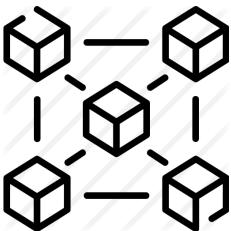


Blockchain Applications



By Samuel Tang, TIBA

Fall 2020 @ Tsinghua University

Content

- ◊ Technology
- ◊ Platforms
- ◊ Projects
- ◊ Conclusion

Why Blockchain?

Bubble or Revolution?

- achieve trust in a new way and with its own set of costs, **reduce the ‘cost of trust’**
- secure, verifiable transfer of value between parties who do not trust each other, without the use of a mutually trusted third party
 - **No middlemen**, which usually takes a cut of the value being transferred
- allow **transparency** in record-keeping
- tolerate localized shutdowns or attacks



Technology



Wallet

Gateway to Blockchain

- Coinbase Wallet
 - iOS & Android
- Metamask
 - Web & iOS & Android
- Ledger
 - Hardware wallet
- ...

 | Wallet



METAMASK



Ledger



DApp Development

Building a Decentralized Future

- **Truffle suite**

- Truffle – development framework
- Ganache – local blockchain emulator
- Drizzle – collection of front-end libraries

- **Solidity** – programming language for smart contract

- **Remix** – solidity web IDE

- **Web3.js** – collection of libraries to interact with ethereum

- **Infura** – Ethereum & IPFS API

- ...

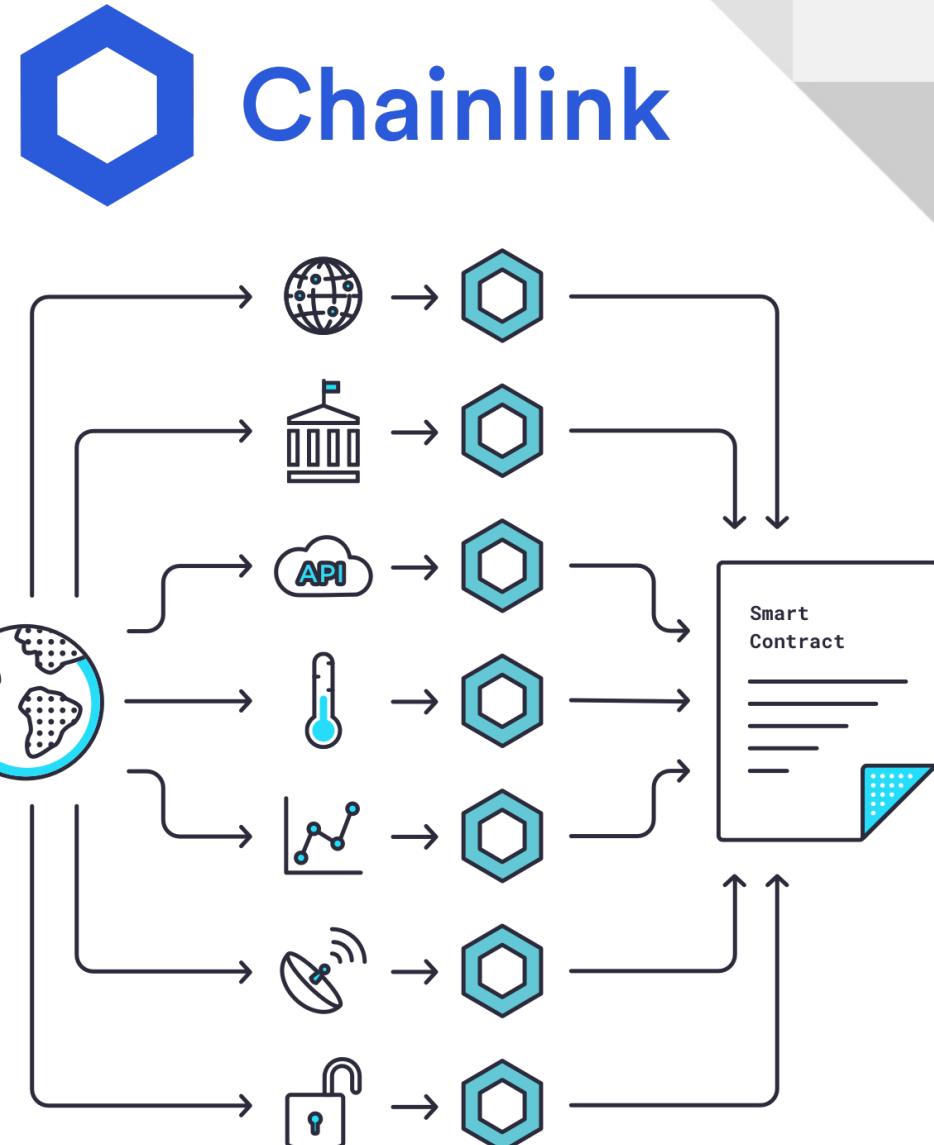


INFURA

Oracle

Providing Data to Blockchain

- **Oracle** – “provides real-world data to smart contracts on the blockchain”
 - Chainlink – decentralized oracle network
 - LINK token – used to pay for services
 - Tellor - decentralized oracle network



IPFS (InterPlanetary File System)

Distributed File System

- IPFS – peer-to peer data storage and sharing
 - Filecoin - cryptocurrency
 - Proof of Space
 - Incentives for renting unused hard drive space for storing data



Brave

Web Browser

- **Brave** – a free and open source web browser
 - block ads and web trackers
 - Earn crypto by watching ads (BAT, Basic Attention Token)





Platforms

Celo

Financial Prosperity for All



- Celo - mobile-first blockchain platform for fast secure, stable digital payments
 - Proof of Stake
 - Phone Number Public Key
 - Mapping phone numbers to addresses
 - **CELO** - cryptocurrency
 - **cUSD** (Celo Dollars) – US Dollar stable asset
 - Alliance for Prosperity

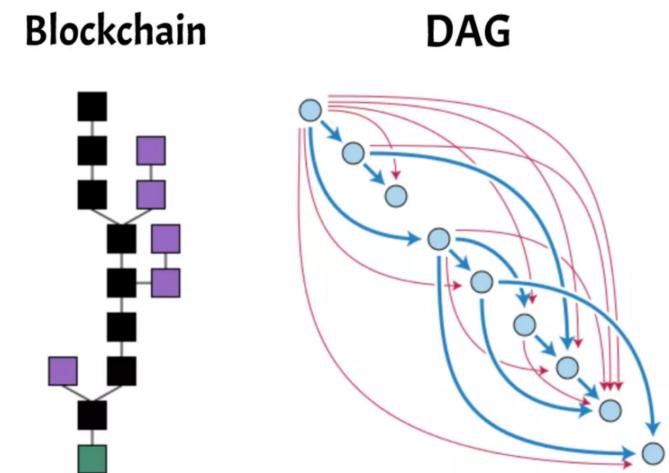


Conflux

Powering Decentralized Commerce



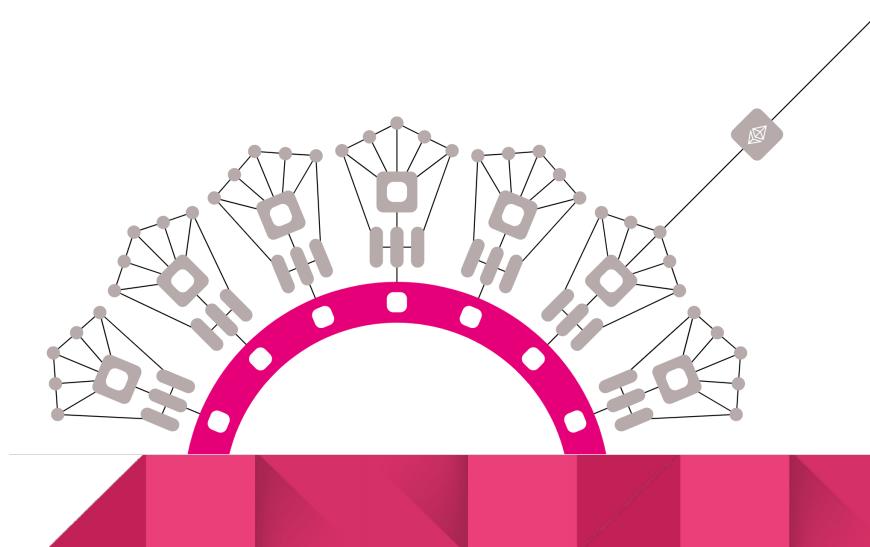
- Conflux – “secure and interoperable flow of assets and data across protocols & applications to create an internet of value for all”
 - Proof of Work
 - DAG (Directed Acyclic Graph)
 - Tree Graph Architecture
 - Higher TPS (transaction per second)
 - Founders are from Tsinghua!



Parity

Infrastructure for the Decentralized Web

- **Parity**
 - **Polkadot** – “platform for connecting independent blockchains together”
 - **Substrate** – framework for building blockchains
 - **Parity Signer** – secure offline mobile wallet



ConsenSys

Blockchain for Business

- **ConsenSys** - Brooklyn-based software-production studio
- Ethereum-based venture studio
- founded by **Joseph Lubin**(co-founder of Ethereum)
 - **Solutions** - consulting
 - **Labs** - incubator
 - **Academy** - education resources

**Codefi**

The blockchain application suite for commerce and finance

**Diligence**

Security audits for Ethereum blockchain smart contracts

**MetaMask**

A crypto wallet and gateway to blockchain dApps

**Infura**

Instant, scalable API access to the Ethereum and IPFS networks

**Quorum**

The complete open source blockchain protocol for business

JP Morgan

Open source blockchain platform for business

- **Quorum** - “an enterprise-focused version of Ethereum”
- Soft fork of Ethereum
- **Consensus:**
 - Raft (default) & Istanbul BFT
 - Able to do both **public & private** transactions & smart contracts
- **State database** is split into private state and public state
- Acquired by ConsenSys in Summer 2020



R3

Transparency & Trust, While Private & Secure

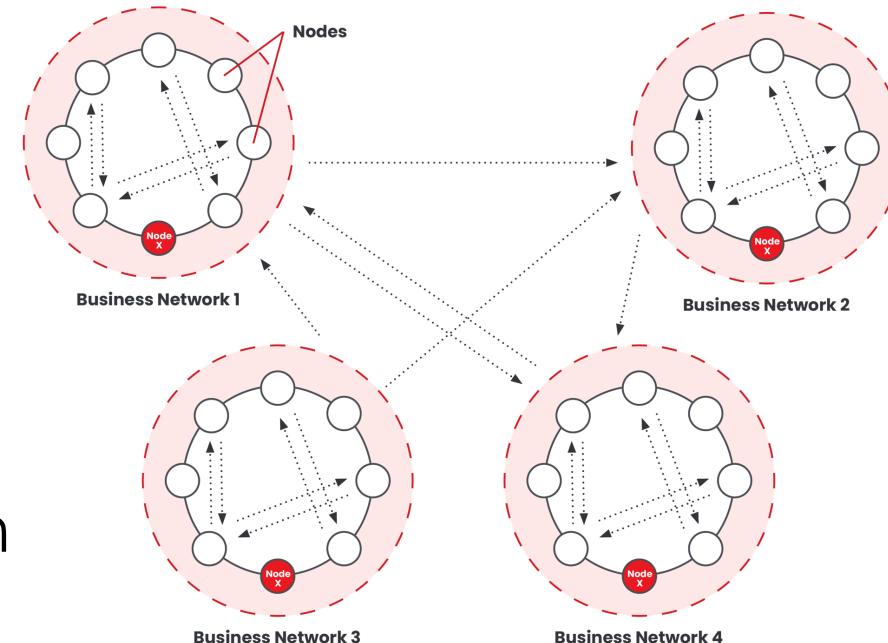
- **Corda** - “ensures data is shared only with parties who have a ‘need to know’”
- Initially designed for the **financial sectors** for recording, managing and synchronizing contracts
- **CorDapps:** distributed apps created with Corda
- Smart contracts that can be written in Java and other JVM languages
- **Corda Enterprise:** more capabilities to the Corda platform for more general enterprise use



R3

Blockchain for Business

- **Corda Network** - enable any organization or individual on this open network to transact directly with each other
- **End-State Principles:**
 - legal footing, shared logic, ...
 - Conclusion: Allow people to transact privately between legally-identifiable counter-parties on a single highly scalable network with the freedom to interoperate other applications



Linux Foundation

Blockchain for Business

- **Hyperledger** - an open source community developing enterprise-focused software solutions
 - Besu - ConsenSys
 - Burrow - Monax
 - Fabric - IBM
 - Indy - Sovrin
 - Iroha - Soramitsu
 - Sawtooth - Intel

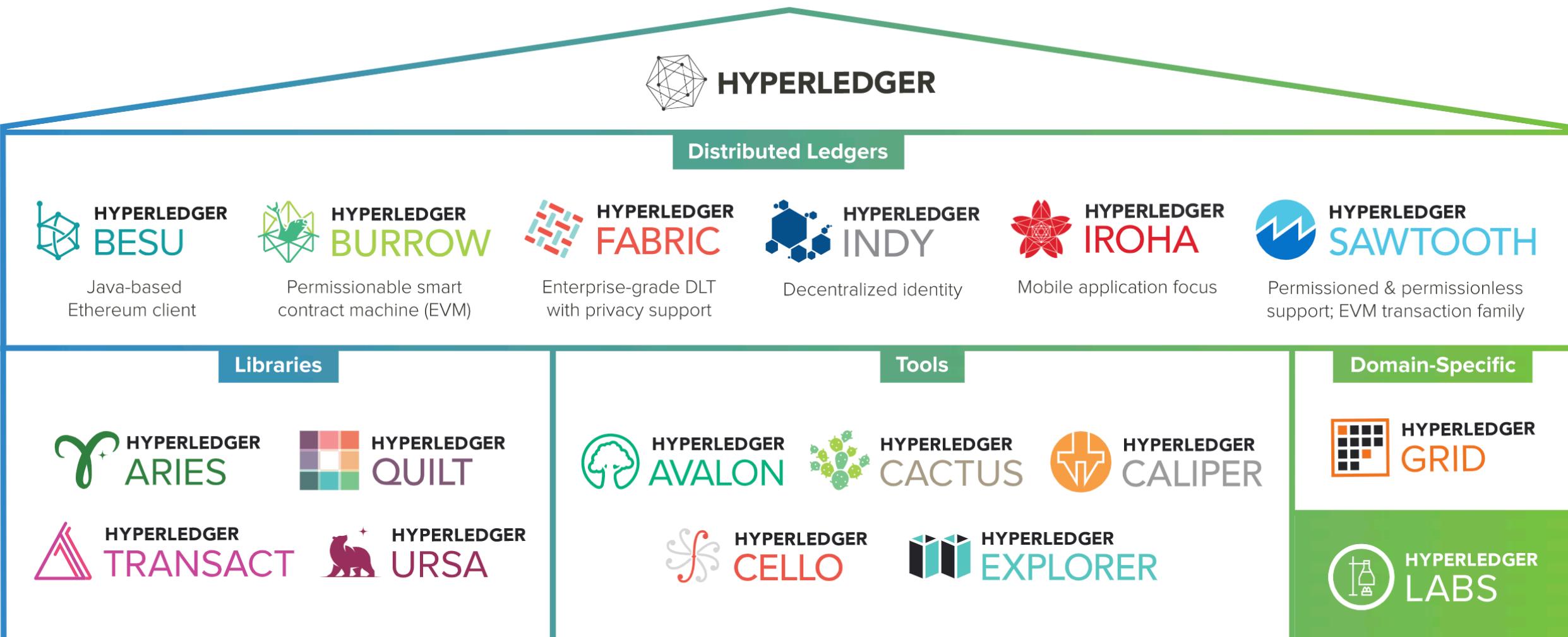


HYPERLEDGER





Hyperledger Greenhouse Structure



Linux Foundation

Blockchain for Business

- **Hyperledger Fabric**
- launched in December 2015
- initiated by Digital Asset and IBM
- all network participants must have known identities
- allows entities to conduct **confidential transactions** without passing information through a central authority
- **modular architecture** enables anyone to develop solutions or applications to plugin and play with different services



Ripple Labs

Blockchain for Finance

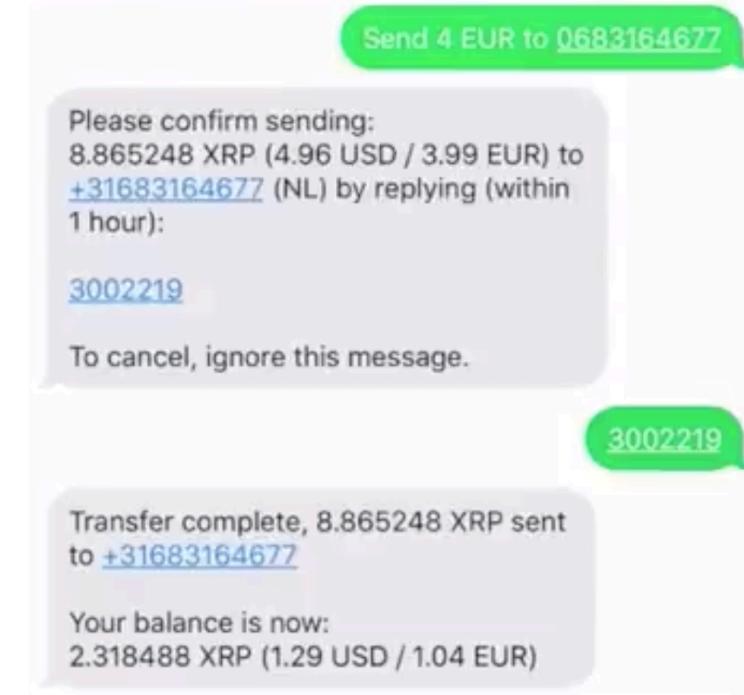
- **Ripple** - “Instantly Move Money to All Corners of the World”
- Founded by Chris Larsen & Jed McCaleb (founder of Mt. Gox)
- **RippleNet** - a payment system that enables global money transfers and offers its users cost efficiency, real-time transactions, and security



Ripple Labs

Blockchain for Finance

- **Network users**
 - SMEs, corporates, small banks, payment providers, consumers
 - can only send transactions
- **Network members**
 - banks and payment providers
 - process transactions and help improve liquidity on the platform
- XRP - name of cryptocurrency
- Ripple's protocol: RPCA (Ripple Protocol Consensus Algorithm)



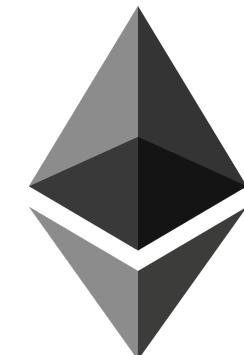
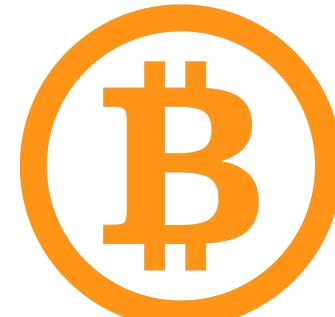
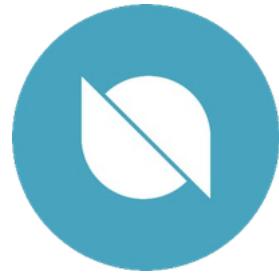
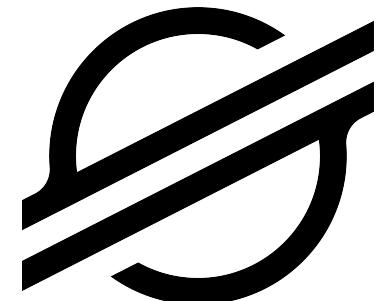


Projects



Cryptocurrency

Digital Money



Zcash



E O S





NFTs (Nonfungible Tokens)

Digital Uniqueness

- **Non-fungible tokens**
 - Not mutually interchangeable
 - Create digital scarcity & ownership
 - Use cases: Art, Collectibles, Gaming, Virtual Assets, Real World Assets, Identity...



Uniswap

Decentralized Exchange

- **Uniswap** – “decentralized protocol for automated liquidity provision on Ethereum”
- Direct swap of ERC20 tokens
 - Automated Market Makers (AMM) = Smart Contracts that hold liquidity reserves (or liquidity pools)
 - Liquidity providers deposits an equivalent value of two tokens into the pool
 - Traders can trade against what's in the pool and pay a fee, which is distributed to liquidity providers
- **UNI** – Uniswap token that allow holders to vote on changes to the protocol (governance rights)



MakerDao

Decentralized Finance

- **MakerDao** – “a decentralized organization built on Ethereum to allow lending and borrowing of cryptocurrencies without the need for a middle man”
- **DAI** – stablecoin (1:1 to USD)
 - created when user lock up ETH
- **MKR** – Governance tokens
 - created or burned based on the stability of DAI



1  ≈ \$1



Compound

Decentralized Finance

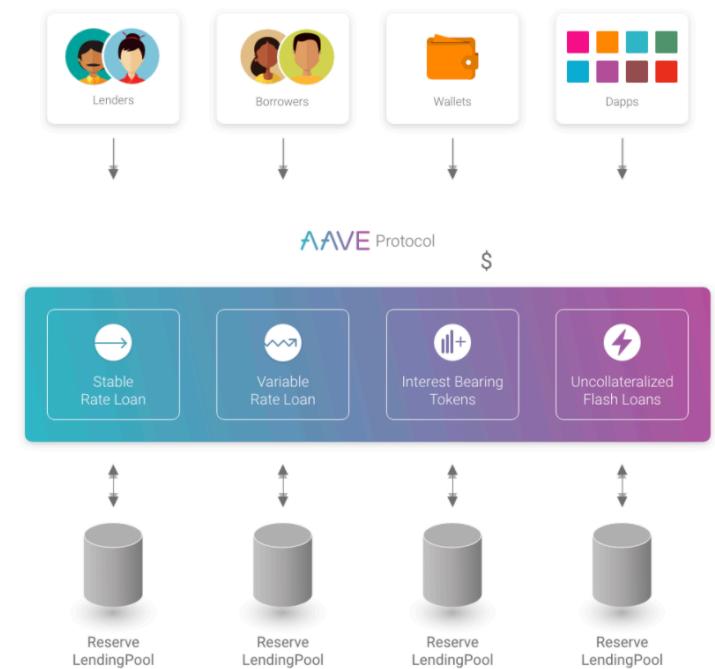
- **Compound** – decentralized protocol that allows you to lend and borrow crypto
- Smart contract built on Ethereum
 - Allow borrowers to take out loans with interest rates (interest rates generated with every block mined)
 - Lenders to provide loans by locking their crypto into the protocol
- **COMP** – governance token
- **cTokens** – tokenization of assets locked



Aave

Decentralized Finance

- **Aave** - decentralized non-custodial protocol
 - Depositors provide liquidity to the market and earn interest
 - borrowers borrow and pay interest
 - **Rate switching** - allows you to switch interest rate
 - **Flash loans** – instant and easy borrowing without collateral, done with one transaction



Farmer Connect

Blockchain Supply Chain

- **Farmer connect** - “Traceability means having the visibility to know, ‘Was this coffee sourced in a responsible and sustainable way?’”
 - **Thank My Farmer app** – access the story behind the product & allow direct donation to farmers
 - Farmer connect - supply chain monitoring platform
 - Farmer ID – identity verification



Plastic Bank

Blockchain for Impact

- **Plastic Bank** – “empowering the world to stop ocean plastic”
- Challenges:
 - many don't have ID
 - lack of access to bank
 - paying in cash is unsafe in many regions
 - bookkeeping would be a nightmare
 - full visibility of the supply chain for partners
- provides **financial inclusion** for the world's poor by enabling **transparent** social plastic recycling



UN World Food Program

Blockchain for Zero Hunger

- **Building Blocks** - Blockchain for Zero Hunger
- Blockchain-base cash distribution system for people in need
- alternative to:
 - delivering bulk food
 - expensive
 - skew local market price
 - traditional money transfers
 - slow process
 - costly
 - financial & privacy risk



UN World Food Program

Blockchain for Zero Hunger

- Proof of Authority (PoA) Consensus
- Two technologies used in transactions:
 - blockchain
 - biometric identity management system
- In early 2019, sent 3 million USD per month to over 100,000 beneficiaries across two refugee camps in Jordan
- In 2019 distributed record of \$2.1 billion, reaching over 28 million people in 64 countries



Bill & Melinda Gates Foundation

Blockchain for Financial Services

- **Mojaloop** - “increase financial inclusion by empowering organizations creating interoperable payments systems to enable digital financial services for all”
- Blockchain-powered mobile payment system
- Working with Ripple
- connecting all payment providers and banks on one platform

BILL & MELINDA
GATES *foundation*

mojaloop
foundation

World Wildlife Fund

Blockchain for Supply Chain

- **WWF** (New Zealand, Australia, Fiji) teamed up with
 - ConsenSys & TraSeable
 - Sea Quest Fiji Ltd (tuna fishing and processing company)
- Tuna Project - use blockchain to track tuna fish **supply chain** (RFID, radio-frequency identification + QR codes)
- “a simple scan of tuna packaging using a smartphone app will tell the story of a tuna fish”
- Solve illegal & unreported fishing

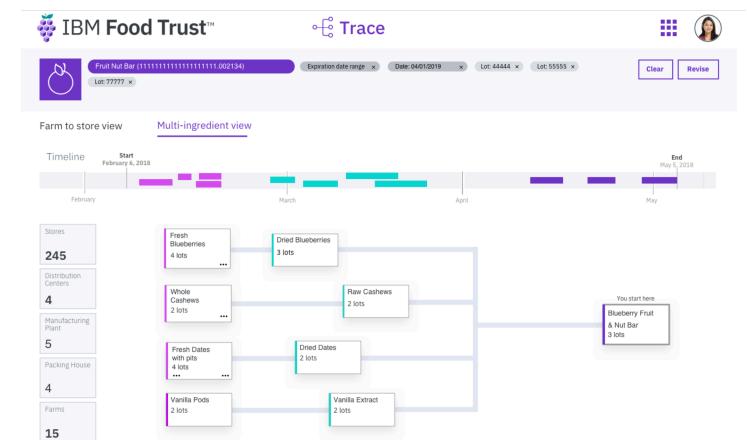
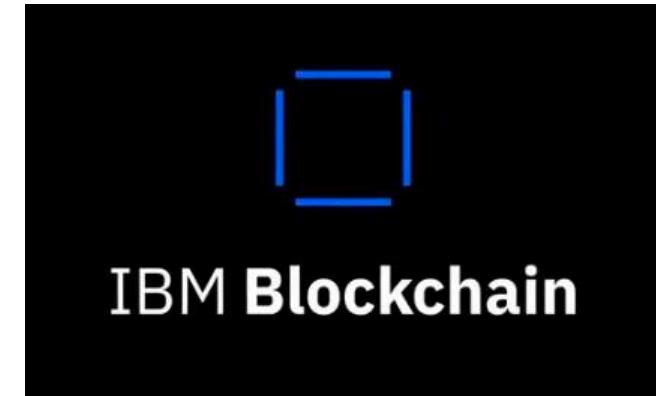
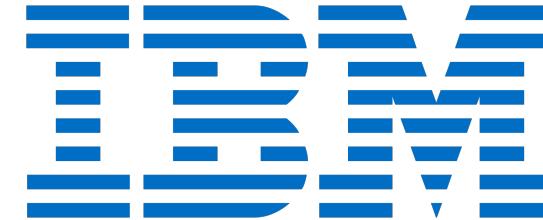




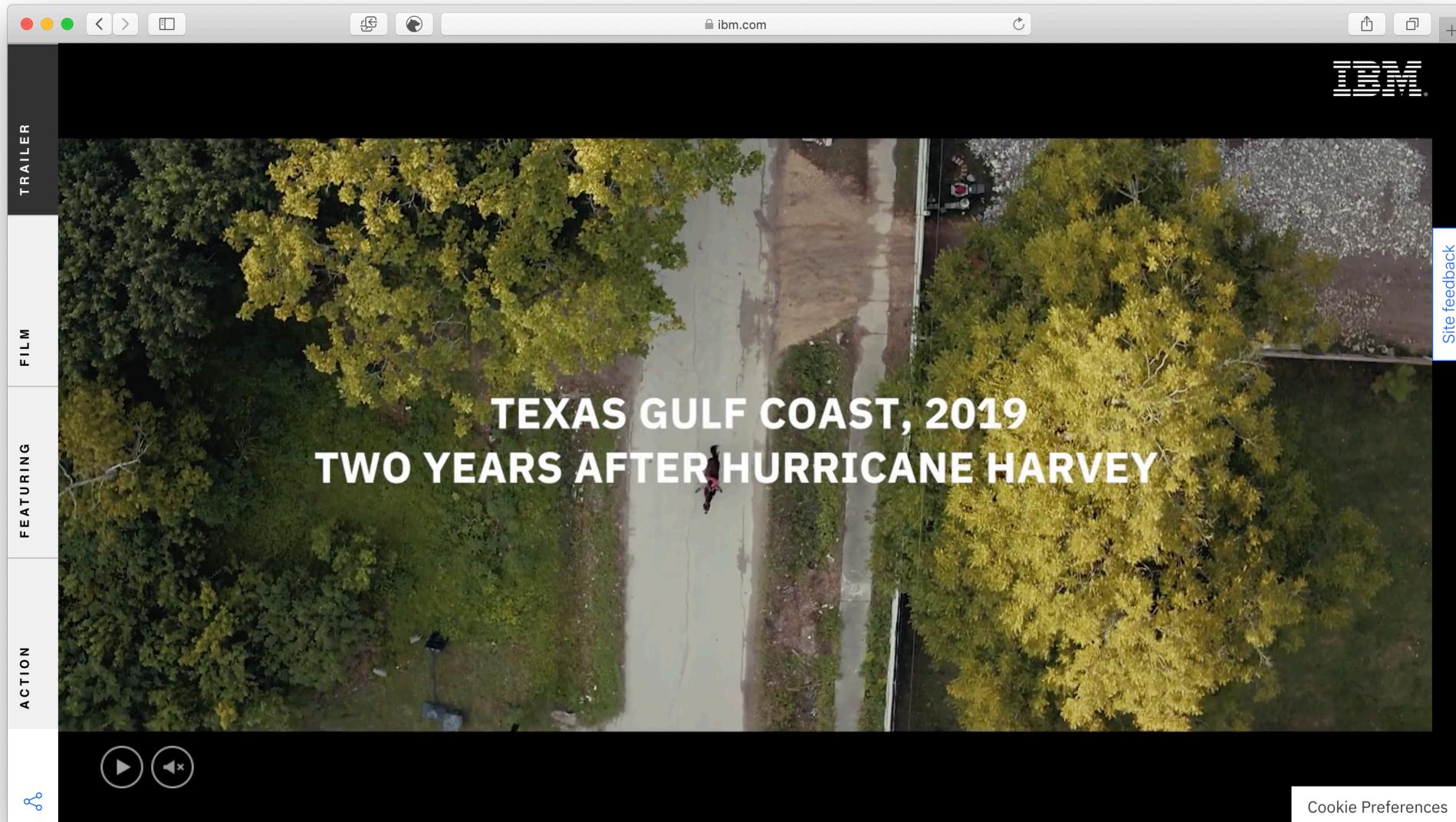
IBM Blockchain

Blockchain as a Service

- **IBM Blockchain** - Blockchain as a Service
- Help developed Hyperledger Fabric and use as its framework
- IBM Food Trust - Food **Supply Chain**
 - used by **Walmart**  and many others
- Decentralized **Identity** Solutions
 - “Build internet’s missing layer of trust”
- Blockchain for **Natural Disaster**
- **Blockchain for social good**



TIBA IBM Blockchain *Bonds of Trust Short Film*



Facebook

Blockchain for Financial Inclusion

- **Libra** - “A simple global payment system and financial infrastructure that empowers billions of people.”
- Secure, scalable, and reliable blockchain
- Backed by a reserve (**Libra Reserve**)
- Open to everyone to use the platform
- ‘Move’: programming language for smart contracts



Facebook

Blockchain for Financial Inclusion

- Governed by the independent **Libra Association**
 - members = validator nodes
 - not-for-profit
 - Headquartered in Geneva, Switzerland
- Start as permissioned but future ambition is to become permissionless
- Currently facing backlash from US regulators





Conclusion

Conclusion

Blockchain Opportunities

- **Opportunities** can be **found** where there's:
 - Inefficiency in the way we record shared data pre-blockchain
 - Middleman/Third-party:
 - taking too much of the transferred value
 - slowing down the process to customers
 - being dangerous and not trust-worthy
- **Opportunities** can be **created** by:
 - changing the way people live in the centralized systems and build decentralized alternatives

Conclusion

Blockchain for Impact

- “People need to talk **less** about what **blockchain** technology is and **more** about what it can do for **people**....That's when the **power** of it comes out and is **understood**.”
 - IBM’s Design Lead for Blockchain Services Chelsey Delaney , *Bonds of Trust* Short Film



Questions?





Homework Assignments

- Blockchains: how can they be used? (Use cases for Blockchains)
- Chainlink: What is the Blockchain Oracle Problem
- CNBC News: JPMorgan creates new unit for blockchain projects, says the technology is close to making money
- Bitcoin Is Helping Undocumented Immigrants Send Money Home - Global remittance industry
- IBM and Twiga Foods Introduce Blockchain-Based MicroFinancing for Food Kiosk Owners in Kenya



Blockchain for Social Impact

- New America-The Blueprint for Blockchain and Social Innovation
- Stanford x RippleWorks - BLOCKCHAIN FOR SOCIAL IMPACT- MOVING BEYOND THE HYPE
- UPenn Wharton-How the Blockchain Brings Social Benefits to Emerging Economies
- Cognition Foundry uses blockchain for social good
- Building Blocks – Blockchain for Zero Hunger



Blockchain
Applications
by
Samuel Tang



Thank you for listening!
See you again soon!

