**Lecture 4-6 Notes**

**Blockchain as a Service (BaaS)**

**6.1 What is Blockchain as a Service (BaaS)?**

* Blockchain as a Service (BaaS)  is a type of blockchain service offering that allows business customers to use cloud-based solutions to develop, host and adopt their own blockchain applications, smart contracts and other relevant functions on the blockchain while the cloud-based IT partner or service provider manages all the required tasks and activities to keep the infrastructure up and running.
* The emergence of Blockchain as a Service is a significant development and an essential milestone in the blockchain landscape, holding the promise to accelerate the adoption of the distributed ledger technology across businesses. The concept is based on and works on engagement principles similar to that of Software as a Service (SaaS).

## ****6.2 Why Do Organizations Need Blockchain as a Service (BaaS)?****

* IT organizations across many industries are increasingly exploring the strategic advantages of adopting Blockchain technology.
* However, the inherent technical complexities, lack of domain expertise and the operational overhead costs involved in developing and operating the Blockchain, and maintaining the infrastructure often force key decision makers to go slow on adoption plans.
* However, BaaS is currently being viewed as a potentially viable solution to this problem.
* Choosing the right Blockchain as a Service provider will give businesses the access to skilled Blockchain developers, process, and governance experts as well as the entire cloud infrastructure for development and deployment, without having to worry about startup and overhead costs.
* Also, a reputed BaaS partner in most cases is a rich source of practical experience and wisdom, which can be leveraged to make the systems more secure.
* It significantly limits the number of risks which one would have to deal with had it been developed in-house.

## ****6.3 How Does the BaaS Model Work?****

* When an organization (customer) signs up for a Blockchain as a Service contract with an IT partner, they essentially enter into an agreement whereby the BaaS partner agrees to set up all the necessary Blockchain technology and infrastructure for the customer for a service fee defined in the contract agreement.
* The Blockchain as a Service partner or provider deploys the essential resources and leverages the required technology and infrastructure to set up and maintain Blockchain connected nodes on behalf of the customer.
* Based on the customer’s business requirements, the BaaS partner may configure the Blockchain network on any distributed ledgers such as Ethereum, Bitcoin, Hyperledger Fabric, R3 Corda, Quorum, Chain Core or BlockApps.
* Furthermore, the Blockchain as a Service partner assumes the responsibility of maintaining all the critical Blockchain-related artifacts and keeping the infrastructure up and running.
* BaaS contracts also include support activities such as bandwidth management, optimization of resources, incident management, system health monitoring, as well as proactive security surveillance such as prevention of hacking attempts.
* Using a Blockchain as a Service model, customers can focus on their core businesses and competition strategies while counting on the BaaS partner to handle the Blockchain infrastructure and its performance.
* Eventually, it empowers them to execute distributed-ledger workloads in environments that demand an impeccable degree of fault tolerance.

## ****6.4 How to Handle Security Concerns Related to BaaS?****

* For enterprises exploring Blockchain for its increased security, the very idea of keeping data transactions on a public ledger is a big turn off.
* It is all the more critical in the wake of stricter data privacy and protection regulations in countries such as the US and the European region.
* The positive aspect of the entire scheme of things, however, is that Blockchain is generally seen as a step forward in the right direction.
* Nonetheless, as elsewhere in the IT world, security is not an inherent characteristic.
* The distributed ledger technology uses public key encryption, hashing, digital signatures, and several other mechanisms to secure data and transactions.
* However, most of these become vulnerable when not administered correctly.
* Glitches in securing a Blockchain or simple bugs in the platforms may cause serious disruption and lead to unforeseen situations, thus putting the entire system at risk. As such, before signing a contract, it is essential to thoroughly evaluate the BaaS vendor and assess the risks inherent in enlisting their services.
* Even before going to the market with the requirements, it would be worthwhile for the IT department to clearly define the parameters and expectations from the services, including assurances and guarantees that might go into the contract.

**6.5 The factors that can help you choose the right BaaS Platform**

**Following are some of the factors that can help you choose the right BaaS Platform:**

* **Smart Contracts Integration:** You would require a smart contract mechanism to integrate business logic into your blockchain solution. Smart contracts don’t only include the rules like typical contracts, but also enforce penalties in case any party breaks the rules. Since the BaaS platforms are immutable, it makes the testing and deployment of smart contracts quite complicated for developers. It is crucial to consider that the blockchain as a service company provides you the smart contract integration with the deployment.
* **IAM(Identity Access Management) Platforms:** A permissioned network allows users to access specific information or layers. Integrating an identity management platform will make the blockchain network tightly secure and you will be able to grant permission to individuals. For example, not every employee in the office can have access to internal confidential information. Identity Access Management (IAM) is a framework that facilitates the management of digital identities for enterprises. To manage the identities, you can use a single sign-in method or even multiple authentication ways to give users access to the information. IAM integration ensures that you only share what’s required, not everything else. Select a BaaS platform that offers IAM framework integration.
* **Different Runtimes and Frameworks:** What if you want to switch to another blockchain platform while building a blockchain app on BaaS architecture? When it comes to blockchain frameworks, you might not find many blockchain-as-a-service providers that offer versatility.  
  Some BaaS providers only support one kind of enterprise blockchain deployment. Ensure to choose a BaaS that supports a diverse range of runtime and frameworks. It will help bring flexibility to your enterprise requirements.
* **Identity-based Consensus Mechanisms:** You must have heard about the typical consensus mechanisms such as Proof of Stake or Proof of Work.  
  However, Proof of Stake and Proof of Work don’t offer enough scalability that the enterprise-grade solution needs. Therefore, select the blockchain-as-a-service providers working on a consensus mechanism that does not depend on the computation. Identity-centric consensus models can scale up the network and allow the enterprises to integrate the technology quickly. So, you can also prefer selecting a BaaS platform with an identity-based consensus algorithm that enables enterprises to operate with authorized identities.

* 1. **Advantageous**
* **Flexible and Efficient:** The best part of using a Blockchain as a Service Platform is that it offers a wide array of consensus mechanisms. Such consensus algorithms can provide the required flexibility in your business ecosystem. It is the reason why various BaaS solutions can provide 5000 transactions per second. Furthermore, other tools like dynamic joining, physical resource management and switching protocols are offered by BaaS providers to make the solutions efficient.
* **Open and Easy:** Blockchain as a Service framework provides an easy solution to your complex deployment. Building a blockchain solution is not a simple task. One mistake can make the system incapable of performing its operations. However, BaaS framework allows you to deploy new networks every minute as they are simple to deploy and will not take more than minutes to get started.
* **Privacy Protection and Security:** With Blockchain as a Service Framework, you can manage permission levels, nodes, and keys from one single control panel. Every BaaS provider offers the control panel for easy access. The cybersecurity in such solutions is exceptional as they don’t allow any internal or external fraudulent activity happen.
* **Cost-Effective:** The blockchain as a service costs comparatively lower than building a blockchain app from scratch. Using the BaaS platforms, you can use the features you require. Therefore, it costs you for the features you are using, not for the entire framework. Also, it does not have any hidden costs.

**6.7 Disadvantageous**

* **Limited In-depth Knowledge:** Blockchain is still an emerging technology and many of the organizations are yet to be equipped with an in-depth understanding of how the technology works. In this scenario, an implementation decision made with half-baked knowledge may put existing business processes at a significant risk of failure and wasted investment.
* **Lack of Visibility and Control:** In most of the cloud-based and plug and play BaaS models, the infrastructure, resources and the BaaS provider owns technical know-how. It may lead to communication breakdowns and lack of understanding or limited visibility into the actual situation on the ground when technical issues arise. In times of critical events such as a service breakdown or external sabotage, the customer will have to depend on the information provided by the BaaS partner entirely. Sometimes, such instances may lead to mistrust between the two parties.
* **Data Compliance Challenges:** Blockchain operates on the principle of dispersing information across a global network. Now, it has the potential to open up a pandora’s box with regards to regulation and compliance, especially when data is shared across geographies or the main servers of the BaaS provider are hosted in third-party countries or in zones which are under economic sanctions.
* **Business Continuity:** Most service agreements are executed based on the assumption that the service provider or partner will be in business and would be in a position to support the business with the service as per the terms of the Service Level Agreements for as long as it is required or at least for the duration of the contract. However, in today’s dynamic business environment, it is not easy to assume for sure that the provider will stay in business. The same holds true for BaaS. If the service provider goes bankrupt within a few years of the Blockchain implementation or undergoes a merger with another company, then the chances of service disruptions may increase manifold.