ethereum

vienna

General Introduction

Project

Decentralisation of the web

Removing the role of central points

Takes away control from service owners

Data cannot just disappear

Data can only be modified by certain rules*

Censorship resistant

Server cannot freeze funds

* most of the time

ethereum

Web 3.0

Platform for decentralised applications (**DApps**)

Ethereum (Blockchain)

Consensus Layer

Whisper

Messaging and Broadcasting

Swarm / IPFS (Content System)

Data publication and distribution

DApps

Escrow Standard UI Wallet

Crowdfunding Weifund

Subscription Services (see workshop)

Prediction Markets Augur / Gnosis

Registries Namereg

Marketplace Safemarket

Decentralised Autonomous Organisations (DAO)

Stablecoins MakerDAO

ethereum

Blockchain

Public record of all transactions

Stored and processed by all full nodes

Determines order of transactions

Necessary to determine current state of the system

Blockchain

Account based System

identified by a 160 bit address

has a balance of Ether / Wei

2 types of accounts

External / Account

Internal / Contract

Blockchain

Account (external)

user controlled account

controlled by a private key

can send and receiver ether

0x1350cf34d093953ce0d2803648da8f3b6a84de77	100
0xd5f9d8d94886e70b06e474c3fb14fd43e2f23970	2500
0xd2963cd505c94dbf3bc663bdd2321bd3000204bb	23290
0xd2963cd505c94dbf3bc663bdd2321bd3000204bb	123809
…	…

Blockchain

Contract (internal)

Controlled by code (evm byte-code)

Gets executed whenever something is sent to it

Ether can only be sent out by the code

Persistent 256 bit to 256 bit storage

Can send messages to other contracts

```
DUP2 SWAP1 SSTORE POP DUP5 DUP5 POP PUSH1 0x6 ADD
PUSH1 0x0 SWAP1 SLOAD SWAP1 PUSH2 0x1 0x0 EXP
SWAP1 DIV PUSH1 0xff AND PUSH2 0x6 0x88 JUMPI DUP5
DUP5 POP PUSH1 0x1 ADD PUSH1 0x0 POP SLOAD DUP4 LT
ISZERO PUSH2 0x5 0x8e JUMPI PUSH2 0x6 0x83 JUMP
JUMPDEST DUP5 DUP5 POP PUSH1 0x0 ADD PUSH1 0x0
```

ethereum

Blockchain

Code written in an ethereum specific language

- Solidity

  high level

  official language

- lll

  lisp-like (low level)

- EVM Assembly

```
contract Coin {

    event Transfer(address indexed from, address indexed to);

    mapping (address => uint) public balances;

    function() {
        balances[msg.sender] = 10;
    }

    function Send(address to, uint amount) {
        if(balances[msg.sender] >= amount) {
            balances[msg.sender] -= amount;
            balances[to] += amount;
        }
    }
}
```

Blockchain

Message

1 Sender

1 Recipient

Value in Ether / Wei

Can have additional data

Can have return value

ethereum

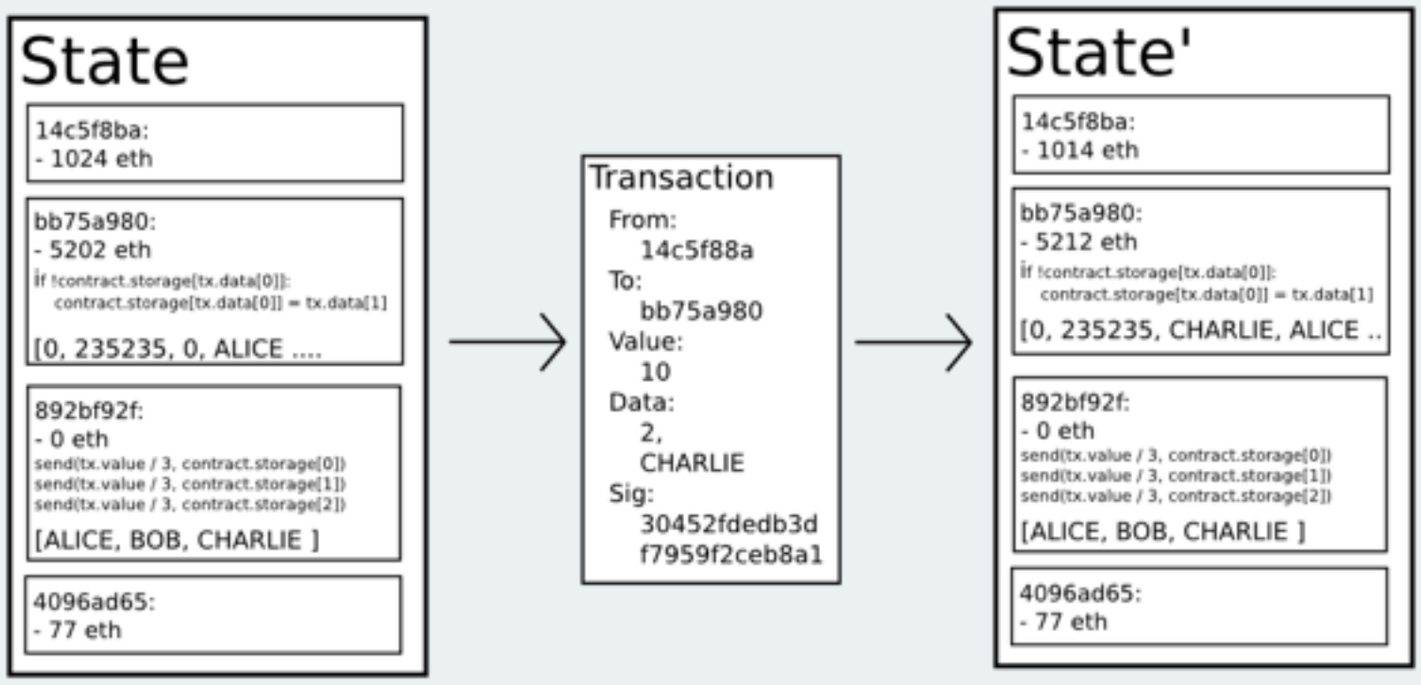
Blockchain

Transaction

Contains a message

Signed by a private key (external account)

Transitions from one state to the next



Blockchain

Gas

Used for transaction fees

Sender “buys” gas at a sender-specified **gasprice**

Every computational step has a fixed gas cost

Remaining gas sent back to sender

If gas runs out

- the state reverts
- but miner keeps ether

Blockchain

Gasprice

Associated gas cost for some action is constant

But the price of ether is not

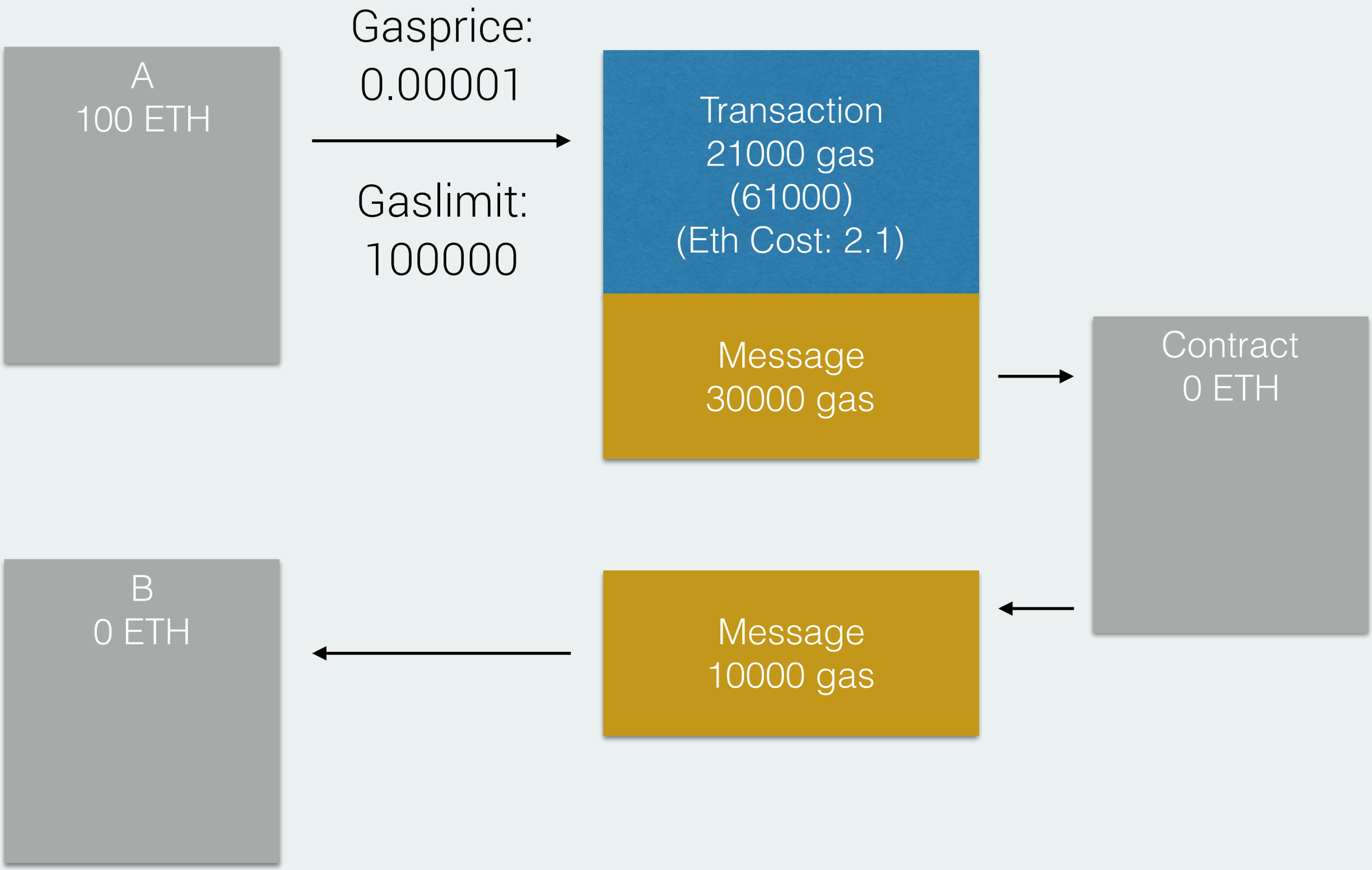
Gasprice is a scale factor against ether price

Ether goes up -> Gasprice goes down

Ether goes down -> Gasprice goes up

ethereum

Blockchain



ethereum

Blockchain

A
90 ETH

-10 ETH

Gasprice:
0.00001

Gaslimit:
100000

Transaction
21000 gas
(61000)
(Eth Cost: 2.1)

Message
30000 gas

Contract
0 ETH

B
0 ETH

Message
10000 gas

ethereum

Blockchain

A
89 ETH

-10 ETH
-1 ETH

Gasprice:
0.00001

Gaslimit:
100000

Transaction
21000 gas
(61000)
(Eth Cost: 2.1)

Message
30000 gas

Contract
0 ETH

Gas: 100000

B
0 ETH

Message
10000 gas

ethereum

Blockchain

A
89 ETH

-10 ETH
-1 ETH

Gasprice:
0.00001

Gaslimit:
100000

Transaction
21000 gas
(61000)
(Eth Cost: 2.1)

Message
30000 gas

Gas: 39000
~ 0.39 ETH

Contract
0 ETH

+10 ETH
-10 ETH

B
10 ETH

+10 ETH

Message
10000 gas

ethereum

Blockchain

A
89.39 ETH

-10 ETH
-1 ETH
+0.39 ETH

Gasprice:
0.00001

Gaslimit:
100000

Transaction
21000 gas
(61000)
(Eth Cost: 2.1)

Message
30000 gas

Gas: 0
~ 0 ETH

Contract
0 ETH

+10 ETH
-10 ETH

B
10 ETH

+10 ETH

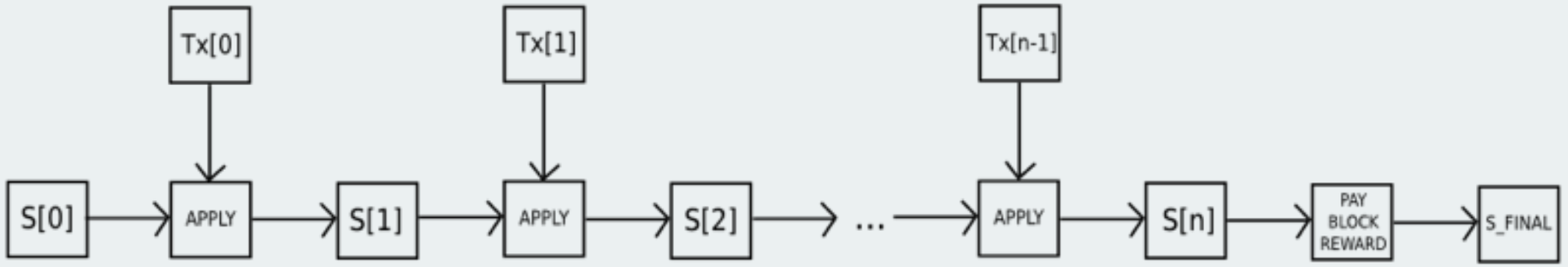
Message
10000 gas

ethereum

Blockchain

Blockchain gives transactions an order

Transactions are grouped together into blocks



Order is important:

Double spend (no unspent outputs, but balance might become 0)

2 transactions interacting with the same contract

Different order -> Potential different outcome

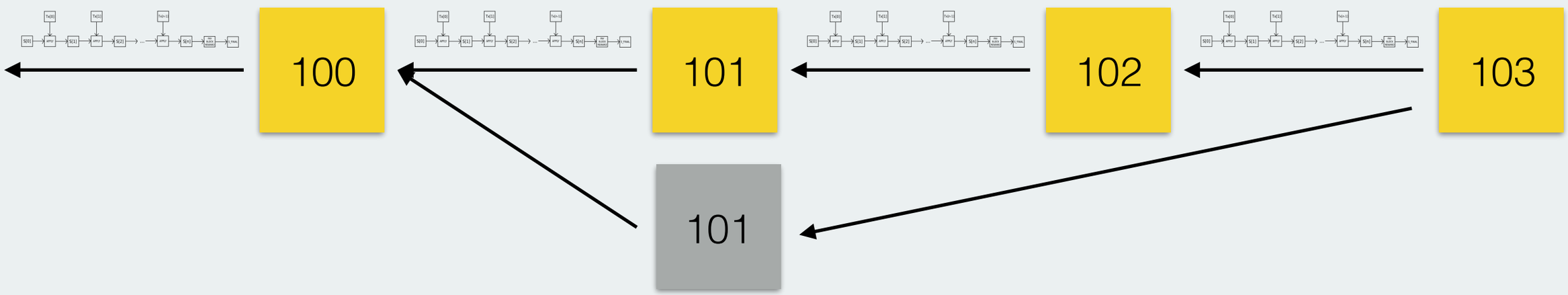
ethereum

Blockchain

Blocks form a chain

~15 seconds apart

Some can uncle blocks



Longest chain is considered the consensus

Blockchain

Proof of Work (Ethereum 1.0)

EthHash

asic-resistant (high memory, io bandwidth)

targets gpu mining (2GB+ GRAM)

To be succeeded by Casper (PoS)

Exponential difficulty increase -> Freeze in December

Constant Block Reward during PoW Phase

ethereum

Blockchain

Yellow Paper (github: ethereum/latexpaper)

ETHEREUM: A SECURE DECENTRALISED GENERALISED TRANSACTION LEDGER

HOMESTEAD DRAFT

0xf1 CALL 7 1 Message-call into an account.

$$\mathbf{i} \equiv \boldsymbol{\mu}_\mathbf{m}[\boldsymbol{\mu}_\mathbf{s}[3] \ldots (\boldsymbol{\mu}_\mathbf{s}[3] + \boldsymbol{\mu}_\mathbf{s}[4] - 1)]$$

$$(\boldsymbol{\sigma}', g', A^+, \mathbf{o}) \equiv \begin{cases} \Theta(\boldsymbol{\sigma}, I_a, I_o, t, t, & \text{if } \boldsymbol{\mu}_\mathbf{s}[2] \leqslant \boldsymbol{\sigma}[I_a]_b \wedge \\ \quad C_{\text{CALLGAS}}(\boldsymbol{\mu}), I_p, \boldsymbol{\mu}_\mathbf{s}[2], \boldsymbol{\mu}_\mathbf{s}[2], \mathbf{i}, I_e + 1) & I_e < 1024 \\ (\boldsymbol{\sigma}, g, \varnothing, \mathbf{o}) & \text{otherwise} \end{cases}$$

$$n \equiv \min(\{\boldsymbol{\mu}_\mathbf{s}[6], |\mathbf{o}|\})$$

$$\boldsymbol{\mu}'_\mathbf{m}[\boldsymbol{\mu}_\mathbf{s}[5] \ldots (\boldsymbol{\mu}_\mathbf{s}[5] + n - 1)] = \mathbf{o}[0 \ldots (n-1)]$$

$$\boldsymbol{\mu}'_g \equiv \boldsymbol{\mu}_g + g'$$

$$\boldsymbol{\mu}'_\mathbf{s}[0] \equiv x$$

$$A' \equiv A \Cup A^+$$

$$t \equiv \boldsymbol{\mu}_\mathbf{s}[1] \mod 2^{160}$$

where $x = 0$ if the code execution for this operation failed due to an exceptional halting $Z(\boldsymbol{\sigma}, \boldsymbol{\mu}, I) = \top$ or if $\boldsymbol{\mu}_\mathbf{s}[2] > \boldsymbol{\sigma}[I_a]_b$ (not enough funds) or $I_e = 1024$ (call depth limit reached); $x = 1$ otherwise.

$$\boldsymbol{\mu}'_i \equiv M(M(\boldsymbol{\mu}_i, \boldsymbol{\mu}_\mathbf{s}[3], \boldsymbol{\mu}_\mathbf{s}[4]), \boldsymbol{\mu}_\mathbf{s}[5], \boldsymbol{\mu}_\mathbf{s}[6])$$

Thus the operand order is: gas, to, value, in offset, in size, out offset, out size.

ethereum

Whisper

Decentralised Messaging

Messages can be filtered by topics

Very flexible

- Messages can be encrypted
- Messages can be signed
- Broadcast

PoW for spam protection and priority

Not designed for real time communication

ethereum

Swarm

Swarm (Not yet merged, but live network) or IPFS

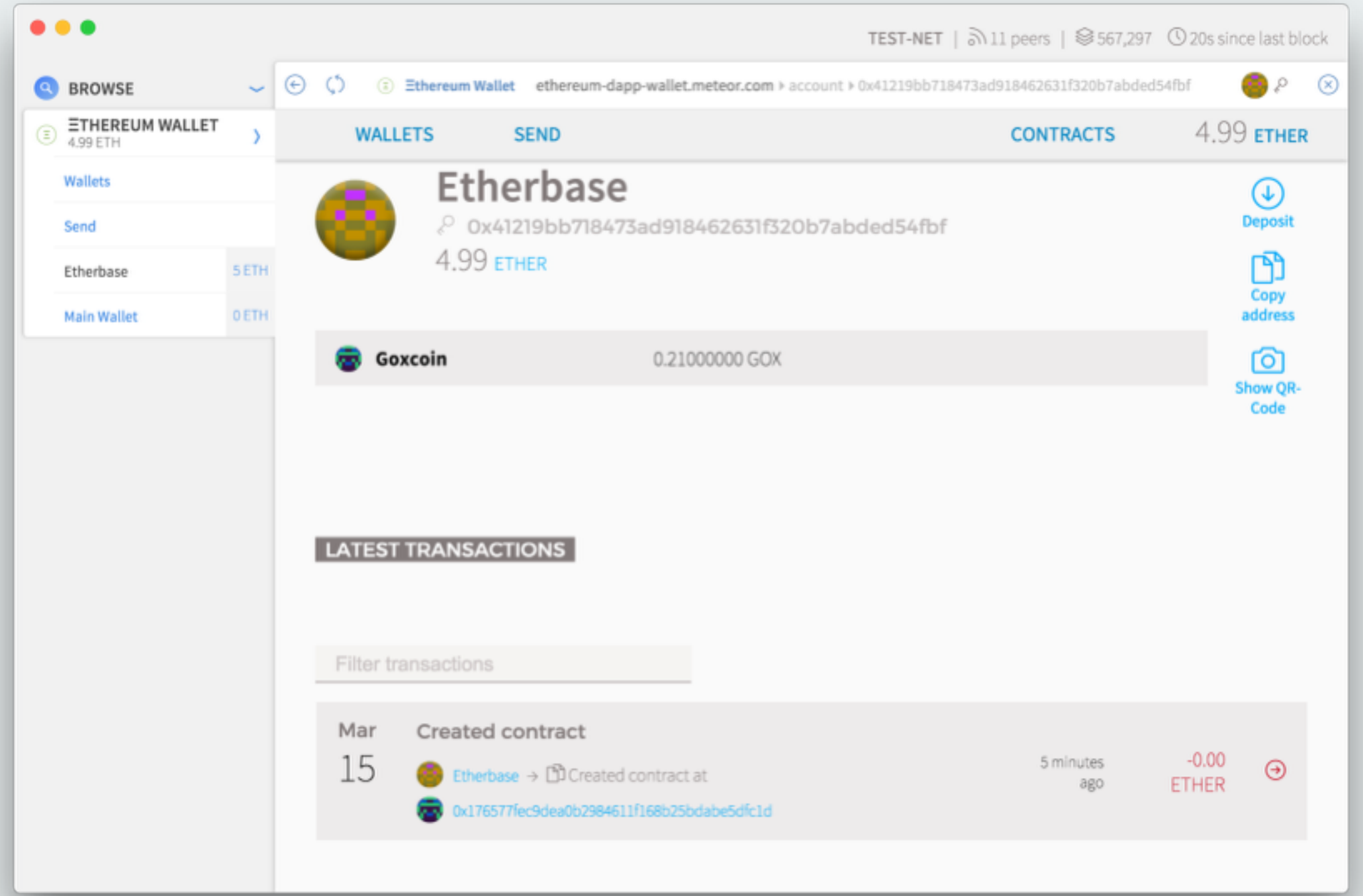
- Reverse Hash-table
- Originator of source unknown
- Low-latency
- Incentivation model for storage

“bzz” branch in go-ethereum repository

Orange Papers

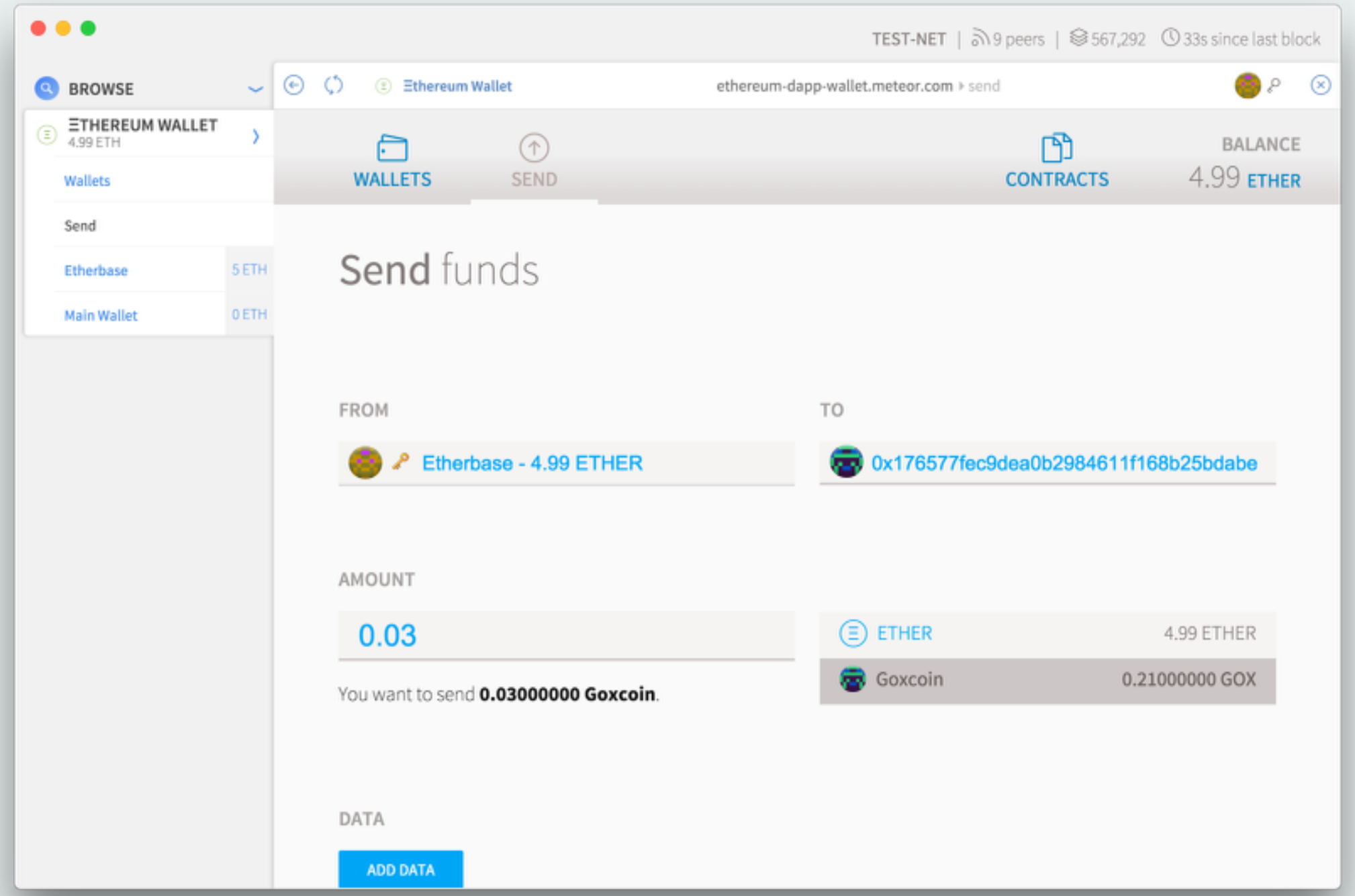
ethereum

Mist



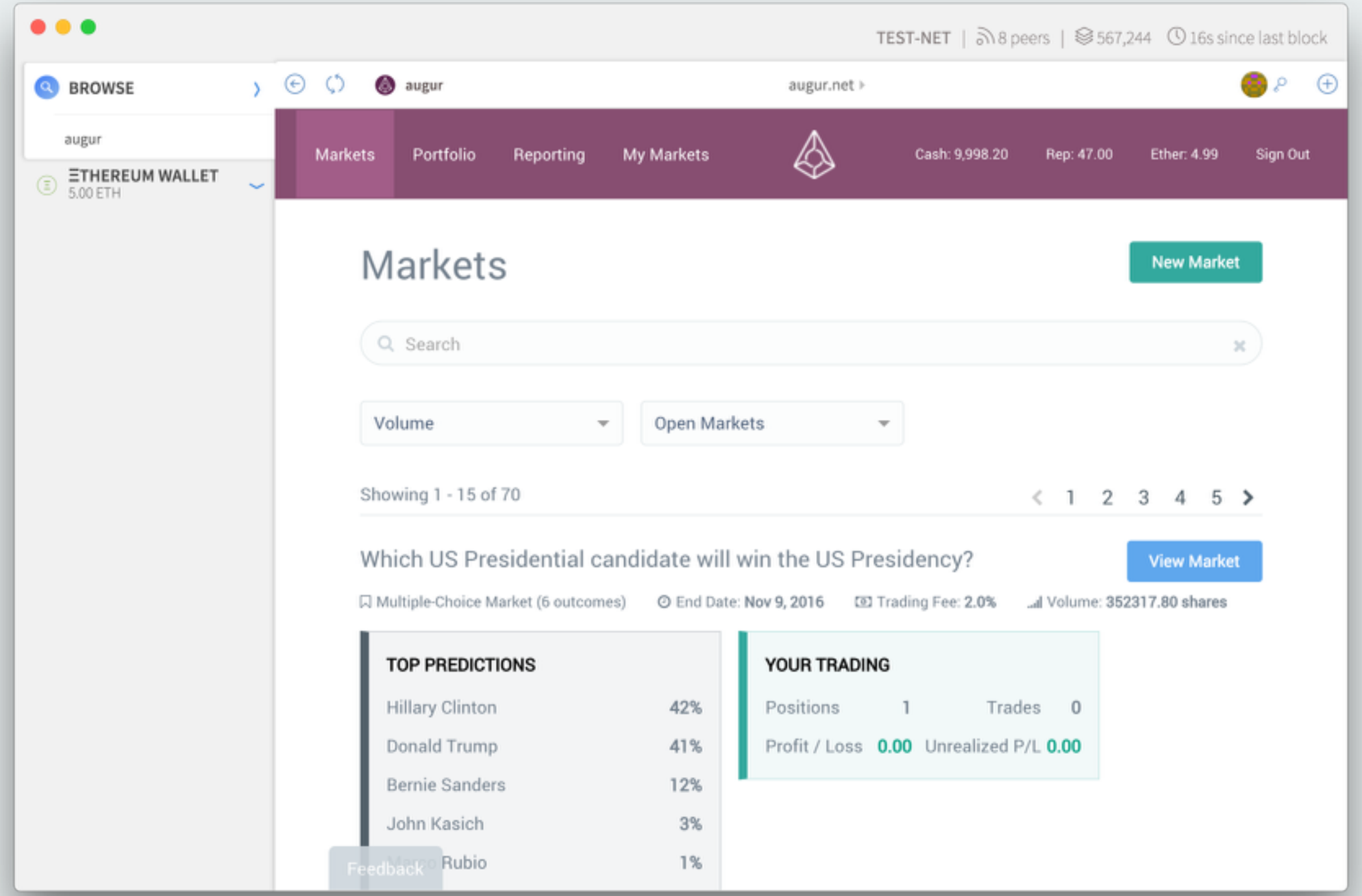
ethereum

Mist



ethereum

Mist



ethereum

DApp

URL

Registry

Hash

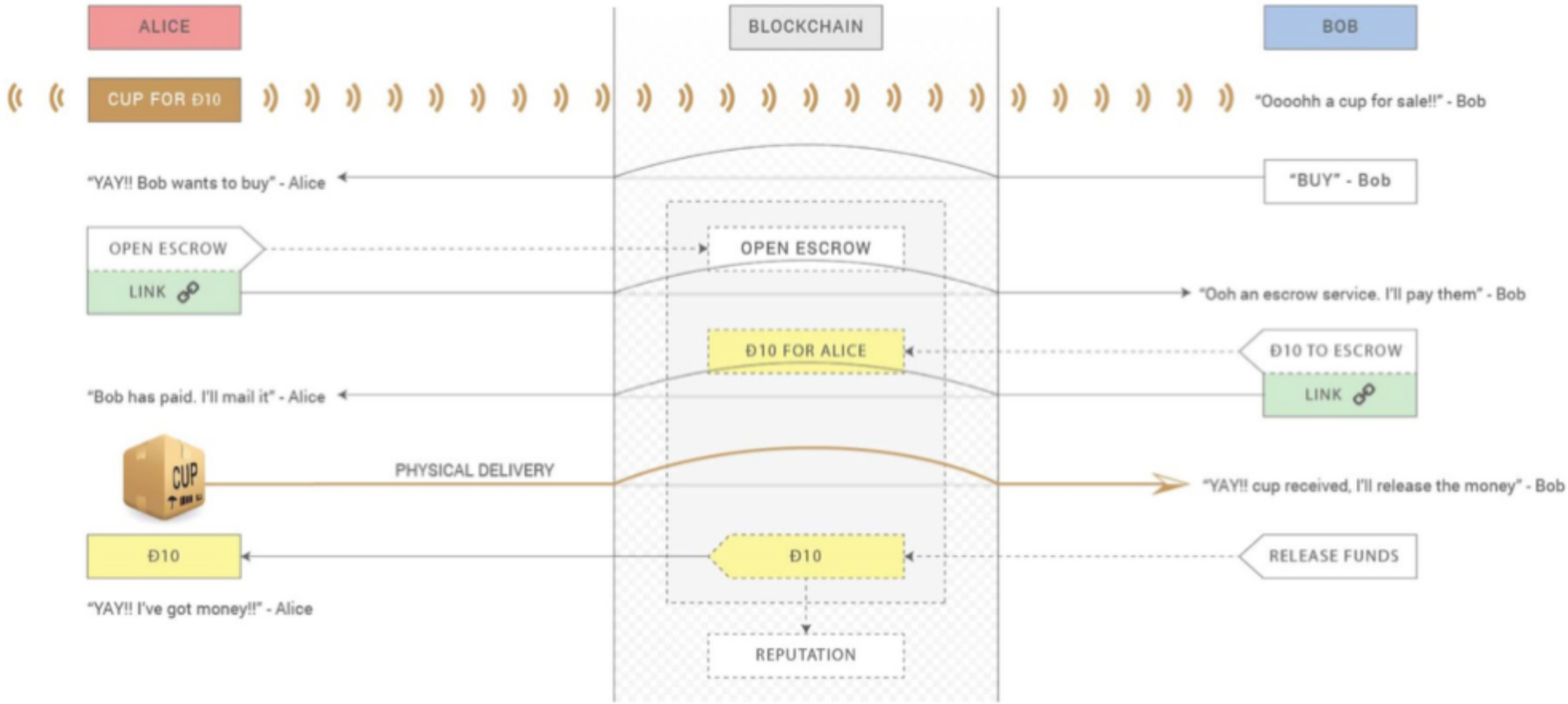
Swarm

Content

Mist

ethereum

DApp



ethereum dapps.ethercasts.com

Trustery **Mustafa Al-Bassam** Public Key Infrastructure and identity management system Working P... 2016-05-19	EtherDesign **Ed** A.I. Design Dapp Live 2016-05-18	KPCS Ethereum **Eric Schulte** The Kimberley Process certificate issuing process Working P... 2016-05-17	Zonafide **Paul Worrall** Trusted Zones: stopping loss due to identity theft Working P... 2016-05-17	Proof of Phone **Igor Barinov** KYC oracle validates and links your phone number and eth address Live MIT 2016-05-16	ETH Digger **ETH Digger** Investment in Ethereum cloud mining using smart contract Live MIT 2016-05-16	elcoin **Pavel Usenkov & Sergey Primachik** Multifunctional platform based on elCoin - ethereum token Live 2016-05-14	Crypted RPS **WhySoS3rious** Uncheatable RPS Duels with encrypted hands Live 2016-05-14	CO•AKT **Nick Barba , Kevin Kriss** The Future of Crowdsourcing: Rapid Business and Group Formation Work in Pr... 2016-05-12	Decibel.LIVE **Shane Loomb** Real time Noise Monitoring Work in Pr... 2016-05-11	CAPSOL **GoDarko** Anonymous virtual geocaching with cryptos and game assets. Work in Pr... 2016-05-09	Ethereum games **Ethereum games** Site for luck based ethereum games Live 2016-05-09
FarmShare **William E Bodell III** Distributed community-supported agriculture (CSA) platform Work in Pr... 2016-05-08	Matching Ethers **WhySoS3rious** Strategy and luck game. Round of 2 teams, Bet upside or flipped Live 2016-05-07	Etheroll **James Britt** Ether dice game casino / gamble ether proprietary Stealth Mo... 2016-05-05	Eaterra **Elliot Yeo** Planetary Food Sovereignty Stealth Mo... 2016-05-05	Last is me! **Riccardo Casatta** Trustless, time based lottery Live MIT 2016-05-03	btcrelay **Joseph Chow** A bridge between the Bitcoin blockchain & Ethereum smart contracts Live MIT 2016-05-03	Regis **ConsenSys / Daniel Novy** Create, deploy and interact with registries on Ethereum. Live 2016-04-29	Community Owned Int... **Thomas Miller** Community Owned Internet Concept 2016-04-28	Otonomos **Han Verstraete** Blockchain-Chartered Companies Live 2016-04-27	myHealthIRL **Ivan Jasenovic** Decentralized Healthcare Work in Pr... 2016-04-27	Ethereum Early Adopte... **Great Hill Corporation** Put your name on the first official list of early adopters Work in Pr... 2016-04-24	Etheramid **Etheramid** Social multi-level invitation game with reward Live 2016-04-21
Wekeep **Adrian** Insurance - Keep money together for risk sharing Work in Pr... 2016-04-18	EthStick **Katatsuki** A satirical ponzi game w/ Ranking, designed to minimize risk Live 2016-04-13	Etherplan **Donald McIntyre** Smart Investment Plans on Ethereum! Abandoned 2016-04-12	ESports Bets **Masaca** Decentralized ESports betting platform Live 2016-04-10	Crystal **Matt Goldenberg** Crowdsource everything with the blockchain Work in Pr... 2016-04-09	Ethereum Jackpot **ETH Jackpot** If 1m people play with just $1 we can make one a millionaire Live 2016-04-08	Maker / Dai **MakerDAO / Nexus Dev** Stable Cryptocurrency MIT Work In Pr... 2016-04-07	AUC **Assemble Utopia** Studios Currency Stealth Mo... 2016-04-06	Kato **Donovan Walter-Girout** Decentralized digital concierge for tasks and services Work in Pr... 2016-04-04	Daemon Market **Daemon** Decentralized Smart Darknet Market Work in Pr... 2016-04-03	ThanksCoin **ThanksCoin** Reputation Ranking and monetary reward of Internet users MIT Working P... 2016-04-02	LittleCactus **Tdecha** Faster Pyramid (lower investment, lower payout) Live 2016-04-02
KYC-chain **Edmund John** KYC onboard for banking, blockchains, and DAPPS Work in Pr... 2016-03-31	Dynamic Payout Pyram... **Daedalus** A pyramid with payouts and fees that alter for prompt payout Live 2016-03-29	Rubix **Rubix by Deloitte / Jinius Tu** Enterprise Blockchain Platform Live 2016-03-29	THE GREED PIT **Katatsuki** Fast pyramid-inspired game with random and strategic elements Live GPL 2016-03-29	Rubix! **Rubix!** A Pyramid with Dynamic Multiplier Factor & Accelerated Payouts Abandoned 2016-03-29	GenesisDAO **Miles** A General-Purpose DAO GPL Work in Pr... 2016-03-29	Watchdog **zyzioziom** Framework for decentralized watchdog Concept 2016-03-28	Hedgy **Hedgy** Demo of an ISDA Master Agreement Demo 2016-03-28	DAERS **mizutaka** Decentralize autonomous emergency reporting system Concept MIT 2016-03-27	Proof of Physical Addre... **ConsenSys** Smart oracle that serves as a primitive form of Know-Your-Customer Live 2016-03-25	EtherLi Multi-Sig Wallet **Ben Chan / Mason Borda** Multi-Sig Wallet with 2FA and mist support Working P... 2016-03-24	Etheropt **Etherboost** Decentralized Ethereum options exchange Live 2016-03-23
Balanc3 **Consensys / Jeff Ward & Christian Lundkvist** Triple Entry Accounting Work in Pr... 2016-03-22	uPort **ConsenSys** The next-generation identity system MIT Work in Pr... 2016-03-21	Election Commission **Rohit Pawar** Decentralize monitoring of election data Concept 2016-03-21	Protect The Castle **MilkyWayz** Ponzi Game: Protect The Castle - x2 + Jackpot Live 2016-03-21	PatrolX **Adam Sculthorpe** Threat intelligence and breach alerts with no false positives. Work in Pr... 2016-03-17	Ether Wheel **doppio** A simple Ethereum lottery with a user-friendly interface Live MIT 2016-03-17	SafeMarket **Aakil Fernandes** P2P Marketplace MIT Working P... 2016-03-16	Ethereum x 1.8 **Diana** Multiplier ethereum 1.8x Payouts Live 2016-03-16	BlockApps **Consensys / Kieren James-Lubin** Scalable Enterprise Blockchain Platform Live 2016-03-16	Blockapps **Consensys / Kieren James-Lubin** Middleware - API Live 2016-03-16	Melange **Algorythmix** Marriage of internet protocols to internet policy CC BY-SA Concept 2016-03-15	Etherdesign **Ed** AI Design Dapp Demo 2016-03-14
Arcade City **Christopher David** Ridesharing for the people Work in Pr... 2016-03-12	Grid Singularity **Ewald Hesse** Decentralized energy data exchange platform Concept 2016-03-12	NervemeterDAO **Ian Allison & Kieron Livingstone** 100% transparent charitable org Concept 2016-03-11	Pangea **BITNATION** A Blockchain Jurisdiction Demo MIT 2016-03-11	GovernMental **g0vernmental** Educational Ponzi Schema Live proprietary 2016-03-11	Transactive Grid **Martin Lundfall / ConsenSys** Peer to peer home produced energy trading Demo 2016-03-10	GroupGnosis **ConsenSys / Martin Köppelmann & Stefan George** Prediction market Live 2016-03-10	Ujo Music **ConsenSys** Rebuilding the music industry on the blockchain Working P... 2016-03-08	Quorum **Alex Beregszaszi** Protect your Ethers with Bitcoin hardware wallets GPL Working P... 2016-03-07	dns2 **Sinking Point** Potential improvement on the DNS in the form of a smart contract GPLv3 Work in Pr... 2016-03-04	the.looney.farm **Xavier Yvez** A small (& growing) collection of ETH in/ETH out games proprietary Working P... 2016-03-02	Syng **Jarrad Hope** open source mobile ethereum client GPL Working P... 2016-02-26
EthereumWall **LPMitchell** Decentralized unmoderated public message board	LETH **Inzhoop** ΞTH is the first hybrid mobile app to manage an Ethereum wallet	PROFETH **Roberto Valenti** A smart contracts ecosystem for a resource-based digital	EtherWall **Aleš Katona** GUI desktop wallet for Ethereum	Solether **Francesco 'makevoid' + KristinaB** Autonomous Electrical	EtherDoubler **Satoshi :)** The first doubler with verified contract	EtherAPIs **Péter Szilágyi & Jeffrey Wilcke** Micropayment platform	Ethereum Computatio... **Piper Merriam** Verifiable off-chain computation for	Icebox **Christian Lundkvist** A cold storage solution for Ether	KingOfTheEtherThrone **Kieran Elby** Will make you a King or Queen, might grant you	Dactuary **Vignesh Sundaresan** Decentralized actuary built on Ethereum	InsurETH **Thomas Bertani, Kristina Butkute, Francesco Canessa**

ethereum dapps.ethercasts.com

Venture Equity Exchan... **Ryan Tate, Sean Pollock** Decentralized Autonomous Ventures (DAVs) proprietary Stealth Mo... 2016-01-13	EthHypeDns **slothbag** Resolve Hyperboria/CJDNS ipv6 addresses via etherid.org contact proprietary Live 2016-01-05	Dapple **Nexus Dev** smart contract package manager and build tool MIT Live 2016-01-02	dappsys **Nexus Dev** Solidity Contract System Framework MIT Working P... 2016-01-02	Cetas **Algorythmix** Decentralized KYC and Credit rating function on blockchain Working P... 2015-12-26	Verbatm **Ciaran Murray** A marketplace for employment credentials Concept 2015-12-25	Decentralized Twitter **Jahn Bertsch** Microblogging on the Ethereum blockchain GPLv3 Working P... 2015-12-22	etherforum **Matias Insaurralde** An experimental / proof of concept / distributed forum built on top of Ethereum Public Domain Work in Pr... 2015-12-21	ethID **Argyris Xafis** Decentralised Password Vault Concept 2015-12-20	4G Capital Smart Contr... **Erick Murimi** Donors can use the application to fund small businesses in Kenya using digital currency. The money lent is converted and [illegible] Concept 2015-12-20	Dapp Store **Tim Coulter** Marketplace for Dapps Live 2015-12-11	ludex **Alex Beregszaszi, Thomas Bertani** smart contract based reputation system MIT Working P... 2015-12-10
JobMarket **Ultra Koder** Decentralized job market of the future for humans and IoT MIT Working P... 2015-12-09	MetaMask **Aaron Davis** MetaMask brings Ethereum to your web browser MIT Work in Pr... 2015-12-09	EtherID **Alexandre Naverniouk** Ethereum Name Registrar Apache Live 2015-11-30	TinyOracle **Alex Beregszaszi** Simple data provider toolkit for Ethereum MIT Working P... 2015-11-25	Community Currency **Rogelio Segovia** Community currency with zero reserve mutual credit and adjustable parameters CC0 Work in Pr... 2015-11-24	RANDAO **Youcai** A DAO working as RNG of Ethereum MIT Work in Pr... 2015-11-23	Blockchain Backpack **Dr. Blue** Valve Item Economy on Ethereum Apache Concept 2015-11-23	Browser-Solidity **chriseth & d11e9** Browser based solidity contract compiler & runtime MIT Live 2015-11-20	Taxeme **Jeffrey B. Petersen** A component of the Resilience taxation system MIT Work in Pr... 2015-11-20	proof-of-individuality **d11e9** anti-sybil token MIT Work in Pr... 2015-11-20	FreeMyVunk **R. Tyler Smith** Monitize your video game junk Concept 2015-11-19	TokenEscrow **Alex Beregszaszi** Contract for running an escrow service for Ethereum token-contracts MIT Work in Pr... 2015-11-16
Etherdice **vnovak** Provably fair and escrowed gambling Live 2015-11-15	Etherboard **unknown** Combining a Ponzi-scheme with the MillionDollarHomepage Working P... 2015-11-15	String **Dominic Williams** Autonomous & open financial cloud for financial assets Concept 2015-11-14	Ethereum Pyramid **ethererik** Ethereum Pyramid Contract Live 2015-11-13	Ampliative Art **Adrian Onco** A decentralized, cooperative and empowering art community Concept 2015-11-13	Shapeshift Bot **Alex Beregszaszi** Simple Ethereum contract to transfer Ether to Bitcoin MIT Working P... 2015-11-12	PublicVotes **Dominik Schiener** A publicly verifiable Voting System, powered by Smart Contracts MIT Working P... 2015-11-12	Oraclize **Thomas Bertani** Provable honest oracle service Live 2015-11-10	Etheria **fivedogit** The first-ever decentralized virtual world GPL Live 2015-11-07	Project Mati **Harsh Patel** Decentralized KYC and Credit rating function on blockchain Working P... 2015-11-06	Spore **Denis Erfurt** Simple package manager for dApp development based on ethereum and IPFS MIT Working P... 2015-10-29	LightWallet **ConsenSys / Chris Lundkvist** Lightweight JS Wallet for Node and the browser MIT Working P... 2015-10-07
Populus **Piper Merriam** Ethereum Contract Development Framework MIT Working P... 2015-10-07	Grove **Piper Merriam** Fast, efficient, queryable storage for ethereum contracts MIT Live 2015-10-07	ethereum-datetime **Piper Merriam** Ethereum Date and Time tools MIT Working P... 2015-10-07	slock.it **Christoph Jentzsch** If you can lock it, we will let you rent, sell or share it. GPL Working P... 2015-10-02	meteor-embark **Chris Hitchcott** Streamlined Ethereum integration for Meteor MIT Working P... 2015-09-30	Colony **AttaAtta** Companies for the 21st Century Working P... 2015-09-29	Dereo **Dereo** Decentralized over-the-air television streaming network Concept 2015-09-28	CryptoRPS **CryptoRPS** Rock-Paper-Scissor game with a twist Live 2015-09-24	Dynamis **Joshua Davis** Insurance Dapp Work in Pr... 2015-09-24	Ethereum Alarm Clock **Piper Merriam** Schedule contract calls MIT Live 2015-09-24	Project Basil **Harsh Patel** Decentralised Vulnerability feed management MIT Working P... 2015-09-15	AuditDog **Roman Plášil** SW audit repository MIT Working P... 2015-09-08
Universal DApp **d11e9** A Universal Interface for contracts on the Ethereum blockchain MIT Live 2015-09-03	Avatar **d11e9** distributed profile registry MIT Working P... 2015-08-28	EtherPot **Aakil Fernandes** Provably Fair Lottery MIT Working P... 2015-08-27	content **d11e9** p2p community content platform MIT Work in Pr... 2015-08-26	HitFin **Patrick Salami** Bilateral settlement of OTC derivatives in 15 seconds Concept 2015-08-26	Occams Run **d11e9** All things being equal (50/50) only The Brave will win MIT Working P... 2015-08-26	Raikoth **moridinamael** Governance experiment Concept 2015-08-26	PirateChest **d11e9** p2p magnet discovery MIT Working P... 2015-08-26	Ethos **d11e9** An Ethereum Browser MIT Working P... 2015-08-26	ChainGraph **Konstantin Kudryavtsev** Blockchain visualizer MIT Working P... 2015-08-25	EtherListen **Kobi Gurkan** Realtime Ethereum transaction visualizer. MIT Live 2015-08-24	Dapper **Jarrad Hope** High Level EVM Assembly meta-programming using Python GPLv3 Work in Pr... 2015-08-24
eDollar **nexus@makerdao.com** Stable Cryptocurrency proprietary Concept 2015-08-20	EtherCrawler **Peter Borah** A dungeon crawler and challenge market based on Ethereum MIT Demo 2015-08-17	studbook **Andres Junge** Tinder for horses MIT Demo 2015-08-17	Frozeth **Kobi Gurkan** Ethereum tools for the offline machine MIT Working P... 2015-08-17	EtherEx **caktux** Decentralized Exchange MIT Working P... 2015-08-15	Cosmo **Nick Dodson** Meteor dapp for building and vetting solidity contracts MIT Working P... 2015-08-15	Etherparty **Lisa Cheng, Whit Jack** Smart Contracts deploying the Cloud Concept 2015-08-15	Embark **Iuri Matias** Framework for Ethereum DApps MIT Live 2015-08-15	smart-exchange **Marek Kotewicz** Exchange service MIT Working P... 2015-08-15	WeiFund **Nick Dodson** Crowdfunding Platform MIT Working P... 2015-08-15	Augur **Jack Peterson, Joey Krug, etc** Decentralized Prediction Market GPL Working P... 2015-08-15	EtherScan **Matt Tan** Blockchain explorer Live 2015-08-14
Ether.Camp **Roman Mandeleil** Blockchain explorer	NotarEth **Maran Hidskes** Ethereum based notary service	HonestDice **etherapps.info** Completely fair dice game	Vevue **Thomas Olson** Bringing Google Street View to life	PowerBall **Peter Borah** "Powerball"-style lottery	cyber•Fund **Dima Starodubcev** Make digital investments comprehensible,	Spritzle **Patrick Salami** Fractional investment platform for Ethereum	WeiLend **Massi Terzi** P2P Lending	Truffle **Tim Coulter** Development framework for Ethereum	Jaakme.in **Vaughn McKenzie** Decentralised music steaming service	Croesus **Anthony Eufemio** Decentralized advertising platform build on ethereum	chess_contracts **bigmug** Chess

Funding

Funded by crowdfunding

31.529 BTC raised (~18.5m USD at the time)

Over 9000 Transactions

half of that value lost due to bitcoin price decline

but rise in ether price secured funding for 4 years

ethereum 2.0

- Abstraction
  - Contract pays fee
  - Other signing mechanisms
- Casper
  - Proof of Stake with weak subjectivity
  - Prediction market for blocks
- Scalability
  - Sharding

ethereum Release Process

OLYMPIC

Jul 2015

FRONTIER

Ethereum 1.0 chain

Kill Switches

Console client only

Hardfork
Now deemed safe

Mar 2016

HOMESTEAD

Ethereum 1.0 chain

UI Wallet

DAO HF

Q3/4 2016

METROPOLIS

Release of **Mist**
DApp Store
Full Light Client

Hardfork

Q4 2016

???

SERENITY