Thesis Project Portfolio

Implementing an Automated Data Replication System for the Genesis II Platform

(Technical Report)

Misleading or Moving Forward? Evaluating Environmental Claims in Green Computing for Greenwashing

(STS Research Paper)

An Undergraduate Thesis

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

My technical project and my STS research paper were both linked with the common thread of green computing. My technical project is a much more narrowly focused, dealing with the challenge of data replication among different data centers, a problem that is more prominent in data centers powered by renewable energy. My STS research paper, meanwhile, is much broader, focusing on the issue of greenwashing that may occur when making environmental claims in green computing. By working with green computing in both the narrow sense of implementation details and the broader sense, I was able to develop insights into how my technical work could be misinterpreted by the general public.

Data replication is an important layer of redundancy that must exist in data centers. Especially, in data centers that are powered by wind power, and are thus privy to being suspended based on how the variable amount of energy produced. My technical project, therefore, produced a design for how a data replication system could be implemented in a specific existing computing system, as well as a basic proof-of-concept implementation in code of how such a system could function. The basic design utilized file access history to determine when to create replicas, updated resource resolving to ensure replicas could be found and used, and ensured that replicas would be deleted in the case where memory usage was above a threshold.

Green computing is a field concerned with designing and utilizing computing devices and systems in a manner that is environmentally responsible. A genuine problem that arises whenever environmental claims are made is the issue of greenwashing, in which deceptive claims are made concerning the environmental benefits of a product. My STS research explored existing knowledge of greenwashing, and attempted to apply it to existing case studies within

green computing. In particular, the Affect-Reason-Involvement Model, a model applied to greenwashing by Schmuck was used to analyze case studies of a Council of European Communities (CEC) energy label and Google's environmental report. My research concluded that while ARI model was effective for determining potentially misleading environmental claims, it does not necessarily detect whether the misleading was intentional, leading to ambiguity when looking for greenwashing.

Both my technical project and my STS paper were complimentary in that the broader scope provided by my STS paper helped inform me of the wider context in which my technical project operated. If I were to have to just done the technical project, it would have been easy for me to get lost in the technical details of the specific problem that I was addressing. However, with the addition of my STS paper, I was able to gain insight into the potential pitfall of my work in green computing could be misinterpreted in a way that would be counterintuitive to the goal of more environmental sustainability.