1. Introduction

Background

In today's digital era, along with the development of science and technology in this digital era, almost all aspect of human life is dominated by the implementation of technology [1]. One of the evolutions of modern technology that had an impact on human life is the transformation of the way we store data and process data [2] where this is applied in almost all sectors such as business, health, logistics, industry, financial, etc. Innovations produced by computer technology have provided new capabilities in managing, storing, and increasing the value of existing or even previously non-existent data [2]. This happens because computers can support the smooth execution of tasks that demand speed, accuracy, and efficient use of time and effort [3].

Having a good and shophiscated system for storing and processing data becomes very important [4]. Managing inventory items is an essential aspect in various sectors because inventory items are assets that must always be monitored for their availability, location, and condition [5]. Companies often faces various challenge in managing inventory items, such as difficulties in tracking inventory, inefficient surplus or shortage of inventory, and others that can have negative impacts on the company such as security problem, etc [6]. These problems usually arise because many companies still use traditional recording method, outdated method such as using MS Excel, or use database systems that are inadequate for inventory management [7].

Meanwhile, technology blockchain has become incredibly popular, and so many industries are actively exploring its applications [8]. In 2008, Satoshi Nakamoto first introduced the concept of blockchain technology, employing the PoW (Proof of Work) time-stamping scheme [9]. There are 3 types of Blockchain, public blockchains permit unrestricted access, enabling anyone with the required resources to participate in the network, private blockchain networks necessitate permission from the network administrator for participation, and consortium blockchain which is a combination of 2 previous types [10], [11]. Blockchain is essentially a continuously expanding list that comprises a series of records, each embedded within a block [12]. Each block includes a hash of previous block, data, timestamp, and hash of the current block [12]. Technically, blockchain system is an immutable transaction log record that is sealed with a cryptographic signature [8] which can be used as a very secure smart database [4]. The key aspect of blockchain system is that information can be recorded data smoothly in real-time [13], where this can potentially have an impact on the speed of the database in storing, receiving, and processing data.

Telkom University is a university that has a large distribution of office equipment. By implementing a modern inventory management system, of course it will have an impact on monitoring the distribution of office equipment placement in every space and structure. Thus, the purpose of this study is to implement private blockchain technology for inventory management, specifically for managing office equipment in the TULT (Telkom University Landmark Tower) Telkom University building's labs and classrooms. The use of private blockchain technology is expected to provide solutions to challenges that traditional systems struggle with, such as ensuring tamper-proof inventory tracking, preventing unauthorized modifications, maintaining a secure immutable record of all transactions, and other potential security issues, given the significance of inventory management in monitoring and tracking company assets. Improvements in the system's speed, dependability, and security are anticipated with this deployment, which will boost the effectiveness of inventory management for office equipment at Telkom University.

Problem Statement

The study focuses on overcoming the limitations of current inventory management systems in terms of inventory management speed performance and security by exploring the potential for implementation of private blockchain technology at Telkom University's TULT building.

Problem Limitation

Considering previous discussions, the implementation of private blockchain for inventory management will be limited to classrooms and informatics practicum laboratory rooms in the TULT building. The strategy entails employing a straightforward blockchain framework, opting not to integrate smart contracts. Nonetheless, paramount importance will be placed on upholding the security and integrity of the implemented system.

Objective

The objective is to create and assess a private blockchain inventory management system at Telkom University, with a focus on gauging gains in inventory management speed performance and data security.