BLOCKCHAIN AND MOVING SMART CONTRACTS FOR DATA QUALITY ASSURANCE AND REPUTATION MONITORING

Shashank Shekher Tripathi, Prof. Dr.-Ing. Volker Skwarek

RTC DiWiP, Hamburg University of Applied Sciences, Hamburg, Germany

HAW
HAMBURG

" As a researcher, I want to **protect my ideas, findings or collected data** etc. (intellectual property (IP), as early in the research process as possible, so I don't worry about rushing to publish or being scooped."

c.f. Initial talk by Max Planck Digital Library (James Lawton) during E-Science Tage 2021

HAW
HAMBURG

Pressure to: Publish literature to protect ideas

Threat of: Intellectual property

In case of dispute: Can one prove that he/she was the first?

SOLUTION

Solution #1: Upload the research data at a **central** public repository where data ownership can be proven.

Problems:

1. Do you trust the backend of central repository?
2. Do you trust the security of the server?
3. What if the data is too large?
4. What if accidentally the data is leaked by the researcher due to wrong accessibility settings?
5. Can the affiliation of the researcher with the data be proven?

In central repository, data manipulation and single point of failure are biggest threats.

Shashank Tripathi
RTC DiWiP

HAW HAMBURG

SOLUTION

Solution #2: Upload the research data at a **decentralized** public repository where data ownership can be proven.
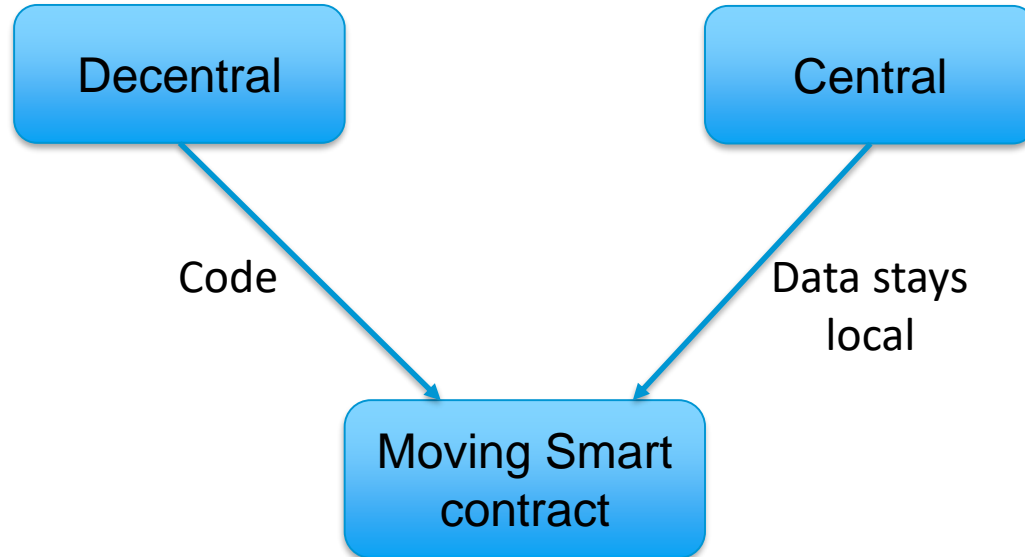
Problems:

1. Do you trust the backend of repository?
2. Do you trust the security of all the servers?
3. What if the data is too large?
4. What if accidentally the data is leaked by the researcher due to wrong accessibility settings?
5. Can the affiliation of the researcher with the data be proven?

In decentral repository, large data is hard to manage.

Shashank Tripathi
RTC DiWiP

HAW HAMBURG

SOLUTION

Solution #3:

In moving smart contract, data remains local and yet certified via decentralized computer programs.

Shashank Tripathi
RTC DiWiP

HAW
HAMBURG

SOLUTION

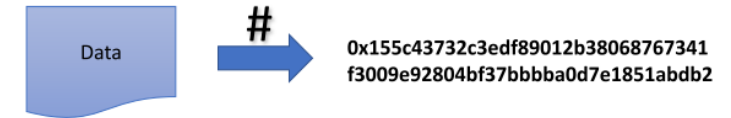**Moving smart contract (Using blockchain)**

Problems:

1. Do you trust the backend of repository? – The data is not revealed to the backend.

2. Do you trust the security of all the servers? – Data is not shared with any server.

3. What if the data is too large? – No upload required.

4. What if accidentally the data is leaked by the researcher due to wrong accessibility settings? – No such settings.

5. Can the affiliation of the researcher with the data be proven? – Yes.

Shashank Tripathi
RTC DiWiP

HAW
HAMBURG

WHAT IS MOVING SMART CONTRACT?

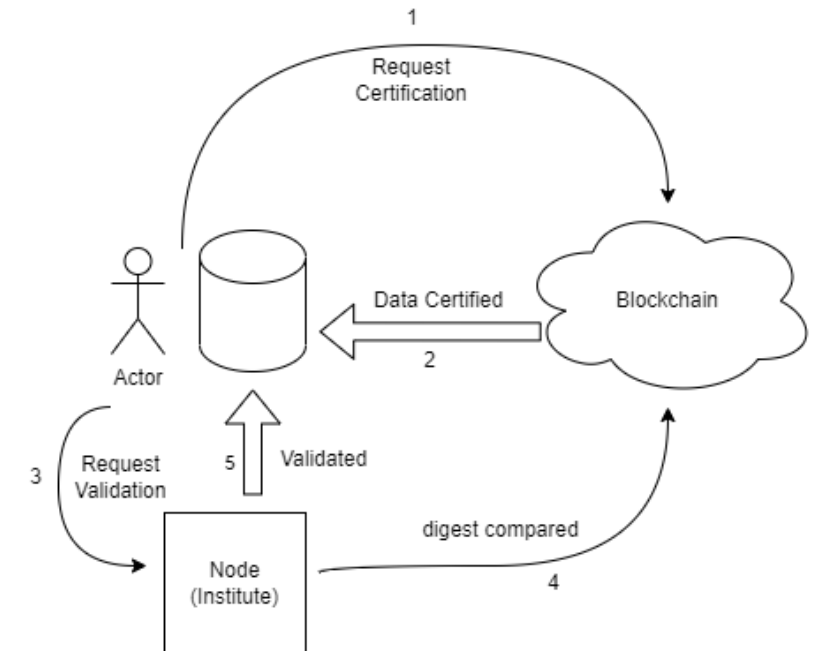Moving smart contract is a **smart contract**.

1. Smart contract: Set of rules governing the **blockchain**.

2. Blockchain: Add-only data structure that are linked together using cryptographic **hash**.

3. Hash: Uniquely identifiable string resulting from applying unidirectional function to a data of variable length.

Data → # → 0x155c43732c3edf89012b38068767341 f3009e92804bf37bbbba0d7e1851abdb2

Moving smart contract is a smart contract deployed on blockchain that facilitates movement of cryptographic function for generating proof of existence.

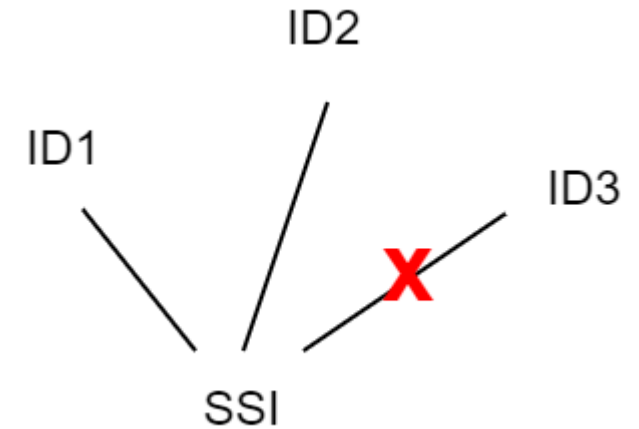**Shashank Tripathi**
RTC DiWiP

HAW HAMBURG

QUALITY ASSURANCE WITH MOVING SMART CONTRACT

1. The researchers can get the data certified by themselves but if they want they can also share the data with any node that they trust to get it validated.

2. During the process of validation, the quality control can be done.

3. Validation is optional for the researchers.

Shashank Tripathi
RTC DiWiP

HAW HAMBURG

REPUTATION MANAGEMENT WITH MOVING SMART CONTRACT

1. Allowing features like privacy and revocation using SSI

2. Reputation can be calculated using citations, validations and number of papers. The formula is not finalised yet.

3. Reputation can also be decreased. (only in case of dishonest validations)

Reputation $\propto$ citations (in case of research paper)
validations
number of papers

Shashank Tripathi
RTC DiWiP

HAW
HAMBURG

End

Shashank Tripathi
RTC DiWiP

HAW
HAMBURG