



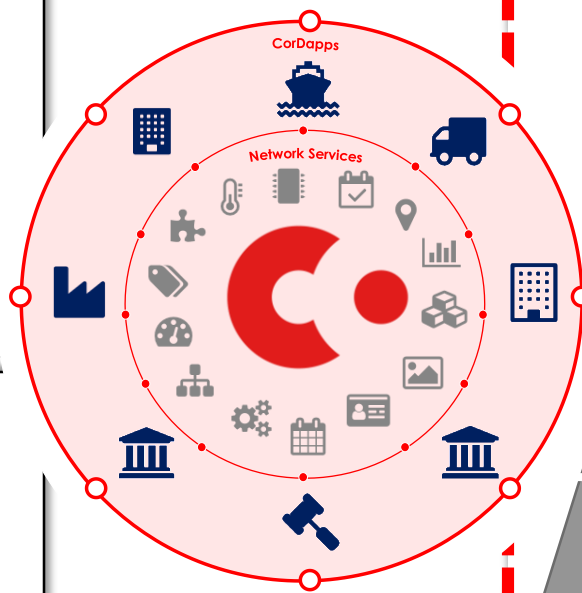
R3 / Cordaのご紹介

山田 宗俊
Partner Lead, Japan

2018年2月27日

100社超のコンソーシアムメンバー（銀行、証券会社、中央銀行、規制当局）と70社超のテクノロジーパートナーが協働してプロジェクトやRFP等に取り組んでおります。

- Bank of Canada
- Hong Kong Monetary Authority
- Hong Kong Securities and Futures Commission
- Monetary Authority of Singapore
- Abu Dhabi Global Markets
- etc...

The logo for r3. features a large, bold, black lowercase 'r' followed by a large, bold, black lowercase '3'. A small red dot is positioned to the right of the '3', completing the 'r3.' branding.

- ・70社超のパートナーが参画
- ・金融に限らず非金融のユースケースも調査研究・実証実験・プロトタイプ開発
- ・主な会社は以下の通り。

- p2.

リーガルセンター・オブ・エクセレンスの設立

R3 creates Legal Centre of Excellence for blockchain technology

14 hours ago | 3613 views | 0



Financial blockchain coalition R3 has assembled a group of ten legal firms in an effort to educate lawyers on the contractual intricacies surrounding the live deployment of distributed ledger technologies.

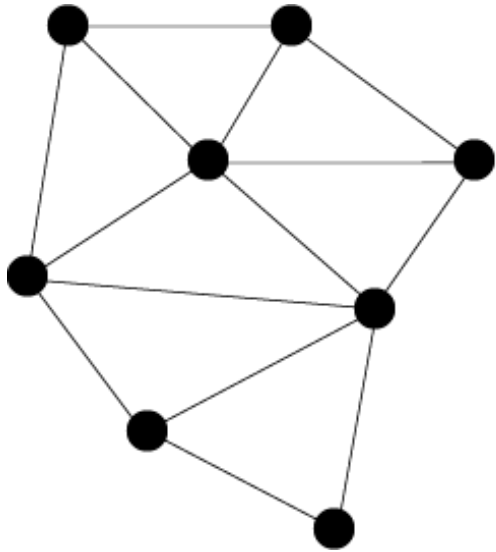
- ブロックチェーンの本番適用における規制問題を検討する法律事務所のメンバー

- Ashurst
- Baker McKenzie
- Clifford Chance
- Crowell & Moring
- Fasken
- Holland & Knight
- Perkins Coie
- Shearman & Sterling
- Stroock
- White & Case

<https://www.finextra.com/newsarticle/31700/r3-creates-legal-centre-of-excellence-for-blockchain-technology/retail>

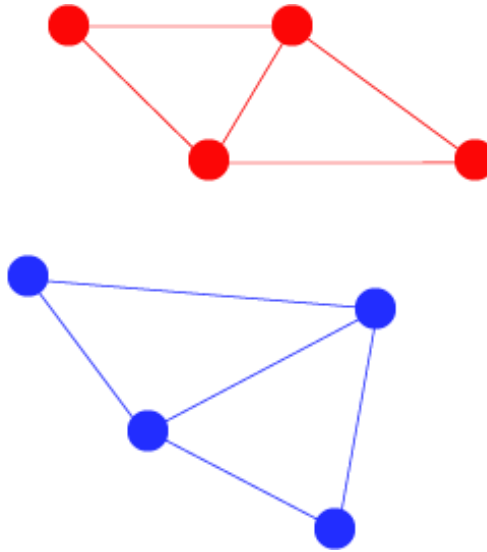
第三世代ブロックチェーン: Corda Connect

ビジネスネットワークの接続 + プライバシー + アセットの流動性 + ネットワーク効果



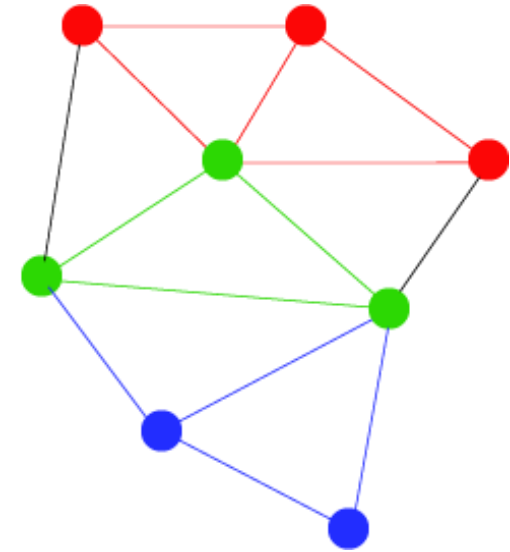
第一世代: Bitcoin/Ethereum

- パブリックブロックチェーン
- プライバシー欠如
- 非効率的なネットワーク



第二世代: Fabric/Quorum

- 複数のサイロ化されたネットワーク
- 孤立したアセット

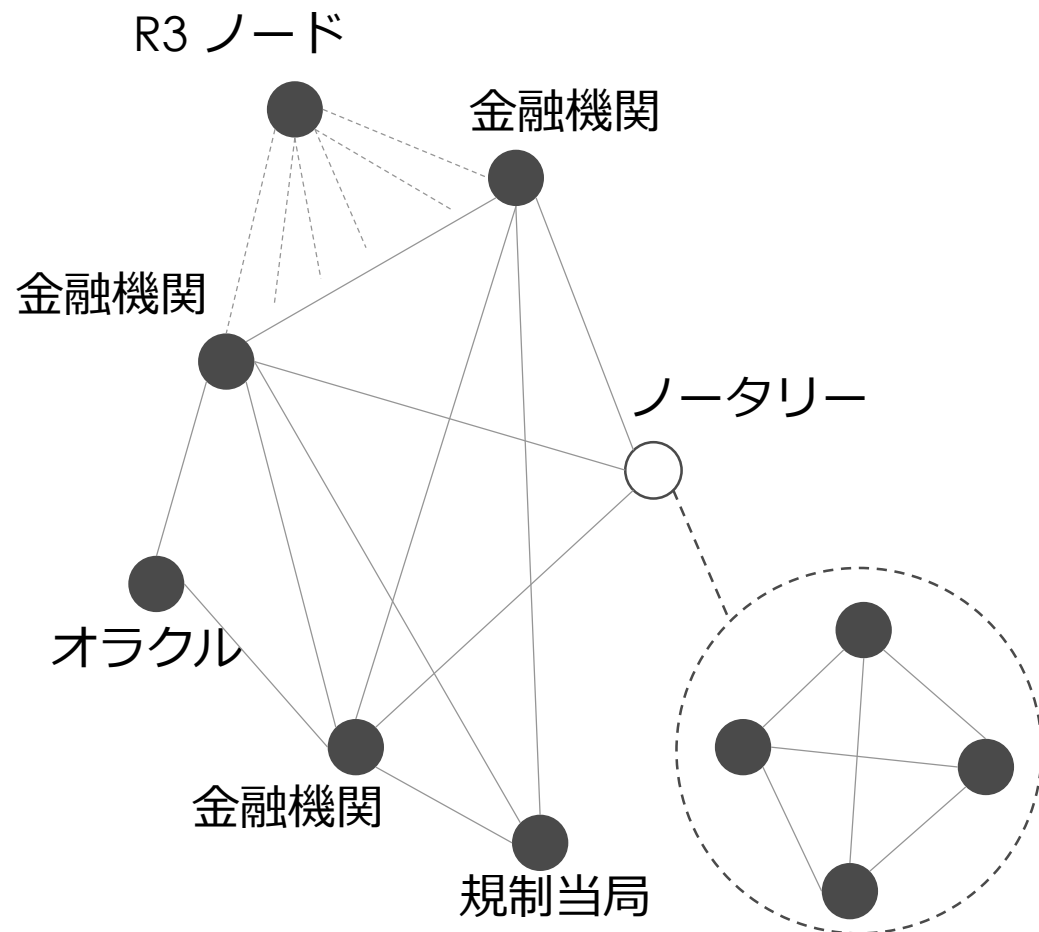


第三世代: Corda Connect

- パブリックなアイデンティティ
- 複数のプライベートなネットワーク
- 移転可能なアセット

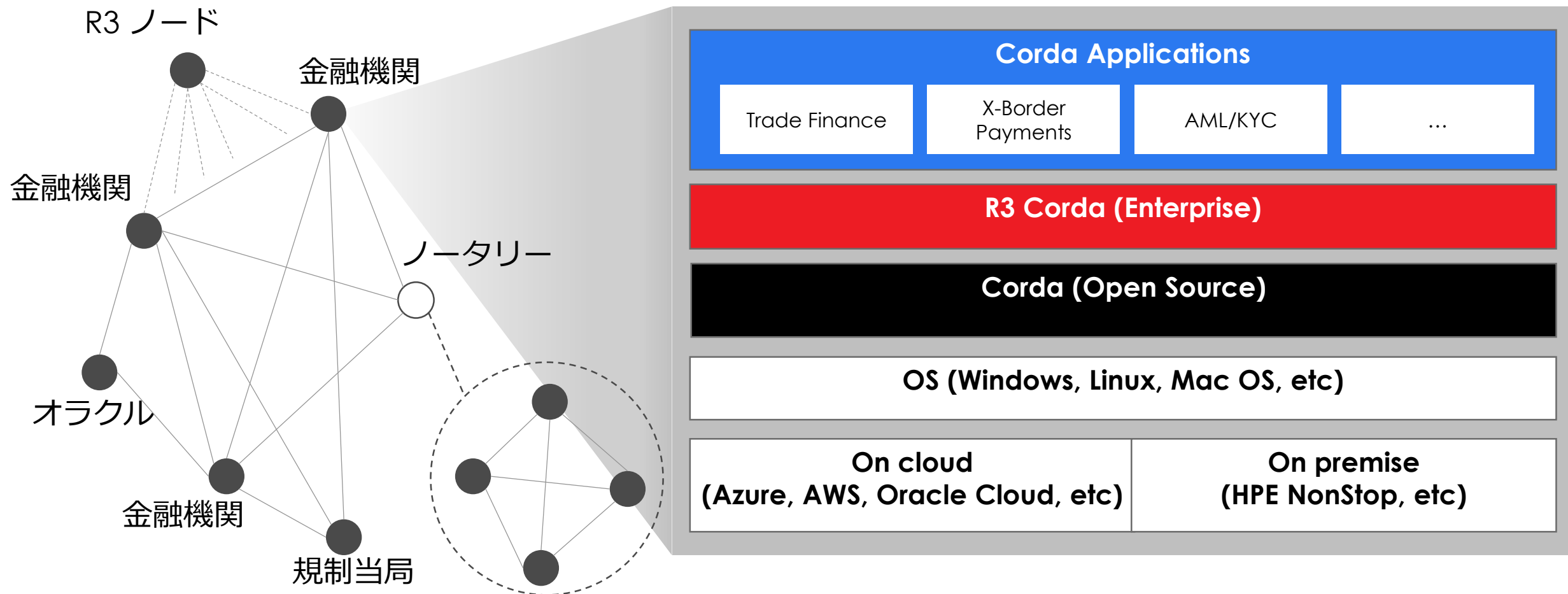
Corda Connectとは?

- Cordaをプラットフォームとして利用する複数のビジネスネットワークの集合体



#	Network 参加者	説明
1	R3 ノード	<ul style="list-style-type: none">● ネットワーク参加への許可● SSL/TLS証明書の提供● 各ノードへ参加者のIPアドレスを配信
2	金融機関	<ul style="list-style-type: none">● 金融取引の実施
3	オラクル	<ul style="list-style-type: none">● 金利や為替レート等の外部情報の提供● トムソンロイターやブルームバーグを想定
4	ノータリー	<ul style="list-style-type: none">● 取引発生時に署名の提供● 二重支払の防止● 監査法人等の第三者的機関を想定
5	規制当局	<ul style="list-style-type: none">● 管轄内の全取引を受領● リアルタイムモニタリング● 当局自らが取引を検証

ノード内のシステム構成



Cordaの特徴

目的：金融取引に特化し、商用に耐え得るプラットフォームを構築する。

データ共有モデル

→ "知る必要のある" 範囲で。ブロードキャストはなし

トランザクションスタイル

→ UTXO モデル, パラレル実行

トランザクションの検証

→ 取引毎に当事者間で。ブロックなし、PoW (Proof of Work)なし

当局対応

→ 当局向けノードを想定、透明性の確保

コンセンサス

→ ユニークネスサービスにより二重支払（取引）を防止。

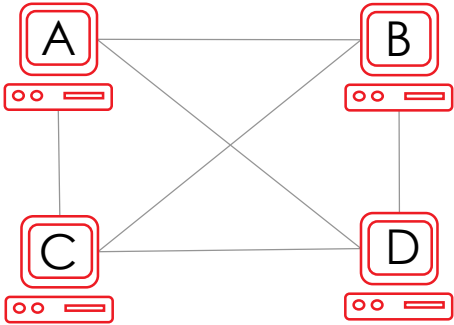
インテグレーション

→ Kotlin, Java, RDBMS(SQL)。既存システムとの統合を容易に。

データ共有モデル:イメージ

Broadcast Blockchain

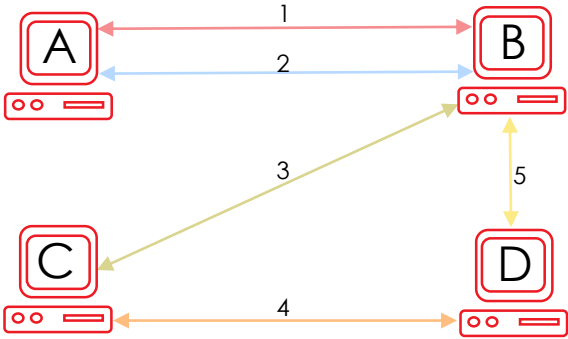
Bank A's Ledger		Bank B's Ledger	
ID	Fact	ID	Fact
1	Bank A pays bank B \$5.	1	Bank A pays bank B \$5.
2	Bank B purchases bond X from issuing bank A.	2	Bank B purchases bond X from issuing bank A.
3	Bank C purchases bond X from bank B.	3	Bank C purchases bond X from bank B.
4	Bank C enters a credit default swap with bank D.	4	Bank C enters a credit default swap with bank D.
5	Bank D owes bank B \$10.	5	Bank D owes bank B \$10.



Bank C's Ledger		Bank D's Ledger	
ID	Fact	ID	Fact
1	Bank A pays bank B \$5.	1	Bank A pays bank B \$5.
2	Bank B purchases bond X from issuing bank A.	2	Bank B purchases bond X from issuing bank A.
3	Bank C purchases bond X from bank B.	3	Bank C purchases bond X from bank B.
4	Bank C enters a credit default swap with bank D.	4	Bank C enters a credit default swap with bank D.
5	Bank D owes bank B \$10.	5	Bank D owes bank B \$10.

Corda DLT

Bank A's Ledger		Bank B's Ledger	
ID	Fact	ID	Fact
1	Bank A pays bank B \$5.	1	Bank A pays bank B \$5.
2	Bank B purchases bond X from issuing bank A.	2	Bank B purchases bond X from issuing bank A.
		3	Bank C purchases bond X from bank B.
		5	Bank D owes bank B \$10.



Bank C's Ledger		Bank D's Ledger	
ID	Fact	ID	Fact
3	Bank C purchases bond X from bank B.		
4	Bank C enters a credit default swap with Bank D.	4	Bank C enters a credit default swap with Bank D.
		5	Bank D owes bank B \$10.

他DLTとの比較

#	項目	パブリック		プライベート	
		Bitcoin	Ethereum	Fabric v1.0	Corda
1	目的	非中央集権型デジタル通貨	分散ネットワークでのスマートコントラクト実行	様々なビジネス向けユースケースへの対応	金融取引に特化したプラットフォーム
2	ネットワークへの参加形態	誰でも参加可能	誰でも参加可能	許可制ネットワーク	許可制ネットワーク
3	データ共有モデル	ブロードキャスト	ブロードキャスト	"知る必要のある" 範囲で (チャンネル毎に共有)	"知る必要のある" 範囲で (取引毎に共有)
4	トランザクションの検証	プルーフオブワーク	プルーフオブワーク	チャンネル毎に当事者間で	取引毎に当事者間で
5	スマートコントラクト	限定的	チューリング完全	チューリング完全	チューリング完全
6	仮想通貨	あり	あり	なし	なし
7	法的文書との紐づけ	コード・イズ・ロー	コード・イズ・ロー	コード・イズ・ロー (チェーンコード)	法的文書を添付可能
8	コンセンサス	Proof of Work	Proof of Stake	チェーンコード+オーダー	ユニークネスサービス
9	トランザクションスタイル	UTXOモデル	アカウントベース	UTXOとアカウントの中間	UTXOモデル
10	インテグレーション	Python, LLL	Solidity	Go	Kotlin, Java, RDBMS(SQL)
11	実行環境	ネイティブコード	Ethereum Virtual Machine	ネイティブコード	Java Virtual Machine
12	当局対応	なし	なし	なし	当局向けノードを想定
13	災害復旧 (DR)	ピアのブロックチェーンから復旧	ピアのブロックチェーンから復旧	ピアのブロックチェーンから復旧	既存RDBMSの機能を利用
14	ワークフロー	-	-	特になし	フローフレームワーク
15	インターオペラビリティ	-	-	チャンネルに閉じたネットワーク	Cordaネットワーク上でのピア間相互運用

Cordaを構成するコンポーネント

Corda ノード

Vault

Apps

ステートオブジェクト

事実の存在そのものを示すコンポーネント

State of Cash Agreement ID #123/1

Contract Code Reference
Whereas:
Issuer : Barclays Bank PLC
Issue Date : 1 Jan 2016
Legal Prose Reference
Amount : 100
Currency : USD
Owner : Barclays Bank PLC

コントラクトコード

所謂、スマートコントラクトに該当するコンポーネント

Cash Payment Transaction #456

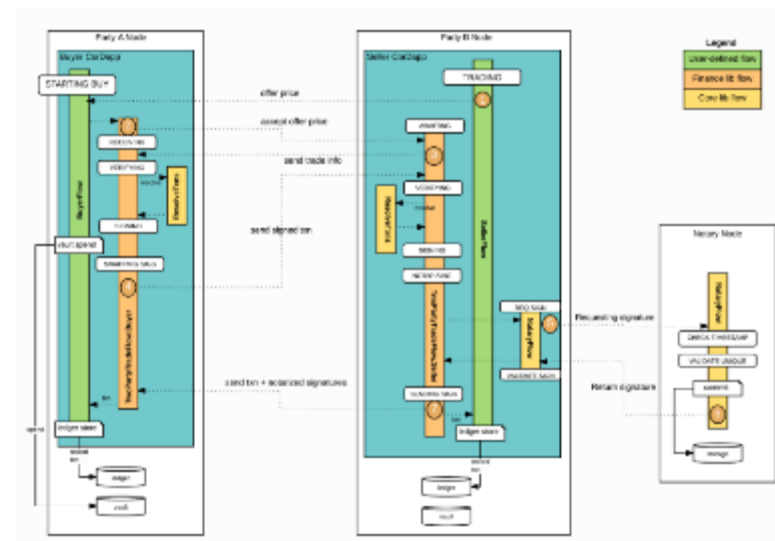
Input Cash State ID #123/1
Command : Cash Pay
Pub Key
Output Cash State ID #456/1
Signature

トランザクション

ステートオブジェクトの状態を遷移させるコンポーネント

フロー

ノード間でトランザクションデータを送信し合い、共有された事実について合意形成を進めるためのコンポーネント



ユニークネスサービス- 二重支払（取引）の防止

Cash Pay トランザクション：提案

インプット

ID : x8d14
金額 : 100
通貨 : USD
オーナー : Alice

コマンド

Cash Pay

アウトプット

ID : x7f14
金額 : 50
通貨 : USD
オーナー : Bob

ID : da01h
金額 : 50
通貨 : USD
オーナー : Charlie

1. “x8d14”は使われていますか？

2. 使われていません。

3. 取引を“提案”から“確認済”にします。

Cash Pay トランザクション：確認済

インプット

ID : x8d14
金額 : 100
通貨 : USD
オーナー : Alice

コマンド

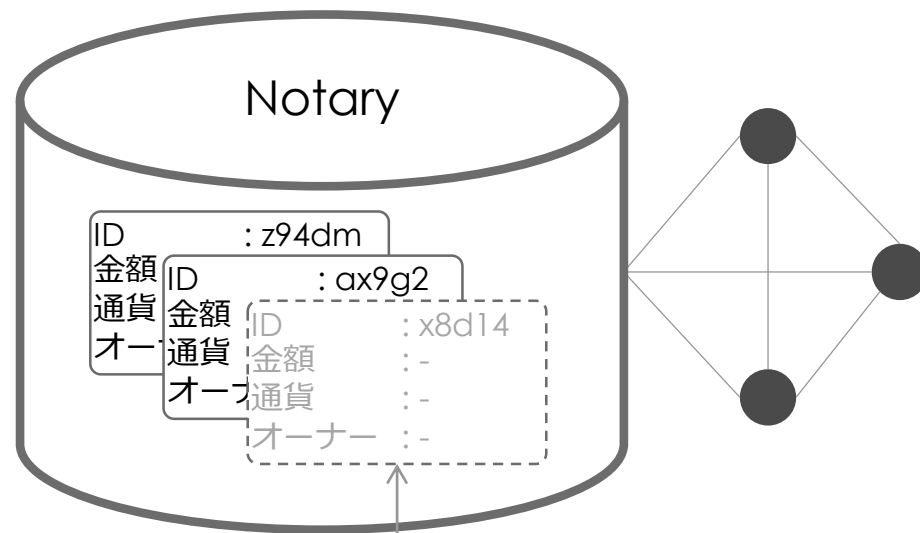
Cash Pay

アウトプット

ID : x7f14
金額 : 50
通貨 : USD
オーナー : Bob

ID : da01h
金額 : 50
通貨 : USD
オーナー : Charlie

4. “x8d14”を使用済みにします。



事例 – トレードファイナンス

Eleven banks develop trade finance app on R3's Corda DLT platform

07 August 2017 | 8844 views | 0

Source: R3

Eleven banks have passed a major milestone in the digitisation of documentary trade finance.

They have developed a prototype application on R3's distributed ledger platform, Corda, that has the potential to significantly reduce inefficiencies and costs by streamlining the processing of sight letters of credit.

Bangkok Bank, BBVA, BNP Paribas, HSBC, ING, Intesa Sanpaolo, Mizuho, RBS, Scotiabank, SEB and U.S. Bank have been collaborating with R3 and technology partner CGI over the last year on numerous trade finance projects, building and testing applications. Using lessons learnt from these projects, the group has now developed a prototype application on Corda that incorporates sight letters of credit.

L/Cトランザクション

<https://www.finextra.com/pressarticle/70297/eleven-banks-develop-trade-finance-app-on-r3s-corda-dlt-platform>

R3 and 12 banks plan overhaul of open-account trade finance

26 September 2017 | 6742 views | 0



オープンアカウント

Blockchain consortium R3 is collaborating with 12 banks and technology vendor TradeIX on an open-account trade finance project for corporate buyers and sellers around the world.

R3, TradeIX and the participating banks - Bangkok Bank, Barclays, BBVA, Bladex, BNP Paribas, Commerzbank, CTBC Bank, ING, Intesa Sanpaolo, Shinhan Bank, Royal Bank of Scotland and Wells Fargo - are

<https://www.finextra.com/newsarticle/31113/r3-and-12-banks-plan-overhaul-of-open-account-trade-finance/transaction>

事例 – トレードファイナンス

R3 and Bolero to partner on a new electronic Bill of Lading (eBL) service

09 October 2017 | 4266 views | 0 
Source: R3

R3, the enterprise software firm, is to partner with Bolero, the premier world trade finance digitisation solution-provider, to develop a new eBL service that opens up seamless connectivity across multiple trade networks.

The two companies have agreed a Memorandum of Understanding for collaboration on the joint project which will deliver a new, easy way of connecting supply chain participants, simplifying and further digitising world trade.

**eBL (bill of lading)
サービスの提供**

<https://www.finextra.com/pressarticle/71041/r3-and-bolero-to-partner-on-a-new-electronic-bill-of-lading-ebl-service>

SIA to open network nodes to R3 blockchain apps

8 hours ago | 1953 views | 0 



**600ノードのネットワーク
2018年Q1に利用可能**

Italy's SIA is to set up a 600 node network for bank clients, government agencies and corporates to connect to blockchain apps developed by the R3 consortium.

SIA says it will build a secure and protected network called SIACHAIN, which will be integrated with R3's Corda platform to enable SIA

<https://www.finextra.com/newsarticle/31297/sia-to-open-network-nodes-to-r3-blockchain-apps>

事例 – パイロット取引

New DLT consortium forms for syndicated lending market

05 October 2017 | 3267 views | 0



シンジケートローンのパイロット取引

A consortium of fintechs and banks has developed a distributed ledger technology (DLT) platform for the syndicated lending market.

The online marketplace, named Fusion LenderComm, is designed to bring more transparency and efficiency to the heavily manual loan

<https://www.finextra.com/newsarticle/31153/new-dlt-consortium-forms-for-syndicated-lending-market>

Commerzbank completes money market transaction over R3 Corda

25 September 2017 | 3651 views | 0



コマーシャルペーパーの
パイロット取引

Germany's Commerzbank has hailed the potential of blockchain technology for money market trades, having successfully replicated a EUR100,000 Euro Commercial Paper transaction with a limited number of trading partners.

The security, comprising a €100,000 issuance volume with a five-day term, was sold to asset management group MEAG, and settled without a paying agent or a clearing system.

<https://www.finextra.com/newsarticle/31107/commerzbank-completes-money-market-transaction-over-r3-corda>

事例 – アイデンティティ

Synechron joins with R3 and 12 global banks on KYC platform

22 August 2017 | 6764 views | 0

Source: Synechron

Synechron, Inc, the global financial services consulting and technology services provider, has today announced a distributed ledger technology (DLT) collaboration with R3, the enterprise software firm.

The collaboration will work toward developing a KYC solution built on Corda; R3's financial grade distributed ledger that operates in strict privacy in an open, global network. The solution will build upon a point-to-point, secure and scalable distributed ledger technology and verifiable corporate data to create a secure, scalable solution reducing the cost of KYC process and improving the efficiency of digital identity.

自己証明型
アイデンティティ

<https://www.finextra.com/pressarticle/70430/synechron-joins-with-r3-and-12-global-banks-on-kyc-platform>

Evernym and R3 pair Sovrin ID with Corda tech

12 hours ago | 1607 views | 0

Source: Evernym

Self-sovereign identity technology leader Evernym and enterprise software firm R3 concluded a study to determine the interoperability of R3's Corda platform with Sovrin, the only distributed ledger purpose-built for self-sovereign identity.

Originally developed by Evernym and later turned over to the international non-profit Sovrin Foundation. Evernym's proprietary distributed identity solutions are built upon the Sovrin network.

As part of the joint initiative, four R3 member banks tested the ability of Evernym's technology to add self-sovereign identity to the Corda platform. Such self-sovereign identity is only achievable on cryptographically protected, distributed ledgers.

他DLTとの
インターオペラビリティ

<https://www.finextra.com/pressarticle/72373/evernym-and-r3-pair-sovrin-id-with-corda-tech>

事例 – 規制当局、中央銀行

R3 unlocks regulatory reporting on Corda with Financial Conduct Authority and two global banks

12 September 2017 | 2147 views | 0

Source: R3

Enterprise software firm R3, the Financial Conduct Authority (FCA), RBS and another major global bank have built a prototype application for regulatory reporting of mortgage transactions on R3's Corda distributed ledger technology (DLT) platform.

This unique collaboration between two major banks and a national regulator demonstrated how DLT's shared data model can enable continuous regulatory reporting for financial institutions. The application is also able to generate automated delivery receipts for the regulator when a mortgage is booked.

英国の規制当局
の巻き込み

<https://www.finextra.com/pressarticle/70642/r>

Singapore central bank open sources blockchain prototypes

17 hours ago | 6140 views | 0



An industry consortium led by the Monetary Authority of Singapore (MAS) and the island's Association of Banks has released the source-codes of three successful distributed ledger prototypes for inter-bank payments in an effort to encourage other financial institutions.

シンガポール規制当局
/ オープンソース化

<https://www.finextra.com/newsarticle/31331/singapore-central-bank-open-sources-blockchain-prototypes>

事例 – プロトタイプ

20+ banks and R3 plan DLT-based cross-border payment platform

31 October 2017 | 8639 views | 0



Blockchain consortium R3 and 22 of its member banks have collaborated on the development of a cross-border payments platform built using distributed ledger technology (DLT).

国際送金

<https://www.finextra.com/newsarticle/31268/20-banks-and-r3-plan-dlt-based-cross-border-payment-platform>

Italian banks to test R3 Corda for payments reconciliation

12 hours ago | 2512 views | 0



NTT Dataが参画

The research and innovation centre of the Italian Bankers Association, ABI Lab, is building a blockchain proof-of-concept to handle straight-through processing of interbank reconciliations over the R3 Corda platform.

For the trial, ABI Lab, in cooperation with NTT Data Italia, will explore

<https://www.finextra.com/newsarticle/31479/italian-banks-to-test-r3-corda-for-payments-reconciliation>

事例 – プロトタイプ

Could distributed ledgers restore the reputation of the MBS market?

18 January 2018 | 7626 views | 0



MBS

Four top tier financial institutions are collaborating on the use of distributed ledger technology to revive the market for mortgage-backed securities, the reviled financial instruments which precipitated the global banking crisis in 2008.

<https://www.finextra.com/newsarticle/31544/could-distributed-ledgers-restore-the-reputation-of-the-mbs-market>

事例 – 非金融分野 (保険)

(B2B) 保険代理店、保険会社間のリスク情報共有プロセスを効率化



Industry consortium creates first blockchain-based solution for the corporate insurance market in Italy to improve customer service in the risk assessment phase

Simplification, transparency, safety and efficiency during the information sharing process between brokers and insurers thanks to Blockchain technology

Paris, Milan - January 10, 2018 - Generali Global Corporate & Commercial Italia, AIG and UnipolSai Assicurazioni as insurers, with Aon and Willis Towers Watson as brokers, and consulting support from [Capgemini in Italy](#) have implemented, for the first time in the Italian insurance market, an innovative solution to reduce inefficiencies and enhance the services offered to corporate clients.

In Italy, a huge amount of data has to be processed in order to establish the correct and prompt evaluation of greater corporate risks. This data is then shared via seamless information flows between clients, brokers and insurers. Operational process inefficiencies and the evolution of the Italian regulatory framework motivated this group of companies to create a set of standards for data communication - starting from property risk - and evaluate the technologies available in order to automate the sharing and approval processes as much as possible. Right now all of these steps are usually performed manually.

https://www.capgemini.com/wp-content/uploads/2018/01/20180110_insurance_blockchain-solution_italy.pdf

- マニュアルで行っている情報共有と承認プロセスの自動化
 - 2017年6月から開始、開発は2か月
 - 交渉および見積時間を**90%**削減
 - データモデルの標準化
 - 業務プロセス
1. 代理店：最低限のリスク情報を収集し、保険会社に一次評価を依頼
 2. 保険会社：リスク情報を評価し、回答する
 3. 代理店：情報を取りまとめ、見積を保険会社に依頼
 4. 保険会社：見積提案を代理店に送信。プラットフォーム上で交渉・合意
 5. 代理店、保険会社：保険契約内容に合意、関係者だけがプラットフォーム上で発注情報、契約情報にアクセス可能

事例 – 非金融分野 (ヘルスケア)

- 膝、腰等の治療に係る支払を包括的に行えるようなソリューションの開発
- Cordaを使ったヘルスケアのユースケースとしては初の試み



[HOME](#) [SERVICES](#) [NEWS](#) [EDUCATION](#) [ABOUT US](#)

Aver and HSBlox Announce Strategic Partnership for Bundled Payments Administration Using the R3 CORDA Platform

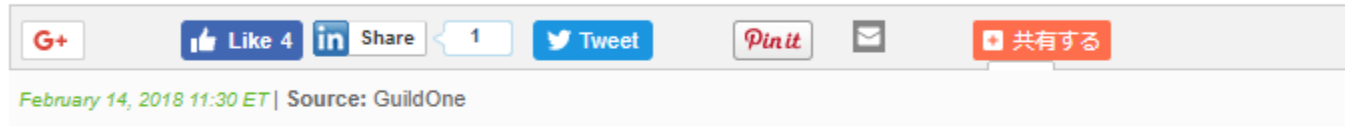
December 20, 2017 07:00 AM Eastern Standard Time

COLUMBUS, Ohio & ATLANTA--(BUSINESS WIRE)--Two industry leading companies with focused solutions for the healthcare ecosystem, Aver Inc. ("Aver") and HealthshareBlox, LLC ("HSBlox"), today announced a strategic partnership that will integrate HSBlox's distributed ledger technology ("DLT" aka "blockchain") smart contract enabled, episodic payment solution (CuraBlox™) into Aver's episode of care administration, analytics, pricing, and network contracting solutions. This collaboration represents an innovative, best-in-class approach to the administration of prospective bundled payments. The companies have identified initial clients for the administration of knee, shoulder, and maternity bundles.

<https://www.businesswire.com/news/home/20171220005106/en/Aver-HSBlox-Announce-Strategic-Partnership-Bundled-Payments>

事例 – 非金融分野 (石油・ガス)

GuildOne's Royalty Ledger settles first royalty contract on R3's Corda blockchain platform



CALGARY, Alberta, Feb. 14, 2018 (GLOBE NEWSWIRE) -- GuildOne Inc. ("GuildOne" or the "Company") is pleased to announce the first execution of a royalty smart contract using the Company's new Royalty Ledger application on R3's Corda blockchain platform. The announcement was made at the [Blockchain, IoT and Machine Learning in Oil and Gas Conference](#) on February 14th in Calgary, Alberta.

Utilizing blockchain technology, Royalty Ledger successfully executed an oil royalty contract settlement and payment transaction. As a Proof of Concept, Royalty Ledger is the first implementation of a smart contract in the oil and gas royalty sector and was delivered together with NAL Resources Management Limited, PrairieSky Royalty Ltd. and ATB Financial.

- 石油・ガスセクター向けの初めてのユースケースになります。
- スマートコントラクトによる利権に関する紛争解決を目的としています。
- 実は、非金融分野でのCorda適用が着々と進んでおります。「一番になりたい」という理由で、POC完了まで公表されないことが多いです。

事例 – クラウド

R3 deepens integration with Microsoft Azure

20 November 2017 | 3154 views | 0

Source: R3

R3 and Microsoft Corp. have expanded their strategic partnership to further accelerate adoption of R3's Corda platform amongst businesses using Microsoft Azure.

Having worked together since April 2016, the partnership will now offer deeper integration of the Corda platform with Azure making it easier for businesses to deploy underlying computing resources for blockchain networks. The expansion reaffirms Azure as R3's preferred cloud provider.

デフォルトパートナー
Azureで利用可能

<https://www.finextra.com/pressarticle/71635/r3-deepens-integration-with-microsoft-azure>

R3's Corda arrives on AWS Marketplace

15 hours ago | 1413 views | 0

Source: R3

Enterprise software firm R3's Corda has become one of the first distributed ledger technology (DLT) solutions available to users of Amazon Web Services (AWS), enabling AWS's network of users to build and deploy applications for finance and commerce on R3's Corda.

Now available on AWS Marketplace, R3's Corda allows AWS users to develop CorDapps, or deploy example CorDapps from R3 directly from AWS Marketplace.

AWS Marketplace
で利用可能

<https://www.finextra.com/pressarticle/71811/r3s-corda-arrives-on-aws-marketplace>

Appendix



Corda Partner Network

There are over 70 partners building on Corda – the only enterprise blockchain solution that is completely partner-led

