

DEDICATION

This thesis is compiled with the support of my family. I praise GOD and thanks to all who have helped, directed, and supported this work. I dedicate the work to my beloved parents

Yuheldi and Ayu Widiya Yanti.

Finally this thesis is dedicated to all informatics students in the world. I hope that this research may provide valuable contribution in Computer Science.

ACKNOWLEDGMENTS

This thesis is compiled with the effort, help, and support from both students and lecturers. I would like to express my deepest gratitude and thanks to:

1. God Almighty, Allah S.W.T, for His mercy and grace, enabled me to complete this research successfully.
2. My beloved parents, Yuheldi, S.Hum, Ayu Widiya Yanti, and my sister, dr. Ritsa Nastafiruka, my brother Muhammad Ridha, S.T., M.Kom and Andi Agus Salim S.H., LL.M, who have continuously prayed for me and given me extraordinary support so that I can survive until now.
3. My mentor and Co-mentor, Dr. Mahmud Dwi Sulistiyo, S.T., M.T., And Dewi Nasien, S.T., M.Sc., Ph.D., has guided me even outside working hours. I got a lot of valuable knowledge from them.
4. My thesis examiner, Dr. Ema Rachmawati, S.T., M.T., Dr. Tjokorda Agung Budi Wirayuda, S.T., M.T., and Bedy Purnama, S.Si., M.T., Ph.D. , who have provided constructive criticism and suggestions to improve my research.
5. All lecturers and employees of the Faculty of Informatics, Telkom University, for their knowledge and service during my master's studies at Telkom University.
6. My beloved Saskia Putri Ananda, S.Kom., M.Kom, who always provides support and motivation for working on this thesis.
7. My best friends Alfian Nur Ardhi, S.Kom, Reyhan Abby Wahyu, S.Kom and Vita Rahmadayanti, S.Kep always pray for each other and give support in times of joy and sorrow.
8. My comrades in arms in residency, a place to complain and always provide encouragement and motivation. Thank you to Ifah, Trya, Aje, Labib, Bintang, Singgih, Fian, Bella and my other residency friends.