Serverless Functions: Transitioning to a Dynamic Web Publishing System

(Technical Paper)

Why Did Bitcoin Fail as a Currency?

(STS Paper)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

My technical paper will describe the specific work done on a web-publishing system to upgrade it from a static to a dynamic system using serverless functions. Serverless functions are single-purpose applications that scale on demand, allowing quick and easy deployment of new code (Nupponen & Taibi, 2020). Their implementation into a web publishing system would vastly improve speed and flexibility, reducing overhead from multiple layers of redeployment that waste valuable computational resources. The proposed technical paper will discuss the drawbacks of a static web page generation system and the benefits of switching to a dynamic web publishing system that leverages serverless functions.

My STS research paper will investigate why Bitcoin failed as a legitimate currency and the social and technical factors that caused its demise. Today, people view Bitcoin as an investment rather than its proposed use as a digital currency (Baur & Dimpfl, 2021). This research will hopefully allow future cryptocurrency developers to learn from Bitcoin and build a new digital currency that is legitimate and decentralized. Although there is no direct connection between the two projects, both topics demonstrate learning from previous attempts to build new systems that are superior and better equipped to serve their intended audience.

Technical Topic

In my internship with the brand management technology company X, I worked on a new dynamic web publishing system that integrated serverless function architecture to generate web pages. Since this new system is still in development, I will keep the company anonymous. Company X's existing website publishing system generated web pages statically, requiring the creation of an HTML file at every website URL path. Many of these files had significant overlap and due to issues in the existing system, wasted valuable resources and were slow to update, test,

and deploy. The new dynamic system invoked serverless functions at given website paths allowing much more flexibility, which improved speed and reduced storage. I built multiple Kafka consumers to record plugin metadata, which listened for serverless function instances to be deployed to cloud servers and wrote information about those instances to an internal database. I then designed various websites to test the system end-to-end to ensure proper functionality. This new system significantly reduced overhead, making page generation more efficient and use less storage. Additional advantages include increased security and flexibility. The system is currently in its nascent stages. In-depth testing is still required to ensure the product works as intended at scale.

STS Topic

When Satoshi Nakamoto first proposed Bitcoin, he introduced it as a type of electronic cash that would simplify online transactions. His goal was to create a decentralized currency that required no mediating institution, which he believed would interfere with a person's autonomy (Nakamoto, 2008). While this may have been the initial use of Bitcoin, its role has vastly changed since its inception in 2008. Bitcoin is currently too volatile to be considered a stable currency, aligning it closer to a traditional investment (Baur & Dimpfl, 2021). I want to research what factors caused the transformation of Bitcoin and whether the actors involved with it influenced its change. A decentralized currency, as Nakamoto described it, is a truly valuable technology. Determining why Bitcoin failed as a currency may pave the way for future developers to iterate on its design to build a successful digital currency.

When considering which social groups are involved in Bitcoin, people who buy and sell the digital currency come to mind first. The intention to adopt the cryptocurrency characterizes these individuals. One study identifies the user groups of Bitcoin as active investors, passive

investors, currency users, miners, testers, and hybrid users (Baur et al., 2018). While this is a generalization of some of the potential user groups of Bitcoin, the different intentions these groups have may clarify differences in the utilization of Bitcoin. If we look more abstractly at Bitcoin and technologies, they shape and are shaped by social and political factors (Dodd, 2018). For this reason, we should include both groups in the discussion. Identifying which groups are involved in the adoption, use, and transformation of Bitcoin may be key to understanding why its use deviated from its intended manner.

Considering Bitcoin as a network that adapts to the actors present. We can claim that all the user groups and social and political factors are actors in the network. They all have different motives and ideologies that influence the use of Bitcoin. For this reason, the most appropriate STS framework for the research paper is Actor-Network Theory, as it will allow me to investigate Bitcoin from a perspective that allows an analysis of all the many factors that affect it. The STS Method I will use for my research is History. This method will allow me to synthesize various works of literature discussing the use cases of Bitcoin from different points of view such as investors, traders, the government, and other groups, which may provide insight into its volatility, price, usage, and other factors.

Key Texts

The primary text and inspiration for this research project is Satoshi Nakamoto's Bitcoin Whitepaper. It discusses his motivations for creating a purely peer-to-peer digital currency and the technical implementation to support his vision. Nakamoto argues that a centralized, trust-based model has inherent weaknesses that a payment system based on cryptographic proof could solve (Nakamoto, 2008). This source is important to my topic as it is the foundational document that created Bitcoin. It provides insight into the creator's motivation for building Bitcoin, which

is essential in understanding its social impact. Since this document is from 2008, it would be interesting to compare this ideal version of Bitcoin to the current state of Bitcoin.

Understanding the intended use of Bitcoin and the deviation of this use is an important aspect of my research topic. In the *Journal of International Financial Markets, Institutions and Money,* Baur, Hong, and Lee try to understand if Bitcoin is a currency or an asset. They compare Bitcoin's financial characteristics to different assets and its primary uses. Their study found that Bitcoin acts as a speculative asset due to its high volatility and returns (Baur et al., 2018). This study is meaningful as it supports my argument that Bitcoin failed as a currency as that is not its primary use. Additionally, the study's financial and user type analysis could allow for a better understanding of the key actors within Bitcoin's network, and how they influence Bitcoin's use.

Another key text, published in the *Journal of Economic Perspectives,* aims to present Bitcoin to a non-technical audience and review its interaction with the current financial system and the economy through an analysis of its use cases and government regulation. (Böhme et al., 2015). Their research discusses how widespread usage of Bitcoin has changed since its inception, which is very similar to my research. Additionally, the article emphasizes the regulations placed on Bitcoin and other cryptocurrencies due to their high electricity usage and the illegal activities they promote as a result of their anonymity. These topics are all important factors in my research, and this article will serve as a great starting point to understand how the users of Bitcoin affected its role as a decentralized currency.

In *The Social Life of Bitcoin,* Dodd challenges Nakamoto's stance that Bitcoin is trust-free. He argues that there exist social practices and organizational structures that sustain Bitcoin, demonstrating the relational character of currencies (Dodd, 2018). By discussing how Bitcoin

interacts with social and political institutions, this paper is crucial to my investigation into the factors that maneuvered Bitcoin from a digital currency to a volatile investment.

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