

## ABSTRACT

The existence of the Covid-19 virus, which was first announced at the end of 2019, in a short time was able to spread throughout the world and cause a pandemic. To overcome this, the government implemented a protocol that integrates Covid-19 test results and vaccination certificates into an application, with the aim that individuals can prove that they are free from Covid-19 infection and can return to normal activities. However, a centralized system is prone to single point of failure and data manipulation from the intervention of certain parties due to a lack of transparency. Therefore, it is necessary to have alternative solutions to these problems and can ensure security of user personal data.

The use of blockchain and smart contracts can be a solution to this problem. With the use of blockchain technology and smart contracts, the data management process will be more transparent, because the blockchain only uses a read and write process and every transaction on the blockchain is recorded by each node. Blockchain can also prevent a single point of failure because there is more than one source of data providers.

This final project produces a website-based application that is built on the Ethereum blockchain network and utilizes smart contracts to execute transactions on the system. Based on white box testing, it can be ascertained that the application and smart contract can run well and from the results of user acceptance testing, it is found that the system can meet user needs. The system has also fulfilled the security and privacy aspects of patient data by implementing password-based encryption on patient data. However, the response time of the system is strongly influenced by the computational capabilities of the Rinkeby network due to the consensus method on the blockchain. For certificate creation takes an average of 47,29 seconds.

**Keywords:** Blockchain, Digital certificate, Smart contract