# Empowering Students with Blockchain: Rethinking Traditional Educational Record Systems

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## Introduction and Motivation

In the age of Big Data, maintaining the security and integrity of personal records has become important in educational institutions. Without implementing the necessary security measures, data stores become vulnerable to different forms of cyber attacks. As the techniques used by cyber-attackers improve, so must the institute's system.This poster presents a novel solution using Blockchain to improve the safety of student records.

## What is Blockchain?

Blockchain is a **distributed digital ledger of events**, where data items are linked and stored across all participating nodes. This is often used in cryptocurrencies such as Bitcoin, but its application can go much further. Each node performs "mining" operations, **verifying transactions** through consensus mechanisms. This architecture makes **data tampering and unauthorised access exceedingly difficult.** [1]. This is why it presents a good solution to maintain integrity of records.

## Advantages

- Improves **interoperability between institutions** (ie. to share student records across universities)
- **Eliminates data-transfered time** due to admin work
- Allows students to grant and revoke access themselves. **Allowing them to have control over their personal data**
- Enables **verification** of user which made each change and ensures data integrity by **requiring peer validation** before any modification is applied.

## Conclusion

**Consortium blockchain** presents a promising solution for managing student records securely. It would allow to handle user access, increase **student's control on their data** and ensure a robust data management system. Heavy consensus processes can however introduce performance and latency challenges. Hence, future work should focus on developing GDPR-compliant smart contracts and conducting pilot studies with educational partners to validate real-world performance metrics

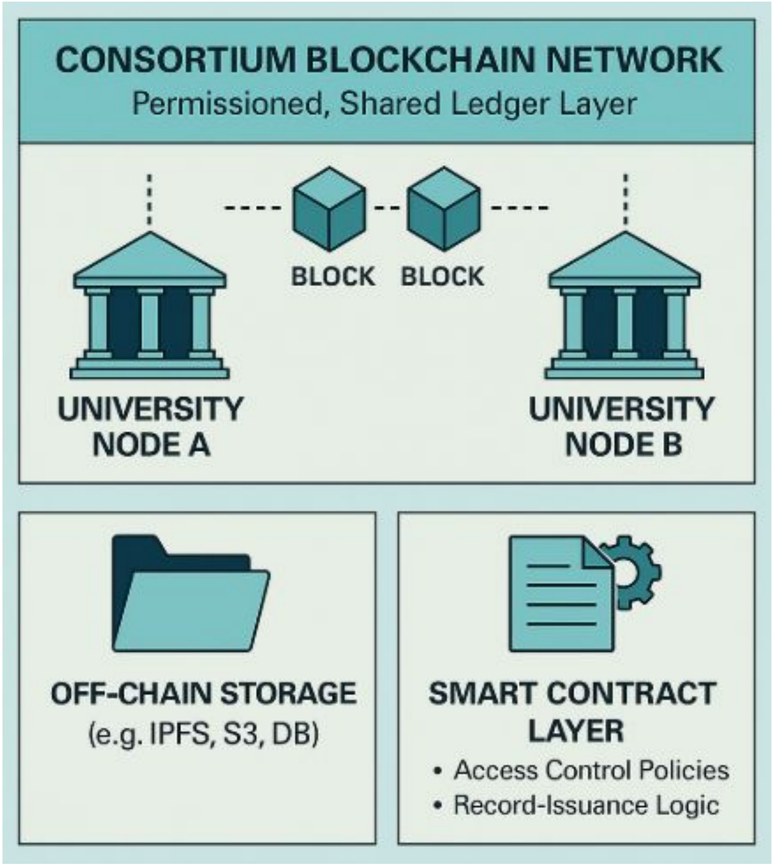


*Figure 1 : Proposed structure for a Consortium Blockchain Network*

## Ethical Implications

A significant ethical issue arises from the **lack of a centralised service provider:** all participants in a blockchain network may be able to view all stored data [2]. In an educational context, this could result in students being able to see each other's personal data, which is unacceptable. GDPR also mandates data erasure upon request, which conflicts with **blockchain's immutability** [4]. Lemieux et al. [5] argue that blockchain could improve transparency by logging data access, but practical implementation remains uncertain. In general, consortium blockchains are recommended. Using a private blockchain places too much power in one authority, i**ncreasing the risk of a single point of failure** or vulnerability [3].

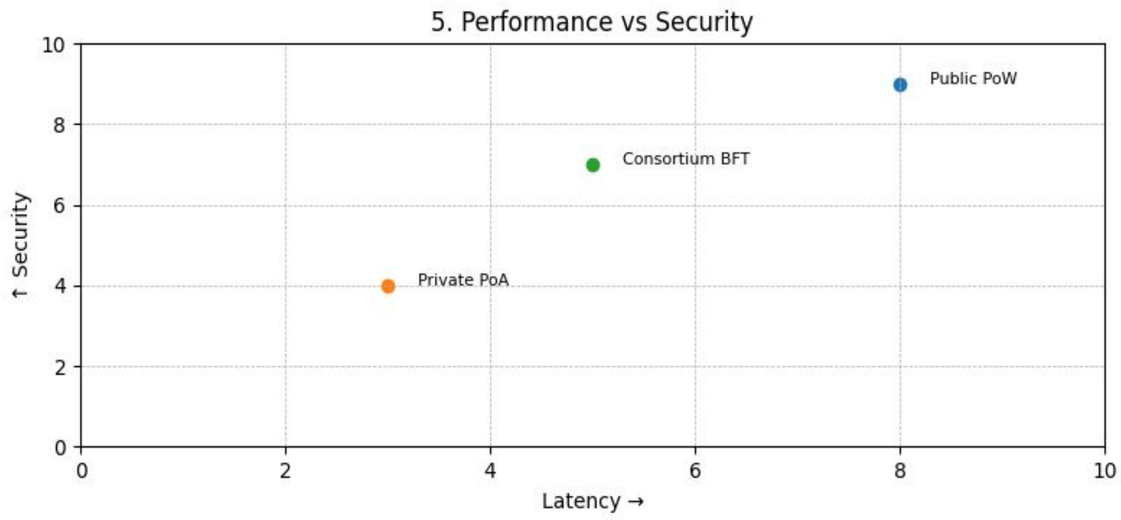


*Figure 2 : Consortium Blockchain's performance vs Public and Private Network*

## References

1. A. Capetillo, D. Camacho, and M. Alanis. 2022. Blockchained education: challenging the longstanding model of academic institutions. International Journal on Interactive Design and Manufacturing 16, 2 (2022), 791–802.
2. Y. et al. Tang. 2020. Ethics of blockchain. Information Technology & People 33, 2 (2020), 602–632.
3. Z. et al. Zheng. 2017. An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends. In 2017 IEEE International Congress on Big Data (BigData Congress). IEEE, 557–564.
4. A. Calder. 2017. EU General Data Protection Regulation (GDPR): An Implementationand Compliance Guide. IT Governance Publishing
5. V. et al. Lemieux. 2019. Blockchain technology & recordkeeping. ARMA International Educational Foundation (2019).

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