

# A permissioned blockchain prototype facilitating banking record interoperability

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# Declaration

Test text

# **Abstract**

# **Acknowledgements**

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# **Chapter 1**

## **Introduction**

# Chapter 2

## Background Literature

### 2.1 Defining Blockchain Technology

#### 2.1.1 Background

Blockchain technology reaches back far further than the inception of Bitcoin, and we can see some of the first implementations appearing in 1998. In a 1998 white paper titled bmoney, we see some of the earliest building blocks of cryptocurrencies and the adoption of blockchain technologies (Dai 1998). Wei Dai outlines some cornerstone concepts that would later inspire Satoshi Nakamoto to create Bitcoin. Wei begins to outline a form of Zero Knowledge proof where two parties involved in an exchange or transaction use pseudonyms in the form of public keys to identify themselves within the context of a transaction (*Zero-Knowledge Proofs* — *Ethereum.Org* 2022). Furthermore, Wei begins laying the foundation of cryptographically complex puzzles that are solved to determine the value of the currency transferred. The concepts mentioned above would eventually lead to one of the crucial components of blockchains known as proof of work.

Further to the cryptographic puzzles introduced by Wei Dai in 2002, we see the emergence of a white paper by Adam Back titled hashcash (Back 2002). Back, originally envisioned these concepts to solve denial of service attacks on email servers where communication over these email protocols would come at a greater cost of computational power. Later Back realised that this denial of service concept would effectively translate into a proof-of-work function where this function would create a token representing the computational complexity required to solve the hash.

As seen above proof-of-work is an essential cornerstone of blockchain technology and is historically significant to one of the most important blockchains in history, bitcoin. 2004 was potentially the most crucial year in the history of blockchain technology; in a white paper titled RPOW - Reusable Proofs of Work by Hal Finny, we observe a piece of client software that creates an RPOW token cryptographically signed by the client's private key (Finney 2022). The token mentioned before is stored on a secure server that identifies the stored token ownership by the private key. If the private key owner wishes to transfer this token to another user, they sign a transfer order which is stored as a public key; the server then assigns the transferred token to the new owner's private key.



## **2.1.2 Types of Blockchains**

**Permissionless**

**Permissioned**

**Consortium**

## **2.1.3 Blockchain Components**

**Cryptographic Hash Functions**

**Transactions**

**Asymmetric-Key Cryptography**

**Addresses**

**Ledgers**

**Blocks**

**Chaining Blocks**

## **2.1.4 Consensus**

**Proof of Work (PoW)**

**Proof of Stake (PoS)**

**Delegated Proof of Stake (DPoS)**

**Proof of Elapsed Time (PoET)**

**Practical Byzantine Fault Tolerance (PBFT)**

## **2.1.5 Smart Contracts**

## **2.2 Organisational Interoperability**

## **2.3 Facilitating Interoperability using Blockchain Technology**

## **2.4 Blockchain Technology in Banking Organisations**

## **Chapter 3**

# **Ethical and Professional Considerations**

## **Chapter 4**

## **Evaluation**

# **Chapter 5**

## **Learning**

## **Chapter 6**

## **Conclusion**

# Bibliography

Back, Adam (2002). “Hashcash - A Denial of Service Counter-Measure”. In: p. 10.

Dai, Wei (1998). *Bmoney*. URL: <http://www.weidai.com/bmoney.txt> (visited on 08/18/2022).

Finney, Hal (2022). *RPOW - Reusable Proofs of Work*. URL: <https://nakamotoinstitute.org/finney/rpow/index.html> (visited on 08/18/2022).

*Zero-Knowledge Proofs — Ethereum.Org* (2022). URL: <https://ethereum.org/en/zero-knowledge-proofs/> (visited on 10/11/2022).

# **Appendix A**

## **Appendices**