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DURHAM COLLEGE E-LEARNING SYSTEM ASSIGMENT

Principles of Software Engineering

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1.0 Functional requirements and documentation (from assessment brief)

1.0.1 Name

- E-Learning System Durham College

1.0.2 Goal

- the main objective of this project is to create a virtual interface/e - learning system (ELS) for Durham College

1.0.3 Brief Description

To begin with, Durham College is a private educational provider within the UK. As a consequence of the Coronavirus pandemic, it's director has decided to shift all learning activities into an electronic form of education. In addition, this online learning system must be an innovative way to provide a virtual mode of teaching. Furthermore, the learning management system (LMS) interface will have to be able to empower both students and staff with an effective way for interaction with one another. Moreover, an Admin team will be set up in order to provide staff, students and parents with the support they need. In conclusion, the main aim of Durham's College new E-Learning Platform is to deliver a great experience for both students and staff, while at the same time acting as a substitute for the physical classroom and matching all activities that were previously done there. The main objects of the ELS can be found underneath:

- User - Log in/out, Register,
- Student - studying/learning interaction, Finding and Reviewing the learning content, check grades, complete tutorials/tasks, submit and check assessments through Turnitin,
- Tutor - teaching interaction, grading, communicate,
- Admin - manage timetables, enroll students, arrange staff-parent meetings, support,
- Parent - monitor progress, pay student fees,
- ELS/Virtual Interface - virtual classroom experience - Q&As, discussions, projects (collaboration), quizzes.
- Sage Service - Student fees, Accounting, Customer Relationship and Inventory Management

A further break down could be found in the next part System Design

2.0 System Design

2.0.1 Use Case Diagram

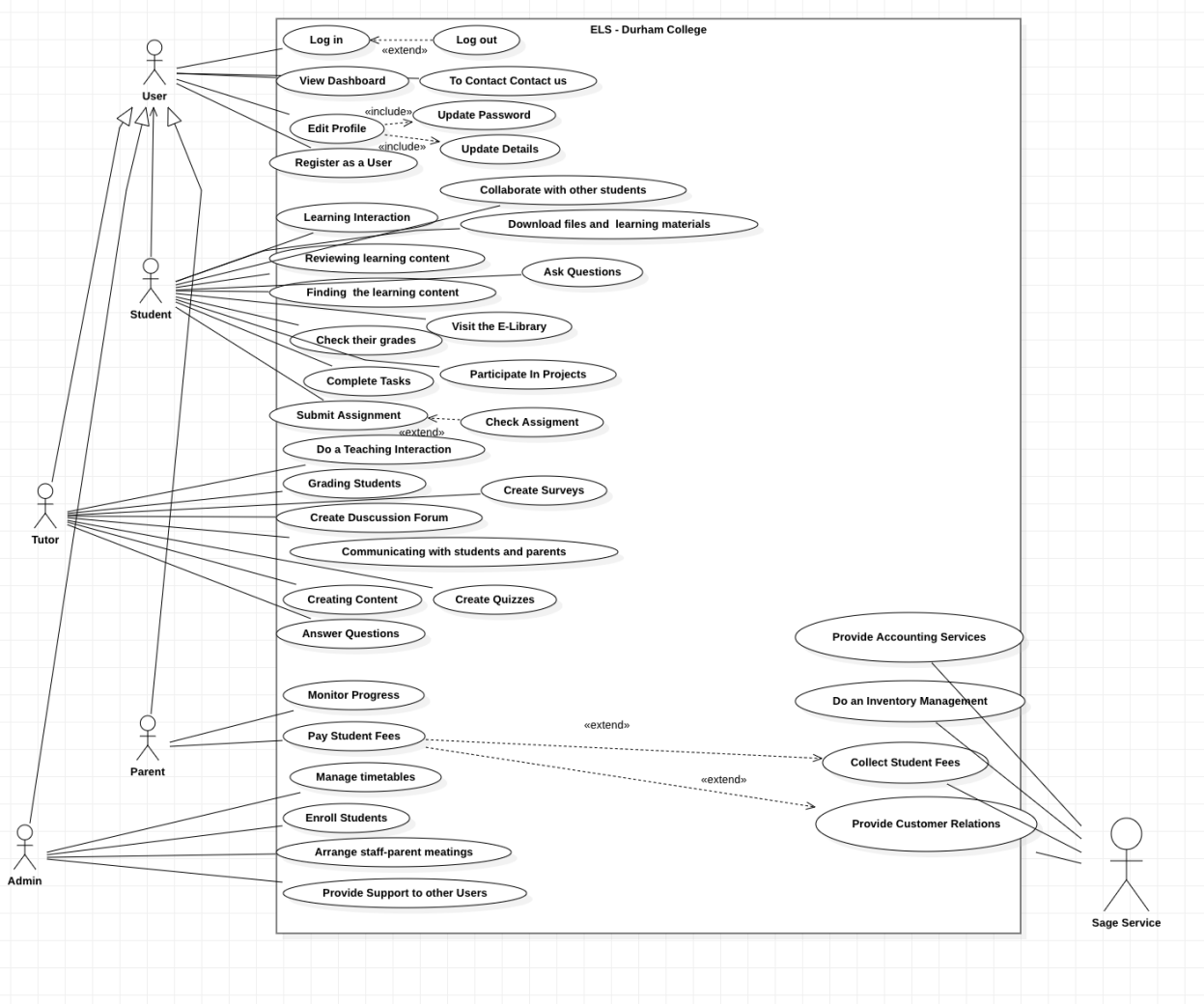

Figure 1

Figure 1: Use case diagram for Durham College ELS

Name: ELS Durham College

Description: A user who wants to access Durham College e-learning platform

Actors:

- User
- Student
- Tutor
- Parent
- Admin
- Sage Service

Preconditions/Basic Flow:

- The use case begins with the user being able to register, log in and out, view its profile/dashboard and edit its profile.
- Students and tutors interact with each other and participate within various learning and teaching activities.
- Parents are also involved in the learning process by monitoring its children's progress and paying college fees.
- Admins are involved with various support activities and maintenance.
- The sage service is a third party that provides customer and account services.

Post conditions/notes:

- User login details must match.
- Users must be valid.

2.0.2 Class Diagram

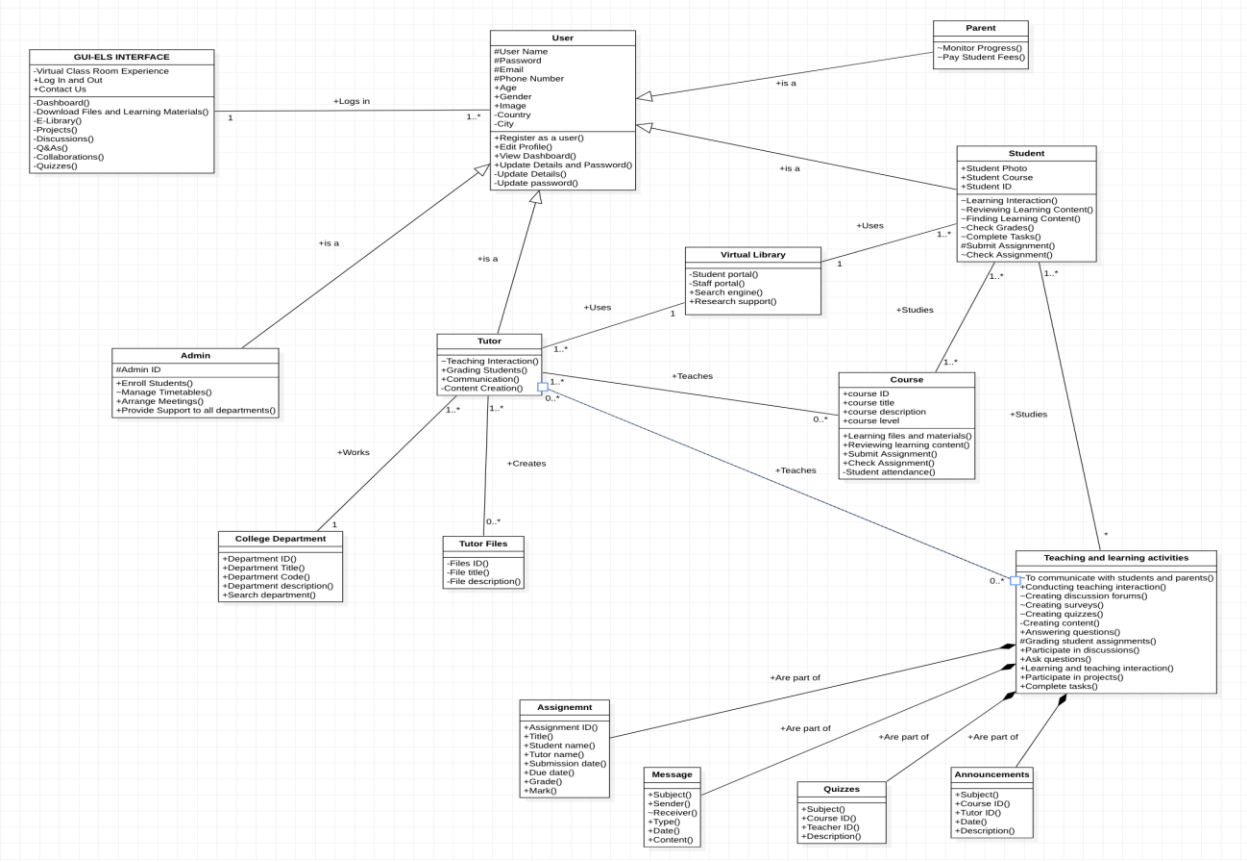

Figure 2

Figure 2: Class Diagram Durham College ELS

Name: Class Diagram for Durham College ELS

Description: How users interact with each other and, as well within the graphic user interface (GUI).

Classes:

- GUI-ELS Interface)
- User
- Admin
- Tutor
- Student
- Parent
- College Department
- Tutor Files
- Library
- Course

- Teaching and Learning activities
- Assignment
- Message
- Quizzes
- Announcement

Pre conditions/basic flow:

- GUI which is the virtual interface of the system where every user logs in and can see their profile and navigate through the e-learning platform.
- User which is the user profile each user logs in to. It holds all of the participating parts details and profiles on the system.

Post conditions/notes:

- N/A

2.0.3 Sequence Diagram

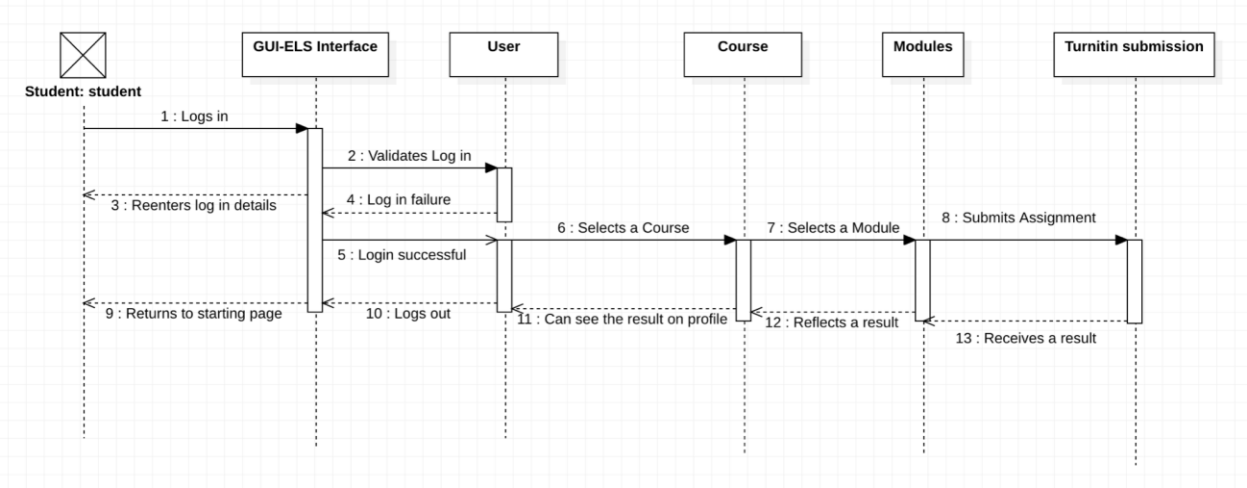

Figure 3

Figure 3: Durham Student Submitting an Assignment (Sequence Diagram Durham College ELS)

Name: Sequence diagram of how a student submitting an assignment for Durham College ELS

Description: This diagram shows how a student enters, logs in, navigates and submits assignment, as well as the way of navigation back until it logs out.

Classes:

- Student
- GUI-ELS Interface
- User
- Course
- Module

Preconditions/basic flow:

- The student, who is also a user, must have valid login details, must be registered with the college, and must have a user profile.
- The user must also enter its login details correctly in order to enter the interface otherwise there will be an infinite loop until his login details match.

Post conditions/notes:

- N/A

3.0 Implementation (Coding) and Testing

3.0.1 Login Panel

```
17      public MainFrame() {
18          initComponents();
19          loginPanel.setVisible(true);
20           dashboardPanel.setVisible(false);
21           createuserPanel.setVisible(false);
22           createnewcoursePanel.setVisible(false);
23           virtuallibraryPanel.setVisible(false);
24           courseactvitiesPanel.setVisible(false);
25
26      }
```

Figure 4

Figure 4: Durham ELS Mainframe

In order to get the ELS program working properly, the first thing that needs to be done is to make the main panel (loginPanel) visible (Figure 4) and hide (setVisible false) all other secondary panels. The code makes it possible for the user to see the launching login panel of the application and then allowing to navigate through (Baajour, 2021).

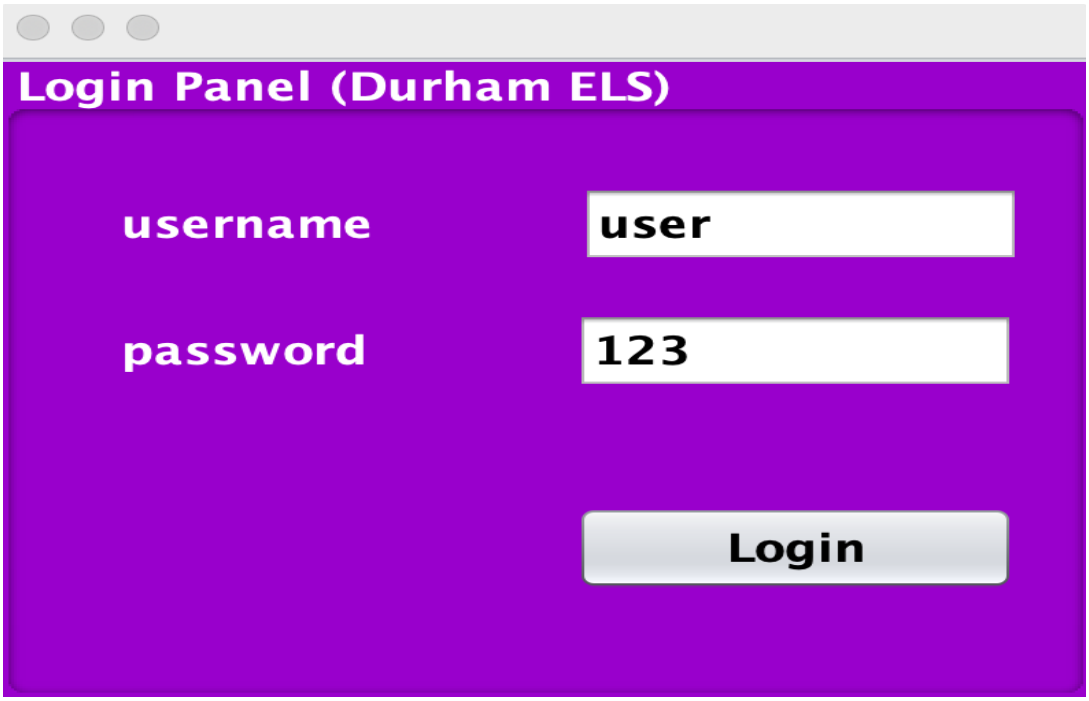

Figure 5

Figure 5: Login panel (Durham ELS)

```
448         String username = usernameTextField.getText();
449         String password = passwordTextField.getText();
450
451         if(username.equals("user") && password.equals("123")){
452             loginPanel.setVisible(false);
453             dashboardPanel.setVisible(true);
454         }
```

Figure 6

Figure 6: Login Panel Coding

After successfully programming the Main Frame, the Main Login Panel (Figure 5) is working properly, when doing the coding there must be a valid username and password in order for a user to log in (Figure 6). By setting the loginPanel on false and the dashboard panel on true the code enables the user to log in and enter the program's dashboard. It is important to take note that this is the test version and the username for this program will be user and the password is 123 (Figure 6) (Baajour, 2021)..

3.0.2 Dashboard navigation

Figure 7

Figure 7: Dashboard Panel (Durham ELS)

After the user has successfully logged in, it can see the main dashboard pane (Figure 7) which consists of the following options: it can create a new user (register on the system). Tutors can create new courses. There is also a virtual library where tutors can create and recommend book lists to their students, the pupils can also search literature and content for their tasks and assessments. Lastly, there are course activities where tutors can create courses, quizzes, assessments etc., and the students can participate. All classes included in the dashboard are as follows: user, student, ELS Interface, tutor, library portal and the course itself which consists of the teaching and learning activities (assignment, quizzes, messages, and announcements) (Baajour, 2021).

3.0.3 Create User Navigation

```
458     private void createnewuserButtonActionPerformed(java.awt.event.ActionEvent evt) {
459         // TODO add your handling code here:
460         dashboardPanel.setVisible(false);
461         createuserPanel.setVisible(true);
```

Figure 8

Figure 8: Create User Panel Coding

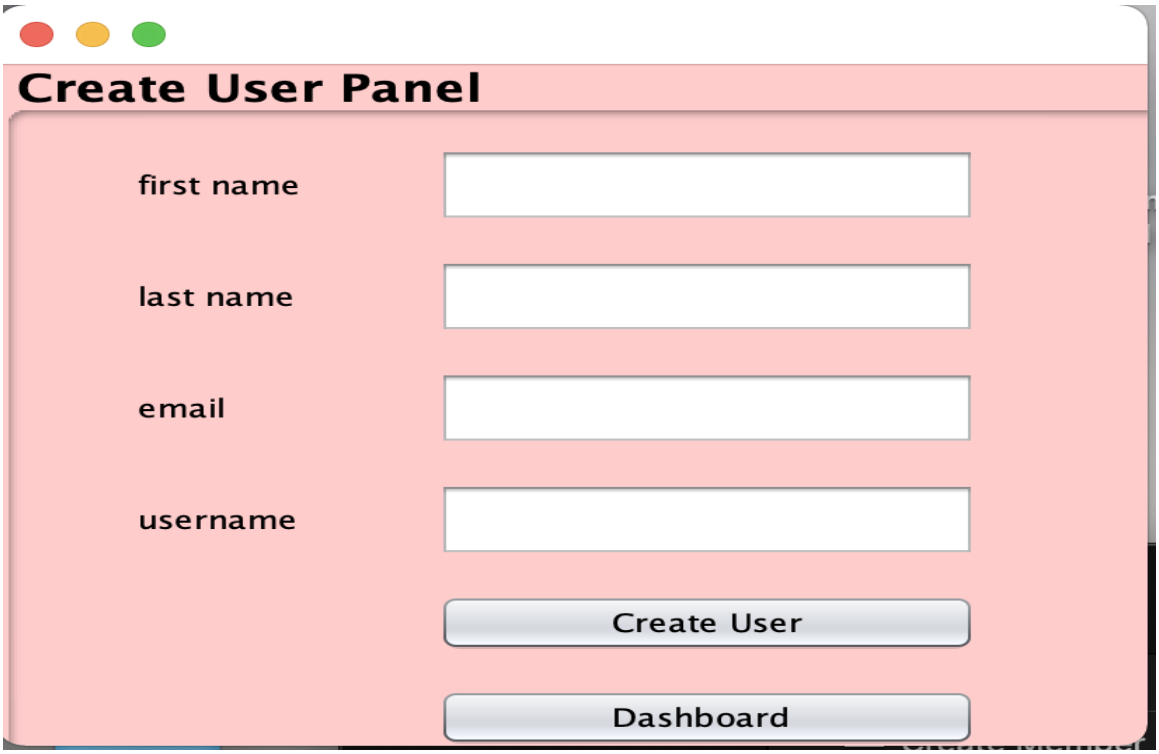

Figure 9

Figure 9: Create User Panel

In order to enable the creation of new users. The first thing that needed to be done was for the create new button option to be set the dashboard panel to be set at visible false (hidden), and for the create user panel which visibility is enabled (Figure 8). After entering the create user panel from the dashboard, this panel consists of options for the user to enter first and last name, email and choose a username. To complete this process the user needs to select create user. To exit the user has to select dashboard button. The code shown in Figure 10 makes it possible for the dashboard button to allow to the user to return to the main dashboard (Baajour, 2021).

```
669     private void dashboardButtonActionPerformed(java.awt.event.ActionEvent evt) {
670         // TODO add your handling code here:
671         createuserPanel.setVisible(false);
672         dashboardPanel.setVisible(true);
673
674     }
```

Figure 10

Figure 10: Dashboard Button (create user panel)

3.0.4 Create a new course navigation

```
465     private void createanewcourseButtonActionPerformed(java.awt.event.ActionEvent evt) {
466         // TODO add your handling code here:
467         createnewcoursePanel.setVisible(true);
468         dashboardPanel.setVisible(false);
```

Figure 11

Figure 11: Create New Course Panel Coding

Figure 12

Figure 12: Create New Course Panel (Durham ELS)

After the user registers (if that user is a tutor) and returns to the dashboard (Figure 7) it can select create a new course option. Figure 11 shows the code where create a new course button enables the user to enter the panel shown on Figure 12 from the dashboard (Figure 7). The following options are presented to the tutors upon entering the create new course panel (Figure 12). Tutors can set course ID, title, description, and level, once they are completed, they can select the create course option. After the course is created the user can select the return to dashboard option and the code for the button is displayed in Figure 13 (where the code shown enables the return to dashboard button to return the user to the main dashboard) (Baajour, 2021).

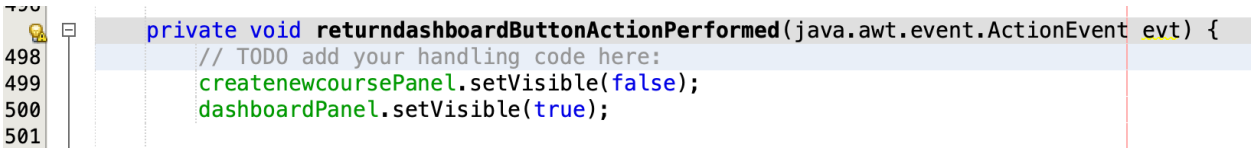

Figure 13

Figure 13: Return to dashboard Coding

3.0.5 Virtual Library Durham

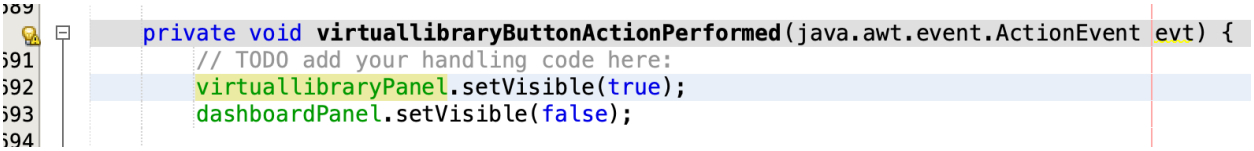

Figure 14

Figure 14: Virtual library panel entry coding

Another function of the ELS is the user can enter the virtual library, from the virtual library button. The coding (Figure 14) provides for this button to enter the virtuallibraryPanel. There the user can use the search engine to search eBooks, journals etc. There is also an option for research support, and students and staff can access their profiles. The last option is a return to dashboard button allowing users to return to the dashboard. The coding from Figure 16 enables the returndashboardButton2 to allow the user to return to the dashboard (Baajour, 2021).

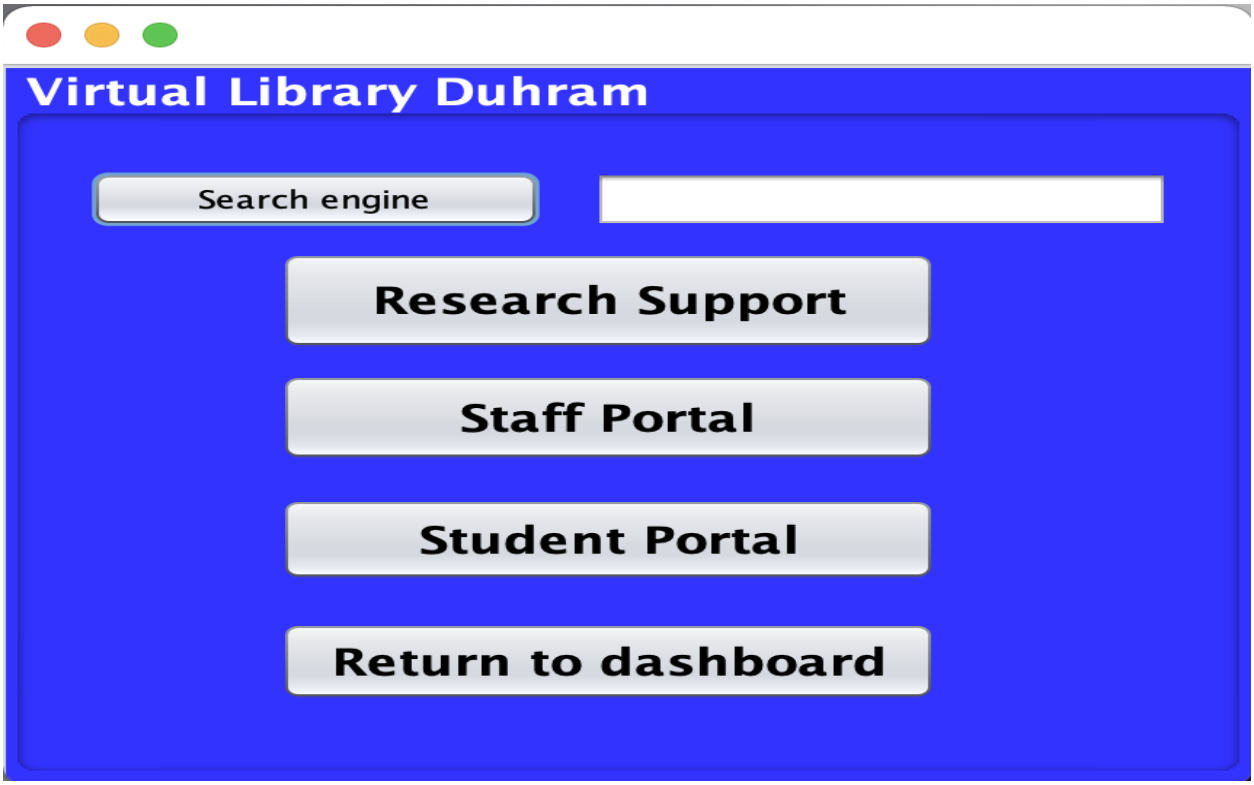

Figure 15

Figure 15: Virtual library panel

```
    private void returndasboardButton2ActionPerformed(java.awt.event.ActionEvent evt) {
724         // TODO add your handling code here:
725         returndasboardButton2.setVisible(false);
726         dashboardPanel.setVisible(true);
727
728     }
```

Figure 16

Figure 16: Return to dashboard button coding

3.0.6. Course Activities

```
701
    private void courseactivitiesButtonActionPerformed(java.awt.event.ActionEvent evt) {
703         // TODO add your handling code here:
704         courseactvitiesPanel.setVisible(true);
705         dashboardPanel.setVisible(false);
706
707     }
```

Figure 17

Figure 17: Course activity panel entry coding

When the user is at the main dashboard (Figure 7) it has the option to enter the course activities through the course activities button. The code displayed on Figure 17 allows user to enter the main course activity portal. There (Figure 18) they have the option to access their respective profiles and the teaching activities. The last button is a dashboard button which returns the user to the main dashboard. The code in Figure 19 provides for users with a way to return to the main dashboard (Baajour, 2021).

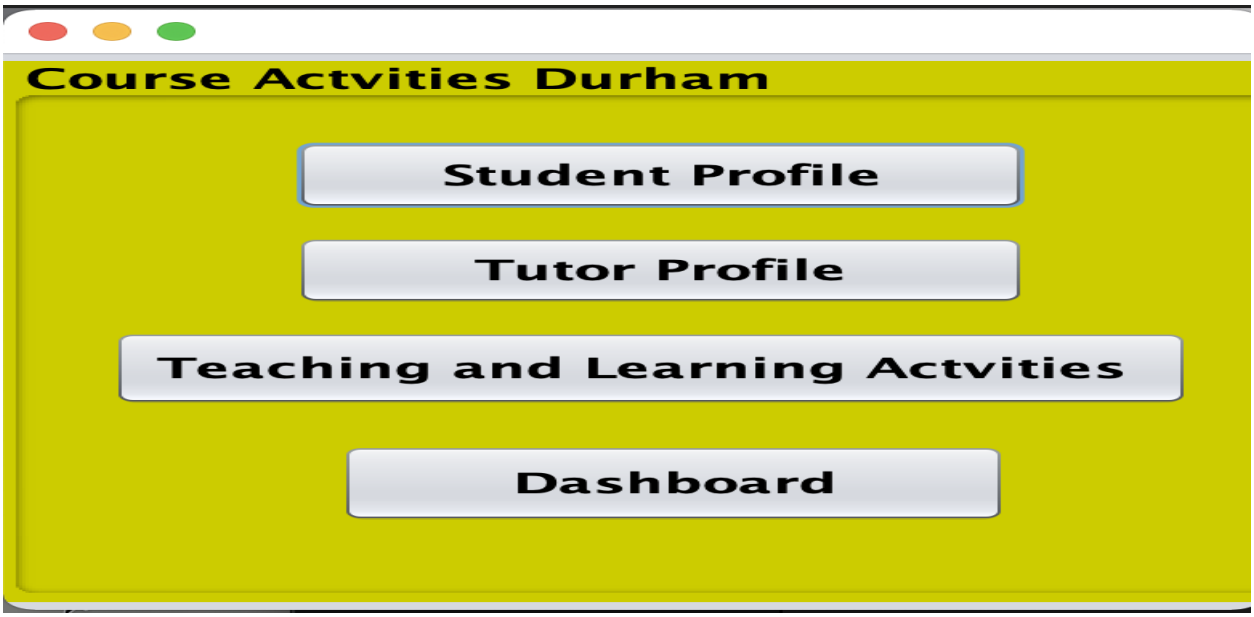

Figure 18

Figure 18: Course activities panel Durham

```
    private void dashboardButton3ActionPerformed(java.awt.event.ActionEvent evt) {
718         // TODO add your handling code here:
719         courseactvitiesPanel.setVisible(false);
720         dashboardPanel.setVisible(true);
721
```

Figure 19

Figure 19: Dashboard Button No3 coding

3.0.7 Durham ELS's classes

Figure 20 below shows all the classes (Figure 2), the login panel and dashboard panel are part of the GUI-ELS Interface. The dashboard, create use and create new course panel are part of the User class. Where the virtual library is part of the virtual library, student and tutor class. The course activates panel consists of the teaching and learning activities, student and tutor classes.

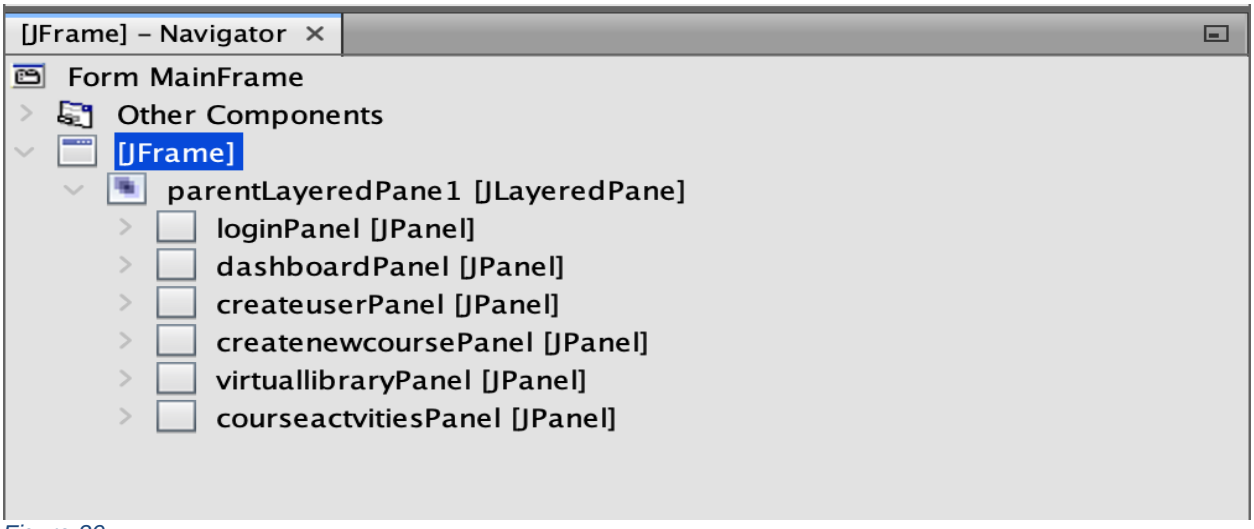

Figure 20

Figure 20: All Classes Used in Durham College ELS

3.0.8 Testing table for the ELS

Table 1

Functional requirement	Implemented	Tested	Output
Creating an ELS	Yes	Yes	It launches
Login Panel	Yes	Yes	It Works
Dashboard Panel	Yes	Yes	It Works and the user is able to enter other panels
Create New User Panel	Yes	Yes	Works – admins will be able to register new users

Create New Course Panel	Yes	Yes	Works – Tutors are able to create new courses
Virtual Library	Yes	Yes	Works – Users are able to search content and access their profiles
Course Activities Panel	Yes	Yes	Works – Students and tutors are able to interact with one another and engage in various activities

5.0.4 Professional issues related to Durham College ELS

For Durham's ELS to be complete there is a need for a general code of practice and guidelines to be set in place for the good of all users and parties involved. The guidelines for use of the ELS would consist of instructions for all users with the standards that should meet society's expectations and what to expect from one another. The code of conduct will follow the following core principles in accordance with general health and safety, as well as the welfare of the participants and the rest of the public involved, and they are:

1. Public - Software developers and engineers must act in the best interest of the public.
2. Client and employer - Software developers and engineers have to perform their duties in accordance with their clients and employers' best interest, as well as consistent with the 1st principle.
3. Product - Software developers and engineers must meet the highest professional standards in relation to the software product and any modifications implemented in the future.
4. Judgement - Software developers are obliged to maintain independence and integrity regarding their professional judgement.
5. Management - Software developing managers should promote ethical approach in how the ELS should be managed and maintained.
6. Colleagues - The software developers must treat their peers in a supportive and fair manner.

References

Brand, W. (2014) *Java all in one for dummies*. 4th edn. Hoboken, NJ: John Wiley and Sons Inc.

Horton, W. (2012) *E-learning by design*. 2nd edn. San Francisco, CA: Pfeifer. Available at: https://books.google.co.uk/books?hl=en&lr=&id=3EXIYh-2TXYC&oi=fnd&pg=PR12&dq=professional+risks+in+e+learning&ots=BOTg0XCPyV&sig=mnBlkW28CHhWgnXkodzU10y6hjg#v=onepage&q&f=false (Accessed: 27/7/2021)

Nakov, S. & Co. (2008*) Introduction to programming with Java*. 1st edn. Sofia, Bulgaria: Software University Foundation. Available at: https://introprogramming.info/intro-java-book/ (Accessed: 11/8/2021)

Balaji, S. & dr. Muragayan, M. S. (2012) 'Waterfall vs v-model vs agile: A cooperative study on SDLC', *International journal of information technology and business management.* 2(1), pp. 26-30.

Drozdova, A. A. & Guseva, A.I. (2017) 'Modern technologies and its evaluation of efficiency', *Procedia Social and Behavioural Sciences Journal*. 237(1), pp. 1032-1038.

IEEE-CS/ACM joint task force on software engineering ethics and professional practices (2001) 'Software engineering code of ethics and professional practices', *Science and Engineering Ethics Journal*. 7(1), pp. 231-238.

Luo, N., Zhang, M. & Qi, D. (2017) 'Effects of different interactions on students' sense of community in e-learning environment', *Computers & Education*. 115(1), pp. 153-160.

Pagram, P. &Pagram, J. (2006) 'Issues in E-learning: A Thai case study', *The Electronic Journal on Information Systems in Developing Countries*. 26(6), pp. 1-8.

Rana H., Rajiv & Lal, M. (2014) 'E-learning: issues and challenges', International Journal of Computer Applications. 97(5), pp. 20-24.

Rahman, N. A., Kamaruzaman, N. N. N., Husain, W. S. W., Hassan, S. H. C. & Yusof, R. (2018) 'Incorporating teamwork in waterfall model – based project', *International Journal of Advanced and Applied Sciences.* 5(12), pp. 126-135.

Salimovna, F. D., Yuldasheva, N. & Islomov, S.Z.U. (2019) 'Security issues in e-learning system', *2019 International Conference on Information Science and Communications Technologies* (ICISCT). 1(1), pp. 1-4.

Yang, H. H. (2013) 'New world, new leering: Trend and issues of e-learning', *Procedia Social and Behavioural Sciences Journal.* 77(1), pp. 429-442.

Zhu, Y., Nie, Z., Zhang, S. & Chen, S. (2011) 'Analysis on research framework of corporate e-learning', *Procedia Environmental Sciences Journal.* 11(1), pp. 525-529.

Baajour, H. (2021) Principles of software engineering: Lectures and seminars. Available at: https://elp.northumbria.ac.uk/ultra/courses/_676035_1/outline/collab/launchRecordings (Accessed: 1-22/8/2021)

Cast software intelligence (2021) *Four types of software maintenance and how they help your organisation.* Available at: https://www.castsoftware.com/glossary/Four-Types-Of-Software-Maintenance-How-They-Help-Your-Organization-Preventive-Perfective-Adaptive-corrective (Accessed: 10/8/2021)

Capogna, S. (2015) *E-learning uses. Risks and perspectives:* Available at: https://www.researchgate.net/profile/Stefania-Capogna/publication/282217960_E-LEARNING_USES_RISKS_AND_PERSPECTIVES/links/56080d3008ae8e08c0945eda/E-LEARNING-USES-RISKS-AND-PERSPECTIVES.pdf (Accessed: 27/7/2021)

De Gagne, J. (2010) *Ethical and legal issues in online education*. Available at: https://www.researchgate.net/profile/Jennie-De-Gagne/publication/230899227_Ethical_and_legal_issues_in_online_education/links/5852e83808ae7d33e01ab2e0/Ethical-and-legal-issues-in-online-education.pdf?origin=publication_detail (Accessed: 19/7/2021)

Hamburg, I. (2003) Social aspects of e-learning and blending learning methods. Available at: https://www.researchgate.net/profile/Ileana-Hamburg/publication/252988629_Social_aspects_of_e-learning_and_blending_learning_methods/links/00b4952f8cac45ecb4000000/Social-aspects-of-e-learning-and-blending-learning-methods.pdf?origin=publication_detail (Accessed: 18/7/2021)

IDG Communication (2019) *PMBoK vs PRINCE2 vs Agile Project Management. Available at:*

https://www.cio.com.au/article/402347/pmbok_vs_prince2_vs_agile_project_management/ (Accessed: 12/7/2019)

IBM Cloud education (2019) *Continuous Deployment*. Available at: https://www.ibm.com/uk-en/cloud/learn/continuous-deployment (Accessed: 5/8/2021)

Khan, S., (2019) Agile vs Waterfall: which is the better software development. Available at: https://rezaid.co.uk/agile-waterfall-software-development/ (Accessed: 16/1/2022)

Lots, M. (2018) *Waterfall vs Agile: what is the right development methodologies for your project.* Available at: https://www.seguetech.com/waterfall-vs-agile-methodology/ (Accessed: 4/6/2021)

Lucid chart Content Team (2017) *What the Waterfall Project Management Methodology Can (and Can't) Do for You*. Available At:

https://www.lucidchart.com/blog/waterfall-project-management-methodology (Accessed: 6/7/2019)

LucidChart (2018) *UML Use Case Diagram.* Available at: https://youtu.be/zid-MVo7M-E (Accessed: 11/6/2021)

LucidChart (2017) *UML class diagram tutorial*. Available at: https://youtu.be/UI6lqHOVHic (Accessed: 19/6/2021)

LucidChart (2018) *How to make UML sequence diagram*. Available at: https://youtu.be/pCK6prSq8aw (Accessed: 12/7/2021)

Merron, D. (2020) *Deployment pipelines (CI/CD) in software engineering*. Available at: https://www.bmc.com/blogs/deployment-pipeline/ (Accessed: 4/8/2021)

PMIS Consulting (2019) *Pros and Cons of Agile and Waterfall*. Available at:

https://www.pmis-consulting.com/agile-versus-waterfall/ (Accessed: 12/7/2019)

Salma (2017) *UML class diagrams tutorial, step by step*. Available at: https://medium.com/@smagid_allThings/uml-class-diagrams-tutorial-step-by-step-520fd83b300b (12/7/2021)

Saquing, P. F. (2020) *Legalities, issues and ethics related to e-learning: be informed.* Available at: http://www.tua.edu.ph/college-news/legalities-issues-and-ethics-related-to-elearning-be-informed/ (Accessed: 19/7/2021)

Sinha, D. (2018) *How to draw a class diagram in StarUML*. Available at: https://youtu.be/eWdLyPhHAbA (Accessed: 19/6/2021)

Synopsis Editorial Team (2017) *Top 4 software methodologies*. Available at: https://www.synopsys.com/blogs/software-security/top-4-software-development-methodologies/ (Accessed: 4/6/2021)

Tech Jaison (2018) *Use case diagram - StarUML tutorial*. Available at: https://youtu.be/wR1SQqcIJhM (11/6/2021)

United Top Tech (2021) *Class diagram in UMLtutorial. Software engineering*. Available at: https://youtu.be/puexSQPLkIM (12/7/2021)

Urdan, T.A. & Weggen, C.C. (2000) *Corporate e-learning: exploring a new frontier*. Available at: http://papers.cumincad.org/cgi-bin/works/Show&_id=caadria2010_015/paper/2c7d (Accessed: 22/7/2021)

Wilson, A. (2011) Effective professional development for e-learning: What do the managers think? Available at:

https://bera-journals.onlinelibrary.wiley.com/doi/full/10.1111/j.1467-8535.2011.01248.x?casa_token=f31eEw92tNoAAAAA%3A4RPRjRj9XmCP-S1120SPsIDxdX-8JDETQgq63rARppeK9Pv5ka3dZaskEhQhsoNIGqy7dc12YFJwdMo (Accessed: 13/8/2021)