Forbes
2021 BLOCKCHAIN
50

Oracle Blockchain Platform Enhancements to Hyperledger Fabric

Making enterprise blockchain easier and simpler to adopt

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Oracle Database R&D

Agenda

1. Oracle Blockchain Offerings
2. Customer Adoption & Partner Solutions Momentum
3. Latest Updates on Oracle Blockchain Platform
4. Q&A

Oracle's Vision for Enterprise Blockchain

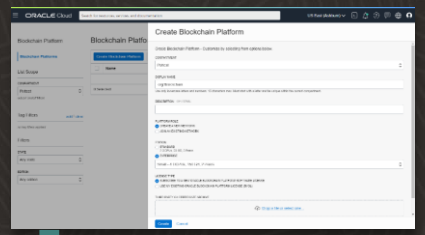
Blockchain can enable *rapid development* of **business & organizational networks** and *significant optimization* of existing networks via transparent, consensus-based trusted transactions maintaining single source of truth between independent parties without the need for intermediaries.

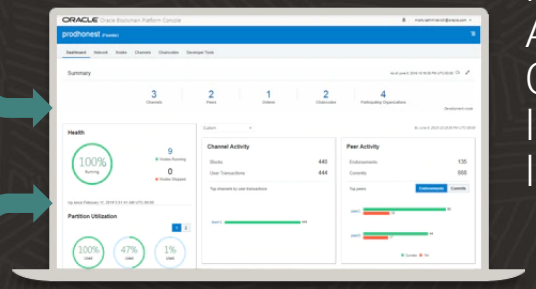
Market Strategy and Offerings

- Make blockchain adoption *easy* and *quick* for enterprises, a go-to platform for enterprise blockchain developers with *superior developer experience*
- Provide market-leading *cloud* and *on-premises* offerings for both customers and developers who want to build their own solutions – **Oracle Blockchain Platform** based on *Hyperledger Fabric*.
- Embed blockchain in enterprise-ready solutions for business users – SaaS Applications – e.g., **Intelligent Track & Trace**.
- Leverage blockchain techniques in **Oracle Database's** Crypto-Secure

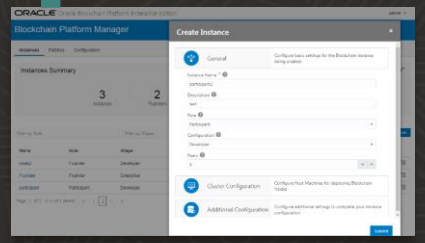
Oracle Blockchain Technology Overview

Cloud provisioning





Admin Console



On-prem provisioning

Blockchain Platform Cloud

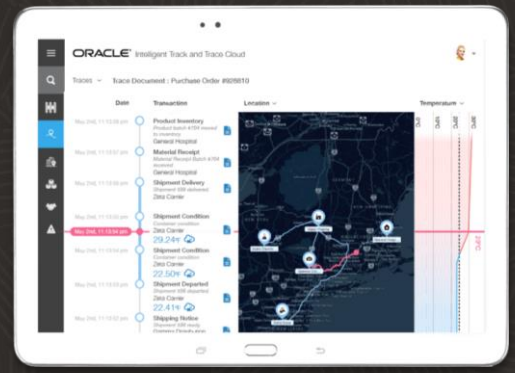
Managed Blockchain-as-a-Service based on Hyperledger Fabric
Highly Available, Resilient, Scalable
Build and deploy smart contracts in Go, Java, JavaScript with superior developer tools & OOTB tokenization
Manage Confidential Transactions
API Gateway & Bi-directional Events
Operations Tools/DevOps APIs
Integration with Oracle DB & Analytics
Interoperable, multi-cloud topology

Blockchain Platform EE (On-Prem)

Pre-assembled platform for on-prem
Simple install using virtualization
Same features & APIs as Cloud
Built on Docker containers
Same console Interface
Identity management using LDAP/AD

Intelligent Track and Trace

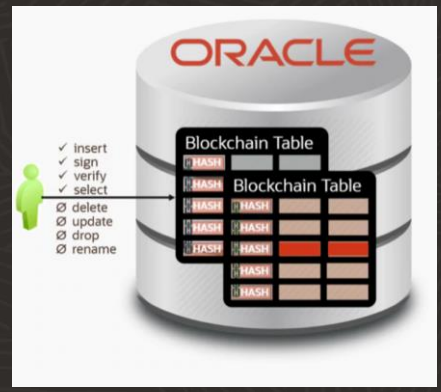
Prebuilt Business-ready SaaS
End-to-end supply chain visibility
Stakeholder on-boarding
Simulation Capability
Integrates data from *OTM Cloud, Mfg. Cloud, Procurement Cloud, Inventory Mgmt. Cloud, IoT Fleet Monitoring Cloud*
Oracle Integration Adapter for 3rd party and on-premises apps



Users can track, trace, and monitor transactions and their associated assets, items, and documents.

Database Blockchain Tables

Insert-only DB Tables
Cryptographic hash-chained rows
Tamper-proof & verifiable
Optional user signatures and DB-signed digest
Standard DB access: SQL, PL/SQL, JDBC, etc. and tools
Protect centralized ledgers against user or admin fraud



Oracle Blockchain Platform | Cloud Service

Comprehensive, production-ready BaaS for enterprise applications

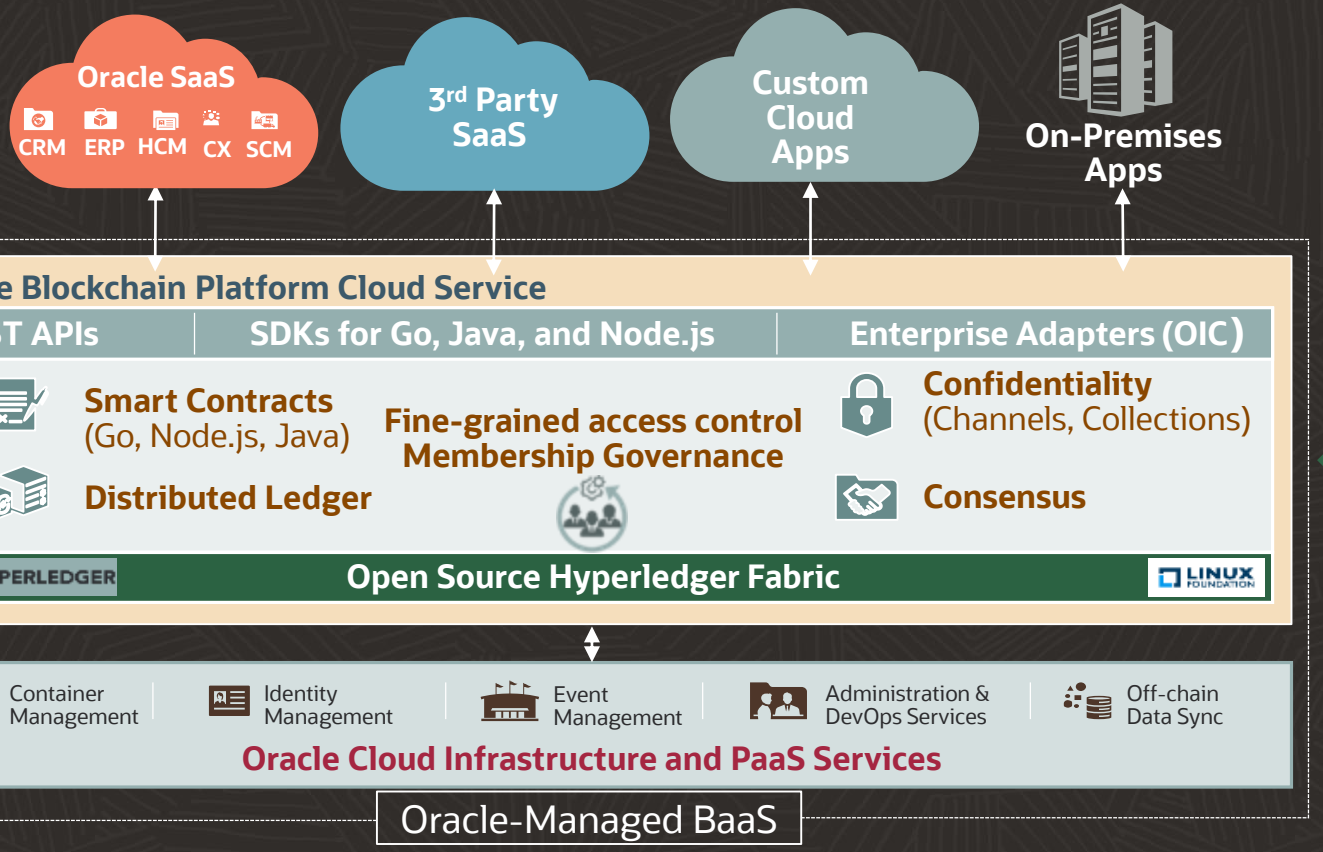
Pre-assembled

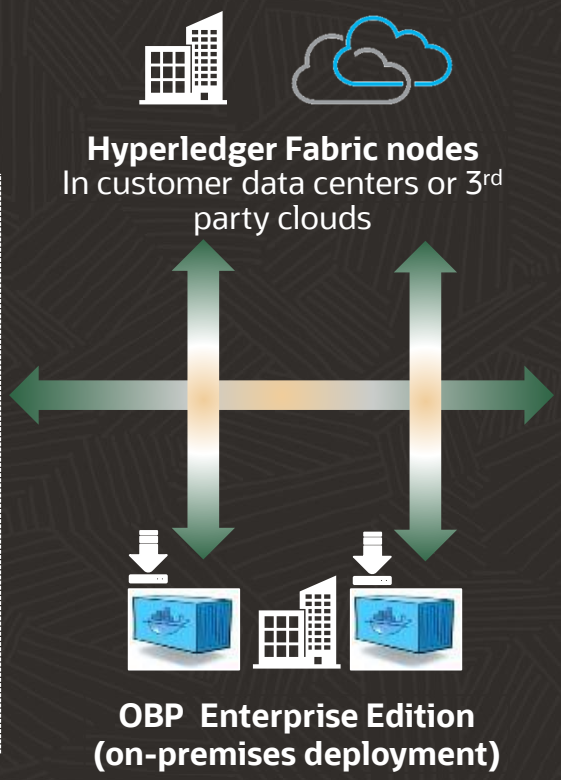
Open

Plug and play integrations

Enterprise-grade

Automated DevOps

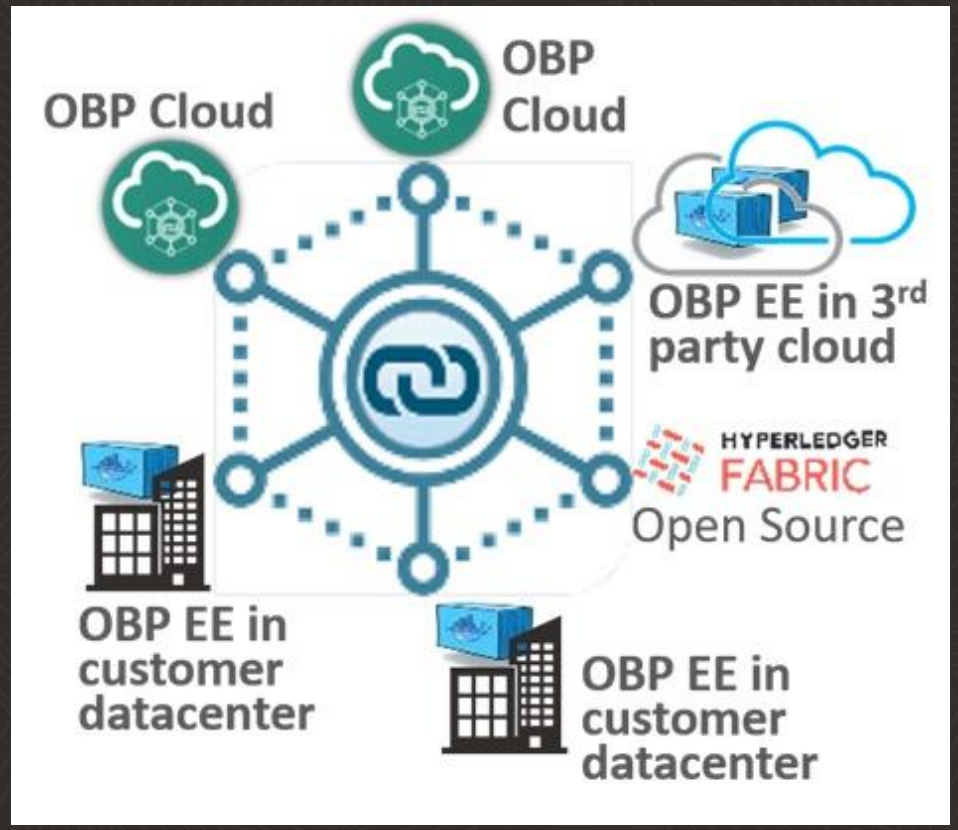




Oracle Blockchain Platform | Enterprise Edition

For customers who operate in industries and countries with data sovereignty or data residency requirements that prevent them from deploying on Oracle Cloud

- Deploy Oracle Blockchain on-premises
  - Choice of virtualization platforms: VMware, OLVM, Virtual Box
  - Enterprise-grade with HA and Dynamic Scale-up/Scale-out
- Create Blockchain network with a few clicks
  - Fully pre-assembled with Hyperledger Fabric 1.4, Blockchain Platform Manager, Operations Console, API/REST Proxy, LDAP/OID/OUD/AD integration
- Feature parity with Blockchain Cloud
  - Same APIs & portability of applications
- Support for hybrid, multi-cloud networks
  - Oracle Cloud, On-Premise, 3rd party Blockchains using Hyperledger Fabric



Oracle Makes Blockchain Easy

With OBP users have quickly gone from zero to a production system

Easy-to-Deploy

Pre-assembled: automatic provisioning of hardened blockchain infrastructure & all of its underlying dependencies. And business-ready SaaS Apps.

Easy-to-Integrate with back-office SORs

REST APIs, client SDKs, and 50+ enterprise adapters to integrate with Oracle and 3rd party applications (cloud and on-premises.)

Easy-to-Secure

Built-in identity management, membership management, and on-chain access control for fine-grained ACLs.

Easy-to-Monitor and Manage

Best-in-class admin console & tooling, extensive config. & DevOps REST APIs.

Enterprise-grade HA & lifecycle mgmt. Unique integration of analytics via rich history DB.

Easy-to-Add New Members On-Prem and On the Cloud

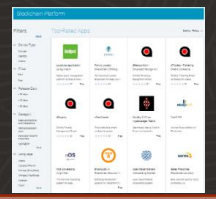
Flexible topologies for multi-cloud, hybrid, and on-prem deployment needs.

Full interop. with 3rd party HLF solutions for heterogeneous networks.

Oracle Makes Blockchain Easy

Partner solutions and superior developer experience help to speed up time-to-value

Blockchain Applications



Growing Portfolio of Industry Solutions

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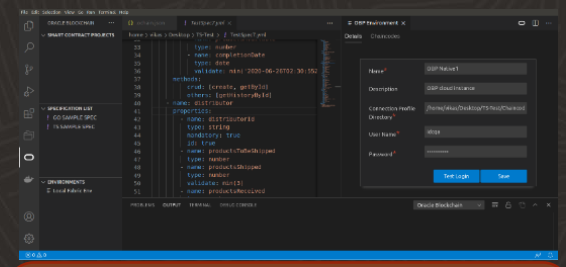

Low-code Dev Tooling for Custom Applications

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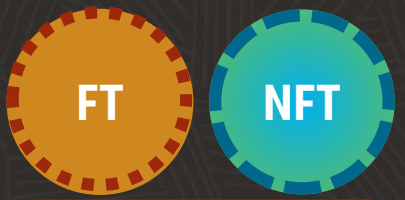


Built-in Tokenization

Blockchain App Builder for OBP

Can automatically generate smart contracts from declarative specs and aids in development, testing, deployment. Now includes Fungible Token (FT – like ERC-20), and soon Non-Fungible Tokens (NFTs).

Production-Ready Blockchain Platform

- Easy-to-Deploy
- Easy-to-Integrate with back-office SORs
- Easy-to-Secure
- Easy-to-Run, Monitor and Manage in Operations
- Easy-to-Add New Members On-Prem and In the Cloud

Blockchain App Builder for Oracle Blockchain Platform

Automatic Chaincode Generation and Lifecycle Tools for Testing & Deployment

Scaffold Project, Generate Code

Add Custom Method Implementations

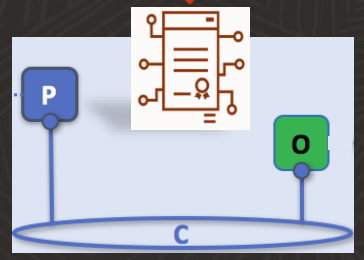
Deploy Smart Contract Locally

Test & Debug Smart Contract

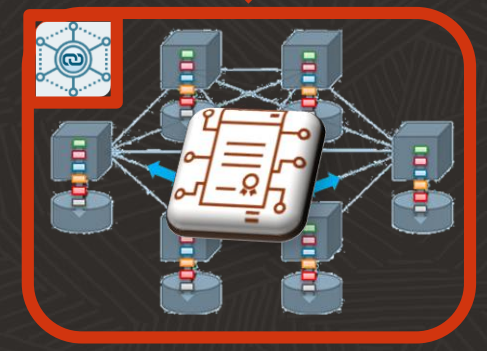
Package & Deploy Smart Contract to OBP

Specification File

Smart Contract Project & Code



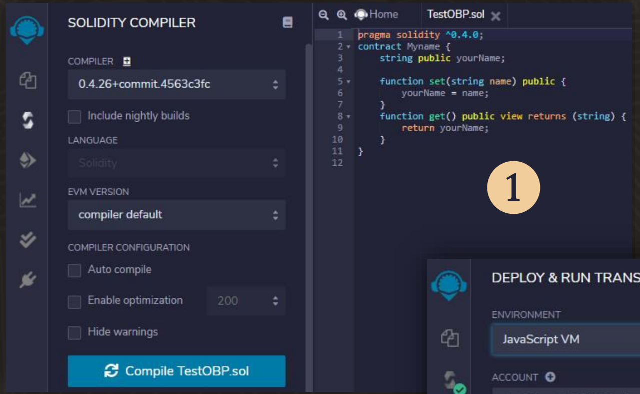
Smart Contract on Local Fabric

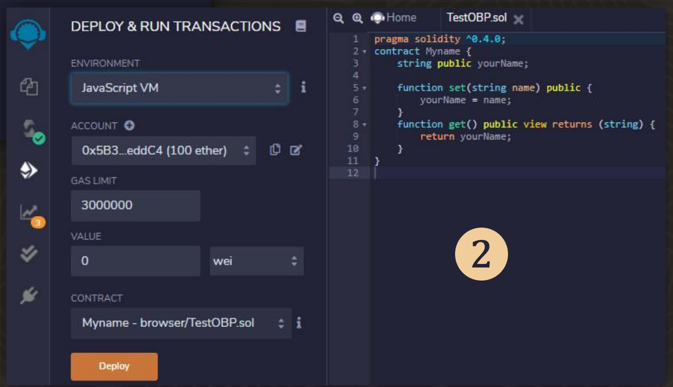


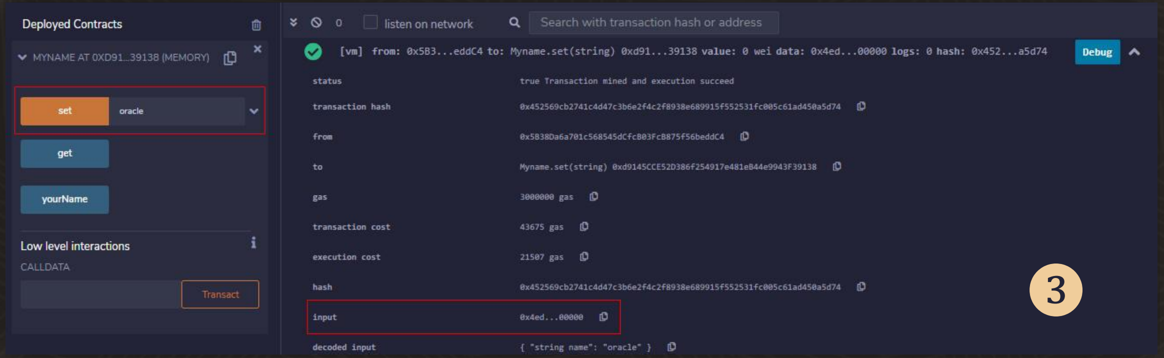
Smart Contract Deployed on OBP

Re-use Ethereum Solidity Smart Contracts on OBP

- Set up the EVM chaincode zip file and deploy it on OBP
- Create and Compile Your Solidity Smart Contract, e.g., using Remix IDE:
  https://remix.ethereum.org/
  - You can import existing smart contracts into Remix
  - Deploy smart contract using Remix
- Invoke Smart Contract







- Can also invoke using Oracle Blockchain REST API
  - --data-raw '{"chaincode":"<chaincodename>","args":["<contractaddress>","<setfunctionexecutionhash>"]}'

```
curl -L -X POST 'https://<hostname>:7443/restproxy/api/v2/channels/<channelname>/transactions' -H 'Authorization: Basic dXNlcm5hbWU6cGFzc3dvcmQ=' -H 'Content-Type: application/json' \
--data-raw '{"chaincode":"soliditycc","args":["66b92979bb66d645371b3247177e4b2513cb9834","4ed3885e00000000000000000000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000000000000000000066f7261636c650000000000000000000000000000000000000000000000000000"]}'
```


OBP Interoperability – *"Blockchain is a Team Sport"*

Single Ledger/Multi-Vendor or Multi-Cloud

- Interoperability of OBP and open source Hyperledger Fabric nodes, or HLF nodes from other vendors
- Documented, proven in production by MiPasa.org – read the blog about building a blockchain powered by Oracle, IBM, and MS Azure nodes
- CargoSmart successfully tested inteop with AliCloud BaaS
- OBP EE can be deployed in 3rd party IaaS clouds

3rd Party Smart Contract Frameworks on OBP

- DAML smart contracts built using Digital Asset's DAML tools using OBP as their ledger
- Solidity smart contracts built for Ethereum can be run using Solidity EVM from HL Burrows

Cross-ledger Transaction Integration

- OverLedger solution from *Quant Networks* available for OBP and deployed in OCI. Middleware that enables developers to write clients that interop across OBP, Corda, Quorum, Ethereum, Ripple, Bitcoin, Stellar, IOTA, EOS.
- Sample scenarios:
  - Dual DLT Logging (e.g., confirming OBP txn on public blockchain)
  - Cross DLT Asset Ownership Swap with cancellation and rollbacks
  - Linking B2B transactions and payments (e.g., PO/Invoice matching on one DLT and issuing payment on a different DLT, with settlement confirmation to the original DLT)

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Examples of Production Apps on Oracle Blockchain Platform

AJIB Arab Jordan Investment Bank

Cross-border funds transfer for same day funds availability

sydema SYSTEMS DEVELOPMENT MANAGEMENT

Non-performing loans marketplace

البنك الأهلي الأردني Jordan Ahli Bank أهلي Jordan Ahli Bank

e-KYC solution for bank customer onboarding & ongoing updates

TraSion

Retail cards wallet for the unbanked

eMcREY

Point-of-Sales merchants eKYC and on-boarding

KOINEARTH HINDALCO ADITYA BIRLA GROUP

B2B platform for inventory visibility, SLA enforcement, geo-origin and authenticity, and invoice financing

EVERLEDGER

Diamonds traceability from mining to Retail

Abbott

COVID-19 immutable test results reporting to HHS

SIAE DALLA PARTE DI CHI CREA

Managing intellectual property rights of authors & representation contracts

CANO

Leather sourcing and shoemaker traceability for retail footwear chain

myElth

Consumer-driven Healthcare Providers & Payers Ecosystem

正保远程教育 China Distance Education Holdings

Diploma/Continuous education certificate tracking

GeTS OTB Global eTrade Services

Country of Origin certificates verification across ASEAN & China

CargoSmart Global Shipping Business Network

Maritime shipping documentation & logistic events tracking

Certified Origins

Extra Virgin Italian Olive Oil provenance & distribution tracking

Circulor

Cobalt tracing for Volvo Cars EV batteries with CATL, and their extended multi-tier suppliers from mining and recycling

DECATHLON SPORT FOR ALL | ALL FOR SPORT

Loyalty system for users and sports clubs to track event points and buy merchandise

tracelabs SMART AGRI HUBS

Milk farmers' payments calculated using verified traceability and laboratory data

Links to Case Studies and Blog Posts

Growing Catalog of Partner Industry Solutions on OBP

BFSI

sydema

Non-performing Loans Marketplace

NEUROsoft

Invoice Factoring & Reconciliation

norbloc

Bank e-KYC

Digital Asset

DAML Drivers for Oracle Blockchain

AHLI FINTECH www.ahlifintech.com

eKYC Solution for Instant Account Opening

ICS FS ICS FINANCIAL SYSTEMS LTD

Core banking connector

REPLY BLOCKCHAIN

Smart Parametric Insurance

eMcREY

Point-of-Sales On-boarding

EastNets financial integrity delivered

Secure Real-time AML Watch List Updates

SECURUS

Insurance Back-office Payments and Reconciliation

Mfg. & Field Svc.

Circulor

Conflict minerals & sustainable supply chain traceability

Tech Mahindra

Aviation Maintenance Records Management

Deloitte.

Intercompany Billing Reconciliation & Settlement

Digital bio seal and tax stamp tracking

KOINEARTH

[markets]^{N} B2B platform for inventory visibility, SLA enforcement, geo-origin and authenticity, and invoice financing

Retail

seres

Franchise networks

retraced

Sustainable Fashion

Dhimahi

Sports Merchandise Loyalty Solution

origintrail

Trusted supply chain exchanges

Food/Ag./CPG

Infosys

Sustainable Agriculture

Cognizant

Sustainable Organic Farming

VERSION 1

Cattle Genome Tracking

Logistics/Transport.

CargoSmart

Maritime shipping documentation & logistic events tracking

PRAVICI

Multi-brand Loyalty Systems & Mobility

Education

VOTTUN

Education/Achievement Credentials

N2N

EduChain—a personal certification ledger for Higher Ed

Healthcare

myElth

Consumer-driven Healthcare Providers & Payers Ecosystem

HEALTHSYNC

Remote Patient Vitals Monitoring

Media & Entertainment

Xoda

Low-code tokenization platform & NFT mkt-place

Contrus GROUP

Advanced tokenization framework & NFT collectibles exchange

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Oracle Blockchain Platform Cloud Service

Quick, comprehensive, production-ready for enterprise applications

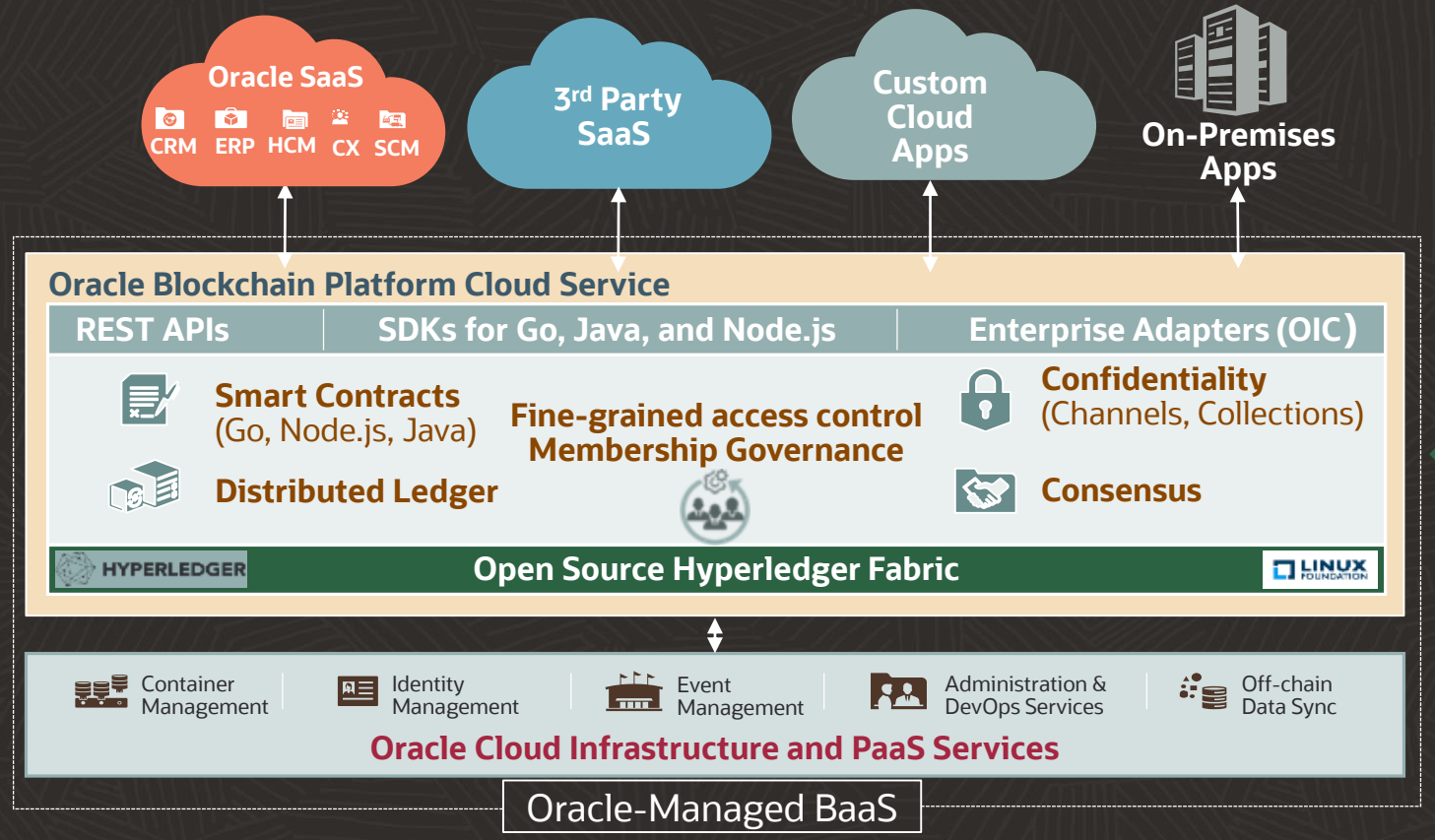
Pre-assembled

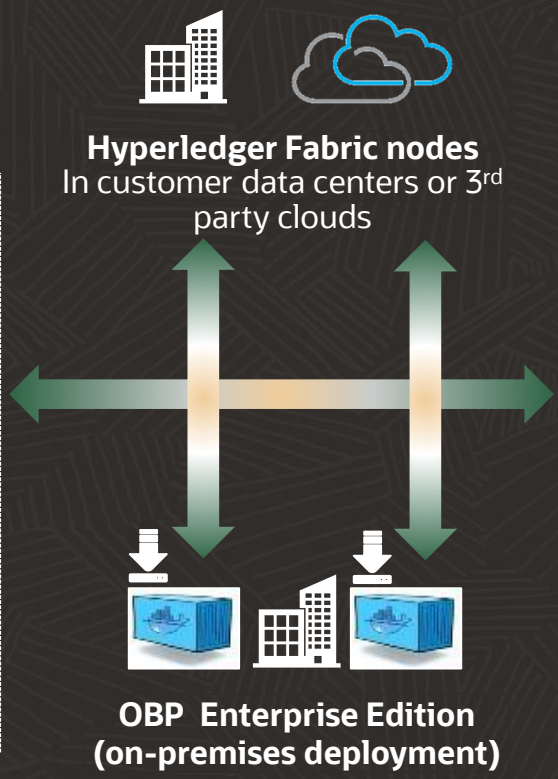
Open

Plug and play integrations

Enterprise-grade

Automated DevOps





Major OBP Added Value In and Around Hyperledger Fabric

Provisioning & Integration in Oracle Cloud

- Pre-assembled, template-based provisioning
- Incorporates infrastructure dependencies via Oracle Cloud Services (managed containers, VMs, identity management, block storage)
- Automatic redundancy and replication for HA/DR

Oracle Managed Service

- Oracle operations monitoring
- Managed, zero downtime patching/updates
- Embedded configuration backups

IdM Integration (IDCS or LDAP/OUD/MS AD)

- User/role management with Federation
- Authentication for BCS Console, REST Proxy, CA

Extended Security and Auditability

- On-chain fine-grained access control and chaincode API
- On-chain audit log of configuration changes
- Crypto-hash integrity validation utility and audit API

Bi-directional API Gateway w/Event Subscription

- Supports rich set of Fabric APIs via REST calls
- Enables synchronous invocation as well as events/callbacks and DevOps operations
- Simplifies integration & insulates apps from transaction flow changes

Management/Operations Console

- Automates many administration tasks
- Dynamic configuration with server restart
- Monitoring and troubleshooting

Low-code Blockchain App Builder Dev/Test Environment

- Scaffolding, local testing, automated deployment to raise productivity
- Auto-generation of chaincodes from declarative specifications
- Token support with auto-generated TTF-based token lifecycle

Ledger DB K/V store replaced by Berkeley DB

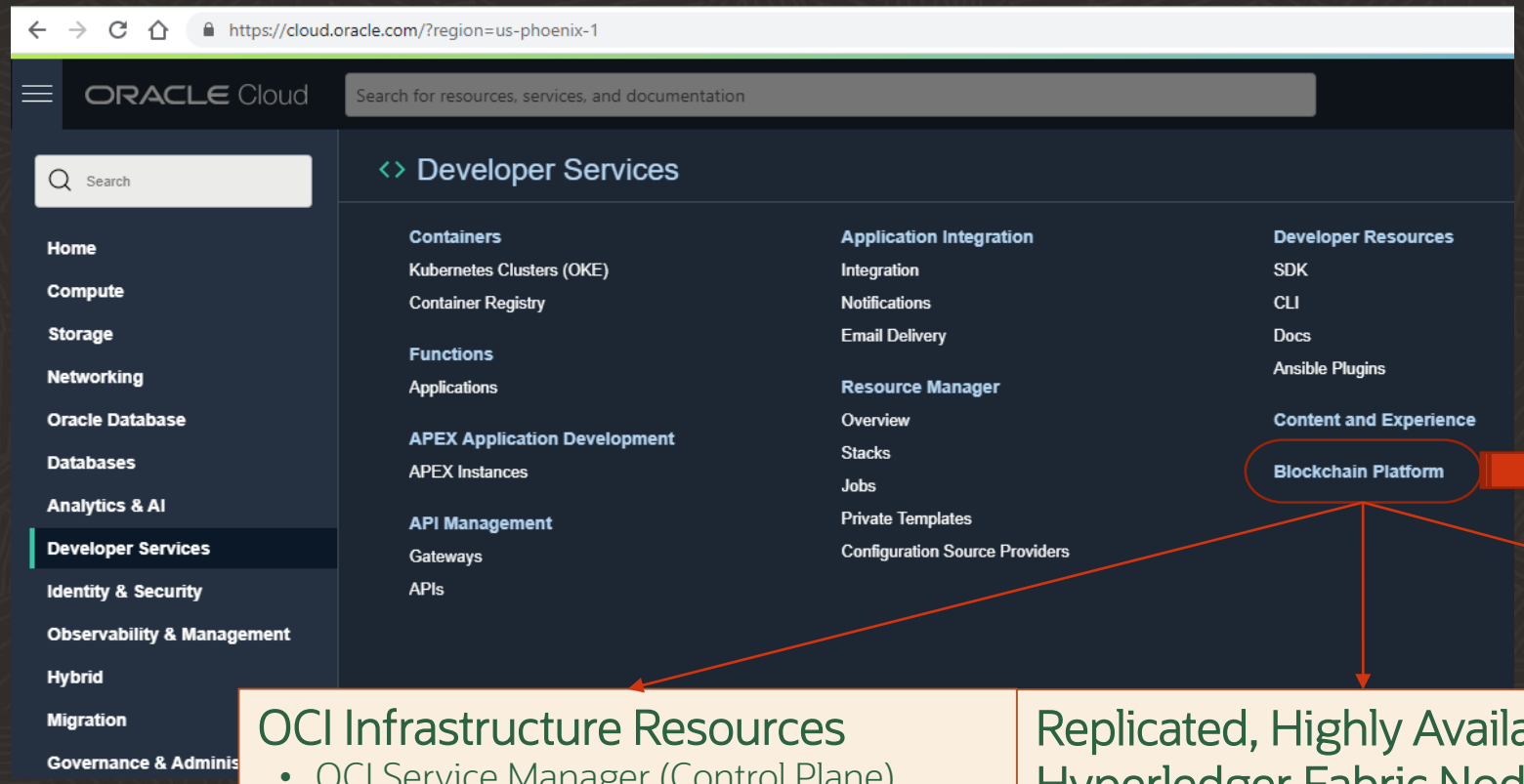
- SQL-based rich query support
- Couch DB rich query support with up to 10X faster performance

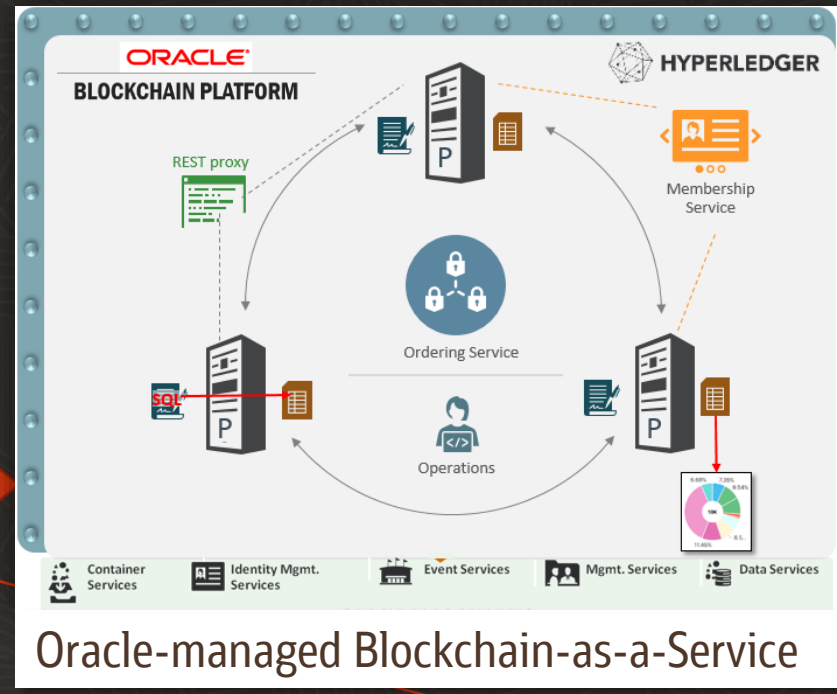
Rich history database w/data pump to Oracle DB

- Shadows transaction history to Oracle DB (ADB/DBCS) and feeds Oracle Analytics/OBI or 3rd party tools

Simple Provisioning of Blockchain Cloud Platform Instance

Everything You Need to Get Going in a Managed Service





Oracle-managed Blockchain-as-a-Service

OCI Infrastructure Resources

- OCI Service Manager (Control Plane)
- Manager VMs (range of shapes)
- Block storage
- Load balancer service (LBR)
- Web tier security service (WTSS)
- Metadata repository for config. data
- Oracle Secrets for private keys

Replicated, Highly Available Hyperledger Fabric Nodes

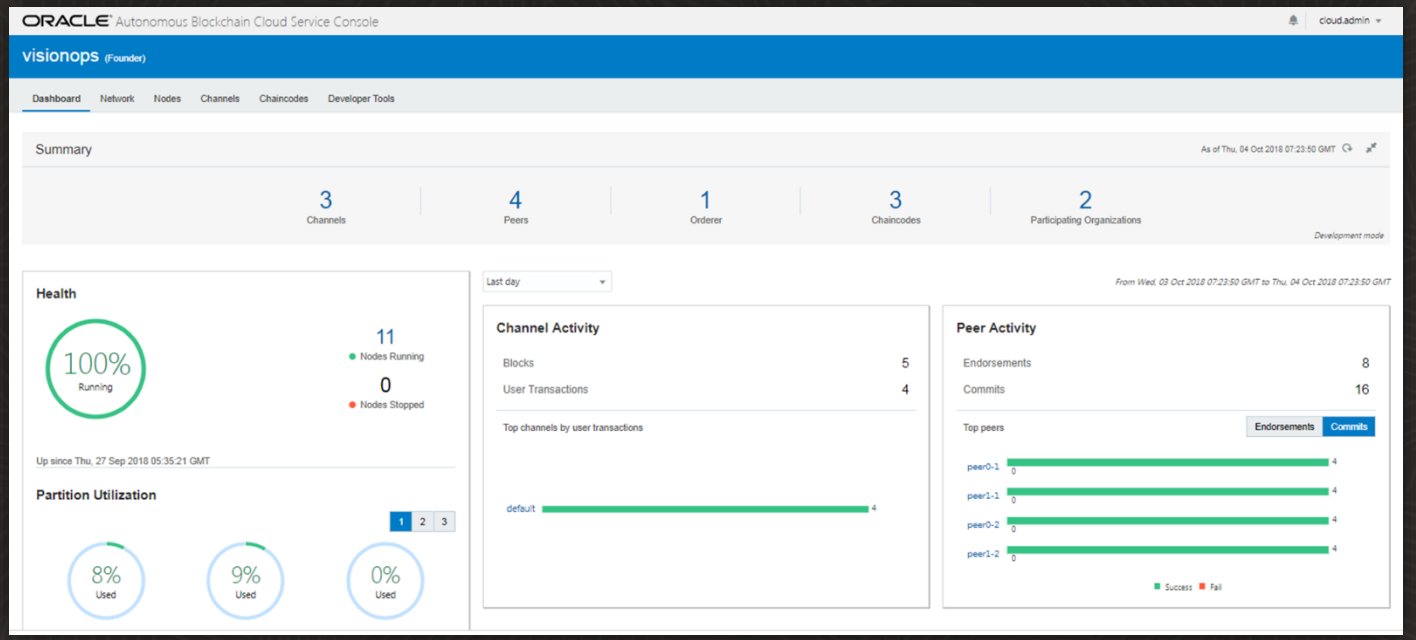
- Peer nodes (up to 16 per instance)
- Ordering nodes with unrestricted channels
- Membership service (fabric-ca)
- Chaincode build & runtime containers

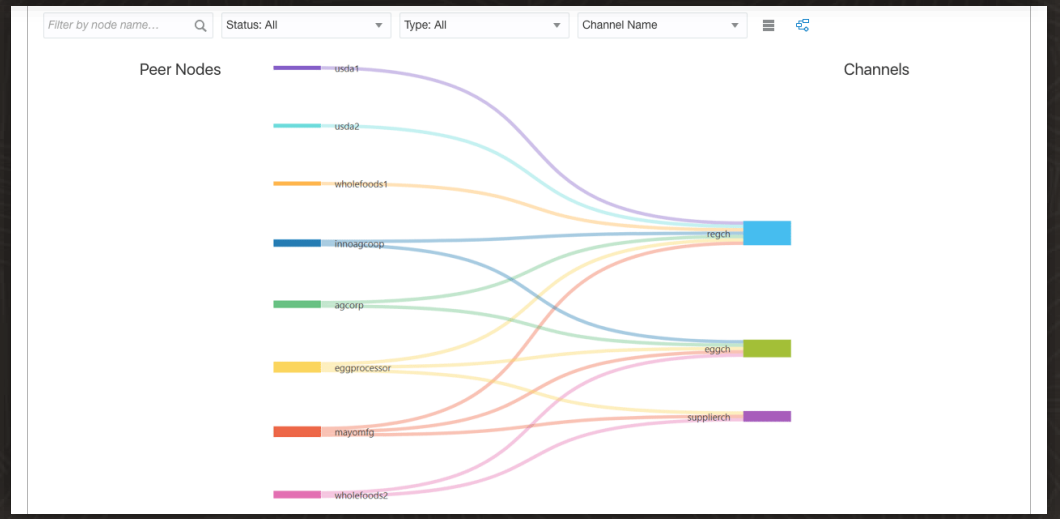
Oracle add-on components

- Administration/Operations Console: Web UI & APIs
- API GW w/REST Proxies & Events
- Integration with IDCS Identity mgmt.
- Dynamic scale-up/scale-out wizard
- Management service (Oracle Ops)

OBP Admin Console: Cloud and On-Prem

- Admin/Config tasks
  - Bring up/down blockchain network and manage nodes (peers, orderers, CA)
  - Configure network channels and members
  - Add nodes (peers), VMs, etc.
  - Edit channel policies & ACLs
- Smart contracts LCM
  - Blockchain App Builder
  - Deploy/Instantiate/Expose/Upgrade
  - Set endorsement policies
  - Define private data collections
  - Map transient data
- Monitoring & troubleshooting
  - View network topology
  - Monitor status of peers, orderers and other network components
  - Monitor operations metrics
  - View ledgers blocks & drill down to transactions





Rich Data SQL Queries in Smart Contracts and Faster Access

- Open source HLF provides two World State K/V stores
  - Level DB (Fast, but basic)
  - Couch DB (Supports rich queries, but slow and incomplete)
- OBP Uses SQLite on Berkeley DB (BDB) as World State
  - Record-level locking for greater concurrency of endorsements and commits
  - Much stronger rich query support (attribute-based queries in K/V store)
    - Enables use of SQL SELECTs to query the world state DB – 30-40% code savings
    - Enables aggregation functions to be done in the DB – big performance gain
    - But also supports CouchDB query syntax for compatibility
    - Results are embedded in merkle trees and, unlike Couch DB, verified at transaction commit time to avoid "phantom reads"
  - Rich query functionality of CouchDB with LevelDB performance (about 10X)

```
SELECT … FROM <state> st WHERE json_extract(valueJson, '$.docType') = 'vehiclePart' AND
json_extract(valueJson, '$.owner') = 'Detroit Auto' ORDER BY json_extract(valueJson, '$.owner')
```

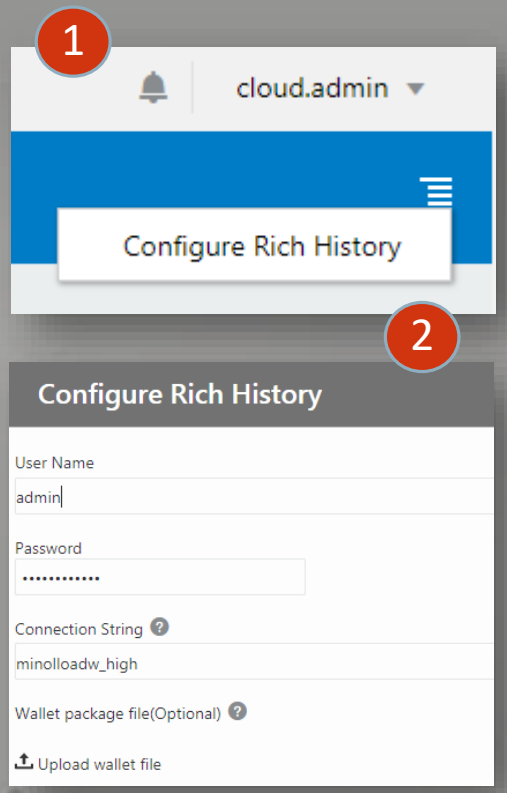
vs. 20-40 LOCs using CouchDB Query Language and Go/node code

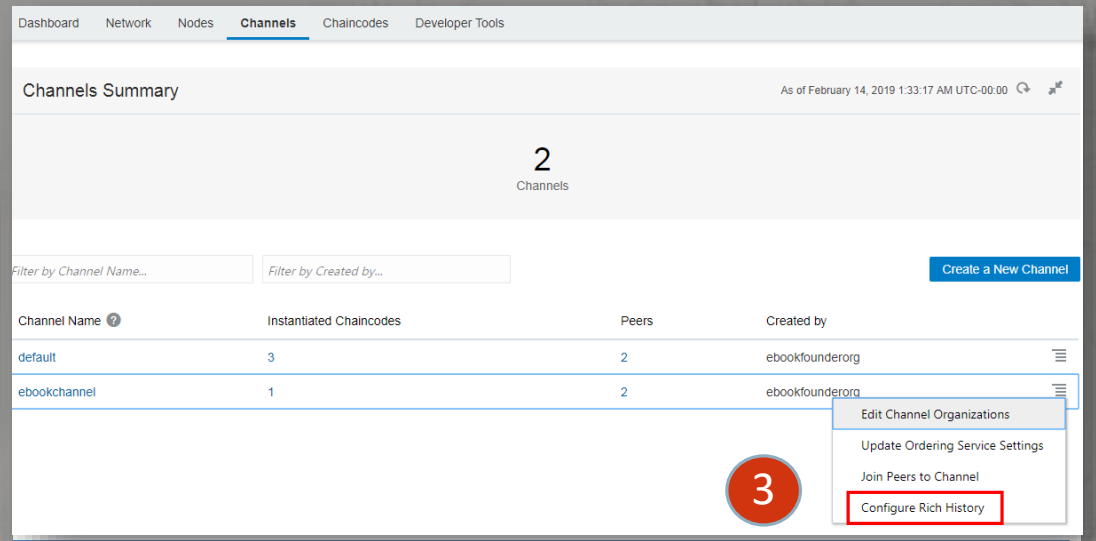
```
SELECT AVG(aCount) FROM (SELECT COUNT(*) AS aCount FROM
<state> st GROUP BY json_extract(st.valueJson, '$.owner'))
```

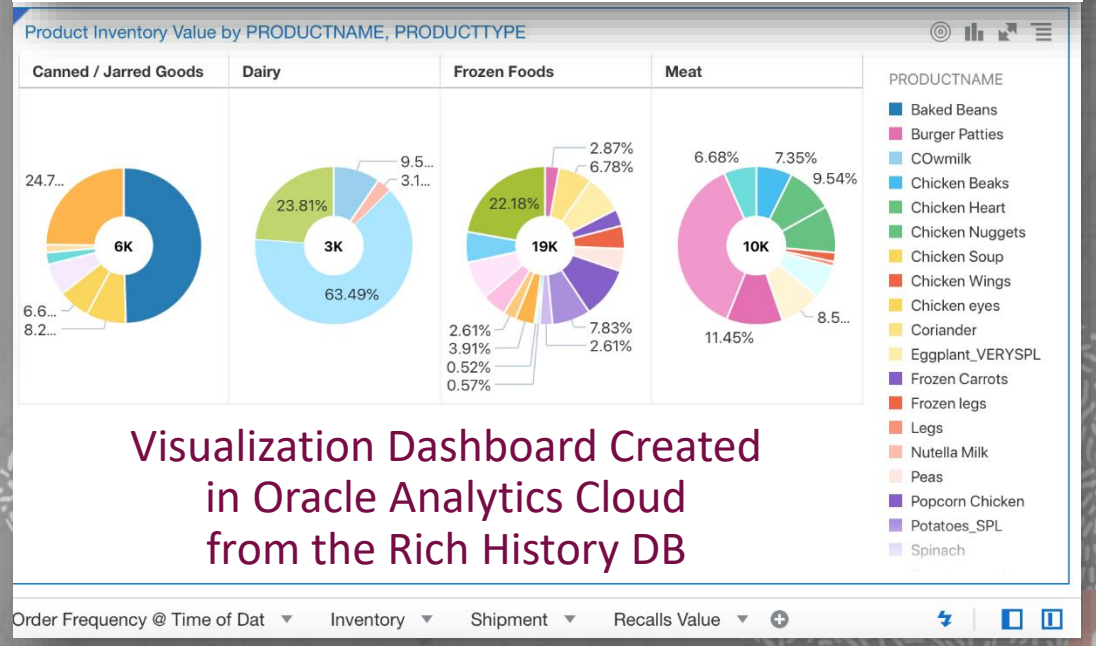
vs. N GetState() calls from Chaincode to Peer resulting in N network hops and a huge RWSet

Rich History DB for Analytics Integration

- OBP Defines RDBMS Schemas for Rich Data History
- In parallel with regular history DB updates, OBP updates (asynchronously) Oracle ADW/DBaaS for every transaction commit
- DB maintains rich data model using Oracle JSON functions
- Accessible for Analytics / BI reporting and interactive visualizations/dashboards, Data Warehouse, etc.
- Can also be used for transaction confirmations and high volume read access

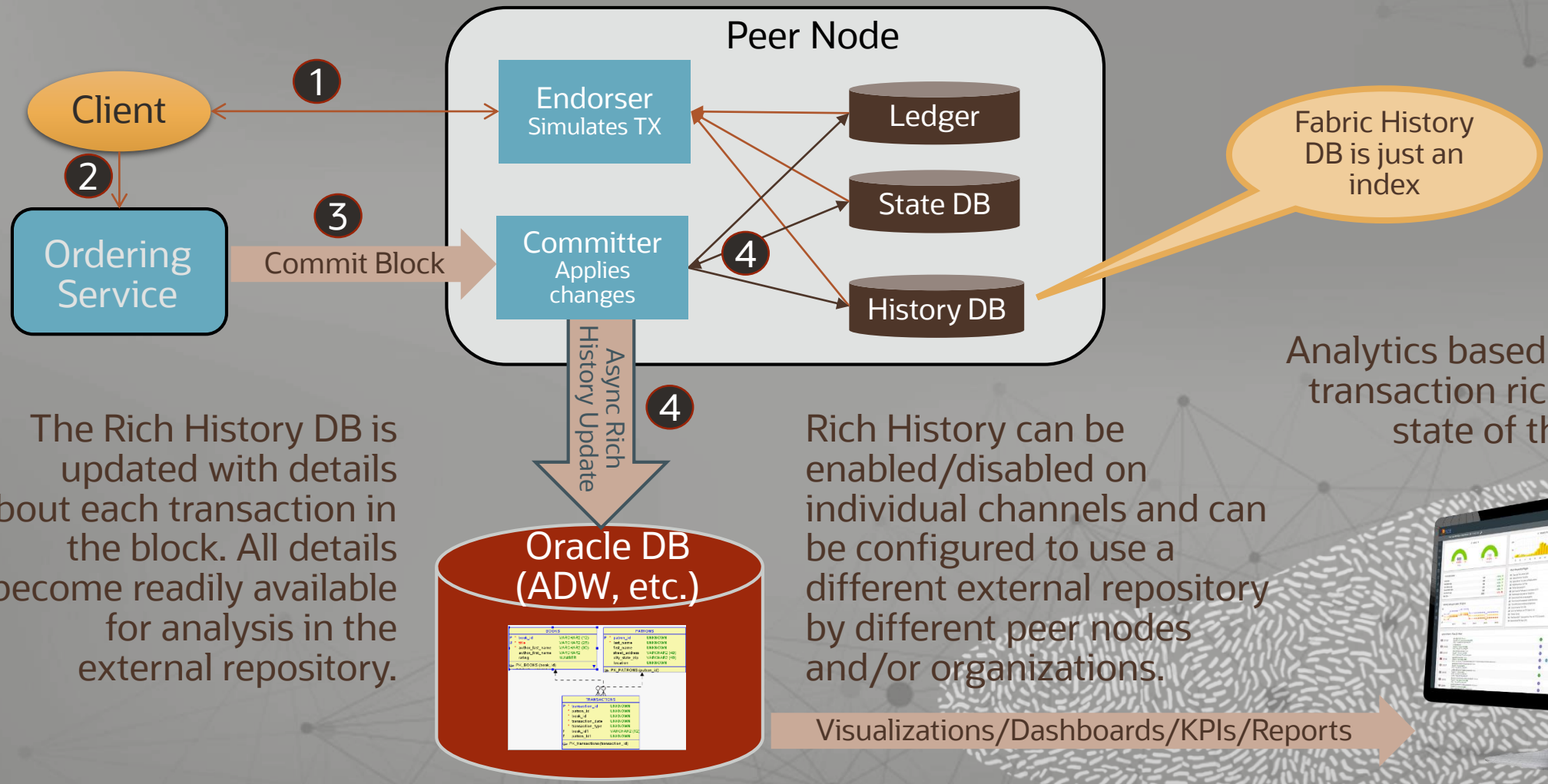






Visualization Dashboard Created in Oracle Analytics Cloud from the Rich History DB

Rich History Database Synchronization to Oracle DB



The Rich History DB is updated with details about each transaction in the block. All details become readily available for analysis in the external repository.

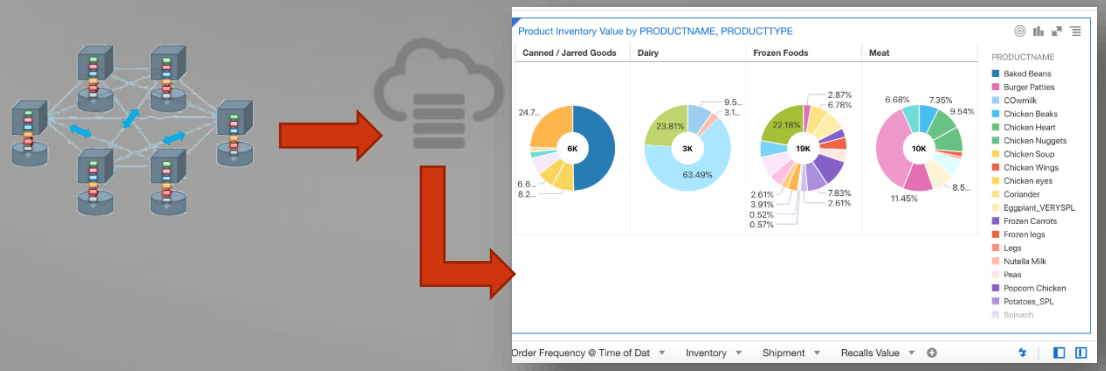
Rich History can be enabled/disabled on individual channels and can be configured to use a different external repository by different peer nodes and/or organizations.

Analytics based on Blockchain transaction rich history and state of the world

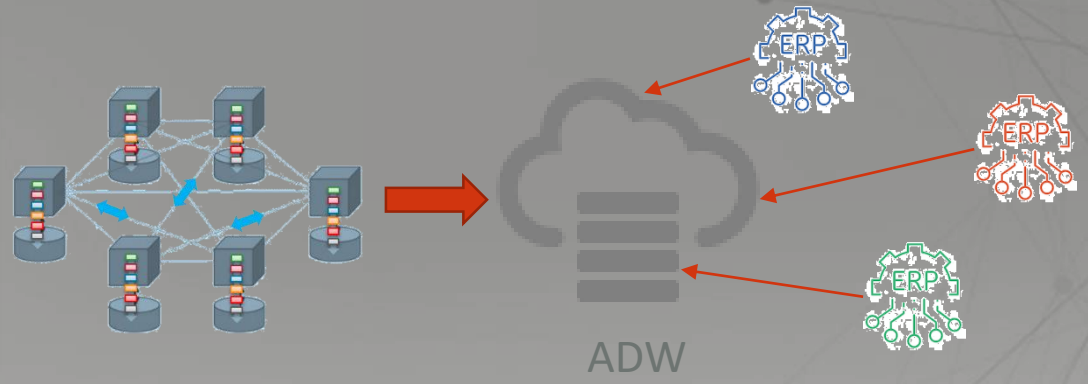
Visualizations/Dashboards/KPIs/Reports

Four Examples of Leveraging Blockchain Data in ADW

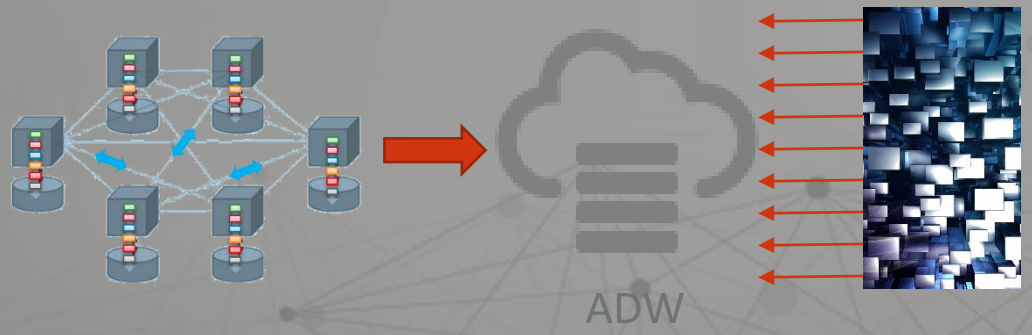
Analytics



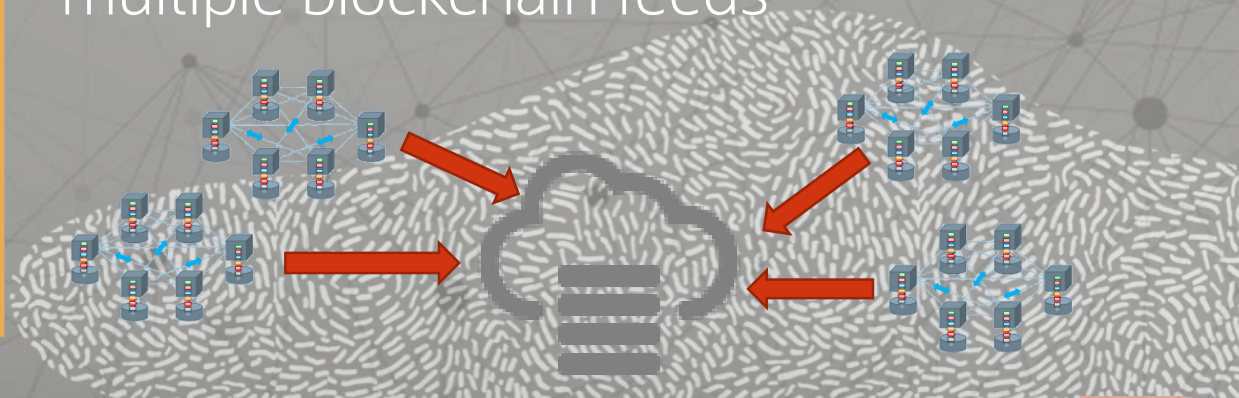
Consolidate blockchain & other data



High volume reads



Consolidation and analysis of multiple blockchain feeds



Solving Confidentiality/Privacy Challenge

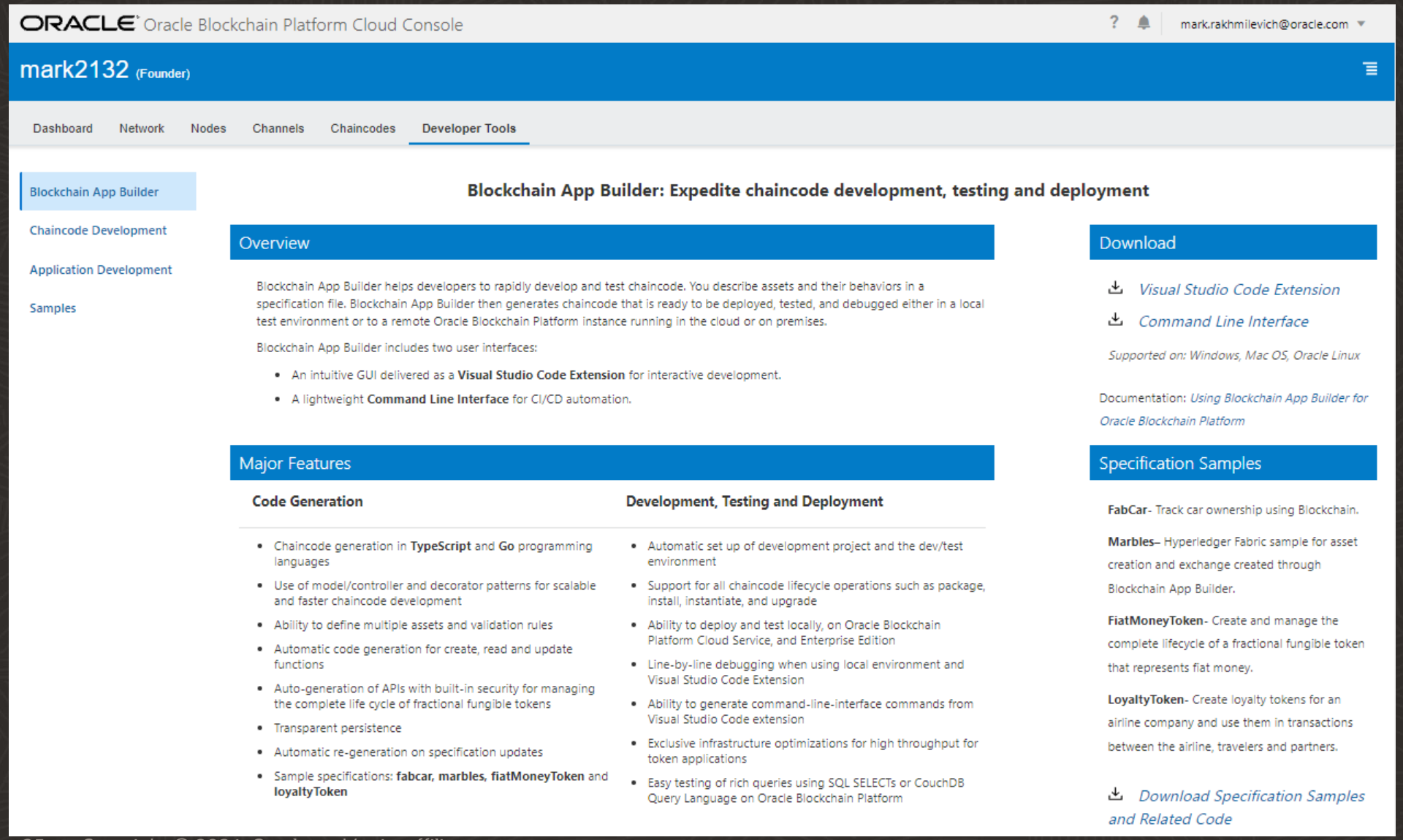
Challenge: Business confidentiality or regulatory privacy requirements in tension with transparent data sharing on blockchain. Existing HLF methods (channels, PDCs, ABAC) are not sufficiently flexible or dynamic.

Solution: On-chain fine-grain Access Control Lists (ACLs)

Oracle extends Fabric channel-based ACL concept to chaincode business logic

- Comprehensive ACL library allows defining:
  - Identity patterns (X.509 fields, OU, CN, etc.)
  - Groups of identity patterns
  - Resources – arbitrary entities (functions, data)
  - Access control lists (ACLs)
- Information stored in world state for persistence and auditability
- At chaincode deployment, allow users to init the list of resources and initial ACLs
- Enables chaincode to
  - Manage (add/update/delete) ACLs via transactions
  - Check and enforce access privileges during execution

Developer Tools and Blockchain App Builder Download



Unique Value of Oracle Blockchain for Enterprises

Productivity enhancing SQL rich data queries for enterprise developers writing smart contracts and faster performance using SQLite & Berkeley DB for world state repository

Easy data visualizations and reporting by streaming transaction updates to “rich history schema” in Oracle DB and integration with Oracle BI EE/Analytics Server

Simplified on-boarding of low-tech member organizations as clients without dependence on dedicated blockchain nodes for every member

Stronger confidentiality and privacy support with on-chain fine-grained Access Control Lists

On-request audit of blockchain integrity using API-driven verification of ledger blocks content and chained cryptographic hashes

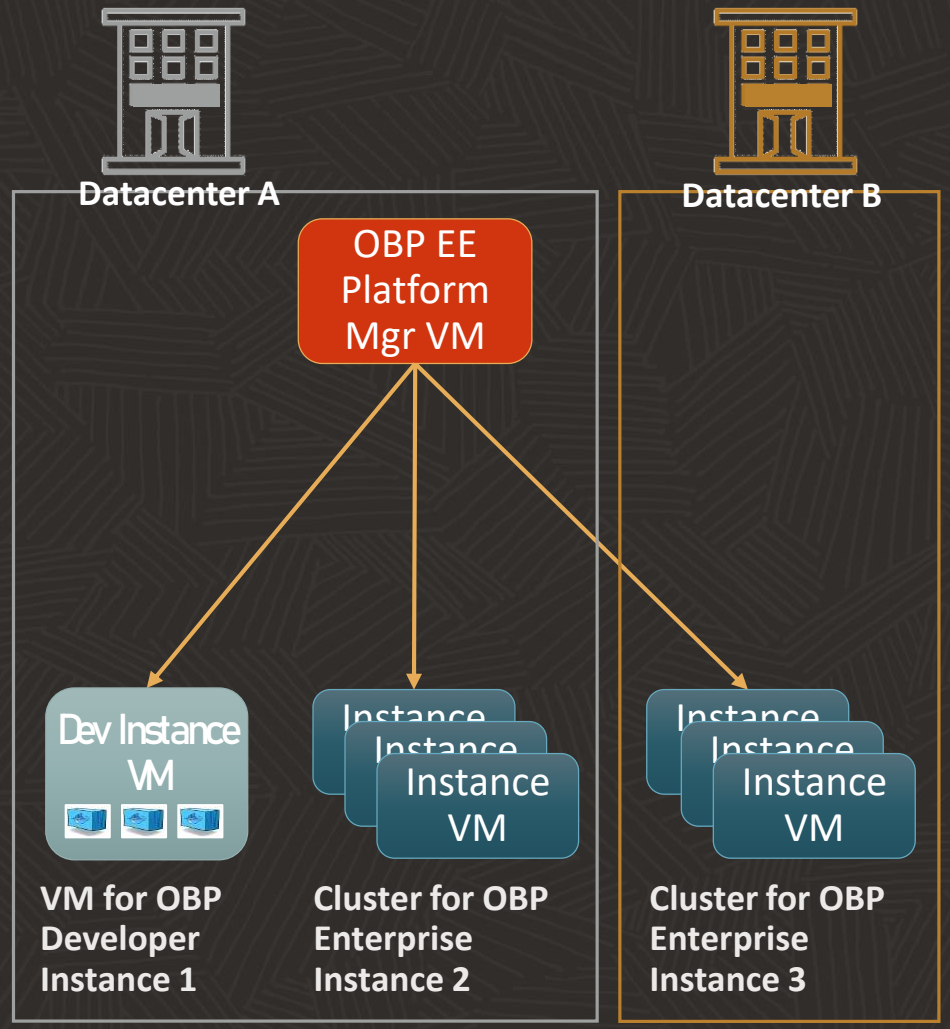
Bi-directional integration between blockchain & back-office applications using API gateway supporting REST API and Event-Driven Architecture

Flexible, Geo-redundant, Interoperable Blockchain Network Topologies to meet the multi-cloud, on-premises, and hybrid needs of diverse ecosystems & regulatory regimes

Deploying OBP Enterprise Edition

Pre-assembled Platform for Customer/3rd Party Datacenter Deployment

- Software Appliance w/Virtualization Options
  - Oracle VirtualBox 5.x or 6.0+
  - Oracle Linux KVM (Oracle Linux 7 with UEK Release 5)
  - VMware vSphere ESXi 6.7+
- Deployment Shapes
  - **Developer:** 1 orderer, single VM deployment topology
  - **Enterprise:** 3 orderers, 3+1 VM deployment topology
- Cluster Configuration for Enterprise
  - 3 VMs for Platform Components
  - 1 VM for Chaincode

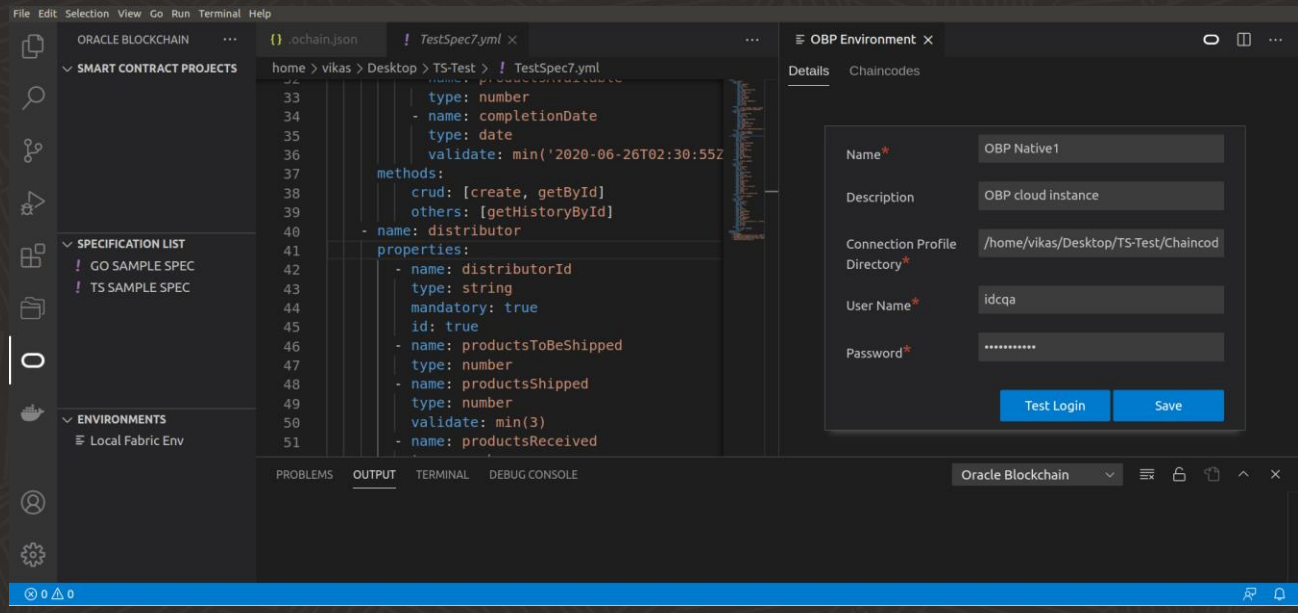


Blockchain App Builder

Expedite chaincode development, testing and deployment

Two User Interfaces

- Easy to use, intuitive GUI delivered as Visual Studio Code Extension for interactive development
- A lightweight Command Line Interface for power users and CI/CD automation



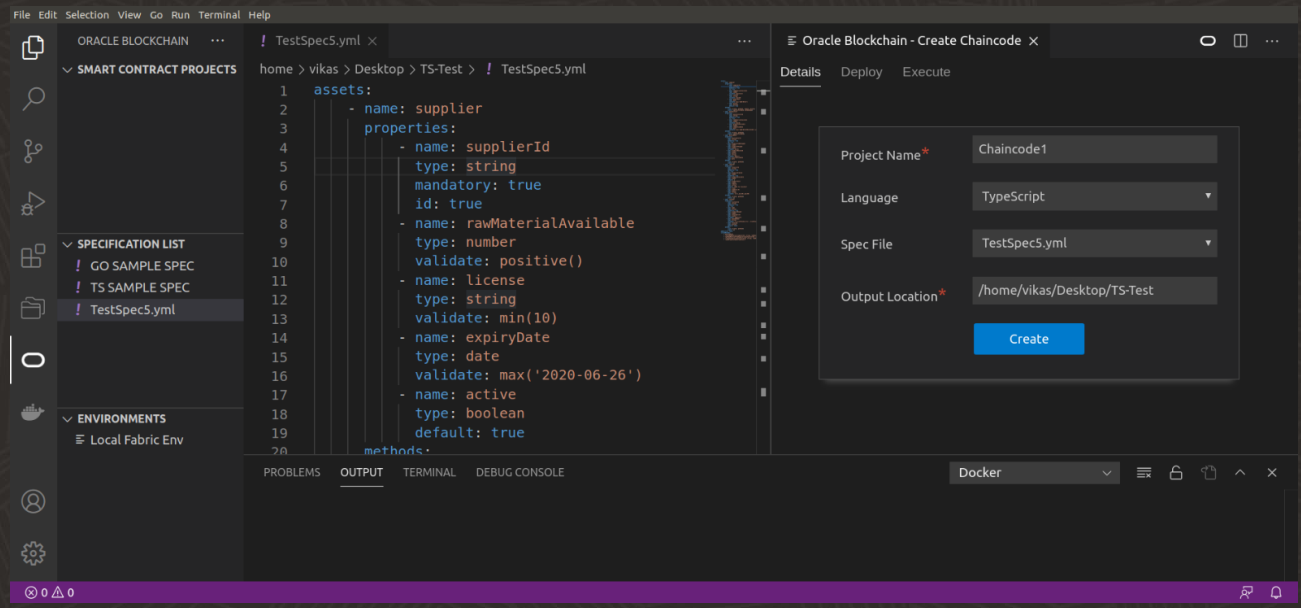
Dev, Test, and Deployment Lifecycle

- Scaffold a chaincode project using a spec file
- Auto deployment of local Hyperledger Fabric network
- Support for all chaincode lifecycle operations, such as package, install, instantiate, and upgrade
- Ability to deploy and test locally
- Line-by-line debugging when using local environment and Visual Studio Code Extension
- Deployment and test in remote OBP network (OBP Cloud Service or on-prem OBP Enterprise Edition)
- Easy testing of rich queries using SQL SELECTs or CouchDB Query Language

Blockchain App Builder
Low-code chaincode development

Automatic Code Generation

- Chaincode generation in TypeScript and Golang
- Use of model/controller and decorator patterns for scalability
- Can define multiple assets
- Can add field validation rules
- Automatic code generation for create, read, update, and delete (CRUD) functions
- Ability to add custom business logic
- Transparent persistence
- Automatic re-generation on specification updates
- Sample specifications: fabcar and marbles



Blockchain App Builder | Tokenization Support

Enterprise use cases

- Loyalty programs, royalty tracking, parts & document tracking, inventory finance, IP monetization via NFTs

No built-in token in Hyperledger Fabric

- Customers and partners have emulated ERC-20 (FT) or ERC-721 (NFT) via application chaincode
- Common building block for some applications

Extending App Builder to generate code & APIs from Token Taxonomy Framework (TTF)-derived token specifications

- Meta-model that defines base token type (e.g. Fungible), behaviors (e.g. Mintable, Transferable, Burnable) and custom properties (e.g., Exch. Rate)
- Currently available Fungible Tokens (FT) support, Non-Fungible Tokens (NFTs) are next

```
assets:
    - name: MyRedCoin
      type: token

      anatomy:
          type: fungible
          unit: fractional

      behaviour:
          - divisible:
                decimal: 2
          - mintable:
                max_mint_quantity: 1000
          - transferable
          - burnable
          - roles:
                minter_role_name: minter

      properties:
          - name: currency_name
            type: string

          - name: token_to_currency_ratio
            type: number

customMethods:
    - executeQuery
```

Blockchain App Builder | Generated Tokenization Framework

Token SDK

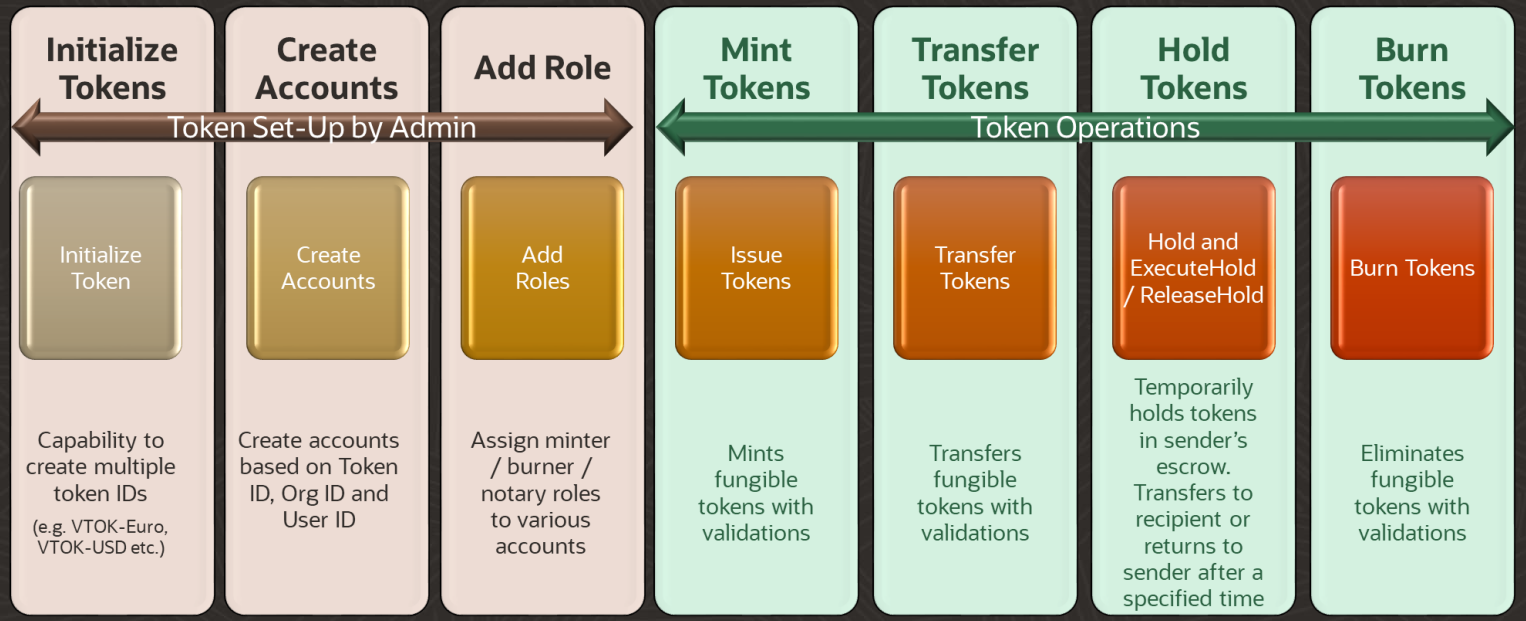
- Supports Token Taxonomy Framework standard behaviours like divisible, mintable, transferable, burnable, roles and holdable
- Supports account based system
- Can be readily used in any custom functions

Token Wrapper Functions

- 30+ functions for token lifecycle support
- Capability to pass org id and user id as parms
- Functions can be customized
- Embedded function-level security

Built-in Security

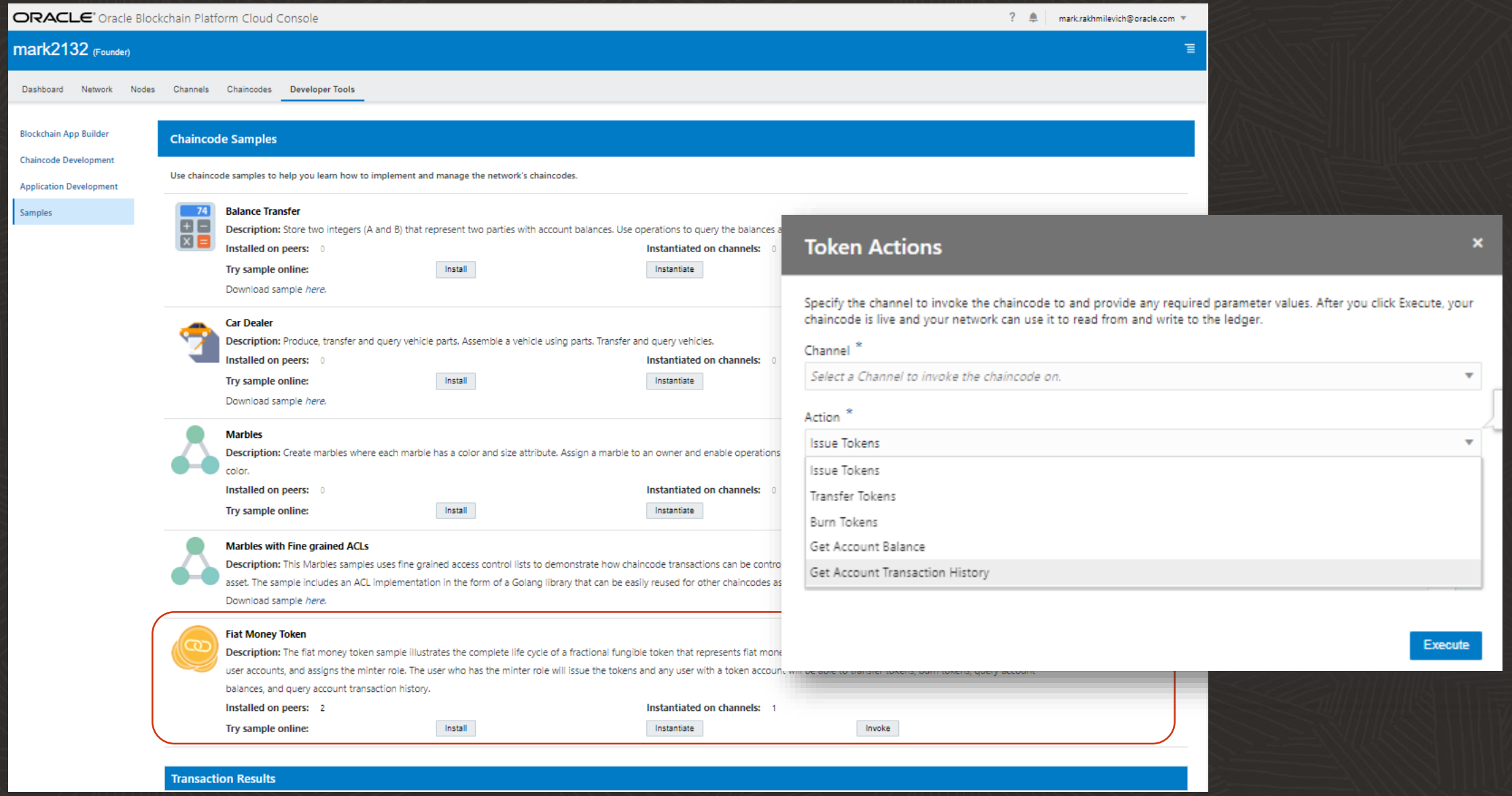
- Role-based security on token initialization and account creation
- Token roles support: Minter, burner & notary (escrow)
- Auto-identification of the caller in the function



Updated chaincode operation and commit/validation code

- Minimizes MVCC errors
- Changes numeric updates to deltas

Tokenization Chaincode Sample Included in OBP Console



Oracle Blockchain Platform – Roadmap Focus Areas

Development and Integration

- **Tokenization framework/APIs + IDE modeling leveraging Token Taxonomy Framework (TTF)**
  - Token modeling in **Blockchain App Builder** based on TTF base types, behaviors, and properties for FTs and NFTs
  - Code generation for all relevant token methods
  - Support on-chain fine grained ACLs
  - Support for transient map and private data collections
- Provide framework libraries/APIs + IDE modelling/low-code dev to simplify development for top use cases:
  - Provenance tracking
  - Asset tracking
  - Payments / settlements
  - Document exchanges
- Network Builder for Consortium Deployments
- OIC Integration Adapter
- Integration of Trusted Data Sources
- Rules engine based chaincode for business user friendly chaincode specs

Operations

- **Governance for consortia**
  - Adding members w/voting
  - Joining members on channels
  - Chaincode Deploy/Upgrade (HLF 2.x based lifecycle)
- **Consortium-wide mgmt. & monitoring**
- Simplified node joining across multi-vendor/multi-cloud networks
- Guaranteed event capture & delivery
- Access control for ledger browser transaction drill down
- Ability to run SQL queries from OBP console
- Ledger check-pointing/pruning

Fabric Network Infrastructure and Interoperability

- **Upgrade to HLF 2.2.x**
- **StateDB scaleout using Oracle Database**
- **Enhanced ordering service ops for**
  - Multiple ordering clusters
  - Non-Oracle Fabric nodes (open source & other vendors)
- **Fabric-to-Fabric network interop**
  - Cross-OBP-networks event subscriptions and call-backs (event on one chain can trigger txn on another chain)
  - Enable OBP peer to join channels in multiple Fabric networks and cross-invoke chaincodes to query data
- Ethereum interop
  - Custom Ethereum contract invocation via OBP event
  - Publishing OBP ledger hashes on public chains
- Interoperability with other blockchain frameworks
- Support for a validated BFT Ordering consensus protocol

This is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decision. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Getting Started

Learn

http://oracle.com/**blockchain**
http://developer.oracle.com/**blockchain**

Try

30-Day Free Trial

Free credits you can use for Blockchain & other OCI services:
https://www.oracle.com/cloud/free/#free-cloud-trial

- Create account/OCI tenancy
- Provision OBP instance
- Deploy Sample Chaincodes
- Invoke via UI or REST APIs

Additional Resources

Oracle Blockchain Blog & News:

blogs.oracle.com/blockchain
oracle.com/blockchain/news-and-opinion.html

Oracle Blockchain Videos:

Youtube: Oracle blockchain channel

App Builder Documentation:

https://docs.oracle.com/en/cloud/paas/blockchain-cloud/usingoci/using-chaincode-development-tools.html

Try OBP in Oracle Cloud Free Tier

https://www.oracle.com/blockchain/cloud-platform/

Once OBP Cloud instance has been provisioned, bring up the Console and navigate to *Developer Tools* tab to download the Blockchain App Builder.

Download OBP Enterprise

https://www.oracle.com/blockchain/blockchain-platform-enterprise-edition/

Q & A

Thank You!

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