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Poster: Data Sharing in Autonomous Vehicles: Hyperledger Fabric Platform

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Abstract—The study proposes a Hyperledger Fabric-based data-sharing application for Autonomous Vehicles (AVs), addressing the secure data-sharing gaps, and revealing the impact of virtual user count on system performance.

I. RESEARCH PROBLEM

AV systems make driving decisions using data from sensors and cameras, essential for validation, improvement, training, and accident legal liability. Thus, this data is crucial for various stakeholders such as government, owners, and insurance providers [1]. Accordingly, in this work, a Hyperledger-based solution has been implemented enabling Attribute-Based Access Control (ABAC) for efficient data-sharing.

II. THE PROPOSED SOLUTION

As illustrated in figure 1, the system is mainly divided into:
1) Decentralised Application (DApp): It provides a robust interface for users to communicate with the system.
2) The storage module: InterPlanetary File System (IPFS) is used for scalable data storage and secure data retrieval. For immutable records, the generated hash is stored on Hyperledge.
3) Network Module. Hyperledger Fabric is used for secure data storage and sharing, with access control policies.
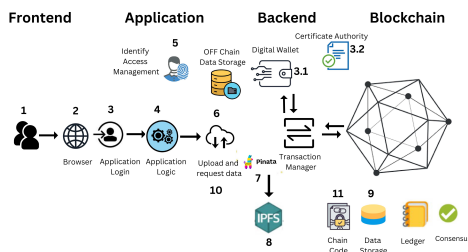

Fig. 1. The main components of the system and the entire life-cycle

III. IMPLEMENTATION AND EVALUATION

The evaluation with the Caliper tool[2] for the system's four chaincodes indicates that the system's performance is impacted
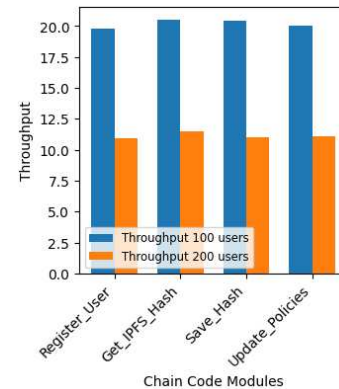

Fig. 2. The throughput within the operational scenarios of 100 and 200 users.
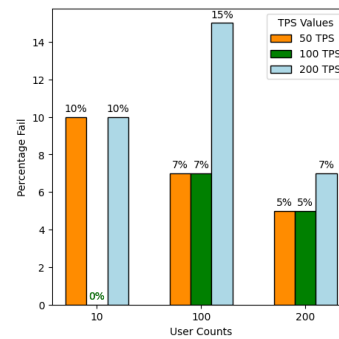

Fig. 3. The failure rate and the number of users under different Transactions Per Second (TPS) scenarios.

by the number of virtual users. For example, as in figure 2 a decrease in throughput observed with the increase in the number of users. In addition, the figure 3, illustrates the failure rate for the "Update_policies" chain code raises as the number of users increases. The next evaluation phase will focus on the system's scalability in handling large volumes of AV data.

REFERENCES

[1] J. T. Correia, K. A. Iliadis, E. S. McCarron, M. A. Smolej, B. Hastings, and C. C. Engineers, "Utilizing data from automotive event data recorders," in *Proceedings of the Canadian Multidisciplinary Road Safety Conference XII, London Ontario*, 2001, p. 18.
[2] "Caliper: An open-source performance testing tool for evaluating system scalability," 2023. [Online]. Available: https://github.com/hyperledger/caliper/