Blockchain: Implications For Enterprise Applications

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David Haimes  
Senior Director, ERP Development, Oracle

- Responsible for future functional and technical architecture within our ERP Applications. What will our applications look like in 3, 5 or more years
- Deeply involved in all of Oracle’s Blockchain and Distributed Ledger Technology Initiatives
- Formerly managed Engineering, Product Management and QA for GL, Intercompany, Legal Entity Enterprise Structures etc (E-Business Suite and Cloud/SaaS products)
- Originally from the UK, based At Oracle HQ In Redwood Shores, California since 2000

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CFTC Suit Files Suit Scheme in New York

Hackers Have Stolen Millions Of Dollars In Bitcoin -- Using Only Phone Numbers

North Korea's hackers are reportedly targeting bitcoin exchanges

India's darknet hackers mint bitcoins from illegal assignments

BENGALURU: Joy D'Souza is a 20-year-old computer science student, freelance website designer and a darknet hacker. Which is to
“The blockchain is one of the most fundamental inventions in the history of computer science.”

Marc Andreeson, cofounder, Netscape and Andreeson Horowitz

“Blockchains are at the heart of the fourth industrial revolution.”

Klaus Schwab, founder and executive chairman, World Economic Forum

“It makes me think we’re at one of those times in technological, economic and social history where the sky is the limit.”

Steve Wozniak, cofounder, Apple Computer
What I Want You To Learn Today

• What is blockchain?
• Why is it so exciting?
• Who will benefit?
• Where do you start?
Blockchain Transactions
Apply to other transactions, not just money movement

Opening Balance
$100

A=$100
A->B $50
B->C $25

Alice

$50

Bob

$25

B->C $25
A->D $75

A=$100
A->B $50
B->C $25

Charlie

$75

A=$100
A->B $50
B->C $25
A->D $75

David

A=$100
A->B $50
B->C $25
A->D $75
Market Trends And Dynamics

- Many Codebases/Standards
  - **Bitcoin** – THE blockchain. Permissionless and anonymous, transfers BTC currency, throughput issues.
  - **R3 Corda** – Consortium of around 50 major banks raising $200 Million in funding. The technology is in a separate organization and will be open source, with a paid enterprise version.
  - **HyperLedger** – Linux foundation open source project. Most popular is the Fabric Permissioned protocol, V1.0 released July 2017.
  - **Ripple** – Ripple Transaction Protocol (RTXP), issued in 2012. Focus on Cross border payments, partner with banks to act as gateways.
  - 40+ others... and growing - Chain, OpenChain, Tendermint, Symbiont, BigchainDB, Dragonchain (Disney), etc, etc.

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R3 CEV (Crypto Exchanges Ventures)
Consortium membership

**150+ Members**
Oracle Joined in July 2017
Three types of Blockchain

• Permissionless
  – Bitcoin, Ethereum
  – Anyone can join
  – Expensive mining process to ensure trust

• Permissioned
  – Hyperledger, R3 Corda, Chain
  – Network operators decide joining criteria

• Private
  – One organization only who controls all nodes
  – Prototypes, Pilots Only
Key Properties of Blockchains
Many technology Innovations Coming Together

• Immutable and Non-Repudiable
  – Trusted Single Source of Truth

• Smart Contracts
  – Defined in Computer Code

• Encrypted for Confidentiality
  – Security and confidentiality of all data
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Enterprise Applications of Blockchains
Four design patterns driving business value

1. Tracking things of value
   – Enable autonomous marketplaces

2. Secure B2B integrations
   – Reduced friction, autonomous governance

3. Secure, Decentralized Record Storage & Maintenance
   – Eliminating transaction intermediaries

4. Tracking the provenance of products and materials
   – Guarantee product quality and safety
Pattern 1: Exchanging Value
Invoice Factoring Marketplace with verified invoices from ERP applications

Ace Supplier

Blockchain Marketplace

Financial Services

Vision Enterprise
Pattern 2: Reduce friction in supply chains & trading networks

Managing spend in organizations is a challenge

- 45% of spend is contract compliant
- 39% of addressable spend is actually sourced
- 63% of spend is linked to a purchase order

Source: Ardent Partners CPO Rising 2016/17
Pattern 2: Reduce friction in supply chains & trading networks

Buyers

Suppliers
Pattern 2: Reduce friction in supply chains & trading networks
A blockchain based trading partner network, providing trust, privacy and reconciliation

- Smart Contracts: Automatic enforcement of contract terms and ratings
- Social Buying Experience
- IOT enabled Shipment: Automated 3-way matching through smart contracts
- Instant Payments
- Transparency

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Pattern 3: Secure Decentralized Record Storage & Maintenance
Management of education and employment records

Education Providers, Employers → Blockchain → Candidate → Employer
Pattern 4: Tracking the provenance of products and materials
Identifying cars with defective components for recall

Automobile Recall Costs for 2009

- **30,000** lives lost due to defective parts
- Total economic loss - **$230** Billion
  - Recall costs (Analysis, Repairs, Fines/Penalties, Communication)
  - Worker productivity losses
  - Insurance and Medical costs
  - Reduction in sale due to loss of trust
Pattern 4: Tracking the provenance of products and materials
Identifying cars with defective components for recall

Parts Supplier

Sub-assembly Maker

Quality Control Provider

Auto Maker

Automobile Blockchain

NHTSA
(National Highway Traffic Safety Administration)
What I Want You To Learn Today

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Technical Barriers For Blockchain Adoption

• Transaction throughput is slow
• Smart contracts are computer code
  • Programmers are not lawyers
  • Code has bugs
• Lack of development tools
• Few skilled developers
• Security not flexible enough (yet)

Transactions per Second

<table>
<thead>
<tr>
<th></th>
<th>Visa</th>
<th>Bitcoin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transactions per Second</td>
<td>7000</td>
<td>4</td>
</tr>
</tbody>
</table>

Also the bitcoin network uses 8 times more electricity than the entire Visa network.
Oracle Blockchain Cloud Service – Launched this week
Based on Hyperledger Fabric Permissioned Blockchain Protocol

• Rapid provisioning & simplified operations
• REST API-driven integration
• SaaS Integration toolkit
  • Integration patterns
  • Sample applications
  • Sample Code
How Do I Build the Network?
Intercompany – I control the network participants
Industries Showcase Demo Station IND-032

Wind Turbine Manufacturer
U.S. Operating Unit: Vision Operations (SCM Cloud – fap0226)

Wind Turbine Control System (Drop Shipment)

Customer General Technologies (US)

Installation
Sales/Ship
Manufacture/Assembly
Purchase/Receipts

Acceptance Simulator

Wind Turbine PTO (WT000500)

Project Commissioning

Wind Turbine PTO (WT000500)

Blockchain

Wind Turbine Control System (Drop Shipment)

Shipping Simulator

Wind Turbine Control System (Drop Shipment) Purchase Order

1. Truck Ship
2. Customs
3. International Air Freight
4. Truck Ship

1. Loaded
2. Unloaded
3. Invoice

1. Loaded
2. Unloaded
3. Invoice

1. Loaded
2. Unloaded
3. Invoice

1. Loaded
2. Unloaded
3. Invoice

UK Operating Unit: Vision Operations/LAGRING SYSTEMS (SCM Cloud – fap0226)

Contract Manufacturer: Associate Manufacturing (E-Business Suite)

Contract Manufacturer: Associate Manufacturing (E-Business Suite)

Shipping Items, Purchase Order for Service Item

Customer General Technologies (US)
Employee Expenses – Incentivize network participants
Hotel next to my HQ, full of my employees

• Oracle Apps UX Team (OAUX) Prototype
  • Hotel Receipts on a blockchain
  • View and approve in expenses mobile app
  • Oracle could pay a consolidated hotel bill
  • No more filing expense reports
Find Use Cases In Your Business
Learn the technology, start pilots and prove business benefit
Blockchain in Oracle Applications
Creative ways to explore use cases in detail

- **Design Jams (1 day)**
  - Apps and Industry Vertical Subject Matter Experts with Blockchain experts
  - Ending with 3 minute Pitches to Executives

- **Hackathons (2 days)**
  - Engineers building Client Apps, Smart Contracts and Integrations to our existing Application Portfolio
  - Live App demos from all teams to Executives
Co-innovation With Application Customers

• Currently working on a few customer partnerships
  – Take to use cases to pilots
  – Eventually evaluate moving to product

• Blockchain Advisory Group / Customer Council
  – Oracle Reps from CX, ERP, EPM, HCM and SCM teams
  – Deep dives into use cases, share feedback
  – Share technical best practices for prototyping & pilots
  – Targeting launch by end of 2017
  – Register your interest now (leave me your card)
Blockchain Apps Integration Toolkit
Helping you integrate your oracle apps to blockchains

- Targeted to go out with the Oracle Blockchain Cloud Service
  - Sample (simple) blockchain applications code
  - Smart contract code for integrations
  - Design Patterns and templates

Blockchain Network

- Orderer Service
- Member Service
- Peer 1
- Peer 2
- …
- Peer n

Adapter Templates

SaaS Cloud On Premises Apps Etc...

① ② ③ ④
Oracle Can Bring Everything Together
Broadest Horizontal and Vertical Product Portfolio to Integrate
Review: What Learn Today

• What is blockchain?
  • A trusted source of truth
• Why is it so exciting?
  • It enables the internet of value
• Who will benefit?
  • Enterprises who are ready
• Where do you start?
  • Start working with Oracle