

Chapter 4

Results and Discussion

4.1 Introduction

In this chapter, the descriptive analysis results will be discussed and the results will be used as a first step of the Linear Sequential Model or the Classic Life Cycle or the Waterfall Model (Pressman, 2001). As mentioned earlier the study application does not have complexity thus this method is suitable and fit for our research, because my applications was relatively small and simple. For example; two main part of my application as Data Extraction Application and Data Transformation Application are relatively simple and don't have complexity.

4.2 Descriptive Analysis Results

Descriptive analysis was used to produce a situation analysis which consists of national or sub-national level information such as residential area, gender, race, age, education level and occupation to name a few. This data provides a snap shot of the situation of the samples under study. The relationship between the students' perception and attitude were also measured by descriptive analysis and shown in Table below. Students were asked about the frequency of referring to their university websites (Table 4.1).

Table 4.1 Traditional Learning Student’s Frequency of Referring to University Website

| Universities (Traditional Learning) | | | | | | |
|--|---------------------|-----------------|-----------------|--------------------|-----------------|--------------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Once a day | 6 (15%) | 7 (17.5%) | 3 (7.5%) | 16 (40%) | 7 (17.5%) | 39 (19.5%) |
| Once a week | 12 (30%) | 11(27.5%) | 9 (22.5%) | 5 (12.5%) | 10 (25.5%) | 47(23.5%) |
| Once a month | 5 (12.5%) | 2 (5%) | 6 (15%) | 5 (12.5%) | 3 (7.5%) | 21(10.5%) |
| Few times in a week | 11(27.5%) | 12 (30%) | 11(27.5%) | 6 (15%) | 11 (27.5%) | 51(25.5%) |
| Few times in a month | 5 (12.5%) | 8(20%) | 9 (22.5%) | 6 (15%) | 9(22.5%) | 37(18.5%) |
| Once a year | 1 (2.5%) | 0 | 2 (5%) | 1 (2.5%) | 0 | 4(2%) |
| Never | 0 | 0 | 0 | 1 (2.5%) | 0 | 1(0.5%) |
| Universities (E-Learning) | | | | | | |
| | UNITAR (100) | UPM (40) | OUM (60) | Total (200) | | |
| Once a day | 45 (45%) | 9(22.5%) | 2 (3.3%) | 56 (28%) | | |
| Once a week | 20 (20%) | 8(20%) | 12 (20%) | 40(20%) | | |
| Once a month | 3 (3%) | 3(7.5%) | 4 (6.7%) | 10(5%) | | |
| Few times in a week | 24 (24%) | 13(32.5%) | 30 (50%) | 67(33.5%) | | |
| Few times in a month | 3 (3%) | 7(17.5%) | 11 (18.3%) | 21(10.5%) | | |
| Once a year | 3 (3%) | 0 | 0 | 3(1.5%) | | |
| Never | 2 (2%) | 0 | 1 (1.7) | 3(1.5%) | | |

Key finding:

Table 4.1 shows that approximately 137 (68%) of 200 traditional learning students respondents 39 (19.5%) of students once a day, 47 (23.5%) of students once a week and 51(25.5%) of students few times in a week) and 163 (81%) of 200 e-learning students respondents 56 (28%) of students once a day, 40(20%) of

students once a week and 67(33.5%) of students few times in a week) stated that they refer to their university website on daily and weekly basis. Based on the results can be concluded though both groups of students (traditional and e-learning university) use their university website in daily and weekly basis and university website plays an important role as a main reference for students.

In the next question Students were asked about their awareness of student affairs website (Table 4.2).

4.2 Student's Awareness of Student Affairs Website

| Universities (Traditional Learning) | | | | | | Total (200) |
|-------------------------------------|---------------|-------------|------------|-------------|-------------|----------------|
| Answer | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Yes | 25 (62.5%) | 34 (85%) | 27 (67.5%) | 24 (60%) | 30 (75%) | 140 (70%) |
| NO | 15 (37.5%) | 6 (15%) | 13 (32.5%) | 16 (40%) | 10 (25%) | 60 (30%) |

| Universities (E-Learning) | | | | |
|---------------------------|--------------|------------|------------|----------------|
| Answer | UNITAR (100) | UPM (40) | OUM(60) | Total (200) |
| Yes | 74 (74%) | 31 (77.5%) | 31 (51.7%) | 136 (68%) |
| NO | 26 (26%) | 9 (22.5%) | 29(48.3%) | 64 (32%) |

Key finding:

Finding shows that 140 (70%) of 200 traditional learning students and 136 (68%) of 200 E-Learning students visited student affairs webpage in their university website. It's indicating that almost majority of 70% of students in both traditional and e-learning universities interested to use online communication with student affairs department.

Table 4.3 E-learning and Traditional Learning Most Used Program

| Universities (Traditional Learning) | | | | | | |
|--|----------------|-----------------|-----------------|----------------|-----------------|--------------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU(40) | UKM (40) | Total (200) |
| Student Club | 20 (50%) | 23 (57.5%) | 19 (47.5%) | 22 (55%) | 15 (37.5%) | 99 (49.5%) |
| Career Counseling | 7 (17.5%) | 7 (17.5%) | 8 (20%) | 6 (15%) | 11 (27.5%) | 39(19.5%) |
| Personal counseling | 6 (15%) | 2 (5%) | 1 (2.5%) | 4 (10%) | 4(10%) | 17 (8.5%) |
| Academic Advisory | 19(47.5%) | 17 (42.5%) | 18 (45%) | 21 (52%) | 14 (35%) | 89(44.5%) |
| Student Disability Services | 2(5%) | 0 | 1 (2.5%) | 0 | 1 (2.5%) | 4(2%) |
| Financial Aid | 3 (7.5%) | 3 (7.5%) | 1 (2.5%) | 7 (17.5%) | 8 (20%) | 22(11%) |
| Tutoring | 5 (12.5%) | 14(35%) | 8 (20%) | 7 (17.5%) | 8(20%) | 42(22%) |
| Others | 2 (5%) | 1 (2.5%) | 0 | 0 | 0 | 3(1.5%) |

| Universities (E-Learning) | | | | |
|----------------------------------|---------------------|-----------------|-----------------|--------------------|
| Answers | UNITAR (100) | UPM (40) | OUM (60) | Total (200) |
| Student Club | 43(43%) | 12 (30%) | 12(20%) | 67 (33.5%) |
| Career Counseling | 48(48%) | 4 (10%) | 5(8.3%) | 57(28.5%) |
| Personal counseling | 14(14%) | 7 (17.5%) | 7(11.7%) | 28(14%) |
| Academic Advisory | 38(38%) | 23 (57.5%) | 18(30%) | 79(39.5%) |
| Student Disability Services | 5(5%) | 0 | 2(3.3%) | 7(3.5%) |
| Financial Aid | 22(22%) | 6 (15%) | 0 | 28(14%) |
| Tutoring | 37(37%) | 14 (35%) | 29(48.3%) | 80(40%) |
| Others | 2(2%) | 1 (2.5%) | 4 (6.7%) | 7 (3.5%) |

Key finding:

Findings from Table 4.3 show that, in case of e-learning universities, the most useful services that students ranked as top four are: Tutoring (40 percent), Academic Advisory (39.5 percent), Student Club (33.5 percent) and Career Counseling (28.5 percent). In traditional learning universities the top four services among the services provided by student affairs department are, Student Club (49.5 percent), Academic

Advisory (44.5 percent), Tutoring (22 percent) and Career Counseling (19.5 percent). The results show that Tutoring is the most useful program among the e-learning students. This might happen due to lack of studying and educational material for e-learning students.

Table 4.4 Ranking of Students' Interests in Programs Provided by Student Affairs Department

| Universities (Traditional Learning) | | | | | | |
|--|---------------------|-----------------|-----------------|--------------------|-----------------|--------------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Student Club | 13(32.5%) | 8(20%) | 7(17.5%) | 9(22.5%) | 14(35%) | 51(25.5%) |
| Career Counseling | 23(57.5%) | 26(65%) | 23(57.5%) | 31(77.5%) | 18(45%) | 121(60.5%) |
| Personal counseling | 8 (20%) | 5(12.5%) | 7(17.5%) | 7(17.5%) | 5(7.5%) | 32(16%) |
| Academic Advisory | 20 (50%) | 13(32.5%) | 15(37.5%) | 18(45%) | 11(27.5%) | 77(38.5%) |
| Student Disability Services | 1 (2.5%) | 5(12.5%) | 1(2.5%) | 0 | 5(7.5%) | 12(6%) |
| Financial Aid | 8 (20%) | 6(15%) | 11(27.5%) | 8(20%) | 13(32.5%) | 46(23%) |
| Tutoring | 9 (22.5%) | 6(15%) | 11(27.5%) | 9(22.5%) | 8(20%) | 43(21.5%) |
| Others | 0 | 1(2.5%) | 0 | 0(%) | 0(%) | 1(0.5%) |
| Universities (E-Learning) | | | | | | |
| Answers | UNITAR (100) | UPM (40) | OUM (60) | Total (200) | | |
| Student Club | 40(40%) | 5 (12.5%) | 8(13.3) | 53(26.5%) | | |
| Career Counseling | 52(52%) | 30 (75%) | 25(41.7%) | 107(53.5%) | | |
| Personal counseling | 25(25%) | 9(22.5%) | 3(5%) | 37(18.5%) | | |
| Academic Advisory | 45(45%) | 15 (37.5%) | 27(45%) | 87(43.5%) | | |
| Student Disability Services | 8(8%) | 3 (7.5%) | 3(5%) | 14(7%) | | |
| Financial Aid | 23(23%) | 7 (17.5%) | 9(15%) | 39(19.5%) | | |
| Tutoring | 29(29%) | 10(25%) | 35(58.3%) | 74(37%) | | |
| Others | 1(1%) | 0 | 0 | 1(0.5%) | | |

Key finding:

Referring to the above Table (4.4), e-learning students are more concerned about Career Counseling (53.5 percent), Academic Advisory (43.5 percent), Tutoring (37 percent) and Financial Aid (19.5 percent). The same results had been repeated for traditional learning universities affairs department, students are interested to know more about Career Counseling (60.5 percent), Academic Advisory (38.5 percent), Financial Aid (23 percent), and Tutoring (21 percent). The results from comparison of the e-learning and traditional learning students' interests in programs provided by student affairs department indicates that e-learning and traditional learning students having similar interests, they interested in knowing more about services such as Career Counseling, Academic Advisory, Tutoring and Financial Aid provided by student affairs department which can provide information and knowledge about their subject, meanwhile create the secure future for them.

**Table 4.5: Students' Attitudes towards Getting Advance Reply from Student's
Affair Department**

| Universities (Traditional Learning) | | | | | | |
|--|---------------------|-----------------|-----------------|-----------------|-----------------|--------------------|
| Answer | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Yes | 12(30%) | 16(40%) | 17 (42.5%) | 13(32.5%) | 20(50%) | 78 (39%) |
| No | 28(70%) | 24(60%) | 23 (57.5%) | 27(67.5%) | 20(50%) | 122 (61%) |
| Universities (E-Learning) | | | | | | |
| Answer | UNITAR (100) | | UPM (40) | | OUM(60) | Total (200) |
| Yes | 37 (37%) | | 10(25%) | | 33 (55%) | 80 (40%) |
| No | 63 (63%) | | 30(75%) | | 27 (45%) | 120 (60%) |

Key finding:

122 (61%) of 200 Traditional Learning students and 122 (60%) of 200 E-Learning students respondents stated that when they require something or report their problem to student affairs department, they don't have any idea when they will get the answer in advance (Table 4.5) . Considering the results above, can be concluded that majority of students do not have any clue or idea about the time of getting responds or finding the results of their demands and requests. Only 40 percent of e-learning students claimed that they have an idea about getting in advanced reply about their requirement. The similar results also repeated for the traditional systems' learners. The findings indicate that there is no on line information system from student affairs department to organize the students' progress and deliver the outcome of their request or any other functional information to them.

Tables 4.6 Frequency of Getting Response from Student affairs Department

| Universities (Traditional Learning) | | | | | | |
|--|---------------------|-----------------|-----------------|-----------------|--------------------|--------------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Very Soon | 4 (10%) | 0 (0%) | 1 (2.5%) | 3(7.5%) | 2 (5%) | 10 (5%) |
| Soon | 4 (10%) | 7 (17.5%) | 9 (22.5%) | 6(15%) | 12 (30%) | 38 (19%) |
| Not Soon/ Late | 24(60%) | 24 (60%) | 23 (57.5%) | 23(57.5%) | 20 (50%) | 114 (57%) |
| Late | 7(17.5%) | 5 (12.5%) | 5 (12.5%) | 5(12.5%) | 5 (12.5%) | 27 (13.5%) |
| Very Late | 1 (2.5%) | 4 (10%) | 2 (5%) | 3(7.5%) | 1 (2.5%) | 11 (5.5%) |
| Universities (E-Learning) | | | | | | |
| Answers | UNITAR (100) | UPM (40) | OUM (60) | | Total (200) | |
| Very Soon | 9 (9%) | 1 (2.5%) | 3 (5%) | | 13 (6.5%) | |
| Soon | 28 (28%) | 5 (12.5%) | 14 (23.3%) | | 47 (23.5%) | |
| Not Soon/ Late | 50 (50%) | 21 (52.5%) | 35 (58.3%) | | 106 (53%) | |
| Late | 11 (11%) | 11 (27.5%) | 7 (11.7%) | | 29 (14.5%) | |
| Very Late | 2 (2%) | 2 (5%) | 1 (1.7%) | | 5 (2.5%) | |

Key finding:

Finding shows that only 5 percent of traditional learning students and 6.5 percent of e-learning students claimed that they would be replied from student affairs department very soon. The majority of 53 percent of traditional learning students and 57 percent of e-learning students were not still certain about time of being replied and also there were quit number of students who claimed of the late or very late time of reply from student affairs department. The results reveal that being respond from student affairs is not very fast process and still time consuming. Learners were also asked about the existence of any online systems which help them to follow their progress.

Table 4.7 Students' Response on the Condition of Online case/ progress Checking

| Universities (Traditional Learning) | | | | | | |
|--|---------------------|-----------------|-----------------|--------------------|-----------------|--------------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Yes | 5 (12.5%) | 6 (15.5%) | 10 (25%) | 12 (30%) | 12(30%) | 45(22.5%) |
| No | 16 (40%) | 17 (42.5%) | 10 (25%) | 13 (32.5%) | 7(17.5%) | 63(31.5%) |
| No Comment | 19 (47.5%) | 17 (42.5%) | 20 (50%) | 15 (37.5%) | 21(52.5%) | 92(46%) |
| Universities (E-Learning) | | | | | | |
| Answers | UNITAR (100) | UPM (40) | OUM(60) | Total (200) | | |
| Yes | 39 (39%) | 11 (27.5%) | 24(40%) | 74 (37%) | | |
| No | 34 (34%) | 13 (32.5%) | 12(20%) | 59 (29.5%) | | |
| No Comment | 27 (27%) | 16 (40%) | 24(40%) | 67 (33.5%) | | |

Key finding:

Finding from above Table (4.7) shows that out of 200 e-learning students 74 (37 percent) were aware of existence an online system to check the progress and report their case back to the students affairs. This number is reduced to 45 (22.5 percent) for traditional learning students. While the majority of e-learning students (126, 63 percent) and traditional learning students (155, 77 percent) still claimed that neither is online system nor their awareness of existence of an online system. Due to lack of awareness among learners it can be concluded that there is no online system to inform students about the progress of their case in all surveyed universities. However providing such an informative on line system is one of the main duties of students' affairs department. From the survey it is revealed that electronic mail (email) is the only communication online system which can relate student to students' affairs department. Another statement was to find out the learners' preference way to communicate with students' affairs department. In the other words the learners were given many choices of communications and asked to choose the most preferred one (Table 4.7).

Table 4.8 Most Preferred Communications by Students

| Universities (Traditional Learning) | | | | | |
|--|-----------------------|------------------|----------------|-----------------------|------------------------|
| Answers | Most Preferred | Preferred | Neutral | Less Preferred | Least Preferred |
| Face to Face Communication | 85 (42.5%) | 25(12.5%) | 59(29.5%) | 16(8%) | 15(7.5%) |
| Phone | 18 (9%) | 56(23%) | 50(25%) | 45(22.5%) | 31(15.5%) |
| Email | 53 (26.5%) | 64(32%) | 53(26.5%) | 23(11.5%) | 7(3.5%) |
| Online Problem Log form | 31(15.5%) | 53(26.5%) | 56(28%) | 33(16.5%) | 27(13.5) |
| Chat | 22(11%) | 50(25%) | 55(27.5%) | 42(22%) | 31(15.5%) |
| Universities (E-Learning) | | | | | |
| Answers | Most Preferred | Preferred | Neutral | Less Preferred | Least Preferred |
| Face to Face Communication | 79(39.5%) | 27 (13.5%) | 49(24.5%) | 24(12%) | 21(10.5%) |
| Phone | 24(12.5%) | 59(29.5%) | 49(24.5%) | 49(24%) | 19(9.5%) |
| Email | 65(32.5%) | 70(35%) | 34(17%) | 26(13%) | 5(2.5%) |
| Online Problem Log form | 47(23.5%) | 74(37%) | 33(16.5%) | 27(13.5%) | 19(9.5%) |
| Chat | 20(10%) | 58(29%) | 61(30.5%) | 38(19%) | 23(11.5%) |

Key finding:

A total of 67.5 percent of e-learning students preferred to communicate with student affairs department via email followed by 35 percent through chat and 60 percent via online problem Log form. On the contrary majority of traditional system students (65 percent) claimed that to them, face to face communication is the most preferred way to contact students' department affair. Considering the differences

between e-learning and traditional system, the results are very expected. E-learning students are not attached to the universities and communicating via online system is the best communication tool for them (Table 4.8).

Table 4.9 Student's Attitudes towards the Suitable Communication

| Universities (Traditional Learning) | | | | | |
|--|----------------------|-----------------|-----------------|----------------------|-----------------------|
| Answers | Most Suitable | Suitable | Neutral | Less Suitable | Least Suitable |
| Face to Face | 52 (26%) | 35(17.5%) | 37(18.5%) | 30 (15%) | 46 (23%) |
| Communication | | | | | |
| Phone | 17 (8.5%) | 50(25%) | 66(33%) | 48(24%) | 19(9.5%) |
| Email | 70(35%) | 67 (33.5%) | 43 (22.5%) | 12 (6%) | 8 (4%) |
| Online Problem | 47(23.5%) | 96(48%) | 29(14.5%) | 20(10%) | 8 (4%) |
| Log form | | | | | |
| Chat | 36(33%) | 51(25.5%) | 60(30%) | 33(16.5%) | 20 (10%) |
| Universities (E-Learning) | | | | | |
| Answers | Most Suitable | Suitable | Suitable | Suitable | Suitable |
| Face to Face | 55(27.5%) | 32 (16%) | 36(18%) | 46(23%) | 31(15.5%) |
| Communication | | | | | |
| Phone | 18(9%) | 55(27.5%) | 57(28.5%) | 49(24.5%) | 21(10.5%) |
| Email | 82(41%) | 67(33.5%) | 32(16%) | 14(7%) | 5(2.5%) |
| Online Problem | 45(22.5%) | 98(49%) | 29(14.5%) | 23(11.5%) | 5(2.5%) |
| Log form | | | | | |
| Chat | 38 (19%) | 63(31.5%) | 53(21.5%) | 29(14.5%) | 17(8.5%) |

Key finding:

Finding shows that According to both the E-Learning and Traditional Learning students the top three services suitable for e-learning students in order are Email, Problem Log form and Chat that is indicate that face to face communication which

is widely use in student affairs department to communicates with students is not suitable for e-learning students.

The reason that face to face communication was chosen as one of the main tool by traditional system learners is because this group of students is so used and trained to practice face to face communication and to them is the most preferred one (Table 4.9).

Table 4.10 Students and Practicing Face to Face communication

| Universities (Traditional Learning) | | | | | | |
|--|---------------------|-----------------|-----------------|--------------------|-----------------|--------------------|
| Answer | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Yes | 24 (60%) | 27(67.5%) | 28 (70%) | 28 (70%) | 28 (70%) | 135 (67.5%) |
| No | 16 (40%) | 13(32.5%) | 12 (30%) | 12(30%) | 12 (30%) | 65 (32.5%) |
| Universities (E-Learning) | | | | | | |
| Answer | UNITAR (100) | UPM (40) | OUM(60) | Total (200) | | |
| Yes | 70 (70%) | 31 (77.2%) | 38 (63.3%) | 140 (70%) | | |
| No | 30 (30%) | 9 (22.5%) | 22 (36.7%) | 60 (30%) | | |

Key finding:

Finding shows (Table 4.10) that overall 70 % of traditional learning students and 67% of e-learning students claimed that they do still practice face to face communication in case of any problem, It seems that although face to face communication is not a proper tool in e-learning system, yet in Malaysian universities the student affairs departments do not pay enough attention to this matter.

Table 4.11 Students' Justification of Student affairs Services

| Universities (Traditional Learning) | | | | | | |
|-------------------------------------|---------------|------------|------------|-----------|------------|-------------|
| Answer | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Yes | 13 (32.5%) | 11 (27.5%) | 13 (32.5%) | 7(17.5%) | 15 (37.5%) | 59(29.5%) |
| No | 5 (12.5%) | 10 (25%) | 9 (22.5%) | 15(37.5%) | 7 (17.5%) | 46(23%) |
| No Comment | 22 (55%) | 19 (47.5%) | 18 (45%) | 18(45%) | 18(45%) | 95(47.5%) |

| Universities (E-Learning) | | | | |
|---------------------------|--------------|------------|------------|-------------|
| Answer | UNITAR (100) | UPM (40) | OUM(60) | Total (200) |
| Yes | 50 (50%) | 15 (37.5%) | 29 (48.3%) | 94 (47%) |
| NO | 15 (15%) | 8 (20%) | 7 (11.7%) | 30 (15%) |
| No Comment | 35 (35%) | 17 (42.5%) | 24 (40%) | 76 (38%) |

Key finding:

Less than half of the e-learners (47 percent) students agreed with the current services from student affairs departments in order to fulfill their request and needs. The results indicate the majority of students believe that the current services system is not suitable for e-learning students (Table 4.11).

Table 4.12 Students Affair Department and Conducting Orientation Students

| Universities (Traditional Learning) | | | | | | |
|-------------------------------------|-----------|------------|------------|------------|----------|-------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM(40) | Total (200) |
| Yes | 25(62.5%) | 35 (87.5%) | 29 (72.5%) | 33 (82.5%) | 28 (70%) | 150 (75%) |
| No | 5 (12.5%) | 3 (7.5%) | 2 (5%) | 5 (12.5%) | 4 (10%) | 19 (9.5%) |
| No Comment | 10 (25%) | 2 (5%) | 9 (22.5%) | 2 (5%) | 8 (20%) | 31 (15.5%) |

| Universities (E-Learning) | | | | |
|---------------------------|--------------|-----------|----------|-------------|
| Answers | UNITAR (100) | UPM (40) | OUM(60) | Total (200) |
| Yes | 85 (85%) | 27(67.5%) | 21 (35%) | 133 (66.5%) |
| No | 8 (8%) | 2(5%) | 18 (30%) | 27 (13.5%) |
| No Comment | 7 (7%) | 11(27.5%) | 21 (35%) | 40 (20%) |

Key finding:

Majority of students from both group (75 percent of traditional learning students and 66.5 percent of e-learning students) reported that the student affairs department in their university is responsible to hold the orientation ceremonies for the new students (Table 4.12).

Table 4.13 Students' Response to Existence of the Online Active Club

| Universities (Traditional Learning) | | | | | | |
|--|--------------|------------|------------|-------------|------------|-------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Yes | 25 (62.5%) | 22(55%) | 18 (45%) | 21 (52.5%) | 23 (57.5%) | 109 (54.5%) |
| No | 5 (12.5%) | 3(7.5%) | 6 (15%) | 12 (30%) | 6 (15%) | 32 (16%) |
| No Comment | 10 (25%) | 15(37.5%) | 16 (40%) | 7 (17.5%) | 11 (27.5%) | 59 (29.5%) |
| Universities (E-Learning) | | | | | | |
| Answers | UNITAR (100) | UPM (40) | OUM(60) | Total (200) | | |
| Yes | 55 (55%) | 16 (40%) | 23 (38.3%) | 94 (47%) | | |
| No | 28 (28%) | 11(27.5%) | 18 (30%) | 57 (28.5%) | | |
| No Comment | 17 (17%) | 13 (32.5%) | 19 (31.7%) | 49 (24.5%) | | |

Key finding:

From the above Table (4.13) the results show that there are online clubs in traditional learning universities and e-learning universities for students to communicate with each others. Although the learners agreed that students from both groups can communicate with each other, but still there is enough evidence which indicate that 24.5 percent of e-learners were not aware of existence of on line communication club or forum.

Table 4.14 Students' Level of Satisfaction with Student Affairs Website

| Universities (Traditional Learning) | | | | | | |
|--|--------------|------------|------------|-------------|----------|-------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Very Satisfied | 2 (5%) | 1 (2.5%) | 2 (5%) | 1(2.5%) | 0 | 6 (3%) |
| Satisfied | 7 (17.5%) | 14 (35%) | 12 (30%) | 14(35%) | 18(45%) | 65 (32.5%) |
| Neutral | 25 (62.5%) | 21 (52%) | 23(57.5%) | 20(50%) | 18(45%) | 107(53.5%) |
| Not Satisfied | 3 (7.5%) | 2 (5%) | 2 (5%) | 5(12.5%) | 2(5%) | 14 (7%) |
| Not Satisfied at all | 3 (7.5%) | 2 (5%) | 1 (2.5%) | 0 | 2(5%) | 8 (4%) |
| Universities (E-Learning) | | | | | | |
| Answers | UNITAR (100) | UPM (40) | OUM (60) | Total (200) | | |
| Very Satisfied | 3 (3%) | 0 | 1 (1.7%) | 4 (2%) | | |
| Satisfied | 40 (40%) | 13 (32.5%) | 26 (43.3%) | 79 (39.5%) | | |
| Neutral | 45 (45%) | 18 (45%) | 30 (50%) | 93 (46.5%) | | |
| Not Satisfied | 10 (10%) | 9(22.5%) | 2 (3.3%) | 21 (10.5%) | | |
| Not Satisfied at all | 2 (2%) | 0 | 1 (1.7%) | 3 (1.5%) | | |

Key finding:

The frequency analysis results of students' satisfaction with students' affairs websites indicated that only 2 percent of e-learners and 3 percent of traditional system students were very satisfied with the student affairs departments' websites. While 39.5 percent of e-learners and 32.5 percent of traditional system students claimed that they were satisfied with their universities' website (Table 4.14).

Table 4.15 Students Ranking Their Student Fairs Website

| Universities (Traditional Learning) | | | | | | |
|--|--------------|------------|-----------|-------------|-----------|-------------|
| Answers | UM (40) | UTM (40) | USM (40) | MMU (40) | UKM (40) | Total (200) |
| Excellent | 2(5%) | 3 (7.5%) | 3(7.5%) | 2(5%) | 3 (7.5%) | 13 (6.5%) |
| Good | 10(25%) | 14 (35%) | 16(40%) | 13(32.5%) | 25(62.5%) | 78 (39%) |
| Average | 25(62.5%) | 19 (47.5%) | 17(42.5%) | 22(55%) | 11(27.5%) | 94 (47%) |
| Below Average | 2(5%) | 3 (7.5%) | 4(10%) | 2(5%) | 0 | 11 (5.5%) |
| Poor | 1(2.5%) | 1 (2.5%) | 0 (%) | 1(2.5%) | 1 (2.5%) | 4 (2%) |
| Universities (E-Learning) | | | | | | |
| Answers | UNITAR (100) | UPM (40) | OUM (60) | Total (200) | | |
| Excellent | 18 (18%) | 1(2.5%) | 7 (11.7%) | 26 (13%) | | |
| Good | 41 (41%) | 16(40%) | 28(46.7%) | 85 (42.5%) | | |
| Average | 36 (36%) | 22(55%) | 22(36.7%) | 80 (40%) | | |
| Below Average | 4 (4%) | 0 | 2 (3.3%) | 6 (3%) | | |
| Poor | 1 (1%) | 1(2.5%) | 1 (1.7%) | 3 (1.5%) | | |

Key finding

The findings from Table 4.15 show that only 13 percent of e-learners and about 6.5 percent of traditional system students ranked their universities' website in excellent position. The majority of e-learners (42.5 percent) ranked the student affairs Web is in good level, while the majority of traditional system students (47 percent) claimed that their universities' website is in an average level. Finding indicates that the majority of students in both e-learning and traditional learning universities rank their universities students' affairs website as an average and above.

Table 4.16 Students' Preference in Using Online Services

| Traditional Learning | | | | | | |
|--|---------------|------------|-----------|------------|------------|-------------|
| Answers | 1 | 2 | 3 | 4 | 5 | Total (1-5) |
| Academic Advising | 87 (43.5%) | 34 (17%) | 27(13.5%) | 14 (7 %) | 9 (3.5%) | 171(85.5%) |
| Career Counseling | 29 (14.5%) | 50 (25%) | 36 (18%) | 27 (13.5%) | 12 (6%) | 154 (77%) |
| Financial Aid Counseling | 6(3%) | 20(10%) | 34(17%) | 19(9.5%) | 21 (10.5%) | 100(50%) |
| Scholarship Information | 20(10%) | 21(10.5%) | 19 (9.5%) | 28 (14%) | 14 (7%) | 102 (51%) |
| Services for Students with Disabilities | 1(0.5%) | 7(3.5%) | 6(3%) | 16(8%) | 23 (11.5%) | 53(26.5%) |
| Services for International Students | 1(0.5%) | 4(2%) | 12(6%) | 8(4%) | 11 (5.5%) | 36(18%) |
| Services for Students with Multicultural Backgrounds | 6(3%) | 1(0.5%) | 3(1.5%) | 10(5%) | 8 (4%) | 28(14%) |
| Technical Support | 2(1%) | 5(2.5%) | 5(2.5%) | 14(7%) | 11 (5.5%) | 37(18.5%) |
| Library Services | 16 (8%) | 21 (10.5%) | 11(5.5%) | 8(4%) | 25 (12.5%) | 81 (40.5%) |
| Personal Counseling and Psychological Services | 0 | 4 (2%) | 5 (2.5%) | 5 (2.5%) | 21 (10.5%) | 35(17.5%) |
| Bookstore | 10(5%) | 6(3%) | 13(6.5%) | 16(8%) | 11 (5.5%) | 56 (28%) |
| Academic Tutoring | 13(6.5%) | 19(9.5%) | 20(10%) | 22(11%) | 17 (8.5%) | 91(45.5%) |
| Student Activities (groups and organizations such as student government, student club, online community) | 13 (6.5%) | 8(4%) | 9(4.5%) | 14(7%) | 16 (8%) | 60(30%) |
| E- Learning | | | | | | |
| Answers | 1 | 2 | 3 | 4 | 5 | Total (1-5) |
| Academic Advising | 71(35.5%) | 37(18.5%) | 30(15%) | 16 (8%) | 11 (5.5%) | 154 (77%) |
| Career Counseling | 24 (12%) | 44 (22%) | 30(15%) | 22 (11%) | 12 (6%) | 132 (66%) |
| Financial Aid Counseling | 8 (4%) | 24 (12%) | 40 (20%) | 33(16.5%) | 20 (10%) | 125 (62.5%) |
| Scholarship Information | 12 (6%) | 16 (8%) | 11 (5.5%) | 28 (14%) | 27(13.5%) | 94 (47%) |
| Services for Students with Disabilities | 5 (2.5%) | 7 (3.5%) | 8 (4%) | 8 (4%) | 20 (10%) | 48 (24%) |

| | | | | | | |
|--|------------|-----------|-----------|-----------|------------|-------------|
| Services for International Students | 1 (0.5%) | 2 (1%) | 5 (2.5%) | 6 (3%) | 8 (4%) | 22 (11%) |
| Services for Students with Multicultural Backgrounds | 2 (1%) | 4 (2%) | 3 (1.5%) | 13 (6.5%) | 5 (2.5%) | 27 (13.5%) |
| Technical Support | 3 (1.5%) | 8 (4%) | 7 (3.5%) | 8 (4%) | 25 (12.5%) | 51 (25.5%) |
| Library Services | 19 (9.5%) | 9 (4.5%) | 19 (9.5%) | 18 (9%) | 21 (10.5%) | 86 (43%) |
| Personal Counseling and Psychological Services | 5 (2.5%) | 0 | 1 (0.5%) | 11 (5.5%) | 15 (7.5%) | 32 (16%) |
| Bookstore | 1 (0.5%) | 10 (5%) | 13 (6.5%) | 10 (5%) | 10 (5%) | 44 (22%) |
| Academic Tutoring | 39 (19.5%) | 28 (14%) | 20 (10%) | 20 (10%) | 16 (8%) | 123 (61.5%) |
| Student Activities (groups and organizations such as student government, student club, online community) | 16 (8%) | 11 (5.5%) | 13 (6.5%) | 8 (4%) | 8 (4%) | 56 (28%) |

Key finding:

Students were also asked to rank the services which can be available online via students' affairs website. Thirteen different services and facilities asked to be ranked by the learners. The overall purpose of ranking was to find out the most preferred online service in Malaysian universities. Ranking is computed by average score form scale 1 (most wanted) to scale 13 (least wanted).

Table 4.16 shows nearly 35.5 percent of e-learners ranked academic advisory in the first level, it refers to necessitate of being advised through their study. Though they are not attached to the campus and universities' environment but they still need to be guide and lead to achieve their goals. The second highest rank in this group is, academic tutoring (19.5 percent), followed by career counseling (12 percent) and library services (9.5 percent). Every single of these factors plays integral and important roles during student life of the learners which need to be considered practically and fundamentally by student affairs departments in universities, finding shows that Academic Advisory, Career Counseling, Financial Aid, Tutoring and

Scholarship Information are the top five services that both e-learning and traditional learning students interested to use online.

The following table (Table 4.17) reports the demographic and socio-economic profile of the sample of students this table summarized the results of question 18 to 21 in surveys.

Table 4.17 Demographic and Socio-Economic Profile of Students

| Characteristics | E-learning Students | | Traditional Students | |
|--|---------------------|------------|----------------------|------------|
| | Number | Percentage | Number | Percentage |
| Residential area | | | | |
| Urban | 41 | 20.5 | 127 | 63.5 |
| Suburb | 159 | 79.5 | 73 | 36.5 |
| Gender | | | | |
| Male | 89 | 44.5 | 92 | 46 |
| Female | 111 | 55.5 | 108 | 54 |
| Race | | | | |
| Malay | 131 | 65.5 | 121 | 60.5 |
| Chinese | 21 | 10.5 | 32 | 16 |
| Indian | 34 | 17 | 14 | 7 |
| Others | 14 | 7 | 33 | 7 |
| Age | | | | |
| Below 25 | 91 | 45.5 | 179 | 89.5 |
| 26-40 | 94 | 47 | 21 | 10.5 |
| 41-60 | 15 | 7.5 | 0 | 0 |
| Marital status | | | | |
| Single | 69 | 34.5 | 186 | 93 |
| Married | 131 | 65.5 | 14 | 7 |
| Occupation | | | | |
| Student | 51 | 25.5 | 113 | 56.5 |
| Career group (working beside studying) | 149 | 75.5 | 87 | 43.5 |

According to Raab, *et al* (2002) residential areas have a positive effect on participation in e-learning program. Students from suburb area seem to be more involved in distance education. Table 1, shows that the number of e-learning students from suburb were 159 (79.5 percent) which is almost 3 times more compared to the students from urban (41, 20.5 percent). Education and studying behavior is regulated by gender-specific factors. In this study most of the e-learning students were females 111 (55.5 percent) as compared to males 89 (44.5 percent). The same trend has been occurred for traditional students. The number of females is more compared to the male students. Malaysia's ethnically diverse population of around 24 million consists of three major races: Malay, Chinese and Indian as well as other citizens. Table 1 show that the majority of the students (either e-learning or traditional) were Malays. Education choices and type of study are also driven by age. As such, most of the survey respondents which involved in e-learning are between 26 to 40 (94, 47 percent), while majority of students (179, 89.5 percent) in the traditional system are below 25. Considering the age of students, the results indicate that, middle age respondents are more likely to be involved in e-learning compared to younger group of them. This might happen because the age group between 26 to 40 mostly belongs to working class therefore the prefer distance learning. Table 1 presents of the 200 e-learning respondents, 131 (65.5 percent) were married and among the traditional learning system only 14 (7 percent) were married. Table 1 show that the occupations of the respondents were categorized into two levels. The majority e-learning respondents had working 149 (75.5 percent) and the response rate of 25.5 percent is just students without working background. The opposite result has been shown for the traditional group of students.

4.3 Summary of the Results

The results of this study suggest that students are very concerned about the student affairs services and their responsibilities in facilitating e-learning system. In their perception student affairs services need to focus on academic advisory, academic tutoring, career counseling, and financial aid and library facilities. Nevertheless, most students mentioned lack of proper communication systems force them to refer to student affairs services regardless of time consuming. In general, various attitude factors significantly influenced the likelihood of students' perceptions on student affairs services. The findings of this study indicated that in-advanced reply, existing online system to check the progress of cases, offering more services and supports, short-time and fast reply are significant factors that influenced satisfaction on student affairs services. From results can conclude that tutoring and academic advisor are central, in the first place, to what are conventionally known as student support services and are very much demanded by e-learners. In the second place the facilitation of communication and the developed friendly e-learning online environment (especially Web) can represent e-learning system superior compared to traditional system. Otherwise the traditional systems still hold promise for the ongoing, thriving and successful educational method in terms of addressing the needs and characteristics of the lifelong learners, ensuring the relevance and quality of learning courses and impacting fundamentally on the way we plan, design, deliver, assess and think about education in general. This empirically validated result will be useful to researchers in developing and testing e-learning systems in other universities, as well as to organizations in implementing successful e-learning systems.

4.4 System Design (Dynamic Model)

The Dynamic Model provides a view of business processes that impact the proposed system. It shows how actors carry out high level business tasks to meet business demands. Business processes that will be performed by the proposed system will be ultimately implemented by the Use Cases detailed in the Use Case model.

4.4.1 Add Letter

Administrator of the system can add a new letter under any category. When administrator sends the filled form, the system first validates necessary fields. Then creates a letter instance and populates all fields from the data submitted. Selected letter staffs are added to the letter. If there is any form templates uploaded by the administrator, that's added to the letter instance. If all validation is successful then letter is saved to the database and letter files are saved to the storage device in a predefined folder.

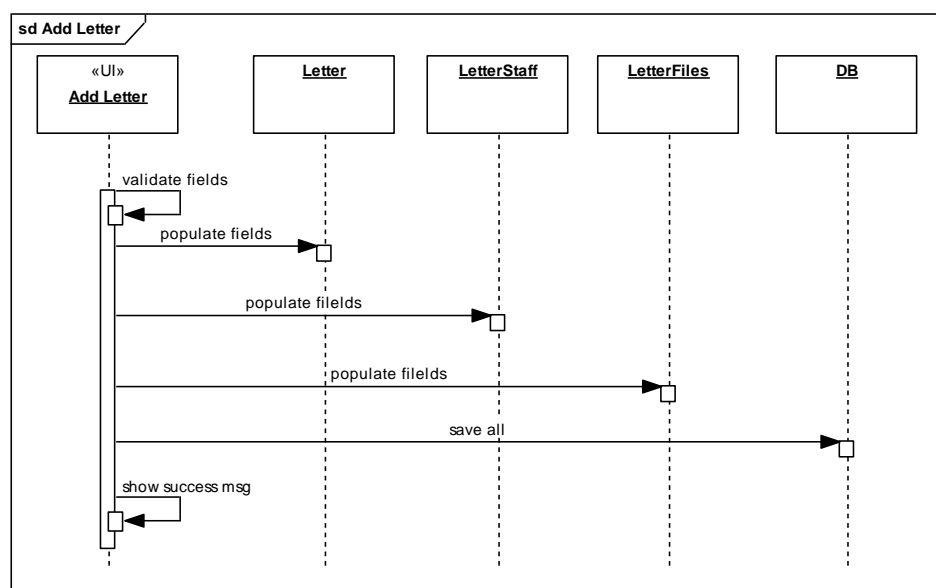


Figure 4.4.1: Add Letter

Add Letter Messages

| ID | Message | From Object | To Object |
|----|------------------|-------------|-------------|
| 1 | validate fields | Add Letter | Add Letter |
| 2 | populate fields | Add Letter | Letter |
| 3 | populate filelds | Add Letter | LetterStaff |
| 4 | populate filelds | Add Letter | LetterFiles |
| 5 | save all | Add Letter | DB |
| 6 | show success msg | Add Letter | Add Letter |

4.4.2 Add Staff

Administrator can add a new staff to the system. When the form is filled with staff information and submitted. System creates a new staff instance and populates all data. The system creates a staff interface which contains declarations of the functions which can connect to the database specified. The definition of functions can vary depending on the database. Then system stores the staff instance to the database.

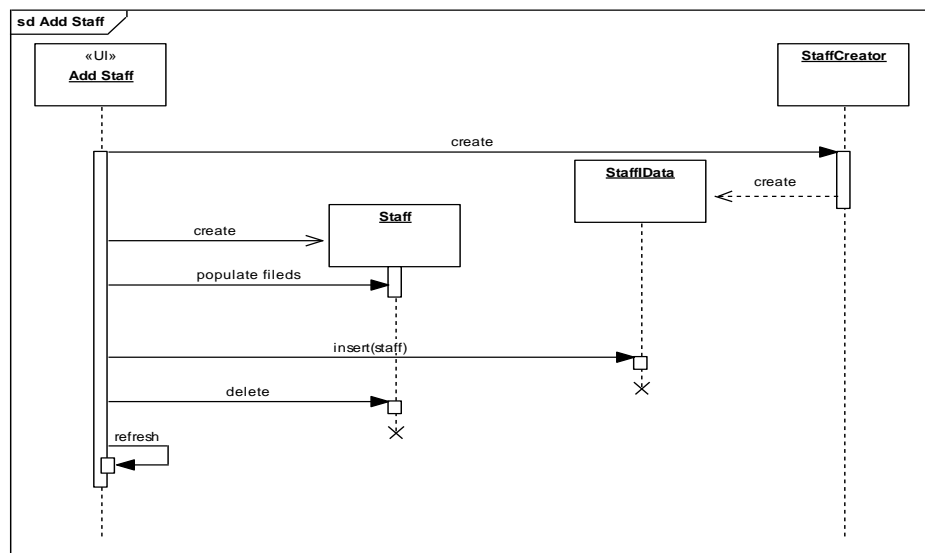


Figure 4.4.2: Add Staff

Add Staff Messages

| ID | Message | From Object | To Object |
|----|-----------------|--------------|--------------|
| 1 | Create | Add Staff | StaffCreator |
| 2 | Create | StaffCreator | StaffIDData |
| 3 | Create | Add Staff | Staff |
| 4 | populate fileds | Add Staff | Staff |
| 5 | insert(staff) | Add Staff | StaffIDData |
| 6 | Delete | Add Staff | Staff |
| 7 | Refresh | Add Staff | Add Staff |

4.4.3 Add Student

When the administrator makes a request to add a new student, system creates a new instance of student creator which creates student data. Then system creates a new instance of student class and populates all attributes with the data submitted just after validation. By calling the insert method system can store the data to the database.

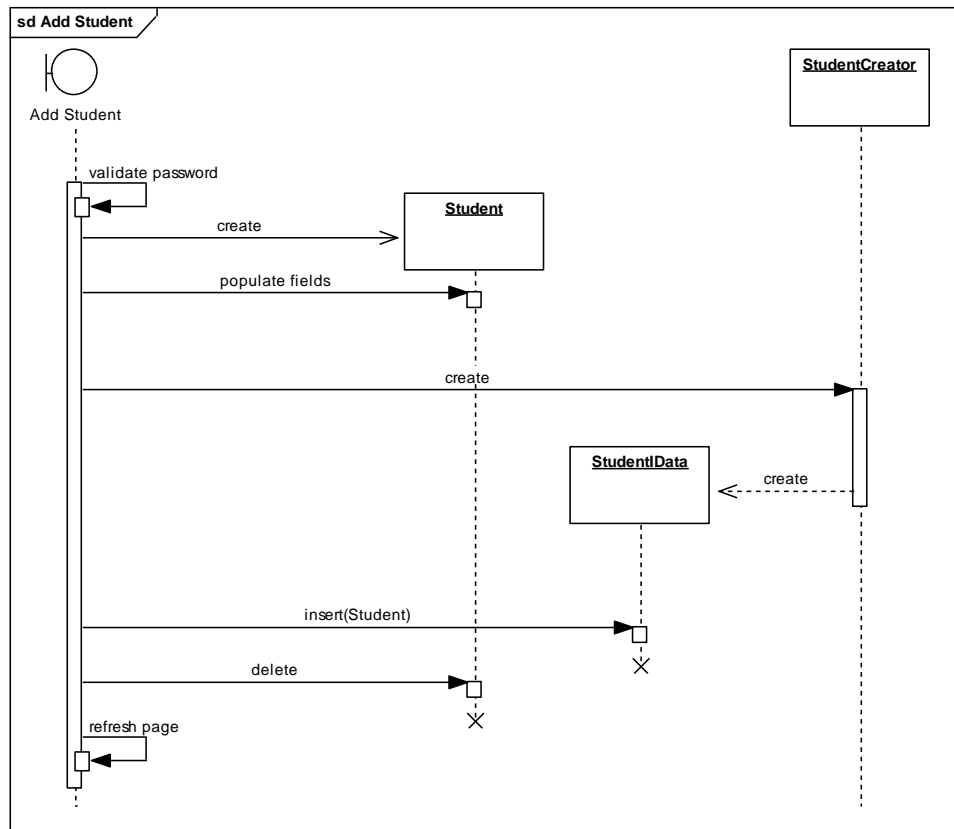


Figure 4.4.3: Add Student

Add Student Messages

| ID | Message | From Object | To Object |
|----|-------------------|----------------|----------------|
| 1 | validate password | Add Student | Add Student |
| 2 | Create | Add Student | Student |
| 3 | populate fields | Add Student | Student |
| 4 | Create | Add Student | StudentCreator |
| 5 | Create | StudentCreator | StudentIDData |
| 6 | Insert | Add Student | StudentIDData |
| 7 | Delete | Add Student | Student |
| 8 | refresh page | Add Student | Add Student |

4.4.4 Case Approve

When the student sends a case, the case arrives to the first staff in letter staff list.

If that staff approves the letter, it forwards to the next staff provided, until there is no

more staff in the list. This process is done by first getting all the list of the staff belonging to the letter. Then system determines the current staff. Set its status to approve. Then system finds the next staff by iterating in the list of staffs. If there is a next staff, then its status is set to on progress, from none. If current staff is the last staff in the list then the status of the letter is set to approve and a notification sent to the student.

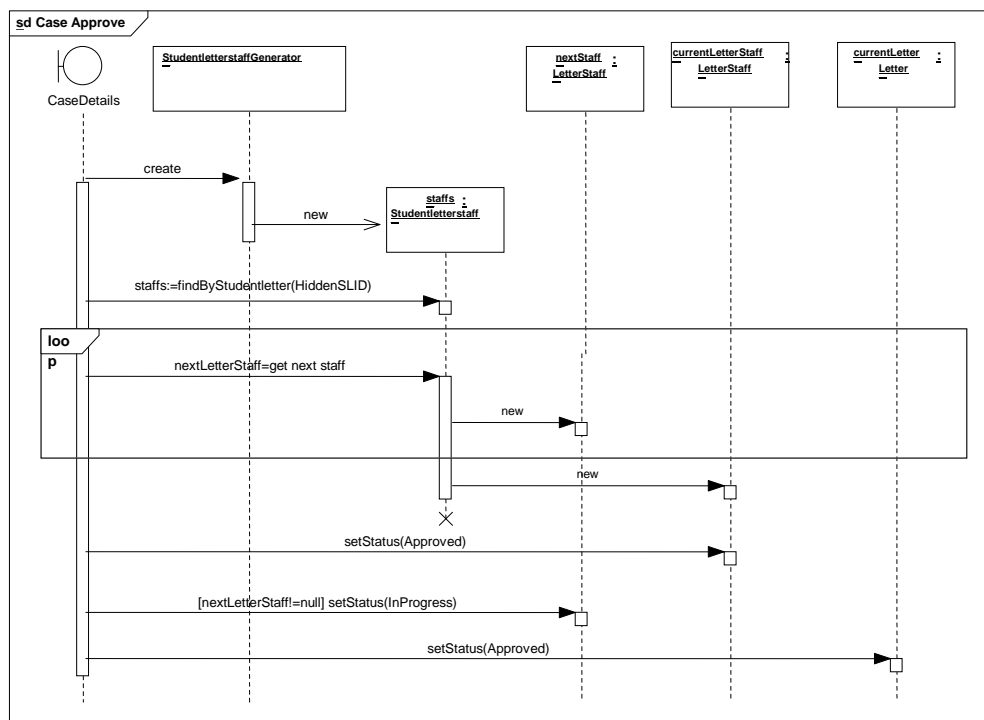


Figure 4.4.4: Case Approve

Case Approve Messages

| ID | Message | From Object | To Object |
|----|--|-----------------------------|-----------------------------|
| 1 | create | CaseDetails | StudentletterstaffGenerator |
| 2 | new | StudentletterstaffGenerator | staffs: Studentletterstaff |
| 3 | staffs:=findByStudentletter (HiddenSLID) | CaseDetails | staffs: Studentletterstaff |
| 4 | nextLetterStaff=get next staff | CaseDetails | staffs: Studentletterstaff |
| 5 | new | staffs: Studentletterstaff | nextStaff: LetterStaff |

| | | | |
|---|--|----------------------------|---------------------------------|
| 6 | new | staffs: Studentletterstaff | currentLetterStaff: LetterStaff |
| 7 | setStatus(Approved) | CaseDetails | currentLetterStaff: LetterStaff |
| 8 | [nextLetterStaff!=null] setStatus(InProgress) | CaseDetails | nextStaff: LetterStaff |
| 9 | setStatus(Approved) | CaseDetails | currentLetter: Letter |

4.4.5 Case reject

A staff can reject a case that has been send to their self. If the staff rejects the letter then the status of the letter directly becomes rejected. Letter does not get forwarded to any other staffs in the list. Also the status of the staff who rejected the case becomes rejected so the student can understand at which point the letter is rejected and what the reason is. Staff can add a predefined reason to the rejection or can add more details.

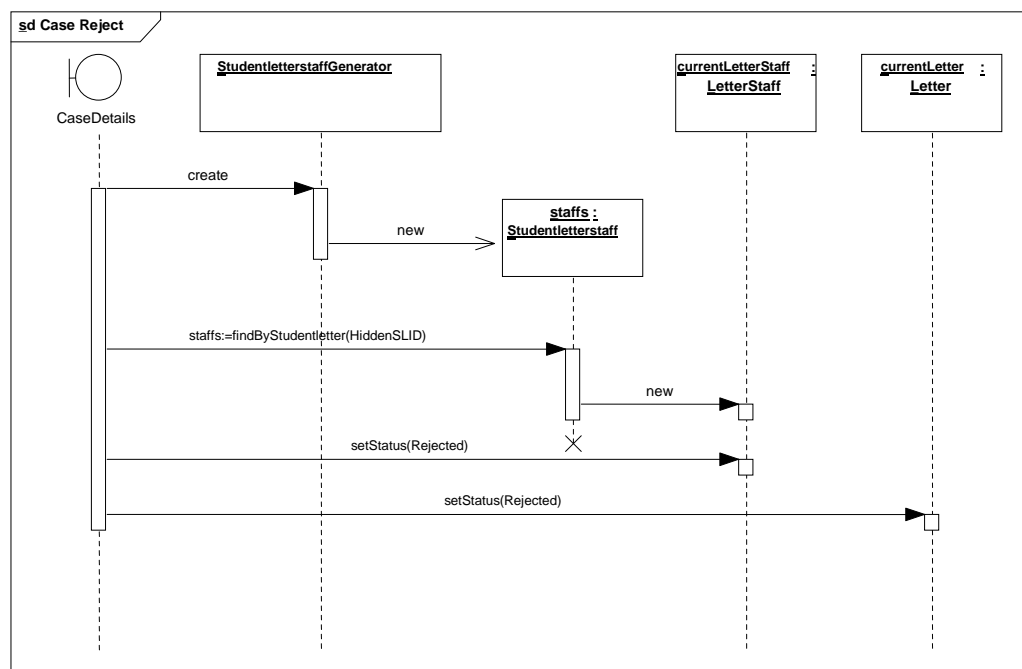


Figure 4.4.5: Case Reject

Case Reject Messages

| ID | Message | From Object | To Object |
|----|---|-----------------------------|---------------------------------|
| 1 | create | CaseDetails | StudentletterstaffGenerator |
| 2 | new | StudentletterstaffGenerator | staffs: Studentletterstaff |
| 3 | staffs:=findByStudentletter(HiddenSLID) | CaseDetails | staffs: Studentletterstaff |
| 4 | new | staffs: Studentletterstaff | currentLetterStaff: LetterStaff |
| 5 | setStatus(Rejected) | CaseDetails | currentLetterStaff: LetterStaff |
| 6 | setStatus(Rejected) | CaseDetails | currentLetter: Letter |

4.4.6 Change Password

Student or staff can change their password. Because the logic of changing a staffs password or students password is exactly the same I show here only the student interaction diagram for changing password. Student writes his old password. This password is checked form the database. Then student write a new password and writes the same new password in another textbox one more time. This lowers the chance of writing the password wrong two times. If the comparison of the passwords is resulted as correct then new password is stored to the database.

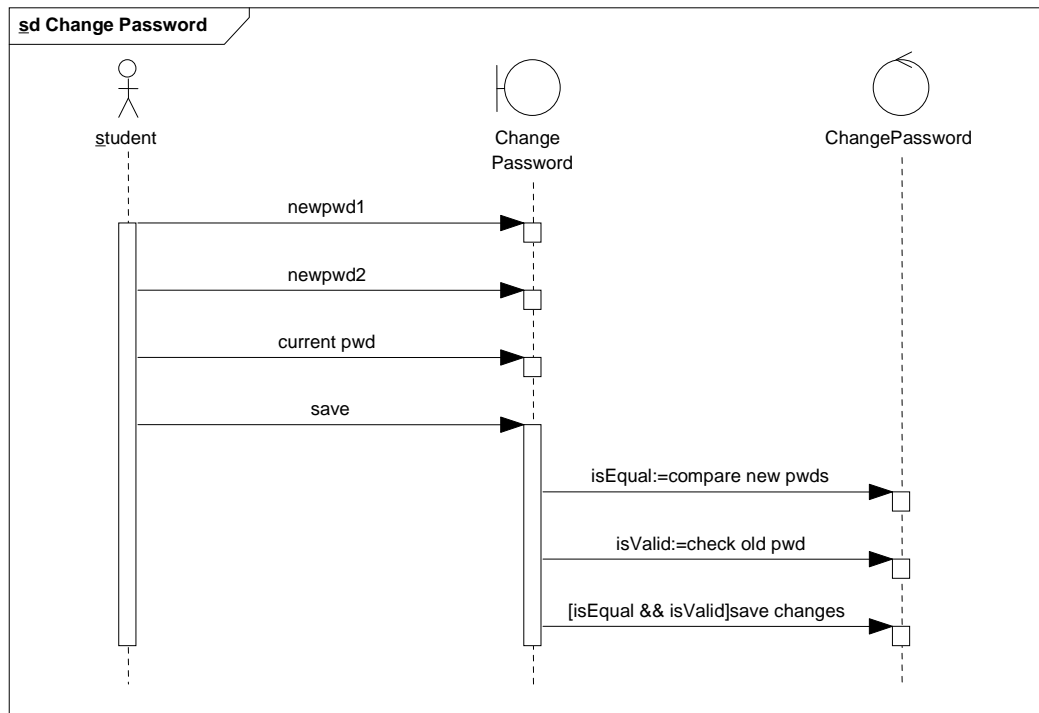


Figure 4.4.6: Change Password

Change Password Messages

| ID | Message | From Object | To Object |
|----|----------------------------------|-----------------|-----------------|
| 1 | newpwd1 | student | Change Password |
| 2 | newpwd2 | student | Change Password |
| 3 | current pwd | student | Change Password |
| 4 | save | student | Change Password |
| 5 | isEqual:=compare new pwds | Change Password | ChangePassword |
| 6 | isValid:=check old pwd | Change Password | ChangePassword |
| 7 | [isEqual && isValid]save changes | Change Password | ChangePassword |

4.4.7 Delete Letter

Administrator can delete an existing letter after selecting the letter to be deleted. Add update letter interface will be displayed with the details of letter. User can select to delete the letter at that point. A lettergenerator object will be created to

obtain a reference to the interface ILetter. After that ILeeter can be used to delete the specific letter with the given ID from the database.

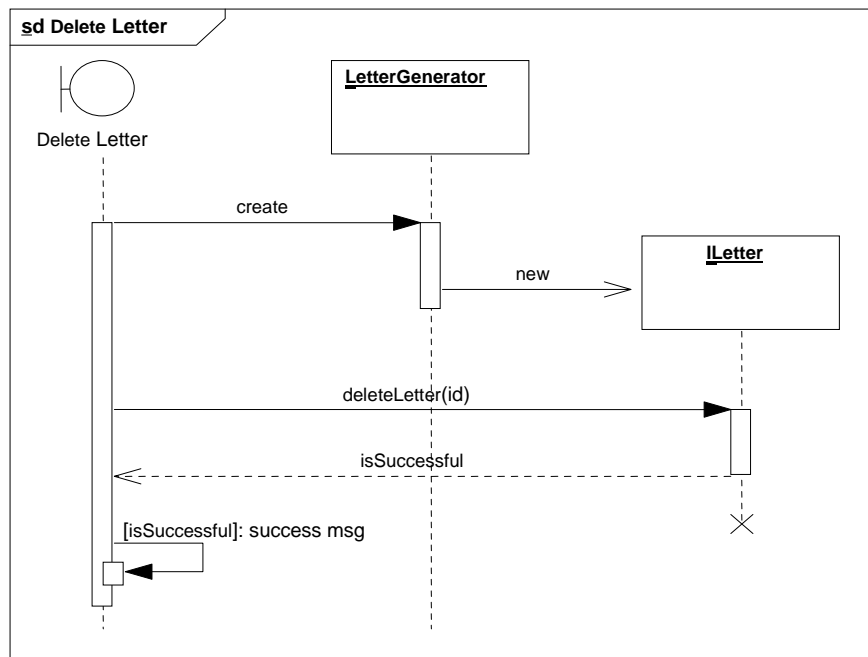


Figure 4.4.7: Delete Letter

Delete Letter Messages

| ID | Message | From Object | To Object |
|----|------------------|-----------------|-----------------|
| 1 | create | Delete Letter | LetterGenerator |
| 2 | new | LetterGenerator | ILetter |
| 3 | deleteLetter(id) | Delete Letter | ILetter |
| 4 | isSuccessful | ILetter | Delete Letter |
| 5 | success msg | Delete Letter | Delete Letter |

4.4.8 Delete Student

User with the Administrator role can delete a student from the system by using Delete student user interface. When a student selected and the signal sent to to the system to delete the selected student, system creates an instance if StudentIDData by implementing the method named create, provided by the class StudentCreator. After creting studentIDData instance, deleteStudent function can be used to delete the student by providing the id of the student.

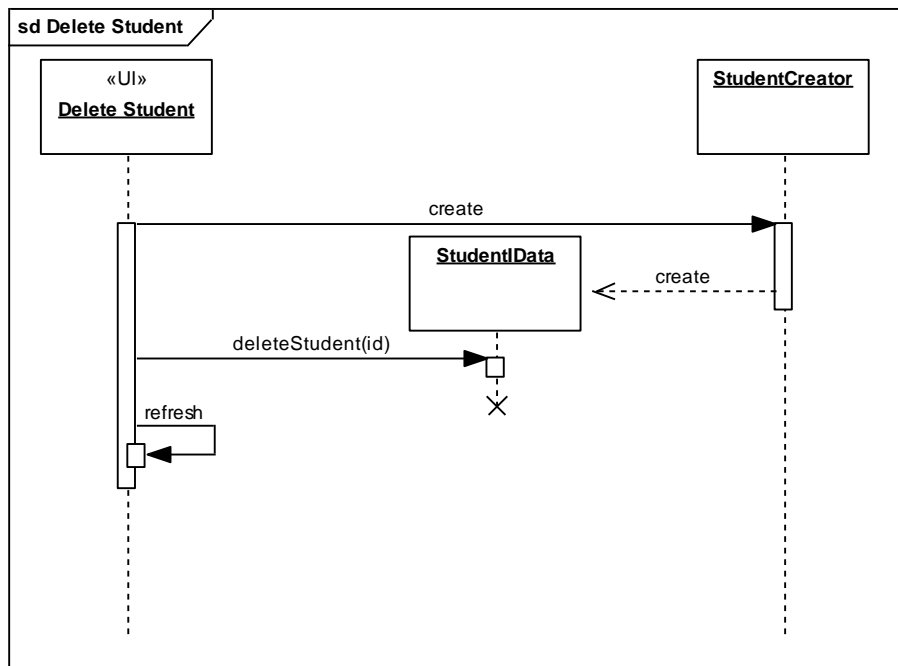


Figure 4.4.8: Delete Student

Delete Student Messages

| ID | Message | From Object | To Object |
|----|-------------------|----------------|----------------|
| 1 | create | Delete Student | StudentCreator |
| 2 | create | StudentCreator | StudentIDData |
| 3 | deleteStudent(id) | Delete Student | StudentIDData |
| 4 | refresh | Delete Student | Delete Student |

4.4.9 Login

All users, with roles student, staff or administrator uses the same login interface to gain access to the system by selecting their role from a radiobutton list. This preference effects in database table that used to search for corresponding user credentials. If wrong role is selected, even the username and password are correct, system will give error. From login interface, we call the signin function of security class which is responsible to create a user session if credentials are valid. After

creating user session, user is redirected to a main page depending on their role. User session is automatically terminated in 20 minutes.

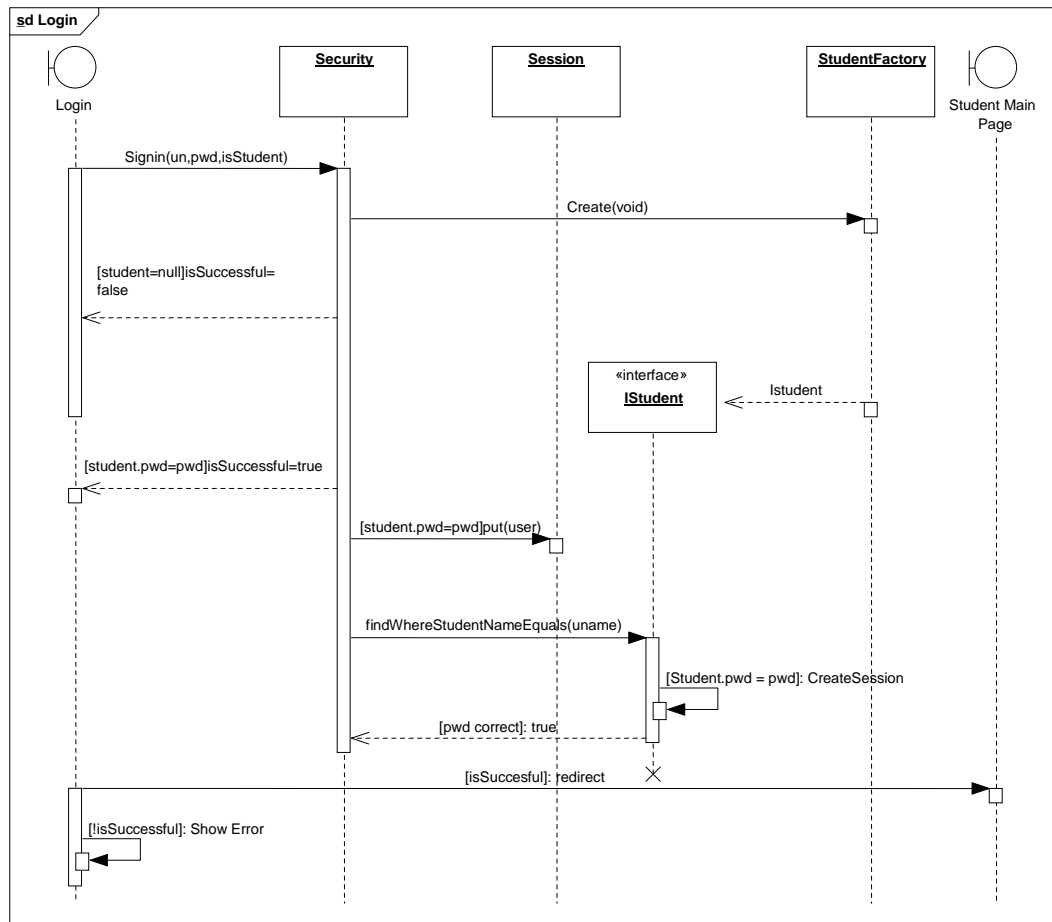


Figure 4.4.9: Login

Login Messages

| ID | Message | From Object | To Object |
|----|------------------------------------|----------------|----------------|
| 1 | Signin | Login | Security |
| 2 | Create | Security | StudentFactory |
| 3 | [student=null]isSuccessful= false | Security | Login |
| 4 | Istudent | StudentFactory | IStudent |
| 5 | [student.pwd=pwd]isSuccessful=true | Security | Login |
| 6 | [student.pwd=pwd]put(user) | Security | Session |
| 7 | findWhereStudentNameEquals | Security | IStudent |
| 8 | CreateSession | IStudent | IStudent |

| | | | |
|----|------------|----------|-------------------|
| 9 | true | IStudent | Security |
| 10 | redirect | Login | Student Main Page |
| 11 | Show Error | Login | Login |

4.4.10 Logout

If user has a valid session, in each page there will be a logout button displayed on the header of the page. When the user clicks logout, a signal is sent to call the logout function of the security class. Security class gets the current session from faces Context, then the users session is invalidated inside http Session instance. If the process doesn't return any exceptions then system redirects to the login page, because without login none of the parts of the system is accessible.

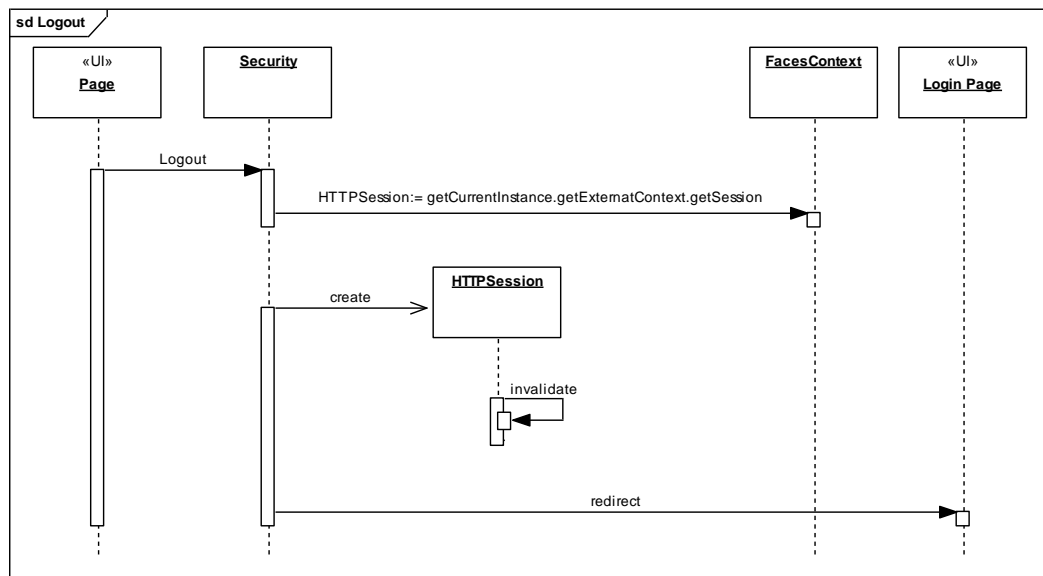


Figure 4.4.10: Logout

Logout Messages

| ID | Message | From Object | To Object |
|----|--|-------------|--------------|
| 1 | Logout | Page | Security |
| 2 | getCurrentInstance.getExternalContext.getSession | Security | FacesContext |
| 3 | create | Security | HTTPSession |
| 4 | invalidate | HTTPSession | HTTPSession |
| 5 | redirect | Security | Login Page |

4.4.11 Select Category

To change the name of a category, or to add a sub category, or deleting a category, we can select a current category from the category tree list. This list is populated with categories data by an iterative function which calls itself as much as there are more subcategories, giving the category instance as a parameter to the function. First we get all categories recorded in the system then we pass this typed array list of categories to the generate category tree function. If we select category from the tree list, it forwards the user to another UI, like add letter.

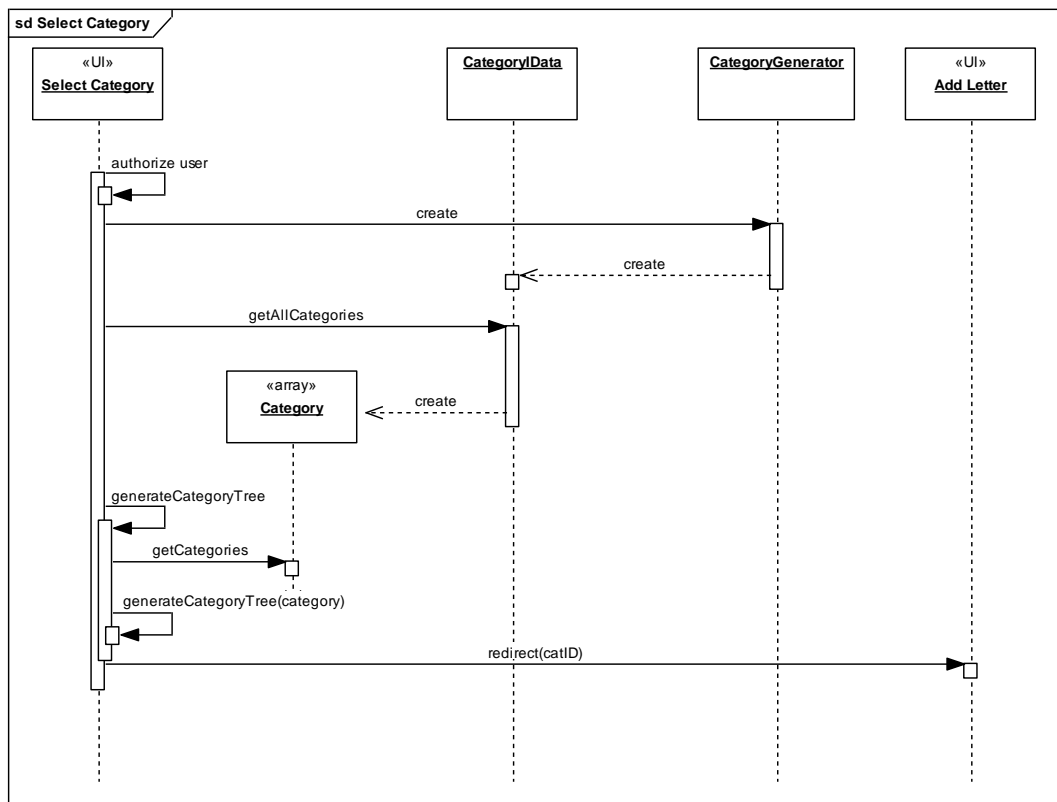


Figure 4.4.11: Select Category

Select Category Messages

| ID | Message | From Object | To Object |
|----|----------------|-------------------|-------------------|
| 1 | authorize user | Select Category | Select Category |
| 2 | create | Select Category | CategoryGenerator |
| 3 | create | CategoryGenerator | CategoryIDData |

| | | | |
|---|--------------------------------|-----------------|-----------------|
| 4 | getAllCategories | Select Category | CategoryIDData |
| 5 | create | CategoryIDData | Category |
| 6 | generateCategoryTree | Select Category | Select Category |
| 7 | getCategories | Select Category | Category |
| 8 | generateCategoryTree(category) | Select Category | Select Category |
| 9 | redirect(catID) | Select Category | Add Letter |

4.4.12 Submit Case (Attaching form)

A student can add a form or forms the case they submit. These forms are attached to the page with a fileupload control. When a form is uploaded, it is kept inside session until the case is completely sent. First user attaches a form to the createletter interface. If there is no form included in uploadform control the error message is generated. Then system checkes if the uploaded file is unique by comparing all of the uploaded form names to the currently uploaded file. If it is unique, file is added to a specific folder that contains student's cases, also a record is generated in the database.

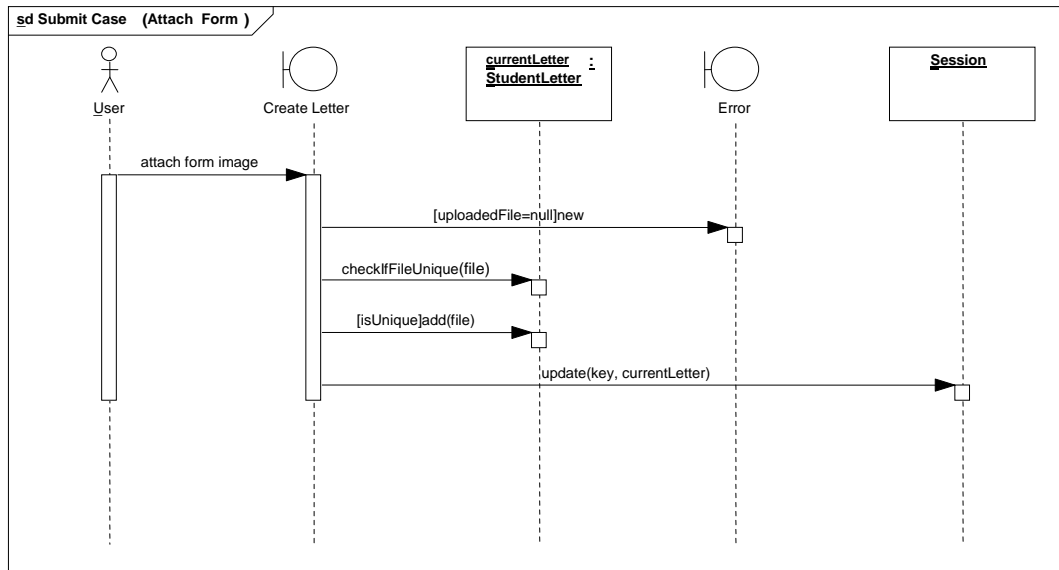


Figure 4.4.12: Submit Case (Attach Form)

Submit Case (Attach Form) Messages

| ID | Message | From Object | To Object |
|----|----------------------------|---------------|------------------------------|
| 1 | attach form image | User | Create Letter |
| 2 | [uploadedFile=null]new | Create Letter | Error |
| 3 | checkIfFileUnique(file) | Create Letter | currentLetter: StudentLetter |
| 4 | [isUnique]add(file) | Create Letter | currentLetter: StudentLetter |
| 5 | update(key, currentLetter) | Create Letter | Session |

4.4.13 Submit Case (Send)

When the students fills out the case form and presses the send button, this process is called. Because letter instance is kept in session memory space, it can be invalidated in 20 minutes. If this happens there is a possibility to get a null pointer error. If this happens at first step this exception is caught and an error message is generated regarding to the matter then by using student letter generator we get an instance of student letter IData. We use this object to insert the letter to the database, after successfully inserting the letter to the database. We iterate through the student

letter files array to get each form uploaded by the user. And insert name and folder information to the database for each of the files in a loop shown in the diagram. If everything goes right then system returns a success message to the user.

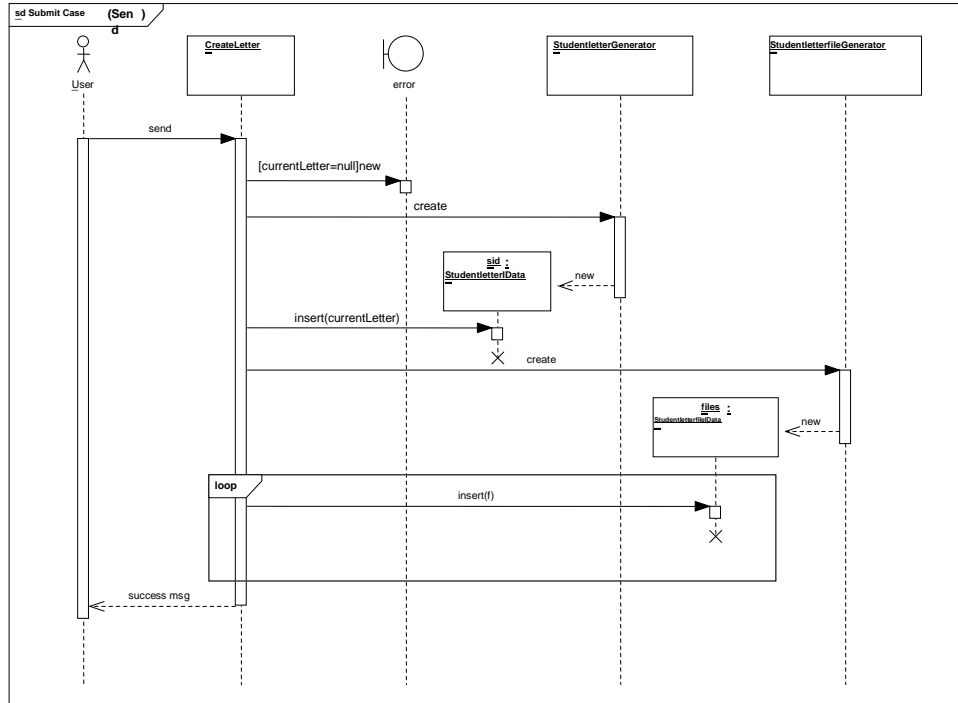


Figure 4.4.13: Submit Case (Send)

Submit Case (Send) Messages

| ID | Message | From Object | To Object |
|----|-------------------------|--------------------------|--------------------------------|
| 1 | send | User | CreateLetter |
| 2 | [currentLetter=null]new | CreateLetter | error |
| 3 | create | CreateLetter | StudentletterGenerator |
| 4 | new | StudentletterGenerator | sid: StudentletterIDData |
| 5 | insert(currentLetter) | CreateLetter | sid: StudentletterIDData |
| 6 | create | CreateLetter | StudentletterfileGenerator |
| 7 | new | StudentletterfileGenerat | files: StudentletterfileIDData |
| | | or | |
| 8 | insert(f) | CreateLetter | files: StudentletterfileIDData |
| 9 | success msg | CreateLetter | User |

4.4.14 Update Staff

Administrators can make changes on existing staff records. In the editable table that lists the data of staffs, administrator can make necessary editing operations and

click the update button to submit changes. When the data is submitted, StaffCreator class's static function create, creates an object that contains database manipulation functions. First we get the staff record that is going to be edited from database. Then we update each properties from the data entered to the form. Then we use update function to rewrite staff data to the database without creating a new record.

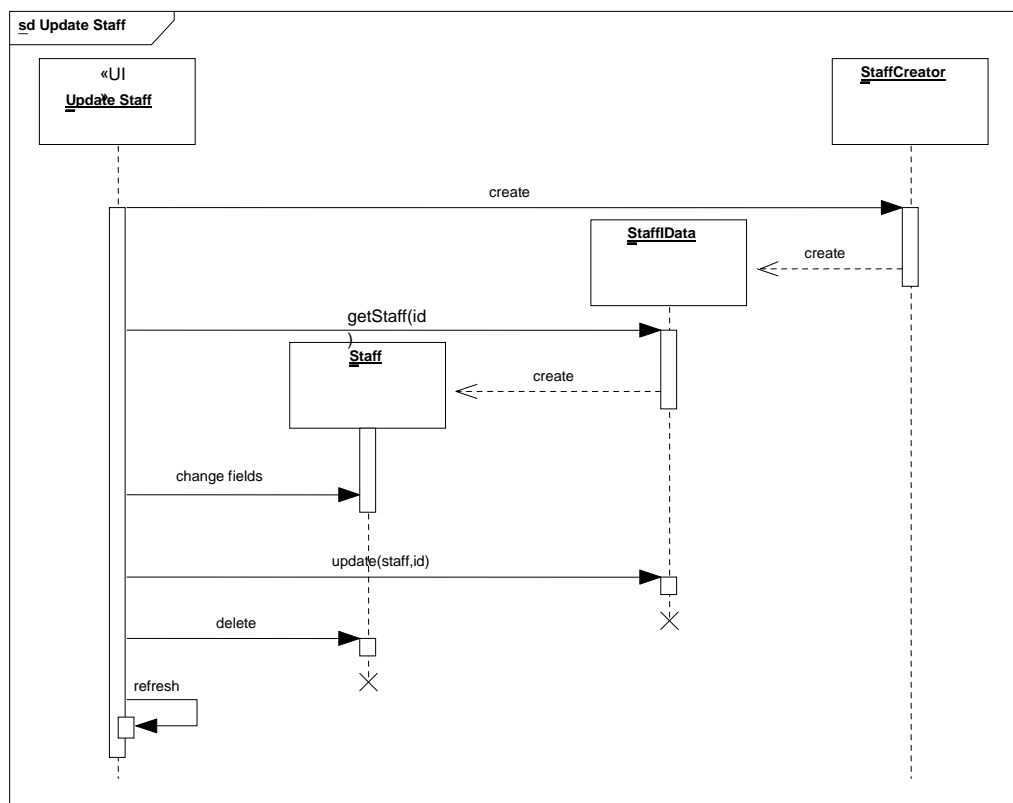


Figure 4.4.14: Update Staff

Update Staff Messages

| ID | Message | From Object | To Object |
|----|-------------------|--------------|--------------|
| 1 | Create | Update Staff | StaffCreator |
| 2 | Create | StaffCreator | StaffIData |
| 3 | getStaff | Update Staff | StaffIData |
| 4 | Create | StaffIData | Staff |
| 5 | change fields | Update Staff | Staff |
| 6 | update (staff,id) | Update Staff | StaffIData |

| | | | |
|---|---------|--------------|--------------|
| 7 | Delete | Update Staff | Staff |
| 8 | Refresh | Update Staff | Update Staff |

4.4.15 Update Student

Similar to update staff process, administrator can update an existing record of a student's profile. When the data is submitted, StudentCreator class's static function create, creates an object that contains database manipulation functions. First we get the student record that is going to be edited from database. Then we update each properties from the data entered to the form. Then we use update function to rewrite user to the database overriding existing record.

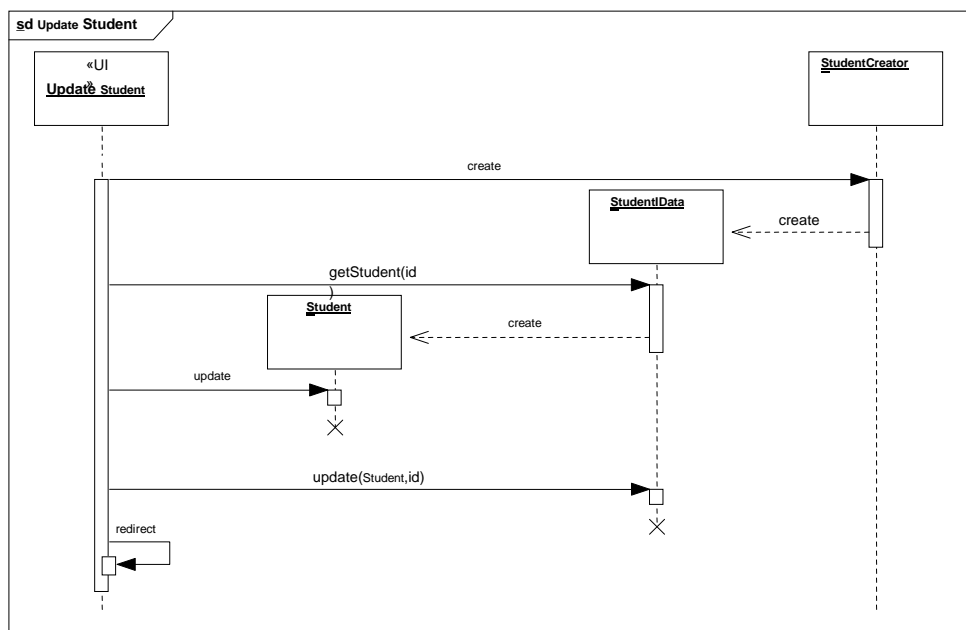


Figure 4.4.15: Update Student

Update Student Messages

| ID | Message | From Object | To Object |
|----|---------|----------------|----------------|
| 1 | create | Update Student | StudentCreator |
| 2 | create | StudentCreator | StudentIDData |

| | | | |
|---|--------------------|----------------|----------------|
| 3 | getStudent(id) | Update Student | StudentIData |
| 4 | create | StudentIData | Student |
| 5 | update | Update Student | Student |
| 6 | update(Student,id) | Update Student | StudentIData |
| 7 | redirect | Update Student | Update Student |

4.4.16 View Letter Details

When the student wants to see the progress of previously sent cases, they can use view letter details interface. If user navigates to view letter details user interface, system first checks if the user is a valid user with student role by implementing security class. If the user is valid, isValid flag gets the value true. Depending on that value, program decides to display an error or proceed to the next step which is getting letter id from requestParameterMap, which includes internet browsers query string if there is a letterID existent inside the query string. System sets the cachedRowset parameter to this ID. And execute the sql query for the database to retrieve information about the letter.

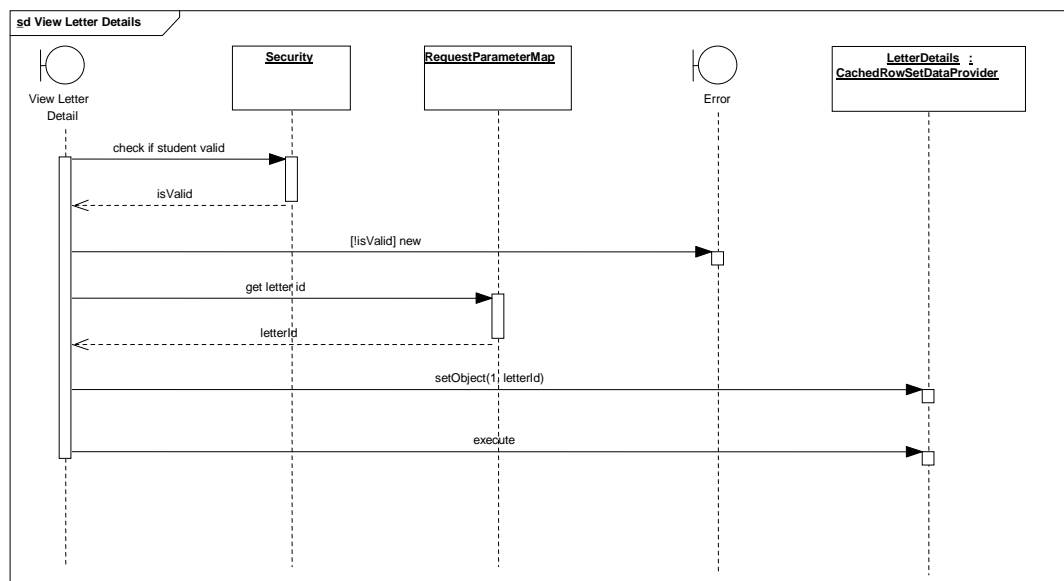


Figure 4.4.16: View Letter Details

View Letter Details Messages

| ID | Message | From Object | To Object |
|----|------------------------|--------------------|--|
| 1 | check if student valid | View Letter Detail | Security |
| 2 | isValid | Security | View Letter Detail |
| 3 | [!isValid] new | View Letter Detail | Error |
| 4 | get letter id | View Letter Detail | RequestParamerMap |
| 5 | letterId | RequestParamerMap | View Letter Detail |
| 6 | setObject(1, letterId) | View Letter Detail | LetterDetails: CachedRowSetDataProvider |
| 7 | Execute | View Letter Detail | LetterDetails: CachedRowSetDataProvider |

4.5 Development Environment and reasons

The developing tools for implementing the application were JSP over MySQL. Before selected this tools, I make a survey on development tools such as JSP, ASP, ColdFusion and PHP that result was:

Top Reason to use JSP:

- a. JSP pages perform with no issues on any platform.
- b. They can be accessed from any web server.
- c. JSP technology emphasizes on reusing the components that helps to develop more purposeful page designs.
- d. JSP encourages you to separate the (Java) code that creates the content from the (HTML) code that presents it.
- e. Is Better language for dynamic part Versus ASP or ColdFusion or PHP.
- f. Portable to multiple servers and operating systems Versus ASP or ColdFusion.
- g. Better Tool Support versus PHP.
- h. More convenient to create HTML versus pure servlets.
- i. Can use standard tools (e.g., DreamWeaver) versus pure servlets.

The MySQL database has become the world's most popular open source database because of its consistent fast performance, high reliability and ease of use. Actually, MySQL runs on most of platforms such as Linux, Windows, OS/X, HP-

UX, AIX, Netware, that can giving you the kind of flexibility that puts you in control.

"MySQL continues to have a very high adoption rate across several industries and is known for its reliability, ease of use, and performance. MySQL 5.0 features are likely to boost MySQL to even higher adoption rates and may open doors for support for more packaged applications and tools."

Noel Yuhanna Forrester Research

Top Reasons to Use MySQL:

- a. Scalability and Flexibility
- b. High Performance
- c. High Availability
- d. Robust Transactional Support
- e. Web and Data Warehouse Strengths
- f. Strong Data Protection
- g. Comprehensive Application Development
- h. Management Ease
- i. Open Source Freedom and 24 x 7 Support
- j. Lowest Total Cost of Ownership

4.6 Coding

There are two Factors that were considered during the coding:

- **Readability:** one of the most important items in development is readability as a standard coding technology with comment that useable for readers or programmers to understand the codes in future for make eventually enhancements or maintenance.

- **Modularity:** one of the most important items in development is Modularity as a structured for easy understanding and future eventually enhancement or maintenance.

4.7 Testing and New System Requirements

Testing is a process of executing the application with the intention of finding errors that were unnoticed or unseen.

4.7.1 Functionality Testing

Login Page:

| No | Action | Expected Result | Result |
|----|---|--|-------------|
| 1 | The password field should display the password as ***** | The password field should display ***** | As expected |
| 2 | Clicking on the "Login" button without entering username and password | Error Message appears indicating "User Name: valued reuiered" Error Message Pop up " Please Enter Password" | As expected |
| 3 | Clicking on the "Login" button with the wrong username and password | Display an error message indicating "Invalid user name or password". | As expected |
| 4 | Clicking on the "Login" button with the correct username And password | Allow the user to proceed to the main page of the website | As expected |

Operator Home Page:

| No | Action | Expected Result | Result |
|----|------------------------------|-------------------------------|-------------|
| 1 | Click Add New Student button | Navigate to Add Student page | As expected |
| 2 | Click Edit Student button | Navigate to Edit Student page | As expected |
| 3 | Click Add New Staff button | Navigate to Add Staffs page | As expected |

| | | | |
|----|------------------------------------|--|-------------|
| 4 | Click Edit Staff button | Navigate to Edit Staff page | As expected |
| 5 | Click Add New Letter button | Navigate to Select Category page | As expected |
| 6 | Click Manage Job Titles button | Navigate to Manage Job Titles Page | As expected |
| 7 | Click Manage Categories button | Navigate to Manage Categories page | As expected |
| 8 | Click Manage Denial Message button | Navigate to Manage Denial Message page | As expected |
| 9 | Click Report button | Navigate to Report Page | As expected |
| 10 | Double Click on Category | Navigate to Manage Letter Page | As expected |
| 11 | Click Logout button | Navigate to Login Page | As expected |

Add Students Page:

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---------------------------------------|--------------------|
| 1 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 2 | Click Clear button | Clear all the field boxes of the page | As expected |
| 3 | Click Save button | Save the records | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |

Edit Students Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---|--------------------|
| 1 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 2 | Click Update button | Update the records and Refresh The Page | As expected |
| 3 | Click Delete button | Delete the records and refresh The Page | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |

Add Staffs Page:

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---------------------------------------|--------------------|
| 1 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 2 | Click Clear button | Clear all the field boxes of the page | As expected |
| 3 | Click Save button | Save the records | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |

Edit Staffs Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---|--------------------|
| 1 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 2 | Click Update button | Update the records and Refresh The page | As expected |
| 3 | Click Delete button | Delete the records and refresh The Page | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |

Select Category Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|--------------------------------|--------------------|
| 1 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 2 | Double in Categories tree | Navigate to Manage Letter page | As expected |
| 3 | Click Logout button | Navigate to Login Page | As expected |

Manage Letter Page

| No | Action | Expected Result | Result |
|----|---------------------|--------------------------|-------------|
| 1 | Click Browse button | File Upload Screen popup | As expected |

| | | | |
|----|---------------------------------------|---|-------------|
| 2 | Click Add Form button | Update Form Table Refresh the page | As expected |
| 3 | Click Add button inside the frame | Add staff record to Selected List Box | |
| 4 | Click Remove button | Add staff record from Selected List Box | As expected |
| 5 | Click Move Up button | Move Up staff record in Selected List Box | As expected |
| 6 | Click Move Down button | Move Down staff record in Selected List Box | As expected |
| 7 | Click Add button outside the frame | Save the records and refresh the page | As expected |
| 8 | Click Cancel button | Navigate to Operator Home page | As expected |
| 9 | Click Go back to change category Link | Navigate to Select Category Page | As expected |
| 10 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 11 | Click Logout button | Navigate to Login Page | As expected |

Manage Job Titles Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---|--------------------|
| 1 | Click Add button | Add Record to Job Titles Table and Refresh The Page | As expected |
| 2 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 3 | Click Update button | Update the Records Inside Job Titles Table | As expected |
| 4 | Click Delete button | Delete the records from Job Titles Table | As expected |
| 5 | Click Logout button | Navigate to Login Page | As expected |

Manage Categories Page

| No | Action | Expected Result | Result and Comment |
|----|---------------------|---------------------------------------|--------------------|
| 1 | Click Add button | Add Child Category to Categories Tree | As expected |
| 2 | Click Update button | Add New Category to Categories Tree | As expected |

| | | | |
|---|----------------------------|---|-------------|
| 3 | Click Delete button | Delete selected Category and its Child from the Categories Tree | As expected |
| 4 | Click Operator Home button | Navigate to Operator Home page | As expected |
| 5 | Click Logout button | Navigate to Login Page | As expected |

Manage Denials Message

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---|--------------------|
| 1 | Click Add button | Add Record to Case Denials Reason Table | As expected |
| 2 | Click Update button | Update the Records Case Denials Reason Table | As expected |
| 3 | Click Delete button | Delete the records from Case Denials Reason Table | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |
| 5 | Click Operator Home button | Navigate to Operator Home page | As expected |

Report Page

| No | Action | Expected Result | Result and Comment |
|----|-----------------------------|---|--------------------|
| 1 | Click Search Student button | Navigate to Search Student page | As expected |
| 2 | Click General Report button | Navigate to General Reports page | As expected |
| 3 | Click Staff Report button | Navigate to Staff Report page and Generate Staff Report | As expected |
| 4 | Click Case Report button | Navigate to Case Report page | As expected |
| 5 | Click Status Report button | Navigate to Status Report page | As expected |
| 6 | Click Logout button | Navigate to Login Page | As expected |
| 7 | Click Operator Home button | Navigate to Operator Home page | As expected |

Case Report Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|---|--------------------|
| 1 | Click Report button | Generate Case Report based on Selection Dates | As expected |
| 2 | Click Logout button | Navigate to Login Page | As expected |
| 3 | Click Operator Home button | Navigate to Operator Home page | As expected |

Status Report Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|--|--------------------|
| 1 | Click Report button | Generate Status Report based on Selection Status and Dates | As expected |
| 2 | Click Logout button | Navigate to Login Page | As expected |
| 3 | Click Operator Home button | Navigate to Operator Home page | As expected |

General Report Page

| No | Action | Expected Result | Result and Comment |
|----|-----------------------------|--|--------------------|
| 1 | Click Create Reports button | Generate Daily, Monthly and Yearly Report based on Selection Dates | As expected |
| 2 | Click Logout button | Navigate to Login Page | As expected |
| 3 | Click Operator Home button | Navigate to Operator Home page | As expected |

Search Student Page

| No | Action | Expected Result | Result and Comment |
|----|----------------------------|--|--------------------|
| 1 | Click Search button | Generate Report based on Selected Student ID | As expected |
| 2 | Click Logout button | Navigate to Login Page | As expected |
| 3 | Click Operator Home button | Navigate to Operator Home page | As expected |

Student Main Page

| No | Action | Expected Result | Result and Comment |
|----|------------------------------|-----------------------------------|--------------------|
| 1 | Double Click Category tree | Navigate to Create New Case Page | As expected |
| 2 | Click Account button | Navigate to Student Profile page | As expected |
| 3 | Click Change Password button | Navigate to Student Password page | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |
| 5 | Click Student Home button | Refresh Student Main Page | As expected |

Student Password Page

| No | Action | Expected Result | Result and Comment |
|----|---------------------|---------------------------|--------------------|
| 1 | Click Save button | Save records | As expected |
| 2 | Click Clear button | Clears all the text boxes | As expected |
| 3 | Click Logout button | Navigate to Login Page | As expected |

Student Profile page

| No | Action | Expected Result | Result and Comment |
|----|---------------------|---------------------------|--------------------|
| 1 | Click Save button | Save records | As expected |
| 2 | Click Clear button | Clears all the text boxes | As expected |
| 3 | Click Logout button | Navigate to Login Page | As expected |

Create New Case Page

| No | Action | Expected Result | Result and Comment |
|----|---------------------|--------------------------|--------------------|
| 1 | Click Browse button | File Upload Screen popup | As expected |

| | | | |
|---|---------------------------|--|-------------|
| 2 | Click Attach button | Attached Selected File in Upload Table | As expected |
| 3 | Click Delete button | Delete Selected File from Upload Table | As expected |
| 4 | Click Send button | Send the File and Navigate Student Main page | As expected |
| 5 | Click Cancel button | Navigate to Student Main Page | As expected |
| 6 | Click Logout button | Navigate to Login Page | As expected |
| 7 | Click Student Home button | Refresh Student Main Page | As expected |

Staff Home Page

| No | Action | Expected Result | Result and Comment |
|----|-------------------------|--------------------------------|--------------------|
| 1 | Click Student Name Link | Navigate to Cased Details Page | As expected |
| 2 | Click Staff Home button | Refresh the Staff Home page | As expected |
| 3 | Click Logout button | Navigate to Login Page | As expected |

Cased Details Page

| No | Action | Expected Result | Result and Comment |
|----|-------------------------|--|--------------------|
| 1 | Click Reject button | Update the Case Status to Reject and Navigate to Staff Home Page | As expected |
| 2 | Click Approve button | Update the Case Status to Approved and Navigate to Staff Home Page | As expected |
| 3 | Click Staff Home button | Navigate to Staff Home page | As expected |
| 4 | Click Logout button | Navigate to Login Page | As expected |

4.7.2 New system Requirements

Purpose of the system is providing students a simple and more efficient way to submit forms, and observe the progress of forms they submit. System also allows staffs to better deal with large amount of forms. This new system designs in such a way to facilitate the communication between e-learning students and student affairs department. The purpose of this online system is to enables students to check the

progress of their case online, when they reporting a case or requesting some thing from student affairs department .

Requirements:

1. Students can submit a letter and monitor their applications.
 - a. Student must choose one of the letters from correspondence categories first for making an application. After letter type selected, user will be able to see which form must be submitted. Then user can download forms image, print, fill and upload the forms.
 - b. User can make any number of applications; each application can be monitored separately.
 - i. User can see the list of authoritative people who suppose to approve the form. If staff approves the form then form state will change to approved and system will forward the form to the next authority. If everyone approves, form will be accepted. Any staff can deny form. If form is denied, the reason of denial must be selected from pre defined list, also staff can enter comments for describing more details about why application returned. While waiting approval, form state will be indicated as “in progress”.
 - ii. There will be a link to the approved or denied letters in student’s main page. If student views the details, it will not be prompted again.

2. Staffs will use staff interface for logging in. an staff can be a student and staff at the same time. They will differ from each other by which interface they use for logging in the system.
3. While creating new correspondence types, operator can search staffs by their name, and authorize them to check forms. System will handle forwarding the forms to staffs automatically. Form will be forwarded to staffs one by one, and in order. Order of staffs can be changed by operator. Staffs will be stored in a single db table.
4. In staff interface, staff will see the applications made by students sorted by date in ascending order. Details of the selected letter, forms attached to the letter. And options to approve or deny.
 - a. Staff can filter applications by their letter type.
 - b. A staff can be responsible for many letters. For instance, staff can be owner of a club and can be head of a department at the same time. So all letters about this title will come to them
5. Every letter will be stored under a parent category. Example: java club can be found under clubs. This will help students to find a specific correspondence letter easily.
 - a. Operator can add, edit or delete new forms, correspondence letters, and staffs to check the letters.

b. Operator will use the same interface with staffs to login. But he/she will be redirected to operator page as default.

6. Categories will be inserted to the database manually with a pre-written insertion script or operator can enter this information to the system.

| Letter states | | |
|---|-----------------------|------------------------|
| Condition | State of staff | State of letter |
| Letter sent to an staff | In progress | In progress |
| Waiting approval from current staff, state of next staff is | Undefined | In progress |
| Letter approved by a staff, waiting next staff to approve | Approved | In progress |
| Letter denied by staff | Denied | Denied |
| Letter approved by all staffs | Approved | Approved |

Letter (application): an application made by student which consists of zero or more attached forms and comments.

Operator: a person who is responsible from maintenance of the form processing system. Operator can add, remove new types of letters and categories, can assign staffs to check forms.

Staff: a person who checks the forms, and decides to approve or reject.

4.8 Conclusion

The development of the applications used the Linear Sequential Model and JSP development language over MYSQL database manager tool that were learned from the course works of my master degree, books and my previous experiences. Although there is much room for improvements the application in the future. Next chapter will explain the system implementation and manual.