Testing Ethereum

How the Ethereum Foundation uses tools like Kurtosis
for **testing protocol upgrades**

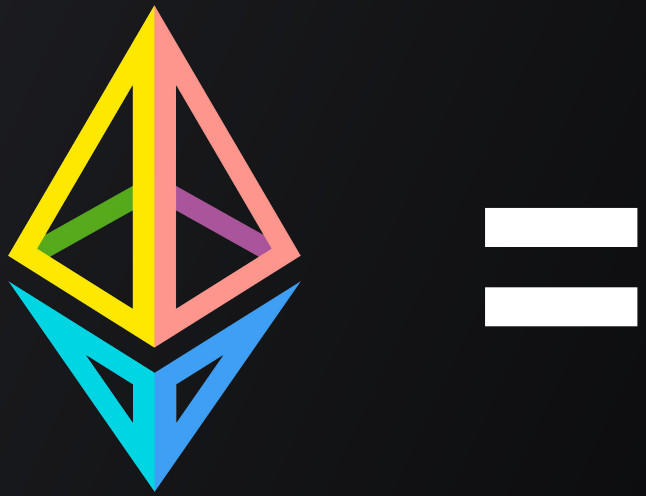
Tedi Mitiku
@drosmitiku

KURTOSIS

The Merge

KURTOSIS

The Merge



KURTOSIS

The Merge

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KURTOSIS

The Merge

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My Goal

- Blockchain testing != easy
- How EF does it
- Kurtosis?
- You<>Blockchain dev/testing<>Kurtosis?

How do you spin up Ethereum on your computer?

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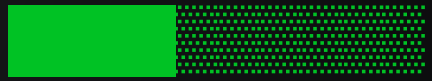
Traditional long process

Local Ethereum loading…

- Generate data to configure blockchain
  - Configure Genesis
  - Which fork? (forks)
- Spin up Ethereum nodes
  - EL + CL client software
    - Lodestar, nimbus, geth, besu, prysm, netheremind
  - Setup with (identical) genesis data
  - Validator keys and



- secrets
  - Get them to talk to each other (network configuration)
  - Additional tools
  - Explorer, wallet, tx spammer?
  - Monitoring?

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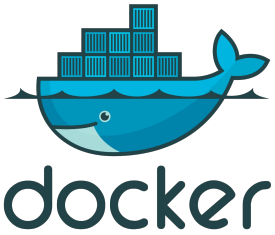
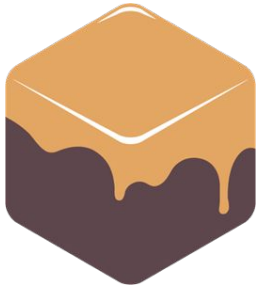
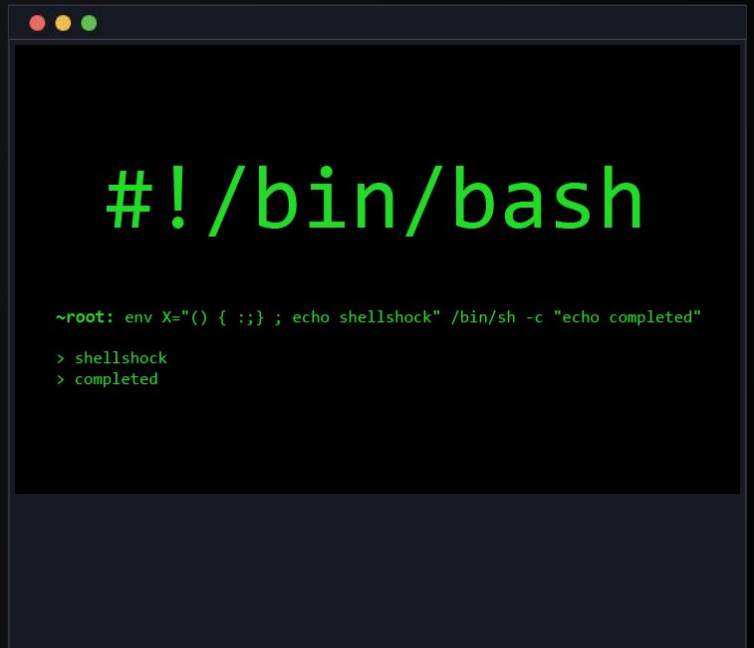
Existing tools

Local Ethereum loading…







or

or

do the same thing

or
do the same thing
in 1 line

```
$ brew install kurtosis-tech/tap/kurtosis-cli

$ kurtosis run github.com/kurtosis-tech/ethereum-package
```

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```

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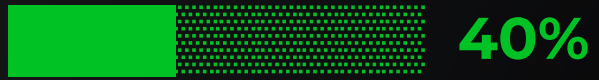
Remember where we started?



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- Validator keys and secrets
  - Get them to talk to each other (network configuration)
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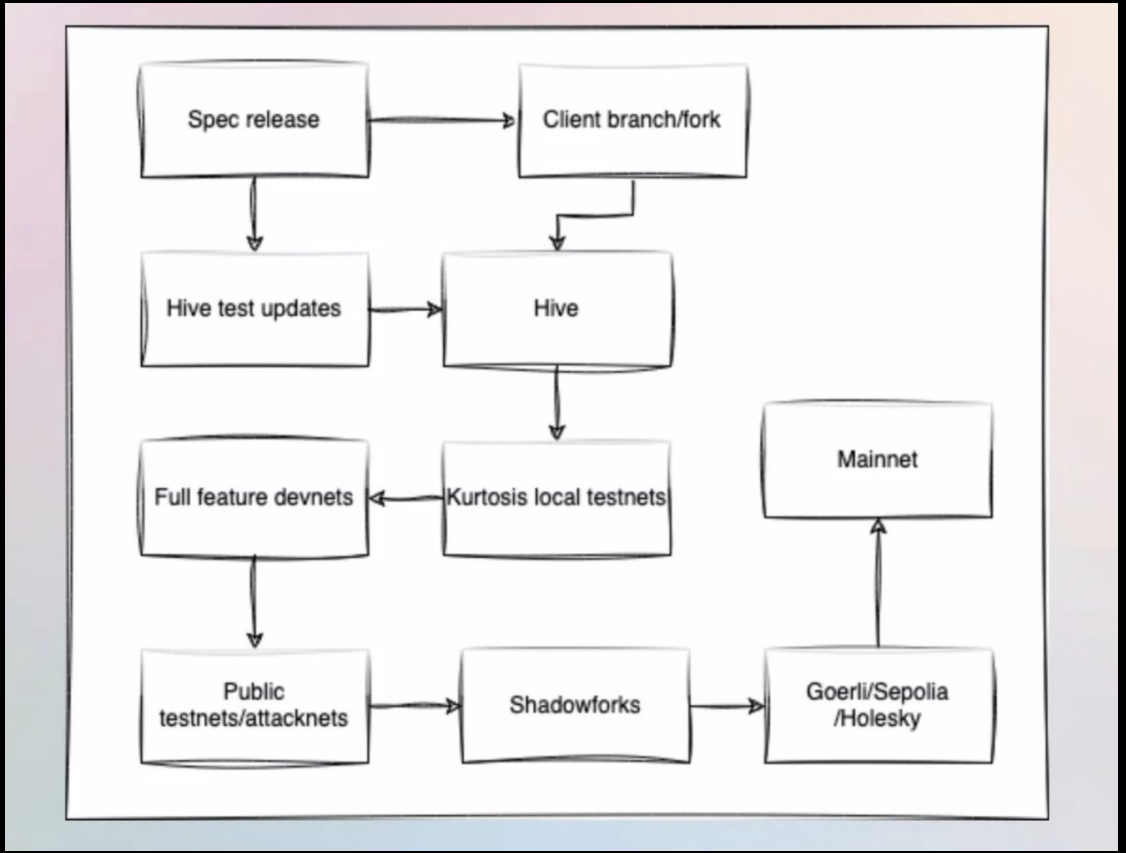
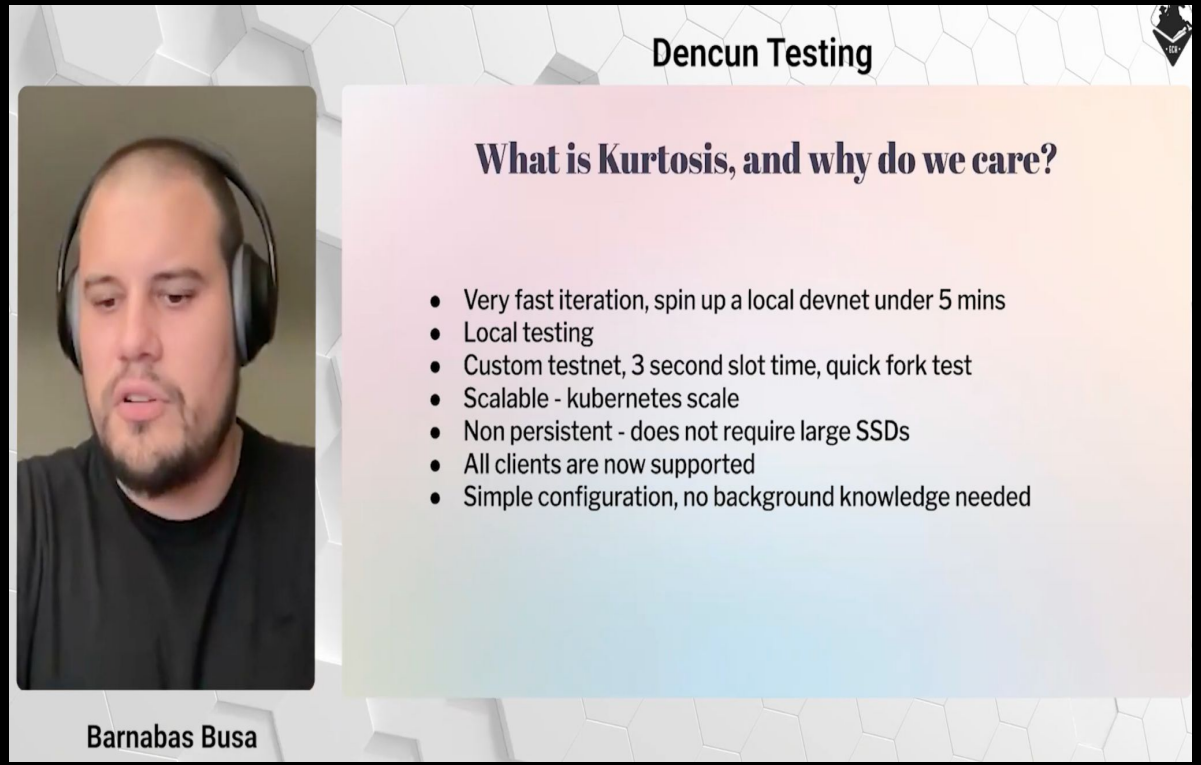
EF <> Kurtosis


Spec release
Client branch/fork
Hive test updates
Hive
Full feature devnets
Kurtosis local testnets
Mainnet
Public testnets/attacknets
Shadowforks
Goerli/Sepolia /Holesky

EF <> Testing


Dencun Testing
What is Kurtosis, and why do we care?
Very fast iteration, spin up a local devnet under 5 mins
Local testing
Custom testnet, 3 second slot time, quick fork test
Scalable - kubernetes scale
Non persistent - does not require large SSDs
All clients are now supported
Simple configuration, no background knowledge needed
Barnabas Busa

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Some other Notes

- EF == decentralized == ⇧coordination
- Multiple DevOps / testing teams
- Variety of tests
  - Spec
  - Regression
  - Scale
  - Chaos
  - Fuzzing

Demo: Running an MEV Ethereum Test

```
$ git clone git@github.com:kurtosis-tech/protocolberg.git

$ go test -v -timeout=20m ./
```

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In the Wild....

dencun-devnet-8 specs

📣 4844 requires a trusted setup file, Please ensure that there is a way for us to specify the file through a runtime flag such as `--trusted-setup-file` (or similar). If the file is baked in during compile, please ensure that the flag would indeed override the file. This is a **MUST** requirement for devnet 8. If your client does not support the override, we can't include it in the devnet.

📣 The specs listed here is currently for hive and only once hive is green we will move on to client deployment on devnet-9.
Until we have enough clients green, 4844-devnet-8 is the canonical chain.

EIP List for Dencun

EIP-1153: Transient storage opcodes
EIP-4844: Shard Blob Transactions
EIP-4788: Beacon block root in the EVM
EIP-5656: MCOPY - Memory copying instruction
EIP-6780: SELFDESTRUCT only in same transaction

DevOps @Ethereum
@EthPandaOps

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In the Wild....

Bug Basher Hall Of Fame

Column 2	Column 1	Aa Title
Bugs Found:	**GitHub Account**	**Name (Twitter)**
https://github.com/ledgerwatch/erigon/issues/8258	https://github.com/mohasdev	@mohasdev
https://github.com/ledgerwatch/erigon/issues/8257	https://github.com/mohasdev	@mohasdev
https://github.com/ledgerwatch/erigon/issues/8255	https://github.com/mohasdev	@mohasdev
https://github.com/paradigmxyz/reth/issues/4701	https://github.com/mohasdev	@mohasdev
https://github.com/NethermindEth/nethermind/issues/6116	https://github.com/mohasdev	@mohasdev
https://github.com/NethermindEth/nethermind/issues/6115	https://github.com/m	
https://github.com/ethereum/go-ethereum/issues/28168	https://github.com/m	
https://github.com/hyperledger/besu/issues/5915	https://github.com/m	
https://github.com/hyperledger/besu/issues/5914	https://github.com/m	
https://github.com/ethereum/go-ethereum/issues/28169	https://github.com/mohasdev	@mohasdev

Blockchain Security Researcher

@mohasdev

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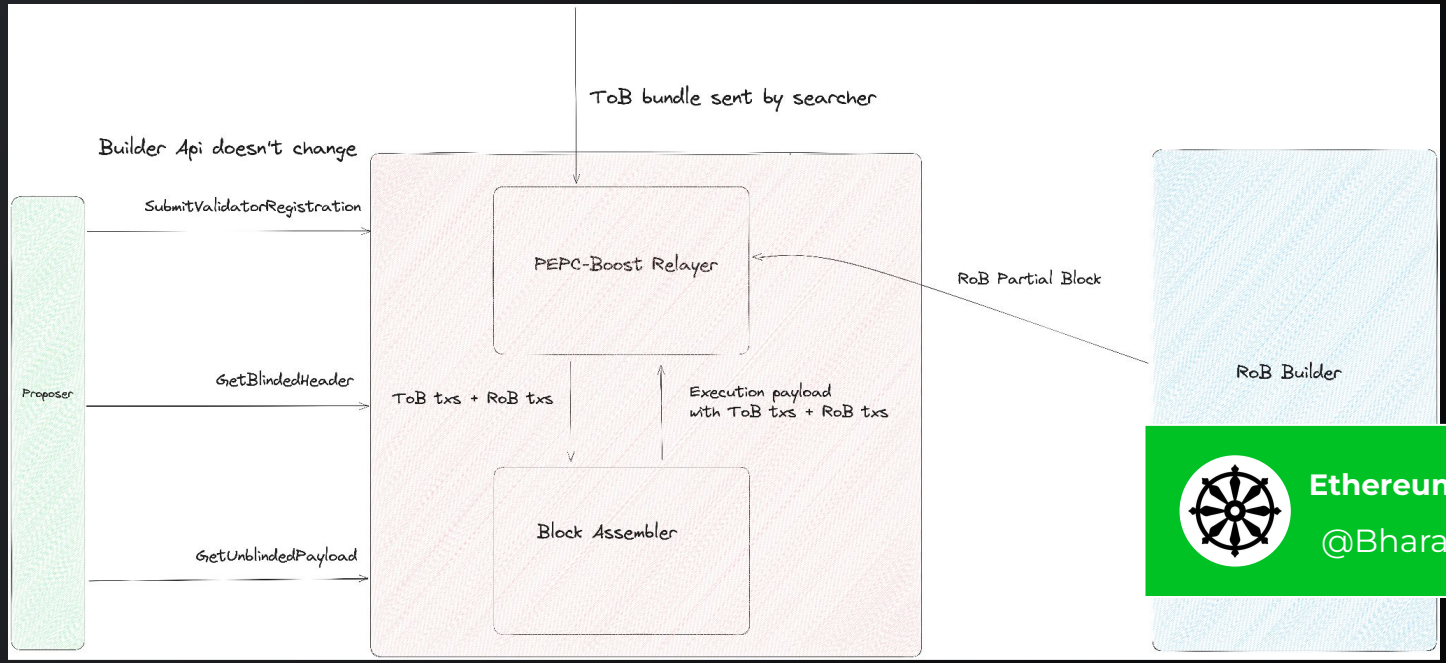
In the Wild....



Ethereum Researcher
@BharathVedarth1

wait

wait

so what is Kurtosis?

Make building distributed systems as easy as building single server apps

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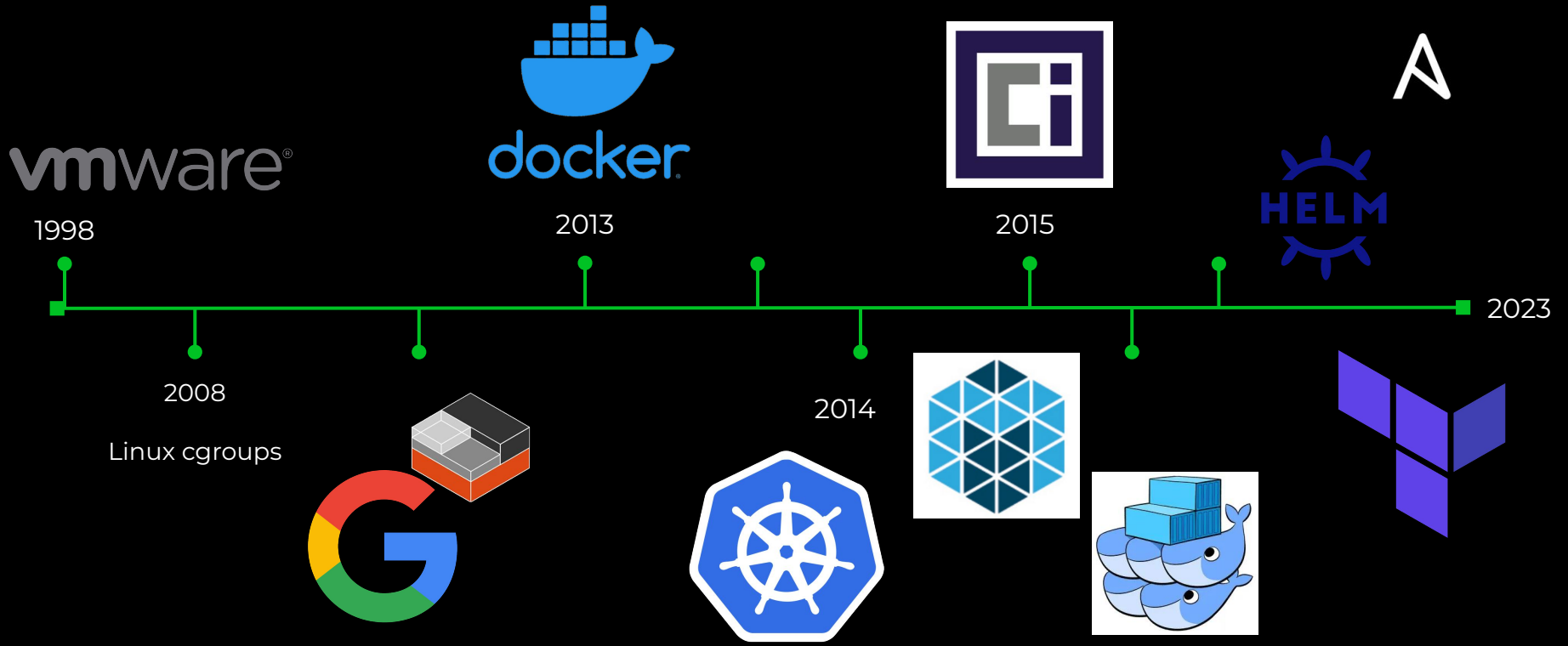
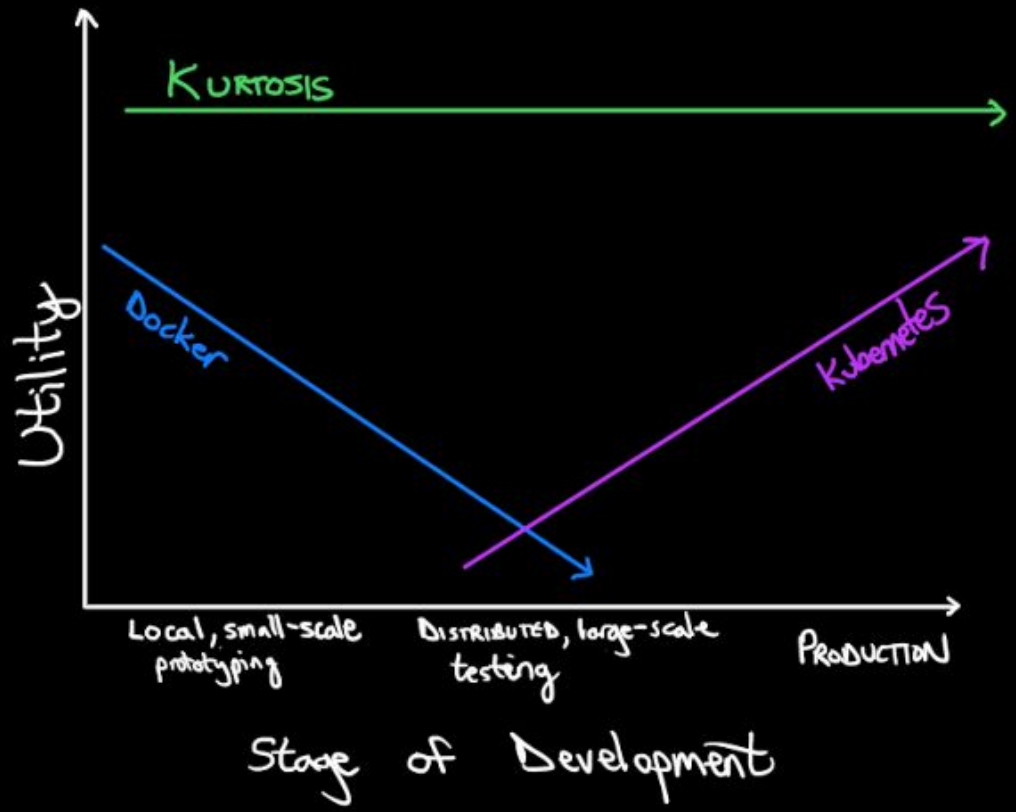
Brief History of Containerization




Kurtosis
Utility
Docker
Kubernetes
Local, small-scale prototyping
Distributed, large-scale testing
Production
Stage of Development

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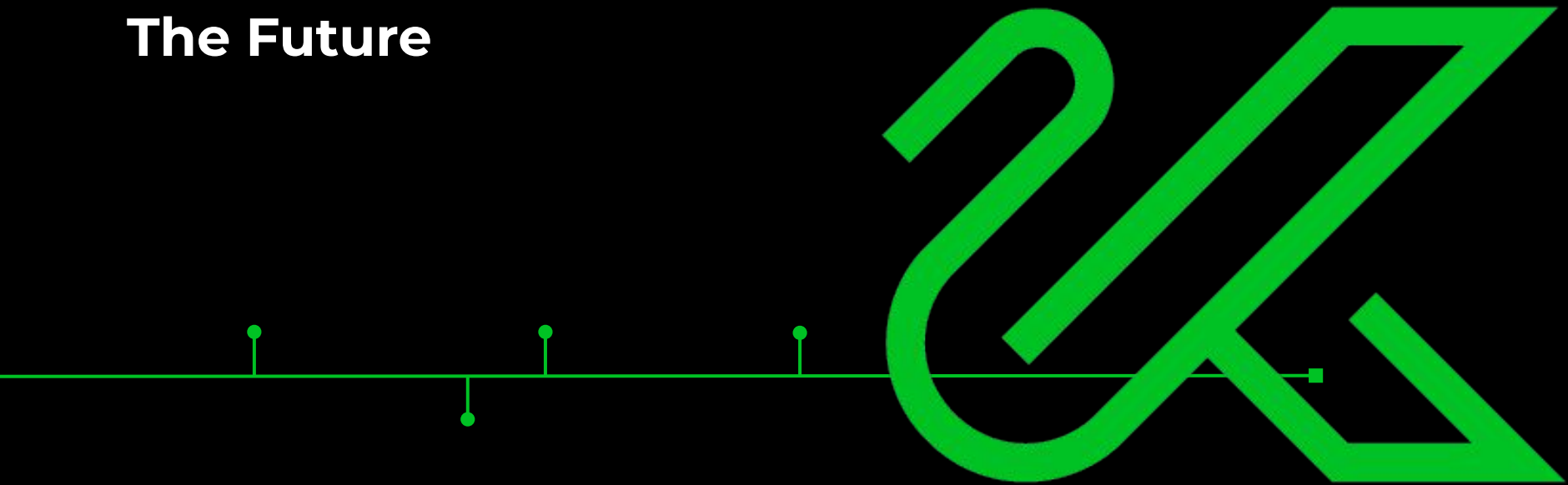
The Future



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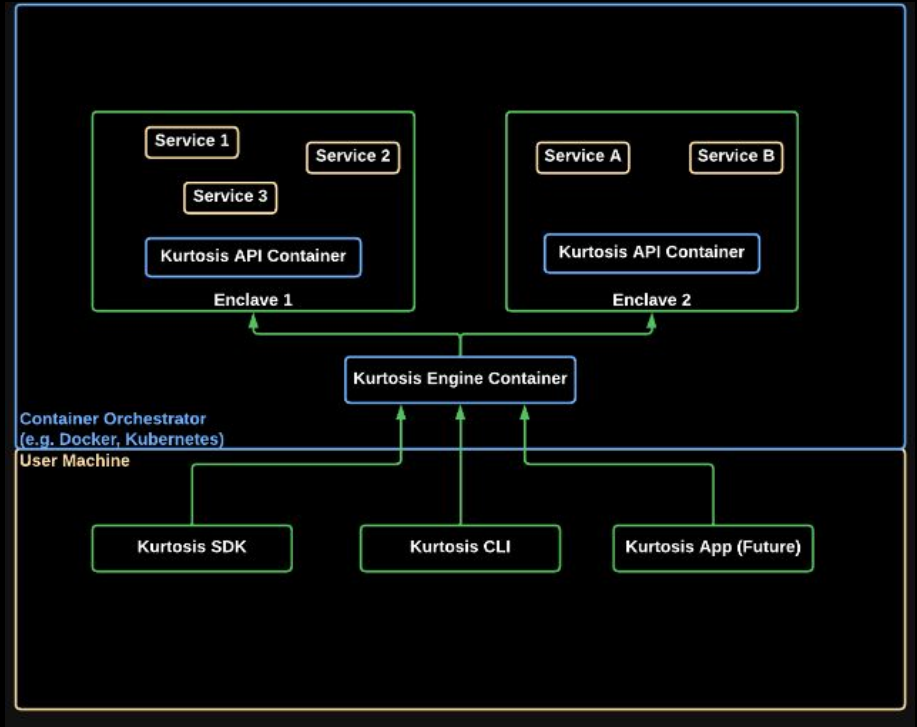
How? One tool for entire SDLC



You <> Ethereum <> Kurtosis

1. Find something to work on (EIP's, Bug Bashing, Your Next Research Project)
2. Write a Kurtosis Starlark Package
3. Let us know about it!

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The End. Thank you! Questions?

@KurtosisTech
github.com/kurtosis-tech
www.kurtosis.com