Additional Blockchain Information

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What is Blockchain

Blockchain is a shared, immutable ledger that tracks assets and records transactions (data). Basically, it's a kind of datastore where saved data is (almost) never updated. Instead, data is always saved as a new record chained to the previous record: the data is the block, and as the blocks are "chained" together, you have a "blockchain". This "never update" pattern is what is meant by the term "immutable", and this kind of storage pattern is ideal for all sorts of digital

use cases where a single trusted source of truth must be maintained and agreed to by multiple distributed parties. The use case most people are familiar is that of Cryptocurrencies such as Bitcoin, which is one kind of Digitial Currency. But this is only one use case. Other types and uses of blockchains include public, private, hybrid, and federated (or consortium) blockchains. Blockchain technology exists in finance, data management, e-commerce, e-governance, identity management, and more - anywhere that auditable trust is a requirement.

An additional and often talked about optional feature of some blockchains is smart contracts.

Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met. - IBM

These simple programs are conditionals that execute against predetermined conditions to automate various elements of a transaction flow (interaction with the blockchain). The benefits include:

- **Speed** - Automatic execution of logic without additional input
- **Trust** - No human intervention means the math and preconditions do all the work and can be trusted
- **Security** - Because it happens within the blockchain itself it is inherently an encrypted difficult to access process
- **Accuracy** - Smart contracts do not require additional paperwork, transactions or other inputs that may be prone to error

Applications of Blockchain

There are a great many examples of real world blockchain implementations. Thankfully, this article from Builtin.com has actually categorized 30 of them! To be clear, there are likely hundreds of potential applications of blockchain. Hopefully these examples will provide some context. Here are some highlights from the article:

Propy - Real Estate • Palo Alto, California

Propy is a global real estate marketplace with a decentralized title registry system. The online marketplace uses blockchain to make title issuance instantaneous and even offers properties that can be purchased using cryptocurrency.

Ocular - Cybersecurity, Fintech • Los Angeles, California

Ocular's anti-money laundering compliance platform leverages blockchain-enabled security to ensure data cannot be manipulated. The technology uses biometric systems to scan the faces of individuals applying for passports, driver's licenses and other government issued IDs. By viewing biometric systems on blockchains, governments can more easily catch identity thieves foraging fake passports, certificates and IDs from other countries.

Civic - Identity Security, Fintech • Palo Alto, California

Civic is a blockchain-based ecosystem that gives individuals insights into who has their information. The company's users enter into smart contracts, where they decide who can share their personal information and how much. If the contract is broken or an unauthorized source tries to access private data, the individual is immediately alerted.

DHL - Logistics, Supply Chain • Florida (US headquarters)

Shipping giant DHL is at the forefront of blockchain-backed logistics, using it to keep a digital ledger of shipments and maintain integrity of transactions. DHL has a major presence in the US and is one of the largest shipping companies to embrace blockchain.

Pixura - NFTs, Creative • Remote-First

Pixura is a platform that helps non-technical users to create, track and exchange digital NFTs on the blockchain. The company helps everyone from game studios to individual musicians and artists to create their own digital assets in just minutes. The company also created the site SuperRare, which has become one of the go-to sites for buying and selling digital art in the NFT era.

Voatz - Government, Cybersecurity, Politics • Boston, Massachusetts

Voatz is a mobile voting platform that runs on blockchain. The encrypted biometric security system makes it secure to vote on a mobile device from anywhere in the world without fear of hacking or data corruption. West Virginia is one of the first states to use the company's platform to collect votes from eligible service people and travelers abroad during elections.

Blockchain Tools, Methods, & Techniques

There are a number of blockchain platforms available. They all perform the same basic function but also, individually have unique features that specialize them for certain usecases. There are a lot of opinions regarding which platform is best; however, generally speaking, this is a good list of the most popular platforms in 2021: Tezos, Stellar, Hyperledger Fabric, Hyperledger Sawtooth, EOS, Openchain, Corda, Tron, Hedra Hashpraph, and Ethereum.

Blockchain also has its own unique ecosystem of libraries, frameworks, tools, and even development languages. Some examples include:

- Solidity
  - Solidity is an object-oriented, high-level language for implementing smart contracts. Solidity is a curly-bracket language. It is influenced by C++, Python and JavaScript, and is designed to target the Ethereum Virtual Machine (EVM).
- Remix
  - Remix IDE allows developing, deploying and administering smart contracts for Ethereum like blockchains. It can also be used as a learning platform.
- Chaincoder
  - Chaincoder is an IDE for Hyperledger Fabric
- Ganache and Truffle

- Ganache lets you quickly fire up a personal Ethereum blockchain which you can use to run tests, execute commands, and inspect state while controlling how the chain operates. Truffle is a development environment, testing framework and asset pipeline for blockchains using the Ethereum Virtual Machine (EVM).

There are many other examples and each blockchain platform has specialized clients and libraries. As you explore the different platforms, they will typically include detailed development documentation and tutorials.

Conducting Blockchain Projects

Like most projects, blockchain specific projects require an objective and success criteria. Blockchain itself has no inherent value (although there is a certain hype associated to them right now). We often see the concept of blockchain being applied to projects even when a more traditional datastore would be sufficient. As an example, if you need an immutable data storage system, its true that blockchain could provide this, but so could any number of other databases and for much less effort. The basic scenarios that may be good use cases for blockchain are:

- **Dapps** - As defined by Ethereum, a decentralized application (dapp) is an application built on a decentralized network that combines a smart contract and a frontend user interface. If you are building one, it's possible a blockchain (ethereum or otherwise) may be appropriate.
- **Decoupled Systems Requiring High Trust** - If you have multiple decoupled systems that need to coordinate and have high trust on data that is potentially written by a large number of individuals (like a ledger) then a blockchain may be appropriate.
- **Audit** - If you are building something that will be audited but can't guarantee a single source of truth to maintain the data, you may have a good case for blockchain.

Beyond this, blockchain can still be used, but is not necessarily a non-negotiable requirement. This is actually perfectly normal and it may still be a good idea to use a blockchain as doing so may increase confidence in security and data accuracy in a market, regardless of whether or not it was technically required.

The best advice that can be provided in beginning a blockchain project is to pick a platform (options which do include managed services - see below) and then work through the supplied tutorials and documentation to spin up a local instance for experimentation. As a technology, blockchain is still relatively new and most platform knowledge bases assume that implementing teams are starting with little to no experience.

Major Blockchain Vendors

Until recently blockchains have predominantly been libraries and frameworks, both open sourced and licensed, that required time and experimentation to implement correctly. Since those early days, all major cloud providers now offer managed blockchain services:

- AWS Blockchain
- Azure Blockchain Service, migrating to Quorum Blockchain in September of 2021
- IBM Blockchain Platform
- Oracle Managed Blockchain

Interestingly, Google's GCP does not seem to have a distinct managed blockchain service available at this time, though you can spin up a blockchain on their infrastructure very easily through their marketplace one click deploy system.

There are of course other more boutique offerings aside from the major cloud services; however, since these cloud provider options became available, most enterprises use them as it is much easier than bringing on a new vendor.

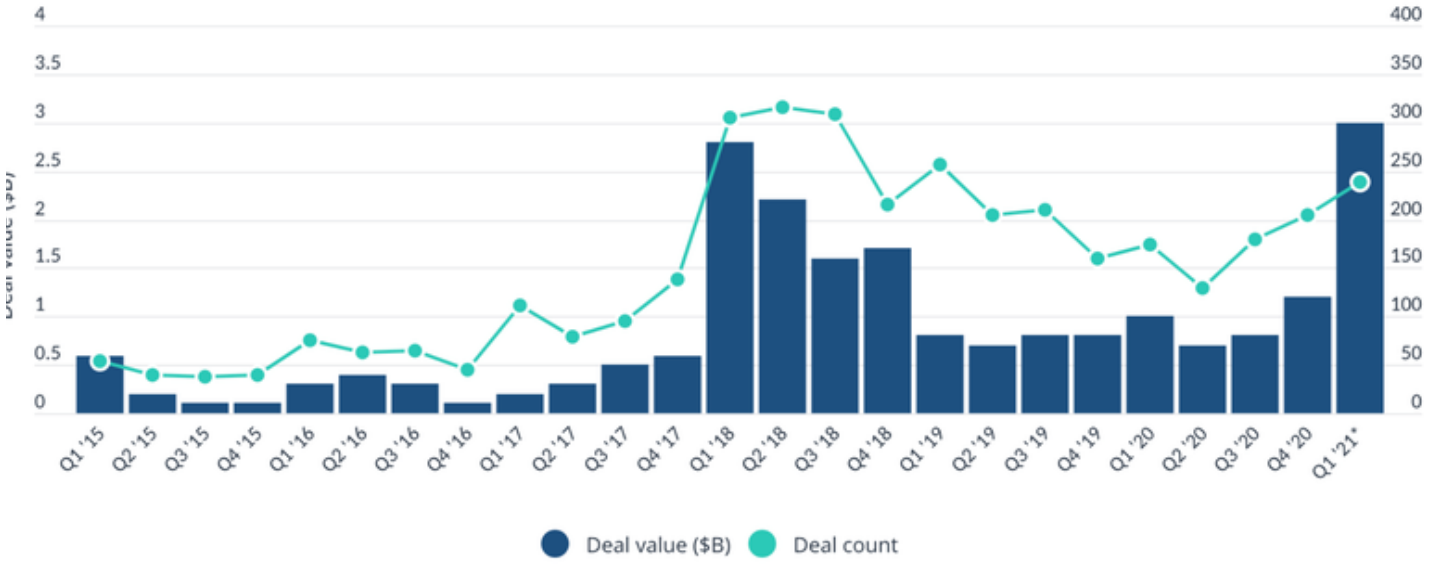
Blockchain Startup Activity

There is a lot of startup capital being raised in 2021 and Blockchain is one of the strongest segments. Q2 2021 as a whole was one of the largest funding quarters on record for financial technology at $30.8 billion across 657 fintech companies, according to CB Insights. $4.38 Billion of that total was for Blockchain companies, despite cryptocurrencies in general having a slump.

The largest financing round for a blockchain company in the second quarter was a $440 million investment in Circle, a payments and digital currency firm. Circle recently announced plans to go public through a $4.5 billion merger with a blank-check company. - CNBC

Ledger had the second biggest round raising $380 million.

Prior to this 2021 surge, the biggest spike in Blockchain on record was in 2018 when there was a lot of interest in trading and mining digital coins.



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