

Applicazione basata sulla tecnologia blockchain per i processi di certificazione ISO



**Politecnico
di Torino**

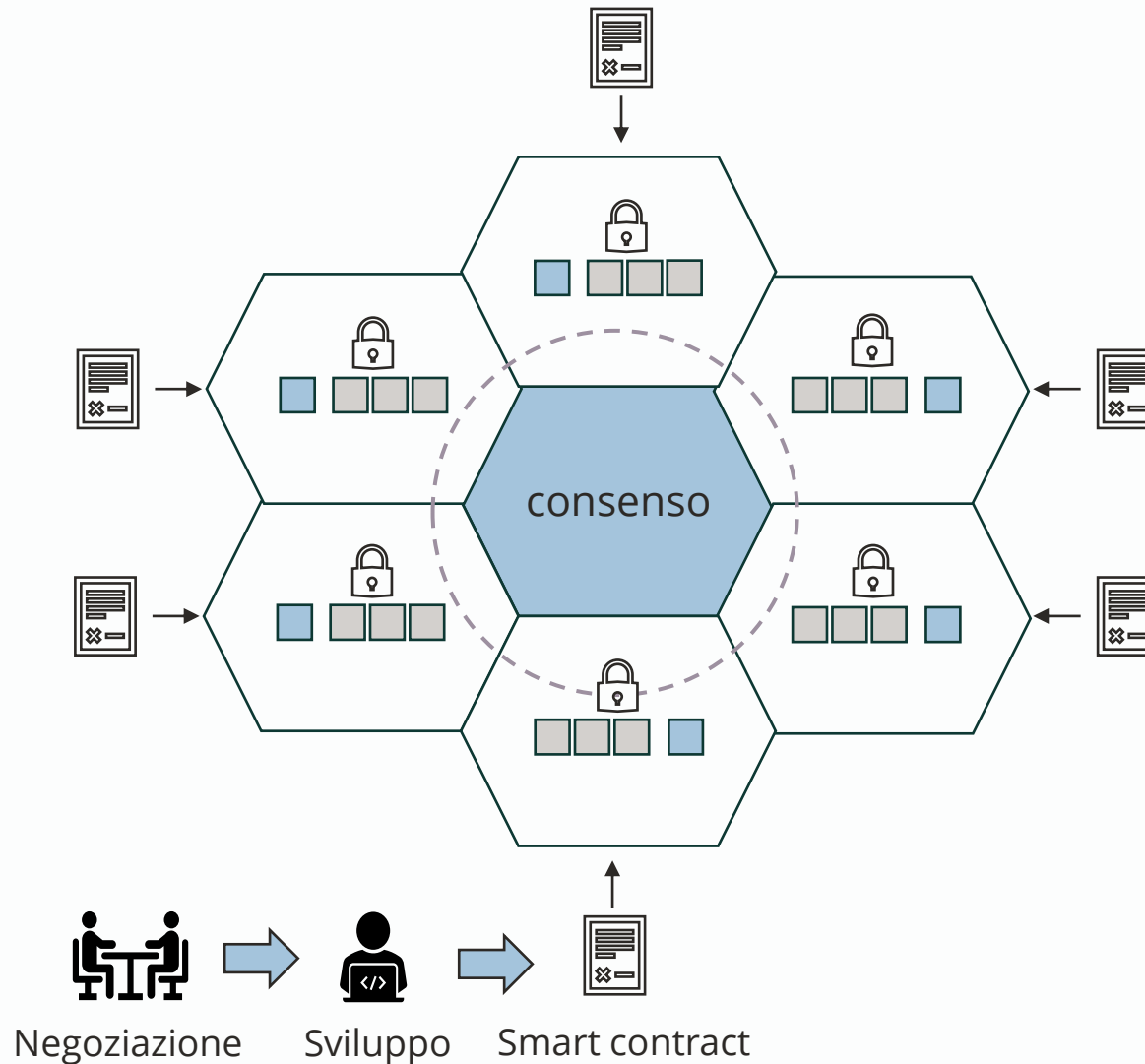
Relatore
Prof. Paolo **GIACCONE**
Candidato
Stefano **SURACI**

Contenuti

The logo of the University of Turin is a large, light gray watermark in the background. It features a central illustration of a building with multiple towers and arches, flanked by two laurel branches. Above the building is a profile of a person wearing a helmet and holding a spear. Below the building is the year '1859'.

Introduzione

1859

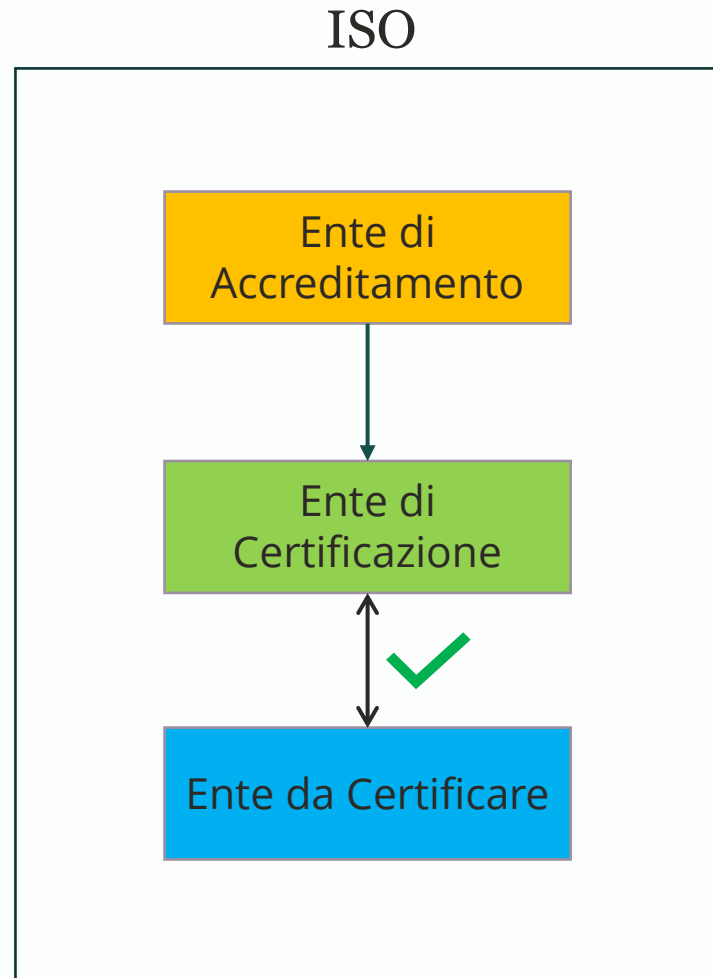


ASPETTI FONDAMENTALI:

- Decentralizzazione
- Autorità decentralizzata
- Logica centralizzata

VANTAGGI:

- ✓ Sistema neutro
- ✓ Affidabile



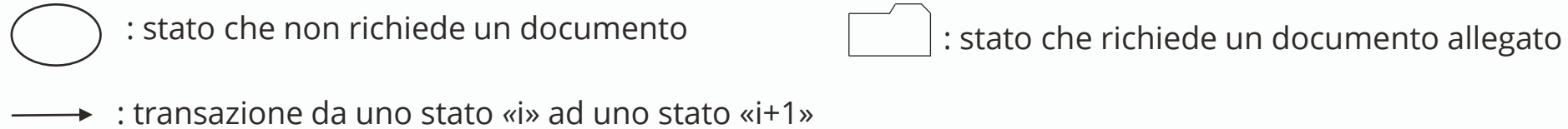
CASO DI STUDIO

- Interazione tra enti di certificazione ed enti da certificare

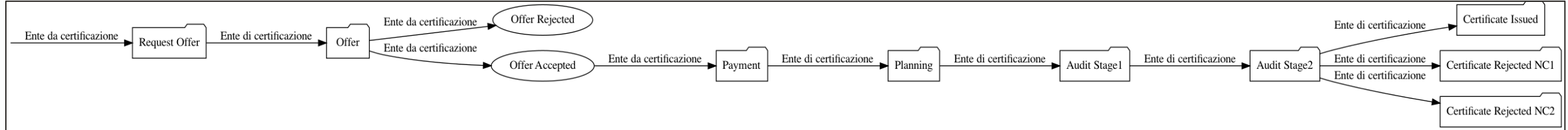
Definizione del modello astratto



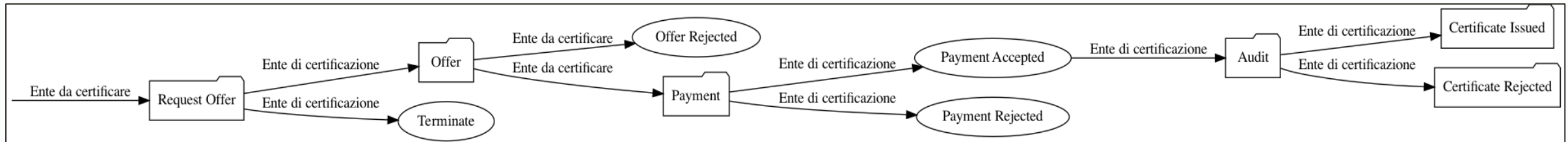
NOTAZIONE:



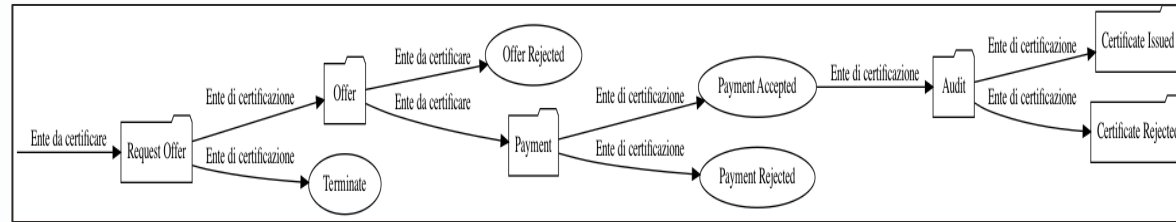
PROCESSO DI CERTIFICAZIONE ISO 9001:



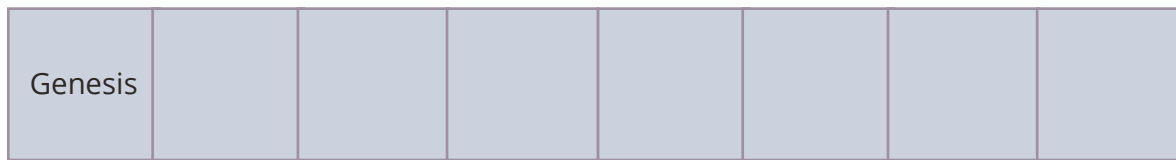
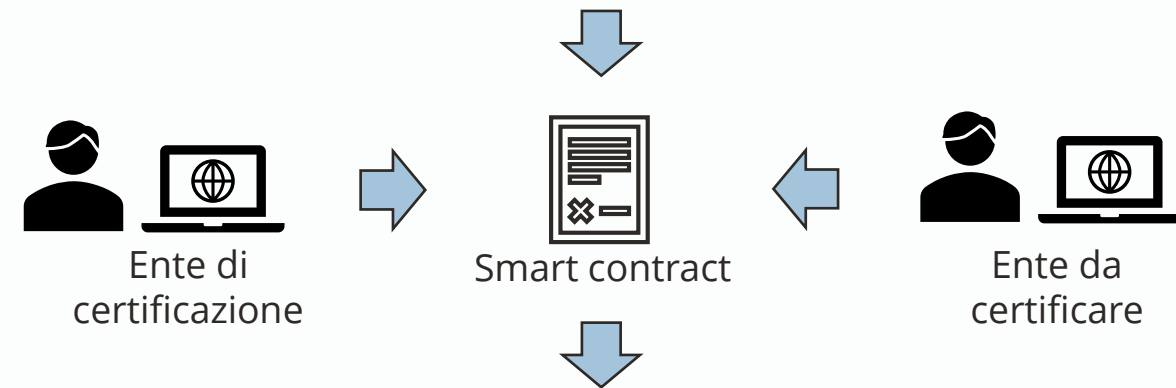
MODELLO ASTRATTO:



Scopo della tesi: blockchain per certificazioni ISO



Modello astratto



Blockchain

PRINCIPALI MOTIVAZIONI:

- Transizione digitale
- Sicurezza dei dati
- Maggiore fiducia nello strumento di accreditamento

IMPLEMENTAZIONE:

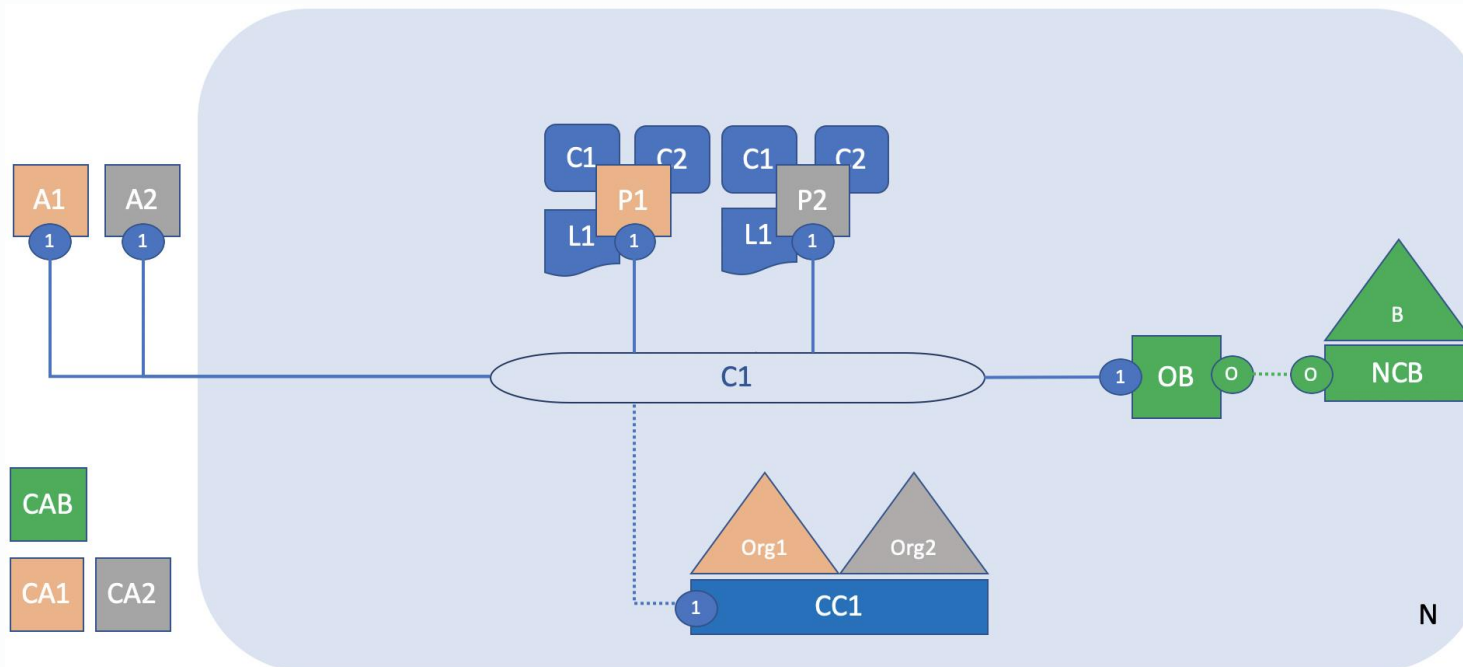
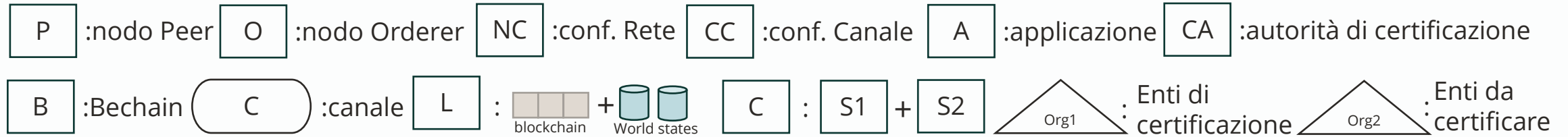
- Inserimento del modello astratto nella logica dello smart contract
- Realizzare un'applicazione web per la comunicazione tra enti di certificazione e da certificare

Contenuti

The background features a large, light gray watermark of the University of Turin logo. It consists of a central illustration of a building with two towers, flanked by a laurel wreath on the left and an oak leaf wreath on the right. Above the building is a profile of a person wearing a helmet and holding a spear. Below the building is the year '1859'.

Contributi personali

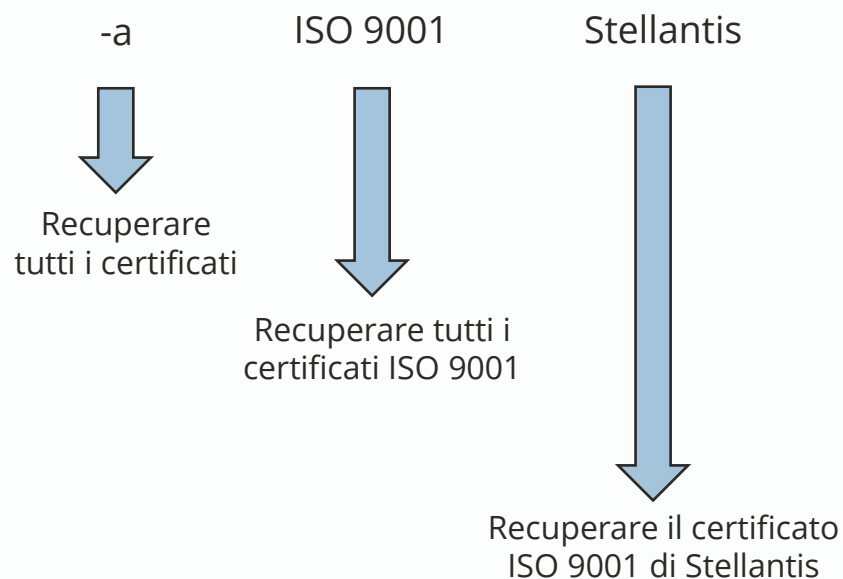
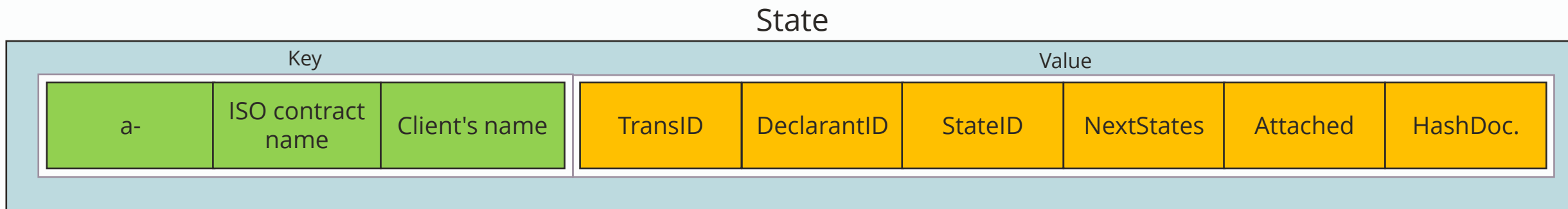
NOTAZIONE:



Architettura di rete.

ASPETTI PRINCIPALI:

- Hyperledger Fabric
- Blockchain permissioned
- Controllo degli accessi
- Comunicazione privata tra enti di certificazione e da certificare
- World states
- Riservatezza tra enti di certificazione
- Endorsement Policy: P1 e P2



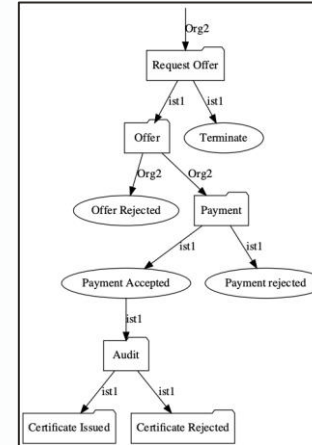
VANTAGGI:

- ✓ Verifica identità enti da certificare
- ✓ Interrogazione efficiente del database di stato
- ✓ Informazioni generiche per ogni documento
- ✓ L' hash garantisce la privacy nei confronti di Bechain

```
digraph G {
  Start [label=""] shape:none,height=0,width=0
  "Request Offer" [id="Request Offer" shape=folder]
  Offer [id="Offer" shape=folder]
  Terminate [id="Terminate" shape=ellipse]
  "Offer Rejected" [id="Offer Rejected" shape=ellipse]
  Payment [id="Payment" shape=folder]
  "Payment Accepted" [id="Payment Accepted" shape=ellipse]
  "Payment Rejected" [id="Payment Rejected" shape=ellipse]
  Audit [id="Audit" shape=folder]
  "Certificate Issued" [id="Certificate Issued" shape=folder]
  "Certificate Rejected" [id="Certificate Rejected" shape=folder]

  Start --> "Request Offer" [label = "Org2"]
  "Request Offer" --> Offer [label = "ist1"];
  "Request Offer" --> Terminate [label = "ist1"];
  Offer --> "Offer Rejected" [label = "Org2"];
  Offer --> Payment [label = "Org2"];
  Payment --> "Payment Accepted" [label = "ist1"];
  Payment --> "Payment Rejected" [label = "ist1"];
  "Payment Accepted" --> Audit [label = "ist1"];
  Audit --> "Certificate Issued" [label = "ist1"];
  Audit --> "Certificate Rejected" [label = "ist1"];
}
```

Output *createGraphviz* script



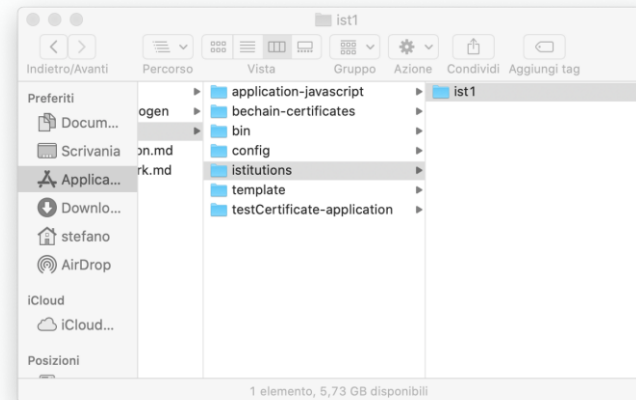
Macchina a stati

VANTAGGI:

- ✓ Creazione di un modello astratto generico
- ✓ Non richiede abilità di programmazione

```
Last login: Sat May 21 07:43:19 on ttys000
stefano@stefano ~ % cd /Applications/XAMPP/xamppfiles/htdocs/Hyperledger/fabric-
samples/template/esempi
stefano@stefano esempi % dot -Tsvg stateMachine.gv -o ISO9000.svg
stefano@stefano esempi % dot -Tplain stateMachine.gv -o ISO9000.plain
stefano@stefano esempi % cd ..
stefano@stefano template % python3 createContracts.py ist1
```

createContracts script



Chaincode

VANTAGGI:


- ✓ Generazione automatica degli smart contracts
- ✓ Non richiede abilità di programmazione

Contenuti



World
State ente di
certificazione
«ist1»



Menu ▾

Dashboard

ist1

Clients ▾ Certificates ▾

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All

Actions	Key	TransactionID	DeclarantID	StateID	Next States	Attached	Hash Document
Process	ISO10095-Hyundai	TxId	Hyundai	Request Offer	Offer, Terminate	1	Hash
Process	ISO10095-Stellantis	TxId	ist1	Payment Rejected	none	none	Hash
Process	ISO9001-Stellantis	TxId	ist1	Audit	Certificate Issued, Certificate Rejected	1	Hash
Process	ISO9001-Toyota	TxId	ist1	Terminate	none	none	Hash
Process	ISO9001-Volkswagen	TxId	Volkswagen	Offer Rejected	none	none	Hash

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Processo di certificazione



Visualizzazione
del processo di
certificazione
ISO 9001
Stellantis



BeChain

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Clients Certificates

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All

Actions	Key	TransactionID
Process	ISO10095-Hyundai	TxId
Process	ISO10095-Stellantis	TxId
Process	ISO9001-Stellantis	TxId
Process	ISO9001-Toyota	TxId
Process	ISO9001-Volkswagen	TxId

ISO9001

Next States	Attached	Hash Document
Offer, Terminate	1	Hash
none	none	Hash
Certificate Issued, Certificate Rejected	1	Hash
none	none	Hash
none	none	Hash

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Cronologia delle transazioni



Visualizzazione
dell'oggetto
aziendale ISO
9001 Stellantis
nella
blockchain



BeChain Menu

Dashboard
ist1

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ISO9001-Stellantis blockchain history

Certifid	Transid	Declarantid	Stateid	NextStates	Attached	HashDocs	Timestamp	IsDelete
ISO9001-Stellantis	Txid	ist1	Audit	Certificate Issued, Certificate Rejected	1	Hash	2022-07-24 17:14:25.97 +0000 UTC	false
ISO9001-Stellantis	Txid	ist1	Certificate Issued	none	1	Hash	2022-07-24 17:14:22.94 +0000 UTC	false
ISO9001-Stellantis	Txid	ist1	Audit	Certificate Issued, Certificate Rejected	1	Hash	2022-07-24 17:14:19.751 +0000 UTC	false
ISO9001-Stellantis	Txid	ist1	Payment Accepted	Audit	none	Hash	2022-07-24 17:14:13.396 +0000 UTC	false
ISO9001-Stellantis	Txid	Stellantis	Payment	Payment Accepted, Payment Rejected	1	Hash	2022-07-24 17:13:50.946 +0000 UTC	false
ISO9001-Stellantis	Txid	ist1	Offer	Offer Rejected, Payment	1	Hash	2022-07-24 17:13:44.978 +0000 UTC	false
ISO9001-Stellantis	Txid	Stellantis	Payment	Payment Accepted, Payment Rejected	1	Hash	2022-07-24 17:13:41.88 +0000 UTC	false
ISO9001-Stellantis	Txid	ist1	Offer	Offer Rejected, Payment	1	Hash	2022-07-24 17:13:14.22 +0000 UTC	false
ISO9001-Stellantis	Txid	Stellantis	Request Offer	Offer, Terminate	1	Hash	2022-07-24 17:13:11.222 +0000 UTC	false
ISO9001-Stellantis	Txid	ist1	Offer	Offer Rejected, Payment	1	Hash	2022-07-24 17:13:08.047 +0000 UTC	false
ISO9001-Stellantis	Txid	Stellantis	Request Offer	Offer, Terminate	1	Hash	2022-07-24 17:12:29.753 +0000 UTC	false
null	Txid	null	null	null	null	Hash	2022-07-24 17:12:26.133 +0000 UTC	true
ISO9001-Stellantis	Txid	Stellantis	Request Offer	Offer, Terminate	1	Hash	2022-07-24 17:12:22.872 +0000 UTC	false

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Contenuti

The background features a large, light gray watermark of the University of Turin logo. It consists of a central illustration of a building with two towers, topped by a helmeted head holding a spear. This is encircled by a laurel wreath. The year '1859' is printed at the bottom of the wreath.

Conclusioni

CONCLUSIONI:

- ✓ I risultati riflettono le scelte implementative
- Necessità di convalidare la logica degli smart contracts e in generale dei processi che governano la blockchain



Grazie per l'attenzione!

1859