TABLE OF CONTENTS

APPROVAL PAGE ii
DECLARATION OF ORIGINALITY iii
PUBLICATION APPROVAL SHEET FOR ACADEMIC INTEREST iv
ACKNOWLEDGMENTS v
ABSTRACT vii
TABLE OF CONTENTS viii
LIST OF TABLES xii
LIST OF FIGURES xiii
CHAPTER 1. INTRODUCTION 1
1.1 Background 1
1.2 Problem Identification 2
1.3 Purpose 2
1.4 Limitation 3
1.5 Benefit 3
1.6 Writing Structure 3
CHAPTER 2. REVIEW OF LITERATURE 5
2.1 Plant Information 5
2.1.1 Taxonomy 5
2.1.2 GBIF 5
2.2 Green Open Space 5
2.3 QR Code 6
2.4 Python 7
2.5 Representational State Transfer (REST) 8

2.6 Django Rest Framework 8
2.6.1 Request and Response 9
2.6.2 Views 10
2.6.3 Serializers 11
2.6.4 Authentication 11
2.6.5 Permissions 11
2.7 PostgreSQL 12
2.7.1 Psycopg2 12
2.8 Android 13
2.8.1 MVVM Architecture 13
2.8.2 Zxing Library 14
2.8.3 Retrofit 14
2.9 System Development Methodology 15
2.9.1 Extreme Programming 15
2.9.2 Unified Modelling Language (UML) 16
2.10 Software Testing 20
2.10.1 Equivalence Partitioning 20
2.11 Related Work 21
CHAPTER 3. RESEARCH METHODOLOGY 23
3.1 Time and Place 23
3.2 Research Requirement 23
3.2.1 Hardware 23
3.2.2 Software 24
3.3 Research Methodology 24

3.3.1 Research Methodology Flowchart 25
3.3.2 Software Development Method 27
3.3.3 Data Collection Method 28
3.4 System Testing Method 28
CHAPTER 4. ANALYSIS AND SYSTEM DESIGN 30
4.1 Problem Identification 30
4.2 System Analysis 31
4.3 User Requirement Analysis 31
4.4 System Design 32
4.4.1 Use Case Diagram 32
4.4.2 Activity Diagram 34
4.4.3 Database Design 44
4.4.4 Deployment Diagram 46
4.4.5 RESTFul API Web Service Design 47
4.4.6 Interface Design 55
CHAPTER 5. IMPEMENTATION AND TEST 64
5.1 Administrator Dashboard Interface 64
5.1.1 Administrator Login Interface 64
5.1.2 Administrator Homepage Interface 65
5.1.3 Category Interface 66
5.1.4 Plant Interface 67
5.1.5 Account Interface 68
5.1.6 Token Interface 70
5.2 Mobile Application Interface 71

5.2.1 Splash Screen Interface 71
5.2.2 Login Interface 72
5.2.3 Registration Interface 72
5.2.4 Home Interface 73
5.2.5 Profile Interface 74
5.2.6 Plant List Interface 74
5.2.7 Plant Detail Interface 75
5.2.8 Category List Interface 76
5.2.9 Category Detail Interface 76
5.2.10 Scan Interface 77
5.2.11 Search Result Interface 78
5.2.12 Empty Result Interface 78
5.2.13 Favorites Interface 79
5.3 Test Result 79
5.3.1 Web API Testing 79
5.3.2 Mobile Application Testing 88
CHAPTER 6. CONCLUSION AND RECOMMENDATIONS 99
6.1 Conclusion 99
6.2 Recommendations 99
LIST OF REFERENCES 100

LIST OF TABLES

Table 2-1 List of Use Case Symbol 17
Table 2-2 List of Activity Diagram Symbol 19
Table 3-1 Hardware Requirement 23
Table 3-2 Software Requirement 24
Table 4-1 Account URI 50
Table 4-2 Plant URI 50
Table 4-3 Account URI Method 52
Table 4-4 Plant URI Method 53
Table 4-5 GET Response Code 54
Table 4-6 POST Response Code 55
Table 4-7 PUT Response Code 55
Table 5-1 Android Version Testing 88
Table 5-2 Login and Registration Form Function Testing 89
Table 5-3 Search Field Function Testing 96
Table 5-4 Main Menu Testing 97

LIST OF FIGURES

Figure 3-1 Research Methodology Flowchart 25
Figure 4-1 Sign board on plant 31
Figure 4-2 System Use Case Diagram 33
Figure 4-3 Activity Diagram Performs User Registration 35
Figure 4-4 Activity Diagram to Login 37
Figure 4-5 Activity Diagram when Forgot Password 38
Figure 4-6 Activity Diagram to Show Plant 39
Figure 4-7 Activity Diagram to Show Category 40
Figure 4-8 Activity Diagram to Search Plant 41
Figure 4-9 Activity Diagram to Scan QR Code 42
Figure 4-10 Activity Diagram to Show Favorite list 43
Figure 4-11 Activity Diagram to Perform Logout 43
Figure 4-12 Plant Table 44
Figure 4-13 Category Table 44
Figure 4-14 Account Table 45
Figure 4-15 Token Table 45
Figure 4-16 ER Diagram of Database 46
Figure 4-17 Deployment Diagram 47
Figure 4-18 Backend Design Stage (Richardson & Ruby, 2008) 48
Figure 4-19 URI Template (Gregorio, Fielding, Hadley, Nottingham, & Orchard, 2008) 49
Figure 4-20 Splash Screen Layout Design 56
Figure 4-21 Login Layout Design 57
Figure 4-22 Registration Layout Design 57
Figure 4-23 Home Layout Design 58

Figure 4-24 Profile Layout Design 59
Figure 4-25 Plant List Layout Design 59
Figure 4-26 Plant Detail Layout Design 60
Figure 4-27 Scanner Layout Design 60
Figure 4-28 Category List Layout Design 61
Figure 4-29 Category Layout Design 62
Figure 4-30 Search Result Layout Design 62
Figure 4-31 Empty Result Layout Design 63
Figure 4-32 Favorite Layout Design 63
Figure 5-1 Administator Login Page 65
Figure 5-2 Administrator Home Page 65
Figure 5-3 Category Menu Interface 66
Figure 5-4 Category Edit Interface 67
Figure 5-5 Plant Menu Interface 68
Figure 5-6 Plant Edit Interface 68
Figure 5-7 Account Menu Interface 69
Figure 5-8 Account Edit Interface 70
Figure 5-9 Token Menu Interface 71
Figure 5-10 Splash Screen Interface 71
Figure 5-11 Login Interface 72
Figure 5-12 Registration Interface 73
Figure 5-13 Home Interface 73
Figure 5-14 Profile Interface 74
Figure 5-15 Plant List Interface 75
Figure 5-16 Plant Detail Interface 75
Figure 5-17 Category List Interface 76
Figure 5-18 Category Detail Interface 77

Figure 5-19 Scan Interface 77
Figure 5-20 Search Result Interface 78
Figure 5-21 Empty Result Interface 78
Figure 5-22 Favorites Interface 79
Figure 5-23 request and response for URL /plants/ species 80
Figure 5-24 request and response for URL /plants/species/<slug> 81
Figure 5-25 request and response for URL /plants/category 82
Figure 5-26 request and response for URL /plants/category/<slug> 83
Figure 5-27 request and response for URL /plants/species/?search={query} 84
Figure 5-28 request and response for URL /plants/favoutite_plant/ 85
Figure 5-29 request and response for URL /plants/species/<slug>/favourite_plant 86
Figure 5-30 request and response for URL /account/login 87
Figure 5-31 request and response for URL /plants/register 88