10 Questions To Ask Before You Use Blockchain

forbes.com/sites/forbestechcouncil/2018/09/11/10-questions-to-ask-before-you-use-blockchain

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Innovation
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Sep 11, 2018,07:30am EDT

A blockchain is as an immutable, append-only (no updates, no deletes) database, where any new data cannot conflict with older data in the database. Also, each piece of data has an owner, is replicated many times and is always available. Finally, everyone agrees on the state of the database, though there is no central authority.

Technically speaking, a blockchain is a linked list or chain of blocks, and a block is a group of ordered transactions. Each transaction has a transaction ID and is digitally signed by the owner. All transactions are broadcast, so everyone can maintain a copy of the blockchain. Miners verify transactions and do work necessary to add a new block of transactions to the blockchain. They run a consensus mechanism to agree on the next block to add to the blockchain. A blockchain is also often called a distributed ledger.

In a public or permissionless blockchain, anyone can write to the blockchain, and anyone can read from the blockchain. In a private or permissioned blockchain, only identified participants are allowed to read and write.

Key Advantages Of Blockchain

A blockchain allows entities who do not know each other to agree on the state of the database without the need for any intermediary or central authority. Put another way, it can establish trust between strangers. No one entity can bring the network down or censor parts of it.

The key advantages of a blockchain are the fact that it is immutable, and the fact that it allows trust between parties without a central authority.

Types Of Solutions Where Blockchains Can Help

Blockchain POCs are being used for asset tracking, payments and settlements, smart contracts, trading, voting, shared record-keeping, digital tokens, claims, provenance, and loyalty/rewards programs.

Enterprise Use Cases

According to Gartner (via PwC), 82% of use cases for blockchain were in the financial industry in 2017, but 2018 has seen a broadening out of use cases, with only 46% related to financial services. Other big verticals where blockchain experimentation is going on include transportation, retail, utilities, manufacturing, insurance, health care and government.

The biggest use cases are asset tracking in transportation and government; record-keeping in utilities, health care and insurance; provenance in retail; and securities trading.

When To Use A Blockchain

Because of the hype surrounding blockchain, we are increasingly seeing it being used in situations where better or simpler methods may suffice, such as a database with application logic.

Brian Scriber's recent paper in issue No. 4 of IEEE Software gives a great framework for evaluating if a blockchain is applicable in a given situation.

Based on that paper and framework, we developed the following simplified list of 10 questions leaders should ask before they embark on using blockchain to address a specific need:

1. Is immutability needed for the proposed use case? Immutability is the assurance that actors in the ecosystem cannot change the historical record. If immutability is not needed, there are simpler methods to ensure other attributes (i.e., that data has not been changed from its original form).

2. Might you have a need to remove a record in the blockchain or correct a mistake? Blockchains are append-only, so they will not allow for that. As an example, GDPR with its "right to be forgotten" may make storing personal data of an EU national on a blockchain challenging/impossible.

3. Are there multiple entities involved, or are you trying to solve a problem inside one organization? Since trust already exists within a single organization, blockchain may be overkill, and simpler solutions may suffice.

4. If multiple independent entities are involved, do the entities trust each other? Blockchain removes the need for trust between different entities. If such trust already exists, blockchain may be overkill.

5. Do you need the transparency provided by the blockchain, where all participants can see the chain (even if individual transactions may be anonymous)? Do you already use external controls (such as escrow or notary services) to validate or audit transactions and, if so, is that adequate for you? You may not need a blockchain if the existing controls you have in place are adequate for your needs.

6. Is it important to know the humans or systems involved in a transaction to be able to ensure that transactions cannot be counterfeited or compromised? Blockchains are useful where you want to know the identity of participants in a transaction (e.g., which doctor prescribed that medication). Or, if anonymity is desired, you still want to be able to prevent X from doing a transaction and making it look like Y did it. Do not use a blockchain if this is not important to you.

7. How important is it for the system to be distributed? Can a centralized system meet your needs? Distribution is very expensive, so don't use it unless you truly need the benefits that distribution brings you, such as system reliability from node failures, immunity from the actions of a minority of bad actors, and security and integrity achieved by having multiple participants confirm transactions and achieve consensus.

8. What are the performance requirements, and can a blockchain meet my needs? A blockchain is computationally expensive and can only support a limited number of transactions per second -- make sure you know what your needs are, and compare that to what blockchains can support.

9. Do constrained devices with limited resources need to participate as a node in the blockchain? If so, check and make sure that they can they handle the computational burden imposed by blockchains.

10. Is there a good architectural fit between the application being designed and blockchain? If the app is non-transactional in nature, how can it be adapted to fit with blockchain's transactional model? If different entities have interacted directly with each other in the past, will there be friction in the system to change to a model where everyone interacts with a distributed ledger?

Conclusion

Blockchains can solve important problems, but make sure to ask yourself these 10 questions so you limit their use to situations where simpler solutions do not exist.

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