

Blockchain and the Big Players

In my last article, I talked about the new emerging ecosystem called Blockchain. I explained the basic concept, gave some examples of companies with their own ecosystems and carried out a mental exercise of Blockchain applied to the tourism industry.

As an evolving technology, Blockchain is gradually being adopted by important technology giants such as IBM, Amazon, Microsoft and others to develop business platforms to suit the needs of different businesses and industries. Even Google, which initially was not quite convinced about this technology, is now working on its own version while providing its Cloud services to host Blockchain platforms such as Ethereum.

I have particularly been observing IBM's technological developments in view of its 110-years' experience, and especially, its enormous influence in the evolution of computing. Just remember some of the company's great technological achievements: the mainframe computer (1952), the Personal Computer or PC (1981), and the launch of the first commercial quantum computer, the IBM Q System One in 2019. Quantum computing is advancing at a faster pace than I thought, but this is a topic for another article.

Let me continue delving into Blockchain technology and what IBM is doing in this field. It is fair to say that IBM has been the leading tech giant, adopting blockchain technology very early. Indeed, the IBM Blockchain Platform was launched on March 20, 2017, based on the Linux Foundation's Hyperledger Fabric.

As we know, the Blockchain technology initially started by supporting Bitcoin transactions; however, the IBM Blockchain platform is designed to go beyond cryptocurrencies, and support other business operations in sectors such as supply chain, logistics, healthcare, media and advertising, manufacturing, finance and insurance, among others.

Since IBM is deploying the Linux Foundation's Hyperledger Fabric, I should briefly mentioned that the Linux Foundation is a non-profit IT organization established in 2007 to promote, protect, standardize and advance the open-source Linux operative system (OS), created by Linus Torvalds in 1991. It has over 1,000 member companies and organizations in the IT sector, including many leading and global tech giants, of which IBM is a premier member. An open-source OS is simply defined as an executable, readable and original software program.

Due to its open nature, the Linux OS source code is publicly available to software developers. They can use, study, share or modify it, and when they modify the software, they must make the code source (the original software) available to the public. It is an essential aspect of any open-source software program, which allows for wide collaboration among independent or company software developers around the world. Open-source software programs are also greatly contributing to the deployment of many smart devices across industries, boosting new developments in the realm of the Internet of Things (IoT).

Except for computers and devices using Microsoft OS, Apple OS or any other closed-source OS, the Linux OS runs on a variety of hardware from supercomputers to servers, modem, routers,

automobile, smart TVs, smart watches, digital and surveillance cameras, smart home appliances, among many other devices. Also, many Internet companies such as Google, Facebook, Twitter, Oracle, Amazon, and others use the Linux OS.

Within the Linux Foundation's ecosystem, we have the Hyperledger Foundation, which manages the Hyperledger Fabric, a Blockchain or Distributed Ledger Technology (DLT). The Hyperledger Foundation describes itself in the following terms:

“The Hyperledger Foundation is the open, global ecosystem for enterprise blockchain technologies. As part of the Linux Foundation, it is a neutral home for developers to collaborate, contribute, and maintain open-source software. Hyperledger was founded in 2015 to bring the transparency and efficiency of DLT technologies to the enterprise market, leveraging the well-proven open-source software model. The high-level aim is to enable solutions that connect industries, organizations, and even individuals more directly, recreating how information is shared and business is conducted.”

Besides the Hyperledger Fabric, the Hyperledger Foundation has deployed other distributed ledgers such as Hyperledger Aries, Hyperledger Besu, Hyperledger Iroha, Hyperledger Indy and Hyperledger Sawtooth, which are considered as “graduated”. All of these Hyperledger have their specific features and are ready for business and industry application. The Foundation is also working on several other Hyperledger projects for business and industry, which are in the “incubation” stage (in development).

Now, let's take a look at the main features of the Hyperledger Fabric.

- It is an open-source software that allows adaptability and scalability (transactions size, platform size, etc.) to suit specific needs of business and industry.
- It has a modular architecture that allows for innovation, versatility and optimization for business and industry. By using a modular architecture, each software component of the platform such as identity and membership, consensus, ordering of transactions, smart contracts, privacy and confidentiality, communication, cryptography, ledger storage, etc. can perform independently and be adapted or upgraded when necessary. Just think of the design of the International Space Station (ISS), built upon modules, which can be replaced and upgraded without rebuilding the entire physical structure. The same architectural logic can be observed in the children's building block toy, Lego.
- It is a permissioned platform. The initial Blockchain platform that supported Bitcoin was permissionless, allowing any participant to buy and sell the cryptocurrency; however, for businesses and industries in general, participation needs to be restricted to only those involve in the specific transaction (specific product or service). It also requires knowing the identity of participants to ensure a trusted environment. Therefore, Hyperledger Fabric uses channels to restrict participation to only those who are involved in the transaction. It allows for privacy, confidentiality, and accountability.
- It uses smart contracts (called chaincode) to self-execute transactions. As computerized transaction protocols that execute the terms of the agreement, smart contracts are at the heart of any business-grade blockchain technology. In Hyperledger, smart contracts can be

written in widely adopted standard programming languages such as Go, Java, JavaScript, and even support Ethereum's Solidity smart contract language.

- It is highly secure, as every actor in the platform has an identity which defines the level of permission to access information in the system. An actor's identity is verifiable through membership service providers, which perform as certificate authority, issuing identity certificates. In addition, its security level is supported by the Open Source Security Foundation (OpenSSF), another organization of the Linux's ecosystem created to improve open-source software security.
- Established by the Linux Foundation, it is supported by a large community of individual and company developers, including prestigious IT corporations from all over the world.

It is important to point out that Hyperledger Fabric was the first project to be delivered within the Hyperledger family, nurtured by the joint collaboration of IBM and Digital Asset Holding. Not without reason, Hyperledger Fabric 2.0 (upgraded in 2020) has become the core Blockchain platform of IBM.

In addition to offering Blockchain as a Service (Baas), IBM has developed partnerships with landmark companies such as Walmart and Maersk to promote Blockchain technology in the area of supply chain management. In the case of Walmart, IBM has implemented Food Trust to ensure compliance, safety, and traceability from source to consumer or from farm to table, bringing together growers, processors, wholesalers, distributors, manufacturers, retailers, and other stakeholders to enhance visibility and accountability in each step of the food supply. Built on IBM Blockchain technology, IBM Food Trust is a platform that directly connects participants through a permissioned, permanent, immutable, and shared record of food origin and shipping details, and other components of the transaction.

Together with Maersk, IBM has also implemented TradeLens, an initiative to transform the containerized freight-based shipping and logistics industry. Maersk was also an early adopter and has invested heavily in IBM blockchain, supporting TradeLens. The goal of this initiative is to reduce costs and paperwork, and to increase visibility and traceability of freight.

Another of IBM's Blockchain endeavors is in the area of trade finance. We.trade is aimed at building trusted trading networks based on smart contracts, which are verified by banks and follow the Know-Your-Customer regulations. In this connection, IBM and 14 major European banks, including Deutsche Bank, HSBC, and Santander have created a trading platform with built-in smart contracts to support cross-border trading.

There are many other sectors where IBM is bringing onboard flagships companies to implement and disseminate Blockchain technology around world. And considering the experience and prestige of IBM in the technological development of computing, as well as its global network, we might see the adoption of business-grade Blockchain much faster than the adoption of Cloud computing. In another article, I will examine what IBM's competitors are doing in this field.

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Sources:

“Timeline of computing”, Wikipedia, accessed on December 13, 2021.

https://en.wikipedia.org/wiki/Timeline_of_computing

“Timeline of quantum computing and communication”, Wikipedia, accessed on December 13, 2021. https://en.wikipedia.org/wiki/Timeline_of_quantum_computing_and_communication

“IBM’s roadmap for scaling quantum technology”, Jay Gambetta, September 15, 2020, accessed on December 18, 2021. <https://research.ibm.com/blog/ibm-quantum-roadmap>

“IBM launches enterprise-ready blockchain service”, Anna Irrera, March 20, 2017, accessed on December 20, 2021. <https://www.reuters.com/article/us-ibm-blockchain-launch-idUSKBN16R07L>

Linux Foundation (LF), Technopedia, February 6, 2017, accessed on December 20, 2021.

<https://www.techopedia.com/definition/15768/linux-foundation-lf>

“An Overview of Hyperledger Foundation”, published in October 2021 by Hyperledger Foundation, accessed on December 22, 2021.

https://www.hyperledger.org/wpcontent/uploads/2021/11/HL_Paper_HyperledgerOverview_102721.pdf

“Hyperledger Foundation Hosted Projects”, accessed on December 22, 2021.

<https://www.hyperledger.org>,

“Hyperledger Fabric”, Jake Frankenfield, September 21, 2021, accessed on December 23, 2021.

<https://www.investopedia.com/terms/h/hyperledger-fabric.asp>

“Hyperledger Fabric: A Distributed Operating System for Permissioned Blockchains”, April 17, 2018, peer review by Elli Androulaki, Artem Barger, Vita Bortnikov, Christian Cachin, Konstantinos Christidis, Angelo De Caro, David Enyeart, Christopher Ferris, Gennady Laventman, Yacov Manevich, Srinivasan Muralidharan, Chet Murthy, Binh Nguyen, Manish Sethi, Gari Singh, Keith Smith, Alessandro Sorniotti, Chrysoula Stathakopoulou, Marko Vukolic, Sharon Weed Cocco, Jason Yellick. Accessed on December 23, 2021.

<https://hyperledger-fabric.readthedocs.io/en/release-1.4/whatis.html>

“Hyperledger Achieve an Important Milestone: Introducing Hyperledger Fabric 2.0”,

Christopher Ferris, January 30, 2020, accessed on December 23,

2021. <https://www.ibm.com/blogs/blockchain/2020/01/hyperledger-achieves-huge-milestone-introducing-hyperledger-fabric-2-0/>

“IBM Blockchain Platform”, Alan Pelz-Sharpe, Deep Analysis, 2020. Accessed on December 23, 2021. <https://www.deep-analysis.net/wp-content/uploads/2020/06/DA-V-2005-IBM-blockchain-no-distribution-3.pdf>

“Blockchain for Dummies”, Manav Gupta, published by John Wiley & Sons, Inc., 2020, IBM 3rd Limited Edition, accessed on December 28, 2021. <https://www.ibm.com/downloads/cas/OK5M0E49>