ORACLE DATA SHEET

Oracle Autonomous Blockchain Cloud Service

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AUTONOMOUS BLOCKCHAIN CLOUD SERVICE

Tamper-proof, transparent, and irrefutable business-to-business transactions combined with distributed digital ledgers storing tamper-evident records promise to fundamentally transform how business is done, making these interactions more secure, transparent, and efficient. Blockchain or Distributed Ledger Technology is one of today's most disruptive emerging technologies. Oracle offers the most comprehensive distributed ledger cloud platform to securely extend your business processes and conduct online transactions in trusted networks with your suppliers, banks, and other trade counterparties.

"The technology most likely to change the next decade of business is not the social web, big data, the cloud, robotics, or even artificial intelligence. It's the blockchain..."

HARVARD BUSINESS REVIEW
"THE IMPACT OF BLOCKCHAIN GOES BEYOND FINANCIAL SERVICES", MAY 2016

KEYBUSINESS BENEFITS

- Increase business velocity with a trusted business network
- Innovate with new business models and revenues from untapped markets
- Avoid reliance on intermediaries, reducing delays, risk, and high fees
- Quickly scale up business network to hundreds of organizations
- Increase developer efficiency with REST API-driven development for cloud or on-premises applications
- Extend Oracle SaaS and on premises application suites using integration accelerators to integrate blockchain
- Achieve 24/7 operations with high resilience and autonomous monitoring and recoverability
- Secure defense in depth with role-based IdM for member enrollment and comprehensive authentication & SSO for ops console & REST proxy

Extending Enterprise Boundaries

A blockchain is a system for conducting transactions and maintaining distributed ledgers that allows organizations who do not fully trust each other to securely and reliably extend business processes and accelerate B2B interactions. Instead of relying on a central third party or suffering the delays inherent in an offline reconciliation process, blockchain enables organizations to use peer-to-peer protocols and a network of distributed validation nodes to execute common business logic in real-time and record the results in a tamper-evident ledger that's replicated among the participants.

Blockchain has the potential to fundamentally transform how global business transactions are conducted. Currently, some business-to-business transactions are routed through third parties to ensure their integrity. These third parties can introduce delays and add costs. Blockchain technology enables the participants in a trusted business network to transact directly, while still ensuring the validity and non-repudiation of their transactions. Once the proposed transactions are validated and the relevant parties reach an agreement on their results, blockchain participants record them in cryptographically linked blocks that cannot be repudiated.

With blockchain you can:

- **Increase business velocity**. Create a trusted network for B2B transactions and extend and automate your operations beyond the enterprise. Optimize business decisions with real-time information visibility across your company's ecosystem.
- **Reduce operations costs**. Accelerate transactions and eliminate the cumbersome offline reconciliations by using a trusted single source of information. Eliminate intermediaries and related costs, possible single points of failure, and reduce delays by relying instead on a peer-to-peer business network.
- **Reduce the cost of fraud and regulatory compliance.** Gain the security of knowing that business-critical records are tamper-proof via securely replicated and cryptographically linked blocks to protect against single points of failure and insider tampering.

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KEY FEATURES

Build Trusted Business Networks

- Simple provisioning of complete enterprise-grade blockchain platform
- Build trusted networks for members inside or outside the Oracle Cloud
- Built-in resilience and autonomous recovery of all network components

Automate with Smart Contracts

- Deploy and maintain Smart Contracts for real-time B2B transactions
- Manage smart contract lifecycle - install, instantiate, expose via REST APIs, and update versions
- Automate manual tasks in the partner ecosystem with event notifications
- Improve developer productivity with SQL-based rich queries
- Define endorsement policies for required number of signatures

Conduct Confidential Transactions

- Define confidential channels and ledgers for private transactions
- Easily control member access privileges
- Execute chaincode across multiple channels for different ledgers
- Dynamically configure channels and authorize members to join

Integrate Blockchain in Applications

- REST API-driven development for invoking transactions and queries
- SDK-based development (Java, GO, and Node.js)
- Plug-n-play integrations for Oracle and 3rd party SaaS and on-prem applications via enterprise adapters
- OOTB blockchain APIs in Netsuite ERP, Open Banking API platform, and FLEXCUBE core banking

Comprehensive Operations Tools

- Intuitive administration & operations console
- Dynamically change the configuration
- Easy monitoring and troubleshooting with built-in dashboards and log viewers

Enterprise-Grade, Pre-Assembled Blockchain Platform

Oracle Blockchain Cloud Service, a part of Oracle's comprehensive platform-as-a service (PaaS) portfolio, is built on the Linux Foundation's Hyperledger Fabric project with Oracle enhancements to provide an enterprise-grade blockchain platform. It is uniquely able to accelerate innovation for on-premises ERP and cloud-based SaaS and PaaS customers. This comprehensive distributed ledger cloud platform enables you to provision blockchain networks, enroll member organizations, and deploy & run smart contracts to update and query the ledger. As a pre-assembled PaaS it includes all the required dependencies (compute, storage, containers, identity services, event services, and management services) supporting blockchain network components and integrated operations using blockchain network console.

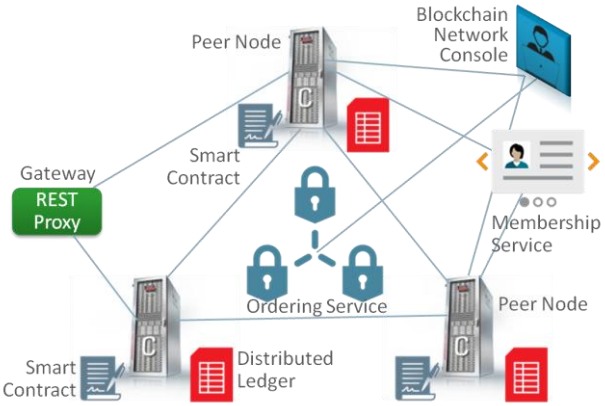

Figure 1. Blockchain Cloud Service Components within the Managed PaaS Offering

The blockchain cloud service is designed for continuous operation as a highly secure, resilient, scalable platform with continuous monitoring and autonomous recovery of all network components with continuous backup of the ledger blocks and configuration information. Managed VM and container framework ensures high availability of peer nodes and chaincode execution containers across replicated VMs. Autonomous agents monitoring all components and object store backup of all configuration updates enables quick autonomous recovery from any failure.

Within a permissioned blockchain network with enrolled members, all organizations use X.509 certificates for their identity and exchange digitally signed messages over TLS-encrypted links for all blockchain network interactions. The access to the network nodes, the admin console, and the REST APIs is protected by Oracle Identity Cloud Service (IDCS) with defense in depth authentication capabilities. TLS protection for data-in-transit and built-in data-at-rest encryption of world state and ledger blocks protect against any unauthorized access from outside the blockchain network.

Within the blockchain network you can conduct confidential transactions over private channels, recording results in segregated ledgers. A channel and its private ledger are established by a group of member organizations with governance policies for adding new members with approval of the current members. When a member organization joins a channel, its peer nodes can be granted R/O or R/W access to the channel's ledger. Only peer nodes on a specific channel can see the channel's transactions and its ledger.

"Oracle's integration capabilities and the ability to add value on top of open source technologies, like Hyperledger Fabric, make Oracle Blockchain Cloud Service a strong contender in the enterprise. Through our initial tests, we were impressed with its pre-assembled approach, ease of integration through the REST APIs, and strong focus on enterprise requirements. We look forward to leveraging the technology to offer new innovative capabilities to our clients."

DAVID TREAT,
MANAGING DIRECTOR,
GLOBAL HEAD OF FINANCIAL SERVICES DLT / BLOCKCHAIN PRACTICE,
ACCENTURE

OPTIONS FOR INTEGRATING BLOCKCHAIN TRANSACTONS

- REST API for API-driven integration
- Client SDKs for Java, GO, and Node.js for advanced integrations
- JCS – SAAS Extension for SaaS applications
- OIC application adapter library for Oracle & 3rd party applications

SMART CONTRACT EXAMPLES

- Verify account balances before transferring funds.
- Check that a proposed sales order complies with certain standards.
- Transfer ownership of assets between parties after conditions are met.
- Match purchase and sales orders or reconcile invoices and trigger payments.
- Update a provenance record to ensure that the rights to a piece of art or a music composition are protected.

Speed to Market with Integration Accelerators

API-driven integration simplifies and accelerates application development and integration using built-in REST Proxy for invoking smart contract transactions from cloud-based or on-premises applications. You can also invoke blockchain operations from Java, GO, or JavaScript SDKs and harness the Cloud Application Development Platform and ready-to-use DevOps capabilities. SaaS applications can integrate with blockchain platform via Oracle Integration Cloud with a rich set of application adapters and Java Cloud Service for SaaS as integration accelerators. As a further benefit of IDCS authentication, you can use single sign-on (SSO) to connect your PaaS and SaaS environments with Oracle Blockchain Cloud Service in the same identity domain.

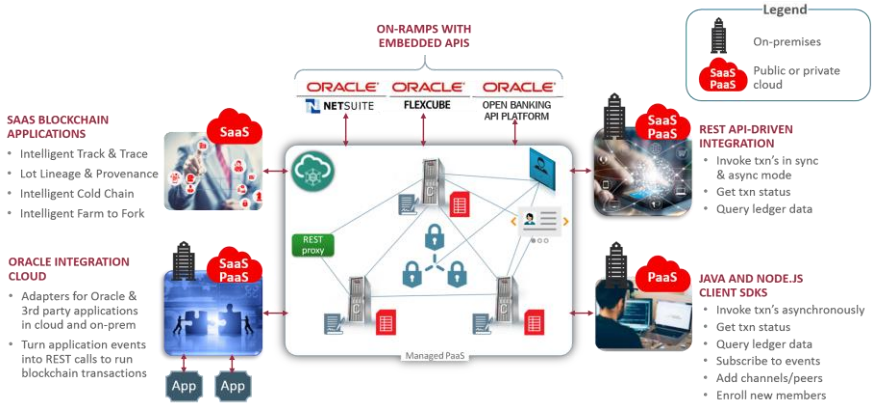

Figure 2. API-Driven Blockchain Integration and Integration Accelerators in Oracle Cloud

These integration options allow your enterprise applications to easily conduct cross-system transactions and leverage partner data posted in the distributed ledger. This can enable new business models and revenue streams by reaching untapped markets leveraging blockchain-verified identity and offerings.

Automate With Smart Contracts

Blockchain network is more than just a shared information store, it's also an automation platform that can execute business logic based on the data in the ledger and external inputs. Encapsulated in smart contracts (a.k.a. chaincode) the business logic can validate the ledger updates or evaluate multiple inputs to determine if an agreed condition has been met, triggering an event notification for downstream processing. For example, if an invoice and purchase order for some equipment match, and a delivery confirmation has been received, chaincode can update the records to transfer ownership of the equipment and trigger an event to issue payment.

Chaincode can be installed on multiple peers and instantiated separately on each channel. When application uses the REST API to invoke the chaincode, it also specifies the channel, thus ensuring that the transaction is operating on the data in the right ledger. For each chaincode there's an endorsement policy, which you can use to specify how many organizations must endorse the transaction (that is send back digitally signed execution results) and, optionally, explicitly select any mandatory endorsers. To increase developer productivity when writing chaincode in GO or Node.js, Oracle service enables use of SQL-based rich queries to more efficiently filter the data in the key-value based world state database.

Simplified Operations and Administration

After initial provisioning you can easily add other members running their own Oracle BCS instances or a compatible Hyperledger Fabric release outside of Oracle Cloud. The BCS console provides an intuitive Web UI for dynamic configuration, monitoring and troubleshooting. It supports common administration and operations tasks, such as:

- Control the blockchain network and manage its components – peers, orderers, etc.
- Add/remove network nodes, such as peers and REST proxies
- Add member organizations that want to join the blockchain network
- Configure network channels and set policies
- Deploy smart contracts to specific peers and channels, update them with new versions, and export their REST APIs
- Browse each channel's ledger and transactions in the appended blocks
- Monitor the network using dashboard and logs to troubleshoot any issues

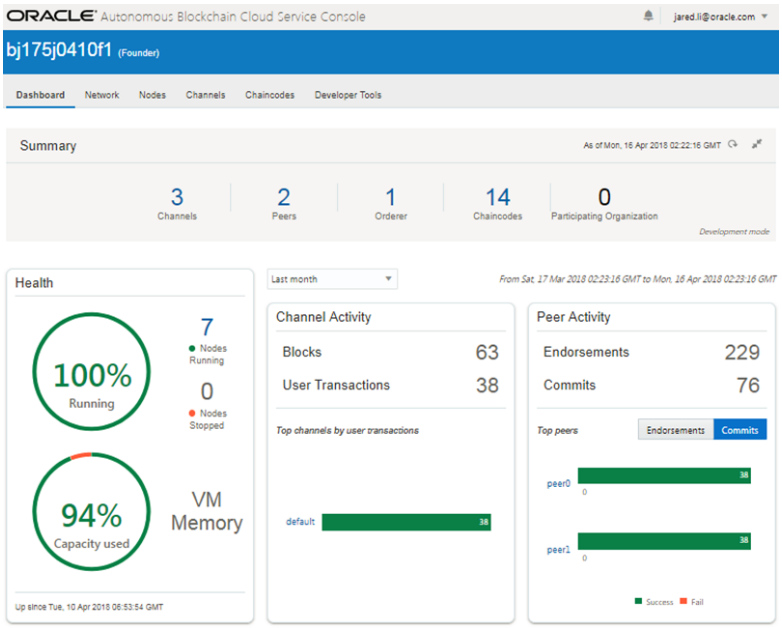

Figure 3. Blockchain Network Dashboard View

Once the network is running and you've deployed smart contracts, you can leave infrastructure updates, backups, and other operational worries behind with Oracle-managed services. This includes built-in continuous ledger backup, infrastructure monitoring and troubleshooting, as well as patching and release updates.

OUT OF THE BOX ON-RAMPS

- NetSuite SuiteCloud Platform provides built-in blockchain APIs for creating DLT-enabled services for Netsuite users
- Oracle Digital Innovation Platform for Open Banking provides built-in blockchain APIs alongside Oracle services and curated Fintech APIs
- Oracle FLEXCUBE blockchain adapters integrate with blockchain cloud platform

FOR MORE INFORMATION

- Oracle.com/Blockchain
- Cloud.oracle.com/Blockchain
- Oracle.com/industries/financial-services/digital-innovation-platform.html
- Netsuite.com/portal/platform.shtml
- Oracle FLEXCUBE blockchain adapter

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For more information about Oracle Autonomous Blockchain Cloud Service, visit oracle.com/blockchain or call +1.800.ORACLE1 to speak to an Oracle representative.

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