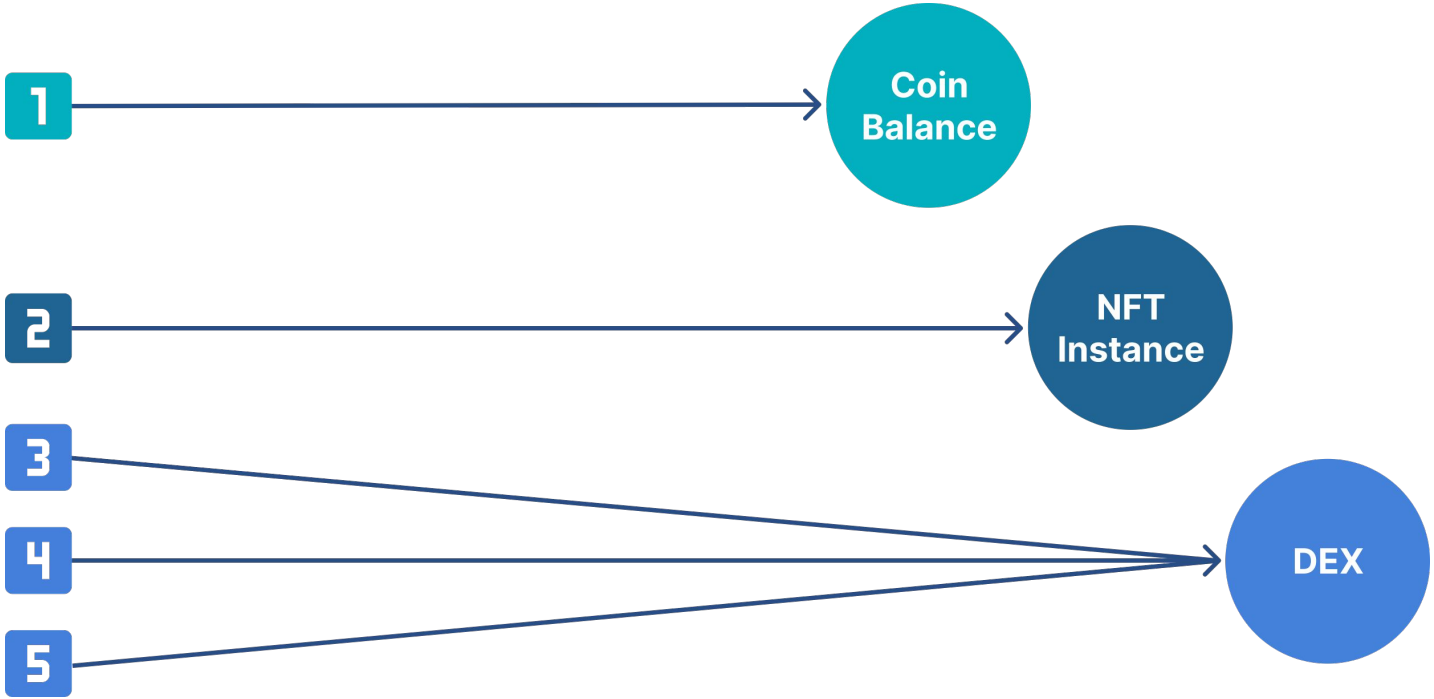

What a validator / miner does:
(Say, in a cosmos chain)
P2P flood & selection on fee
Sequences all transactions in blocks
Execute each transaction (Global lock)
Update DB, indexes, crypto (Merkle trees)
Transaction
Mempool / Initial checks
Consensus / Sequencing
Sequential Execution
DB update + Hi-integrity DS
Done!
Issues
Overlay flooding slow and with significant redundancy
Byz consensus seconds latency, traditionally low throughput
Single core does all computations (eg, EVM ~300tps)
Added latency of store, blocks, and crypto computations


1
Coin Balance
2
NFT Instance
3
4
5
DEX

TL; DR

Other blockchains: choose total order on transactions, then execute

Sui: choose causal order on transactions, then execute

Data model makes dependencies between transactions explicit

Total ordering only required for transactions with shared objects (i.e. AMM)

For transactions without shared objects, no need for consensus

Problems Solved by Sui's Architecture

Horizontal Scaling

Composability

Sparse Replay

On-Chain Storage

Horizontal Scaling

On Sui, each group of transactions are processed in parallel

- If there are more groups of transactions, Sui just needs more cars

Sui scales via intra-validator sharding - more workers for more transactions in parallel

Why is this helpful?

- Predictability of cost
- Infrastructure can keep up with growth

Blockchains having a capacity limit is going to be a barrier of entry. Sui architecture is designed to handle demand spikes

Composability

With Sui one is able to:

- Pass asset as an argument to a function
- Return an asset from a function
- Store an asset in a data structure, or inside another asset

Sui significantly improves upon composability at the contract level (see how easy to chain them) and at the asset level - where objects of different types can be nested in others.

Sparse Replay

Blockchains provide a history of every transaction

However, if a product cares about some of on-chain data, reads can be quite expensive.

- Products on Sui can follow the evolutions of only the objects they care about - sparse replay.

For example, a RPG that put all its characters on Sui can simply watch these objects that represent these characters. They don't need to dig out the data from the Merkle Tree data structure.

On-Chain Storage

Asset data, e.g. race, level, experience of an RPG hero, are now stored as Sui objects. They are not "merklized"

Sui can use conventional means to scale on-chain storage

- Much cheaper to update on-chain assets

TL; DR

Horizontal Scaling enables massive increase in throughput

Composability unlocks new and creative ways we can interact with a blockchain

Sparse Replay allows for developers to focus on their assets only

On-Chain Storage provides a true Web3 approach for data

Bibliography/ Further Reading

docs.sui.io/learn

twitter.com/EvanWeb3/status/1569414567268331520

decentralizedthoughts.github.io/2022-06-28-DAG-meets-BFT/

twitter.com/0xShayan/status/1572010345736314880

What's Next!

Next Workshop: Program Your First Smart Contract in Sui Move

docs.sui.io

15 February 2023

Sui Denver Builder House!

lu.ma/suidenver

Survey

Questions?

Twitter: @0xShayan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