

## TABLE OF CONTENTS

|   |     |
|---|-----|
| DECLARATION OF ORIGINALITY .....                      | I   |
| VALIDATION SHEET.....                                 | II  |
| PUBLICATION APPROVAL SHEET FOR ACADEMIC INTEREST..... | IV  |
| ACKNOWLEDGMENTS .....                                 | V   |
| ABSTRACT .....  | VI  |
| TABLE OF CONTENTS .....                               | VII |
| LIST OF TABLES .....                                  | X   |
| LIST OF FIGURES .....                                 | XI  |
| CHAPTER 1. INTRODUCTION .....                         | 1   |
| 1.1 Background of Study .....                         | 1   |
| 1.2 Problem Statement .....                           | 3   |
| 1.3 Purpose of the Study .....                        | 3   |
| 1.4 Limitation of the Study .....                     | 4   |
| 1.5 Benefits of the Study .....                       | 4   |
| 1.6 Research Methodology .....                        | 5   |
| 1.7 Writing Structure.....                            | 6   |
| CHAPTER 2. REVIEW OF LITERATURE.....                  | 7   |
| 2.1 Project Management .....                          | 7   |
| 2.2 ReactJS.....                                      | 8   |
| 2.2.1 JSX.....  | 8   |

|  |           |
|--|-----------|
| 2.2.2 State, Props and Life Cycle .....            | 8         |
| 2.2.3 React Virtual DOM .....                      | 9         |
| 2.2.4 Components.....                              | 9         |
| 2.3 GraphQL .....                                  | 11        |
| 2.4 JSON.....                                      | 13        |
| 2.5 Node JS .....                                  | 14        |
| 2.6 Related Works.....                             | 14        |
| <b>CHAPTER 3. Analysis and design .....</b>        | <b>18</b> |
| 3.1 Software Development Method .....              | 18        |
| 3.2 Phase of Planning.....                         | 18        |
| 3.2.1 Analysis of the Current System .....         | 18        |
| 3.2.2 Weakness of the Current System.....          | 19        |
| 3.2.3 Functional Requirement .....                 | 20        |
| 3.2.4 Non Functional Requirement.....              | 21        |
| 3.3 Phase of Designing.....                        | 21        |
| 3.3.1 Use Case Diagram.....                        | 21        |
| 3.3.2 Activity Diagram.....                        | 24        |
| 3.3.3 Schema Design.....                           | 32        |
| 3.3.4 Wireframe Design .....                       | 35        |
| <b>CHAPTER 4. IMPLEMENTATION AND TESTING .....</b> | <b>46</b> |
| 4.1 System Development Environment.....            | 46        |
| 4.1.1 Hardware.....                                | 46        |

|  |    |
|--|----|
| 4.1.2 Software .....                             | 46 |
| 4.2 Back-End Implementation .....                | 47 |
| 4.2.1 Installed Packages and Modules.....        | 47 |
| 4.2.2 Apollo Server .....                        | 48 |
| 4.2.3 TypeDefs .....                             | 49 |
| 4.2.4 Resolvers .....                            | 51 |
| 4.3 Front-End Implementation .....               | 61 |
| 4.3.1 Installed Packages and Modules.....        | 61 |
| 4.3.2 Module Implementation .....                | 62 |
| 4.3.3 User Interface Implementation.....         | 71 |
| 4.4 Testing.....                                 | 78 |
| 4.4.1 GraphQL Testing.....                       | 78 |
| 4.4.2 Blackbox Testing.....                      | 85 |
| CHAPTER 5. CONCLUSIONS AND RECOMMENDATIONS ..... | 92 |
| 5.1 Conclusions.....                             | 92 |
| 5.2 Recommendations .....                        | 92 |
| LIST OF REFERENCES .....                         | 93 |

## LIST OF TABLES

|            |                                     |    |
|------------|-------------------------------------|----|
| Table 3.1  | Functional Requirement.....         | 20 |
| Table 3.2  | Non-Functional Requirement.....     | 21 |
| Table 4.1  | Packages and Modules Back End.....  | 47 |
| Table 4.2  | Query Typedef.....                  | 49 |
| Table 4.3  | Mutation Typedef.....               | 49 |
| Table 4.4  | Packages and Modules Front End..... | 61 |
| Table 4.5  | Layout Context.....                 | 62 |
| Table 4.6  | Auth Context.....                   | 63 |
| Table 4.7  | Student Context.....                | 64 |
| Table 4.8  | User Role Testing.....              | 85 |
| Table 4.9  | Admin Role Testing.....             | 86 |
| Table 4.10 | Student Role Testing.....           | 87 |
| Table 4.11 | Supervisor Role Testing.....        | 89 |

## LIST OF FIGURES

|             |   |    |
|-------------|---|----|
| Figure 2.1  | Styled Component Example (Smashingmagazine, 2017) ..... | 10 |
| Figure 2.2  | Get Supervisors Query.....                              | 12 |
| Figure 3.1  | Rapid Application Development (Softermii, 2020) .....   | 18 |
| Figure 3.2  | Use Case Diagram .....                                  | 22 |
| Figure 3.3  | Activity Diagram Propose Topic.....                     | 25 |
| Figure 3.4  | Activity Diagram Approve Topic .....                    | 26 |
| Figure 3.5  | Activity Diagram Set Appointment.....                   | 27 |
| Figure 3.6  | Activity Diagram Confirm Appointment.....               | 28 |
| Figure 3.7  | Activity Diagram Manage Project.....                    | 29 |
| Figure 3.8  | Activity Diagram Give Approval.....                     | 30 |
| Figure 3.9  | Activity Diagram Add Comment .....                      | 31 |
| Figure 3.10 | Report and Comment Schema.....                          | 32 |
| Figure 3.11 | User Schema .....                                       | 33 |
| Figure 3.12 | User Type GraphQL .....                                 | 33 |
| Figure 3.13 | Student Type GraphQL.....                               | 34 |
| Figure 3.14 | Supervisor Type GraphQL.....                            | 35 |
| Figure 3.15 | Login Page .....  | 36 |
| Figure 3.16 | Admin-Dashboard .....                                   | 37 |
| Figure 3.17 | Admin-Manage Student.....                               | 37 |
| Figure 3.18 | Admin-Create Student .....                              | 38 |

|             |  |    |
|-------------|--|----|
| Figure 3.19 | Admin-Manage Supervisor .....              | 38 |
| Figure 3.20 | Admin-Student Progress .....               | 39 |
| Figure 3.21 | Student Dashboard.....                     | 39 |
| Figure 3.22 | Student Propose Topic .....                | 40 |
| Figure 3.23 | Student-Create Topic .....                 | 41 |
| Figure 3.24 | Student-Set Appointment.....               | 41 |
| Figure 3.25 | Student Weekly Report.....                 | 42 |
| Figure 3.26 | Supervisor-Dashboard .....                 | 43 |
| Figure 3.27 | Supervisor-Student Propose Topic .....     | 43 |
| Figure 3.28 | Supervisor-Student Weekly Report.....      | 44 |
| Figure 3.29 | Supervisor-Student Report Details .....    | 44 |
| Figure 3.30 | Supervisor-Student Progress .....          | 45 |
| Figure 4.1  | Index.js.....                              | 48 |
| Figure 4.2  | Generate Token Function.....               | 52 |
| Figure 4.3  | Get Additional Info Students Function..... | 54 |
| Figure 4.4  | Check Auth Function.....                   | 57 |
| Figure 4.5  | Upload File Code .....                     | 59 |
| Figure 4.6  | ApolloProvider.js .....                    | 65 |
| Figure 4.7  | Example of Layout Component .....          | 66 |
| Figure 4.8  | User and Menu Management .....             | 67 |
| Figure 4.9  | Example of Writing Mutation .....          | 68 |
| Figure 4.10 | Create and Update User Mutation .....      | 69 |

|             |   |    |
|-------------|---|----|
| Figure 4.11 | Conditional Create Button Rendering ..... | 70 |
| Figure 4.12 | Create Topic and Report Mutation .....    | 71 |
| Figure 4.13 | Login Page .....                          | 72 |
| Figure 4.14 | Manage Student Page .....                 | 72 |
| Figure 4.15 | Manage Supervisor Page .....              | 73 |
| Figure 4.16 | Propose Topic page .....                  | 74 |
| Figure 4.17 | Weekly Report Page .....                  | 75 |
| Figure 4.18 | Student Topic Page .....                  | 75 |
| Figure 4.19 | Student Report Page .....                 | 76 |
| Figure 4.20 | Student Report Detail Page .....          | 76 |
| Figure 4.21 | Topic Detail Page .....                   | 77 |
| Figure 4.22 | PDF Viewer Page .....                     | 77 |
| Figure 4.23 | Login Mutation Testing .....              | 78 |
| Figure 4.24 | Change Password Mutation .....            | 79 |
| Figure 4.25 | Create Topic Mutation .....               | 80 |
| Figure 4.26 | Set Topic Status Mutation .....           | 81 |
| Figure 4.27 | Create Comment Topic Mutation .....       | 81 |
| Figure 4.28 | Delete Comment Topic Mutation .....       | 82 |
| Figure 4.29 | Create Report Mutation .....              | 82 |
| Figure 4.30 | Delete Report Mutation .....              | 83 |
| Figure 4.31 | Get Student Mutation .....                | 84 |