

## Explore – Impact of Computing Innovations

### Written Response Submission Template

Please see [Assessment Overview and Performance Task Directions for Student](#) for the task directions and recommended word counts.

#### Computational Artifact

2a)

My innovation is Blockchain, which is designed to create a framework for online transactions that is more secure (Rosic). Blockchain functions as a series of computers, called nodes. When one computer requests a transaction, each computer independently verifies the authenticity of the request, using certain algorithms. Then, once all of the nodes verify the request's identity, the data about the request is added to a computerized ledger, creating another "block" in the "chain." (Rosic)  
My artifact provides an illustration for each step of the process of how Blockchain works. It also allows the reader to see the amount of data blockchain uses.

2b)

I used Google Slides to create my artifact. I gathered relevant images with an online search. I then made captions to explain my images, and made a flowchart with the steps of how Blockchain works. I included extra images to show where the data is stored. This is a new artifact, as I gathered images and wrote the explanations myself.  
Bhaskar, Raghav "Securing the Future of Cryptocurrency" Appspicket, July 27, 2017, <https://appspicket.com/private-key-security-cryptocurrency/> 12/13/17  
Frisby, Dominic. "Entrepreneurs Move in on Bitcoin as Blockchain Makes its Mark" Virgin, October 7, 2014 <https://www.virgin.com/entrepreneur/entrepreneurs-move-bitcoin-blockchain-makes-its-mark> 12/13/17

## Computing Innovation: Blockchain

2c)

A beneficial effect is that blockchain will save money on financial services infrastructure- since it's distributed, it is safer by design- and this security will allow the financial sector to decommission expensive systems that are currently used to secure transactions. It would reduce the amount of human resources that are necessary to audit and check the validity of transaction requests, and put that duty into the hands of the computer software. (di Gregorio). Banks and financial security companies would save a lot of money and time that would otherwise be spent training and paying human employees. This has an impact on the economy, because banks save a lot of money in transaction security. This creates more confidence in the US economy as a whole, as stock values for the major banks rise.

A harmful effect is that blockchain technology uses a lot of energy. When the computers check with each other to see if they "agree," their verification process is more complex than any other. Going through the process uses a lot of computing power, and consequently, electricity. (Fairley). Everyone in the country is impacted, because we all use energy, and soon, we may all be using the blockchain. Society itself, namely the environment, is harmed. If a growing technology uses more energy, we are forced to burn more resources to create electricity. With the growing issue of climate change, this is an issue for all of humankind.

2d)

The system of blockchain operates with a distributed ledger. According to Coindesk, "a distributed ledger is a database held and updated independently by each participant (or node) in a large network." (Bauerle)The computers use metadata from transaction requests. Each block of data contains a pointer to the previous block, a timestamp, and transaction data. Then, this chain of blocks is held in the storage of each node.

The data it produces is the blockchain itself, which is a stream of transaction data separated into blocks by set intervals of time. This data is kept in a ledger, which does not need to be verified by a central authority. (Siegel)

It computes by taking the data and runs it through algorithms to verify the identity of the request. "In the case of blockchain technology, private key cryptography provides a powerful ownership tool that fulfills authentication requirements. Possession of a private key is ownership." (Bauerle). So essentially, the blockchain computes by running transaction data through algorithms that verify private key ownership.

A privacy concern is that "Bitcoin relies on a public blockchain, a system of recording transactions that allows anyone to read or write transactions. Anyone can aggregate and publish those transactions, provided they can show that a sufficient amount of effort went into doing so." (Berke) This means that anyone who really wanted to could

see transactions being made on the blockchain, and with a little effort and computing ability, they'd have access to transaction amounts, time, and other data.

## References

2e)

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- [3] Rosic, Ameer. “What is Blockchain Technology.” Blockgeeks, December 2016, <https://blockgeeks.com/guides/what-is-blockchain-technology/> 12/13/17
- [4] di Gregorio, Max. “Blockchain; a new tool to cut costs” PwC, February 2017  
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- [6] Bauerle, Nolan. “What is a Distributed Ledger?” Coindesk, March 9, 2017  
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- [8] Berke, Alison. “How Safe are Blockchains? It depends.” Harvard Business Review, March 7, 2017 <https://hbr.org/2017/03/how-safe-are-blockchains-it-depends> 12/26/17