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Dissecting Decentralization: An in Depth Look at Blockchain Technology and its Applications

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The question this project is motivated by is: does blockchain technology have potential outside of cryptocurrency applications? The inspiration behind the motivating question is that cryptocurrencies, such as Bitcoin and Ethereum, have exploded into mainstream attention over the course of 2017, resulting in a 1200% growth [1]. The underlying technology blockchain is known by crypto-enthusiasts but there is a general lack of understanding of it in the public. Crypto-hype aside, a technology that can cryptographically establish trust between parties [2] has an extreme potential to be a revolutionary power in the current digital landscape.

Decentralization, and how far it can go in improving current systems, is a topic now garnering a lot of attention due to what blockchain can accomplish with its digital ledger-style approach. The project's methodology included gathering technical papers on blockchain and collecting enough information through review to compile a survey paper spanning the lifetime of the technology. Information covered ranges from a detailed look at blockchain in a purely technological standpoint to how it is utilized in specific applications that are more than just cryptocurrencies. The original goal of this project included the aforementioned survey paper, but alternatively had the intent to use that information to develop a novel application for blockchain to be used to protect personally identifiable information (PII) to increase private data security. However, upon the discovery of a MIT paper that published a similar idea the project scope was shifted towards the current results.

This project produced a survey paper that covers the lifespan of blockchain technology, a seminar directed towards those who want to learn more about blockchain to develop a deeper understanding of it, and a baseline of information for a lesson plan to be expanded into a future class on blockchain technology at the University of New Haven. Through the project we discovered the amount of potential that blockchain has to grow outside of being tied to financial applications such as Bitcoin and Litecoin. The survey of papers came across medical record applications such as MedRec, a foundation blockchain that serves as a distributed state machine where other decentralized applications can be built on top of it without having to build their own blockchain such as Ethereum, decentralized and encrypted cloud storage applications such as Storj, and many more blockchain applications. We plan to publish the survey paper in either a heavily technical form to an academic journal or conference or in a more blockchain novice form to an academic magazine. As for the future of this research project, more research on down to the code level and finer details can be done for further development of material for a future blockchain class.

References:

- [1] C. Bovaird, "Why The Crypto Market Has Appreciated More Than 1,200% This Year," *Forbes*, 17-Nov-2017. [Online]. Available: <http://www.forbes.com/sites/cbovaird/2017/11/17/why-the-crypto-market-has-appreciated-more-than-1200-this-year/#16b01e326eed>. [Accessed: 02-Sep-2018].
- [2] Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," <https://bitcoin.org/bitcoin.pdf>, 2008.