Open, Verifiable and Anonymous Access Management

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About Me

Tim Jungnickel
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TU Berlin (Germany)
- 35’000 students
- 8’000 staff
- 339 chairs / professors
Berlin Universities Demand Fair Prices and Free Access to Information

Freie Universität Berlin, Humboldt-Universität zu Berlin, Technische Universität Berlin, and Charité – Universitätsmedizin Berlin are canceling their contract with the international publisher Elsevier. They are demanding fair prices and free access to knowledge.

- Berlin universities discontinue the purchase of Elsevier services due to overly expensive (and unfair) subscription models.
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What this talk is about:

- Introduction to the Blockchain technology
- A library ecosystem based on Blockchain technology (LibChain)
- Discussion: emerging billing models and OA opportunities
The Blockchain

Block #1
initial

Block #2
#1

Block #3
#2
The Blockchain Challenge

Blockchain

Block #1
initial

Block #2
#1

Block #3
#2

new blocks

Alice

Block
#3

Bob

Block
#3

?
The Blockchain Challenge

Blockchain

Block #1
- Puzzle
initial

Block #2
- Solution
- Puzzle
#1

Block #3
- Solution
- Puzzle
#2

new blocks

Block
- Solution
- Puzzle
#3

Alice

Bob

?
The Blockchain Challenge

Blockchain

- Block #1
  - Puzzle
  - initial

- Block #2
  - Solution
  - Puzzle
  - #1

- Block #3
  - Solution
  - Puzzle
  - #2

- Block #4
  - Solution
  - Puzzle
  - #3
Bitcoin

- The most famous cryptocurrency network
- $1 \text{ BC} = 2300 \text{ €}$
- Power consumption of a small country
Bitcoin

Block #1

Puzzle

- Account A: 30 BC
- Account B: 70 BC
- Account C: 10 BC
- Account D: 5 BC

Block #2

Solution + Puzzle

- A → B: 20 BC
- C → D: 10 BC
- B → E: 50 BC
Ethereum

- More general than bitcoin
- Developers can implement their own application logic
- Transactions are payed with *gas*

ethereum.org
contract Counter() {
    int value = 0;
    function increase() {
        value = value + 1;
    }
}

User A: increase()
User B: increase()
The Blockchain Library

Blockchain Library Features:

- *create / delete* user
- *add / remove* inventory
- *borrow / return* publications
The Blockchain Library

Blockchain Library Features:

- create / delete user
- add / remove inventory
- borrow / return publications

Blockchain Publisher Features:

- publish books, journals etc.
The LibChain Universe

Register Library

buy (owner)

Library

borrow

Publication

Publish (owner)

Publish
LibChain Tools

Blockchain Application

- Smart Contracts for essential library functions on Ethereum
- Secure, distributed & trusted

LibChain Library Client

- Robust Website (based on React)

LibChain Publisher Client

- Robust Website (based on React)
- No DRM

http://libchain.github.io
What can we do with it?

1. Enable a pay per use model for digital publications.
   - Trusted usage records based on Blockchain transactions

2. Reliable metrics for Open Access publications
   - Anonymous but trusted usage metrics, even for *untrusted* publishers

3. Interlibrary rentals of digital publications
   - Secure borrowing from a foreign and *untrusted* library

4. Rentals of a printed publication from another user
A Remark on Copyright
Summary:

➔ Introduction to the Blockchain technology
➔ LibChain: a Blockchain based Library ecosystem
➔ Discussed the opportunities of LibChain for Libraries and Publishers
Conclusion

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Technical Challenges

● Small number of possible transactions
● High costs for executing a transaction

Copyright Challenges

● Transfer a digital publication without copying it
● Enable a user friendly model to rent digital publications