

## **Thesis Project Portfolio**

### **Artificial Intelligence and Cloud Migration: Unlocking the Future of Business Infrastructure**

(Technical Report)

### **Revolutionizing Businesses in the Cloud and Their Profound Impacts on the Digital and Physical Future**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science  
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Bachelor of Science, School of Engineering

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## **Executive Summary**

### **Introduction**

The intersection between the technological revolution in cloud migration innovation and its broader societal implications forms the core of my academic exploration, bridging my internship experience at Fannie Mae and STS research paper. The internship provided hands-on experience in implementing cloud technology within a leading mortgage financing company, and my discoveries working with such cutting-edge technology prompted my STS research to explore the environmental ethics within Cloud migration and how to sustain this new era of the digital age. Together, these projects illuminate the dual aspects of technological progress, their potential to progress businesses and society to new limits, and the grave ramifications that may lie within their environmental impacts if not appropriately innovated sustainably. This synthesis underscores the critical need for environmental ethics to understand cloud technology's place within modern society and its future trajectory.

### **Summary of Technical Report**

Fannie Mae, the mortgage financing company, is making substantial technical strides to improve the efficiency of its business infrastructure through groundbreaking leaps with cloud migration of on-prem applications and artificial intelligence (AI) chatbots serving Application Programming Interface (API) and functionalities. During my internship at Fannie Mae, my main project was to aid in their cloud migration. I utilized AWS services to develop a file drop website to migrate on-prem assets and coded the UI with JavaScript, HTML, and jQuery. For the AI application, Amelia - Intelligent Assistant, I utilized BPNs, business process networks, and regression testing to train the model with new responses and questions. The projects showcased the future of business applications, in which cloud migration allows for improved efficiency,

reduced costs, and greater scalability. These benefits are further increased through the newly discovered use of AI to perform API calls in business application tasks. Future steps for such projects include fully migrating all Fannie Mae applications to the cloud and more widely applying Amelia to improve its training and other capabilities to revolutionize the business to new digital heights.

### **Summary of STS Research Paper**

This STS research investigates the environmental ethics surrounding the booming cloud migration, specifically the potential environmental ramifications of energy usage by the data centers hosting the cloud. The primary research question addressed is how the performance benefits of cloud migration can be balanced with the imperative environmental impacts to foster a sustainable, green cloud future.

Cloud usage has expanded exponentially in the past years, and the vast benefits of scalability, accessibility, and efficiency blind the environmental costs. As cloud computing emerges as the primary computing infrastructure, incorporating environmental ethics becomes imperative to ensure cloud sustainability. The framework draws upon critical theories that need to be embraced in the cloud, such as the environmental uncertainty in calculating the worst-case scenarios from non-traditional sources. The research seeks to uncover steps necessary for facilitating sustainable cloud migration, including policies and regulations governing data center infrastructure and energy sources that need to be implemented. Furthermore, to determine more proficient algorithms to control energy usage within data centers and reduce excessive energy usage on non-computational tasks such as cooling.

The significance of this research to the field of STS and engineering is determining what it takes for a revolutionary technology to be ethically sustainable and prosperous, to stand the test of time, and not to be a pressing technological force of environmental degradation that society must fix later.

## **Reflection**

The exploration of my software engineering internship and STS research paper offered a multifaceted view of the interconnection of technology and society. The capstone project of my internship experience, which I conducted the summer before my research, allowed me to develop divergent outlooks on the exponentially rising implementation of cloud computing within our society. My internship experience painted only cloud migration's grand powers and capabilities within the digital world. In contrast, my research on cloud impacts on the physical world elaborated on the grave environmental implications. By examining my experiences in practical applications and the theoretical implications of cloud migration, I was able to gain a holistic understanding of the incredible capabilities and challenges presented by cloud migration. My diverse experiences with the cloud emphasize the importance of technology progressing sustainably to move society forward and not be at the expense of the environment. The insights gained from my internship and research facilitate a newfound approach to technological development, advocating for a future where innovation and environmental stewardship do not have to be hindered from one another but rather symbiotically beneficial and push technology and society together to newfound limits and capabilities with a sustainable and ethical foundation.