

Augmented Blockchain Services for Blockchain as a Service Offerings

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Abstract:

Blockchain is a disruptive and revolutionary technology that is rapidly impacting the way we do business and is vast emerging as the technology of choice in areas where trust is of utmost importance. The use of cryptography ensures that the blockchain records keep growing and that the records in the blockchain are tamper-proof. This irreversible nature of blockchain makes it especially useful in financial transactions as well as supply chain. The usage of the various consensus algorithms, implementation level details, setting up a network specifically with mining privileges could be potential road blocks in the widespread usage of the blockchain technology. In light of the above mentioned details a dedicated setup of the blockchain offering various services could be a potential offering which may make the adoption of this radical technology swift in sectors where trust is of paramount importance. The coining of the term blockchain as a service has not only led to widespread usage of the blockchain technology but will also ensure a broad array of services proposed in the following paper to be offered by a potential organisation under this umbrella.

Keywords: Blockchain as a service, consensus algorithms, blockchain services, mining

1. Introduction:

Blockchain originally coined as block chain is a distributed, decentralised ledger containing scores of records joined together using cryptography. The blockchain is an immutable repository of records created with the sole intent of providing trust among trust-less peers. Each block in this repository is composed of a computed cryptographic hash of the previous block coupled with a time stamp and transaction data. The core building block of the blockchain framework are as follows:

1.1 A distributed yet shared ledger: This ledger is responsible for appending only the distributed transaction record. A key example in this case is the Bitcoin blockchain which was designed with the main intent of democratising visibility. The use of a SQL or noSQL could give us append only semantics however.

1.2 Cryptography: In order to ensure the verifiability of the transactions and their authenticity, we make use of cryptography in the blockchain. This imperative is of prime importance in the blockchain as the focus is to introduce computational difficulty and make the encryption difficult to be broken down by the adversary.

1.3 Trust System or Consensus: The power of the blockchain network can be leveraged to authenticate the transactions. Trust is the most important facet of the blockchain technology and lies at the heart of the technology. This foundational element governs the overall design and investment in the blockchain infrastructure. Every new entry in the blockchain space modifies the trust system and it results in variations which are specialised for specific blockchain use cases.

1.4 Smart Contracts: The rules component of a blockchain solution is referred to as the smart contracts. These are essential in assigning the business terms and aspects in the blockchain transaction database.

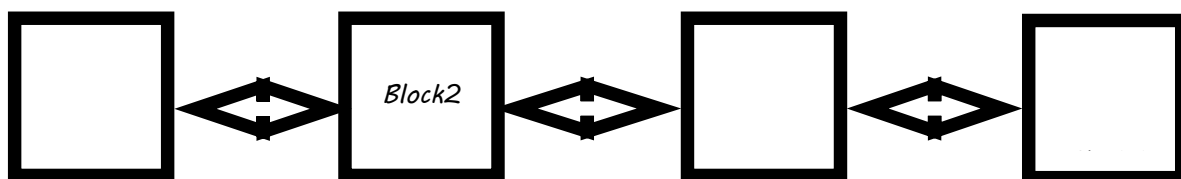


Figure 1. Representation of Blocks in Blockchain

2. Motivation:

The unique features of the blockchain technology makes it a technology of choice for a variety of sectors inclusive of but certainly not limited to the financial sector, supply chain, healthcare etc. The technology is however plagued with certain limitations which have may cause temporary roadblocks in its widespread usage. The prominent shortcomings of this technology include the following:

- Excessive energy usage
- Mining does not ensure security of the network
- Scalability is still a major concern in the blockchain technology
- Consensus mechanisms especially proof of work are difficult and contribute to the high energy usage
- Inefficiency is one of the major factors in the blockchain

The above limitations coupled with the complexity in setting a private and in essence a public blockchain makes it difficult for most of the medium and small scale businesses. The need for blockchain as a service which offers a broad spectrum of services is easily felt by big corporations as well. The blockchain as a service is in essence a third-party creation and operation handling of cloud-based networks for these organisations. In addition, they can also cater to companies which are in the process of building blockchain applications. It is derived from software as a service model and operates in a similar manner. It should primarily operate as a web host with a plethora of services offered at the backend. These augmented services has the potential to take the blockchain technology adoption to the next level. These services can be offered under one umbrella by a corporation or can be independent offerings under open source licenses. These gamut of services should potentially make it easier for a prospective user to leverage the power of the blockchain technology using customised and tailor made solutions for their use cases. Although there exist certain offerings in this domain however, the services offered by them could be augmented with the amalgamation of services inclusive of but not limited to storage, cryptocurrency, money lending, supply chain, finance, IoT etc. A brief overview of the proposed services is as follows:

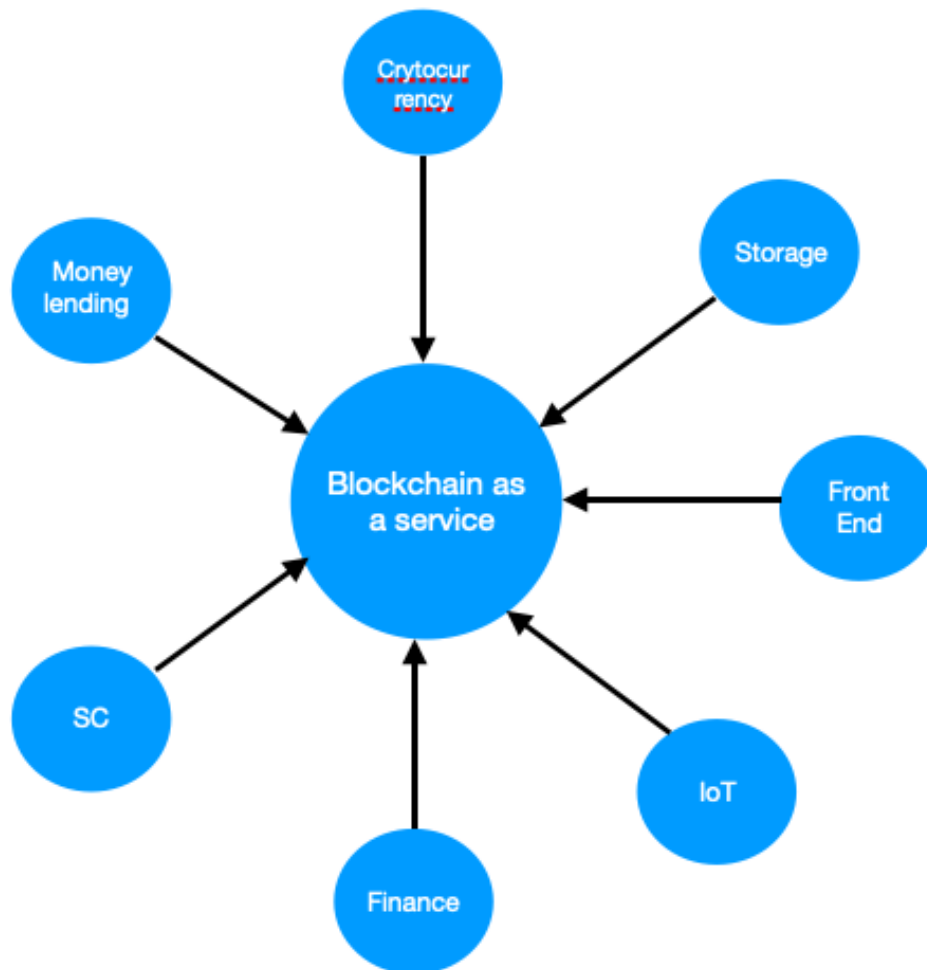
2.1 Storage: The storage solution in the blockchain technology refers to the decentralised storage of the data in the unused disk space of the network users. This is an alternative to using the cloud storage and serves to alleviate the disadvantages of the centralised system. The data in the network can be replicated to achieve reliability. This service can be offered as a part of blockchain as a service package.

2.2 Cryptocurrency: It is a digital asset which is used to work mostly as an exchange medium and it employs strong cryptographic algorithms to ensure the security of a financial transaction. The most notable example of a cryptocurrency is that of Bitcoin. The ingenuity of the cryptographic mechanisms lie in the way the public and private digital keys are combined to form a secure system. The cryptocurrencies are available as a by-product of the blockchain technology. Among the notable cryptocurrencies are Bitcoin, Litecoin, Monero, Bitcoin Cash, EOS, Binance Coin, Tether, Stellar, Cardano, Ripple etc. The cryptocurrency can be earned as a reward by the participating computers in the Blockchain network and serve as a good incentive towards contribution in the blockchain network.

2.3 Money Lending: The emergence of technologies such as Secured Automated Lending Technology abbreviated as SALT has revolutionised the way money lending is carried out. Technologies like the one mentioned encompass and leverage the power of the blockchain technology to form blockchain backed loans. They are based on the fact that the blockchain assets are ideal for a collateral as they exist in a peer-to-peer ledger, with efficient transfer, liquidation and storage. This thwarts fraud and lowers risk. The service can work on the underlying cryptocurrency which could be used coupled with the money lending aspects especially loans. The proposed money leading services can be coupled together with blockchain as a service so as to provide more flexibility to the consumers of the platform.

2.4 Supply Chain: The supply chain is being radically transformed using digital supply chain and integration with the blockchain is a step in the right direction. The entire process is becoming increasingly dynamic. The customer demand and product services and deliveries need to be monitored and tracked to ensure better visibility. The reference architectures as well as standards govern the setting up of business standards which in turn offer end-to-end integration of product data. The blockchain integration of supply chain is bound to yield best results with the

consumers being sure of the origin of the products/services. This should be an offering in the blockchain as a service framework.



2.5 Finance: The distributed ledger technology provides transparency of transactions carried out on blockchain thereby making it indispensable in the fields of settlement, remittance, loan, banking, securities and investment. The trusted centralised third party system of the modern electronic payment system have certain shortcomings which have been overcome in the systems employing distributed ledgers which could be easily achieved with the help of the blockchain technology. The financial sector for example an interbank payment and global financial transactions paves the way for the use of distributed ledgers as well as they ensure that only authenticated personnel can participate. A closed distributed ledger is the ledger of choice in the financial sector. This service when offered bundled as a part of blockchain as a service will surely add value to the overall framework.

2.6 Integration with IoT: One of major challenging aspects of the IoT is the provision of a secure ecosystem for the IoT architecture [2]. The current IoT architecture is heavily dependent and governed by a centralised brokered communication model commonly referred to as the client/server paradigm. All connections use the internet irrespective of the distance between the devices. A decentralised approach to the above can help alleviate many of the above stated concerns. The establishment of peer-to-peer communications will present its own set of challenges with security challenges being paramount in this regard. The decentralised distributed ledger technology can

Figure 2. Various services in Blockchain as a service framework

come to our rescue as although every participant can see the blocks however, the data is hidden. The reliability and security coupled with privacy concerns can very well be put to rest by the blockchain technology. The billion of connected devices can be easily tracked with the help of blockchain. The decentralised approach can help eliminate single point of failures and since the ledger is tamper-proof the security is ensured. Furthermore, it can be used to provide an immutable record of the history of smart devices. This is also one of the services which can be coupled in the Blockchain as a service framework.

The above stated services are in no way an exhaustive list and serves as a general guideline only. The services along with a few more should essentially be coupled and bundled together in the blockchain as a service framework which should make this package easy to use for the prospective clients.

3. Conclusion:

The blockchain technology is a revolutionary technology and has had a deep impact on various sectors. The true potential of this disruptive, decentralised, distributed ledger technology has not been realised due to the problems of complexity, scalability and implementation difficulty. Owing to these shortcomings, it is difficult to realise the true potential of this disruptive technology especially in case of small and medium business sectors. In the above text and to alleviate a majority of these shortcomings, a gamut of blockchain based services have been proposed on the blockchain as a service framework which will ensure ease of adaptability and use by the prospective users. This framework and integrated services can be further extended and will ensure widespread usage of the blockchain technology.

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