Acknowledgements

First of all, lets pray and thanks God, Ida Sang Hyang Widhi Wasa for all of the blessings and graces. Because of the grace that God gave, the author can complete this minor thesis. The completion of this minor thesis could not have been possible without all support and assistance of many people whose names may not all be enumerated. I would like to express them a deep appreciation and a huge thanks, particularly to the following:

- 1. My mom; Anak Agung Ayu Murtini, my dad; Nyoman Mandia, my only younger brother; Made Satria Budi Kusuma and all of my big family for all the support, trust and motivation. I love you all, I do.
- 2. Mr. Kiki Maulana Adhinugraha, Ph.D., Professor David Taniar and Dr. Sultan Alamri as my supervisors that have been patiently supervise me with all the bright solution.
- 3. Keluarga Mahasiswa Hindu Universitas Telkom that has welcomed me when I first arrived in Bandung and provided many organization experience especially during my period as deputy of this organization. There are so much memories happen during my membership, happy, sad and absolutely a love story. Thank you so much for such a great memories guys!
- 4. KMH'2014 which have been my family during my education in Telkom University. We share, we laugh, we sad together. I won't forget you guys.
- 5. UKM Kesenian Bali Widyacana Murti that has accommodated and developed my talent in the field of traditional art, so that I can relieve my stress of the college problems.
- 6. IF-38-10, my class during college. I meet a lot of new people from all around Indonesia. We've been doing a lot of great things together, I really lucky to have you guys. Do not forget our friendship and wish us a huge luck!

- 7. My group during all of possible lecture we have "Asprak Harkos"; Imam, Plp and Gina. Thanks for help me during many lecture. You guys are awesome people, hopefully we gonna be successful together.
- 8. Database Research Laboratory that have been my second home during this work. Thank you for providing such a great kinship environment. I never regret joining this laboratory.
- 9. Mobile Innovation Laboratory that have been place to learn mobile programming during my college. Meet a lot of great and visionary people which gives me good experience. Thank you all, keep coding!
- 10. Informatics Laboratory that have provide me with great professional experience when I become an assistant for Database Modelling, Object Oriented Programming. I meet a lot of professional and diligent friends, which make me more excited to get on real world work out there.
- 11. My friends during this minor thesis work with the same supervisor; Diska, Fany, Habib and Ncus. We've been supporting each other, it is a great friendship. Thanks all.
- 12. My friends that worked on previous work, Daud Sandy that have been explained all of his work to me. Wish you a great success on your career.
- 13. Peoples around the world that posted questions and answers in Stackoverflow, you are helping a lot of people. Keep sharing.
- 14. All of my friends that I can't mention one by one, who always support me and become the reason of me to smile and laugh. It's been a pleasure to have you guys.