Efficient Load Balancing in Hybrid Clouds through Optimized VM Migration Strategies

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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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DECLARATION

This is to certify that the work is entirely my own and not that of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Sri Lanka Institute of Information Technology or to any other institution for assessment for any other purpose.

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ABSTRACT

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Dynamic VM migration optimization plays a pivotal role in enhancing the efficiency, performance, and cost-effectiveness of hybrid cloud environments. By intelligently transferring virtual machines (VMs) between private and public cloud resources, organizations can optimize resource utilization, improve application performance, and ensure business continuity.

This research explores the challenges and opportunities associated with dynamic VM migration optimization in hybrid clouds. It delves into existing optimization algorithms, performance metrics, and security considerations. Furthermore, the research investigates the potential of emerging technologies like artificial intelligence and machine learning to enhance optimization strategies.

Key research contributions include a comprehensive evaluation of existing optimization algorithms, considering their strengths, weaknesses, and suitability for different hybrid cloud scenario followed by the development of novel optimization techniques that incorporate advanced machine learning algorithms for more accurate workload prediction and resource allocation. An in-depth analysis of security implications associated with VM migration and the development of security-centric optimization strategies to mitigate risks will also be conducted. The exploration of the integration of dynamic VM migration optimization with emerging technologies like container orchestration and serverless computing to address the evolving needs of modern applications would be the cornerstone for this research project.

This research also aims to provide valuable insights for organizations seeking to optimize their hybrid cloud environments. The findings can guide the development of effective VM migration strategies that improve resource utilization, enhance application performance, and ensure a secure and scalable hybrid cloud infrastructure.

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Special thanks to the industry experts I looked up for guidance from, whose willingness to share their experiences and insights provided a rich foundation for my research. Their input was invaluable in understanding the real-world implications of legacy application migration, and their diverse perspectives contributed significantly to the depth of my findings.

I would also like to acknowledge Sri Lanka Institute of Information Technology for providing the necessary resources and facilities that enabled me to conduct this research. The access to relevant literature, databases, and technological tools was crucial in facilitating my exploration of the subject matter. I appreciate the institutional support that allowed me to focus on my research without undue distraction.

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