Modernizing Intercompany Billing using Hyperledger Fabric

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Agenda

• Introduction - The art of the possible
• Business case with capabilities model
• Introduction to DLT/Blockchain
  • Why blockchain?
  • What is Hyperledger Fabric?
• Architecture
  • Oracle blockchain as a service platform (OBP)
  • Oracle integration cloud (OIC)
  • Autonomous data warehouse (ADW)
  • Oracle Analytics Cloud (OAC)
  • Identity management cloud service (IDMCS)
• inter-company Distributed Accounting Ledger (iDeAL) demo
• Analytics
• Closing
The art of the possible

This proof of concept demonstrated the potential to transform GE’s inter-company system and processes. The application of the technology components and the lessons learned in this exercise go beyond inter-company and can be implemented to modernize various business processes.

• Event-driven integration with ERP and other financial systems
• Enterprise distributed ledger platform to participate in blockchain networks
• Mobile-first front-end application development to deliver modern UI/UX
• Dispute management tool that provides a framework for users to collaborate in effort to expedite issue resolution
• Smart analytics that increases process transparency
Business case
On average, 3MM – 4MM intercompany invoices are created in GE’s Internal Billing System (IBS) annually.

IBS is used to manage intercompany transactions globally and facilitates the settlement of those transactions internally.

The system, now over 25 years old, operates on legacy mainframe technology and with rising capital requirements to operate the platform, a replacement is required.
Overview of Current Inter-Company Transaction Flows
High Level: In-Scope Entities, and Transactions Flows & Sizing

Intercompany Transaction Flows

Intercompany Pairs: Number & Value of Transactions Per Month

Transactions per Month by Pair

Transaction Value by Month by Pair
Intercompany Business Capabilities Model

The Intercompany Business Capabilities Model was created in collaboration with functional users and process leaders. It illustrates the activities that the Intercompany function should be able to perform regardless of the technology. This model was used to drive the technology assessments that will be described in the upcoming pages.
GE Intercompany Capabilities Model Mapped to iDeAL Benefits

### 3.3.1 Operate IC Transaction Management System
1. Initiate Intercompany Transaction
2. Agree PO/SO/services transactions match
3. Manage multi-currency & cross-currency IC transactions
4. Maintain substantiating documents of the transaction for audit and Tax purposes
5. Perform TAX calculations according to local rules
6. Adapt to volatile business landscape
7. Provide communication / collaboration between counterparties
8. Operate month-end closing process
9. Operate alternative channels for non conforming and off of period transactions

### 3.3.2 Govern IC Master Data
1. Govern Vendor & Customer Master Data
2. Control billing to disabled counterparties
3. Manage Vendor & Customer Relationships
4. Govern Bank Account Master Data
5. Operate IC Process aligned with ESCOA rules
6. Reflect Accounting Segments Master Data updates

### 3.3.3 Execute Settlement Process
1. Determine payment route
2. Initiate payments
3. Calculate FX Gain and losses
4. Operate Payment Thresholds policies
5. Execute Inv netting (bilat & multilat) & aggregation
6. Operate flexible Settlement Schedule
7. Operate Cashless Settlement
8. Comply with Restricted Currency Policies

### 3.3.4 Deliver visibility to W2W Process
1. Provide operational view of open invoices flow
2. Provide visibility across standard issue resolution process
3. Provide visibility of historical transactions
4. Provide visibility of integration errors with related systems
5. Optimize payment cycle visibility
6. Provide notifications to users as needed

### 3.3.5 Drive efficient reconciliation process
1. Execute seamless integration with IT systems
2. Support Account Reconciliation Process
3. Provide visibility of historical transactions
4. Provide visibility of integration errors with related systems
5. Optimize payment cycle visibility
6. Provide notifications to users as needed
7. Operate Cashless Settlement
8. Comply with Restricted Currency Policies

### iDeAL Benefit
- **New Capability**
- **No changes req**
- **Minor capability change**
- **Major capability change**
- **First Priority**
- **Second Priority**
- **Third Priority**
GE Intercompany Blockchain Solution Overview

The Blockchain solution connects independent ERP systems through an integration layer to applications governed by smart contract business rules and a web-based user interface.

**Intercompany Blockchain Solution Architecture**

**ERP**
- EBS, SAP, JDE, etc.
- Cloud ERP, SCM
- Cloud HCM, CX

**INTEGRATION**
- EVE - Validation
- DRM - Enrichment
- Process Management
- Document Management

**BLOCKCHAIN SMART CONTRACTS**
- Invoice & PO Validation, Matching
- Netting
- Settlement
- Intercompany Agreements

**DATA WAREHOUSE**
- Autonomous Database
- Advanced Analytics

**USER INTERFACE**
- PO / Invoice
- Health Check
- Settlements
- Disputes
- Suspensions
- Rules Management

**Solution Benefits:**
- **Process Efficiency**
- **Financial Efficiency**
- **Business Enablement**
- **Architecture Modernization**
High Level Flow

**Blockchain Smart Contracts**

**Level 1 Validations**
- EVE & DRM Codes
- Intercompany Agreements

**Level 2 Validations**
- 2-way or 3-way Match (POs/Receipts and Invoices)

**Real-time Netting**

**Scheduled or On-Demand Settlement**

**Process Management Workflows**

**Corrections & Re-submission**

ERP1 → Enrichment, Verification → ERP2 → ERP3

ERP4 → ERP5

Update Events

failed → Events

disputes → Treasury
Summary of Blockchain Benefits

Delivers a tailored solution for users that provides near real-time transaction processing, codified business rules/controls, reduction in unreconciled invoices, trusted data and reporting and architectural flexibility.

<table>
<thead>
<tr>
<th>Major Benefit</th>
<th>Key iDeAL Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Efficiency</strong></td>
<td><strong>Tailored Solution</strong></td>
</tr>
<tr>
<td></td>
<td>User experience and process design customized to GE needs and adaptable to future changes</td>
</tr>
<tr>
<td></td>
<td><strong>Upfront Transaction Management</strong></td>
</tr>
<tr>
<td></td>
<td>Transactions validated by codified rules, linked to process management and analytics for continuous transaction visibility and execution</td>
</tr>
<tr>
<td></td>
<td><strong>Continuous Accounting</strong></td>
</tr>
<tr>
<td></td>
<td>Transaction provenance reduces risk, accelerates bilateral recording &amp; reconciliation and enables a continuous monthly close.</td>
</tr>
<tr>
<td><strong>Financial Efficiency</strong></td>
<td><strong>Codified Controls</strong></td>
</tr>
<tr>
<td></td>
<td>Invoice/PO provenance and controlled business data exchange provide trusted, shared records for reporting and reduced risk</td>
</tr>
<tr>
<td></td>
<td><strong>Financial Metrics</strong></td>
</tr>
<tr>
<td></td>
<td>Reduction in unreconciled invoices, real-time outcome visibility and continuous accounting, enables multi-lateral settlement</td>
</tr>
<tr>
<td></td>
<td><strong>Real-Time Forecasting</strong></td>
</tr>
<tr>
<td></td>
<td>ERP integration enhances financial analysis and real-time P&amp;L, Cash Flow, and working capital forecasts.</td>
</tr>
<tr>
<td><strong>Business Enablement</strong></td>
<td><strong>Integration &amp; Flexibility</strong></td>
</tr>
<tr>
<td></td>
<td>Integrates w/GE ERPs, DRM, EVE, for faster adoption &amp; flexible evolution. Faster execution of Transaction Service Agreements.</td>
</tr>
<tr>
<td></td>
<td><strong>Single Source of Truth Across BUs</strong></td>
</tr>
<tr>
<td></td>
<td>Data and rules are stored together on the distributed ledger (i.e., transaction provenance) enabling trusted data for users</td>
</tr>
<tr>
<td></td>
<td><strong>Extensibility</strong></td>
</tr>
<tr>
<td></td>
<td>Provides platform for other Blockchain networks and initiatives at the ERP/SCM/HCM level.</td>
</tr>
<tr>
<td><strong>Architectural Modernization</strong></td>
<td><strong>Microservices &amp; Cloud Enablement</strong></td>
</tr>
<tr>
<td></td>
<td>Transitions IBS to modular implementation with independent layers using an API-based framework with cloud-based deployment</td>
</tr>
<tr>
<td></td>
<td><strong>Data Model &amp; Rulesets</strong></td>
</tr>
<tr>
<td></td>
<td>The Blockchain implementation enforces a standard data model, and universal and transparent rulesets</td>
</tr>
<tr>
<td></td>
<td><strong>Disaster Recovery</strong></td>
</tr>
<tr>
<td></td>
<td>The Blockchain network provides a replicated, fault tolerant data store and application, Oracle Cloud services provide built-in HA/DR.</td>
</tr>
</tbody>
</table>
Blockchain Process Flow & Interaction Model for PO and Non-PO Invoices

Transaction recordation, business process/logic optimization, DRM/EVE Validation and Enrichment

**Generic Interaction Model**

1. Acquire Data
2. Submit Invoice
3. Validation to DRM and Response & Enrichment
4. Validation to EVE & Response
5. Invoice Submit and Smart Contract Validation
6. Update Invoice Status
7. ERP Update to OIC Local
8. Update Invoice Status
9. ERP Update to OIC Global

Success Path:
- Acquire Data
- Submit Invoice
- Validation to DRM and Response & Enrichment
- Invoice Submit and Smart Contract Validation
- Update Invoice Status
- ERP Update to OIC Local
- Update Invoice Status
- ERP Update to OIC Global
- Validation to EVE & Response
Process Flow & Interaction Model: Failure Scenarios

Transaction recordation, business process/logic optimization, 2 - or 3-Way Match Failure

Generic Interaction Model

1. Update Invoice Status
2. ERP Update to OIC Local
3. Invoice Recycles
4. Validation to DRM & Response
5. Validation to DRM and Failure Response
6. Validation to EVE and Failure Response
7. Invoice Submit and Smart Contract Validation
8. Initiate Resolution
9. Failure Resolution
10. Invoice Submit and Smart Contract Validation
11. Invoice Submit and Smart Contract Validation
12. Invoice Submit and Smart Contract Validation
13. Invoice Submit and Smart Contract Validation
14. Invoice Submit and Smart Contract Validation
15. Invoice Update and Smart Contract Validation
16. Invoice Update and Smart Contract Validation
17. Invoice Update and Smart Contract Validation
18. ERP Update to OIC Local
19. ERP Update to OIC Global
20. ERP Update to OIC Global
21. ERP Update to OIC Global
22. ERP Update to OIC Global
Dispute Management
Initiating and resolving disputes

Generic Interaction Model

1. Invoice Submit and Smart Contract Validation
2. Initiate Dispute
3. Initiate Dispute
4. Raise Event
5. Dispute Resolution
6. Invoice Update and Smart Contract Validation
Smart Contract Functions and Logic for Reconciliation and Netting

Smart contract design and process logic

**Smart Contract Functions**

1. **PO Submission and Validation**
   - Checking Duplicates
   - Updating Status

2. **Receipt Submission and Validation**
   - Check if PO Exists
   - Validating and Ingesting Receipts
   - Updating Status

3. **Invoice Submission and Validation**
   - EVE Validation
   - DRM Validation
   - Update Status

4. **2/3 Way Match**
   - 2/3 Way Match (Reconciliation)
   - Aggregate Type
   - Legal Entity Type

5. **Intercompany Agreement**
   - Check ICA Exists
   - Check ICA Invoice Matches
   - Update Status

6. **Real-time Netting and Settlement**
   - Match 2/3 way POs and ICAs
   - Check Invoice Receipt Type
   - Check Net Settlement Exists
   - Update or Create New Settlement

7. **Dispute Handling**
   - Check Status If Dispute allowed
   - Update Invoice Data
   - Update Settlement Data
   - Add to Success or Failure List

**Smart Contract Logic**

1. **PO Submission and Validation**
   - Check Duplicates
   - Update Status

2. **Receipt Submission and Validation**
   - Check PO Exists
   - Update Status
   - Validate Receipt
   - Ingest Receipt
   - Update Status

3. **Invoice Submission and Validation**
   - EVE Validation
   - DRM Validation
   - Update Status

4. **2/3-Way Match**
   - Match Non-PO Invoice with IC Agreement

5. **Intercompany Agreement**
   - Check ICA Exists
   - Check ICA Invoice Matches
   - Update Status

6. **Real-time Netting and Settlement**
   - Match 2/3 way POs and ICAs
   - Check Invoice Receipt Type
   - Check Net Settlement Exists
   - Update or Create New Settlement

7. **Dispute Handling**
   - Check Status If Dispute allowed
   - Update Invoice Data
   - Update Settlement Data
   - Add to Success or Failure List
Why Blockchain?
Blockchain has moved beyond the hype, and is poised to deliver value to enterprise.

Blockchain Unique Value Propositions

**Trust**
- Non-repudiation reduces risk of fraud
- Tamper-proof / tamper evident records
- Process integrity based on pre-agreed rules

**Transparency**
- Single source of truth
- Optimized decision-making
- Self regulating
- Full audit history

**No Intermediaries**
- Improved consumer experience
- Faster transactions
- Lower transaction cost

**Automation**
- Real-time reconciliation and settlement
- Continuous visibility into relative positions
- Eliminate risk of human errors
**Business Impact and Results**

**Capabilities**
- Decentralized Network
- Distributed Ledger
- Immutable Transactions
- Smart Contracts
- Transparency

**Impact**
- Eliminate Intermediaries Cost
- Near Real Time Settlement
- Single Source of Truth
- Avoids Offline Reconciliation
- Fraud Reduction
- Increased Confidence in Data
- Greater Process Automation
- Reduces Human Errors
- Simplifies Audits
- Improves Governance

**Results**
- Increase Revenue
- Reduce Costs
- Reduce Risk
- Better Outcomes
## Spectrum of Blockchain Models

<table>
<thead>
<tr>
<th></th>
<th>Public Blockchain</th>
<th>Private Blockchain</th>
<th>Federated/Consortium Blockchain</th>
<th>Public/Permissioned Blockchain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong></td>
<td>Anyone</td>
<td>Single organization</td>
<td>Multiple selected organizations</td>
<td>Multiple selected organizations</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>Permissionless</td>
<td>Permissioned</td>
<td>Permissioned</td>
<td>Permissioned writers</td>
</tr>
<tr>
<td></td>
<td>Anonymous</td>
<td>Known identities</td>
<td>Known identities</td>
<td>“Public” read access</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>Consensus mechanism</td>
<td>Pre-approved participants</td>
<td>Pre-approved participants</td>
<td>Pre-approved participants update the ledger</td>
</tr>
<tr>
<td></td>
<td>Proof of Work / Proof of Stake</td>
<td>Voting/multi-party consensus</td>
<td>Voting/multi-party consensus</td>
<td>Flexible policies for read access</td>
</tr>
<tr>
<td><strong>Transaction Speed</strong></td>
<td>Slow</td>
<td>Lighter and faster</td>
<td>Lighter and faster</td>
<td>Lighter and faster</td>
</tr>
</tbody>
</table>
Qualifying questions:

- Do your business processes cross divisional or organizational boundaries?
- Do cross-system discrepancies that impact operations?
- Is there less than full trust among transacting parties?
- Do you rely on intermediaries, possibly charging expensive fees, adding risk or delay?
- Do you rely on periodic (batch) reconciliations?
- Is there a need to improve traceability or audit trail?
- Do you need real time visibility into multi-party transactions or processes?

Typical Enterprise Scenarios

- Enable distributed, autonomous marketplaces
- Reduce friction in business transactions & reconciliations
- Securely maintain and share decentralized records
- Track the provenance of products and materials
Enterprise Blockchain in Action

Enterprise Blockchain is a type of corporate Blockchain implementation that focuses on the streamlining and automation of operational processes within a secure network of participants.

Current State versus a Blockchain enabled ecosystem

- Blockchain creates a single source of truth for multi-organization interactions and business processes

Current State

Future State

Key Characteristics of an Enterprise Blockchain

- An enterprise Blockchain is permissioned; only authorized/enrolled transacting parties can participate
- Transaction requests are cryptographically signed by their originating members for non-repudiation
- Codified business rules on the blockchain (smart contracts) enable autonomous transaction processing, resulting in signed RWSets
- Multi-party consensus is used to agree on the RWSets and the transaction ordering before its committed to the ledger
- Transaction data is stored in cryptographically linked data blocks on participant nodes; signed data cannot be modified without detection
- Transaction information can be stored only on the nodes owned by parties specific to a transaction, but a hash to prove the transaction can be stored in a shared ledger
- There is no single point of failure, as data blocks are replicated on participant blockchain nodes
Why Blockchain and not Database?
Would you permission a counterparty to read/write access of your systems?

- Enables collaboration among different organization without compromising data privacy
  - No centralized control and access to sensitive data
- Non-repudiation and Immutability
  - Creates trust
  - Minimize disputes
- Verifiability
  - Consensus of action from participants
  - Creates accountability
- Smart Contracts
  - Upfront multi-party validation that submitted invoices/POs follow pre-agreed rules
  - Automation for cross organization interactions and eventing for ERP updates
Hyperledger Fabric
Hyperledger Fabric (HLF) is a robust and flexible blockchain network architecture that provides enterprise-ready security, scalability, confidentiality and performance. Its unique implementation of distributed ledger technology ensures data integrity and consistency, while delivering accountability, transparency and efficiency. As a permissioned network, the HLF delivers a trusted blockchain network, where members are assured that all transactions can be detected and traced by authorized regulators and auditors.

Fabric offers:

- A permissioned blockchain model with membership services
- Programmability – containerized smart contracts for automating business processes
- Independent Ordering Service delivers transaction blocks consistently to peers in the network and provides greater scalability
- Channels and Private Data Collections for confidentiality and privacy
- Modular architecture with pluggable data store, consensus protocols, and multiple membership services
- No cryptocurrency required!
Smart contracts

Also known as chain-codes

- A data schema and a set of business rules defined in code that describes all the conditions and steps pre-agreed by the participants for a specific transaction
- Transactions that meet the criteria of the smart contract as executed by multiple member nodes are considered valid and are automatically committed to the ledger without further intervention required
- Foundation of “algorithmic trust”
<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Orchestration</th>
<th>Data Management, Reporting &amp; Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provisioning &amp; Integration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pre-assembled, template-based provisioning in Oracle Cloud and on-premises</td>
<td>• Supports rich set of Fabric APIs via REST calls</td>
<td></td>
</tr>
<tr>
<td>• Incorporates infrastructure dependencies (managed containers, VMs, identity management, K/V storage, Kafka/Zookeeper)</td>
<td>• Enables synchronous invocation as well as events/callbacks and extensive DevOps operations</td>
<td></td>
</tr>
<tr>
<td><strong>Oracle Cloud Managed Service</strong></td>
<td></td>
<td><strong>Ledger DB replaced by Berkeley DB</strong></td>
</tr>
<tr>
<td>• Oracle operations monitoring</td>
<td>• Simplifies integration and insulates applications from underlying changes in transaction flow</td>
<td>• CouchDB rich query support at LevelDB performance</td>
</tr>
<tr>
<td>• Managed patching/updates</td>
<td>• Managed patching/updates</td>
<td>• SQL-based rich query support and results validation at commit time</td>
</tr>
<tr>
<td>• Embedded configuration backups</td>
<td>• Embedded configuration backups</td>
<td><strong>Rich history database</strong></td>
</tr>
<tr>
<td><strong>Object Store Integration</strong></td>
<td></td>
<td>• Streams transaction history to ADW/DBaaS and hooks up with Analytics/BI (e.g., OAC or 3rd party tools)</td>
</tr>
<tr>
<td>• Configuration backup, archiving ledger blocks</td>
<td>• Configuration backup, archiving ledger blocks</td>
<td><strong>Security</strong></td>
</tr>
<tr>
<td><strong>Management/Operations Console</strong></td>
<td></td>
<td><strong>Security Integration</strong></td>
</tr>
<tr>
<td>• Automates many administration tasks</td>
<td>• Automation of many administration tasks</td>
<td>• IDCS User/role management</td>
</tr>
<tr>
<td>• Dynamic configuration without server restart</td>
<td>• Dynamic configuration without server restart</td>
<td>• Authentication for OBP Console, REST Proxy, CA</td>
</tr>
<tr>
<td>• Monitoring dashboards and troubleshooting</td>
<td>• Monitoring dashboards and troubleshooting</td>
<td>• Fine-grained Access Control Lists capabilities</td>
</tr>
</tbody>
</table>
Oracle Blockchain Platform Cloud Service

Pre-integrated, hardened for enterprise applications

Oracle Cloud Infrastructure and PaaS Services

Oracle-managed PaaS

Open Source Hyperledger Fabric

Pre-Assembled

Open

Plug and Play Integrations

Enterprise-Grade

Automated DevOps

REST APIs

SDKs for Go, Java, and Node.js

Enterprise Adapters (OIC)

Smart Contracts (Go, Node.js, Java)

Fine-grained access control

Membership Governance

Confidentiality (Channels, Collections)

Consensus

Distributed Ledger

Container Management

Identity Management

Event Management

Administration & DevOps Services

Off-chain Data Sync

Oracle SaaS

3rd Party SaaS

Custom Cloud Apps

On-Premises Apps

Hyperledger Fabric Peers in customer data centers or 3rd party clouds

OBP Enterprise Edition (on-premises deployment)
Architecture
Solution Overview

- Accounting Data Ingestion
- Enrichment/Validation
- Exception Management
- Document Management
- Distributed Ledger (OBP)
- Data Warehousing
- Data Analytics/Reporting
- User Interface

Technology Stack

- PO/Invoice Ingestion, Enrichment & Validation
- Exception Management
- Business Logic & TX Recording
- Analytics & Forecasting
- User Interface

- Enrichment/Validation Oracle Integration Cloud (OIC)
- (PM) Process (Workflow) Management (OIC)
- (CE) Content and Experience (Doc Mgmt.)
- (OBP) Oracle Blockchain Platform
- (ADW) Autonomous Data Warehouse
- (OAC) Oracle Analytics Cloud

Custom UI (Cloud Compute Instances)

- Pre-integrated Connections
- OIC Application Adapters
- REST API-based Integrations and SQL

Solution & Integration with Oracle Products
Solution is built on a suite of Oracle Cloud platforms
iDeAL Solution Architecture

Transaction Flow and Distributed Network Architecture

Transaction Flow

Max Flexibility
Ability to add additional BUs and ERPs, validations/enrichments, process flows (disputes, holds, etc.), smart contracts, dashboards, and downstream integrations.

Microservices-Based Layered Services

- Enrichment & Validation Orchestration
- Process Flows
- Smart Contracts
- Tables & Views
- Dashboards & Reports
- Roles, Interactions

Enrichment & Validation
- DRM
- EVE
- OIC
- PM

Workflow
- CE (docs)
- DP

Distributed Ledger
- OIC

Data Warehouse
- AOW

Analytics
- OAC

UI
- Compute

Aviation
- Whittle
- Kitty Hawk

Healthcare
- GL PROD
- SAP Global

Corporate
- Manual
- CCL Classic

Businesses share a set of common, secure communication protocols that automate intra- and inter-BU processes across the ERPs.
Cloud Services Building Blocks
Pre-integrated Cloud Services for rapid development and managed operations

Oracle Cloud Infrastructure (OCI)

Custom Development, Low-code/Declarative

Front-end App

REST Connector

Integration Cloud

SAP, JDE, etc.

On Premises

Custom

E-Business Suite

IDCS

IDCS

Analytics Cloud

DBaaS or ADW

Blockchain Platform

Oracle Cloud Infrastructure (OCI)

Smart Contracts (Chaincode)

Integration Orchestration

Dashboards & Reports

Distributed Ledger

Consensus

Privacy

Custom Development, Low-code/Declarative

ERP Adapter

SAP Adapter

EBS Adapter

Events

Users, Groups, Roles

Users, Groups, Roles
Application-Centric View

Integrations to various services

Oracle Cloud Infrastructure (OCI)
Oracle Integration Cloud

Reduces code development and provides off-the-shelf integration to existing systems
Oracle Integration Cloud

Reduces code development and provides off-the-shelf integration to existing systems

- Integration to break up CSV file into individual invoices and pass to the canonical invoice handling API
- Integration to take in invoice data, enrich the data, and submit to blockchain.
- EVE Validation
- DRM Enrichment
- Integration to process PO data and submit to blockchain
Organization Nodes in the Blockchain Network

This diagram shows the network's structure and the relationships between organizations and nodes. Hover over an organization or node to find more information about it.
**Oracle Blockchain Platform**

**Peer Nodes on Channels**

### Nodess Summary

| Nodes | 15 Nodes | 3 Hires | 2  | 1  | CA | NA |

### Channels Summary

<table>
<thead>
<tr>
<th>Channel Name</th>
<th>Hired Channel</th>
<th>Peers</th>
<th>Owned by</th>
<th>Application Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>channel1</td>
<td>2</td>
<td>2</td>
<td>CO</td>
<td>1.3</td>
</tr>
<tr>
<td>channel2</td>
<td>3</td>
<td>0</td>
<td>CO</td>
<td>1.3</td>
</tr>
<tr>
<td>channel3</td>
<td>2</td>
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<td>CO</td>
<td>1.3</td>
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<td>channel4</td>
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<td>2</td>
<td>CO</td>
<td>1.3</td>
</tr>
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<td>channel5</td>
<td>3</td>
<td>3</td>
<td>CO</td>
<td>1.3</td>
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</table>
## Oracle Blockchain Platform

### Peer Nodes on Channels

<table>
<thead>
<tr>
<th>Ledger Summary</th>
<th>Blocks</th>
<th>Transactions</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1,961</td>
<td>2,475</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Block</th>
<th>Time</th>
<th>Type</th>
<th>User Transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January 1, 2020</td>
<td>data</td>
<td>1</td>
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### Transactions

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Active Event Subscriptions

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</table>
Oracle Blockchain Platform

Rich History DB
Seamless connectivity to ADW provides feature rich visualization of blockchain transactions.
Security: IDCS and Federation to Remote Identity Providers
Security: Authentication and Authorization
iDeAL solution is built on a collection of pre-integrated Oracle Cloud platform services

- Integration, Blockchain, Autonomous Database, Analytics, Identity Management
  - Each strong in its own right, but providing greater value when used together
  - Enables rapid development of complex applications using well-defined APIs
  - Supports declarative/low-code development of many components
  - Provides independent layers of Microservices-based functionality

- Enables IT Flexibility and Business Agility
  - Decentralized topology and flexible deployment architecture for corporate and BU needs, speeds up execution of TSAs
  - Provides high availability and resilience of managed cloud services in a cost effective manner
  - Can easily evolve through ability to add additional BUs and ERPs, validations/enrichments, process flows (disputes, holds, etc.), smart contracts, dashboards, and downstream integrations.
Demo
iDeAL Demo
Dashboard Overview
Analytics
<table>
<thead>
<tr>
<th>Source Invoice Number</th>
<th>Status Code Description</th>
<th>Last Update Date (Second)</th>
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</thead>
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<tr>
<td>GUS1_V542_1-5</td>
<td>EVE/DRM validation failed for invoice</td>
<td>01/13/2020 06:52:16 AM</td>
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<tr>
<td>GUS1_V542_1-5</td>
<td>Invoice has been reconciled</td>
<td>01/22/2020 08:44:38 PM</td>
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<td>GUS1_V542_1-5</td>
<td>Invoice has been updated from UI</td>
<td>01/22/2020 08:43:54 PM</td>
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Provide transaction provenance at a glance
OAC narrative describing invoice activity

Invoice Table

<table>
<thead>
<tr>
<th>Total Invoice Amount by Initiator Company Code</th>
<th>Countinvoces</th>
<th>Total Invoice Amount</th>
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</thead>
<tbody>
<tr>
<td>Initiator Company Code: GFR1, GM02, GUS1, SECA, ST</td>
<td>1,155</td>
<td>$4,914,469.96</td>
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</table>

The data represents the Total Invoice Amount for a total of 10 Initiator Company Codes.

What stands out in this situation is that two Initiator Company Codes account for more than 80% of the total. There is a dominant group of Initiator Company Codes. This group is composed of two Initiator Company Codes: GFR1 V535, with 51.59% 32.23%, respectively.

The eight other Initiator Company Codes combined make up the rest of the list, only accounting for 16.18% of the total.

When taken together, the 10 Initiator Company Codes amount to a total value of 3,974,579, an average of 397,458.
OAC invoice settlement – Sankey diagram

Initiator Company Code, Settlement Type, Invoice Type, Recipient Company Code, Net Amount

Initiator Company Code: GFR1, GMX2, GUS1, SECA, SGIS, SSSS, USE1, V198... +2
Key takeaways
Executive Summary

Evaluation of Blockchain as a potential replacement for GE’s legacy “Intercompany Billing System” (IBS)

We have explored the use of Distributed Ledger technology as a potential way to modernize IBS (>7,000 users) and transition mission critical processes from legacy mainframe to the cloud.

We have successfully developed a Blockchain-based platform aligned with our IC Capabilities Model and that supports a cloud-based replacement application for IBS.

The PoC delivers a tailored solution for users that provides:

- Distributed ledger of IC invoices/POs and account balances
- Near real-time transaction processing
- Codified business rules/controls
- A robust exception/dispute management process
- Reduction in unreconciled invoices
- Trusted data and reporting
- Enhanced cash flow forecasting
- Architectural flexibility with Microservices agility
<table>
<thead>
<tr>
<th>GE Presenter</th>
<th>Presentation Title</th>
<th>Day</th>
<th>Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>Mike Fuori</td>
<td>Increasing Controls, Validations and Data Integrity for HFM</td>
<td>11-Jun-18</td>
<td>10:45 AM - 11:45 AM</td>
<td>Asia 3</td>
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<tr>
<td>Bill Nall</td>
<td>The EPM Force Awakens @ GE into a Fully Functional Shared Service</td>
<td>11-Jun-18</td>
<td>1:15 PM - 2:15 PM</td>
<td>Southern Hemisphere III</td>
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<tr>
<td>Rakesh Kandagatla &amp; Neviana Zhgaba</td>
<td>Set the DRG Genie free! It will ask, ever had a governance friend like me?!</td>
<td>11-Jun-18</td>
<td>2:30 PM - 3:30 PM</td>
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<tr>
<td>Gary Adashek &amp; Gary Crisci</td>
<td>Save &quot;The Beverage Company&quot;! – How to impress people with Smart View in PowerPoint</td>
<td>11-Jun-18</td>
<td>4:15 PM - 5:15 PM</td>
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<tr>
<td>Gary Adashek</td>
<td>Inside Out OAC Essbase &amp; DV</td>
<td>12-Jun-18</td>
<td>11:45 AM - 12:45 PM</td>
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<tr>
<td>Gary Crisci</td>
<td>Happily, Ever After: ODTUG and Oracle Enterprise Planning and Budgeting Cloud Solution (EPBCS)</td>
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<td>Joe Nasal</td>
<td>Building a World Class EPM Platform as a Service</td>
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<tr>
<td>Neviana Zhgaba</td>
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<td>12-Jun-18</td>
<td>3:45 PM - 4:45 PM</td>
<td>Oceanic 4</td>
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"Our primary focus must be on delivering outcomes. We don't define that solely by the number of gas turbines, wind turbines, jet engines, or CT scanners we manufacture. The ultimate purpose of our work is the children in distant villages who get access to electricity for the first time, the travelers who get home safely, and the patients who receive better diagnoses and treatments in the moments that matter most. When our teams understand customer needs and deliver outcomes for them, we always end up in a good place for our employees and our owners.”