



HYPERLEDGER PROJECT

Altoros Hyperledger Demo

Bond Issuance and Trading



ALTOROS™

Introducing Hyperledger

A **collaborative** effort created to **advance blockchain** technology by identifying and addressing important features for a **cross-industry open standard** for distributed ledgers that can transform the way **business transactions** are conducted globally.

Introducing Altoros

Altoros is a 250+ people consultancy helping banks and insurance companies digitize revenue streams.

For blockchain applications we integrate solutions offered by the Hyperledger ecosystem.



Insurance

needs to raise money

exposed to a risk of a
disaster when it
needs to pay out
claims

Investor

needs to invest money

needs to diversify with
an instrument less
dependent on market
conditions



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Catastrophe Bond

- pays attractive rate
- principal is forgiven if a disaster happens



Insurance

needs to raise money

exposed to a risk of a disaster when it needs to pay out claims

Investment Bank

advises on terms

connects with investors

keeps records

forwards payments

administers the catastrophe trigger

Investor

needs to invest money

needs to diversify with an instrument less dependent on market conditions



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Insurance

needs to raise money

exposed to a risk of a disaster when it needs to pay out claims

Investment Bank

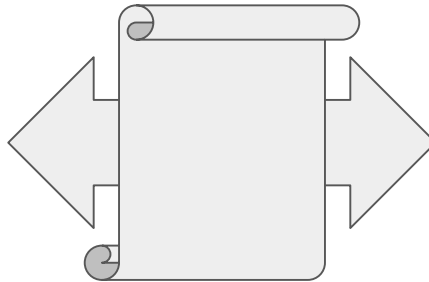
advises on terms

Investor

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Smart Contract



Trust

While software can execute the tasks of a **custodian** it needs to be trusted by Issuer and Investor at least as much as they trust Investment Bank.

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Blockchain

Shared immutable ledger

records are kept by all involved parties: Issuers and Investors

Consensus



the records cannot deviate
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Automation

Blockchain not only keeps records but executes smart contracts that automate the functions of a financial instrument.

Open market: Issuer and Investor discover each other on the blockchain

Terms of the bond contract are codified in a smart contract

Coupon payments are triggered by the smart contract

Maturity and payment of principal is automated by the contract

Catastrophe event is automated on a trigger by a public record



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Confidentiality

Hyperledger provides for confidentiality of transactions unlike public blockchains

Terms of the agreement are visible to counterparties only

Only vetted parties are allowed to participate

Efficiency

Minimum investment in infrastructure or software

Built in security by advanced cryptography. The architecture of blockchain is safer than any single enterprise system or a combination of them.

Blockchain peer software is deployed at every participant's server

Low cpu load. Unlike public blockchains where peers run intensive and wasteful proof-of-work calculations

No single point of failure



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Payment

The blockchain does not run any cryptocurrency but relies on traditional payment systems to tell it that a money transfer occurred. These payment systems like SWIFT, FedWire or ACH are agreed to be trusted by members.

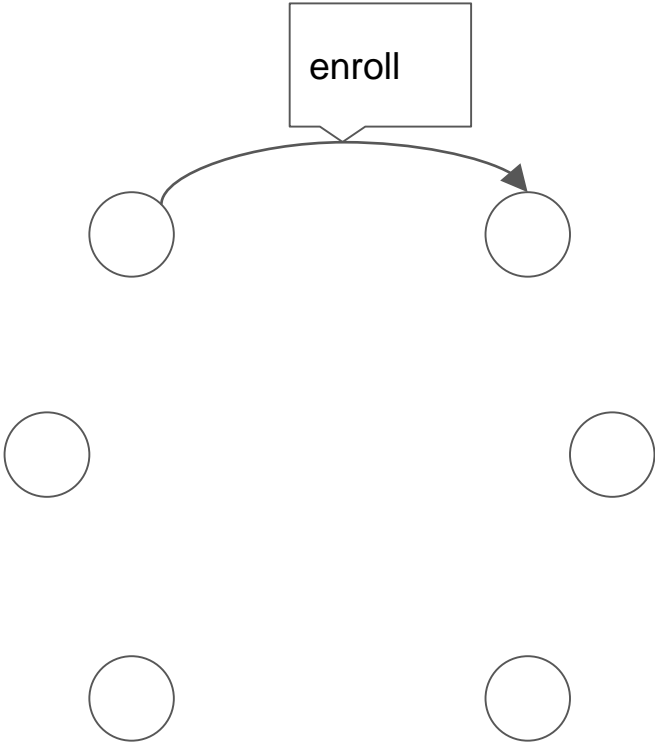
Discovery

1. Issuer and Investors install blockchain software



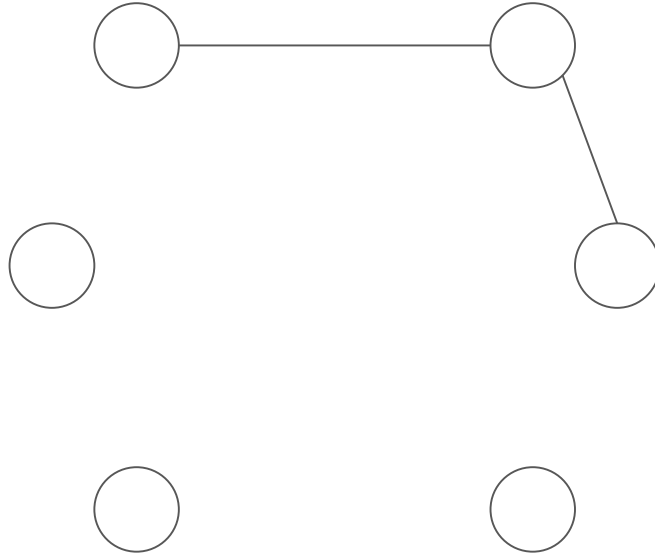
Discovery

- 1. Issuer and Investors install blockchain software
- 2. An authority run either by the Issuer or a regulator enrolls market participants



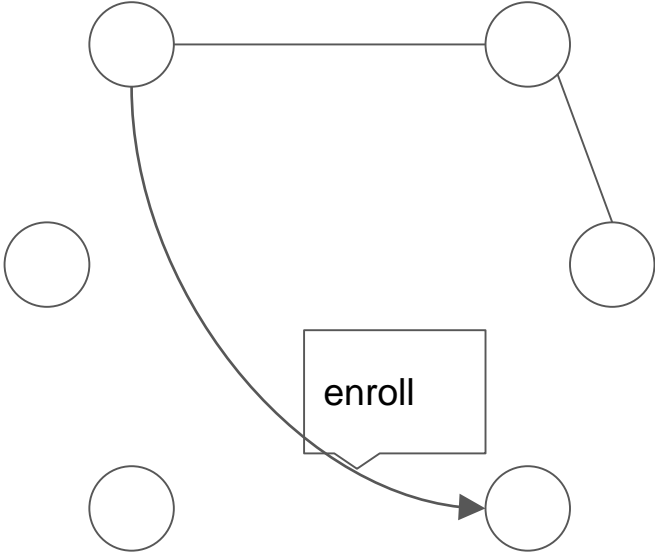
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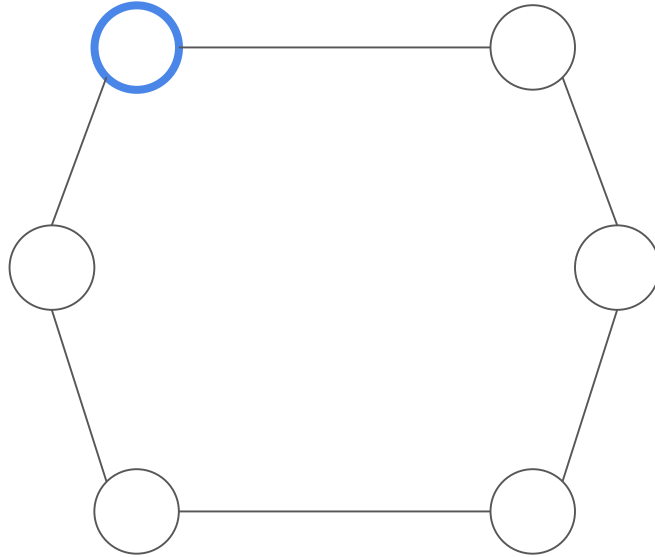
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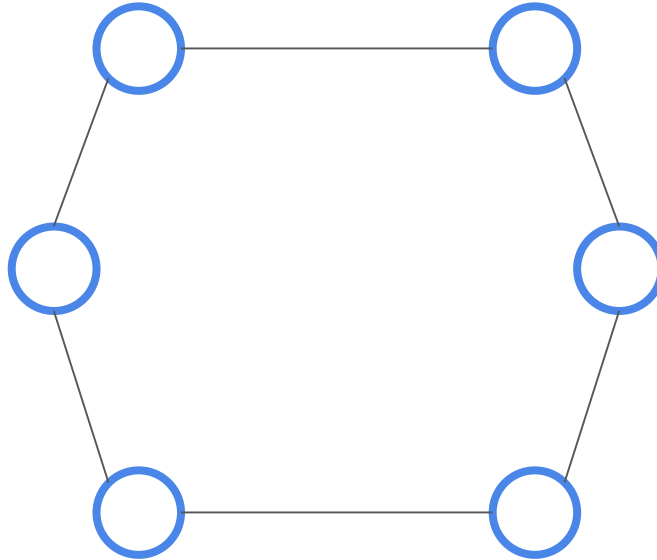
Discovery

1. Issuer and Investors install blockchain software
2. An authority run either by the Issuer or a regulator enrolls market participants
3. Issuer deploys a smart contract with a new bond terms



Discovery

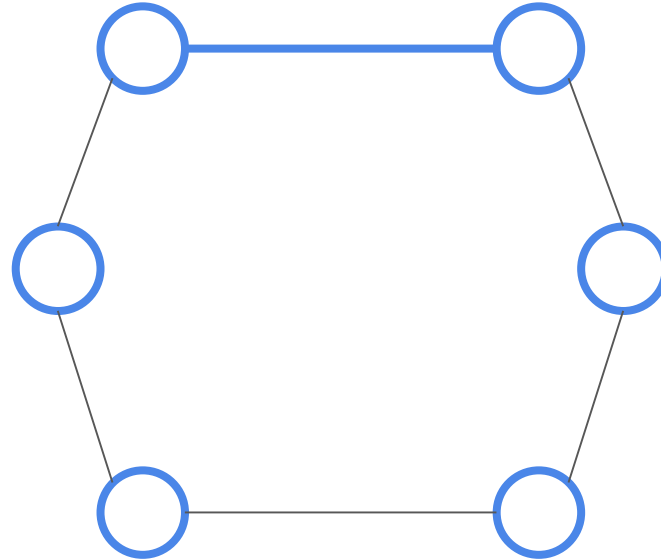
1. Issuer and Investors install blockchain software
2. An authority run either by the Issuer or a regulator enrolls market participants
3. Issuer deploys a smart contract with a new bond terms
4. Investors query the blockchain, discover the bond



Investor buys a bond contract

1. Investor invokes bond smart contract with his identity and enters into an agreement with the Issuer

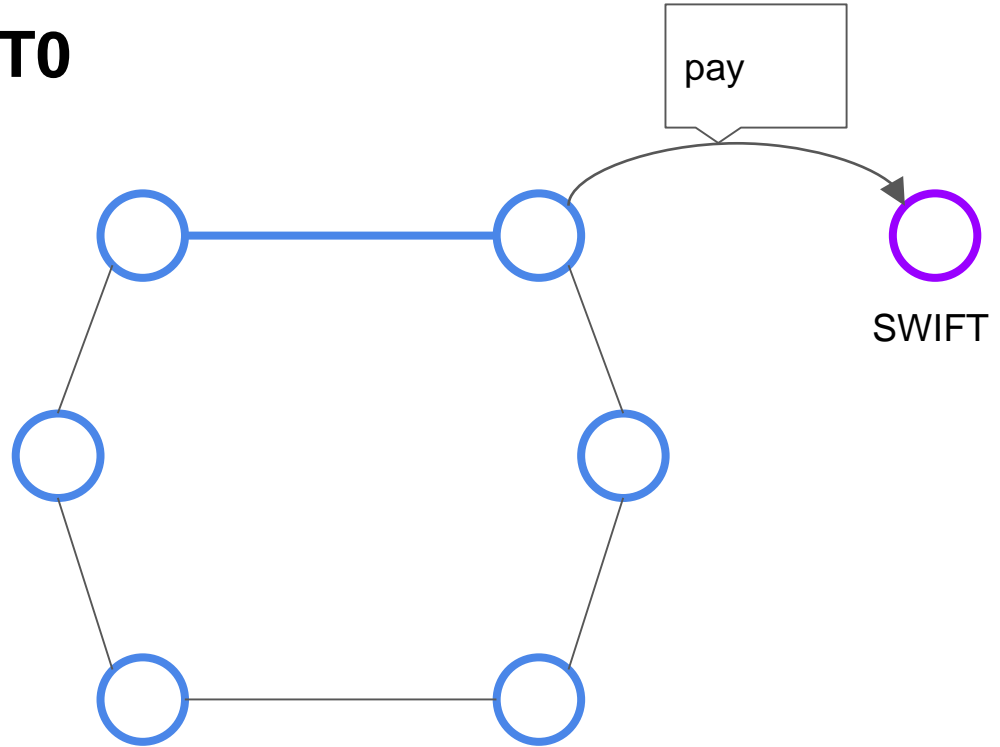
T0



Investor buys a bond contract

1. Investor invokes bond smart contract with his identity and enters into an agreement with the Issuer
2. Investor issues payment instructions to SWIFT to pay Issuer

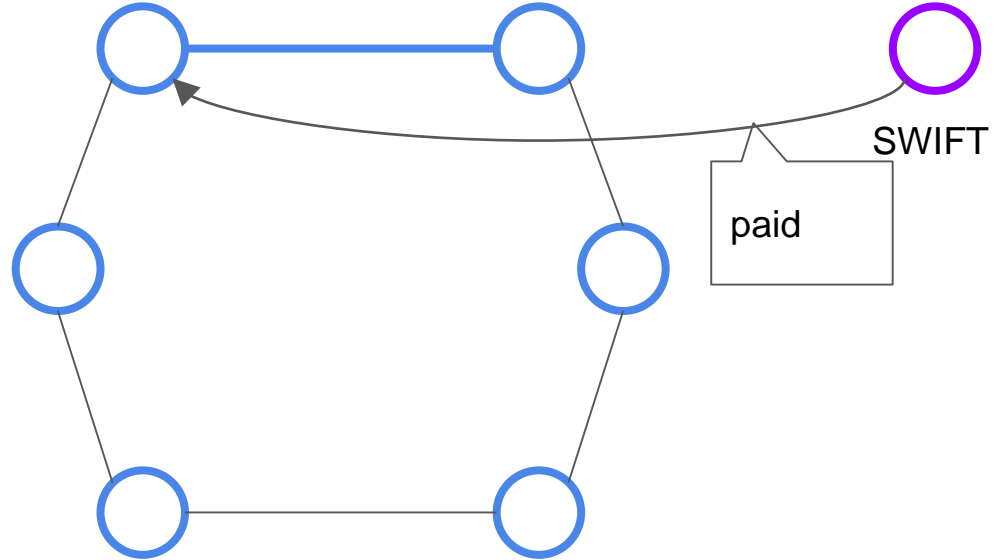
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Investor buys a bond contract

1. Investor invokes bond smart contract with his identity and enters into an agreement with the Issuer
2. Investor issues payment instructions to SWIFT to pay Issuer
3. SWIFT invokes smart contract with the payment confirmation

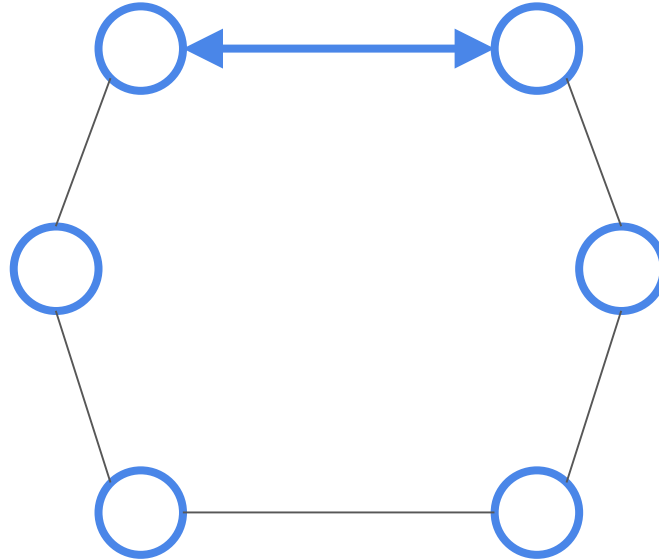
T0



Investor buys a bond contract

1. Investor invokes bond smart contract with his identity and enters into an agreement with the Issuer
2. Investor issues payment instructions to SWIFT to pay Issuer
3. SWIFT invokes smart contract with the payment confirmation
4. Smart contract is activated

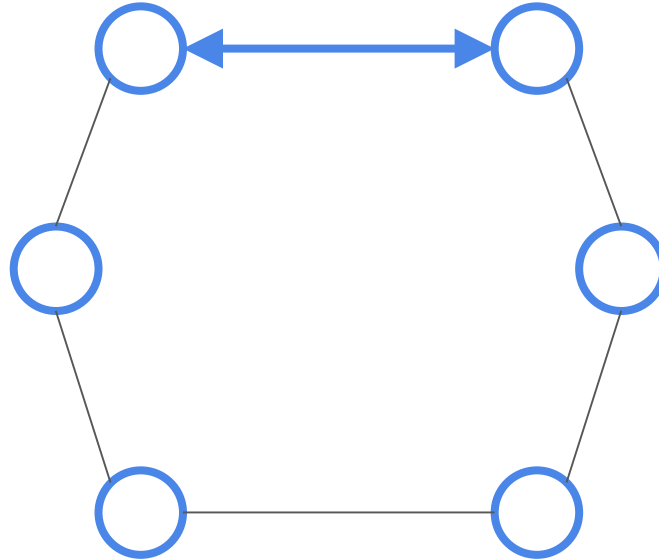
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Issuer pays coupon to Investor

1. Smart contract is invoked on coupon date

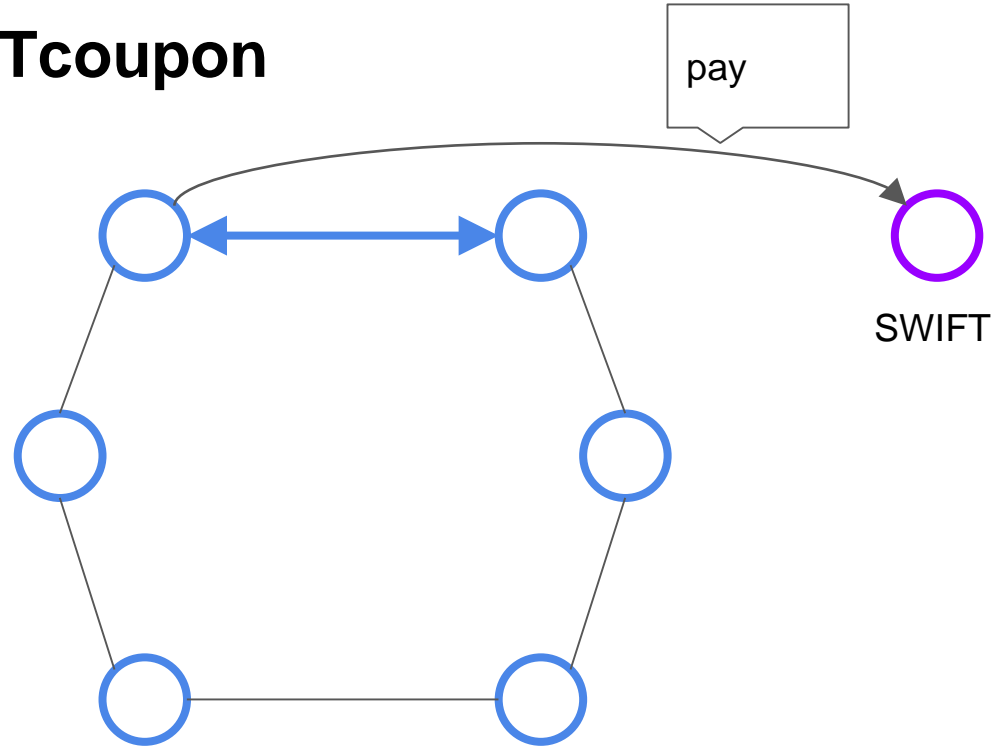
Tcoupon



Issuer pays coupon to Investor

1. Smart contract is invoked on coupon date
2. Smart contract issues payment instructions to pay Investor on behalf of Issuer

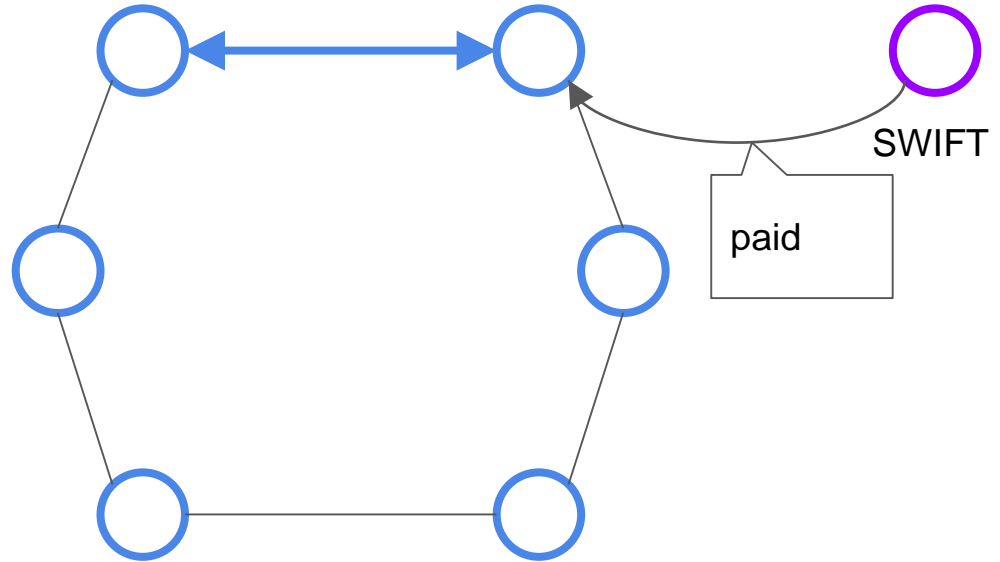
Tcoupon



Issuer pays coupon to Investor

1. Smart contract is invoked on coupon date
2. Smart contract issues payment instructions to pay Investor on behalf of Issuer
3. SWIFT invokes smart contract with the payment confirmation

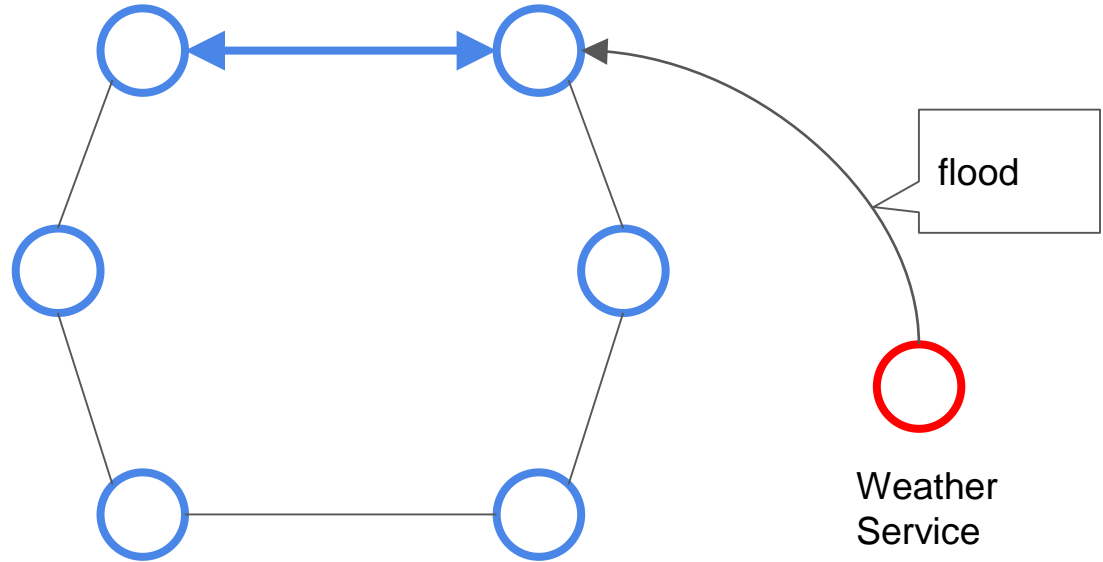
Tcoupon



Catastrophe trigger

1. Catastrophe Oracle like a National Weather Service invokes smart contract with a trigger

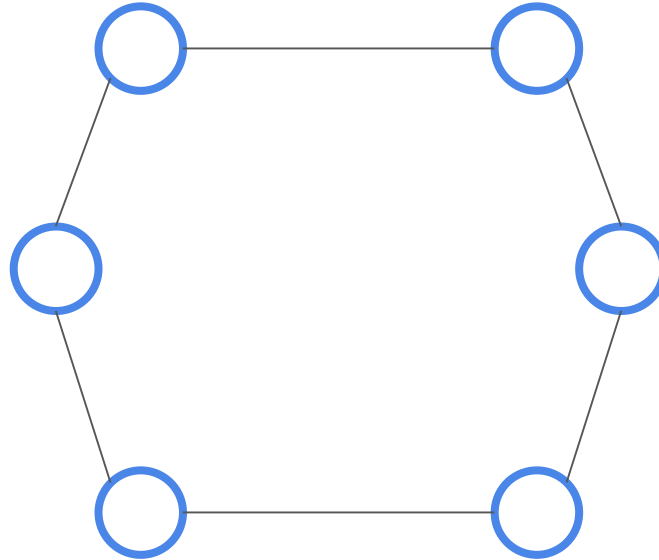
Tcataastrophe



Catastrophe trigger

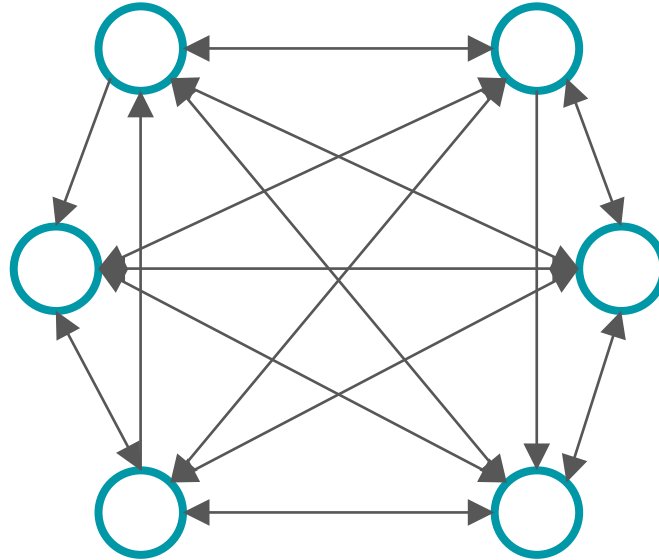
1. Catastrophe Oracle like a National Weather Service invokes smart contract with a trigger
2. Smart contract is unwound

Tcataastrophe



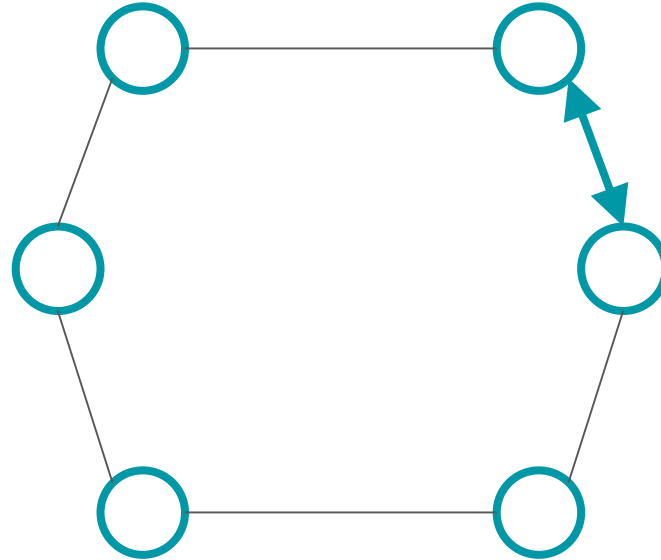
Bond contract is traded

Another smart contract implements a marketplace where investors meet and trade bond contracts



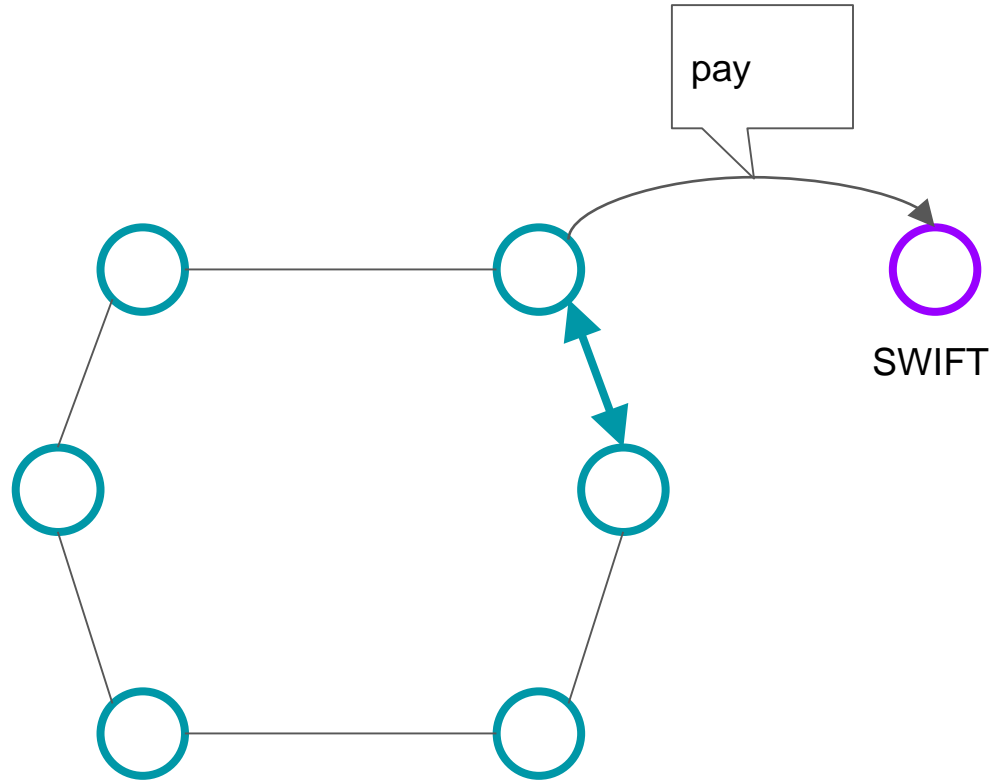
Bond contract is traded

1. Investors agree to trade via Marketplace smart contract



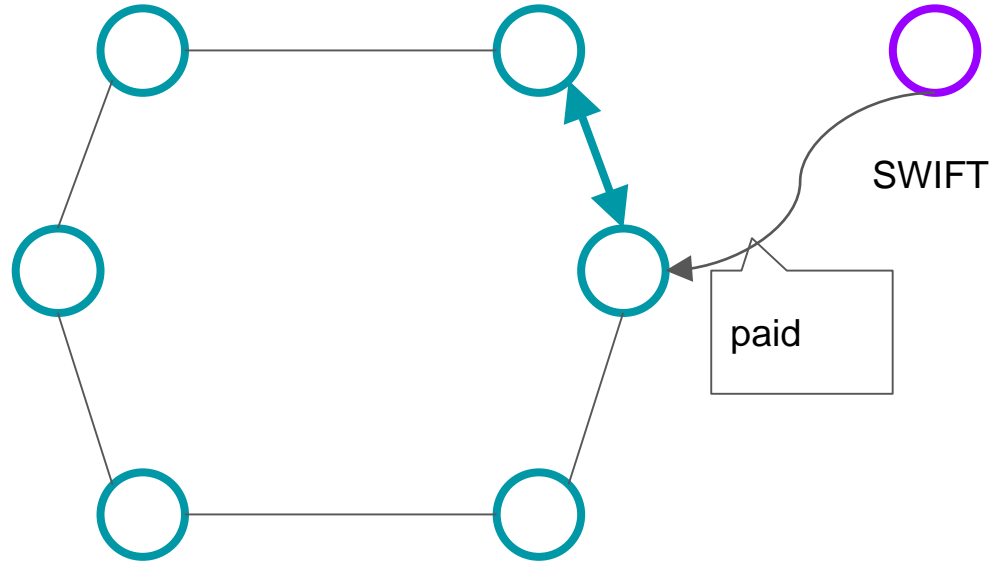
Bond contract is traded

1. Investors agree to trade via Marketplace smart contract
2. Payment instructions are issued



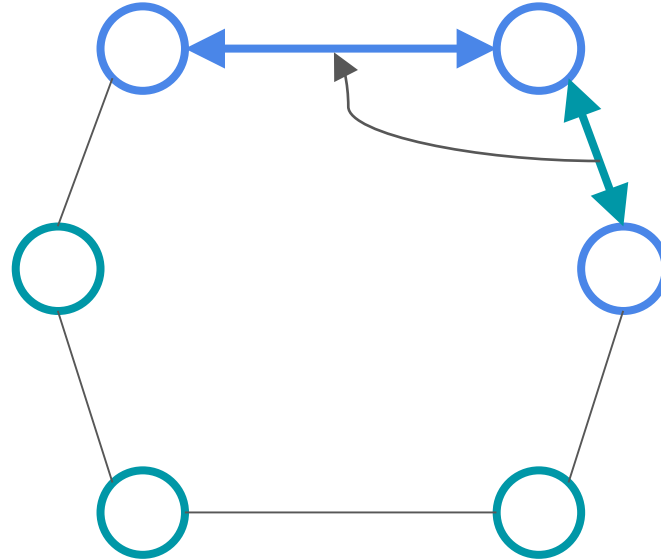
Bond contract is traded

1. Investors agree to trade via Marketplace smart contract
2. Payment instructions are issued
3. Payment confirmed



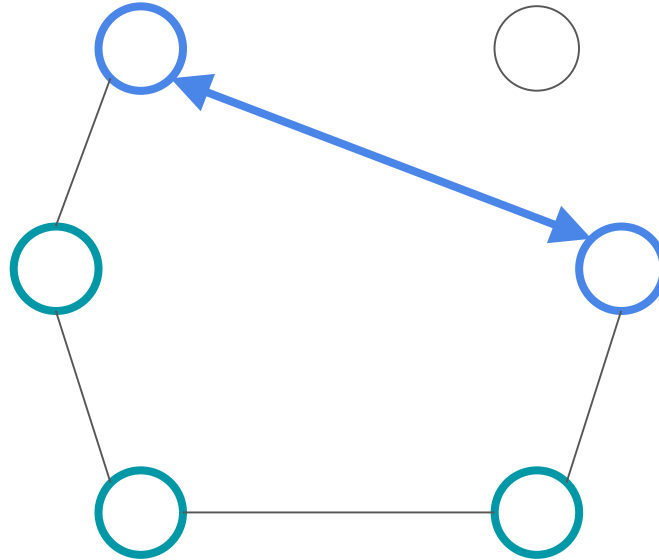
Bond contract is traded

1. Investors agree to trade via Marketplace smart contract
2. Payment instructions are issued
3. Payment confirmed
4. Marketplace invokes bond smart contract



Bond contract is traded

1. Investors agree to trade via Marketplace smart contract
2. Payment instructions are issued
3. Payment confirmed
4. Marketplace invokes bond smart contract
5. Bond smart contract changes counterparty



Bond Issuance on Hyperledger

Hyperledger technology provides confidentiality of financial agreements committed to a common ledger.

Smart contracts run by on Hyperledger blockchain allow to automate and model financial instruments.

A smart contract can model a distributed marketplace with complex workflows where smart contracts invoke each other.