INDEPENDENT THOUGHT

Technology and suppliers series

Making blockchain easier

Oracle Blockchain Platform Generation 2 Cloud release

Oracle Blockchain Platform is a permissioned enterprise blockchain platform, based on the Hyperledger Fabric framework. Its Gen 2 Cloud release leverages second generation Oracle Cloud Infrastructure (OCI) capabilities (around resilience and availability, dynamic scalability, etc.), alongside blockchain specific tooling and new advancements in Hyperledger Fabric, to provide an enterprise blockchain platform that's geared towards helping customers more easily scale out their production level deployments into reliable services

Independent Thought provides independent technology industry insights to professionals working with emergent technologies. We work with tech suppliers to help them better anticipate and respond to their customers needs, frame their marketing messages, and understand how their portfolios stack up against the competition; and with tech buyers and end users in organisations large and small to help them to think themselves into new futures, become smarter customers, and get the best value from their tech investments.

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Top takeaways

1

Scale-up and scale-out with confidence (and predictable costings)

Oracle Blockchain Platform has been built to leverage the company's enterprise-grade integration, provisioning, support, and management capabilities; designed to help customers take the next steps beyond Proofs-of-Concept – bringing production services online, and 'battle-hardening' them as demand and reliance grows (with all the attendant issues around scalability, on-boarding, security, integration, etc.). Its supporting ethos is that, for deployments to succeed in the long term, there needs to be a 'minimum viable ecosystem' – both of blockchain business network members, and of business processes, systems, services etc. integrated with the blockchain network (so that it's not forever an adjunct to the main order of business).

2

Low(er) code blockchain (and heavier lifting) brings opportunities for *decentralised transformation* to all

Oracle's Blockchain App Builder for Oracle Blockchain Platform provides automated smart contract code generation from high-level specs (including from a library samples and, in the future, pre-defined specs for well-known use cases), helping developers with 'heavy-lifting' at a different level. The tool allows developers to configure and extend (from a spec) rather than their only option being to customise (chaincode) when leveraging ready-made library functions, and simplifies testing, debugging, and deployment to Oracle blockchain nodes in the cloud and on-premises. This marks a major milestone towards the 'normalisation' of blockchain development. It moves the spotlight from 'newness of the technology' to the 'value of the outcome', helping the atmosphere become more *post-blockchain* in nature – where the technology's contributions are quietly incorporated as an expected part of any relevant development project. Such a move firmly plays to Oracle's 'make blockchain easy' ethos, and will start to bring more of a low-code vibe to blockchain app dev, similar to what we've seen happen across other branches of emergent tech in recent years.

3

From enterprise to ecosystem, with support for consortium governance

Oracle is looking to position itself as a champion of good consortium governance and management (at the wider ecosystem level), and doing so with an expectation that (as the future rolls on) not all its customers' blockchain networks will necessarily be wholly Oracle in nature – so its tools have a multi-cloud / multi-vendor flavour (although still, for now, anchored to the Hyperledger Fabric stable) supporting interoperability with other vendors' Fabric nodes as well as with DAML-based smart contracts (and Solidity coming in the "near future").

Introducing Oracle's blockchain offerings

Oracle views enterprise blockchain as a transformational technology (one able to promote the rapid development and optimisation of business networks – whether new or already existing) through its support for transparent, consensus-based (and intermediary-free) trusted transactions, and the single source of truth it's able to maintain amongst multiple, independent, and distributed parties in a business relationship.

Oracle's blockchain strategy

Oracle's aim is to offer, in an enterprise-friendly way, blockchain advantages (extending business processes and tracking assets beyond organisational boundaries, establishing a trusted network for online transactions, etc.) to a customer base more at home with more 'traditional' business applications. And to make those capabilities available in the most easy-to-consume way that best fits a customer's existing technology posture and talent pool – whether they want to build their own custom solution (or have one built for them), or take advantage of pre-built, business-friendly, enterprise-ready apps *off-the-shelf*; and whether they're looking to deploy across a decentralised ecosystem of partners, or within a more centralised use case environment).

To that end, Oracle has branched beyond its initial [Hyperledger Fabric](#)-based platform and now offers additional blockchain-flavoured products and services (namely, blockchain-powered SaaS apps, and immutable database tables for centralised ledgers) as part of an enhanced overall offering alongside its fully-managed blockchain PaaS service.

An evolving palette of blockchain-flavoured offerings

Oracle's blockchain story started mid-2017 when it joined the Linux Foundation's [Hyperledger](#) project and then launched the first iteration of its fully-managed, cloud-based blockchain platform (then called *Oracle Blockchain Cloud Service*) at that October's OpenWorld conference. This Hyperledger Fabric-based PaaS offering was refined and enhanced during the course of its early-access and beta programme engagements, before becoming generally available in July the following year (as *Oracle Autonomous Blockchain Cloud Service*) – the "autonomous" tag a nod to how its production version was able to leverage the AI / machine learning infused managed service lifecycle and automated recovery capabilities inherent in *Oracle Cloud Platform*'s suite of autonomous services).

Later in 2018, as Oracle's first blockchain *platform* customers entered production, the company announced it was expanding its offering to include a number of targeted, use- case-specific, blockchain-powered *SaaS* applications (under the banner of *Oracle Blockchain Applications Cloud*) – aimed at customers who didn't need all the blockchain capabilities its platform service provides, and didn't want to build applications for themselves. The first of these (*[Oracle Intelligent Track & Trace](#)*) was first released in 2019, and has been extended to support Lot Lineage, Cold Chain, and Warranty and Usage Tracking use cases.

Also in 2019, Oracle released an on-premises version of its blockchain platform (*[Oracle Blockchain Platform Enterprise Edition](#)*) for customers with specific data residency requirements (mandated or preferred), whilst also doubling the number of *Oracle Cloud Infrastructure* (OCI) regions worldwide offering blockchain PaaS – increasing capacity for the users of the cloud-based platform.

In 2020, a third flavour of blockchain capability was added to Oracle's armoury with the launch of *Oracle Blockchain Tables* in Oracle Database (initially available in 20c version as a Preview release, and soon to be generally available in 21c as well as back-ported to 19c) – for customers looking to exploit the immutability characteristics of distributed ledgers, but in *centralised* databases.

2020 has also seen the latest version of *Oracle Blockchain Platform Cloud Service* – *Oracle Blockchain Platform, Generation 2 Cloud release* (built to fully exploit the capabilities of its 'second generation' OCI services) – become generally available, and the recent release of *Blockchain App Builder* for developers.

Partners play an important role

Oracle's partner ecosystem plays an important role in its blockchain strategy too:

- Custom blockchain applications, built atop the company's blockchain platform, are orchestrated through the company's worldwide **Solution Engineering Hubs** and Oracle Consulting (following a methodology of *Discovery* – i.e. understand blockchain, understand user needs; *Design and plan* – a 'design thinking' workshop; and *Pilot and deploy* – technical architecture workshop and deep dive to build a minimum viable product).

- **Systems Integrator partners** (such as Deloitte, Infosys, PWC, REPLY Blockchain, Tech Mahindra, and Cognizant) are furnishing solutions and accelerators for track & trace, intercompany reconciliation and settlement, contract and license management, maintenance records management, and smart insurance use cases across the food, agriculture, consumer-packaged goods, retail, manufacturing, aviation, entertainment, and banking, sectors (to name a few).

- **Industry-specific ISV applications and integrations** are being built on Oracle blockchain tech which are targeted at a less bespoke market (and complement Oracle's own vertical offerings – e.g. FLEXCUBE Core Banking, Oracle Digital Innovation Platform for Open Banking, and the Oracle Industry 4.0 Solutions Blueprint); all of which all boast APIs that blockchain-enable processes across trade finance, invoice factoring, Know-Your-Customer / Anti-Money Laundering, conflict minerals and luxury goods traceability, B2B contracts management and SLA enforcement, consumer-driven healthcare records sharing, smart education credentials, and supply chain/logistics use cases in maritime shipping and truck-based delivery, etc.

Technical capabilities

Oracle Blockchain Platform Cloud Service is a managed Blockchain-as-a-Service based on Hyperledger Fabric (currently v1.4.7 Long Term Support version).

Oracle Blockchain Platform's core capabilities now include Fabric's distributed RAFT consensus algorithm (which facilitates greater decentralisation, by enabling multiple participants – not just network founders – to contribute orderer nodes to the network); and Oracle's own extension providing fine-grained, on-chain access control (providing enhanced privacy, by enabling developers to manage access permissions within smart contracts).

However, to create its enterprise-grade platform service, Oracle has also provided additional layers of tooling and tuning, *viz*:

- **admin consoles for easier cloud (and on-prem) provisioning, peer & orderer node management, channel definition, chaincode deployment, and overall monitoring** – featuring on-demand scale-up and scale-out of individual nodes or of the overall instance, including storage capacity management (in 1Tb increments), allowing customers to scale more easily (self-service, rather than a service request) when workloads increase; together with an operations audit log that tracks admin access and configuration changes;

- **improved network resilience, availability, and geo-redundancy** – with automatic deployment and replication across multiple availability / fault domains in OCI datacentres (regions), and the ability to deploy across different OCI regions / geographies in order to operate geo-redundant clusters of ordering nodes; together with cross-region disaster recovery and failover planned in the future;

- **heterogeneous architectures** – support for multi-cloud deployment, and interoperability with other Hyperledger Fabric nodes, with plans to extend this to interoperability across networks;

- **integrations with *Oracle Database* and *Oracle Analytics Cloud* services** – enabling transaction updates to be streamed to *Oracle Database and leveraged in Oracle Analytics* for integrated data visualisation and reporting – a feature called "rich history database", which in the latest release has been extended to optionally use Blockchain Tables in the database in order to extend the auditability and tamper-proof characteristics of on-chain data streamed to the database tables used for analytics and business intelligence – to ensure the in-database version of the data is as authentic as it was on-chain;

- **enhanced stateDB implementation** – using Oracle Berkeley DB key/value store with SQLite support for using SQL queries in chaincode implementations in order to make use of enterprise developers' existing SQL skills and improve performance on rich data queries (compared to Hyperledger's CouchDB), plus recent enhancements for CouchDB query compatibility for chaincode developers migrating existing code from other Fabric implementations;

- **an API gateway using re-architected REST proxy** – to help integrate blockchain transactions, queries, and events in custom applications;

- **advanced security features** – extending data-at-rest encryption and authentication services that leverage *Oracle Identity Cloud Service* with key management based on the *Oracle Cloud Infrastructure Vault* service (with support for Thales Luna Network Hardware Security Modules (HSMs) planned for a future *Oracle Blockchain Platform Enterprise Edition* release), integration with OCI Audit service to track lifecycle events, and addition of Oracle's on-chain fine-grained Access Control mechanism for chaincode developers;

- **developer tools for cloud and enterprise deployment** – including the new *Blockchain App Builder for Oracle Blockchain Platform*, which auto-generates smart contract chaincode for create, read, update, and delete functions based on a declarative specification file – the assets data schema described in yaml or json format. It does this through both a VS Code extension and a lightweight command line interface, providing output in TypeScript (node.js) and Golang, which can be tested locally (i.e. easier than having to debug in a containerised cloud environment) before being deployed to *Oracle Blockchain Platform* in the cloud or on-premises;

- **choice of different product 'shapes'** – either a development-oriented Standard SKU, or a production-grade Enterprise SKU (the latter providing high availability – 99.95% SLA backed by customer service credits – and dynamic scalability) to better match where the customer is along their own particular pilot-to-production journey… and the ability, in the future, to upgrade from "Standard" to "Enterprise";

- **more flexible and 'predictable' pricing** – a resource-based billing model (per OCPU unit – i.e. one core and two threads – plus storage), with the ability to stop / restart an instance when the platform isn't in use (which actually throttles back usage metrics to 25% of allocated OCPUs) and support for 'bring your own licence' model so *Oracle Blockchain Platform Enterprise Edition* customers can use their on-premises licences for cloud deployments.

For customers using earlier versions of *Oracle Blockchain Platform Cloud Service*, the company provides a managed migration support to the new Gen 2 release through its *Cloud DevOps-managed* process to minimise customer impact (especially in already-live production environments).

It's particularly pertinent this time around because the move incorporates significant shifts in both underlying technology and hosting environment. Hyperledger Fabric's changes from Kafka to RAFT-based ordering require a sequence of migration steps to convert the ledger and ordering configurations in order to preserve its integrity; and second-generation Oracle Cloud Infrastructure (with the enhanced resilience and dynamic scaling capabilities outlined earlier) requires that the instances be re-created in a new tenancy environment – also meaning that customers will still need to update endpoint URLs used by client applications.

Rounding off the rest of Oracle's blockchain stable (for completeness):

- ***Oracle Blockchain Platform Enterprise Edition*** is the on-premises version of its cloud-based cousin. It has the same features and APIs as *Oracle Blockchain Platform Cloud Service*, only pre-assembled for on-premises installation (built on Docker containers) using virtualisation managers, such as VMware, Oracle VirtualBox, or Oracle Linux Virtualization Manager. It uses LDAP / Active Directory for its identity management, can connect with the on-prem *Oracle Analytics Server*, and *Oracle Database* as well as *Oracle SOA Suite* for (for wider integration with back-office application suites). It's touted not only as the choice for wholly internal blockchain network deployments (spanning multiple business units or subsidiaries of a single organisation, say; or where regulatory restrictions prevail), but also as component in a hybrid arrangement (with some nodes on-prem, and others in managed through Oracle *Blockchain Platform Cloud Service*), primarily in response to local country mandates, government sensitivities, and/or company preferences around data residency.

- ***Oracle Intelligent Track & Trace*** app leverages the requisite elements of Oracle's blockchain and IoT capabilities (in a single, 'business-ready' SaaS package) that tracks, traces, and monitors trading transactions (along with their associated assets and documents) across multiple supply chain partners. It features tools to aid stakeholder on-boarding; provides a 'simulation' capability that aids logistics planning; and includes a range of integration options (enabling data exchange with *Oracle Transportation Management Cloud*, *Oracle CX Marketing* (part of *Oracle Cloud CX*), *Oracle Cloud Procurement*, *Oracle Cloud Inventory Management*, and *Oracle IoT Fleet Monitoring Cloud* – as well as third-party apps via an integration adapter).

- ***Oracle Database Blockchain Tables*** are insert-only database tables, with cryptographically hash-chained rows (and optional user signatures), accessed via standard database protocols (via SQL, PL/SQL, JDBC, etc.). They provide tamper-evident and verifiable data storage options, bringing some of blockchain's inherent fraud-protection characteristics to the essential data stored in databases without the need for any of the distributed blockchain's attendant new infrastructure (i.e. it's an immutable ledger, but without the peer-to-peer consensus-based network).

Future plans

Oracle's future plans for its blockchain platform take in areas of work across development and integration support, operational management, and interoperability amongst wider Hyperledger Fabric networks and other blockchain technologies.

Development

Oracle anticipates its platform will migrate to Hyperledger Fabric v2.x (in both its cloud and on-prem incarnations) during the first half of 2021, bringing all the base capabilities inherent in the framework's second generation release.

It's also aiming to introduce a framework of libraries for low-code development to do more of the 'heavy lifting' around popular use cases – building upon functionality inherent in the *Blockchain App Builder* tool. Such a move firmly plays to Oracle's 'make blockchain easy' ethos, giving more of a 'leg-up' for developers and bringing more of a low-code vibe to the development of applications which leverage blockchain capabilities (just as we've seen happen across other branches of emergent tech, in recent years).

Though this won't quite be *sufficient* (on its own) to truly herald a true 'post-blockchain' era (where decentralising and tokenomic capabilities are simply part-and-parcel of everyday app dev, no longer requiring any 'special treatment' or scrutiny)… it's certainly a significant *necessary* step towards that point, and will position Oracle very well as a champion of 'simple(r) blockchain' as customer expectations (and appetite for self-build) evolve.

Operations

Oracle is planning to expand its blockchain network support capabilities beyond the enterprise boundary and more into the ecosystem realm, bringing additional governance, simplified on-boarding, and cross-ecosystem monitoring capabilities to emerging consortiums – reflecting the fact that it's often the business model, governance, and financial sustainability aspects of whole-network adoption which now throw up as many (if not more) challenges as the technology and internal organisational side of things.

In a post-COVID, high stakes innovation environment the business case for blockchain initiatives needs to articulate individual organisational benefits now more keenly (and quickly) than ever – in order for projects to retain senior sponsorship and 'make the cut'. However, it's often at the overall ecosystem (rather than individual enterprise) level where the value equation really makes sense over time – often because an injection of decentralising technologies and approaches tends to force / encourage *longer-term* shifts in business behaviour, with *wider-reaching* eventual consequences.

With one eye remaining on the traditional enterprise-level theatre-of-operations then, Oracle is looking to position itself additionally as a champion of good consortium governance and

management (at the wider ecosystem level). And doing so with an expectation that (as the future rolls on) not all its customers' blockchain networks will necessarily be wholly Oracle in nature… so its tools have a multi-cloud / multi-vendor flavour too (although still, for now, anchored in the Hyperledger Fabric stable).

Fabric Network infrastructure

In further pursuance of wider Hyperledger Fabric network support, Oracle plans to enhance its interoperability during 2021 (starting with Oracle customers running blockchain "islands" in adjacent spaces first – to prove the tech – and then extending to other Fabric networks and other blockchain frameworks).

The company is also planning to certify *Oracle Blockchain Platform Enterprise Edition* for deployment in third-party clouds too, further widening the scope of its multi-cloud operations.

Suitability

Over the last three years, Oracle's blockchain platform has seen use in over 250 customers – over a quarter of which have already moved into production, and has been explored in more than 200 trials.

The company reports that it's increasingly seeing organisations (catalysed by COVID responses) start to move their blockchain initiatives beyond investigative Proof-of-Concept dabbling, into production services which the business can *rely* upon. And many of those with services already in production are now starting to scale up their deployments and ramp up transaction volumes. In most cases it's seeing blockchain applications operate in the role of *primary*, business critical system too; not just as an ancillary or adjunct service (i.e. one rarely exposed to 'battle-hardening' conditions).

Not only are expectations high for blockchain's ability (in key use case areas) to drive business survival and recovery through more efficient processes and new business models; but so too is confidence in the technology's ability to now perform at scale (in *real* production environments), where it was once seen as more of a niche and experimental performer.

Blockchain has had to 'grow up fast' in recent months, and grow some serious 'business chops' too – shining a spotlight on the carefully constructed enterprise-friendliness and production-grade tooling of offerings from vendors, such as Oracle, with solid, industry experience, expertise, and an understanding of how new technology works to drive value in established (as well as 'new normal') business contexts. The climate has never been more attuned to the approach of enterprise blockchain vendors (like Oracle) with a deep history of technology and business know-how alike, since – post-COVID, especially – blockchain projects need to be able to prove themselves *quickly*; do so in clear, unequivocal, and evidence-based terms; and in business-friendly language.

It's especially the case where blockchain-infused enhancements and additions drive cost savings and process optimisations (such as measures to shore up fractured supply chains with more streamlined due diligence; increase consumer confidence in online retail (by providing irrefutable provenance of assets and data); and support a *physical untethering* of processes that had hitherto anchored employees to their offices, and/or hindered the adoption of more *touchless* business models with partners, suppliers, and customers.

In other words, successful candidate blockchain projects have to be more than 'interesting', and more than simply a 'good' thing / 'the right thing' to do… they need to move the needle on

top and bottom lines; to be an *essential* component of the organisations 'new normalisation' as it moves to establish a new stable state for recovery and growth.

Oracle's blockchain use case examples span sectors as diverse as financial services (e.g. international transfer of funds and loyalty programmes; asset and securities tokenisation), supply chain (e.g. provenance of food ingredients, clothing materials, and high-tech components; maritime shipping logistics; cross-border trade compliance), public sector (e.g. customs and excise trade; certification of tax deducted at source; digital assets tracking), and Healthcare and Pharma (e.g. health records sharing, remote patient monitoring, anti-counterfeit drugs tracking).

In an effort to 'make blockchain easy(ier)', the *Oracle Blockchain Platform* is focused on five basic tenets of assisted-adoption:

- **Development.** By providing auto code gen from high-level specs (including from a planned library of pre-defined specs for well-known use cases – such as document exchange, token issuance and exchange, asset tracking, etc.), Oracle's *Blockchain App Builder* helps developers building blockchain-based apps focus on the development lifecycle. It's 'heavy-lifting' at a different level, allowing developers to configure (from a spec) rather than their only recourse being to customise (code) when extending ready-made library functions for their own smart contract chaincode.

- **Deployment.** Platform infrastructure comes pre-assembled and automatically provisionable, taking care of underlying dependencies and thus speeding time-to-value. Oracle supports multi-cloud, hybrid and on-prem deployment; with full interoperability with open source and other vendors' Hyperledger Fabric nodes (providing support for modern, multi-vendor / multi-cloud blockchain networks).

- **Integration.** REST APIs, SDKs and enterprise adapters provide bi-directional easy-integration routes between *Oracle Blockchain Platform* and the company's own (and third-party) applications, both in the cloud and on-prem; facilitating an easier 'bedding-down' of blockchain applications amongst more traditional, core elements of the IT estate (such as centralised systems of record, and other business-critical systems).

- **Operation.** Oracle has furnished the platform with extensive admin console configuration capabilities for network management and member on-boarding, plus analytics tooling (the latter via a rich history database). Additionally, the Gen 2 release has brought in enhanced resilience, plus dynamic scaling and lifecycle management capabilities – all helping customers run, monitor and manage their blockchain networks from pilot to production. Also, 'low tech' organisations now don't need a dedicated blockchain node in order to join a network – lowering one of the barriers to entry for growing consortia / blockchain-based services looking to attract a range of members.

- **Security.** The platform provides support for private data collections, with built-in identity and network membership management. Gen 2 sees new audit logging capabilities and fine-grained access control list (ACL) functionality added to smart contracts (providing on-chain mechanisms to control access to data and process execution) too.

The platform has been built to leverage the company's enterprise-grade integration, provisioning, support, and management capabilities; designed to help customers take the next steps beyond Proofs-of-Concept, bringing production services online (with all the attendant issues around scalability, on-boarding, security, integration, etc.). Its supporting ethos is that, for deployments to succeed in the long term, there needs to be a 'minimum viable ecosystem'

– both of blockchain business network members, and of business processes, systems, services etc. integrated with the blockchain network (so that it's not forever an adjunct to the main order of business).

Thus Oracle's blockchain strategy for 2020 and into 2021 is simple: make the technology quick and 'easy' for enterprises to adopt and see value from, especially as a means to recover and thrive in a post-COVID business environment. (See the Independent Thought report *2020 rebooted: Challenge and response* for more on how blockchain is helping organisations and individuals become *differently digital* in an era of rapidly evolving – and often parallel, co-existing – *new normals.*)

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