

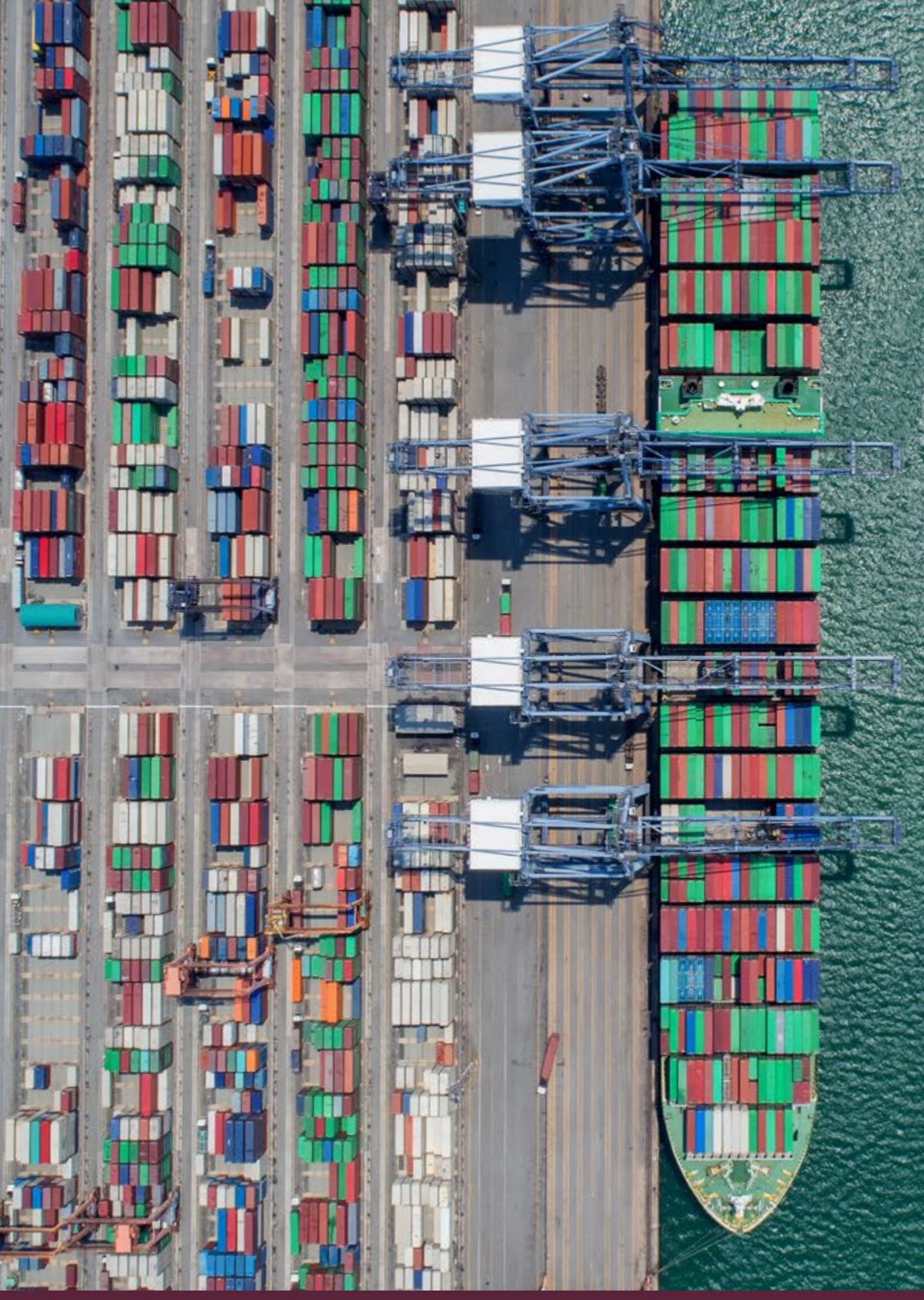


Blockchain Technology for the Enterprise

Securely and reliably extend your business processes and accelerate B2B transactions.

Cloud **Essentials**

ORACLE[®]
Cloud



Executing business-to-business (B2B) transactions in today's digital economy is a complex undertaking that involves global supply chains, a myriad of integration points, and multiple online services. Trusted business relationships depend on sharing data and verifying transactions. However, setting up secure B2B collaboration often involves complex application integration—and sometimes even manual reconciliation of information. Until recently, there was no way to verify the authenticity of items being exchanged or to track the execution of transactions without enlisting intermediaries such as banks, EDI vendors, trading partners, and logistics brokers.

Bridging many parties and their data can raise overhead, increase security risks, and lead to costly delays when onboarding new trading partners. It's complex—and in some cases, it can become overwhelming. However, a new technology called blockchain cuts through the interoperability and trust issues that slow down business processes. Blockchain makes it much easier to establish trustworthy B2B relationships, share data, and execute transactions. It solves integration challenges by enabling companies to establish a shared digital ledger that streamlines collaboration and establishes trust among business partners and trading partners.

Around the world, blockchain technology is quickly gaining momentum in industries such as transportation, energy, retail, financial services, telecommunications, supply chain, and logistics. By enabling collaboration based on shared data, participants in these blockchains remove the need for third-party intermediaries and establish consensus-based trust. Because data is shared and cannot be changed without all parties being aware of those changes, a blockchain provides a verifiable and incorruptible source of truth. The distributed ledger of a blockchain can store any type of information, reducing overhead and eliminating manual processes by establishing tamper-proof, immutable records.

Oracle Blockchain Platform can securely accelerate your business processes and establish trust among parties that have never met or done business together. It provides a single source of reliable information via a secure portal accessible

to all trading partners. Preassembled, plug-and-play components make it easy to set up and provision blockchain networks, while integrated identity management technology simplifies participant authorization.

Because it is a managed platform-as-a-service (PaaS) offering, Oracle customers don't need to concern themselves with infrastructure, maintenance, or security. Based on a high-performance cloud platform, Oracle Blockchain Platform accelerates business transactions and creates a secure platform for B2B collaboration.

“Blockchain projects are quickly moving from pilot to production as enterprises and governments begin to see the inherent value of distributed ledgers and smart contracts. As spending accelerates, buyers will need an enterprise-class platform beyond open source that includes data security and integrity, scalability, manageability, and interoperability.”

Robert Parker, Group Vice President of Manufacturing and Retail Insights, IDC





Understanding Blockchain Technology

Think of a blockchain as a historical record of transactions. Each block is “chained” to the previous block in a sequence, and is immutably recorded across a peer-to-peer network. Cryptographic trust and assurance technology applies a unique identifier—or digital fingerprint—to each transaction. Trust, accountability, transparency, and security are forged into the chain. This enables many types of organizations and trading partners to access and share data, a phenomenon known as third-party, consensus-based trust.

All participants maintain an encrypted record of every transaction within a decentralized, highly scalable, and resilient recording mechanism that cannot be repudiated. Having a decentralized, single source of truth reduces the cost of executing trusted business interactions among parties that may not fully trust each other, without adding additional overhead or intermediaries.

Two Types of Blockchain

Permissioned

Members invited to join the network
Examples: a manufacturer and its suppliers or a cargo shipper and its broker network
More secure and better governance, since parties are known in advance
Better suited for enterprise deployment

Permissionless or Public

Anyone on internet able to join and access the ledger information
Examples: Bitcoin, Ethereum
Less secure and poorer governance, since parties are not known in advance

Oracle Offers a **Permissioned Enterprise Blockchain Platform**

In a permissioned blockchain, used by most enterprises, participants are authorized to participate in the network, and each participant maintains an encrypted record of every transaction. Any company or group of companies that needs a secure, real-time, shareable record of transactions can benefit

from this unique technology. There is no single location where everything is stored, leading to better security and availability, with no central point of vulnerability.

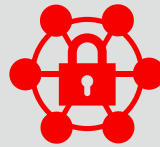
Characteristics of Blockchain



Tamper-Proof Data

Records written to the blockchain **cannot easily be changed** or deleted.

Enhance trust in a decentralized single source of truth.



Shared and Transparent

A distributed ledger enables **single shared source of truth** distributed across all nodes.

Enable transparency, reduce delays, and lower costs of third-party intermediaries.



Consensus-Based

Make updates to the distributed ledger after consensus among network peers.

Protect against fraud among participants and maintain trust in the ledger.



Security and Privacy

Only those **authorized** with keys can view the data.

Blockchain stores **auditable historic records** that can be encrypted for privacy.



Enables Trust

Introducing Trust as a Service

Blockchain enables a new concept: trust as a service. Transactions are synchronized in real time, so everyone can see the most up-to-date data. A record of consensus is created by a secure, cryptographic audit trail.





The Promise and the Pitfalls: Overcoming Implementation Challenges

Blockchain has tremendous potential in retail, logistics, finance, manufacturing, healthcare, utilities, public sector, and other industries. Worldwide spending on blockchain solutions is forecast to reach US\$11.7 billion in 2022, according to a new update to the “Worldwide Semiannual Blockchain Spending Guide” from International Data Corporation (IDC).¹ During one recent 12-month period, blockchain-related job postings on LinkedIn tripled in response to escalating demand. 22 percent of CIOs are currently experimenting with blockchain technology, and another 43 percent have it on their radar. According to a recent survey of 780 business technology buyers across North America and Europe, 56 percent of large enterprises plan

to adopt blockchain-enabled technology by 2020—up from the current 25 percent.²

However, despite the news hype and executive-level enthusiasm, several hurdles stand in the way of adopting blockchain technology. Sure, a blockchain enables a secure, unalterable, distributed ledger—but connecting information systems requires manual development and integration work. In most cases, developers have to figure out how to record and synchronize transactions among multiple, disparate systems of record (SOR). Communication discrepancies degrade transaction processing performance, increase operational overhead, and raise costs.

Barriers to Blockchain Adoption

- **No “plug-and-play” for enterprise systems:** Closed ERP systems, one-off integrations, and complex APIs hinder development.
- **Insufficient production readiness:** Lack of resilience, haphazard security, limited recoverability, and constrained global reach imply a lack of enterprise readiness.
- **Continuous platform evolution:** Rapid technology changes complicate compatibility and lead to early obsolescence.
- **Ongoing operational challenges:** Difficulties with member onboarding, participant monitoring, lifecycle management, and scalability create operational headaches.

“Oracle’s blockchain platform is agile, easy to develop on, and its enterprise-grade scalability makes it an ideal choice for deploying blockchain platforms rapidly.”

Juan José Miranda, Blockchain Project Manager, Magia.Digital

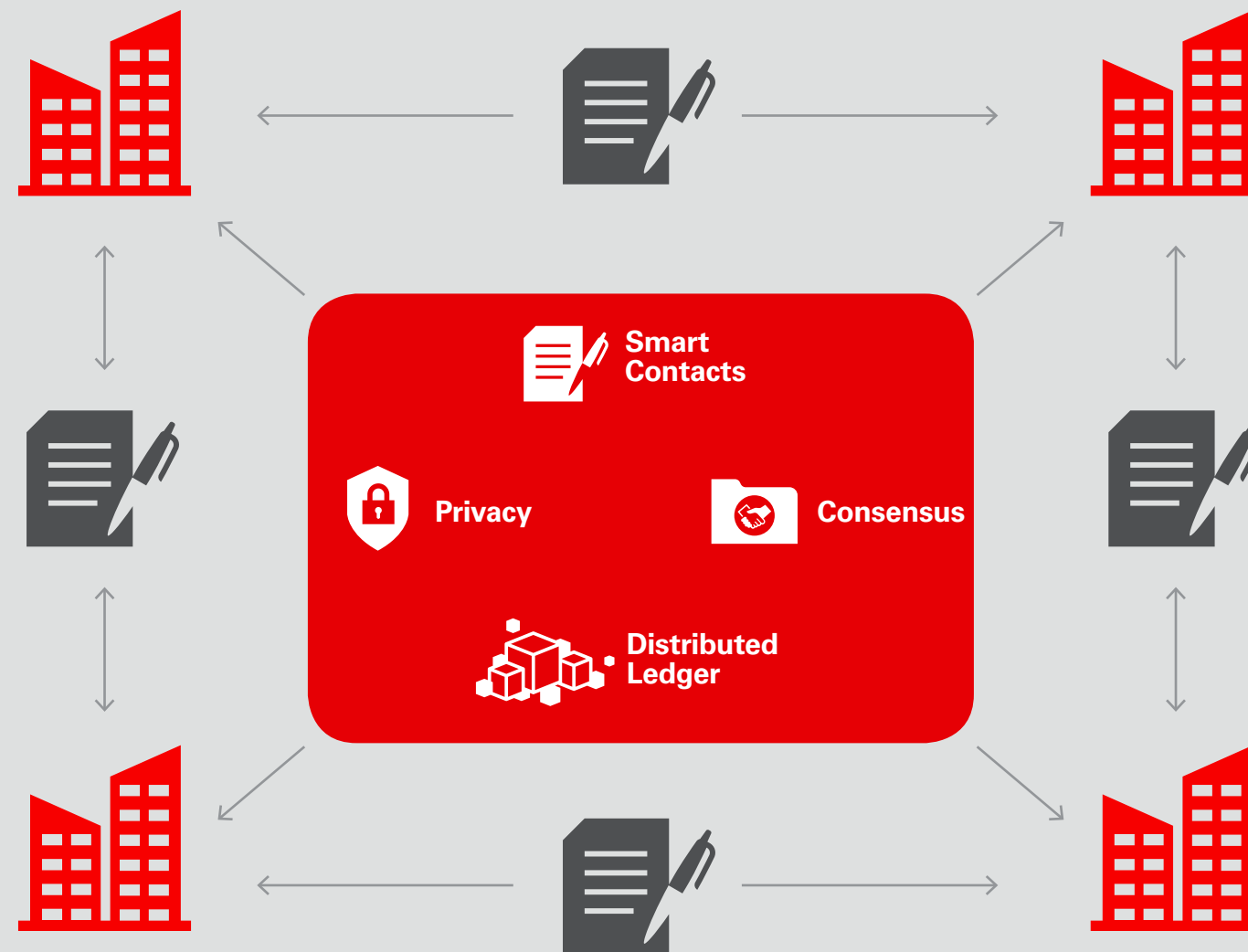
¹ IDC press release, “Worldwide Spending on Blockchain Forecast to Reach \$11.7 Billion in 2022, According to New IDC Spending Guide,” July 2018, [idc.com/getdoc.jsp?containerId=prUS44150518](https://www.idc.com/getdoc.jsp?containerId=prUS44150518).

² Spiceworks press release, 2018, [spiceworks.com/press/releases/spiceworks-study-reveals-emerging-tech-adoption-rates-are-up-to-10-times-higher-in-large-enterprises](https://www.spiceworks.com/press/releases/spiceworks-study-reveals-emerging-tech-adoption-rates-are-up-to-10-times-higher-in-large-enterprises).

Introducing a Complete Blockchain Platform Based on Open Standards

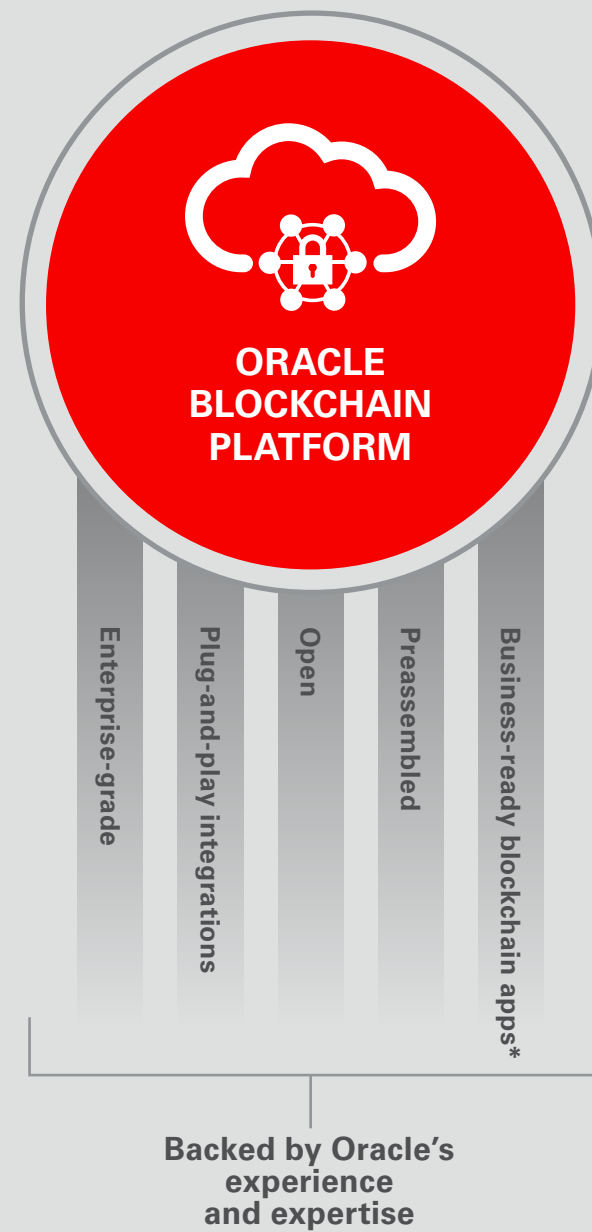
Blockchain technology has applications in finance, manufacturing, logistics, supply chain management, and many other domains. For example, banks can use blockchain applications for clearing and settlement, loan origination, and trading. Logistics companies can track shipments and ownership transfers. Manufacturing companies can easily establish track-and-trace procedures and exchange shipping requirements. Pharmaceutical companies can streamline lot tracking, verify the authenticity of drugs and accelerate regulatory control.

Oracle's blockchain technology is based on the broadly accepted Hyperledger® Fabric, an open source industry standard developed by a community of contributors and promoted by the Linux Foundation. Adhering to this standard ensures that these industry networks and applications can interoperate. Hyperledger Fabric provides the core blockchain capabilities of smart contracts, consensus, privacy, and a distributed ledger. It can execute hundreds—and in some cases, thousands—of transactions per second (versus 15 to 20 transactions per second for Ethereum).



Oracle uses the Hyperledger Fabric as the foundation for a complete cloud platform that includes infrastructure services along with embedded development resources such as compute, containers, storage, identity management, and event streaming. This makes it easy for customers to attach smart contracts and tamper-proof distributed ledgers to a larger business process or workflow. For example, a smart contract can automatically verify account balances before transferring funds, check that a proposed sales order complies with agreed-upon standards, and perform many other actions to enforce each participant's business policies. When purchase orders, invoices, and delivery records are matched by a smart contract, the blockchain can post an event so that subscribing applications can process related payments and update the associated information systems—with direct links to relevant ERP systems.

Oracle's Comprehensive Blockchain Platform



* Apps available in 2019



- **Preassembled.** Includes a built-in identity management framework, object store, and REST APIs, reducing setup time from weeks to minutes.
- **Open.** Built on Hyperledger Fabric, an open source project governed by The Linux Foundation, ensuring compatibility with other member systems.
- **Plug-and-play.** Easy integration with Oracle and third-party apps helps ensure fast integration with diverse systems of record. Blockchain integration accelerators include PaaS-for-SaaS and Oracle Integration Cloud Service.
- **Enterprise-grade.** An enterprise-grade, managed service with a 99.95 percent uptime guarantee, backed by enhanced security, availability, and continuous ledger backups for multi-data-center disaster recovery.



“Oracle is abstracting away from its customers all the complexity of hardening, securing, and accelerating open source componentry to make it production-ready and enterprise-grade, and is facilitating integration with other business systems from Oracle and third parties.”³

Rik Turner, Principal Analyst, Infrastructure Solutions, Ovum

³ “Oracle’s PaaS Delivery of Blockchain is a Smart Move,” February 2018.

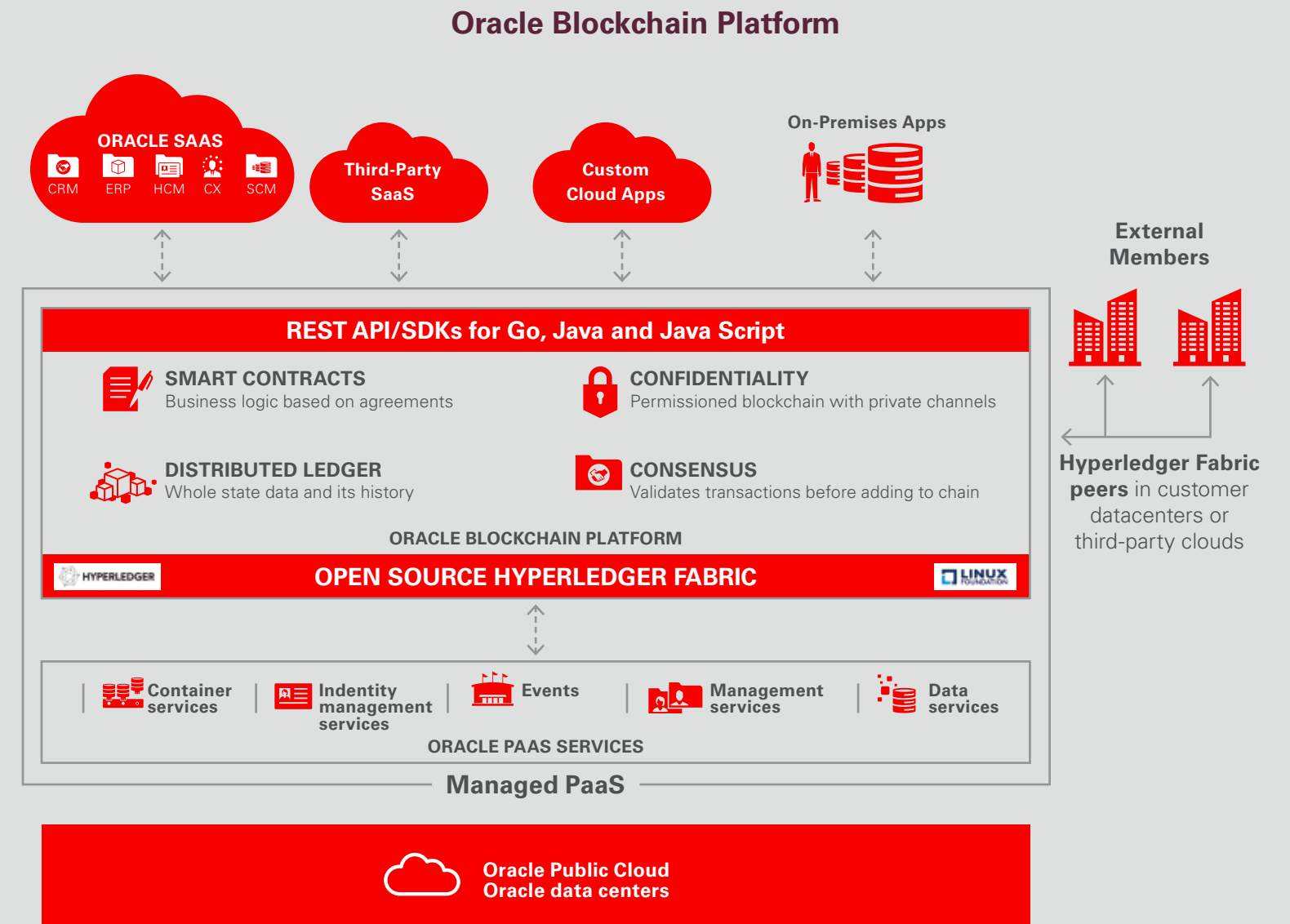
Plug-and-Play Integration with Enterprise Applications

Oracle makes it easy to rapidly integrate blockchain with established systems of record such as ERP, CRM, and supply chain management (SCM) systems. Customers can use adapters and workflow tools in Oracle Integration Cloud to extend applications with blockchain technology. It's simple to integrate cloud-based and on-premises applications, including out-of-the-box access to Oracle's NetSuite ERP system, Oracle FLEXCUBE Core Banking applications, and the Open Bank API platform.

Developers can use Oracle's cloud application development platform to invoke blockchain operations from multiple languages such as Java, Node.js, and GO, a versatile development environment backed by turnkey DevOps capabilities. Additionally, Oracle will soon be releasing new SaaS

applications that apply blockchain technology to common use cases, such as track and trace, provenance identification, warranty and usage, and cold chain.

System administrators can authorize and authenticate users of Oracle Blockchain Platform using Oracle Identity Cloud Service, taking advantage of single-sign-on and key management services to secure the environment. This helps ensure that only authorized applications and users can access blockchain services to invoke transactions and run queries. Oracle also offers integration accelerators to leverage B2B transactions and data from enterprise applications, both internally and from partners.



The Business Value of Oracle Blockchain Platform

As an IDC white paper points out, companies are investing in blockchain technology to improve data quality and timeliness, conduct B2B transactions, improve data security, and provide distributed access to data that serves as the one single source of the truth. However, there are many challenges to developing, testing, deploying, and maintaining enterprise-grade blockchain solutions because the technology is still relatively new. With Oracle Blockchain Platform, enterprises and service providers can build blockchain ledgers and networks by quickly provisioning one or more instances of the service, with all the required infrastructure provided out of the box.⁴

According to the IDC research, Oracle Blockchain Platform delivers numerous benefits to enterprise customers, including:

- Faster transactions with greater resilience
- Enhanced data privacy
- Simplified operations through managed services
- Integration with Oracle SaaS and on-premises application suites
- New business models and revenue streams
- Deployment flexibility and choice



⁴IDC white paper, sponsored by Oracle, "The Emergence of Blockchain: Seizing Opportunity," December 2017.



Innovation Aided by Emerging Technologies

Oracle Blockchain Platform is a unique component of Oracle Cloud Platform, a suite of platform services that simplify business processes, boost efficiencies, and free IT resources for strategic purposes. The portfolio is anchored by Oracle Autonomous Database, which is characterized by three unique attributes:

- It's **self-driving**, which means it automatically provisions, secures, monitors, tunes, and upgrades itself—lowering costs and increasing productivity.
- It's **self-securing**, reducing risks by protecting cloud resources from external attacks and malicious internal users. This includes automatically applying security patches with no downtime, automatically encrypting all data, and intercepting data leaks with preventive controls.
- It's **self-repairing**, maximizing uptime and productivity with 99.995 percent availability. That's less than 2.5 minutes of both planned and unplanned downtime per month, and the complete elimination of administrative errors.

Your Automated Future

Artificial intelligence (AI) technology is fundamentally altering enterprise computing by changing how organizations receive, manage, and secure business data. By 2020, Oracle predicts that 90 percent of all applications and services will incorporate AI at some level—and that more than half of all enterprise data will be managed autonomously.

Oracle Autonomous Database represents an entirely new category of software based on machine learning that allows you to focus on your core business, worry less about day-to-day operations, and create opportunities for innovation. Oracle Cloud puts these emerging technologies to work by enabling customers to establish new IT capabilities quickly, affordably, and securely.

Intelligence at Every Layer

Oracle's complete, integrated cloud platform includes intelligent solutions that span the SaaS, PaaS, and IaaS layers. For example, Oracle embeds intelligence into all of its apps. Oracle also extends intelligence into the platform, making it available for any developer to build upon. The goal is to make cloud technologies simpler to access, easier to create, and more efficient to secure, manage, and run—so you can achieve real business outcomes.

Bring Your Own License

Oracle recently introduced two new programs to make it easier to buy and consume cloud services, helping you get more value from your hardware and software investments.

- **Oracle Universal Credit Pricing**

enables you to access current and future Oracle Cloud Platform and Oracle Cloud Infrastructure services under a single umbrella contract.

- Oracle's **Bring Your Own License**

program enables you to apply your on-premises software licenses to equivalent Oracle services in the cloud.

These popular programs alleviate cloud adoption challenges by simplifying the way your organization purchases and consumes cloud services.



Oracle Blockchain Platform

Oracle Blockchain Platform provides customers with a development platform for building their own networks. It can quickly integrate with Oracle SaaS and third-party apps, as well as other Oracle Cloud Platform services or other blockchain networks. Plus, it enables users to provision blockchain networks, join other organizations,

and deploy and run smart contracts to update and query a shared ledger. Oracle's blockchain platform leverages advanced technology, along with the company's decades of experience across industries and its extensive partner ecosystem, to enable customers to conduct trusted transactions among suppliers, banks, and other trade partners.

"As a company dedicated to making business-to-business payments and supply chain finance secure, frictionless, and ubiquitous using blockchain, we are able to significantly accelerate the time to onboard corporations, their suppliers and banks, by using Oracle's blockchain platform."

Amit Baid, CEO, TradeFin

Cloud Essentials

Learn more about [Oracle Blockchain Platform](#), and find out what sets Oracle apart from other cloud providers. Try Oracle Cloud today. Go to oracle.com/tryit.

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The Oracle Cloud logo, featuring the word "ORACLE" in a bold, white, sans-serif font with a registered trademark symbol, and the word "Cloud" in a smaller, white, sans-serif font below it. The background of the logo area is a photograph of a large cargo ship at sea during a sunset or sunrise, with a warm, golden glow over the water and sky.