Snapshot on Hyperledger

International Bridge, Tunnel, and Turnpike Association June 23, 2020

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What is a Blockchain?

A form of distributed ledger that is an **append-only system** of record or log of transactions.



Facets of distributed, shared ledgers



Network nodes both generate their own data and verify data generated by others



Contain historic record of verified transactions and easily auditable



Distributed Consensus eliminates costly and inefficient reconciliation processes



No central repository – each node stores identical copies of the ledger



Resilient due to network power and cryptographic integrity



Large economic disincentive for malicious actors



Deloitte Survey: "Blockchain is integral to organizational innovation"

Worldwide spending on blockchain solutions is forecasted to be nearly \$2.9 billion in 2019, before surging to \$12.4 billion in 2022.

Report by WEF 2019



Deloitte's 2020 Global Blockchain Survey

From promise to reality



Deloite 2020 Global Blockchain Survey

Why is blockchain relevant to Transportation?



Increase efficiency in processes while reducing errors



Enhancing both safety and security--due to data integrity among others listed



Provide a single source of truth linking interdependent transactions



Complex data reconciliation and intricate audit and certifications



Data sharing among multiple actors



Prevent loss, distortion, or forgery of vital log data



What Is Hyperledger?





Open source collaborative effort to advance crossindustry blockchain technologies Hosted by The Linux Foundation

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Global collaboration

spanning finance, banking, IoT, supply chains, manufacturing and technology





The Linux Foundation is working with the global technology community to solve the world's hardest problems through open source and creating the largest shared technology investment in history. Some of the 150+ game-changing initiatives hosted by The Linux Foundation include:





Hyperledger Goals

Where open source teams build diverse approaches for business blockchain



Create enterprise grade software

open source, distributed ledger frameworks & code bases to support business transactions



Provide community-driven infrastructures

that are open, neutral and supported by technical and business governance



Build technical communities

to develop blockchain and shared ledger POCs, use cases, field trials and deployments



Educate the public about the market opportunity for

bout the market opportunity for blockchain technology

Build the commercial ecosystem

to help ISVs, cloud providers, SIs, and end user organizations all realize commercial benefit from participation in the project, and demonstrate the economic power of this domain



Building the Commercial Ecosystem

Vendor Directory

Search for business blockchain products and services built by Hyperledger members



Global Vendors across multiple service types, products and industries





The Hyperledger Greenhouse





View How to Get Involved in Projects

Forbes BLOCKCHAIN 50

52% of the Blockchain 50 use Hyperledger !

- 2020 Breakdown
- 25 Hyperledger Fabric
 - 2 Hyperledger Sawtooth
 - 2 Hyperledger Indy
- 1 Hyperledger Grid
- 1 Hyperledger Iroha
- **1 Hyperledger Burrow**

- 22 Ethereum (Public?)
- 11 Corda
- 7 Quorum



https://www.forbes.com/sites/michaeldelcastillo/2020/02/19/blockchain-50/



HYPERLEDGER BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

"Hyperledger Fabric is the most popular outright with [25] companies using the permissioned ledger." -Blockdata

More than half of 'Forbes Blockchain 50' is built on Hyperledger



Community Special Interest Groups (SIGs)

Sector Groups are open to the public



HYPERLEDGER Healthcare SPECIAL INTEREST GROUP



HYPERLEDGER Telecom SPECIAL INTEREST GROUP



HYPERLEDGER Supply Chain SPECIAL INTEREST GROUP



HYPERLEDGER Climate Action & Accounting SPECIAL INTEREST GROUP



HYPERLEDGER Education Architecture SPECIAL INTEREST GROUP



HYPERLEDGER Capital Markets SPECIAL INTEREST GROUP

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HYPERLEDGER Trade Finance SPECIAL INTEREST GROUP



HYPERLEDGER Public Sector SPECIAL INTEREST GROUP

Visit: https://wiki.hyperledger.org/display/HYP/Special+Interest+Groups

Thank you

Karen Ottoni kottoni@linuxfoundation.org

Appendix

Hyperledger Blockchain Frameworks

The Hyperledger Greenhouse





View How to Get Involved in Projects

Distributed Ledgers



Project	HYPERLEDGER FABRIC
Status	ACTIVE
CII Badge	cii best practices passing
Description	Distributed ledger in Golang

- 1. <u>Get the Code</u>
- 2. Build your First Network
- 3. Visit the Hyperledger Fabric Wiki
- 4. Visit the Website <u>https://www.hyperledger.org/projec</u> <u>ts/fabric</u>

Platform for developing blockchain networks with a modular architecture for consensus and membership services.
 Fabric 2.0-beta released in December 2019.
 200+ devs across 100+ companies contributing.
 Hundreds of pilot and production networks deployed.





Hyperledger Fabric: Now Across All Major Clouds





Project	
Status	ACTIVE
CII Badge	cii best practices passing
Description	Distributed ledger purpose-built for decentralized identity

- 1. <u>Get the Code</u>
- 2. <u>Get Started</u>
- 3. Visit the Hyperledger Indy Wiki
- 4. Visit the Website <u>https://www.hyperledger.org/proj</u> <u>ects/hyperledger-indy</u>

Tools, libraries, and reusable components for providing digital identities rooted on blockchains or other distributed ledgers so that they are interoperable across administrative domains, applications, and any other silo. Utilizes zero-knowledge proofs to provide verifiable claims which can be used to prove something about the identity without providing access to the underlying data.



Project	
Status	INCUBATION
CII Badge	cii best practices in progress 82%
Description	Permissioned Ethereum smart-contract blockchain

- 1. <u>Get the Code</u>
- 2. <u>Get Started</u>
- 3. Visit the Hyperledger Wiki
- 4. Visit the Website <u>https://www.hyperledger.org/proj</u> <u>ects/hyperledger-burrow</u>

Burrow provides a modular blockchain client with a permissioned smart contract interpreter built in part to the specification of the Ethereum Virtual Machine (EVM). Uses Tendermint as its default consensus mechanism, but has also been ported to Fabric and Sawtooth.



Project	HYPERLEDGER IROHA				
Status	ACTIVE				
CII Badge	cii best practices passing				
Description	Distributed ledger in C++				

- 1. <u>Get the Code</u>
- 2. Get Started
- 3. Visit the Hyperledger Wiki
- 4. Visit the Website <u>https://www.hyperledger.org/proj</u> <u>ects/iroha</u>

A business blockchain framework designed to be simple and easy to incorporate into infrastructural projects requiring distributed ledger technology. Written in C++ incorporating unique chain-based Byzantine Fault Tolerant consensus. Mobile SDKs. Multisig support for transactions.



Project	
Status	INCUBATION
CII Badge	cii best practices not started
Description	Besu is an Ethereum client that runs on the Ethereum public network, private networks, and test networks such as Rinkeby, Ropsten, and Görli.

- 1. <u>Get the Code</u>
- 2. <u>Get Started</u>
- 3. Visit the Hyperledger Besu Wiki
- 4. Visit the Website <u>https://www.hyperledger.org/projects/</u> <u>besu</u>

Open source Ethereum client written in Java. It can be run on the Ethereum public network or on private permissioned networks, as well as test networks such as Rinkeby, Ropsten, and Görli. Hyperledger Besu includes several consensus algorithms including PoW, PoA, and IBFT, and has comprehensive permissioning schemes designed specifically for uses in a consortium environment.





Hyperledger: Libraries







Infrastructure for blockchain-rooted, peer-to-peer interactions. It provides a shared, reusable, interoperable tool kit designed for initiatives and solutions focused on creating, transmitting and storing verifiable digital credentials.

Transaction execution platform designed to be used as a library or component when implementing distributed ledgers, including blockchains.

A shared cryptographic library that would enable people (and projects) to avoid duplicating other cryptographic work and hopefully increase security in the process.

An interoperability solution for blockchains. DLTs and other types of ledgers



Hyperledger: Tools



Blockchain benchmark framework which allows users to measure the performance of a specific blockchain implementation with a set of predefined use cases.



Deploy, manage and operate blockchains. Support various infrastructures like baremetal, vm platform, and container cloud (e.g., Swarm, Kubernetes).

Support advanced operational analytics for the system status and ledger behaviors



User friendly web application to view/query blocks, transactions and associated data, network information (name, status, list of nodes), chain codes/transaction families (view/invoke/deploy/query) and any other relevant information stored in the ledger.



Hyperledger Avalon is a ledger independent implementation of the Trusted Compute Specifications published by the Enterprise Ethereum Alliance. Hyperledger Avalon will realize have different Worker types and include TEE (Trusted Execution Environments like Intel® SGX), MPC (multi-party compute), and ZK (zero-knowledge proofs).



Hyperledger: Domain Specific



A platform for building supply chain solutions that include distributed ledger components. It includes a set of libraries, data models, and SDK to accelerate development for supply chain smart contracts and client interfaces. This project will accelerate the development of blockchain-based solutions to cross-industry supply chain problems

LABS

HYPERLEDGER







Hyperledger Labs provides a space for innovation and testing of ideas where work can easily be started without the creation of an official Hyperledger project.



https://wiki.hyperledger.org/display/labs/Hyperledger+Labs+Home

Hyperledger 2020 Global Forum Highlights



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FORUM

- 450+ global attendees working in over 20 different industries
- 90+ sessions, including demos, technical how-to's and workshops
- Industry Analysts and Media in attendance w/ 400+ press articles, 1300+ tweets using #hyperledgerforum garnering 17.3M Twitter impressions
- All keynotes and session videos, available on <u>Hyperledger YouTube</u> channel
- All speaker bios and presentations available publicly <u>on SCHED</u>
- Browse pictures from the event



Global Forum Highlights

Over 500 attendees with 80+ speaker sessions with most of it on video: the keynotes to the business and technical tracks

You can find all of the videos by browsing the SCHED agenda app (includes links to video and the decks if uploaded) or just browse the YouTube Global Forum 2020 video channel. **Getting Started with Indy and Aries**

Hands on with Avalon

Hyperledger Fabric 101

Architecting Production-Worth Solutions with Hyperledger Fabric

Hands-on Intro to Decentralized Identity

Introduction to Besu

Burrow and Solidity



Be a part of a global ecosystem

Collaboration Tools





There are many ways you can make an impact on Hyperledger projects. To be successful we need community members like you to get involved and contribute. Please be sure to follow our Code of Conduct when participating.





Participate

Learn

Build

Visit www.hyperledger.org

We know, if you haven't been involved in an open source project before it can be intimidating to start participating.

Here are some tips for how to get comfortable:



Feel free to lurk

Seeing how other community members interact will help you adjust and learn the social norms in the community



Don't wait for an invitation

Our tools and meetings are open by default, so jump in and introduce yourself, ask questions and share ideas



Read our Code of Conduct We've set and enforce high standards of professional practice from everyone you'll be meeting

Community Working Groups (WGs)

Technical Working Groups are open to the public



Technical Steering Committee



Smart Contracts Working Group



Architecture Working Group



<u>Technical Working Group</u> <u>China</u>



Identity Working Group



<u>Performance and Scalability</u> <u>Working Group</u>



Learning & Materials

Development Working Group



Diversity, Civility and Inclusion Working Group (DCI)

Visit: https://wiki.hyperledger.org/display/HYP/Working+Groups

Community Special Interest Groups (SIGs)

Sector Groups are open to the public



HYPERLEDGER Healthcare SPECIAL INTEREST GROUP



HYPERLEDGER Telecom SPECIAL INTEREST GROUP



HYPERLEDGER Supply Chain SPECIAL INTEREST GROUP



HYPERLEDGER Climate Action & Accounting SPECIAL INTEREST GROUP



HYPERLEDGER Education Architecture SPECIAL INTEREST GROUP



HYPERLEDGER Capital Markets SPECIAL INTEREST GROUP

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HYPERLEDGER Trade Finance SPECIAL INTEREST GROUP



HYPERLEDGER Public Sector SPECIAL INTEREST GROUP

Visit: https://wiki.hyperledger.org/display/HYP/Special+Interest+Groups



Linux Foundation ID (LFID)

Linux Foundation ID (LFID) is a free account that identifies you and securely provides access to web sites of The Linux Foundation, our projects, and our service providers.

In order to participate in the <u>Hyperledger Chat</u> rooms (powered by Rocket chat) or edit the <u>Hyperledger Wiki</u> (powered by Confluence), all community members need to have a LFID. See video on <u>How to Setup a LFID</u>.



Community Wiki: wiki.hyperledger.org

E O HYPERLEDGER Spaces ~	Projec	ts 👻 Groups 👻 Lab	os 👻 Events 👻 Community 🛩				Search Q	6	Log in
Hyperledger		Dashboard							
AGE TREE Hyperledger Code of Conduct Calendar of Public Meetings Projects Security Special Interest Groups Working Groups Technical Steering Committee FAQ Page Archive		Hyperledger is an oper manufacturing and tec Projects Working Groups Special Interest Governing Docu	source collaborative effort create hnology. Questions? Please visit th Groups ments of the Hyperledger Technic	d to advance crossee FAQ.	BLOCKCHAII ss-industry blockchain technologies.	ERLEDGER N TECHNOLOGIES FOR BUSINESS It is a global collaboration, hosted by The Linux Foundation, including leaders in	finance, banking, IoT, supply chain		
About Legal		Figects							
		Title	Project	Status	CII Badge	Description			
		Hyperledger Aries	Hyperledger Aries	INCUBATION		Edit this description.			
		Hyperledger Burrow		INCUBATION	cii best practices in progress 82%	Permissioned Ethereum smart-contract blockchain			
		Hyperledger Caliper	HYPERLEDGER CALIPER	INCUBATION	cii best practices in progress 97%	Blockchain benchmark framework which allows users to measure the performation with a set of predefined use cases.	nce of a specific blockchain		
		Hyperledger Cello		INCUBATION	(R)	Blockchain management/operation			
		Hyperledger Composer		INCUBATION	cii best practices passing	Development framework/tools for building Blockchain business networks			
		Hyperledger Explorer	HYPERLEDGER EXPLORER	INCUBATION		Blockchain Web UI			
space tools «		Hyperledger Fabric	FABRIC	ACTIVE	cii best practices passing	Distributed ledger in Golang			



Community Chat: chat.hyperledger.org





Community Calendar: Public Meetings

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≡ ♦ HYPERLEDGER Spaces ▼	Projects 👻 Groups 👻 Labs 👻 Events 👻 Community 👻	Sea	arch Q
	Dashboard / Hyperledger		
	Calendar of Public Meetings		
	catendar of Fublic Meetings		
5	Created by Tracy Kuhrt, last modified on Nov 06, 2018		
Hyperledger	Following is a calendar of community meetings. Times are GMT .		
	Today 📢 🕩 Wednesday, March 27 👻		
DACE TREE	Shawing quarte after 3/07. Look for partier quarte		
PAGE INCL	Wednesday, March 27		
 Hyperledger Code of Conduct 	2:00am Technical Working Group China		
 Calendar of Public Meetings 	9:00am Hyperledger Caliper Contributors Meeting		
 Managing Zoom Meetings 	10:00am HL Iroha Community Meeting		
• FAQ	2:00pm Hyperledger Quilt Bi-Weekly Sync-Up		
h Davie de	2:00pm Hyperledger Indy SDK coordination		
Projects	3:00pm Smart Contracts WG		
> Security	4:00pm Hyperledger Architecture WG		
> Special Interest Groups	7:00pm Indy Agent WG Call		
> Working Groups	Thursday, March 28		
> Bage Archive	8:30am Hyperledger Sawtooth Application Developer's Forum		
· Fage Archive	1:00pm Fabric SDK Py		
 Academic and Associate collaborati 	1:00pm Hyperledger Fabric Interoperability Discussion		
About	2:00pm Technical Steering Committee (TSC)		
	3:00pm Hyperledger Indy WG		
	6:00pm Hyperledger Telecom SIG		
	Friday, March 29		
	6:00am Fabric Documentation WG (schedule A)		
	12.30pm Hyperledger Cello Scram Meeting		
	4:00m Eship Documentation W/G (schedule B)		
	4:00nm Hyperfedger Healthcare SIG: Patient/Member Subgroup #patient-member-subgroup		
	Tunaday Anel 3		

To view the calendar in your timezone, open the calendar and modify the ctz parameter to view the calendar in your local time zone. Options for time zone can be found in the TZ column of https://en.wikipedia.org /wiki/List_of_tz_database_time_zones#List.

Here are some time zones that you may find useful:

China Standard Time

. IIC Arizona Time



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O Space tools

Hyperledger in Action

Street, range Anny And All 21412

Newest Cross Industry Case Study Honeywell

AEROSPACE



"In the \$4 billion industry for used aerospace parts, less than 2.5% of all transactions are done online. Think about that. Business is still done the oldfashioned way."

– Lisa Butters, General Manager, GoDirect Trade, Honeywell Aerospace

Read full Case Study: https://www.hyperledger.org/resources/publications/honeywell-case-study

Watch Global Forum Keynote: Blockchain in Action: The Latest on Production Deployments from American Express, Honeywell and Walmart - Moderated by Michael del Castillo, Forbes https://www.youtube.com/watch?v=9Et-o78XgeQ

Other Cross Industry Case Studies

CHANGE HEALTHCARE

Change Healthcare using Hyperledger Fabric to improve claims lifecycle throughput and

transparency

Industry: Healthcare Topics: Hyperledger Fabric, Healthcare, Blockchain Project(s): Hyperledger Fabric



<u>When Hyperledger Sawtooth Met Kubernetes – Simplifying Enterprise Blockchain Adoption</u> **Industry:** Blockchain, Cloud Computing, Technology, IT Services **Topics:** Hyperledger Sawtooth, Kubernetes, Blockchain, Containers, Cloud computing **Project(s):** Hyperledger Sawtooth



BC aims to cut government red tape with Hyperledger Indy

Industry: Blockchain, Tech, Small Business, Government
 Topics: Blockchain, Open Source, Digital Identity, Self Sovereign Identity, Bureaucracy, Small
 Businesses, Business Development, Government
 Project(s): Hyperledger Indy

Trade Finance: we.trade

- we.trade is a blockchain-based international trading system for a consortium of major world banks including:
 HSBC, Deutsche Bank, KBC, Natixis, Rabobank, Société
 Générale, Santander, UniCredit and Nordea
- SMEs generate 85% of employment growth in Europe, but only ~50% of them have access to formal credit.
- Went into production July 2018 conducting **seven live trade transactions by ten companies via four partner banks**
- Enables accurate trading position information, order to settlement control, risk coverage, track and trace options
- Near-real time exchange of information on a secure platform that digitizes transactional financing
- Continual business and **compliance readiness** in any relevant regulatory environment
- **Scalability** that allows for rapid international expansion as business, regulatory, and security opportunities converge





Letters of Credit

- China Minsheng Bank and China CITIC Bank jointly developed an open, standard and regulatory compliant domestic L/C transmission platform using blockchain
- Banks involved include China Minsheng Bank, China CITIC
 Bank, Bank of China and Suning Bank
- Completed 100 million RMB letter of credit transaction
- Removes need for SWIFT in China domestic L/C settlement and enables creation of an independent and domestic-controlled L/C exchange system
- Improved user experience, supporting a Chinese UI tailored to domestic business requirements
- Incorporated the whole L/C process, shortening delivery time, with improved efficiency and security









Digital ecosystems are critical to safeguard and protect data in today's hyper-connected world. Secure Key launched the Verified.Me network in Canada – a privacy-enhanced service enabling consumers to conveniently and privately assert identity information using trusted providers.







Increasingly, consumers expect clean pork and know where the ingredients are sourced from. Additionally, companies want to create better loyalty programs. Scan Trust partnered with Unilever to build a solution that provides reports, analysis, and recommendations based on the big data from consumers, thanks to connecting the data sources. Additionally now clients can benefit from better loyalty programs.





Food provenance history stored in a blockchain

U.S. Government Procurement: HHS

- HHS Accelerate, relies on blockchain to streamline the process the department uses to procure products and services from private vendors.
- With the tool, HHS aims to **speed up the procurement process and reduce its costs.**
- Uses blockchain as a ledger to record vendors' interactions with HHS so vendors are able to access a time-stamped record of all financial information, requests-for-information, reference checks and other data they provided in the past so it can be used again.
- Enable contracting professionals to access historical information about prices, terms and conditions for a product or service in real time. Collecting, organizing and analyzing that information would normally take an agency four to six months for a large sourcing initiative

Achieved authority to operate (ATO) status which means all federal funded systems can operate this tool built on Hyperledger Fabric



Kiva: Implementing SSI and a privacy-first credit bureau for Sierra Leone

Challenge:

- 1. There is no effective digital identity system or credit bureau for SL's 7.5M citizens
- 2. As a result, Kiva's lending rates are 30%, much higher than in other countries and a blocker to financial participation.

Solution:

- 1. 2019-Q2 NCRA (SL government ID agency) will issue credentials on a Hyperledger-Indy based network.
- 2019-Q4 BSL (central bank) will use Hyperledger Fabric for a shared, decentralized credit reporting bureau.

In April, the National Civil Registration Authority (the gov't identity agency in Sierra Leone) issued 5.2M DIDs using Indy, which are being used to bring broad financial inclusion in the country.



Introducing Kiva Protocol, an exciting new initiative to give unbanked people digital identity and secure control over their own credit information.

Kiva, Sierra Leone and U.N. agencies announced the first implementation of the Kiva Protocol on Sept. 27, 2018, at the U.N. General Assembly. The Kiva Protocol will be used to create a nationwide digital identification system designed to help the country's 7 million citizens access the financial services they need to improve their lives.

Digital Identity: The OrgBook

- The OrgBook serves as a **trusted digital network of verifiable data** about organizations which is globally connected, **interoperable**, **secure**, **and easy to join**
- Why? So business/government can quickly access evidence of that a potential partner is legally incorporated
- The new enrollment experience is **more convenient** and use an open global blockchain registry
- Reduced single point of failure for database, reduced fraud from counterfeit IDs, reduces bottlenecks, and improves privacy which a complex verification system can expose
- As more businesses establish their Self-Sovereign Identity, more Services will become Self-Sovereign Identity-aware
- Live, public, globally accessible network using the Sovrin Provisional Network built on Hyperledger Indy.



Thank you

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