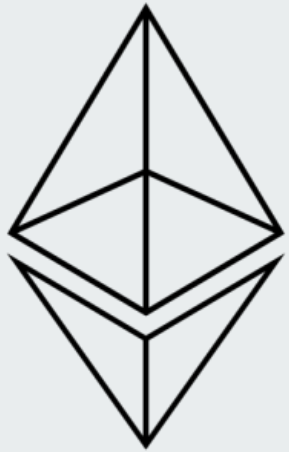
What is this Ethereum Thing Anyways?

Waterloo Ethereum Developer Meetup
September 25th, 2018
Hernando Castano



What is Ethereum?

“Open blockchain platform that lets anyone build and use decentralized applications that run on blockchain technology.”

http://ethdocs.org/en/latest/introduction/what-is-ethereum.html

That's All Folks!

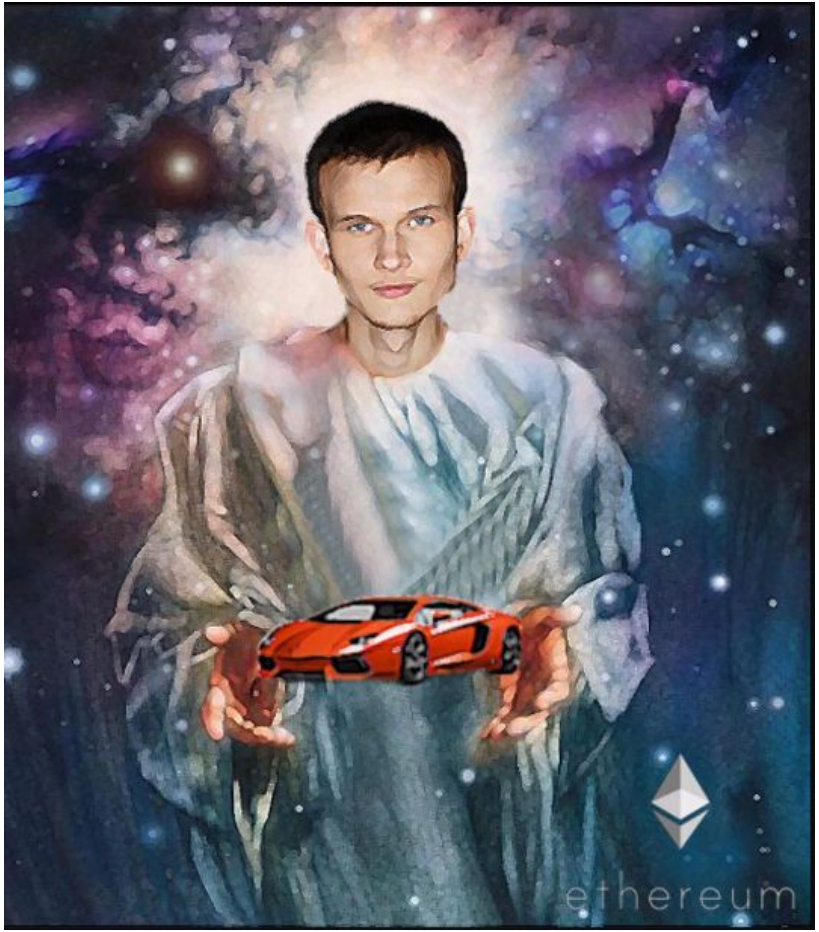
Presentation Overview

- A Brief History of Ethereum
- How Does it Work?
- Ecosystem

History of Ethereum

Vitalik-Lambo-Jesus

- In 2011 Vitalik Buterin saw a need Bitcoin to include a usable scripting language
- Wrote the Ethereum Whitepaper in November 2013
- Work on Ethereum begun in 2014
    - Dropped out UWaterloo for this
- Crowdfund happened in 2014, raising $18 million



The Vitalik Buterin Show

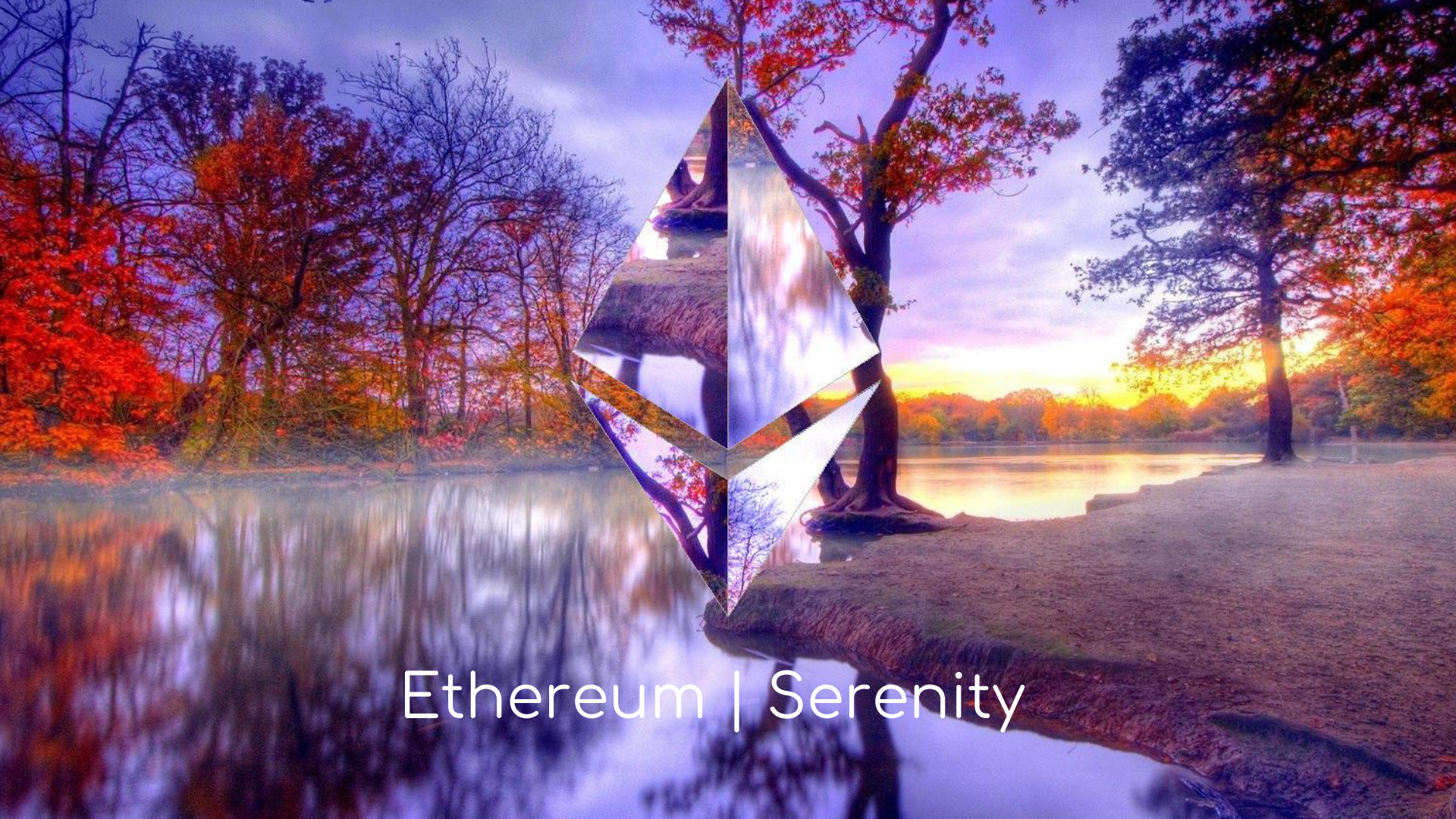
https://www.reddit.com/r/ethtrader/comments/6ecxfu/the_vitalik_buterin_show_everybody_gets_a_lambo/

Ethereum Network Releases

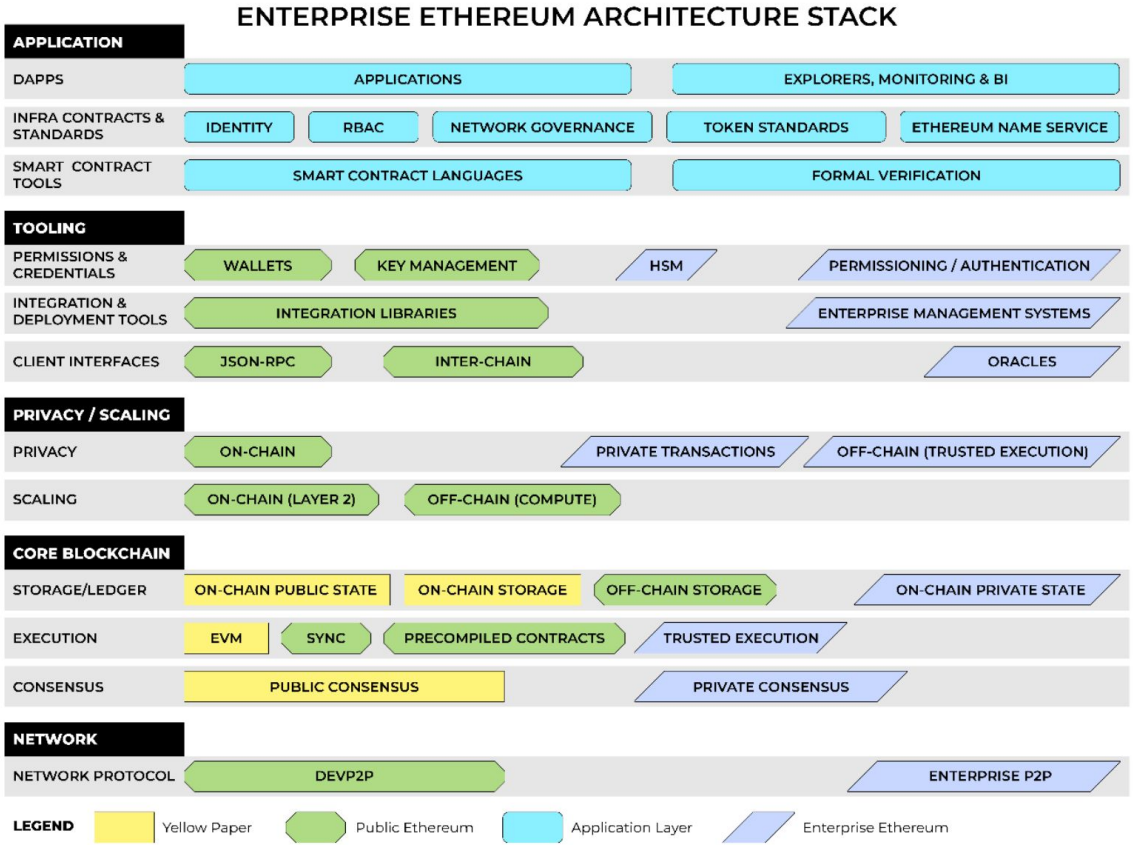
ETHEREUM
FRONTIER

ethereum
HOMESTEAD RELEASE
BLOCKCHAIN APP PLATFORM

Ethereum Metropolis


Ethereum | Serenity

How Does it Work?

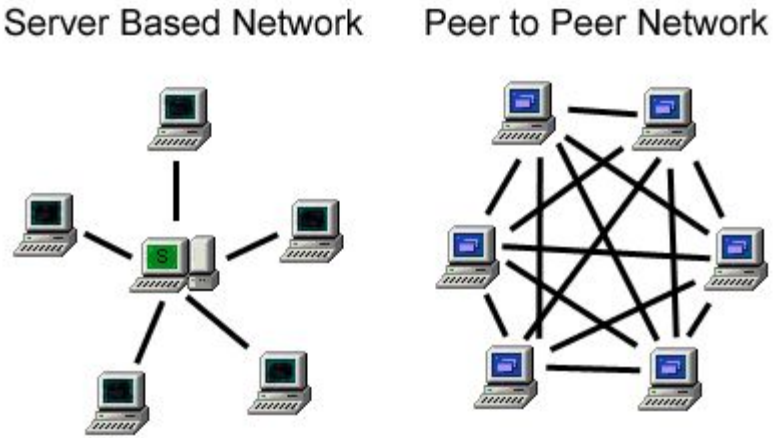


The Ethereum Stack

https://entethalliance.org/wp-content/uploads/2018/05/EEA-Architecture-Stack-Spring-2018.pdf

Networking Layer

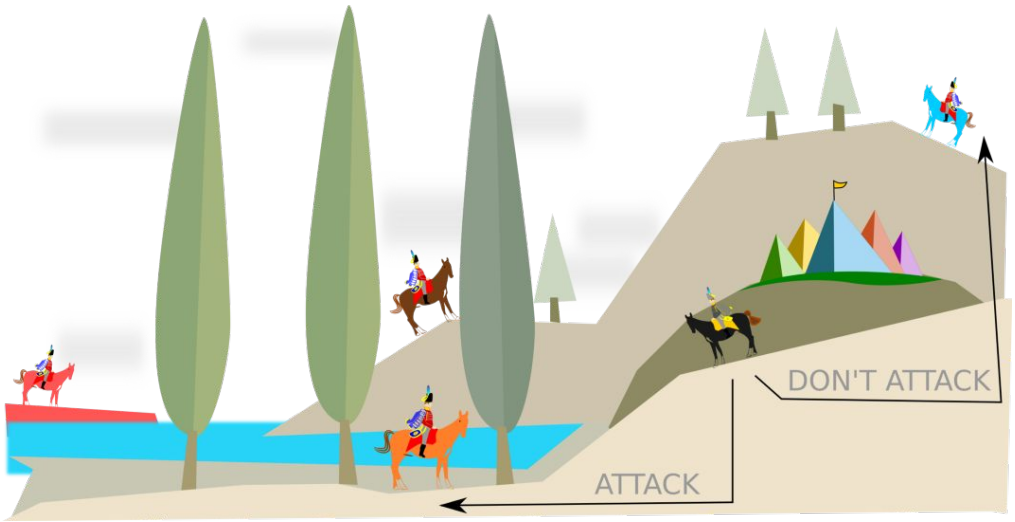
- How communication between nodes on the network occurs
- Nodes talk to each other directly
- Ethereum uses *devp2p*
  - *Peer Discovery*
  - *Transport (RPLx)*
  - *Application Layer (devp2p)*



https://medium.com/@alberthu/wtf-is-peer-to-peer-4b865d29e44e

Consensus Layer

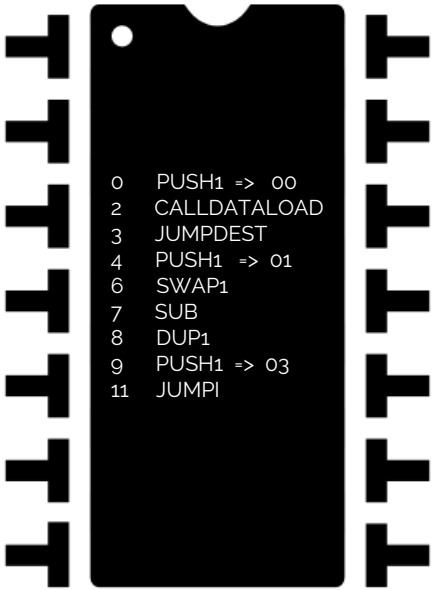
- Algorithm used to agree on the state of the network
- Ethereum uses a Proof-of-Work algorithm called *Ethash*
- Some testnets use Proof-of-Authority algorithms
  - Kovan => Aura
  - Rinkeby => Clique



(Yes, I know this is for a BFT consensus algorithm, not a POW one)
https://hackernoon.com/a-hitchhikers-guide-to-consensus-algorithms-d81aae3eb0e3

Ethereum Virtual Machine (EVM)

- Compute layer of Ethereum
  - Runtime environment for smart contracts
- Turing complete (ish)
  - Computation is bounded by gas
- Completely deterministic
- Word size of 256-bits (unlike the typical 32/64-bits)
  - Better for cryptographic operations
- Lots of fun details in the *Yellow Paper*



https://www.kisspng.com/png-ethereum-virtual-machine-blockchain-smart-contract-1302259/

https://github.com/CoinCulture/evm-tools/blob/master/analysis/guide.md

JSON-RPC

- Lightweight protocol for sending/receiving requests
- Used in Ethereum space when sending commands to a remote node
  - Querying blockchain data
  - Sending transactions
- How things like Metamask* talk to the blockchain

```
// HTTP POST
curl https://mainnet.infura.io/ \
    -X POST \
    -H "Content-Type: application/json" \
    -d '{"jsonrpc":"2.0","method":"eth_blockNumber","params": [],"id":1}'
```

```
 {
     jsonrpc: "2.0",
     id: 1,
     result: "0x5c174e"
 }
```

https://infura.io/docs/api/get/eth_blockNumber

Smart Contracts

- Immutable pieces of code that live on the blockchain
- Do exactly what they are programmed to do
  - Even if they're programmed wrong!
- Various smart contracting languages
  - Solidity - Most popular
  - Vyper - Up and coming

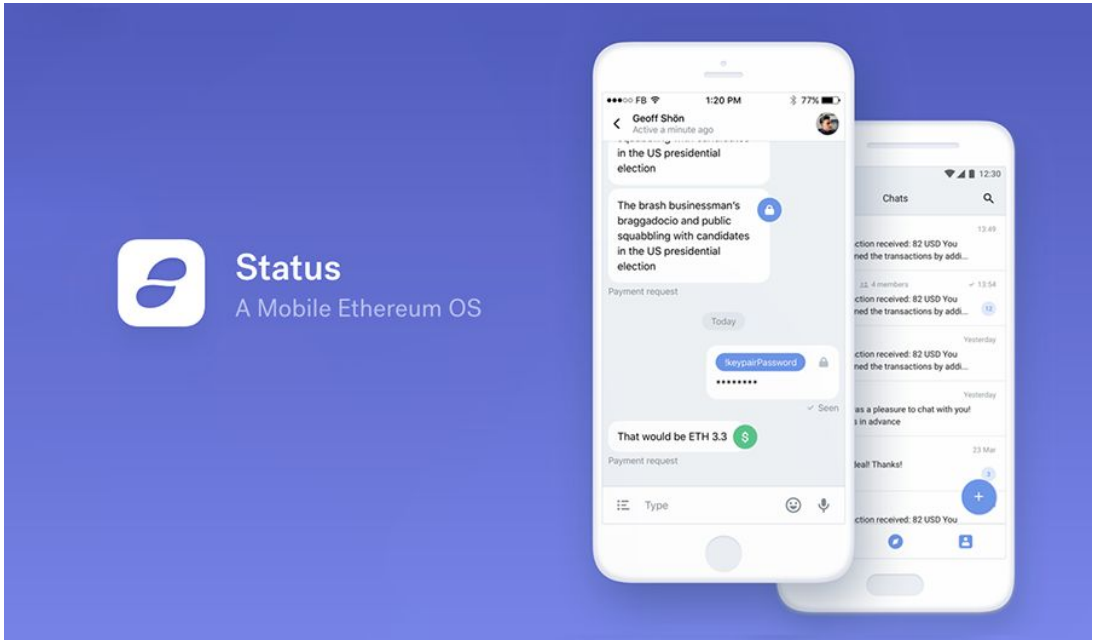
```
pragma solidity ^0.4.0;

contract SimpleStorage {
    uint storedData;

    function set(uint x) public {
        storedData = x;
    }

    function get() public view returns (uint) {
        return storedData;
    }
}
```

https://solidity.readthedocs.io/en/v0.4.24/introduction-to-smart-contracts.html

Ecosystem

Status.IM

- Instant Messaging
- Run dApps on your phone
- Manage crypto funds
- Live on mainnet with a *v0.9x* mobile app



MakerDAO

- Best known for their stablecoin, Dai
  - 1:1 Peg with USD
  - Backed by ETH (for now)
- Collateral loans
  - Collateral Debt Positions (CDPs)
- Governance
  - Recently had first Foundational Vote

For Real Now, That's All Folks