

AWS Server Failover System

Exploration of The Socio-Technical Relationship Between Voters and Social-media

A Thesis Prospectus

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By

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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

As the COVID-19 pandemic assigned a newfound importance to personal technology, young voters turned to social media platforms to engage with the U.S national election (Circle, 2020). An analysis of this trend showed that over 60% of young voters stated that social media allowed them to feel more informed and represented (Booth, 2020). This trend stems from the public's gravitation towards technology during the pandemic to learn all new information about the world. But this presents a hazard; politicians extensively use free services like Instagram, Twitter, and Facebook to promote their political ads since they know that the user considers the platforms free (Riordan, 2021). Furthermore, when a user creates a new account, they cede their privacy rights to these platforms. In turn, their private data becomes fair game for strategists to tailor their advertisements around to influence voting outcomes (Stieglitz, 2012). To support this proposed research paper, the STS frameworks of actor-network theory and co-production will be used to explore the socio-technical relationship between voters and social media during the COVID-19 pandemic, which influenced their voting outcomes.

On another note, the second proposed project in this document is about my internship experience last summer at Capital One where my team and I built an automated server failover system by utilizing various services provided by AWS (Amazon Web Services). Servers are integral to a business's daily transactions because they hold all the crucial data. Accordingly, to hedge against disaster scenarios (data breaches, server failures, disruptions at datacenter), failover systems must be implemented where a backup server is configured and prepared with a primary server's resources to maintain server uptime (cloudflare, n.d.). By utilizing the mass computing power and different services of AWS as well as the knowledge I gained from my Computer Science classes at UVA, I created an active-active server configuration that allows an

automatic server failover to uphold its platinum resiliency standard and maintain server uptime which will be explored more in depth in the technical part of this thesis.

Technical Topic

IT disasters such as the loss of a physical data center, server failures, or cyber-attacks are a common occurrence if a proper server failover system is not configured and cannot only perturb the company's business, but also induce data loss, impact revenue, and damage its reputation (cStor, n.d.). Over the summer, I participated in an internship at Capital One where they tasked me to upgrade their failover system to be automated and faster. Prior to my arrival, the team's failover system consisted of an active-passive configuration where the primary server took all the traffic while the secondary server waited on standby for a disaster scenario to occur and the program itself required a manual start. Owing to the system's specific configuration, the failover of resources from the primary to the secondary server took up an RTO (Recovery Time Objective) of around an hour where RTO is defined as the acceptable time allowed for server down time before it is relaunched (Baginda, 2018). An hour of server downtime has serious implications ranging from detrimental damage to the company's reputation as well as revenue loss, especially if the servers contained transaction data.

Moreover, my team was tasked with reaching platinum customer resiliency, the highest tier of objectives that was to be achieved at the end of the summer for the failover system. This platinum tier consisted of reaching an RTO of 15 minutes instead of one hour for failover and automating the entire failover process where both servers handled a specific traffic load before the disaster scenario. When the failure occurs in the primary region, the load is automatically rebalanced for the secondary server to handle (Krishna, 2017). To reach this tier, I created an

active-active configuration between the primary region (ex. us-east-1) and secondary region (ex. us-west-2), so that both servers can receive network traffic, database updates, and manage application traffic through a load balancer that will distribute the traffic throughout the regions (Holenstein, 2007). To that effect, when the primary server goes offline, the secondary server already has traffic distributed to it. This idea ensures that the data is not lost from the server failure and through fast database replication, the secondary server can maintain server uptime and data redundancy (Izrailevsky, 2018). At UVA, CS 4740 taught me the foundations of cloud computing and how to utilize the AWS services which enabled me to become familiar with my team's project and its detailed components very early on in the internship. Furthermore, CS 2110 prepared me to create a Java executable that sets up the active-active configuration and runs the failover system as well as enables it to interact with the different AWS services. Finally, keeping in mind the skills rewarded at my internship, I will explore various ways to improve the CS classes at UVA to better prepare others for similar experiences as well as provide a technical report on the problem, process, and results I uncovered while working on the failover system at my summer internship.

STS Topic

In the past decade, social media has been heavily used to manipulate the outcomes of national elections (Feedom House, 2019). Dating back to the first elections in 1789, political advertising has been a crucial aspect in campaigning because politicians can draw attention from audiences that were not aware of their ideas or political intentions prior (history.com editors, 2009). However, in early 2014, the Trump campaign built a system that utilizes an abundant amount of personal information of Facebook users to profile U.S. voters so that they receive

personalized advertisements manipulating them into voting for Trump and his party (Staff, 2020). Furthermore, the Russian government purchased \$100,000 worth of Facebook ads to release political information that would sway politically sensitive Facebook users to be divided on controversial issues such as gun control and abortion (Shane, 2017). The relationship between voters and social media has changed drastically from 2014 to the current day because the pandemic created a situation where social media was heavily used for debating political issues which led to the spread of misinformation and eventually influenced voter outcomes. Inevitably, this inclined most social media platforms such as TikTok, LinkedIn, and Twitter to avoid the issue by creating strict regulations, which ban any political advertisements posted (Americanbar.org, n.d.). On a separate note, social media has been most beneficial for new politicians because they can inform their constituencies through cost-free platforms. These politicians also gain 1-3.1% more donations when they open a new Instagram or twitter account in regions of social-media use (Petrova, 2020). Finally, voters are the most important stakeholders in this socio-technical relationship because the pandemic created conditions in which the voters migrated from other forms of obtaining political information to social media platforms.

To better understand and analyze the socio-technical factors in this complex relationship, the STS framework of actor-network theory will be explored because it provides a unique lens to discuss the complex relationship between voters and social-media platforms. Contrived by Bruno Latour, actor-network theory (ANT) depicts the idea that everything in the world exists in constantly evolving networks of relationships. In other words, action is shared with a multitude of people and things where actors are considered actants each endowed with a character (Cresswell, 2010). However, critics such as Langdon Winner often claimed that actor-network

theory requires that the researcher judges, which actors are integral in a network and, which are not but when actor-network theory is implemented, the assumption is that all actors are equally important in the network (Winner, 1993). This assumption is one of the main points of critique for actor-network theory as most critics say that the actor's importance should be determined by their position in the network and the interactions with other actors (Kolli, 2020). ANT is also criticized to be descriptive as it fails to provide analysis for social processes because the endless connections created in the network will start to contribute less to the network as a whole as the connections go on (Sheldon, 2010).

Specifically, for this theory, a network must be well described and structured before taking any moral or political positions on it. For the STS research portion of this thesis, I will construct an actor-network theory consisting of three major actors: politicians, social media, and voters who use social media for their political information. These are the actors that were chosen for the network because they are the central actors, which will be associated with other smaller actors such as social media policies, misinformation in political ads, and political campaigns. Overall, actor-network theory is critiqued as a controversial approach because it lacks the substantive political critique but can still be used to explore the relationships between different entities in a whole network.

Finally, Sheila Jasanoff created the STS framework of co-production to help understand the dynamic relationship between society and technology. Jasanoff said that co-production explores how technology evolves along with the representations, ideas, discourses, and institutions that give practical meaning to the ideas and innovations developed by society. Mary Douglas critiqued co-production by stating that "Hierarchical structures can paradoxically

be reinforced in co-production,” which implies that what technological results are communicated is determined by those in positions of power (Flinders, 2016). For the STS portion of this report, co-production will be utilized to look at the political ad regulations that were continuously changing due to the mass influx of political ads and voter engagement on social media. Specifically, how Facebook and Instagram’s political ad policies became more restrictive during the pandemic to better combat misinformation (Freedom Forum, 2020). Overall, co-production will be used to explore the continuously evolving socio-technical relationship between voters and social media.

Research Question and Methods

Research question: How has the socio-technical relationship between voters and social media during the COVID-19 pandemic influenced their voting outcome?

To answer this question, various sources such as research papers, scientific journals, and website articles will be consulted. First, social media policies that regulate political campaigning and discussions on these various platforms such as Instagram and Facebook will be analyzed thoroughly. Then, a network will be created to explore the relationships between the three major actors in the network: politicians, social media platforms, and the voters who use social media. Social media, political campaigns, misinformed political ads, and voters are all key words helpful in collecting more sources. These are the most important words related to the central research question because they all act as separate entities, which have interacted with each other heavily during the COVID-19 pandemic. These various methods will lead to a complex understanding and analysis of the socio-technical factors between social media and

voters because they will dissect the relationship and depict the interactions between social media and the voters as well as their interactions with entities outside of their relationship.

Conclusion

The COVID-19 pandemic has elicited a preoccupation with social media among both voters and politicians due to its zero-cost nature. Furthermore, this thesis will extensively explore the socio-technical relationship between both voters and social media in the STS research paper. Insights into what misinformation is released on social media, how voting outcomes are affected, how social media regulates political discussions, and how politicians utilize social media will be explored. It is expected that voters who have gravitated towards social media for their political information during the pandemic will be heavily swayed by those posts to either side of the political spectrum. On a different note, the platinum resiliency objectives for the server failover system were completed, and the tools, soft skills, CS classes that I utilized to do so will be discussed more in depth. Due to the completion of this internship experience, I gained industry knowledge about how to manage AWS services as well as provide Capital One with a unique solution to one of their longstanding problems of a slow, manual server failover system.

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