Blockchain as a Service: An Effective Service to Financial Sectors through Cloud Environment

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Abstract— **Blockchain is of rising technology for engineering and medical applications across organizational settings that avoid trusted central third-parties, instead of traditional databases or services we can use of blockchain that is an architectural choice in the development of a software or applications. In this paper, we propose a service of block chain technology through cloud, it may help to both customers and financial sectors, this enables a service through cloud for all the deployed applications in secure way called Blockchain As A Service, and we propose a distributed and trusted cloud data origin architecture using block chain technology. Blockchain-based data fount can provide tamper-proof records, enable the transparency of data liability in the cloud, it helps to enhance the privacy and availability of the provenance data.**

Keywords— Blockchain, cloud computing, e-ledger, minors, Blockchain as a Service
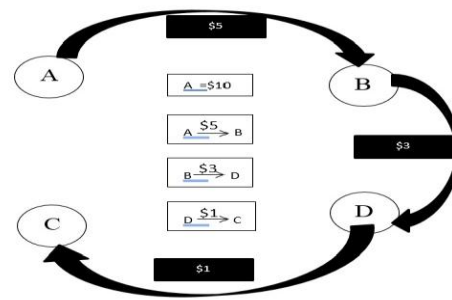
I. INTRODUCTION

1.1 Blockchain Technology:

Blockchain is a technology that enables moving the digital coins from one individual to other, here we call the digital coins as Bitcoins. Now these days we have the problem with money transactions. If a person A wants to move a money to person B. It is typically done through third trusted party. A send $5 amount of money to third party and then it moves to B after taking some money as commission. It typically takes about three to four days. Blockchain technology is attempting to solve is fixed to do transfer of money
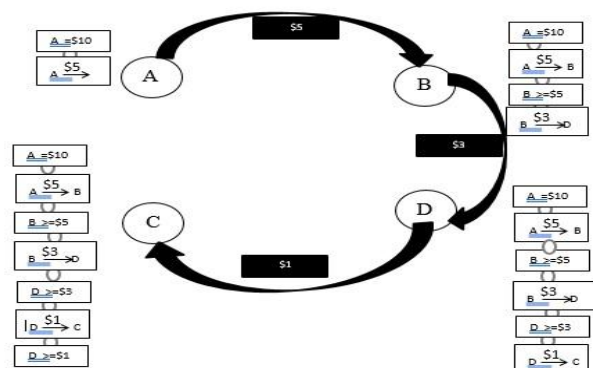
    i.   Without trusted third entity as major

    ii.   Do it faster or immediately

    iii.   Do it without commission

How Blockchain address this money transfer problems?

First, We should know the concept 'Open Ledger'. For example Lets say there is a network of Four people that actually want to move money from one to another. A has $10 and wants to move$5 to B, this transaction is added to open ledger, now B transfer $3 to D, it is also added to open ledger and link it with previous transaction then D sends $1 to C then C to somebody and so on. This chain of transaction that is open to public i.e. everyone in the network can see the transactions that where is the money and how much money he owns in his pocket. Every on in the network can decide whether the transaction is valid or invalid

Second principle of Block chain technology is 'Distributed ledger'. Block chain is centralizing the ledger and it distributed across the network. For example, 'A' person can have the copy of ledger in his node and D can have also has same copy. Ay one can else can participate in the network and can hold the ledger that has chain of events happened. Because of it is open and distributed ledger it can be seen by all participants and they the know every transaction done by other also . Essentially we don't need open ledger here any more. It may create a problem in the network that we need to make sure that all these copies are synchronize and all the participants in the network seems to have same copies of ledger.

Synchronize the ledger:

All the nodes in the network has the distributed ledger that keep on synchronizing it for every transaction done by any other node. How it could be synchronized? If any an invalid transaction done by any node, it can be validated and entry it into the ledger by "miners" (The minors who are competitors themselves in the network are find the invalid transaction first and enter it in the ledger first those are get financial reward.)

The Role of Minors:

Any person is trying to pay money to other without sufficient balance (Bitcoins) in his account, minors compete among themselves and find any and every invalidated transaction and enter it into e-ledger in the form of blocks. The minor has been able to validate this transaction with help of mathematical acumen, he will get a financial reward of bitcoins.

1.2 Blockchain overview:

The blockchain technology is the solution for securing online transactions and management,that will completely change the model of business of major industries that manage big volume of transactions. Blockchain, likely to be one of the most important keys for digital perturbation in the future, that's why the most relevant IT companies in the world are investing in the projects of blockchain and partnerships.

The "disruptive" features

Blockchain has always been associated with Bitcoin, one of the leading online crypto-values. Indeed, it was born in 2008 along with bitcoins, but the power of its architecture and the possibility to adopt it in many other business areas became clear only in recent years. In simple words, block chain is the technology that creates a distributed ledger account of transactions on a network which qualifies as secure, tamper-proof, and easily accessible for its users. A block chain is made with a set of data blocks, each of them contains a set of transactions. These are chained electronically together and locked with cryptography key, and a public record of every transaction is established. The most the number of blocks in a chain increases, difficulty to an attempt to modify any of them

"The nature of transparency and decentralization of blockchain are the reasons why it is considered as valued answer for data security management and healthy online transactions issues"

"In a decentralized network backed by a blockchain, the incentives for its participants are well-aligned and - by design - this system is much better because there is no honeypots to be attacked - therefore the target is more difficult as it is distributed to the entire world. In centralized system, respective incentives are not equal, the power is concentrated in the hands of owner of the infrastructure and, so the level of trustworthiness of the owner is crucial. With blockchains, on the other hand, you need to trust only Math, not people."

The reasons for disruptive architecture

- Blockchain is reliable: it is not regulated by a central "authority" but granting all the direct participants with a degree of control throughout the chain; therefore, the blockchain is safer and more reliable against cyber-attacks.
- Transparent: transactions are visible to all participants, thus ensuring transparent in operations.
- convenient: Lesser third parties are needed.
- solid: the information in the blockchain cannot be alter in any way and remain as first entered.
- Irrevocable: it is possible to perform transactions at the same time both irrevocable and easy to trace. This ensures that they are permanently fixed, without any possibility of being modified or aborted

Finance and other applications

Security, transparency, reliability: all the blockchain key features are crucial for the industries require higher security solution standards for their products and services. For example, finance and economy are considering by investors as the first two natural application fields for blockchain. Since there is no intermediators are required to handle transactions, the blockchain could cut down the costs of bank commissions, allowing savings, speed and reliability of transactions. The interest of insurers is also high thanks to blockchain anti-fraud model supporting secured and decentralized transactions. Blockchain could also be ubiquitously applied in industry 4.0 as a model to purchase decentralized logic to produce technologies backing production, logistics, and supply chains. Once again, in the IOT scenario where its adoption could facilitate communication among connected objects, as well as making data exchange safer and faster. Finally, the public sector could largely benefit from it by accomplishing a true digital identity system, thus heightening, on top of the rest, law enforcement assets against crime

II. CLOUD COMPUTING:

A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., servers, storage, networks, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction

2.1 Essential Characteristics:

- on-demand and self-service:

The on-demand and self-service aspects of Cloud Computing mean that a consumer can use Cloud services as required, without any human intervention with the Cloud service provider. By using the self service interface, consumers can adopt Cloud services by requesting for the necessary IT resources from the service catalogue. In order to be effective and acceptable to the consumer, the self-service interface must be user-friendly

- Broad network access:

Cloud services are accessed via the network, usually the internet, from a broad range of client platforms, such as desktop computer, laptop, mobile phone, and thin client. Traditionally, softwares, such as Microsoft Word or Microsoft PowerPoint, have been offered as client-based software. Users have to install the software on their computers in order to use this software application. It is not possible to access this software if the user is away from the computer where the software is installed. Today, much of the software used can be accessed over the internet. For example, Google Docs, a Web-based document creator and editor allows users to access and edit documents from any device with an internet connection, eliminating the need to have access to a particular client platform to edit documents.

- Resource pooling:

A Cloud must have a large and flexible resource pool to meet the consumer's needs, to provide the economies of scale, and to meet service-level requirements. The resources (compute, storage, and network) from the pool are dynamically assigned to multiple consumers based on a multi-tenant model. Multitenancy refers to an architecture and design by which multiple independent clients (tenants) are serviced using a single set of resources. In a Cloud, a client (tenant) could be a user, a user group, or an organization/company. Multitenancy enables compute, storage, and network resources to be shared among multiple clients. Virtualization provides ways for enabling multitenancy in Cloud. For example, multiple VMs from different clients can run simultaneously on the same server with hypervisor support. There is a sense of location independence, in that the consumer generally has no knowledge about the exact location of the resources provided .

- Rapid elasticity

Rapid elasticity refers to the ability of the Cloud to expand or reduce allocated IT resources

quickly and efficiently. This allocation might be done automatically without any service interruption. Consumers will take advantage of the Cloud when they have large fluctuation in their IT resource usage. For example, the organization may be required to double the number of Web and application servers for the entire duration of a specific task. They would not want to pay the capital expense of having dormant (idle) servers on the floor most of the time and also would want to release these server resources after the task is completed. The Cloud enables to grow and shrink these resources dynamically and allows the organizations to pay on a usage basis.

- Metered service

Metered service provides billing and chargeback information for the Cloud resource used by the consumer. The metered services continuously monitor resource usage (CPU time, bandwidth, storage capacity) and report the same to the consumer. Metered services enable transforming capital expenditure (CAPEX) into 'pay as you use' operational cost.

2.2 Cloud computing benefits:

Reduced IT cost: Cloud services can be hired. Therefore, consumers can save money because there is no capital expenditure or CAPEX required. Consumers can leverage the Cloud service provider's infrastructure. Hence, there are no ongoing expenses for running a datacenter, such as the cost of power, cooling, and management. Additionally, the real estate cost can be minimized.

Business agility support: The speed at which a new computing capacity can be provisioned is a vital element of Cloud Computing. Cloud can reduce the time required to provision and deploy new applications and services from months to minutes. Cloud allows organizations to react more quickly to market conditions and enables to scale up and scale down the resources, as required.

Flexible scaling: A Cloud can be easily and instantly scaled up and scaled down based on demand. It appears to the consumers that the Cloud resources are expandable to infinite limit. Cloud service users can independently and automatically scale their computing capabilities without any interaction with the Cloud service providers.

High Availability: Cloud computing has the ability to ensure application availability at varying levels, depending on customer policy and priority of the application. Redundant server, network resources, and storage equipment along with clustered software enable fault tolerance for Cloud infrastructure. These techniques encompass multiple datacenters in different geographic regions that have identical resource configuration and application instances. Hence, data unavailability due to regional failures is prevented.

Less Energy Consumption: ''Going Green" is an important focus for many organizations. Cloud enables organizations to reduce power consumption and space usage.

2.3 Cloud service models:

Cloud service models can be classified into three categories:
• Infrastructure-as-a-Service (IaaS)
• Platform-as-a-Service (PaaS)
• Software-as-a-Service (SaaS)

Infrastructure-as-a-Service

Infrastructure-as-a-Service (IaaS) is the base layer of the Cloud stack. It serves as the foundation for the other two layers (SaaS, PaaS) for their execution. The Cloud infrastructure such as servers, routers, storage, and other networking components are provided by the IaaS provider.
The consumer hires these resources as a service based on needs and pays only for the usage. The consumer is able to deploy and run any software, which may include Operating Systems (OSs) and applications. The consumer does not manage or control the underlying Cloud infrastructure, but has control over the Oss and deployed applications. Here, the consumer needs to know the resource requirements for the specific application to exploit IaaS well. Scaling and elasticity are the responsibilities of the consumer, not the provider. In fact, IaaS is a mini do-it-yourself data center that you would need to configure the resources (server, storage) and to get the job done.

Platform-as-a-Service (PaaS)

Platform-as-a-Service is the capability provided to the consumer to deploy consumer-created or acquired applications on the Cloud infrastructure. PaaS can broadly be defined as application development environments offered as a 'service' by the Cloud provider. The consumer uses these platforms that typically have Integrated Development Environment (IDE), which includes editor, compiler, build, and deploy capabilities to develop their applications. They then deploy the applications on the infrastructure offered by the Cloud provider. When consumers write their applications to run over the PaaS provider's software platform, elasticity and scalability is guaranteed transparently by the PaaS platform. Here, the consumer does not manage or control the underlying Cloud infrastructure, such as network, servers, OSs, and storage, but controls the deployed applications and possibly the application-hosting environment configurations. For PaaS, consumers pay only for the platform software components such as databases, OS instances, and middleware, which includes its associated infrastructure cost.

Software as a Service:

SaaS is the top most layer of the Cloud Computing stack, which is directly consumed by the end user. It is the capability, provided to the consumer, to use the service provider's applications running on a Cloud infrastructure. It is accessible from various client devices through a thin client interface such as a Web browser. On-premise applications are quite expensive and requires high upfront CAPEX (Capital Expenditure). They also incur significant administration costs. In a SaaS model, the applications such as Customer Relationship Management (CRM), Email, and Instant Messaging (IM) are offered as a 'service' by the Cloud provider. Here, the consumers will use only the applications they really want and pay a subscription fee for the usage. The Cloud provider will host and manage the required infrastructure and applications to support these services. SaaS offers the following advantages:

-Reduces the need for infrastructure because storage and compute powers can be provided
 remotely.
-Reduces the need for manual updates because SaaS providers can perform those tasks automatically

III. CLOUD AND BLOCKCHAIN: WHERE ARE THE SYNERGIES

Cloud technologies are the antecedents to blockchain and both developers and designers delivering inventions in this area should concentrate on blockchain opportunities. In cloud environment Private blockchain networks might be run securely, that could consequently play a key role in blockchain deployments. At the same time, cloud and blockchain have so many aspects in similar that deploying blockchain fender projects in the cloud would ensure that many of the advantages are leveraged.

- Cloud and blockchain have been protected by secured systems, allowing data to be encrypted. The ability of cloud deployment models to explicitly address to private, community and public clouds perfectly matches blockchain's nature, targeting by design particular members in the chain.
- Cloud and blockchain are resistant to cybercrime. Blockchain qualifies in this sense thanks to its peer-to-peer model, while the cloud is resisted by effective solutions constantly developing and actively contributing in creating cyber risk free zones. It includes monitoring round-the-clock and proactive identification of untrusting activities and real time response to such threats.
- cloud and blockchain significantly reduce costs. Blockchain, like cloud, avoids by design potency inefficiencies from its processes.

We are having two powerful scenarios, as noted by several observers. The Cloud removes bequest systems while blockchain removes the middleman in such systems. The question that anyone implementing blockchain-based projects and cloud services should ask themselves is: why should I deploy my new blockchain projects on an expensive and possibly risky on-premise system? And why don't I choose a suitable cloud environment to deploy my blockchain?

3.1 Blockchain as a Service: The New Weapon in the Cloud Wars?

Pricing battles have always been going on in the cloud wars. Surprising that, in one sense, the pricing battles have made pricing a small consideration in the process of decision making. While there will be no abatement in that battle, traffickers are searching for other ways to impact the decision-making process, such as by enhance the new features and capacities. These include a variety of platform and software as a service (PaaS/SaaS) offers which can be very attractive to formations looking to explore new technologies without having to make a significant capital investment and expenditure.

Enter the Blockchain – the Latest Technology Disruption

It looks lately you can't have a discussion around new and disruptive technologies without the word "blockchain" get into the conversation. Blockchain technology, in basic, is a distributed ledger. blockchain has close association with bitcoin, it is also be looked at for the variety of situations well beyond digital currency.

Hack around blockchain is definitely high. blockchain could clean up American politics. While I have my doubts about that, there is no question blockchain has the potential as a disruptive technology to impact many businesses in a positive fashion. How to research and investigate the utilization of the technology to a deep enough level in a cost-effective fashion has become the challenge for many businesses.

Could the Cloud Come to the Rescue?

Constructing an environment to test and research blockchain is not a trivial undertaking. Blockchain technology is a distributed, peer-to-peer technology. It should require an ecosystem with multi-system in order to be able to develop, research, and testing. In the benefits of leveraging the public cloud for test environment, One of the big benefits is the ability to stand up, deployment, testing, and break-down environments. No larger hardware investments are required, nor any capital investment. during the time of environments are up and being used the cost is involved.

When we talk about the cost, this is a definite plus. We still have the complexity of configuring and setup the blockchain ecosystem. This is where the concept of offering Blockchain as a Service (BaaS) can provide value added service. Imagine if your cloud provider not only could provide you the necessary flexible infrastructure to investigate blockchain, but besides, they could offer you a full of blockchain ecosystem to get start working worth.

3.2 Blockchain as a Service (BaaS) –

Most of the leaders in the cloud space have seen the potential benefits of offering Blockchain as a Service (BaaS) to their customers and have started providing some level of BaaS capabilities.

- Microsoft(Azure) – In November of last year, Microsoft fired the first shot. They announced a partnership with ConsenSys to provide the Ethereum Blockchain as a Service (EBaaS) in their Azure environment. Offering the service will allow "customers and partners to play, learn, and fail fast at a low cost in a ready-made dev/test/production environment" according to Marley Gray, a director in Microsoft's Cloud and Enterprise organization. In April, Microsoft also announced partnering with the R3 Consortium of 43 banks to help spur distributed ledger amongst the R3 members.

- IBM (BlueMix) – In February of this year, IBM announced they would be offering Blockchain as a Service using the Hyperledger. The release stated, "Using IBM's new blockchain services available on Bluemix, developers can access fully integrated DevOps tools for creating, deploying, running, and monitoring blockchain applications on the IBM Cloud."

- Amazon (AWS) – In May of this year, Amazon announced a collaboration with the Digital Currency Group, one of the largest investors in blockchain firms. The agreement will provide Blockchain as a Service to members of DCG's portfolio so they "can work in a secure environment with clients who include financial institutions, insurance companies, and enterprise technology companies."

Another Weapon in the Armoury

In the rapidly changing landscape of the cloud wars, no single technology or offering will be the silver bullet to winning the battle. Not every business looking to move to the cloud necessarily will have a need or interest in blockchain. That being said, for those businesses that are considering blockchain, having BaaS as an offering will be a checkbox when evaluating different vendors. The announcements by Microsoft, IBM, and Amazon over the last 8 months demonstrate the vendors see it as a benefit to have the offering available in their portfolio. As interest in blockchain continues, and we move past the hype into the reality of actual implementations, it could become an even more powerful weapon in every escalating and changing cloud wars marketplace. There is a common phrase, often attributed as a Chinese proverb/curse, "May you live in interesting times." Blockchain and the cloud wars will definitely keep things interesting for some time to come.

IV. CONCLUSION:

A Blockchain-based decentralized system in Cloud will allow on-demand, secure and low-cost access to the most competitive computing environments. The decentralized open ledger system in financial sectors gives more security than centralized open ledger system. Because of the properties transparency and decentralization, the block chain technology should use in the cloud and provide it as a service to demanded users. Different companies of their different products are provided to end customers through Blockchain As A Service, if those products are provided through cloud then it is more secured. Finally, I concern that all cloud providers should also provide their products by another service i.e. BLOCKCHAIN-AS-A-SERVICE

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