Provenance Built on Open Source

Hyperledger In-Depth Webinar with BTP

25 January 2022
Provenance
The term *provenance* is often associated with the art world. However, recording and sharing provenance data can provide significant value across industries...

*Provenance* captures the origin and life journey — including the ownership history — of a physical or digital asset.
Why Provenance Matters

Transparency & Trust
Anti-fraud & Anti-counterfeiting
Consumer Safety
Ethical Sourcing
Environmental Sustainability
Resilient Supply Chains
Our Value Proposition

We are a digital provenance company with a mission to make assets trustworthy. We believe that provenance is a force for good, as it brings transparency and trust to a wide range of markets.

We make it easy for organizations to record and query immutable provenance information on a distributed ledger, about any asset, in any domain, across multiple parties.

We do this by providing Chronicle, our open-source, blockchain-backed, domain-agnostic provenance product.

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The Chronicle Story

Introducing Chronicle: Blockchain-Backed Provenance

Today, we are officially launching Chronicle, our blockchain-backed and distributed ledger solutions for irrevocably recording provenance data, at the European Blockchain Convention. The ability to track the provenance of an asset — in a trusted and efficient way — can translate into immense value across industries, and blockchain and distributed ledger technology is key to making this happen.

Provenance and Why It Matters

The notion provenance originally comes from the art world, where it refers to the chronology of ownership and location of an artwork. As discussed in my previous piece — a "Provenance and A Killer Application for Blockchain" — blockchain offers a solution for provenance records that confirms the authenticity as well as the provenance of the art. We decided to explore this idea and share our experiences with the blockchain community.

The importance of provenance doesn’t stop at art, however. In the digital world, recording and sharing provenance data can have a multitude of use cases of its own, such as tracking ownership, events, and historical events. In the case of your digital assets, blockchain may be the answer.

Why Does Provenance Matter?

Provenance is, in essence, capturing the life journey and ownership history of an asset. Not only does it ensure the authenticity, but it also allows the owner to trace the value of the item. For example, a pair of shoes from the late 1960s and early 1970s in pristine condition can be worth millions of dollars. Understanding the journey of these items can provide historical context and value.

How Does Blockchain Fit In?

Blockchain provides a solution for recording and tracking provenance data. By leveraging blockchain technology, a record of ownership and usage can be maintained throughout the asset’s lifetime. This transparency can help build trust and authenticity, which is crucial in industries such as art and collectibles.

Conclusion

In conclusion, blockchain technology offers a powerful solution for provenance and authenticity. As the world becomes more interconnected, the ability to track and verify the history of an asset becomes even more critical. Whether it’s art, collectibles, or digital assets, blockchain offers a secure and transparent way to ensure the accuracy of provenance data.

Next Steps

In the future, we look forward to expanding our blockchain technology to other industries and use cases. We believe in the power of blockchain to create a more transparent and traceable world, and we’re excited to see where this journey takes us.

BTP Makes Provenance Product Chronicle Generally Available and Turbocharges Its Sentinel Blockchain Platform

BTP’s blockchain-backed provenance solution Chronicle software was made available by state and management platform Sentinel and an upgrade.

The Chronicle Story
Open-source, blockchain-backed, domain-agnostic product for immutably recording and querying provenance data.

Built on the W3C PROV Ontology specification; uses the lightweight JSON-LD linked data format, and the data query language GraphQL.

Records provenance information of any physical or digital asset on a distributed ledger. Available with Hyperledger Sawtooth as its default backing ledger.

Easily configurable to enable users to capture provenance information for a range of domain-specific applications.

Delivered by Sextant, to facilitate its deployment and management, as well its integration with enterprise systems.
Chronicle Stack

Sextant

- Domain-Specific Data Capture
  - GraphQL
- Domain-Specific Data Queries
  - GraphQL

- Provenance Domains
  - Chronicle

- Provenance Platform
  - Chronicle

- Permissioned Blockchain / Distributed Ledger
  - Hyperledger Sawtooth

- Computing Infrastructure
  - Kubernetes
PROV-O: Domain-Agnostic Ontology

Source: PROV-O: The PROV Ontology - At a Glance
Domain-Specific Ontology

Domain: Manufacturing

Assets (aka Entities in PROV-O speak): Item, Certificate

Agents: Contractor

Activities: ItemManufactured, ItemCertified

# See the Manufacturing Example Guide
Item Manufacturing

Although various agents may be involved in the ItemManufactured activity, in this example, the Contractor is the only agent responsible for the manufacturing of the Item.
The Contractor issues a Certificate for each item. The ItemCertified activity uses this item.
Resources

Join Chronicle Works on Slack

Github - btpworks/chronicle

Github - btpworks/chronicle-examples

Github - blockchaintp/sawtooth-core

Chronicle: You Say Provenance, We Say Open Source

Is Provenance a Killer App for Blockchain?
Getting Started

# Clone Repo

git clone https://github.com/btpworks/chronicle-examples.git
cd chronicle-examples

# Build Manufacturing Example

make run-manufacturing

# Connect to GraphQL Playground

http://127.0.0.1:9982/

# See the README.md
subscription {
  commitNotifications {
    delta
  }
} # Write your query or mutation here
Define Contractors

mutation {
  agent1: defineContractorAgent(
    externalId: "helicoptersplc"
    attributes: {
      companyNameAttribute: "Helicopters PLC"
      locationAttribute: "Bristol, England"
    }
  ) {
    context
    txId
  }
  agent2: defineContractorAgent(
    externalId: "acmecorp"
    attributes: {
      companyNameAttribute: "ACME Corp"
      locationAttribute: "Burbank, California"
    }
  ) {
    context
    txId
  }
}

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Query Contractors

```graphql
query {
  agentsByType(agentType: ContractorAgent) {
    nodes {
      __typename
      ... on ContractorAgent {
        externalId
        companyNameAttribute
        locationAttribute
      }
    }
  }
}
```
Define ItemManufactured Activity

```graphql
mutation {
  defineItemManufacturedActivity(
    externalId: "rotorblademake-run-001"
    attributes: { batchIDAtribute: "run-001" }
  ) {
    context
    txId
  }
  wasAssociatedWith(
    activity: { externalId: "rotorblademake-run-001" }
    responsible: { externalId: "helicoptersplc" }
    role: MANUFACTURER
  ) {
    context
    txId
  }
}
```
Start ItemManufactured Activity

mutation {
  startActivity(id: { externalId: "rotorblademake-run-001" }) {
    context
    txId
  }
  i1: defineItemEntity(
    externalId: "rotorblade-run-001-001"
    attributes: { partIDAttribute: "run-001-001" }
  ) {
    context
    txId
  }
  g1: wasGeneratedBy(
    id: { externalId: "rotorblade-run-001-001" }
    activity: { externalId: "rotorblademake-run-001" }
  ) {
    context
    txId
  }
}
End ItemManufactured Activity

```
mutation {
  i2:defineItemEntity(
    externalId: "rotorblade-run-001-002"
    attributes: { partIDAttribute: "run-001-002" }
  ) {
    context
    txId
  }
  g2:wasGeneratedBy(
    id: { externalId: "rotorblade-run-001-002" }
    activity: { externalId: "rotorblademake-run-001" }
  ) {
    context
    txId
  }
  endActivity(id: { externalId: "rotorblademake-run-001" }) {
    context
    txId
  }
}
```

Define ItemCertified Activity

```
mutation {
  defineItemCertifiedActivity(
    externalId: "rotorbladecert-run-001-001") {
    context
    txId
  }
  wasAssociatedWith(
    activity: {
      externalId: "rotorbladecert-run-001-001"
      responsible: { externalId: "helicoptersplc" }
      role: CERTIFIER
    }
    context
    txId
  )
}
```
Start ItemCertified Activity

```
mutation {
  startActivity(
    id: { externalId: "rotorbladecert-run-001-001" }) {
    context
    txId
  }
  defineCertificateEntity(
    externalId: "rotorbladecert-run-001-001"
    attributes: { certIDAttribute: "run-001-001" }
  ) {
    context
    txId
  }
  wasGeneratedBy(
    id: { externalId: "rotorbladecert-run-001-001" }
    activity: { externalId: "rotorbladecert-run-001-001" }
  ) {
    context
    txId
  }
}
```
mutation {
  cert: used(
    id: { externalId: "rotorbladecert-run-001-001" } }
    activity: { 
      externalId: "rotorbladecert-run-001-001" }
  )
  context
  txId
)
blade: used(
  id: { externalId: "rotorblade-run-001-001" } }
    activity: { 
      externalId: "rotorbladecert-run-001-001" }
  )
  context
  txId
)
endActivity(id: { externalId: "rotorbladecert-run-001-001" }) {
  context
  txId
}

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Query Item #1

query {
  q1: entityById(id: { externalId: "rotorblade-run-001-001" }) {
    ... on ItemEntity {
      partIDAttribute
      wasGeneratedBy {
        ... on ItemManufacturedActivity {
          id
        }
      }
    }
  }
  q2: entityById(id: { externalId: "rotorbladecert-run-001-001" }) {
    ... on CertificateEntity {
      certIDAttribute
      wasGeneratedBy {
        ... on ItemCertifiedActivity {
          id
        }
      }
    }
  }
}

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Query Item #2

```graphql
query { 
  q3: entityById(id: { externalId: "rotorblade-run-001-002" }) { 
    ... on ItemEntity { 
      partIDAttribute 
      wasGeneratedBy { 
        ... on ItemManufacturedActivity { 
          id 
        } 
      } 
    } 
  } 
  q4: entityById(id: { externalId: "rotorbladecert-run-001-002" }) { 
    ... on CertificateEntity { 
      certIDAttribute 
      wasGeneratedBy { 
        ... on ItemCertifiedActivity { 
          id 
        } 
      } 
    } 
  } 
}
```

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