# Table of Contents

Permission to use  
Abstract  
Acknowledgment  
Table of Contents  
List of Tables  
List of Figures  
Appendixes  

## Chapter 1  
Introduction

1.1 Background  
1.2 Research Focus  
1.3 Problem Statement  
1.4 Research Objectives  
1.5 Research Significant  
1.6 Research Scope  
1.7 Organization of Thesis  
1.8 Conclusion  
1.9 Summary  

## Chapter 2  
Literature Review

2.1 Introduction  
2.2 Health Care Information system  
2.3 Definitions of information system and health care information system  
2.4 Health Care Management system  
2.5 Patient Appointment system  
2.6 Managing Patient Appointment system  
2.7 Critical analysis for previous research  
2.8 Conclusion  
2.9 Summary  

## Chapter 3  
Research Methodology

3.1 Introduction  
3.2 Research Strategy  
3.3 Data Collection  
3.3.1 Data Collection Techniques  
3.3.2 Data Collection Tools  
3.4 Research Sample and Respondent  
3.5 Plan of Data Collection  
3.6 Framework for Data Analysis  
3.7 System Development  
3.8 Conclusion  
3.9 Summary  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permission to use</td>
<td>iii</td>
</tr>
<tr>
<td>Abstract</td>
<td>iv</td>
</tr>
<tr>
<td>Acknowledgment</td>
<td>v</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>vi</td>
</tr>
<tr>
<td>List of Tables</td>
<td>vii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>viii</td>
</tr>
<tr>
<td>Appendixes</td>
<td>x</td>
</tr>
<tr>
<td>Chapter 1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Background</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Research Focus</td>
<td>3</td>
</tr>
<tr>
<td>1.3 Problem Statement</td>
<td>4</td>
</tr>
<tr>
<td>1.4 Research Objectives</td>
<td>5</td>
</tr>
<tr>
<td>1.5 Research Significant</td>
<td>6</td>
</tr>
<tr>
<td>1.6 Research Scope</td>
<td>7</td>
</tr>
<tr>
<td>1.7 Organization of Thesis</td>
<td>8</td>
</tr>
<tr>
<td>1.8 Conclusion</td>
<td>8</td>
</tr>
<tr>
<td>1.9 Summary</td>
<td>9</td>
</tr>
<tr>
<td>Chapter 2 Literature Review</td>
<td>10</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>10</td>
</tr>
<tr>
<td>2.2 Health Care Information system</td>
<td>11</td>
</tr>
<tr>
<td>2.3 Definitions of information system and health care information system</td>
<td>12</td>
</tr>
<tr>
<td>2.4 Health Care Management system</td>
<td>14</td>
</tr>
<tr>
<td>2.5 Patient Appointment system</td>
<td>20</td>
</tr>
<tr>
<td>2.6 Managing Patient Appointment system</td>
<td>21</td>
</tr>
<tr>
<td>2.7 Critical analysis for previous research</td>
<td>39</td>
</tr>
<tr>
<td>2.8 Conclusion</td>
<td>45</td>
</tr>
<tr>
<td>2.9 Summary</td>
<td>46</td>
</tr>
<tr>
<td>Chapter 3 Research Methodology</td>
<td>47</td>
</tr>
<tr>
<td>3.1 Introduction</td>
<td>47</td>
</tr>
<tr>
<td>3.2 Research Strategy</td>
<td>47</td>
</tr>
<tr>
<td>3.3 Data Collection</td>
<td>49</td>
</tr>
<tr>
<td>3.3.1 Data Collection Techniques</td>
<td>49</td>
</tr>
<tr>
<td>3.3.2 Data Collection Tools</td>
<td>50</td>
</tr>
<tr>
<td>3.4 Research Sample and Respondent</td>
<td>50</td>
</tr>
<tr>
<td>3.5 Plan of Data Collection</td>
<td>50</td>
</tr>
<tr>
<td>3.6 Framework for Data Analysis</td>
<td>52</td>
</tr>
<tr>
<td>3.7 System Development</td>
<td>53</td>
</tr>
<tr>
<td>3.8 Conclusion</td>
<td>55</td>
</tr>
<tr>
<td>3.9 Summary</td>
<td>55</td>
</tr>
</tbody>
</table>
Chapter 4
Data Collection, Analysis and Findings

4.1 Introduction 56
4.2 Case study 57
  4.2.1 Case 1 (UH) University Hospital 57
  4.2.2 Case 2 (HUKM) Hospital of University Kebangsaan Malaysia 59
4.3 Data Capture 61
4.4 Data Analysis 63
  4.4.1 University Hospital (UH) 66
  4.4.2 Hospital of University Kebangsaan Malaysia (HUKM) 70
4.5 Finding 74
4.6 System Testing 78
4.7 Feedback 83
4.8 Conclusion 84
4.9 Summary 85

Chapter 5
System Design

5.1 Introduction 86
5.2 System Structure 86
  5.2.1 System Concept 86
  5.2.2 System modules 87
  5.2.3 System Environment 88
5.3 Functional Requirement 89
5.4 Non Functional Requirement 89
  5.4.1 Integrity 89
  5.4.2 Flexibility 90
  5.4.3 Security 90
  5.4.4 Maintainability 90
5.5 System Interface 91
  5.5.1 User Interface 91
  5.5.2 Hardware Interface 134
  5.5.3 Communications Interfaces 134
5.6 System Tables 135
5.7 System Code 137
5.8 Conclusion 150
5.9 Summary 150

Chapter 6
Discussion and Conclusion

6.1 Introductions 151
6.2 Contribution to Knowledge 152
6.3 The Research Outcome 153
6.4 System strength 153
6.6 System Limitation 155
6.5 Recommendation and Future Work 155
6.7 Research Conclusion 156

References 157
vii
List of Tables

Table 2.1 Appointment Type 32
Table 2.2 Basic Patient Flow Logic 33
Table 2.3 Critical analyses, system features and types for previous studies based on the literature review 42
Table 2.4 Limitation and strength of the health care system based on the previous study in the literature review 44
Table 3.1 Research Respondent 50
Table 4.1 The analysis of data collected 64
Table 4.2 UH Nurse, use system for creating patient profile and setting appointment 80
Table 4.3 UH Patients use system to confirm the appointment 80
Table 4.4 HUKM nurse use system for creating patient profile and setting appointment 81
Table 4.5 HUKM Patients use system to confirm the appointment 82

List of Figures

Figure 2.1 Patient accesses their own medical records 16
Figure 2.2 Integrated web page Patient Gateway portal 18
Figure 2.3 The Integrated Tbase system 19
Figure 2.4 Single point of access to the health care gateway 20
Figure 2.5 Patient appointments Flow Chart 26
Figure 2.6 Information about physicians 27
Figure 2.7 Appointment time table 27
Figure 2.8 Patient Flow diagram 29
Figure 2.9 Patient Flow diagram 31
Figure 2.10 Patient processes in the clinic 35
Figure 2.11 Patient information for registration 36
Figure 2.12 Patient appointments (electronic booking) 37
Figure 2.13 Patient appointments process 38
Figure 2.14 Conceptual framework for health care system based on the literature review 43
Figure 2.15 Conceptual framework for the appointment system based on the literature review 43
Figure 3.1 Framework of data analysis 52
Figure 3.2 Waterfall method 53
Figure 4.1 The current system construction use in UH and HUKM 65
Figure 4.2 Network design topology for hospital UH and HUKM 66
Figure 4.3 Patient flow steps (Chart) in UH 69
Figure 4.4 Patient flow steps (Chart) in HUKM 73
Figure 4.5 The new integrated module 75
Figure 4.6 Finding Module form the Current System Used for Managing the Patient Appointment 76
Figure 4.7 The new module for managing the patient appointment 77
Figure 5.1 The structure chart of the new application 87
Figure 5.2 System users as group 89
Figure 5.3 Login interface 91
Figure 5.4 Today Queue 92
  Figure 5.4.1 Search Patients 93
Figure 5.4.2 Create new Patients
Figure 6.4.3 View appointments
  Figure 5.4.3. (a) Appointment list
  Figure a1 Edit Appointments
Figure 5.4.4. (a) View Documents
  Figure a1 Downloading document
Figure 5.4.4.b Upload file
  Figure b1 Locate upload file
Figure 5.4.4. (c) Managing files
  Figure c1 Editing /Deleting file
Figure 5.4.5 View My Tasks
  Figure 5.4.5. (a) Editing/ Deleting Task
  Figure 5.4.5. (b) Creating a new Task
Figure 5.4.6 Doctor Schedule
  Figure 5.4.6. (a) Doctor Schedule History
  Figure 5.4.6. (b) Editing Doctor Status
  Figure 5.4.6. (c) Creating New Status
  Figure 5.4.6. (d) Doctor Schedule and status history
Figure 5.4.7. (a) View Report (Appointment)
Figure 5.4.7. (b) Patients Gender Report
Figure 5.4.7. (c) Patients Race Report
Figure 5.4.7. (d) Payment Report
Figure 5.4.7. (e) Payment method Report
Figure 5.4.7. (f) Doctor Consultation Report
Figure 5.4.7. (g) Client Report
Figure 5.4.7. (h) Document Report
Figure 5.4.7. (i) The Patient Complaint Report
Figure 5.4.7. (j) The Patient Treatment Report
Figure 5.4.7. (k) The Diagnosis Category Report
Figure 5.4.7. (l) The Total Product Used Report
Figure 5.4.8 Patients list
  Figure 5.4.8. (a) Patient details
  Figure 5.4.8. (b) Full Patient Details
  Figure 5.4.8. (c) Patient previous illness details
  Figure 5.4.8. (d) Patient consultation history
    Figure d1 The Patient Consolation Details
    Figure d2 Patient Consolation Diagnosis
    Figure d3 Patient Medication
    Figure d4 Patient Payment page
Figure 5.4.9 Patient Appointment History
  Figure 5.4.9. (a) Create/ Edit appointment
Figure 5.4.10 Patient allergies
Figure 5.4.11 Admin home page
Figure 5.4.11. (a) User Management
  Figure 6.4.11. (b) Edit/ Create user
Figure 5.4.12 Group Management
  Figure 6.4.12. (a) Edit/ Create group
Figure 5.4.13 System Management
  Figure 5.4.13. (a) System Profile
  Figure 5.4.13.b System Code Control
    Figure b1 Edit/ Create System Code
Figure 5.4.14 Account Management
Appendixes

Appendix A primary collected data
Appendix a-1 Doctor HUKM 162
Appendix a-2 Nurse1 HUKM 166
Appendix a-3 Nurse2 HUKM 170
Appendix a-4 Patient 1 HUKM 174
Appendix a-5 Patient 2 HUKM 176
Appendix a-6 Nurse1 UH 178
Appendix a-7 Patient 1 UH 181
Appendix a-8 Patient 2 UH 183
Appendix a-9 Patient 3 UH 185
Appendix a-10 Doctor HUKM 187

Appendix B feedback
Appendix b-1 Doctor Feedback HUKM 193
Appendix b-2 Nurse 1 Feedback HUKM 195
Appendix b-3 Nurse 2 Feedback HUKM 197
Appendix b-4 Patient 1 Feedback HUKM 199
Appendix b-5 Patient 2 Feedback HUKM 200
Appendix b-6 Patient 3 Feedback HUKM 201
Appendix b-7 Patient 4 Feedback HUKM 202
Appendix b-8 Patient 5 Feedback HUKM 203
Appendix b-9 Nurse1 Feedback UH 204
Appendix b-10 Nurse 2 Feedback UH 206
Appendix b-11 Patient 1 Feedback UH 207
Appendix b-12 Patient 2 Feedback UH 208
Appendix b-13 Patient 3 Feedback UH 209
Appendix b-14 Patient 4 Feedback UH 210
Appendix b-15 Patient 5 Feedback UH 211

Appendix C system use case 213
Appendix D System Table 235
Appendix E System Chart Code 248