Blockchain as a Service

Product Introduction

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What is BaaS?

Alibaba Cloud BaaS (Blockchain as a Service) is an enterprise-level PaaS (Platform as a Service) based on leading blockchain technologies, and is powered by Ant Financial Blockchain Team. This service helps you build a stable, secure blockchain environment, and manage the deployment, operation, maintenance, and development of blockchains easily. Alibaba Cloud BaaS enables you to focus on business innovation.

Blockchain establishes a peer-to-peer network where each participant in the network has access to a shared ledger. Transactions and history records cannot be removed or altered. The smart contract and consensus algorithms enable transactions between multiple participants and confirm the transactions and ledger records.

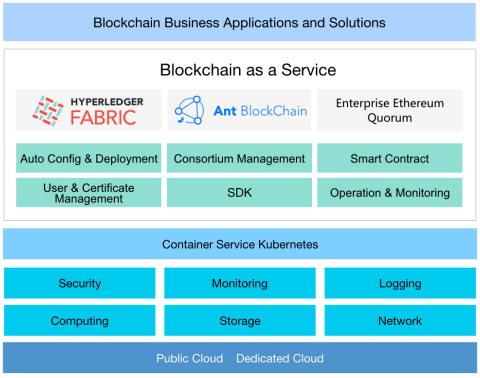
Why blockchain on Alibaba Cloud?

Alibaba Cloud BaaS is built on Alibaba Cloud Container Service for Kubernetes clusters. It leverages the capabilities of Alibaba Cloud in databases, security, maintenance, and computing. Alibaba Cloud BaaS provisions blockchain services based on multiple architectures, such as public cloud deployments and private cloud deployments.

Alibaba Cloud BaaS supports mainstream open source blockchain technologies Hyperledger Fabric and Enterprise Ethereum - Quorum, and also supports proprietary financial-grade blockchain technology Ant Blockchain, satisfying various requirements.

- Hyperledger Fabric is an open source enterprise-class blockchain technology hosted by Linux Foundation. Hyperledger Fabric has a modular architecture, and allows components, such as consensus and membership services, to be plug-and-play.
- Ant Blockchain is a proprietary finanical-grade blockchain technology developed by Ant Financial, providing high performance, global deployment and strict privacy protection.
- Enterprise Ethereum - Quorum is an enterprise-focus version of Ethereum,

developed by J.P. Morgan, and is compliant with the specification of EEA (Enterprise Ethereum Alliance).



-Alibaba Cloud BaaS helps users quickly create and deploy a production-level blockchain environment, and provides graphical interfaces for blockchain management and operation. Enterprises and businesses can be dynamically added to the blockchain network. This service simplifies development and reduces the development time with pre-configured networks and infrastructure.

- The consortium blockchain network is built on the Alibaba Cloud BaaS. This network relies on the multi-tenant isolation of cloud computing, including the isolation of computing, storage, and network resources. Business participants are independent and can manage their own resources separately.
- This service provides a cross-regional network for participants in different regions. For example, as shown in the following figure, operators and participants in a consortium blockchain network can be deployed in three different cities.

-Alibaba Cloud provides a wide range of methods for you to integrate the blockchain service into your applications. You can

create resources on demand and scale up the deployment easily. Additionally, this service provides advanced protection for data security and privacy. You can select the services that best suit your business needs at the optimal costs.

For more information, see Product advantages.

Product editions

Hyperledger Fabric and Ant Blockchain both provide multiple product editions for your choice. For a detailed description and comparison of these product editions, see Product editions.

How to use Alibaba Cloud blockchain service

Hyperledger Fabric

Create a blockchain network

You can manually create organizations, create and join a consortium, and create a channel. For more information, see Operation process.

Deploy chaincodes

This step includes uploading, installing, and instantiating the chaincode. For more information, see Deploy chaincodes.

Access the blockchain network

This step includes Manage users and Access a blockchain network.

Ant Blockchain

The consortium manager applies to create a consortium blockchain, and then invites other consortium participants to join the blockchain. Consortium participants can visit the consensus nodes and perform read and write operations after they accept the invitation. The detailed procedure is as follows.

Activate the blockchain service.

For more information about how to activate the BaaS service on the homepage of BaaS, see Purchase Guide.

Create or join a blockchain.

You can apply to join a blockchain or create a consortium blockchain in the console. For more information, see Manage consortium blockchains.

Manage a blockchain.

After you log on to the console, you can invite other users to join your consortium blockchain, review the applications made by consortium participants, manage nodes, and view blockchain details on the management page. For more information, see Create a consortium.

Connect to the blockchain network.

For more information about how to connect to the blockchain network, see Development Guide.

Enterprise Ethereum - Quorum

Create a blockchain network

You can create a Enterprise Ethereum - Quorum blockchain network in BaaS Console. For more information, see Create a blockchain network.

Manage blockchains

You can invite Alibaba Cloud users to join a Quorum network, and then add Quorum nodes from Alibaba BaaS. For more information, see Invite a user of Alibaba Cloud BaaS to join and Add a new node from Alibaba Cloud BaaS. You can also directly add Quorum nodes from other cloud platforms (e.g. AWS, Azure) or from on-premise environments. For more information, see Add a new node from another environment.

Deploy smart contracts

After smart contracts are developed, you can start to compile and deploy smart contracts, and then send transactions to invoke the contract. For more information, see Use solc to compile smart contracts, Deploy a smart contract using geth and Send a transaction using geth.

Alibaba Cloud BaaS API

Alibaba Cloud BaaS API is an extension to the native API of underlying blockchain technologies. It not

only simplifies the complex processes of using native API for management and invocation, but can also operate both the blockchain objects and cloud resource objects related with BaaS. BaaS API allows users to manage and maintain blockchain consortium, organization, peer, channel, smart contract, log, configuration, etc. in a much easier way.

BaaS API supports both HTTP and HTTPS requests, and requires Access Key and Access Key Secrect generated with Alibaba Cloud account for authentication, in order to guarantee the security of API invocation.

Besides, you can also leverage Alibaba Cloud OpenAPI Explorer, a web-based GUI tool, for quick search and visual debugging of BaaS API.

If you are interested to learn and use BaaS API, please refer to the API Reference.

Benefits

Hyperledger Fabric

Openness and sharing

- Alibaba Cloud BaaS supports blockchain applications and data under the Hyperledger Fabric framework. Development results are shared to an open source blockchain community.
- Alibaba Cloud will integrate developed blockchain systems to build an open, capable, and standardized blockchain ecosystem for users.

High security

- Supports encryption and decryption based on China’ s recommended cryptographic algorithms.
- Establishes a consortium blockchain management system targeting multiple enterprises to facilitate collaboration among enterprises.
- Provides multi-dimensional network isolation, network access control and attack protection for enterprises.
- Each enterprise has an independent CA service to suit their business needs.
- Provides built-in risk control and operation auditing to avoid a “fat-finger error”.

High availability

- Provides end-to-end and highly available services, covering blockchain nodes, service administration, and container clusters, to ensure business continuity.

- The bottom-layer storage of the blockchain ledger is highly reliable (99.999999999%) and can scale up quickly without interruption.

Ease-of-use

- Helps you quickly build an enterprise-level blockchain network.
- Alibaba Cloud BaaS provides rich management and operation functions through a graphical interface. This user-friendly service allows all levels of users to get started quickly. You can easily configure, deploy, manage, and monitor multiple blockchain networks owned by an enterprise.
- Provides REST API, SDK and BaaS VSCode Plugin for development of blockchain applications, which can lower the barriers for developers.
- Integrates with cloud services such as Function Compute, MQ and Content Moderation, which can provide on-chain and off-chain collaboration.
- This service allows you to save bottom-layer infrastructure and daily operating and maintenance costs. This allows enterprises to focus on business application innovation.

High performance

Alibaba Cloud BaaS is based on high-performance cloud servers, high-bandwidth network, and high-concurrency and high-throughput storage. This service can maximize the performance potential of blockchains.

Global deployment

- With data centers around the world, Alibaba Cloud helps you deploy business systems worldwide.
- Based on proven overseas compliance processes and practices of Alibaba Cloud, this service helps you build a secure, compliant, and operational business system.

Ant Blockchain

As the leading blockchain service platform in the industry, Ant Blockchain BaaS has the following advantages:

High performance

Based on cutting-edge concurrency and consensus technologies, Ant Blockchain can handle a maximum of 25,000 notary blockchain transactions per second to fit high-concurrency scenarios in the finance industry.

High reliability

Ant Blockchain provides high business reliability and supports buffering during peak workloads. The consensus technologies based on PBFT supports Byzantine fault tolerance (BFT), automatic recovery of the consensus state, multiple backups, storage distribution balancing, and automatic load balancing.

Dual-permission protection

Ant Blockchain provides dual-permission protection to secure your data. The first-layer protection is that the consortium blockchain is visible to its trusted participants while invisible to other users. The second-layer protection requires that each user submits the CA certificate application and waits for the application to be approved before they can participate in the consortium blockchain.

The first-layer protection is that the consortium blockchain is visible to its trusted participants while invisible to other users.

Cross-network deployment

Ant Blockchain allows you to deploy blockchain nodes across cloud platforms based on your business requirements. A part of the nodes that participate in the consensus can run on the Alibaba Cloud platform, while other nodes can run in your IT environment.

Data privacy and security

You can chain plaintext data or encrypt the chained data by using the symmetric encryption method. Ant Blockchain allows you to share privacy models. You can encrypt the encryption key with another private key. The encrypted plaintext and encrypted key are stored in a chain. You can manage the private keys with specific key derivation functions, and share different private keys based on the corresponding security levels and sharing ranges.

Easy to use

Ant Blockchain reduces the knowledge requirement to use blockchains, and you do not need to understand the underlying technical details of blockchains. You can focus on designing and developing blockchain applications instead of managing the application environment.

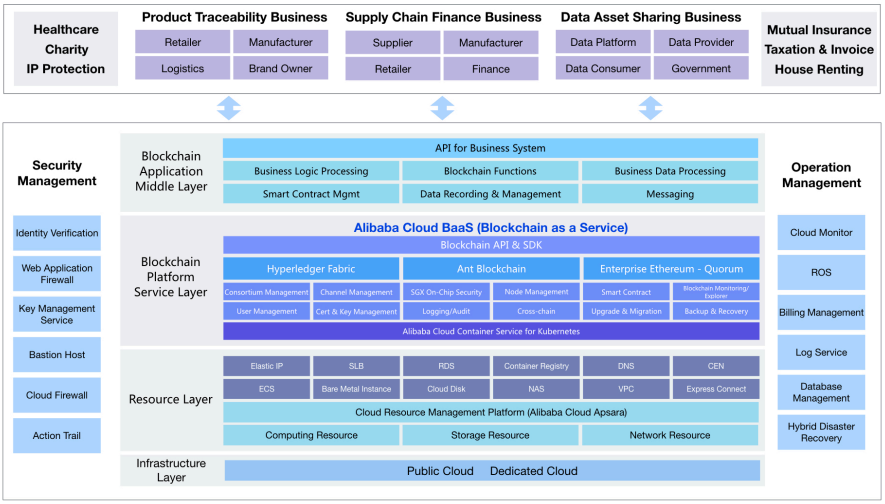
Architecture

Alibaba Cloud BaaS is built on top of Kubernetes, supports mainstream blockchain technologies, and integrates with the comprehensive services of Alibaba Cloud. BaaS allows users to establish cross-enterprise, cross-region business cooperation and transaction network, and to implement blockchain

business scenarios at speed.

Product architecture

- Infrastructure layer: Currently BaaS supports public cloud and private cloud offerings of Alibaba Cloud. And BaaS will support hybrid cloud deployment in near future.
- Cloud resource layer: Provides basic cloud resources for blockchain services and upper-layer applications, including ECS, VPC, NAS, and SLB.
- Platform services layer: Built on Alibaba Cloud Container Service Kubernetes clusters, the blockchain platform supports multiple basic BaaS services. These services include resource creation, resource management, resource operation, and security management. The blockchain engines currently support Linux Foundation’ s Hyperledger Fabric 1.4 LTS, Ant Financial’ s Ant Blockchain, and J.P. Morgan’ s Enterprise Ethereum - Quorum.
- Mid-layer application: This is a reference architecture that is used to connect BaaS with business applications. It is usually implemented in form of blockchain business solution or blockchain middleware.
- The overall architecture also includes multiple services that may be applicable to BaaS, such as security management and operation management.



Scenarios

Scenarios

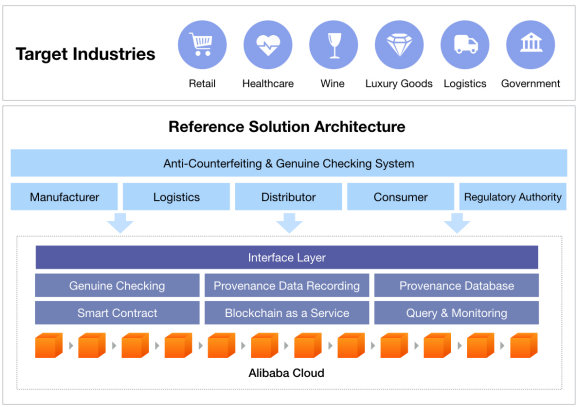
Alibaba Cloud BaaS can be applied to multiple business scenarios, such as product traceability, data asset transactions, supply chain financing, digital content ownership, charity, letters of credit, asset

securitization, asset custody, energy and chemical trading, real estate transactions and leasing, and digital identity. The following two scenarios are taken as examples:

Scenario one: product traceability

In conventional retail scenarios, consumer and supply chain information is not traceable. When a product quality or safety issue occurs, it is difficult to trace and recall the product, or locate the responsible party. At the same time, the supply chain information is at risk of counterfeiting and tampering.

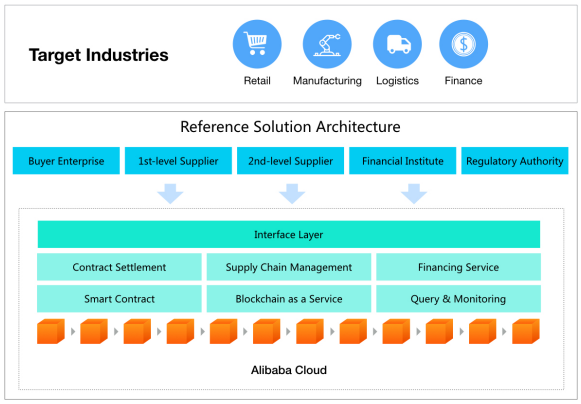
Alibaba Cloud BaaS provides a tamper-resistant shared transaction history. This service supports querying and auditing by consumers. At the same time, the blockchain ensures that the source information is confirmed by all participants and the information cannot be tampered with. The entire transaction history on the blockchain can be audited to meet policy and regulatory requirements. The blockchain can be combined with anti-counterfeiting and digital technologies to provide a complete set of traceability solutions for multiple commodities.



Scenario two: supply chain financing

In conventional transactions, the credit of enterprises cannot be shared securely among key enterprises and suppliers up and down the supply chain. As a result, it is very difficult and inefficient for small and medium-sized enterprises (SMEs) to secure funding. Supply chain information cannot be shared securely. This causes funding inefficiencies. For example, poor instrument negotiation causes long settlement periods.

In Alibaba Cloud BaaS, information of the key enterprises, such as receivables and payables, can be shared securely among suppliers, dealers, and financial institutions. The blockchain service can protect private data while sharing the transaction data among enterprises. In addition, the smart contract supports automatic fund clearing and the circulation of corporate bonds, to improve business operations and the efficiency of capital flow.



Scenario three: charity

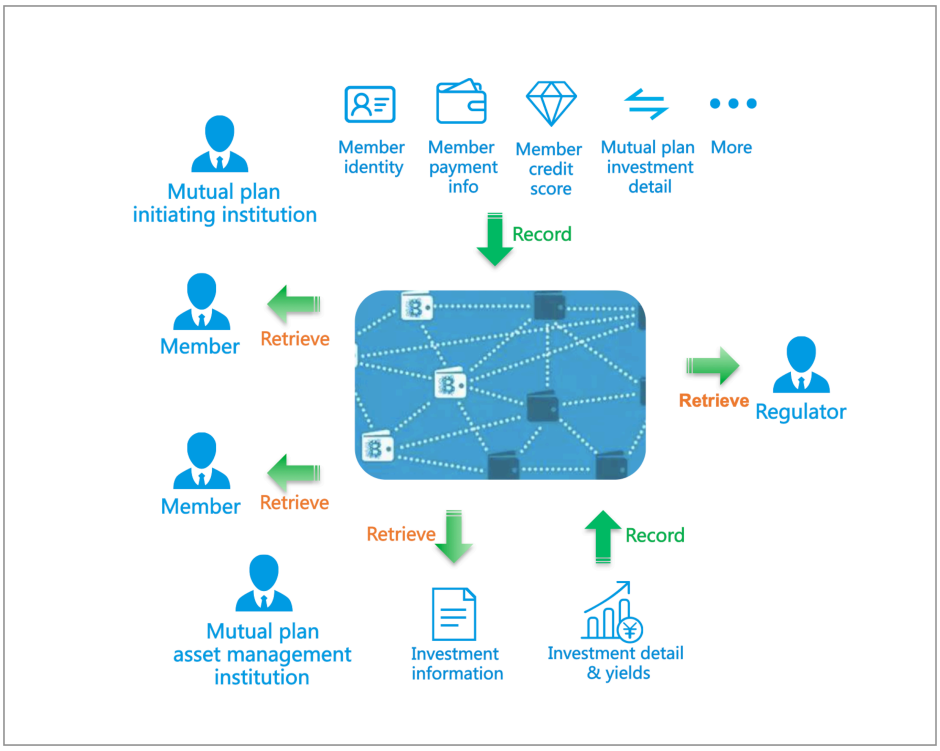
From donor to beneficiary, end-to-end traceability of charity projects. With transparent and trusted ledger and timely disclosure, the blockchain service enhances mutual trust between donators and public interest organizations, and improves the efficiency of charitable acitivities.

Running live for over 1 year, with 38 charity organizations and 355 charity projects (data at the end of July, 2017).

Scenario four: mutual insurance

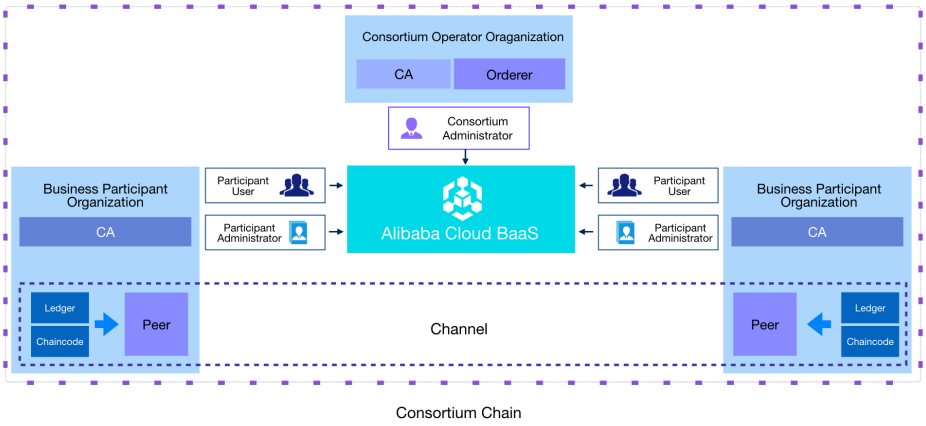
This model is based on a certain group of people forming an insurance risk pool and support each other without a trust center. In this case, it is especially important that how to make sure the usage of insurance funds is financially fair and reasonable.

With the blockchain techniques establishing the flow of funds, transparency and trust within the loosely affiliated group are enhanced, which builds a better future for this insurance model. BLockchain also provides a tamper-proof information disclosure which leads to better self-regulation, improves system availability and reduces management cost.



Usage mode

Hyperledger Fabric Usage Mode



Consortium Chain

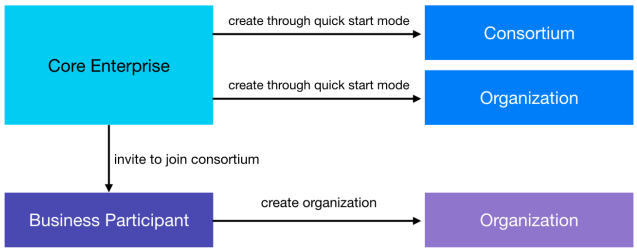
Alibaba Cloud BaaS provides two usage modes. Enterprises can select a mode based on their business specific.

> Note: The following information is for reference only. There is no strict boundary between these two usage modes, and you can choose one mode based on your needs.

Quick mode

If the business consortium is started or dominated by a key enterprise, and other businesses involved are invited to join the consortium, you can choose the quick mode.

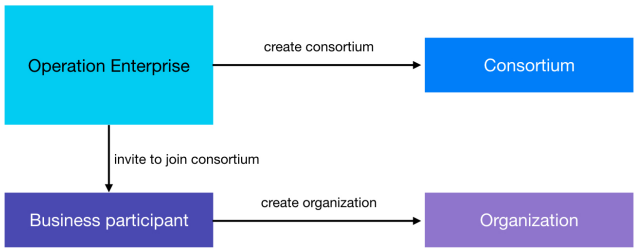
In the quick mode, key enterprises can quickly start their services on the blockchain and add more business participants to the consortium blockchains and business channels later. In this mode, the key enterprises can be both the operator and the participant, while other enterprises act as business participants.



Standard mode

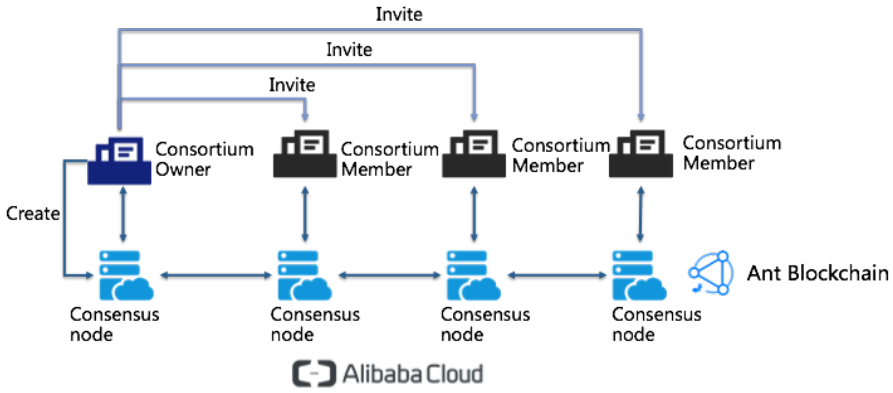
If the consortium infrastructure is operated by a commissioned enterprise, and if other enterprises participate in business collaborations and transactions, you can choose the standard mode.

In the standard mode, the operator creates the consortium and invites other enterprises to join the consortium blockchain and the corresponding channels. In this mode, the enterprise in charge of operation acts as the consortium operator only (not the business participant), while business enterprises act as the participants.



Ant Blockchain Usage Mode

The usage mode of Ant Blockchain is shown as below. The consortium owner applies for creating a consortium blockchain, and then invite consortium members to join the consortium. Consortium members accept the invitation to join, and then start to access consensus nodes and read/write data.



Basic terms

General terms

Bitcoin

The first major applier of blockchain technology was Bitcoin, a world-renowned form of electronic cash proposed by Satoshi Nakamoto in 2008.

Blockchain

Blockchain was first introduced to the market as the technology underpinning Bitcoin exchanges, but its practical uses in the business world extend far beyond cryptocurrency transactions. Blockchain establishes a peer-to-peer network where each participant in the network has access to a shared ledger. Transactions and history records cannot be removed or altered. The smart contract and consensus algorithms enable multiple participants to transact with one another and confirm the transactions and ledger records. Currently, Alibaba Cloud supports three types of blockchains: public blockchains, private blockchains, and consortium blockchains. Blockchain frameworks include Ethereum, EOS, Hyperledger Fabric, and Corda.

Smart contract

As one of the highlights of blockchain technology, the smart contract describes the contract terms, the conditions of a transaction, and the business logic of transactions using cryptography. Smart contracts support self-execution and automatic reconciliation in real time.

Genesis block

The first block in a blockchain.

Hyperledger Fabric specific terms

consortium

A consortium is a collection of organizations involved in a blockchain-based business collaboration or a business transaction network. A consortium may consist of multiple organizations.

In Alibaba Cloud BaaS (Hyperledger Fabric), each consortium should have a **consortium instance**, which is generally created by the initiator or operator of the consortium. This instance contains the Orderer nodes, which are responsible for transaction sequencing, block generation and consensus. The consortium operator invites organization instances to join the consortium, then creates channels, and is responsible for managing the Orderer nodes.

Organization

Organization refers to entities involved in the blockchain business network, such as enterprises, government agencies, and groups. In Alibaba Cloud BaaS (Hyperledger Fabric), an organization instance includes the below major nodes:

- CA: The Certificate Authority (CA) is an entity that issues digital certificates. CA provides users of a blockchain with a number of certificate services, including services related to blockchain user register and enrollment.
- Peer: A peer receives ordered state updates from the ordering service and maintains the state and the ledger. Peers can also facilitate smart contracts and act as an endorser.

In Alibaba Cloud BaaS (Hyperledger Fabric), one blockchain network is composed of 1 consortium instance + N organization instances, N>=1. The number of organization instances N is determined by the number of business participants and whether there is an exclusive requirement. If a participant needs exclusive blockchain node and ledger, as well as chaincode deployment, blockchain user creation and other management functions, the participant needs to create a separate organization instance. An organization instance can be shared if the participants has no exclusive requirement. Consortium instance and organization instances can be purchased and created by a single cloud account or by different cloud accounts.

Channel

Channels are used to isolate the businesses in the consortium. Each channel represents a business and contains the participants of the business (some or all of the organizations within the consortium). There can be multiple channels in one consortium. One organization can join multiple channels. Each channel can be viewed as a sub-chain with its own ledger, and smart contracts can be deployed to the channel.

Chaincode

A chaincode is a piece of code written in one of the supported languages such as Node.js, Go or Java. In the Hyperledger Fabric framwork, chaincodes are the ‘smart contracts’ that run on the peers and create transactions.

Orderer node

An ordering service node that provides services to order and broadcast transactions. The orderer collects transactions from network members, orders the transactions and bundles them into blocks. The orderer delivers the block to all peers to ensure that ledgers are updated with the same transactions in the same order.

Peer node

Peer node: A node that maintains a ledger under the Hyperledger Fabric framework. Nodes in peer-to-peer networks must come to a consensus on the ledger status. There are two types of peers: endorsing peers and committing peers. You must install the chaincode on each endorsing peer node to forward the endorsement request to that peer. With no need to install chaincodes, the committing peer validates the transaction, accepts blocks of valid transactions from an ordering service, and persists the block information to a modular data store.

Anchor peer

The anchor peer serves as the entry point for the peer from another organization on the same channel to communicate with each of the peers in the anchor peer’ s organization. The anchor peer in Hyperledger Fabric framework ensures high availability and keeps the entire network in a synchronized state.

Ant Blockchain specific terms

Identity

Identity uniquely identifies an account or a smart contract. It is 256 bytes in length. Typically, it is a unique readable hash value.

Ledger data

Ledger data refers to the data written into a blockchain. A blockchain is a tamper-resistant ledger. Data written into a blockchain cannot be tampered and therefore can be trusted. Ledger data can be in the format of a string or file hash to represent text, files, or other types of data.

Root hash

The root hash of the Merkel tree is calculated based on the current blockchain transaction.

Consensus algorithm

Consensus algorithm ensures the data consistency in a distributed ledger and keeps the ledger transactions synchronized across the network based on protocol interactions. Common algorithms include PBFT, RAFT, POW, and POS.

Consensus proof

Consensus proof is a data structure used to prove that the consistency of the target data is confirmed

by the consensus algorithm.

Transaction count

Transaction count refers to the number of transactions in a block.

Transaction receipt

Transaction receipt is the execution result of a transaction. A blockchain is an asynchronous network that requires consensus protocols to confirm a transaction after the transaction is executed. Unlike the traditional architecture, a blockchain cannot directly return the result of a transaction, and you need to check the final result in the transaction receipt.

Transaction type

Transaction type includes link notary, content notary, hash notary, ciphertext notary, privacy sharing notary, and ciphertext-only notary.

Transaction

Transactions refer to the total number of transactions that have been saved on the current blockchain ledger.

Node information

Node information refers to the information about the blockchain nodes. A blockchain is typically composed of multiple nodes. The number of nodes is 3F+1, where F is a positive integer.

Trusted Execution Environment (TEE)

TEE refers to a trusted execution environment that provides hardware-level isolation and trust metrics. In the field of servers and terminals, the TEE technology and its applications, best represented by Intel SGX, have attracted increasing attention in recent years.

Consortium

Consortium refers to a group of organizations that work together to complete a specific business.

Organization

Organizations are members of a consortium.

Certificate

Certificates for Ant Blockchain are issued by the third-party Certificate Authority (CA) working with Alipay upon certificate application requests.

Block height

Block height is used to identify the location of the block in the blockchain and to find all the underlying attributes and transaction records associated with the block.

Blockchain identification (Blockchain ID)

Blockchain ID is the unique identifier of a blockchain, corresponding to the unique physical resource in the underlying layer.

Application

Application refers to an application that is developed based on the blockchain SDK.

Decentralized application (DApp)

A DApp directly connects to blockchain nodes through clients, and calculates and accesses data by using smart contracts. Unlike the traditional centralized applications, the DApp has no centralized backend services.

Gas

Gas refers to the unit for measuring the computational and storage resources required to perform actions in virtual machines. It can prevent malicious attacks and save computational and storage resources.

Previous block hash

Previous block hash refers to the hash of the previous block.

World state

World state refers to the storage status of the blockchain account, including the basic storage status of all accounts and the internal storage status of the contract accounts. The contract platform can be viewed as a transaction-based state machine. The world state stores the latest value for all data in the ledger and can change frequently after the execution of smart contracts.

Digital envelope

Digital envelope is a secure electronic data container that is used to protect a message through encryption and data authentication. Only users with permissions can decrypt the content in digital envelopes.

Private key

Private key files are generated by tools such as OpenSSL. During the generation process, two keys are generated, one is the public key which is the certificate signing request (CSR) file, and the other one is the user private key. The user needs to save the private key and the corresponding password.

Private transaction

Unlike ordinary transactions, private transactions are not executed and stored on the public blockchain, but are encapsulated in the data field of the envelope transaction, delivered, and finally stored on the private blockchain.

Envelope transaction

Envelope transaction is a type of transaction used to encapsulate private transactions. When you send an envelope transaction, the private transaction will be encoded and stored in the data field of the envelope transaction. The envelope transaction will be stored in the public blockchain in the format of a notary, but the data field can be modified based on different business needs.

Virtual machine (VM)

Virtual machine (VM) refers to the sandbox environment where the smart contracts are executed.

Business identification (Business ID)

Business identification refers to the unique identifier of the business. It indicates a business scenario in which the blockchain is applied, such as traceability and renting.

Category

Category refers to the format of the chained business data of the transaction.

Business time

Business time refers to the time when the transaction is generated.

Intel Software Guard Extensions (Intel SGX)

Intel SGX is an extended instruction set on Intel CPU, which can be used by applications to set up private regions to protect code and data. It aims to ensure the integrity and confidentiality of the security sensitive computation performed on a computer where all the privileged software is potentially malicious.

Account

Account is the basic operational object on a blockchain. It is the logical representation of a user on a blockchain. You need an existing account to perform transactions on the blockchain. Accounts can be divided into common accounts and contract accounts.

Certificate Signing Request (CSR)

Certificate Signing Request (CSR) files are generated by tools such as OpenSSL. During the generation process, two keys are generated, one is the public key, which is the certificate signing request (CSR) file, and the other one is the user private key. The user needs to save the private key and the corresponding password.

Quorum specific terms

Ethereum Virtual Machine (EVM)

EVM is one of the key elements of Quorum and the distributed computing environment running smart contracts.

Solidity

Solidity is an object-oriented, high-level language for implementing smart contracts. It is similar to JavaScript and is used to write code in EVM.

Gas

Gas is used to measure the computing resources consumed by a transaction. The gas consumption increases with the complexity of a transaction executed by an Ethereum node.

Network ID

Network ID is a digital identifier used to represent a specific version of the Ethereum network.

Geth

Geth is the command line interface for running a full Ethereum node implemented in Go.

DApp

DApp refers to a distributed application.

Private transaction

You can specify the public keys of specific blockchain participants in the privateFor parameter of the transaction to make the transaction information visible only to these participants.

Quorum node

Ant Blockchain provides the following modifications based on Geth:

- Consensus algorithms, including Istanbul BFT and RAFT, are supported.
- The P2P layer has been modified to allow connections to or from permissioned nodes.
- The block verification logic for private transactions.
- Retained the Gas mechanism but removed the Gas price.

Transaction Manager

Transaction Manager of Quorum is responsible for transaction privacy. It stores encrypted payloads, allows access to encrypted transaction data, and exchanges encrypted payloads with other participant’ s Transaction Managers. However, it does not have access to any sensitive private keys. Transaction Manager makes a call to its associated enclave to encrypt the payload. The Transaction Manager is restful and stateless, and can be load balanced easily.

Enclave

The Enclave works together with Transaction Manager to strengthen transaction privacy. The Enclave manages the encryption and decryption in an isolated way. It holds private keys and is essentially a virtual hardware security module (HSM) isolated from other components.

Cloud Service Integration

Alibaba Cloud BaaS integrated Alibaba Cloud’ s other products and services, as well as providing

convenient functions for on-chain and off-chain collaboration, reduce the development cost of the integration of the blockchain with other cloud services, helping you quickly complete system construction.At the same time, Alibaba Cloud BaaS also provides you with a REST API to help you avoid the tedious blockchain SDK configuration process, you can directly call smart contracts, query blocks, query transactions, and subscribe events on the chain through the REST API.

Function Compute

When you want various events on the blockchain to automatically trigger off-chain business logic, you can upload the business logic code to the Function Compute. By integrating the Function Compute service, when the event you configure to listen occurs on the chain, Alibaba Cloud BaaS will automatically invoke and push events into function that you configured in console. For configuration procedure, please refer to Integrate with Function Compute. For a detailed example, please refer to On-chain Event Triggering Off-chain Operation.

Message Queue RocketMQ

By integrating the Message Queue RocketMQ service, we will reliably and automatically publish events on the blockchain to specific topics of the Message Queue RocketMQ according to the configuration. Other applications can subscribe to these event messages in MQ for further processing. For configuration procedure, please refer to Integrate with Message Queue. For a detailed example, please refer to On-Chain Events Send to Message Queue.

Connect to External HTTP Service

By integrating external HTTP service, you can let various events on the blockchain automatically trigger your own business applications or third-party services, and push the event content to the outside for further processing. For configuration procedure, please refer to Integrate with External HTTP Service.

Content Moderation

Due to the immutable nature of the blockchain, if there is illegal information on the data on the chain, it will be difficult to clear it separately. By integrating Alibaba Cloud Content Moderation service, you can prevent such problems and prevent illegal information from being uploaded to the chain. For configuration procedure, please refer to Integrate with Content Moderation. For an example of usage, please refer to Invoke with Content Moderation.

Database

Generally blockchain data is in key-value format, which is inconvenient for data query and analysis. By

integrating with relational database, BaaS can reliably and automatically export blockchain data to target database table according to your configuration. Other applications can process the data via SQL statement or analysis tools further. For configuration procedure, please refer to Integrate with Database. For an example of usage, please refer to Export Blockchain Data to Database.

OSS (Object Storage Service)

Alibaba Cloud BaaS supports storing a large volume of data or files on OSS, which can be linked with on-chain data by using trusted anchoring technique. This can guarantee immutability of the data or files. A sample application based on Hyperledger Fabric Go SDK has been provided here for reference.

Video DNA

Alibaba Cloud BaaS supports fusion with Video DNA service, which can extract unique identifier from multimedia contents (e.g. image, video, audio) as DNA. And by recording such key information (including DNA) on blockchain, we are able to build up platforms for copyright attestation, infrigement tracing, copyright trading. You can refer to the homepage of The Blockchain copyright protection solution for more details.

CEN (Cloud Enterprise Network) and DNS Private Zone

Alibaba Cloud BaaS supports hybrid cloud-based consortium network by integrating with CEN and DNS Private Zone. CEN can provide secure interconnectivity between VPC and local datacenter, where blockchain nodes of BaaS and applications are deployed. Besides, DNS Private Zone can provide private domain name resolution and management capbalities for blockchain services within the CEN network.

Link TEE (Trusted Execution Environment)

For Enterprise Edition and Enterprise Security Edition, Alibaba Cloud BaaS supports running Hyperledger Fabric Client SDK (private key management and signature) in Link TEE, which can be leveraged for providing enhanced security for blockchain applications, especially on edge devices in IoT scenarios. You can refer to the homepage of BaaS-IoT Edge & Device Security Solution for more details.

DDoS Protection

Alibaba Cloud BaaS has built in Anti-DDoS Basic Service by default. And BaaS can also support integrating with Anti-DDoS Pro Service and Anti-DDoS Premium Service for protecting critical core business.

If you are interested to learn more details of the above cloud service integration, please contact Alibaba Cloud support team by opening tickets.