## **ACKNOWLEDGMENTS**

First and foremost, praises and thanks to the Allah SWT, the Almighty, for His showers of blessings throughout my work to complete the research successfully.

I would like to express my deep and sincere gratitude to my supervisors Dade Nurjanah., Ph.D for her guidance and insight throughout the research.

I would like to express gratitude to Dr. Setyorini, the Head of Informatics in the Graduate School of Computing, and Dana Sulistyo Kusumo, Ph.D. my Guardian lecturer. I would also like to express my gratitude to all reviewers for their detailed and sharp comments and suggestions to improve the quality of the thesis book.

I thank my friend classmates: Mba Titi, Mba Siti, Pak Soni, Mba Ikke, Mba Aya, Mas Manaf, and Mas Amir, for the sleepless nights, we were working together before deadlines, and for all the fun we have had in the last two years.

Last but not the least, I would like to thank my family: my parents, my brother, my wife, my son for supporting me spiritually throughout my life.