

**The Ghostbusting Brochure:
A Systematic Analysis of Real Time Spectre Side-Channels Detection**

The Colonization of Loudoun County through Cloud Computing

A Thesis Prospectus
In STS 4500
Presented to
The Faculty of the
School of Engineering and Applied Science
University of Virginia
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Computer Science

By
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May 9th, 2023

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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The Cloud Computing Revolution and its Socio-Environmental Impacts

Overview:

The emergence of the internet and subsequent cloud computing has caused a technological boom and exponential population increase in Loudoun County. This is also my hometown, where I grew up, and where I have seen the structure of the region around me develop, so I wanted to take a closer look at the ways in which people and the land have melded to shape the world's datacenter capital. This will be accomplished by doing a case study that examines news articles, interviews, and observations made during my time spent in the region. How has the Cloud Computing Revolution transformed Loudoun County and its inhabitants? By using an Ecological reasoning framework in observing this, I aim to provide an answer to this question and hope that readers will not only learn about the history of Cloud Computing, Loudoun County, but also witness comparable developments in their own backgrounds.

Positionality:

Dhruv Pandya is a South Riding, Virginia-born Indian American student. He was born and raised in Northern Virginia and has been immersed in DC culture for more than 20 years. He excelled at quick math and logic in his early school, which helped establish him into his eventual major of choice, Computer Science. His father had worked in computer science since the 1980s and had influenced his future career decision significantly. The material he was taught varied from basic coding abilities to hot issues in the field, notably in the government sector of Washington, DC. This piqued his interest in data, notably the developing sector of cloud services such as AWS and Microsoft Azure, which was a significant market coming up for governmental contracts in the Washington, DC area.

As he began attending the University of Virginia, he polished his abilities as an engineer in the program and learned how to navigate the computer engineering sector. This got him thinking about what he wanted to do with the knowledge he gained from his university education: make the necessary contacts and use the resources to successfully provide a meaningful impact for data-driven projects for corporate companies that may need to keep sensitive data on their platforms. As a result, his future ambitions were fueled by the desire to use these key moments in his life to make a positive impact on the community and city in which he grew up.

Problematization:

The Cloud Computing Revolution was exemplified by the 2006 launch of Amazon Web Services, a project spawned by the behind-the-scenes effort needed by the e-commerce company to support all the shopping done on the website. The team's work was dependent on massive data centers that housed thousands of computers in a vast warehouse. Over 70% of the world's data is anticipated to travel through the biggest concentration of data centers in Loudoun County, Virginia. Numerous residents of the region have since infused their own culture into this area. Because I've watched the region's quick transition from a mostly rural setting to a small urban

area with its own culture, people, and environment, I want to give a framework for how future inhabitants of this county might comprehend its history. Exploring the pros and cons of this would provide me and my community with a deeper understanding of the long-term impacts of these companies occupying so much property in the area and whether it would be to our advantage.

In the 2000s, the rise of "Cloud Computing" was aided by faster processors, improved networking infrastructure, and more robust security measures. The investment of big firms in enormous datacenters to serve as a hub for their cloud resources has affected the region surrounding me. The "NA-1" zone comprises Loudoun County and the metropolitan region around Washington, DC. It is estimated that over 70% of the world's data flows through Loudoun County alone. Due to the rising usage of Cloud Computing as a tool for managing large-scale commercial activities, this region of the United States has become one of the country's most significant locations. This has several repercussions and raises concerns on the various effects of the Loudoun County Cloud Boom. For this study, I intend to analyze the effects of cloud computing on energy consumption and the environment, as well as on employment and the labor market.

Guiding Question or Main Argument:

In what way has the Loudoun County been shaped by Cloud Computing and the Corporate boom in the surrounding area? What can we as citizens of the area learn from what is happening behind the scenes and the way it effects the schooling, employment, and natural land even?

Projected Outcomes:

This article would give insight through personal observation and first-hand reports, as well as an examination of many sectors of the area, such as educational advancements, the nature of the local employment market, and local news sources. This is intended to assist the local populace and investigate if the move to a Cloud Computing-heavy region has truly benefited us or whether we could make any adjustments, such as protesting or altering what we do in the region to ensure its continued prosperity. I do not intend to offer solutions, but rather to offer knowledge and assist the community in examining the fabric of its own identity.

Technical Project Description:

My engineering experience began with computers. This was accomplished mostly by mastering operating system shortcuts, the terminal, and eventually coding. I was able to learn about cloud computing eight years ago and have maintained an interest in related areas. Amazon Web Services has provided me with certificates for their Cloud examinations, which I have used to enhance my internship experience. Specifically for my time at both Neustar and TransUnion. I was a member of the Neustar team that assisted in migrating the company's long running on-premises servers to the AWS cloud and demonstrating the significant cost and time benefits that resulted. Specifically, I utilized python scripting to build the needed heavy code for the clients and compared it on different hardware to show proof of our claim using Tableau for data

analysis. At TransUnion, I was able to develop a Geo Directory Server using the Google Cloud and Google's GRPC server technology. I designed a client side that spoke with the TransUnion server side and hosted the apps from which consumers could obtain insightful statistics. I was able to take an interest in the process of scaling the TransUnion server side. Due to this and my connection to the subject I wish to investigate, I can supply more insightful information for exploring my area of interest. In this instance, I believe that my understanding of the area's businesses and the sorts of engineers it draws can help me get relevant information more quickly. While the project will not be tied to the understanding of Cloud Computing, I have spent considerable time researching its history, and I believe this project will enlighten me of recent advancements.

Preliminary Literature Review & Findings:

Using blogs, news articles, journal articles, and corporate/educational websites, the annotated bibliography I created provided me with a wealth of information on the Loudoun County cloud growth. The majority of the sources I uncovered were articles discussing how corporations such as Amazon have seized land to make way for the data centers required to host the AWS cloud (Bast, 2022). On top of this, it went into an explanation of the benefits for these corporations and why they matter (Rice, 2021; Greenstein, 2020). Other articles discussed how these companies would fund numerous initiatives for students to increase their interest in the area's technology (Amazon Staff, 2022). I was able to uncover evidence supporting this claim through partnerships with new magnet schools in the area and how the LCPS curriculum has shifted to encourage a more STEM-focused mindset since the cloud boom (LCPS, 2020; Dellinger, 2016). Outside of education, I used websites that helped in breaking down demographics of the area along with the job type and wealth of the area (Statistical Atlas, 2018; NTVC, 2018; NTVC, 2020). I did this in order to provide a more wholistic approach to the type of people in the community. In the annotated bibliography, I also found counterexamples, including residents' claims that it is destroying the land and lowering property values as a result of the increased number of power lines (Sverdlik, 2016; Alley, 2020; Main, 2023). As it pertains to cloud, the STS research on this topic is limited, as it has been restricted to a small subset of the country's population. While I intend to write this as a case study, I did check to see if what I was doing would have a use case. It appeared that many people have recently been interested in this type of discussion, and I hope to provide my local community with a more definitive perspective on the pros and cons of this entire enterprise.

STS Project Proposal:

STS is the study of the connections between science, technology, and society. It would examine how, in my instance, technology and subsequent technical advancements have altered the social, political, economic, and cultural landscape. The research I am conducting falls under this category since I am investigating how Cloud Computing technology has significantly influenced the Loudoun County region. These include the economy/job market, the sort of

education children receives, the type of new homeowners, and the influence of housing and maintenance on the land itself.

I intend to address this research question from a variety of perspectives. I hope to be able to discuss a variety of factors that may have resulted from this. One instance would be the environmental and sustainability viewpoint. This is an evident consequence, as I have personally witnessed the leveling of so much land for the construction of enormous warehouses. It is essential to study our abilities to preserve these and prevent their abandonment by these corporations in the future. It would be fascinating to examine how Loudoun County has changed because of the construction of datacenters, either from an employment perspective or a relocation/gentrification one. While I am a computer scientist, it is crucial that we analyze the long-term impacts of our work and ensure that our contributions to society are only constructive. I will conclude by discussing how government and public processes have adapted to accommodate Cloud corporations. I am aware that most schools include coding as part of their curriculum and that the county has constructed special schools for individuals who are interested. Lastly, I would like to investigate how government rules, whether environmental or political, have changed or been added as a result of the expansion of cloud data warehousing.

The best framework for positioning this study would be ecological thinking. Ecological reasoning is an obvious choice for defining the relationship between humans and the ecosystem of Loudoun County and the non-living technology of Cloud Computing and its data storage systems. In this instance, the effects of this technology are far-reaching, and it would be essential to describe how it affects the county's people and land. I believe I can give relevant research by describing the history of cloud computing and society's reliance on it. From there, I can illustrate how, even though this is a vital technology, it has a complex connection with the environment it is housed in and the people it interacts with in the process of bringing us websites that are utilized by everyone on the globe.

This is anticipated to be accomplished by a doing a case study. Local government records describing changes in housing markets, school curricula, racial and age demographics, local legislation, etc., are a prime example. These should demonstrate how the proliferation of data centers has harmed or disproportionately disenfranchised certain populations. I would like to know, for instance, how many more tech employees have relocated to the region and how school curricula and special institutions have significantly increased the number of technology and engineering projects in the area.

Barriers & Boons

While I intend to present adequate proof for the arguments I wish to make, this is still a "new" field in which the environment is still evolving. It is unknown how future events, such as a decline in the stock market, might alter the overall findings of this study. Given that this is undergraduate student research, there would also be time constraints for doing a lengthier study in addition to funding constraints.

Having first-hand interviews would aid in providing knowledge that field experts can forecast or assess. While I strive to obtain the greatest data and evidence to support my claims, it is sometimes simpler to speak with community members who can be directly questioned.

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