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It is approved that this project has been written in compliance with the formatting rules laid down by the Faculty of Informatics.

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ACRONYMS

MySQL.....	My Structural Query Language
PHP.....	Personal Home Page
CSS.....	Personal Home Page
UAT	User Acceptance Testing
HTML.....	Hypertext Markup Language
DBMS.....	Database Management System
UI	User Interface
E-learning	Electronic learning
OMG	Object Management Group
RDBMS.....	Relational Database Management System
UML.....	Unified Modeling Language
DB	Data Base
SQL.....	Structural query language
MS.....	Micro Soft
OOSAD.....	Object oriented system analysis design
UC.....	Use case
PK	Primary key
FK	Foreign key

Abstract

The main aim of this project is to develop an online learning platform that overcomes the shortcomings of the existing online learning systems in Ethiopia and improves the capacity of learners. By providing a hybrid model with free and paid courses for the platform, the platform caters to individuals with diverse financial backgrounds and interest, democratizing access to education. Including features such as video lesson, quizzes, discussion forums, feedback and certificates creates a respectable and delightful learning platform. Additionally, a cooperative learning environment is created by communication with instructors, participation in by answering and giving up/down voting answers in the forums, and networking with other learners.

The platform concentrates more on the delivery of unique learning experiences and also on building into the development process. A well-functioning feedback mechanism gathers valuable insights from both registered learners and guests, allowing for ongoing refinement of course content and effective addressing of user needs. This commitment to improvement, combined with the platform's user-friendly interface and functionalities including user management, course management, content management, enrollment, assessment, and certificate generation, which makes it a comprehensive solution for learners.

By addressing critical issues like limited access, engagement, and recognition, this project attempts to make quality education more accessible and more impactful to a wider Ethiopian audience. The platform's hybrid model, engaging features and comprehensive functionalities make it a useful tool for empowering students, and hosting a dynamic online learning community in Ethiopia. The system makes use of full-stack technology that encompasses both the front-end and the back-end which includes HTML, CSS, JavaScript, PHP and MySQL, making it work efficiently and providing the best user experience with the ability to scale as the user base grows

CHAPTER ONE

INTRODUCTION

In today's digital era, technology has seamlessly integrated itself into various aspects of human existence, converting everyday activities into digital processes. The rise of technology has granted individuals the ability to effortlessly carry out tasks regardless of time or location. Among the numerous progressions facilitated by technology, online learning emerges as a significant contribution to the educational domain, offering learners the advantage of engaging in educational pursuits with flexibility and convenience.

Referred to as E-learning, the concept of online learning goes beyond traditional approaches. Within this framework, a segment of the curriculum is delivered through online courses, making use of the Internet capabilities. This method of education redefines the conventional temporal and spatial limitations associated with learning environments. As clarified by Berge and Collins in 1995, online learning entails the transmission of information over the Internet, eliminating the requirement for the simultaneous physical presence of learners and educators.[\[1\]](#).

As technology continues to advance, online learning emerges as a transformative force in Ethiopian education, offering a pathway to overcome traditional constraints and provide widespread access to quality education. The integration of online learning into the Ethiopian education system holds the promise of bridging educational gaps, enhancing accessibility, and fostering a more inclusive and dynamic learning environment for learners across the country.

By these facts our project will include different features which helps both the student and also the instructor. Our projects are initiatives that aim to create, improve, or expand the use of digital technologies for education. Our platforms can offer various benefits, such as increased accessibility, flexibility, affordability, and personalization of learning experiences. Our platform can also foster collaboration, creativity, and innovation among learners and educators.

our projects can have various goals, such as increasing access, improving quality, reducing costs, or fostering innovation in education. Our platform can also target different audiences, such as students, teachers, professionals, or lifelong learners.

1.1 Background of the project

The educational system in Ethiopia is greatly challenged by a number of factors, such as inadequate access to tertiary education, low literacy rates and scarcity of good quality online learning resources. This limited access is combined with unequal distribution of internet infrastructure and technological resources, thus creating a digital divide that prevents a large proportion of the population from getting access to educational opportunities. Moreover, the majority of the online learning platforms which are present currently have high enrollment fees, have no interactive features, and don't provide certificates, all of which reduce students' learning and performance.

This project is aimed at solving these problems by creating an easy-to-use, economical and engaging web-based e-learning platform that suits the Ethiopian context. Through this platform we are aiming at eliminating the downside factors associated with the traditional classroom learning method such as space shortages, cost inefficiencies, and inflexible learning schedules.

Our proposed online learning system will allow users to create accounts, enjoy the flexibility to select courses, take quizzes, give feedback and provide final certificate at the end of the lesson. It will support abilities like quick course delivery, assigned educators, and check time quizzes to boost interaction and improve learning effectiveness. our project utilizes the internet and digital technologies to deliver learning materials, facilitate interaction with instructors and peers, and assess learning progress. It will offer asynchronous learning options, catering to diverse learning styles and preferences.

The potential benefits of this project are numerous. It can increase access to education for Ethiopians regardless of location or financial constraints, offering greater flexibility and convenience compared to traditional methods. Additionally, our platform can promote personalized and self-directed learning, potentially reducing costs and fostering deeper understanding.

Nevertheless, we also acknowledge the difficulties that may come with online learning, including technical issues, limited social interaction, and problems of motivation and engagement. To address the challenges, the platform needs to be designed carefully, implemented strongly, and evaluated properly to ensure its effectiveness and efficiency. Through the overcoming of shortcomings of the current solutions and adding the new features, this project aims at the creation

of a simpler, more attractive, and effective e-learning system for Ethiopians. This creates a great opportunity for the nation to improve its educational system through enlargement of access to education, enhancing learning conditions, reducing costs and issuing recognized certificates.

1.2 Statement of the problem

The current educational landscape in Ethiopia reveals several critical challenges. Firstly, there is a scarcity of reliable online learning platforms, Secondly, most existing platforms often lack interactive features, hindering effective engagement and the development of essential skills. Lastly, high enrollment fees create a financial barrier for many students, exacerbating inequalities in educational opportunities. Our initiative seeks to bridge these gaps by creating an accessible, cost-effective, and interactive e-learning platform designed specifically for Ethiopian. Key features include affordability, with minimal subscription fees to ensure accessibility for all learners. Interactive learning experiences, such as quizzes and collaborative projects, aim to foster active engagement and deeper understanding. Diverse course offerings across various disciplines cater to learners' interests and career aspirations, while supplementary resources enhance accessibility and flexibility. Ultimately, our platform aims to empower Ethiopian learners with the knowledge and skills necessary for success, thereby contributing to the country's overall development and workforce readiness.

To summarize the problems are:

- ❖ the scarcity of online learning platform in Ethiopia.
- ❖ lack of interactive features in existing online learning platform in Ethiopia.
- ❖ High Enrollment Fee The few available platforms charge high enrollment fees.

1.3 Objective of The Projects

1.3.1 General objective

The general objective of this project is to develop and implement an accessible, cost-effective, and interactive web-based e-learning platform specifically designed for Ethiopians.

1.3.2 Specific objectives

- ✓ To provide an online learning system which can be accessed all the
- ✓ Develop a responsive design that adapts to various devices,

- ✓ implement features that enable learners and educators to monitor progress.
- ✓ To enable learners to enroll in subjects, download course material, take exams, check results, and interact with lectures online.
- ✓ To provide learners with the flexibility to learn at their own pace and on their schedule.
- ✓ To create a platform that anyone can access from anywhere with an internet connection.
- ✓ To allow learners to customize their learning experience by selecting courses and programs that meet their specific needs and interests.
- ✓ To provide opportunities for learners to collaborate with peers.
- ✓ To implement a system for collecting feedback from learners and guests to continually improve the platform and content.
- ✓ To provide accessible learning materials, including video lectures, downloadable resources, and interactive quizzes for learners.

1.4 Scope of The Study

This project focuses on developing web based online learning platform specifically designed for Ethiopian learners of diverse backgrounds and interests. Unlike some platforms where instructors are encouraged to sign up, create classes and get paid ours prioritizes learners by offering a user-friendly interface for easy registration, course enrollment, and access to various learning materials like video lessons, exams, and downloadable resources.

To foster engagement and deeper understanding, our projects facilitates learner interaction through discussion forums, enabling learners to provide questions and receive answers from peers. This collaborative learning environment complements individual study and assessment through various quizzes. Upon successful course completion, learners earn certificates acknowledging their achievements. While instructors contribute by sharing valuable resources like course materials, video lessons, and quizzes. Additionally, administrators manage course offerings, publish blogs, and collect feedback from learners and guests to ensure continuous improvement and cater to their evolving needs.

This comprehensive, interactive, and learner-centric approach aims to significantly enhance the learning experience for Ethiopian learners, empowering them to acquire knowledge and skills effectively.

THIS PROJECT DELIVER THE FOLLOWING

- ✓ practice exams and quizzes
- ✓ The opportunity to learn new skills and advance your career.
- ✓ These Online learning platforms often provide opportunities for interaction with other learners and instructors.
- ✓ Learners can participate in online discussions.
- ✓ Learners can ask questions in discussion form.
- ✓ Learners can answer different questions asked by their peer learners.
- ✓ Can submit feedback about the courses.
- ✓ Online courses are often more affordable than traditional courses. Learners can save money on tuition, textbooks, and transportation costs.
- ✓ Online learning platforms offer a wide variety of courses and programs.
- ✓ Students can learn from anywhere with an internet connection, and you don't have to worry about commuting to a physical location.

1.5 Limitation of The Study

As every project our project also have some limitation. which is listed below.

These projects have some limitations these are: -

- ❖ It is country-wide because there is a lack of fast internet in most parts of the country.
- ❖ only multiple choose question are is provided for learners.
- ❖ It requires continuous funding and sponsors to provide courses even if it contains some courses with payment.
- ❖ It lacks the opportunities for social interaction that traditional classrooms provide.
- ❖ Online learning can make it easier for learners to cheat on exams.
- ❖ Technical issues such as slow internet speeds or computer malfunctions can disrupt the learning process.

- ❖ It lacks the face-to-face interaction that traditional classrooms provide.

1.6 Significance of the projects

This project primarily assists in the teaching-learning system in Ethiopia with online learning methods. These are then followed by registering learners and selecting a course, taking lessons, quizzes, and lectures.

As a result, it has the following advantages for the learner.

- ✓ Online learning platforms often provide opportunities for interaction with other learners and instructors
- ✓ Students can participate in online discussions.
- ✓ Get feedback on their work.
- ✓ Students can study from anywhere and at any time.
- ✓ You don't have to worry about missing classes or rearranging your schedule to accommodate your coursework.
- ✓ Online courses are often more affordable than traditional courses.

1.7 Methodology

1.7.1 Data Collection Methodology

Data collection methodology Is the process of gathering and looking over information on important things in a planned way. Data collection can be done in two ways: qualitative or quantitative. To get precise data project team members had to use the following data collection techniques. These are Primary data collection and secondary data collection. Primary data collection involves the collection of original data directly from the source or through direct interaction with the respondents. This method allows us to obtain firsthand information specifically tailored to our research objectives. When you use data that someone else has already gathered for a different reason than what they originally planned, that's called collecting secondary information the project team members analyze and interpret this data to extract relevant information.

Observations: Researchers observe and record behaviors, actions, or events in their natural setting. This method is useful for gathering data on human behavior, interactions, or phenomena without direct intervention. project team members use this data collection methodology directly

by analyzing current learning strategies since project team members observe existing learning platforms to analyze their functionalities, user interface, and overall learning experience. This will inform the design and development of our own platform.

Interviews: interviews involve direct interaction between the researcher and the respondent. They can be conducted in person, over the phone, or through video conferencing. Interviews can be structured (with predefined questions), semi-structured (allowing flexibility), or unstructured (more conversational). Project team members conducted Semi-structured interviews with Ethiopian learners from diverse backgrounds to understand their current learning needs, preferences, and challenges. This will help us tailor the platform to their specific requirements.

document and content review: are research methodology that involves systematically reviewing and analyzing existing documents or content. Such websites, articles, and books project team members had observed different online learning platforms like Coursera, Skill share, and LinkedIn and take best feature they have into our platform.

Past Research Studies: Previous research studies and their findings can serve as valuable secondary data sources. We analyze relevant research studies on online learning, particularly those focusing on the Ethiopian context, to gain insights into learner behavior, success factors, and potential challenges.

1.7.2 System Analysis and Design Methodology

System development methodology is a structured and organized approach to the entire process of designing, building, testing, and implementing an information system. It provides a systematic framework for managing the complexities of software development, ensuring efficiency, quality, and successful project completion. By considering the dynamic and user-centric nature of our online learning platform project, the selection of the agile methodology is a strategic decision. Let's explore in more detail why Agile harmonizes seamlessly with the ambitious goals of our project:

Flexibility to Adapt: Agile thrives on its capacity to adapt. In the ever-changing landscape of educational technology, where user preferences and technological advancements evolve swiftly, Agile provides the flexibility to make adaptable changes to meet emerging requirements.

User-Focused Development: Education inherently revolves around meeting the needs of learners. Agile iterative cycles and continuous user involvement ensure that the platform evolves based on immediate user feedback, resulting in a final product that is more attuned to user preferences.

Step-by-Step Progress: The Agile approach underscores the delivery of functional components incrementally. This step-by-step progress facilitates the rapid deployment of essential features, enabling users to derive benefits from the platform at an earlier stage.

Collaborative Development: Collaboration is integral to Agile. The Scrum framework, a component of Agile, promotes regular communication among team members, stakeholders, and end-users. This collaborative approach nurtures a shared understanding of project objectives and challenges.

1.7.3 Development Tool and Technologies

Here is a list of items that project team members-use in our platform. The following are list of tools and technologies that project team members are going to use throughout our projects.

Table 1 development tool and technologies

SOFTWARE	HARDWARE
operating system (OS) Windows 10x64(64 bits)	Processor: Intel(R) Core (TM) i5-2520M CPU @ 2.50GHz 2.50 GHz
Visual studio code: text/code editor	RAM: 8GB
MySQL for database	Hard disk: 512GB - 1TB
Edraw max: to draw UML architecture diagrams	Flash disk: 32GB
Figma: to design user interface	
Web browser: Google chrome & Microsoft edge	

1.7.4 System Implementation

System implementation, also referred to as quality assurance, involves outlining the development of the information system (physical system design). This includes making sure the information system is functional, utilized correctly, and meets established quality standards. Based on the

project's requirements and the need for efficiency and effectiveness, Project team members have chosen the following technologies tools our development team will use those are HTML, JavaScript, and CSS will serve as the front end for our project development, while the back-end development will be PHP and MySQL for the database system. This strategic selection aims to optimize the efficiency and effectiveness of our project's technological foundation.

HTML

Hypertext Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS) and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web. Web browsers receive HTML documents from a web server or local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language like HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript. CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate CSS file, and reduce complexity and repetition in the structural content.

JavaScript

JavaScript often abbreviated as JS, is a high-level, interpreted programming language. It is a language that is also characterized as dynamic, weakly typed, prototype-based, and multi-paradigm.

PHP

PHP is an open-source language and all its components are free to use and distribute. PHP is a server-side scripting language. It is embedded in HTML source code. PHP supports all major web servers such as Apache, Microsoft IIS Netscape, etc. All the major database such as MySQL, Oracle, Sybase, and Microsoft SQL Server are supported by PHP. Following are some major Advantage: -

- ❖ Friendly with HTML.
- ❖ PHP and HTML are interchangeable within the page.
- ❖ Can put PHP outside the HTML or inside.
- ❖ Interactive Features - PHP allows you to interact with your visitors in ways HTML.
- ❖ It is Compatible with Databases.
- ❖ A benefit of using PHP is that it can interact with many different database languages including MySQL.

MySQL

MySQL is the most popular open-source relational database management system. It is one of the best RDBMS being used to develop web-based applications. It is easy to use and fast RDBMS. The following are the top reasons to use MySQL: -

- ❖ High Performance
- ❖ Robust Transactional Support
- ❖ Strong Data Protection
- ❖ Open Source Freedom
- ❖ To create and manage the database and store courses, results of student etc.

1.7.5 Testing and Deployment Methodology

Testing e-learning products at each stage of development is becoming critical due to the increased number of platforms and devices, growth in online content & digitalization. The main objective of testing an online Learning program is to ensure its “learnability” that is how “learnable” the course is. Learnability is a combined measure of platform functionality, accessibility, usability, and performance. User Acceptance testing plays a noteworthy job in online Learning platforms, as it exhibits that the required course is working in a way that meets the desire of the client. With UAT, the partner can make sure "What's in store" from the course, as opposed to simply assuming. The advantage of UAT is that there will be no real shocks when the application is taken off to the client.

■ UNIT TESTING

Unit testing is very important in making software. It checks parts of the program one by one to make sure they work right. Developers mostly use this method. It helps find and fix

problems with small parts of code like functions or methods, making the our platform better overall Individual code modules will be tested for functionality and reliability.

The process of running unit tests consists of four steps

- ❖ Creating test cases: Writing multiple test cases of a web application's components.
- ❖ Review and re-write: Review the written test cases and re-write them if there are any mistakes.
- ❖ Baseline: Checking whether each code line is in a manner or not.
- ❖ Execution: Performing test execution using an online Selenium Grid.

• Integration Testing

Integration testing is an approach where different components or modules of a software application are tested as a combined entity Flawlessly. It ensures connectivity between individual modules by examining the rendering values and logically implementing them. It's also crucial to ensure the data accepted by the API is correct so that the response generated is as per the requirement. Integration testing includes several steps and has a range of frameworks and continuous integration. Firstly, prepare a test integration plan and the required frameworks. Decide the type of integration testing approach: Bottom-Up, Top-Down, Sandwich testing, or Big Bang.

• System Testing

In system testing, a full and connected software program is tested to see if it works well. The goal of this test is to check if the system follows the given rules. For online learning platforms, system testing is crucial to ensure that the entire system functions correctly and provides a seamless learning experience.

Deployment Methodology

Deploying an online learning platform involves several steps. Here's a general methodology:

- ❖ **Design the System Structure:** Identify the main components of the system. For our learning platform, these could include Courses, Students and lecturers.
- ❖ **Define the Attributes:** Each component or class will have its attributes. For instance, the learner class like learner ID, learner name, learner email.

- ❖ **Develop User Activities:** Determine the actions that users can perform within the system. This could include searching for a course, viewing course descriptions, and adding or updating courses.
- ❖ **Implement Security Measures:** Ensure that certain pages or activities are secure and can only be accessed after user verification.
- ❖ **Test the System:** Before deploying the system, it's important to test it thoroughly to ensure it functions as expected.
- ❖ **Deploy the System:** Once testing is complete, the system can be deployed. It's important to ensure that the production data follows the same distribution as your training and evaluation data.
- ❖ **Monitor and Update:** Regularly re-evaluate the system by collecting more training data. If your data distribution changes, retrain your model.

Software deployment

Deploying software for an online learning platform involves several steps and considerations.

- ❖ **Customization and Integration:** Depending on users' specific needs, project team members may want to customize the learning platforms.
- ❖ **Course Creation and Management:** our online learning platform should provide tools for creating and managing courses.
- ❖ **User Experience:** our online learning platform should be easy to use for learners, instructors, and administrators.

1.7.6 Security Methodology

Security is the act/practice of protecting websites from unauthorized access, use, modification, destruction, or disruption. Effective website security requires design effort across the whole of the website. in our online learning platform project team members will implement password encryption methods like md5.

1.7.7 Backup and Recovery Methodology

Employing an incremental backup methodology, our approach begins with a full backup, capturing the entirety of our online learning platform's data. Subsequent backups exclusively retain alterations made since the previous backup, maximizing efficiency and minimizing storage requirements. This flexibility empowers us to schedule backups as frequently as needed, ensuring that only the most recent changes are preserved. The incremental nature of these backups facilitates lightning-fast backup processes, as they necessitate storage space solely for the changes, or increments, rather than duplicating entire datasets. This streamlined approach not only conserves storage resources but also accelerates the backup process, optimizing data protection for our online learning projects.

1.8. System Requirement

1.8.1. Software Requirement

Table 2: software requirements

Name of tools	Purpose	version
Operating System	To control and manage software and hardware	Windows10 32bit or 64 bits
MySQL Database	To perform database operations such as store, update, delete, and search.	Compatible with Visual Studio version 1.63.2
Browser	Chrome, Firefox Mozilla, Microsoft Edge	For Windows 10 64-bit.
Microsoft word	For documentation	MS- word 2021
Visual studio code	For editing and running the code	version 1.63.2
PHP	Connect back end with front-end	PHP 5
XAMP	To run program	Compatible with 64-bit

Apache server	To handle HTTP requests from clients and deliver the requested web pages	
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1.8.2 Hardware Requirement

Table 3: Hardware requirement

Component	Minimum requirement	Recommended requirement
Processor	Intel(R) Core (TM)	3.3GHZ or faster 64-dual core processor
Memory	4GB RAM	8GB or more
Storage	500 GB	1TB
Display	monitor with a resolution of 1024 x 768	monitor with a resolution of 1024x768 that has a graphics card

1.9 Feasibility Study

The feasibility study conducted for the development of the online learning portal aligns well with the objectives and goals of the project. Each aspect of feasibility has been carefully examined to ensure the viability and success of the initiative.

1.9.1 Technical Feasibility

The technical feasibility study assesses the compatibility of the project with the existing computer system. As indicated, the project does not require any complicated hardware or software. It is designed to run on widely used platforms like Windows 7/10, making it technically feasible for implementation. The need for internet connectivity and a web browser aligns with common technical capabilities, ensuring widespread accessibility.

1.9.2 Operational Feasibility

Operational feasibility assesses whether the project can be easily operated and maintained. The study indicates that the online learning portal is designed to be user-friendly, requiring minimal training for both operators and users. The simplicity of the web application ensures that even individuals with basic computer knowledge can navigate and utilize the platform effectively. This aligns with operational feasibility, emphasizing ease of use and maintenance.

1.9.3 Economic Feasibility

The economic feasibility of the online learning platform is characterized by a less cost analysis, emphasizing the long-term benefits of offering free education to a broad audience. While initial development costs are anticipated, potential revenue streams through partnerships, sponsorships, or grants could sustain and enhance the platform's features over time.

1.10 Cost Estimation and Schedule Breakdown

1.10.1 Cost Estimation

Software cost is a small part of the total cost of a computer system. A lot of things are looked at that might change the overall price of the program, like people, hardware, software, and availability of computer programs.

The main thing looked at when figuring out the price of the project was the amount For the Project, our cost estimation is made by current economic background. These were used with other things to make predictions of cost and effort. The expenditures incurred during the application's development are depicted in the following two tables.

HARDWARE COST

Table 4: Hardware cost

Material/ resource used	Amount	Price (in birr) per unit	Total price(birr)
Laptop	1 Lenovo laptop	45,000	45,000
RAM	8GB RAM	2200	2200
Flash driver	1	300	300
Transport	5	20	100
Pen	8	15	120
Paper	100 sheets	2	200

SOFTWARE COST

Table 5: Software cost

NO	Material	Price per unit
1	Visual studio code	Free
2	Microsoft Office 2016	Free
3	MySQL server	Free
4	XAMP/WAMP	Free
5	browser	Free

1.10.2 Schedule Breakdown

The schedule breakdown decides whether or not the planned system will be finished on time. Regardless of the time constraints imposed on the project by the internal drive and potential of the project's team members, project team members are certain that the project will be finished on time. The following is a basic timeline chart for the development plan. The plan specifies the tasks and how long it will take to execute them.

Table 6: Timeline chart

Activities	Time											
	Dec-10	Dec 17 -	Dec 20	Dec -24	Dec 26	Dec 27-31	Jan 1-15	Jan 16-25	Jan 25-30	Feb 1-10	Feb 11-15	Feb 16
Project title selection												
Requirement Analysis												
Submission of chap 1												
Submission of chap 2												
Submission of chap 3												
Submission of chap 4												
Submission of chap 5												
Compiled & complete												
Project presentation												

CHAPTER TWO

DESCRIPTION OF EXISTING SYSTEM

2.1 Introduction of Existing System

Nowadays some online learning platforms provide different online courses in Ethiopia. Although they are very promising ways to fulfil the need of the educational, there are some limitation of the reach, engagement and recognition. With the current number of online learning platforms being limited in Ethiopia, and factors such as narrow reach and access constraints, the effectiveness of e-learning is restricted substantially. Lack of equal access to reliable internet infrastructure, especially in remote areas, gives rise to a digital divide which leaves a big proportion of the population outside the reach of digital technologies. Moreover, the lack of technological resources such as computers and smartphones for some others increase this involvement exclusion. Secondly, low level of engagements and learning are the characteristics of many platforms that lack the features which stimulate the learning activities. The lack of discussion forums induces that students might lose the chance to discuss and share the knowledge in a group where they are the peers. Also, feedback mechanisms limit a student's personalized learning journey and educators' abilities to give educative feedback or feedback that creates a sense of achievement for a student.

Finally, the value of online learning experiences can be diminished by the lack of recognition and accreditation. Some platforms do not offer certificates upon course completion, disadvantaging learners seeking to showcase their achievements for academic or professional purposes.

Despite all these obstacles, online learning has great opportunities for Ethiopia. It can be an important source of education for those who do not have access to formal education due to number of different reasons. Moreover, it may provide learning options for the regular learners, which will be their choice to extend their knowledge and skills. To realize this capacity, it is necessary to remove the barriers to reach, engagement, and recognition. This entails expanding internet access, creating awareness about online learning among students and educators, providing teachers with the skills to operate the platforms and instructing the students. Thus, with the capability of overcoming these challenges online learning can become a worthy tool in the process of democratizing access to education and empowering students in Ethiopia.

2.2 Proposed systems

The proposed system aims to overcome the problems that exist in these current online learning platforms that exists in Ethiopia. The proposed system offers a variety of courses in different skills for Ethiopian learners from different areas and backgrounds. The best part of our proposed system is that it is a hybrid model offering both free and paid courses. Free courses provide essential knowledge and skills to a wider audience, democratizing access to education. Paid courses cater to specific interests and potentially contribute to the platform's long-term sustainability, so anyone who wants to learn and acquire new knowledge in different courses by sign up and register for the courses they are interested in. This makes learning accessible and affordable for everyone without financial barriers.

The proposed system also provides a high-quality learning experience for the learners. The learners can watch video lessons and access all the course materials they need online. The courses are designed to be engaging and interactive, with quizzes, feedback, and certificates. The quizzes are graded automatically within the given time so learners can view their results immediately after finishing their quiz. Learner will get certificates in completion of courses and they can download their certificate in PDF format. The certificates show that the learners have gained new skills and knowledge that can help them in their academic and professional goals.

The proposed system also fosters a collaborative and enjoyable learning environment for the learners. The learners can communicate and interact with the administrators and instructors if they have any questions or need any help with the courses by sending feedback. The learners can also participate in a special forum where they can ask questions, share ideas, and discuss things with each other. The forum has features like up voting and down voting of learner answers which allow the learners to get the most helpful answers for their questions. The forum also helps the learners to build a network and a community with other learners who have similar interests and goals.

The other feature proposed system is blogs, this feature is used to post announcements about new courses, promote programs, and also post different advertisements that help the platform attract sponsors who can support the proposed system this increases the revenue and the visibility of the platform.

Furthermore, our platform will incorporate a feedback mechanism, allowing enrolled learners to provide valuable insights about the courses they are taking this feedback mechanism is not only used by the registered students but also guests who visit this platform this incessantly improves the learning experience to suit the different needs of our users. The feedback obtained from this mechanism helps us identify areas for improvement, perfect the content of our courses and quickly deal with any issues. By welcoming involvement from registered students and guests alike, we cultivate a supportive community that aspires to high standards of education with an emphasis on openness. By adopting such an inclusive approach, we strive to make sure that everyone whomever they are regardless of their registered status plays a role in making our platform successful overall this feedback loop is crucial for continuous improvement, ensuring that the courses offered meet the expectations and needs of the learners.

In conclusion, the proposed system provides free as well as cost effective, high-quality, and interactive courses in various skills. The new system also creates a supportive, collaborative, and enjoyable learning atmosphere for the learners. The new system is more than just regular online learning. It's a platform where learners can learn, grow, and succeed.

2.3 Strength of Existing System

- ❖ They provide access to a variety of courses and topics that may not be available in traditional classrooms.
- ❖ Most of Them have well known and professional instructors.
- ❖ they enable learners to study at their own pace and convenience.
- ❖ some platforms are accessible through a toll-free number [\[2\]](#).
- ❖ they allow learners to access courses and materials from anywhere and at any time

2.4 Weakness of Existing System

As the group members investigated, the currently available online platforms in Ethiopia are not a lot of in number and also have seen various drawbacks on those platforms that may affect the quality and accessibility of online learning.

One of the drawbacks of these currently existing online learning platforms Ethiopia, unfortunately, these platforms often come with high enrollment fees, creating a significant barrier for many learners who cannot afford these costs. For example, Gx Camp, an online platform in Ethiopia, a

price ranging from \$15 to \$299 for its on-demand video courses [\[3\]](#). Another example is Ethio-Study, an Ethiopian eLearning portal that provides courses that require prices ranging from ETB 2,500 to ETB 10,000 for some of its courses [\[4\]](#). These prices are too expensive for many Ethiopian learners who have limited income or resources.

The other drawback that the group members observed in some of the existing online learning platforms, in Ethiopia is the absence of features. Interactive features refer to elements that enhance learners' engagement and interaction with course content, instructors, and fellow learners. Examples of features include discussion forums, quizzes, feedback mechanisms, and chat functionalities. However, it is unfortunate that some online learning platforms in Ethiopia lack these features that are crucial for facilitating active learning and collaboration among learners. As an example, Ethio-Telecom, a telecommunications service provider partnered with the Ministry of Education to offer an online English language learning platform unfortunately, this platform does not offer any features apart from a toll-free number for accessing the platform [\[5\]](#). This limitation could potentially hinder learners' outcomes and overall satisfaction with using the platform.

Another drawback of some current online learning platforms in Ethiopia is the absence of certificates for courses. Certificates serve as documents that validate learners' completion and achievements in a course. These certificates hold significance in aspects such, as job applications pursuing education opportunities, or showcasing acquired skills. However, it is worth noting that certain online learning platforms, in Ethiopia some platforms do not offer certificates, for their courses or the certificates they provide may not be recognized or accredited by the authorities or institutions. For example, Ethio Telecom and Learning Management System, a national electronic health management information system platform [\[6\]](#), do not provide certificates for their courses which may affect the academic credibility and career opportunities of the learners who complete the courses.

Generally, the following are some drawback

- ❖ Some are the absence of features. Interactive features include discussion forums, quizzes and feedback mechanisms.
- ❖ Certain online learning platforms, in Ethiopia do not offer certificates.

- ❖ Come with hefty enrollment fees, creating a significant barrier for many learners who cannot afford these costs.
- ❖ In some current learning platforms in Ethiopia, learners do not receive enough constructive feedback from educators or administrator which may difficult to understand the courses.
- ❖ They are inaccessible and most are not well known.

CHAPTER THREE

3. SYSTEM FEATURES

3.1 Introduction

In this chapter, we will try to express the system features of our project, which is based on the agile methodology. We will describe the functional and non-functional requirements that define the behavior and quality of the system. We will also use UML diagrams to model the system structure and interactions, applying the object-oriented concept. The UML diagrams include use case diagrams, class diagrams, sequence diagrams, and activity diagrams. These diagrams will help us to visualize and communicate the system design and functionality. By the end of this chapter, we will have a clear and comprehensive understanding of the system features of our project.

3.2 Functional requirements

Functional requirements are statements of services the system should provide. How the intended behavior of the system or what the system will do. Accordingly, the tasks that the projects E-learning Portal System will do are listed as follows:

The system will provide the following functional requirement

➤ **For the learners:**

1. The system must have a registration form for learners.
2. The learner must able to login in to the system.
3. The learners must be able to update his or her password through the system.
4. The learners must able to view available courses.
5. The learners must be able to select one or more course.
6. The learners must be able to access learning materials.
7. The learner must able to view video lessons.
8. The learners must able to take a quiz.
9. The learner must able to view their result.
10. The learner must able to get their certificate.
11. The learners must able to send feedback to their lecturer.

12. The learners must able to view available questions in discussion forums.
13. The learners must able to ask question in discussion forums.
14. The learners must able to answer the questions in discussion forums.
15. The learners must able to track their questions in discussion forums.
16. Learner must able to track their progress.

➤ **For the educators**

1. The educator must able to login in to the system.
2. The educators must able to view their profile.
3. The educator must able to update their profile.
4. The educators must able to manage their students.
5. The educator must able to send a material to learners.
6. The educator must able to give a quiz to their learners.
7. The educator must able to see their learner's result.
8. The educators must able to send replay for learner's feedback.

➤ **For admin**

1. The admin must able to login in to the system
2. The admin must able to view his profile
3. The admin must able to edit his profile
4. The admin must able to add, edit, and delete course.
5. The admin must able to add, edit and delete educators.
6. The admin must able to add, edit, and delete students.
7. The admin must able to assign educators to each course.
8. The admin must able to track educators.
9. The admin able to post blogs.
10. The admin able to view, edit and delete blogs.
11. The admin must able to see feedback guests.
12. The admin must able to manage forums.

➤ **For guests**

1. The guests must able to view courses, blogs and navigate through different pages.
2. The guests must able to give feedback

3.1. Non-Functional requirements

Non-functional requirements - this is the desired behavioral or structural aspects of the system that are not its specific functions, e.g. performance, security, maintainability, and others. Non-functional requirements of the system are explained as the following:

Scalability: The system should be scalable to handle more users, courses, and data without affecting the performance and stability. This is critical to provide smooth operations as the platform gains more users.

Responsiveness: The site should be responsive and work well with various devices such as desktop, hardtop, tablets, and smartphones. It enables the users to access the platform via any location and any device that they prefer to.

Security: this requirement is very important in this project; the platform must prioritize the security and privacy of user data. This includes Grant different access levels to users based on their roles (administrator, educator, learner, guest) and Encrypt sensitive data like passwords.

Performance: The system shall minimize errors and the clear error message should be displayed that guide user to handle it. For example, if the user interts the wrong password the system displays error message.

Usability: user-friendly interface enables the end-users are able navigate and interact with the system efficiently.

Availability: This system should always be available for access at 24 hours, 7 days a week unless in the occurrence of any major system malfunctioning, the system should be available in all working days, so that the process is not severely affected.

Accuracy and Consistency: The system should deliver accurate and consistent results throughout its functionalities. This involves Validate user input and system functions to ensure data integrity and prevent errors.

Portability: The software be deployed in different operating system.

Reusability: The data and record that are saved shall be reused if needed.

Quality Control: The system quality control also is an important requirement. The system should a fast and efficient service to all users.

3.2. System Analysis Models

3.4.1 Introduction

UML is a language for modelling software systems as objects with characteristics and methods object-oriented techniques were used to model our system in form of collection of interacting objects. Different types of UML diagrams were used to represent different aspects on our system including the use case, classes, sequences and activities. Our diagrams assisted us in defining the needs, architecture, components and interfaces as well as interactions of our system. UML means Unified Modeling Language, and it was founded by the Object Management Group (OMG) [\[7\]](#) UML is a graphical representation with additional textual annotations of how software systems will work. A number of software engineers use UML because it enables one to communicate the design of a system between various stakeholders including developers, testers, managers as well as clients the major benefit of using UML is that it provides levels, ranging from conceptual or logical level to implementation level. UML also provides for many different views of a given system, such as the static view or physical one. Every view reveals a separate character of the system and may be presented by different UML diagrams. This chapter provides some of the most used UML diagrams that project members employed to design our online learning project.

3.4.2 Use Case Diagram

A UML (Unified Modeling Language) use case diagram is a visual representation of the interactions between actors (users or external systems) and a system under consideration. It depicts the functionality or behavior of a system from the user's perspective. Use case diagrams capture the functional requirements of a system and help to identify how different actors interact with the system to achieve specific goals or tasks [\[8\]](#).

Use case diagrams provide a high-level overview of the system's functionality, showing the different features or capabilities it offers and how users or external systems interact with it. They serve as a communication tool between stakeholders, helping to clarify and validate requirements, identify system boundaries, and support the development and testing processes.

Actor: in a use case diagram is any entity that performs a role in one given system. This could be a person, organization or an external system and usually drawn like skeleton shown below.

Use case: Use Case a use case represents a function or an action within the system. It's drawn as an oval and named with the function.

System: The system is used to define the scope of the use case and drawn as a rectangle. This is an optional element but useful when you're visualizing large systems. For example, you can create all the use cases and then use the system object to define the scope covered by your project. Or you can even use it to show the different areas covered in different releases.

Relationship: The relationships between and among the actors and the use cases.

Include: The include relationship indicates that one use case includes another use case. This means that the included use case is a part of the main use case and is essential for its execution.

Extend: The extend relationship represents optional or conditional behavior that can extend the functionality of a base use case under specific conditions.

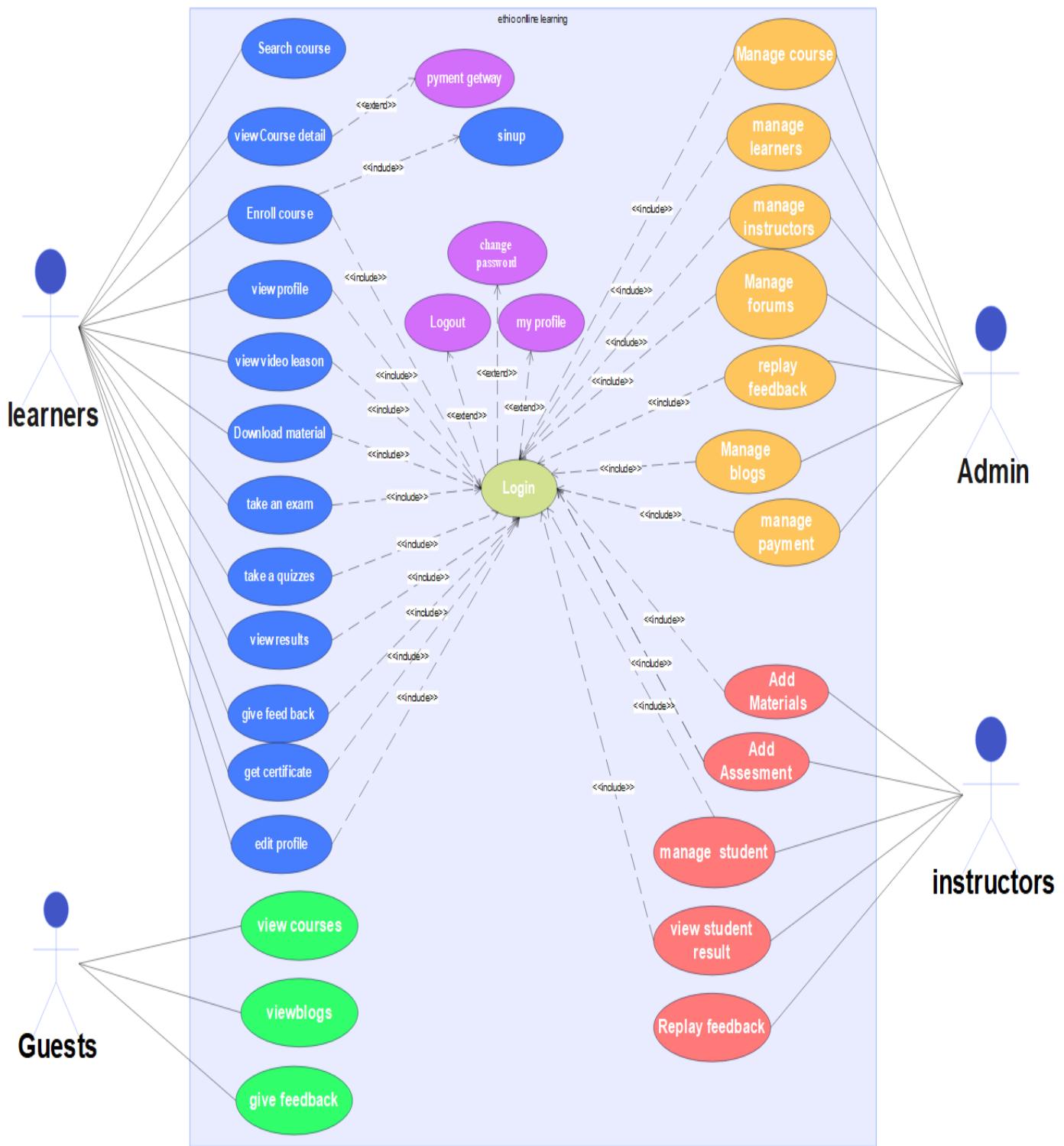


Figure 1: use case diagram

Table 7: use cases and their identifiers

Use case name	Use case id
Visit	UC-01
Registration	UC-02
Login	UC-03
add course	UC-04
add Educator	UC-05
add blogs	UC-06
add lesson	UC-07
Add quiz	UC-08
enroll course	UC-09
Take a quiz	UC-10
add question in discussion forum	UC-11
give answer in discussion forum	UC-12
Get certificate	UC-13
Change password	UC-14
give feedback	UC-15

Use case description

Table 8: visit description

Use id 01	Visit	
Actors	New user Registered user	
Preconditions	go to our website.	
Scenario	Gust action	System response
	1, guest get in to our website. 3, Guests navigate through the available courses, blogs, and other pages. Upon selecting a specific course. 5, if user click enrollment option, 7, if Guests navigate in to the feedback form 9, guests fill feedback form and click submit button. 11, Guests can continue navigating the platform, exploring more content or performing additional searches.	2, The system responds to displaying homepage. 4, the system presents a detailed page with enrollment options register for a course. 6, system response by providing registration page. 8, the system offers a feedback form, allowing guests to share their thoughts 10, system processes the submitted feedback and displays a confirmation message.
Post conditions	User must be registered to access courses.	
Exceptions	Can't access course if not logged in.	

Table 9: registration description

Use Case id 02	Registration	
Actors	New user	
Preconditions	go to our website.	
Scenario	User action	System response
	1 Learner click on sign up button. 3, learner fill the form with needed information.	2, account creation form displays to learners. 4, The system validates the information entered by the learners 5, the system announces to the learners that they have successfully registered 6, System displays a success message allowing login.
Post conditions	After customer click on sign up button your data will be saved in our database And user can be able to login in our website.	
Exceptions	If users fill incomplete information, the system prompts the users to review and correct the detail.	

Table 10: login description

Use Case id 03	Login	
Actors	Registered User	
Preconditions	Only registered users.	
Scenario	User action	System response
	<p>1. The Administrator, educator and Registered students click on 'sign-in' button.</p> <p>3, The Administrator, educator and students enter the required email and password and press the 'sign-in' button.</p>	<p>2. The sign-in form is displayed</p> <p>4. The system validates the information entered by the customer.</p> <p>5, if it is a valid input the system displays homepage</p>
Post conditions	<p>After that</p> <p>Registered students can able to enroll the courses.</p> <p>Administrator, they can able to manage learners, educators and courses.</p> <p>Educators click on the login button, they can able to add edit delete lessons.</p>	
Exceptions	<p>1, if User enter invalid email id or password, they get this message" Invalid login id and password, retry again".</p> <p>2, if User not register on our website, they get this message." Please register yourself first"</p>	

Table 11: add course description

Use Case id 04	add/ Update / Delete Course	
Actors	Registered Admin	
Preconditions	Admin must Logged in, for create and Same course will be not repeated. For Update and Delete - Course must be there in system.	
Scenario	Administrator Action 1 selects the option to create a new course. 3, administrator fills in the necessary details and assign, storing all the provided information. 6, Delete Course - If course had some issues so admin can delete the course clicking delete button. 8, for Update Admin edits the course details.	System response 2, displaying a course creation form. Educator 4, system performs validation checks to ensure that the entered information is complete and valid 5, system creates a new course object database. 7, System removes the course from the database. 9, System validates and updates the course information.
Post conditions	Admin should verify and analyze the course properly.	
Exceptions	No repetition of courses should be done and updating of course must be proper.	

Table 12: add educator description

Use Case Name 05	add/ Update / Delete Educator	
Actors	Registered Admin	
Preconditions	Admin must Logged in order to add blogs	
Scenario	<p>Administrator Action</p> <p>1, administrator selects Educators' option to add a new Educator.</p> <p>3, administrator click add Educator button.</p> <p>5, administrator fills in the necessary details and click submit button.</p> <p>8, Delete educators If educators had some issues so admin can delete the educators click by clicking delete button.</p> <p>10, for Update Admin edits the educator's details.</p>	<p>System response</p> <p>2, the system displaying a list of Educators (if there is) with add Educator option.</p> <p>4, the system provides Educator addition form.</p> <p>6, system performs validation checks to ensure that the entered information is complete and valid</p> <p>7, system save Educator information into database</p> <p>9, System removes the educators from database.</p> <p>11, System validates and updates the educator's information.</p>
Post conditions	Admin should verify and analyses the course properly.	
Exceptions	If admin fill incomplete information, the system prompts the admin to review and correct the detail.	

Table 13: add blogs description

Use Case id 06	add/ Update / Delete blogs	
Actors	Registered Admin	
Preconditions	Admin must Logged in order to add blogs	
Scenario	Administrator Action 1, administrator selects blogs option to add a new blog. 3, administrator click add blog button. 5, administrator fills in the necessary details and click submit button. 8, Delete educators If blogs had some issues so admin can delete the blogs click by clicking delete button. 10, for Update Admin edits the blogs details.	System response 2, the system displaying a list of blogs with add blogs option. 4, the system provides blog creation form. 6, system performs validation checks to ensure that the entered information is complete and valid 7, system save blogs database 9, System removes the blogs from database. 11, System validates and updates the blog information.
Post conditions	Admin should verify and analyses the blogs properly.	
Exceptions	No repetition of blogs should be done and updating of blogs must be proper.	

Table 14: Create lesson description

Use Case id 07	Create/ Update / Delete Lessons	
Actors	Registered Educators	
Preconditions	<p>Educators must be login and that particular course should be available in available courses.</p> <p>For create - same lesson will not be repeated and</p> <p>For update and delete - that lesson must be available in system.</p>	
Scenario	Instructor action 1, in Educator dashboard Educators go to Course option. 3, The Educator clicks on the "Add Lesson" option. 5, the Educator fills in the required details for the lesson and submitting the lesson details. 8, Delete lesson If lesson had some issues so admin can delete the lesson click by clicking delete button. 10, for Update Admin edits the lesson details.	System response 2, system displaying the available courses. 4, the system provide lesson add form 6, the system performs validation checks to ensure completeness and correctness of the entered information 7, If the validation is successful, the system saves the new lesson information in the database, associating it with the respective course. 9, System removes the lesson from database. 11, System validates and updates the lesson information.
Post conditions	System displays a confirmation message.	
Exceptions	No repetition of lessons should be done and pupation of lessons must be proper.	

Table 15: add quiz description

Use Case id 08	add/ Update / Delete quiz	
Actors	Registered Educators	
Preconditions	Educators must be login and that particular course should be available in available courses. For create - same quiz will not be repeated and For update and delete - that quiz must be available in system.	
Scenario	Instructor action	System response
	1, on the Educator dashboard Educators click into add quiz button. 3, the Educator select the course. 6, the Educator fills in the required details for the quiz and click submitting button.	2, system displaying the available courses. 4, the system displays the quiz creation form. 5, the system performs validation checks to ensure completeness and correctness of the entered information. 7, If the validation is successful, the system saves the quiz information in the database, associating it with the respective course.
Post conditions	System displays a confirmation message.	
Exceptions	No repetition of lessons should be done and updating of lessons must be proper.	

Table 16: enroll course description

Use Case id 09	Enroll Course	
Actors	Registered learners	
Preconditions	1. learners must be registered and login in our system. 2. Particular course that you want to place order must be selected	
Scenario	User action	System response
	1, learners select course they want to enrolled 3, learners click enroll course button. 5, access courses with material and lessons	2 provides detailed information about the selected course. 4, if the course is free system confirm enrollment. Else system provides payment option.
Post conditions	After customer click on Enroll button you will be taken to that course's detail page.	
Exceptions	If learners fill incomplete information, the system prompts the learner to review and correct the information detail.	

Table 17: take a description

Use Case id 10	Take a quiz	
Actors	Registered learners	
Preconditions	1, the learner must be registered and login in our website. 2, Particular course that you want to take exam must be selected 3, learners must finish with in given time	
Scenario	User action	System response
	1, the learner clicks into take a Quiz button on his dashboard. 2, the learners select course they want to take a quiz. 4, learners select the best answer for the questions and click next button. 7, learners view their results immediately after finishing the exam.	2, the system provides list of available courses for quizzes. 3. The system provides choose questions with prescribed time 5, the system provide next question until the question is ended. 6, after learners finished their questions, the system displays their results.
Post conditions	After finishing the quiz learners can view their result.	
Exceptions	If the given time for the quiz is complete the result is submitted automatically if the learner closes the browser their result will be submitted automatically	

Table 18: Add question in discussion forum description

Use Case id 11	Add question in discussion forum	
Actors	Registered learners	
Preconditions	1, learners must be registered and login in our website. 2, Particular course that you want to add question must selected	
Scenario	User action	System response
	<p>1, Navigating to their dashboard, the learner selects the "Discussion Forum" section.</p> <p>3, the learner clicks add question button.</p> <p>5, the learner fills required details and click submit button.</p>	<p>2, The system displays the discussion forum interface with existing question and add a new question option</p> <p>4, the system display form to create a new question.</p> <p>6, if any issues arise during submission, such as incomplete information, the system prompts the learner to review and correct the question details else save to the database</p>
Post conditions	After customer click on submit button you message will be send.	
Exceptions	If learners fill incomplete information, the system prompts the learner to review and correct the question detail.	

Table 19: Answer question in discussion forum description

Use Case id 12	answer question in discussion forum	
Actors	Registered learners	
Preconditions	1, Customer must be registered and login in our system. 2, Particular course that you want to add answers must selected	
Scenario	User action 1, Navigating to their dashboard, the learner open "Discussion Forum" pages. 3, the learner clicks give answer button. 5, the learner fills their answer and click submit button.	System response 2, The system displays the discussion forum interface with different existing learners' questions. 4, the system display answering form for learners. 6, if any issues arise during submission, such as incomplete information, the system prompts the learner to review and correct the answer they provide else save to the database
Post conditions	After learners click on submit button the learner's comment will be send and other peer learners can give like for answer.	
Exceptions	If learners fill incomplete information, the system prompts the learner to review and correct the question detail.	

Table 20: get certificate description

Use Case id 13	Get certificate	
Actors	Registered learners	
Preconditions	1, the learner must be registered and login in our website. 2, the learner must be finished all lessons. 3, the learner must be taking a quiz and must have a passed their quiz with a great result	
Scenario	User action	System response
	1, the learner clicks into a get certificate option on their dashboard. 3, the learners click generate certificate button. 5, learners click into download button.	2, the system provides courses if there is a course that learner already completed. 4. The system displays certificate paper with download option. 6, the system provides downloaded pdf format certificate.
Post conditions	Learners get certificate in pdf format which describes.	
Exceptions	If learners are not complete the course and pass their quiz with great mark, they will not get any certificate.	

Table 21: change password description`

Use Case id 14	Change Password	
Actors	Registered user Registered admin Registered Educators	
Preconditions	User/Admin must be login.	
Scenario	User action	System response
	1, user navigate in to my profile option. 3, clicks on the "Change Password" option on the Profile page desired new password. 5, The user fills in the required information, including the current password and the new password and conformation password then click submit button.	2, The system responds by displaying the user's profile page 4, The system presents a password change form for the user to input the current password and new password and confirm password. 6, The system validates the entered information the user's password in the database and if it is valid system displays password change is successful message.
Post conditions	Users Admin can access their profiles after login with new password.	
Exceptions	User must enter valid new password and correct old password and then only they can update new password.	

Table 22: submit feedback description

Use Case id 15	Submit feedback	
Actors	Registered learners	
Preconditions	1, learners must be registered and login in our website. 2, learners must be selected a Particular course to give feedback.	
Scenario	User action 1, after accessing course dashboard, the learner navigates to the "Feedback" section. 3, The learner fills in the feedback form click submit button.	System response 2, The system displays a form for submitting feedback, 4, the system validates the feedback form to ensure all required fields are filled. 5, If the validation is successful, the system acknowledges the submission with a success message else prompt learner to complete any missing information
Post conditions	After customer click on submit button you message will be send.	
Exceptions	If learners fill incomplete information, the system prompts the learner to review and correct the feedback detail.	

3.4.3 Sequence diagram

Sequence diagram is a form of UML (Unified Modeling Language) used in software-engineering and system design for visual representation of the interactions and communications between components or objects within a specified domain. The sequence diagrams are very important for the dynamic behavior of a system and interacting components that work together to accomplish specific tasks or mission. They are widely used in the design and documenting stages of software development [9].

Key elements and concepts in a sequence diagram include:

Lifelines: These represent the individual objects or components involved in the interaction. Each lifeline is typically depicted as a vertical line, and their names are often placed at the top of these lines.

Messages: These are the horizontal arrows or lines that connect lifelines, indicating the order of messages passed between objects. Messages can be synchronous (blocking) or asynchronous (non-blocking), and they typically have labels that describe the action or method being invoked.

Activation Bars: These represent the period during which an object is active and processing a message. They are depicted as a box or vertical rectangle on the lifeline and show the duration of the object's involvement in the interaction.

Return Messages: These indicate the response from an object to a message it received. They are usually represented by a dashed line and are labeled to show the result or value being returned.

Optional Fragments: Sequence diagrams can also include optional fragments, such as loops, conditionals, and alternative paths, which help illustrate different scenarios and decision points within the interaction.

Sequence diagrams are helps project members to Understanding and visualizing the flow of interactions between objects or components.

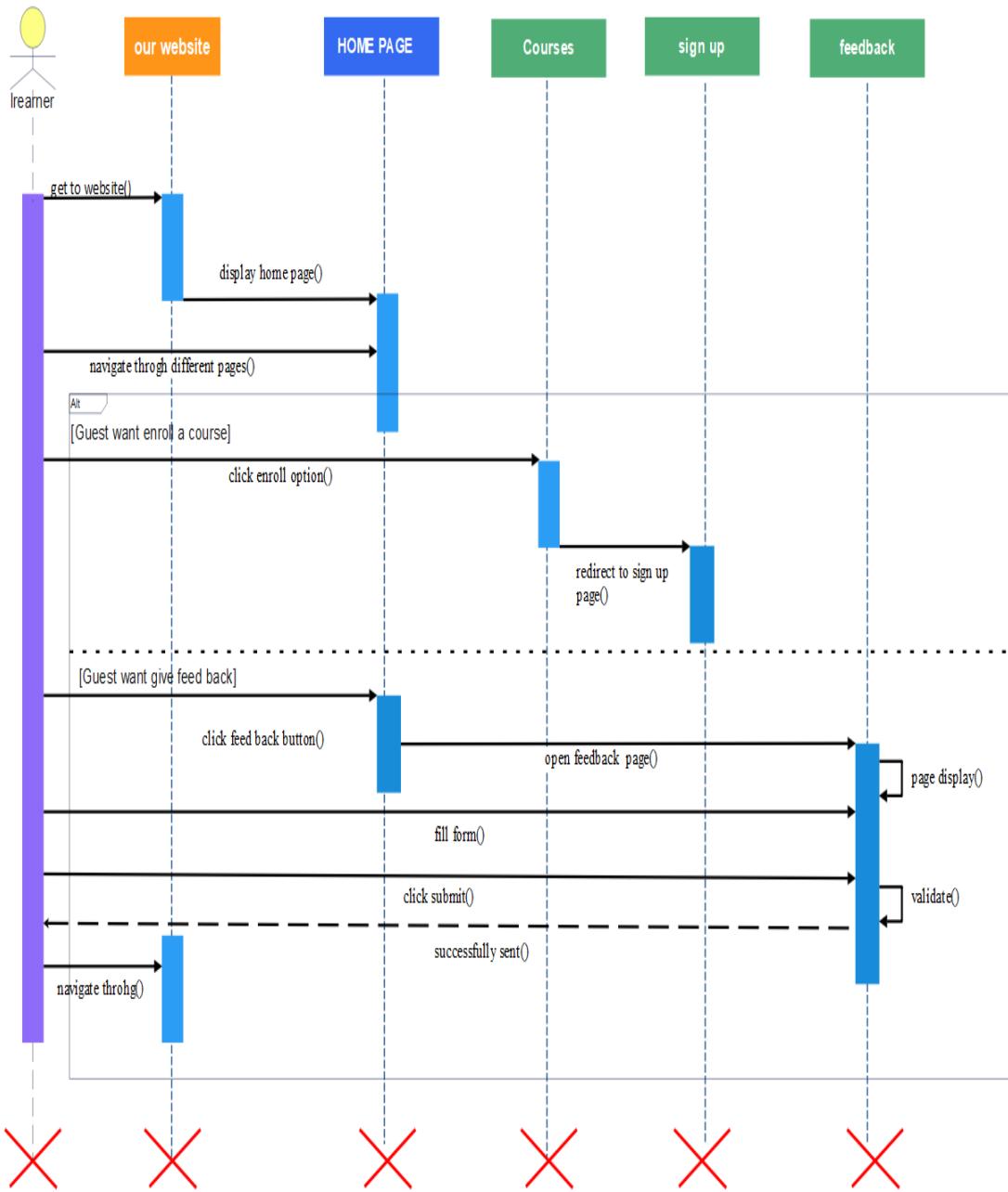


Figure 2: sequence diagram for visit

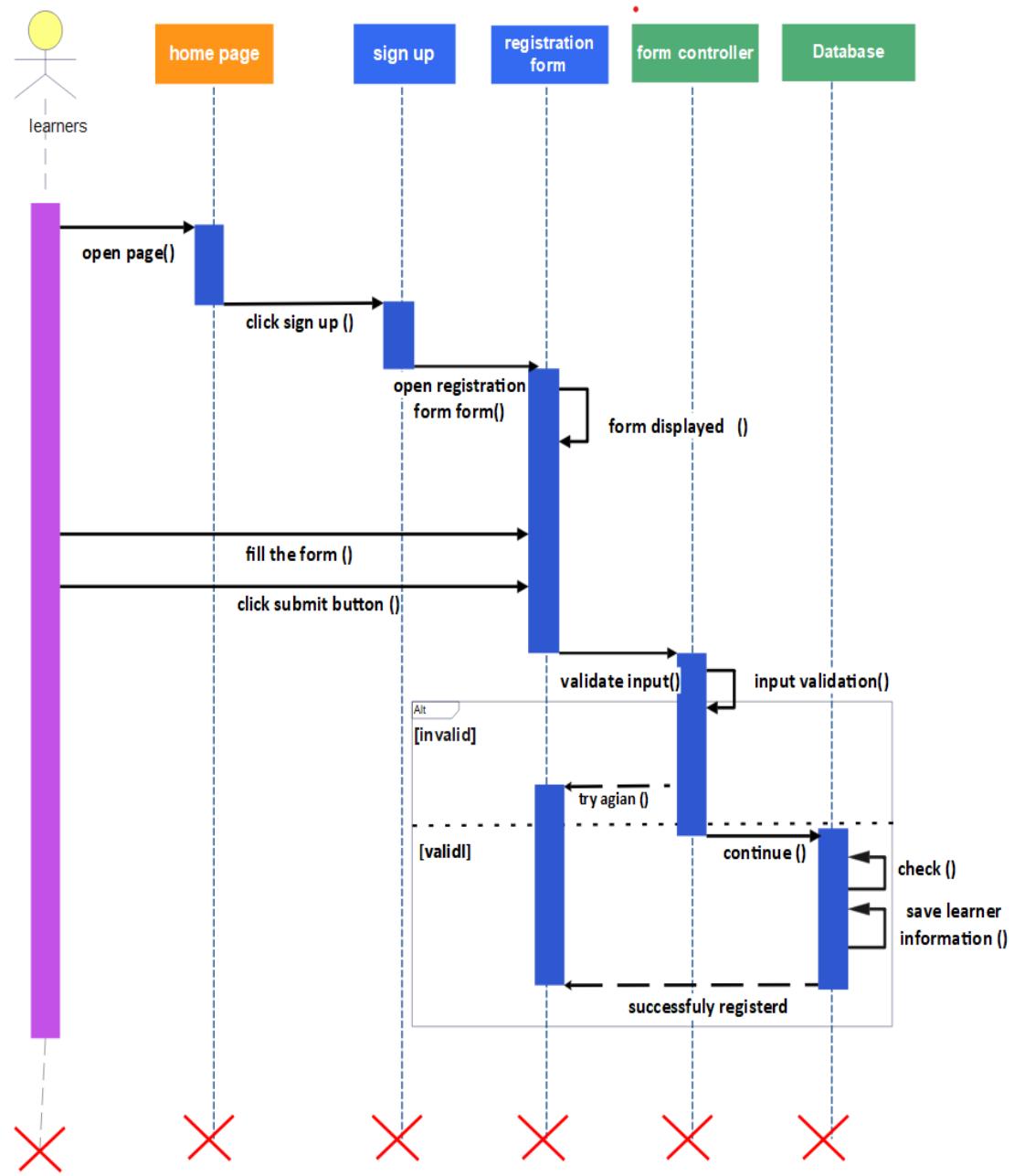


Figure 3: sequence diagram for Registration

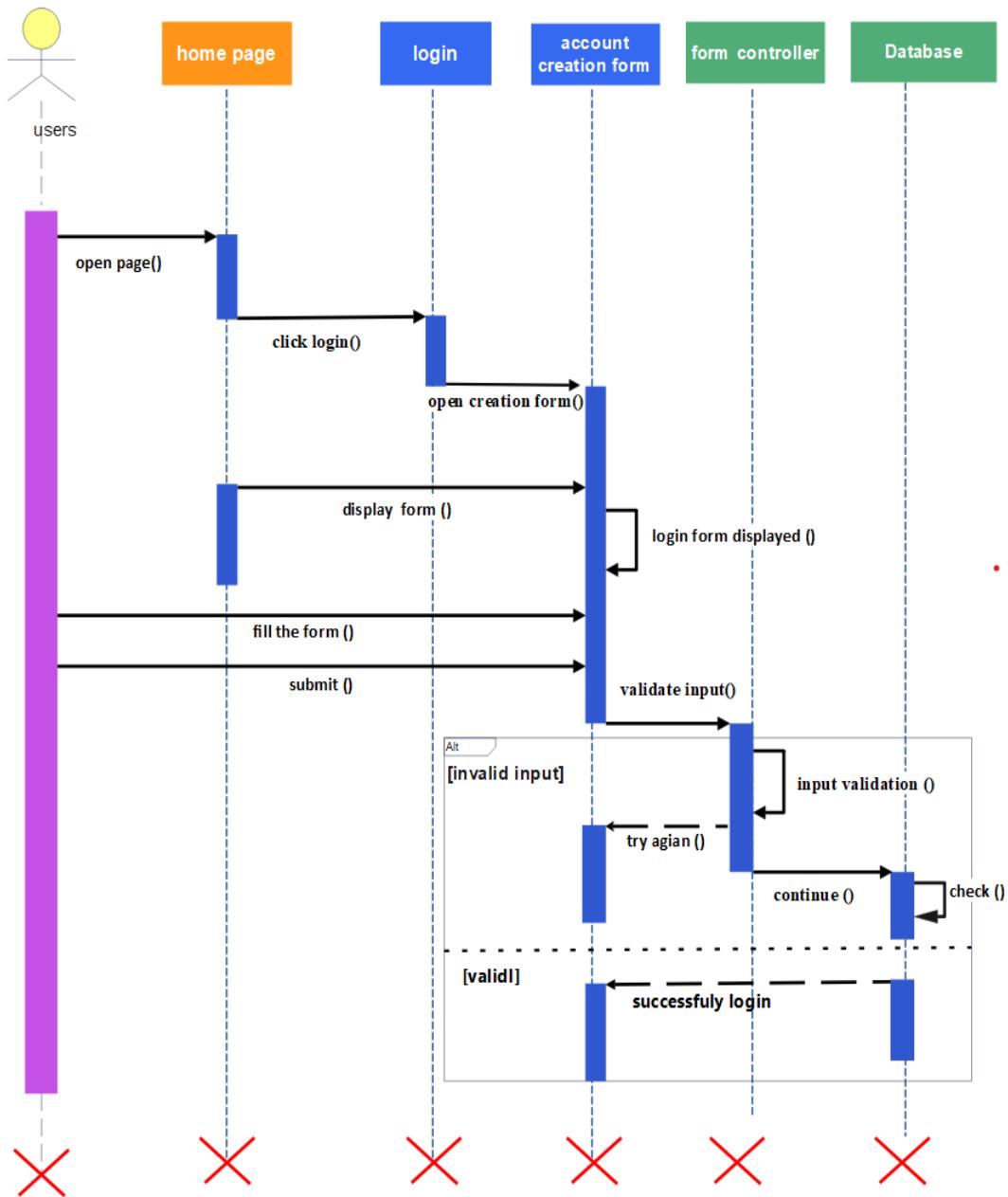


Figure 4: sequence diagram for login

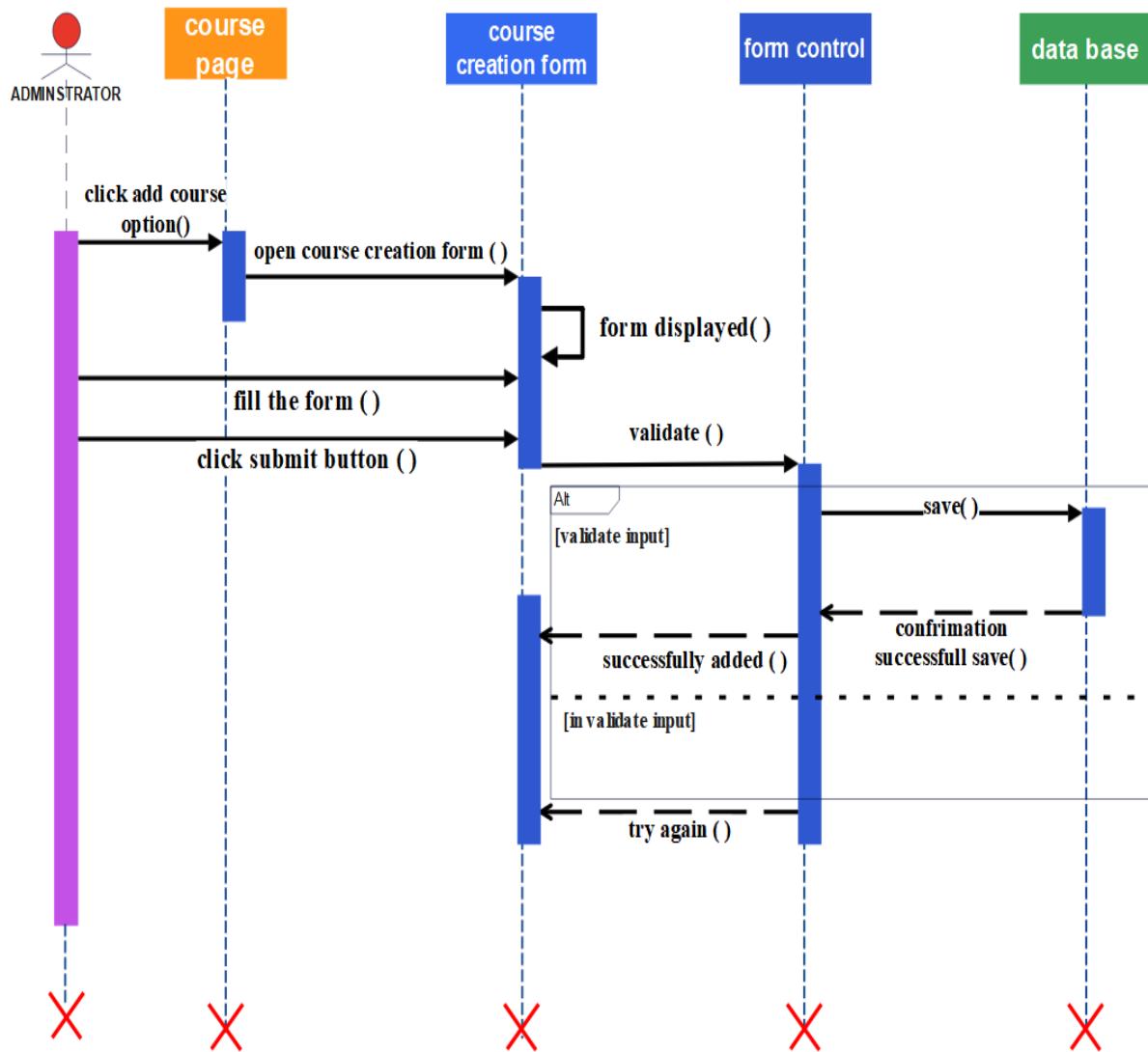


Figure 5: sequence diagram for add course

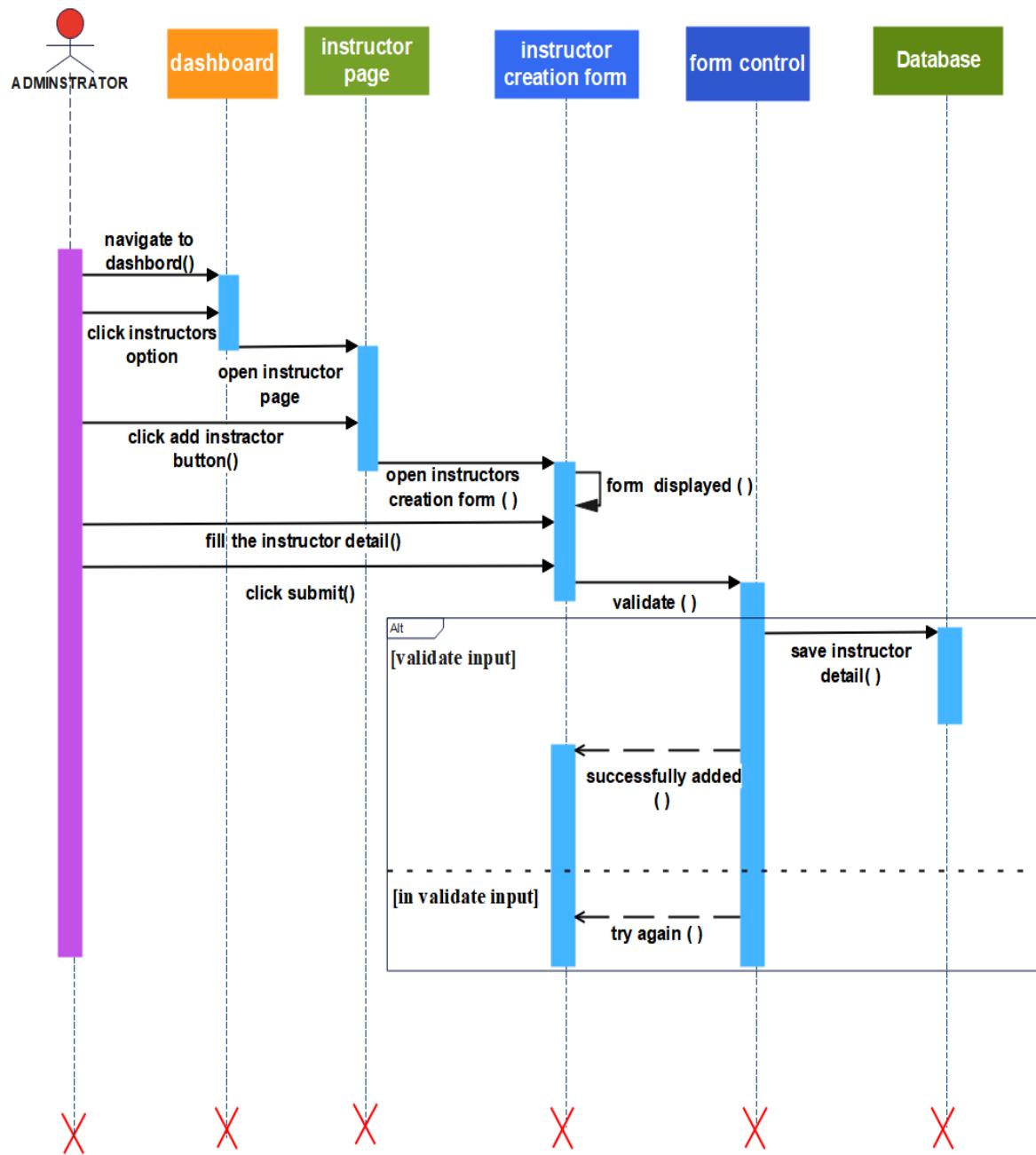


Figure 6: sequence diagram for add Educator

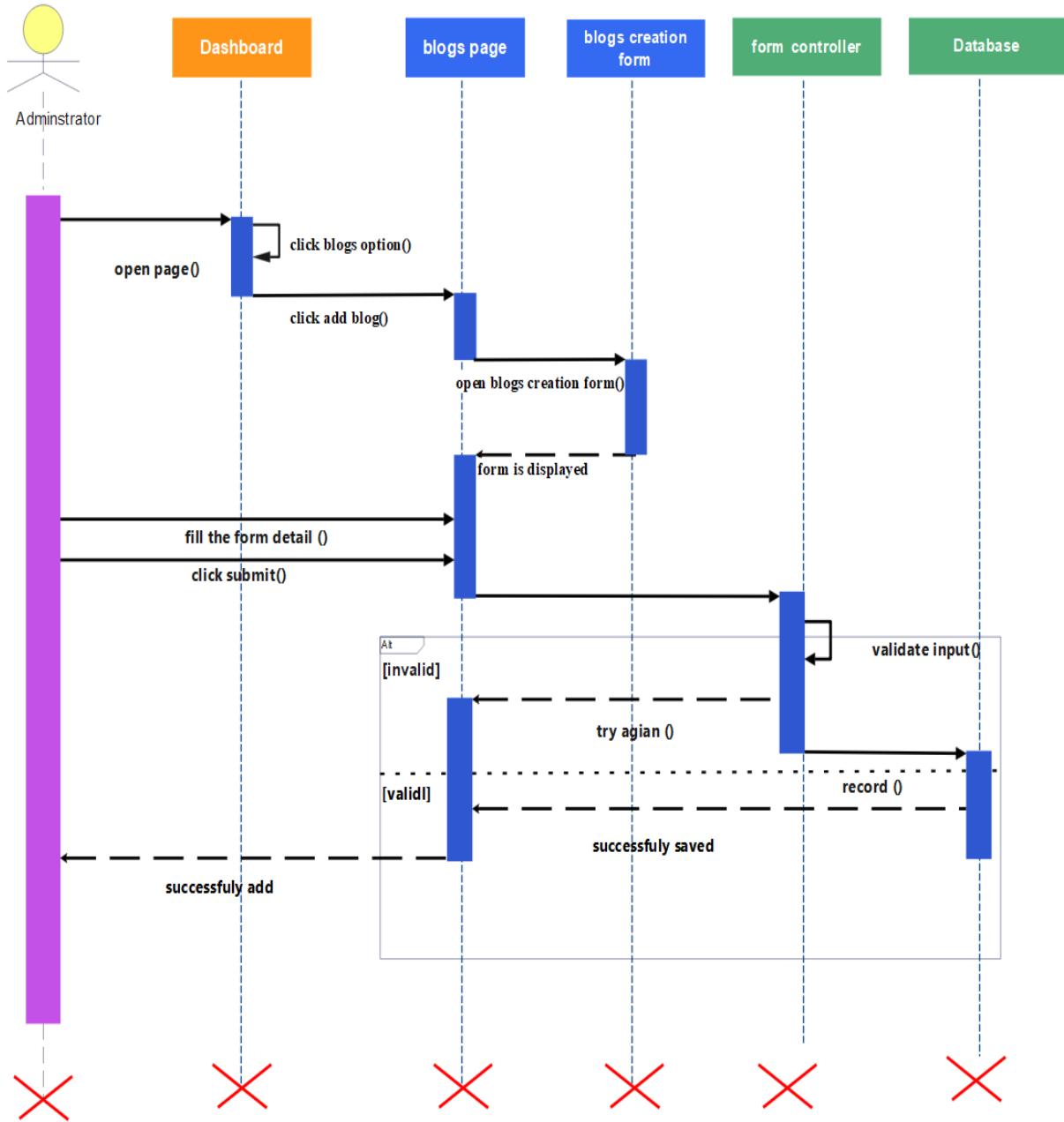


Figure 7: sequence diagram for add blogs

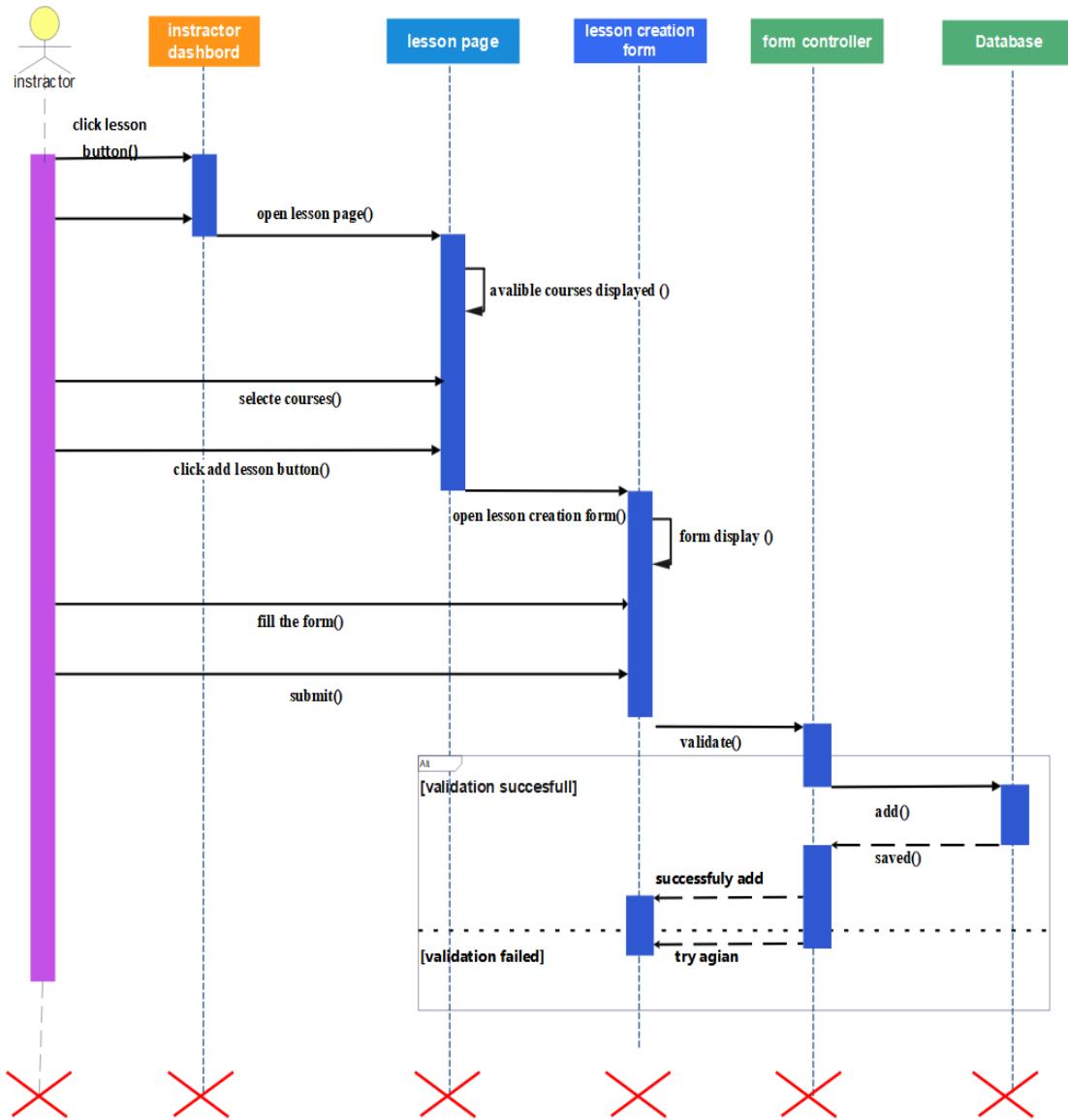


Figure 8: sequence diagram for add lesson

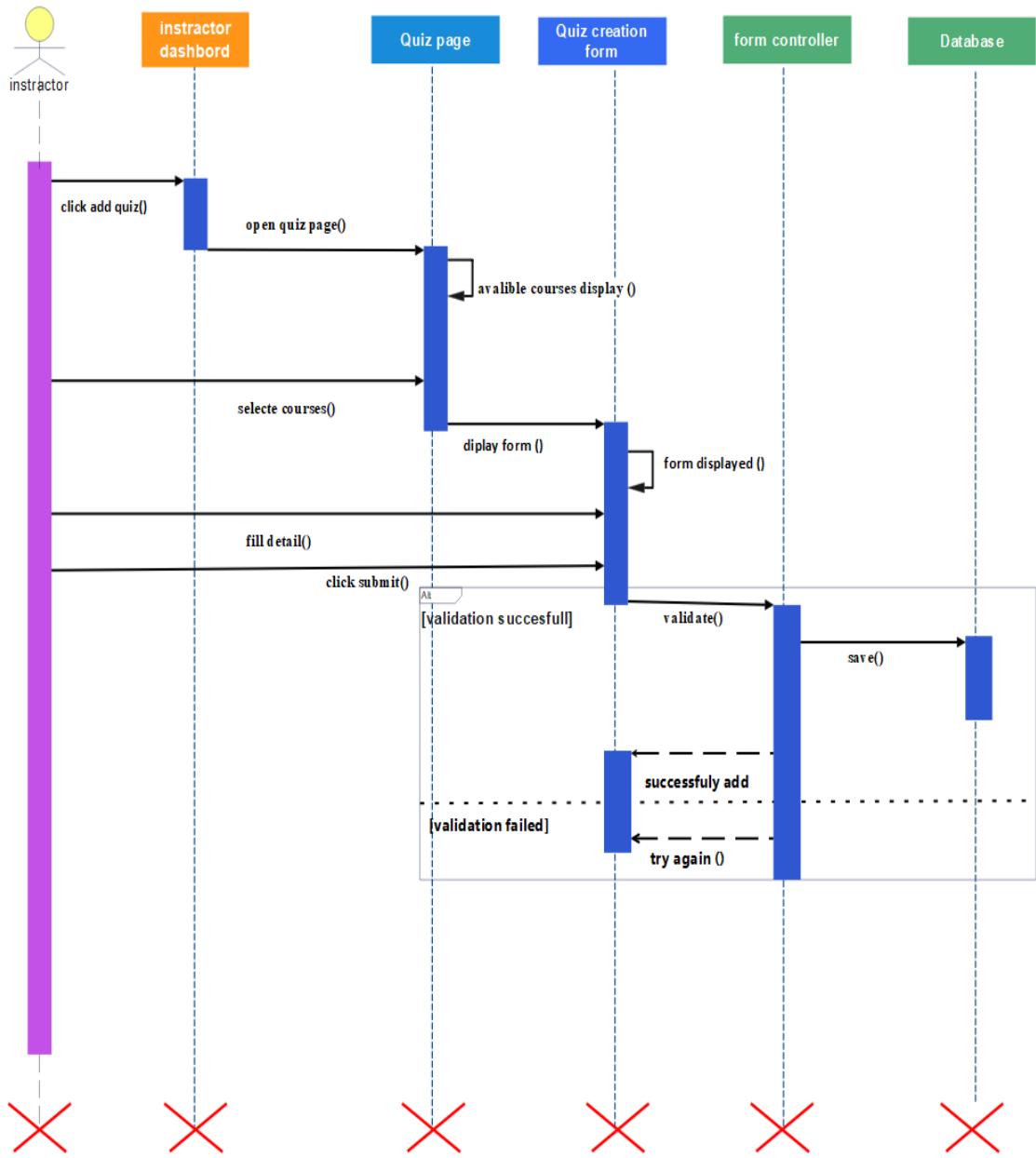


Figure 9: sequence diagram for add Quiz

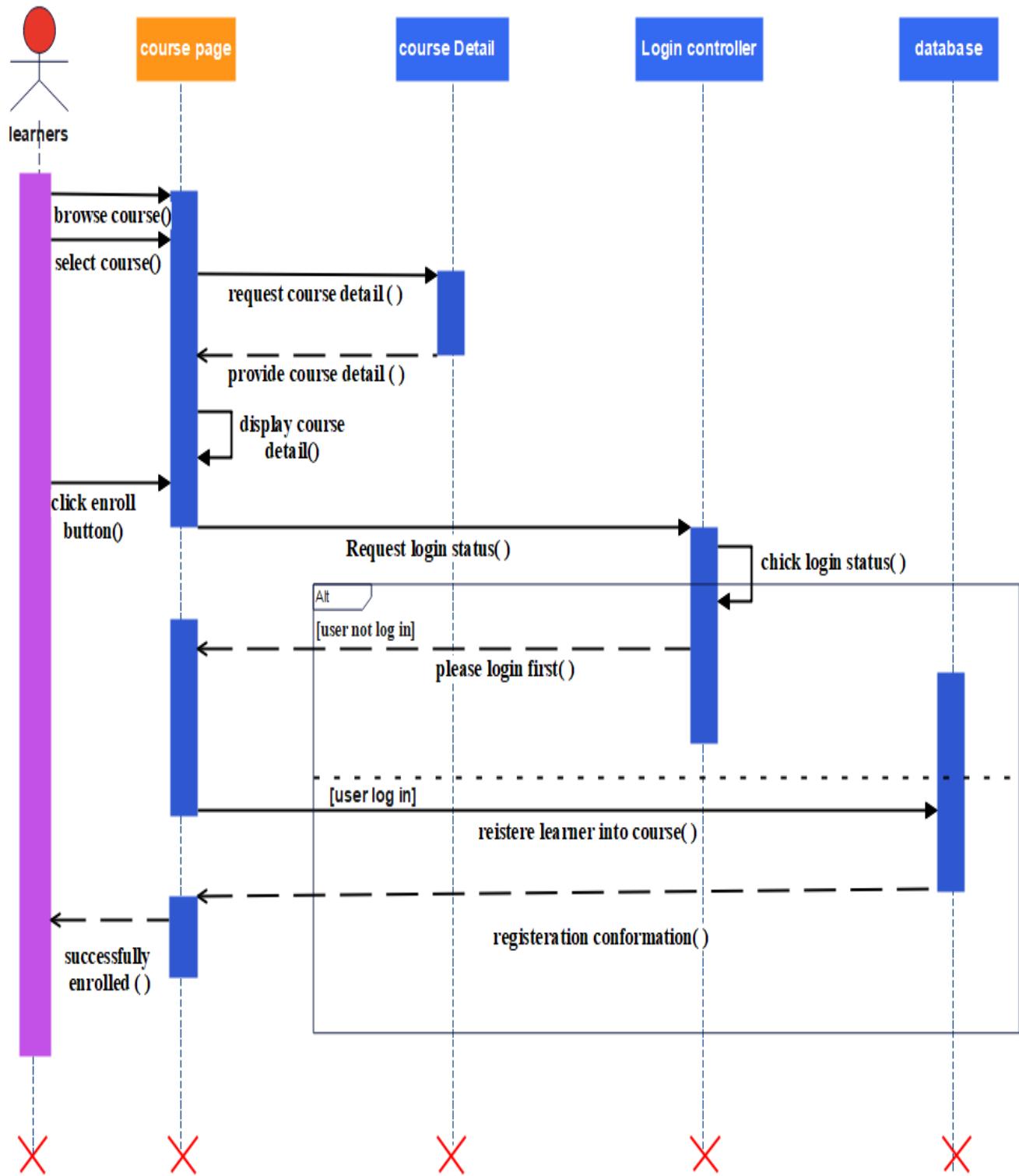


Figure 10: sequence diagram for enroll course

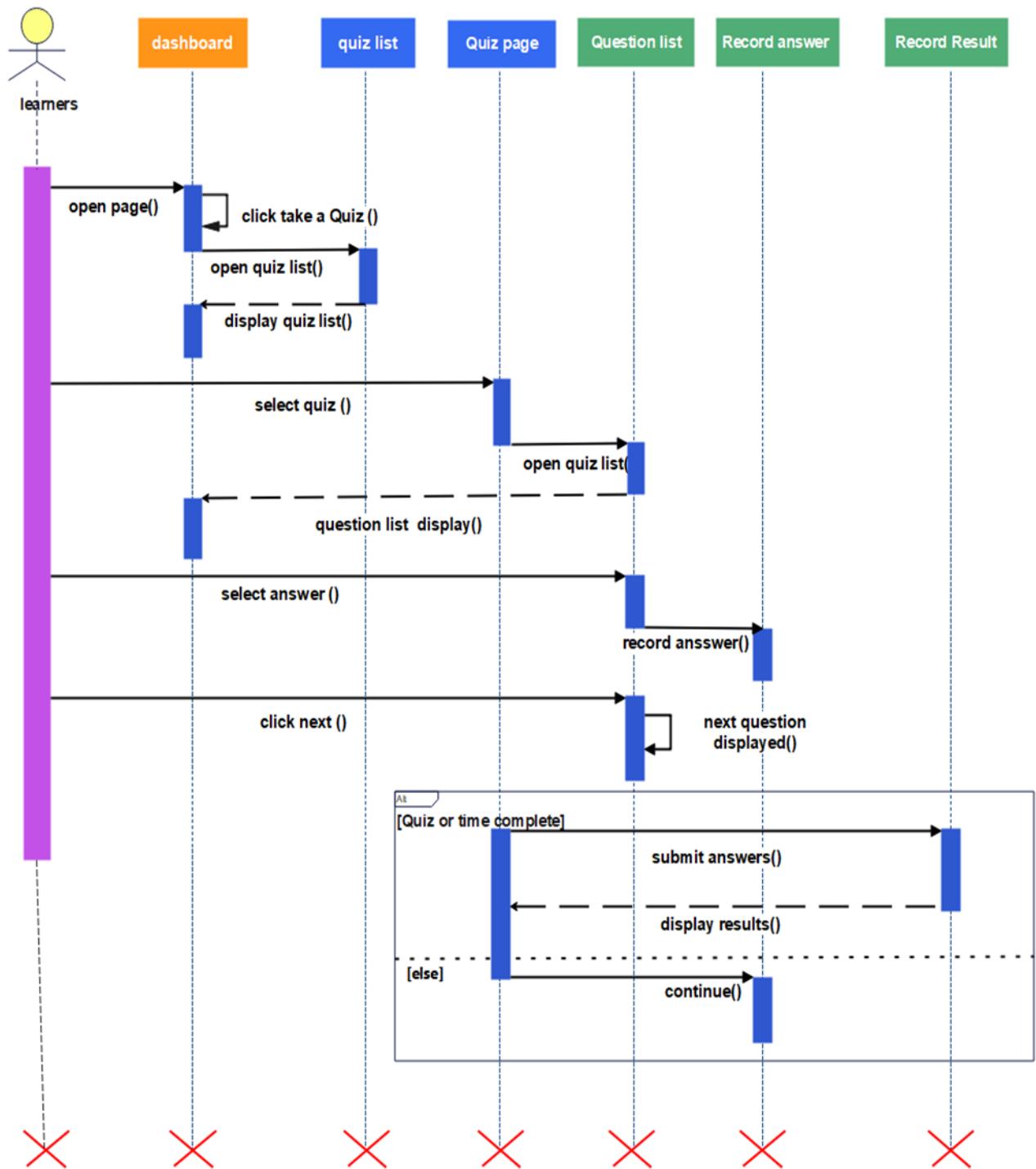


Figure 11: sequence diagram for Take a quiz

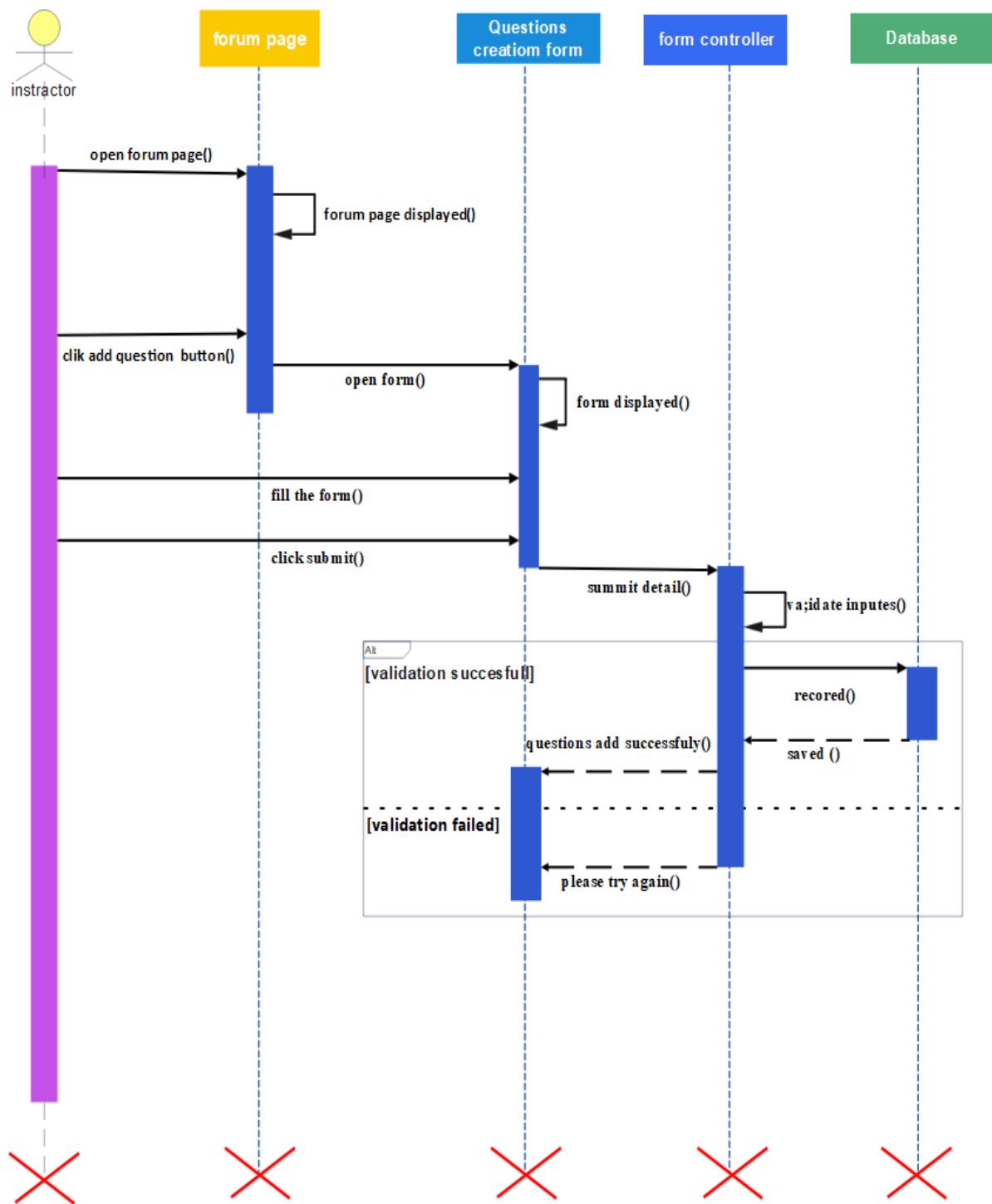


Figure 12: sequence diagram for add question in discussion forum

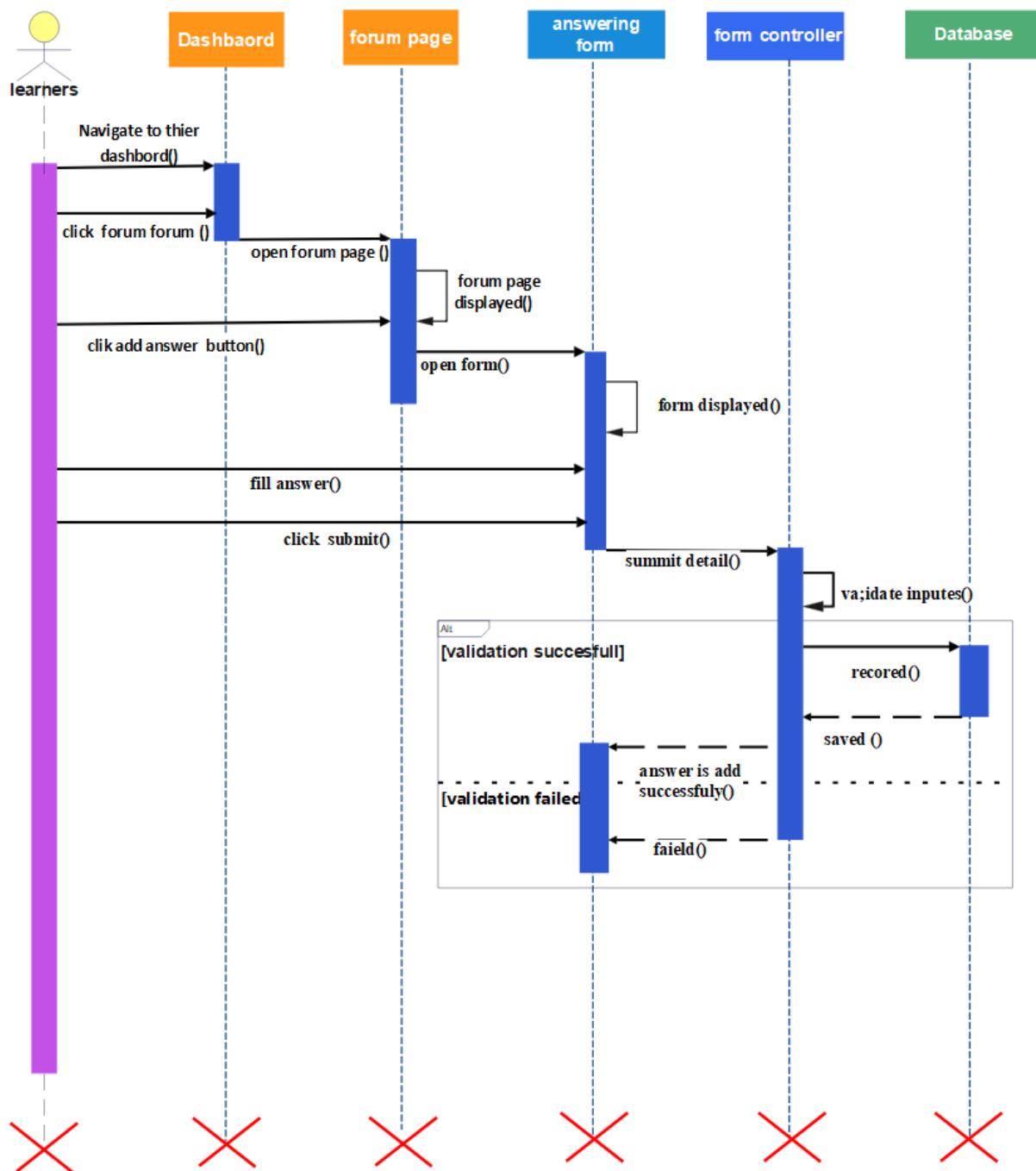


Figure 13: sequence diagram for give answer in discussion forum

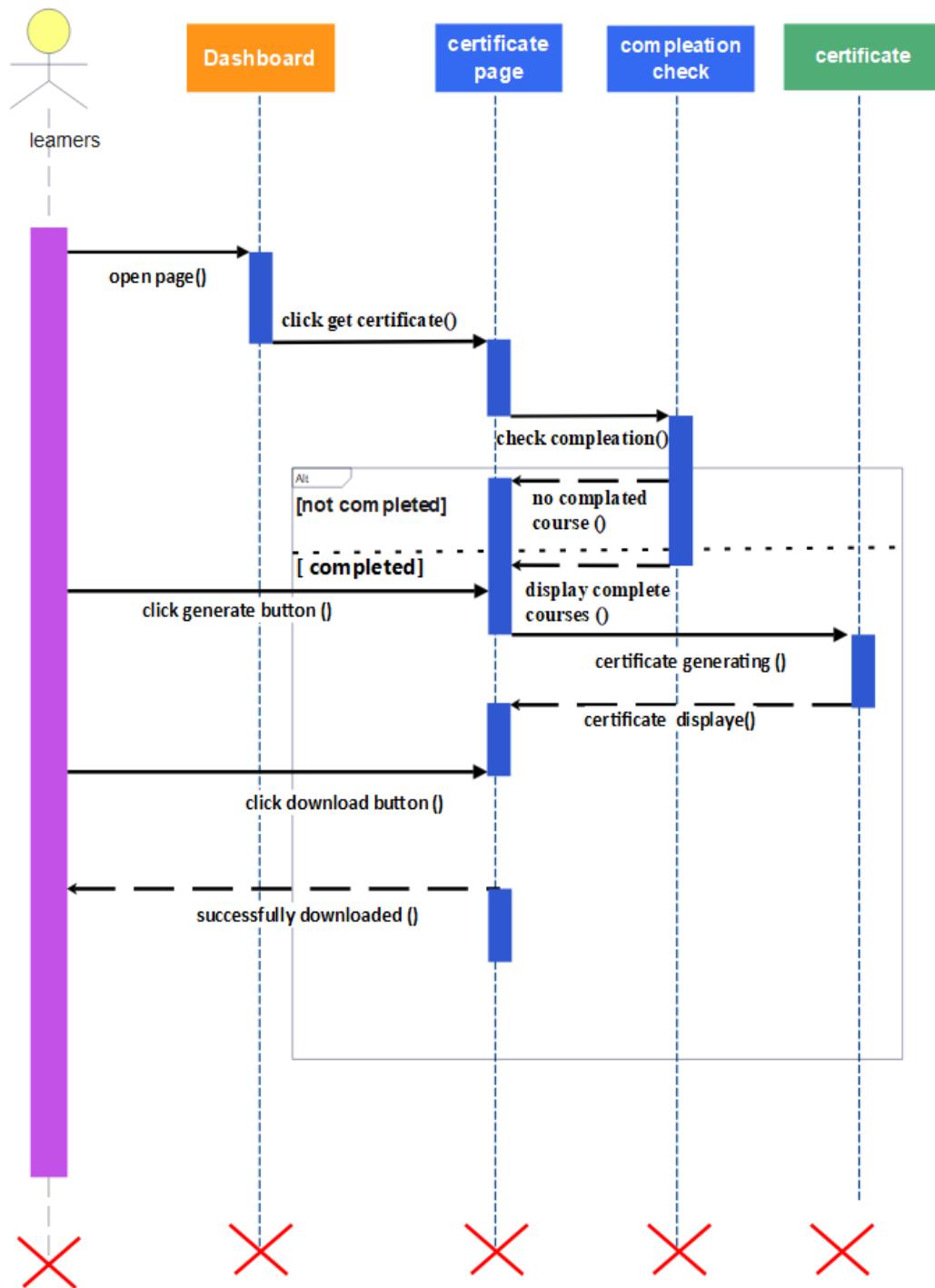


Figure 14: sequence diagram for Get certificate

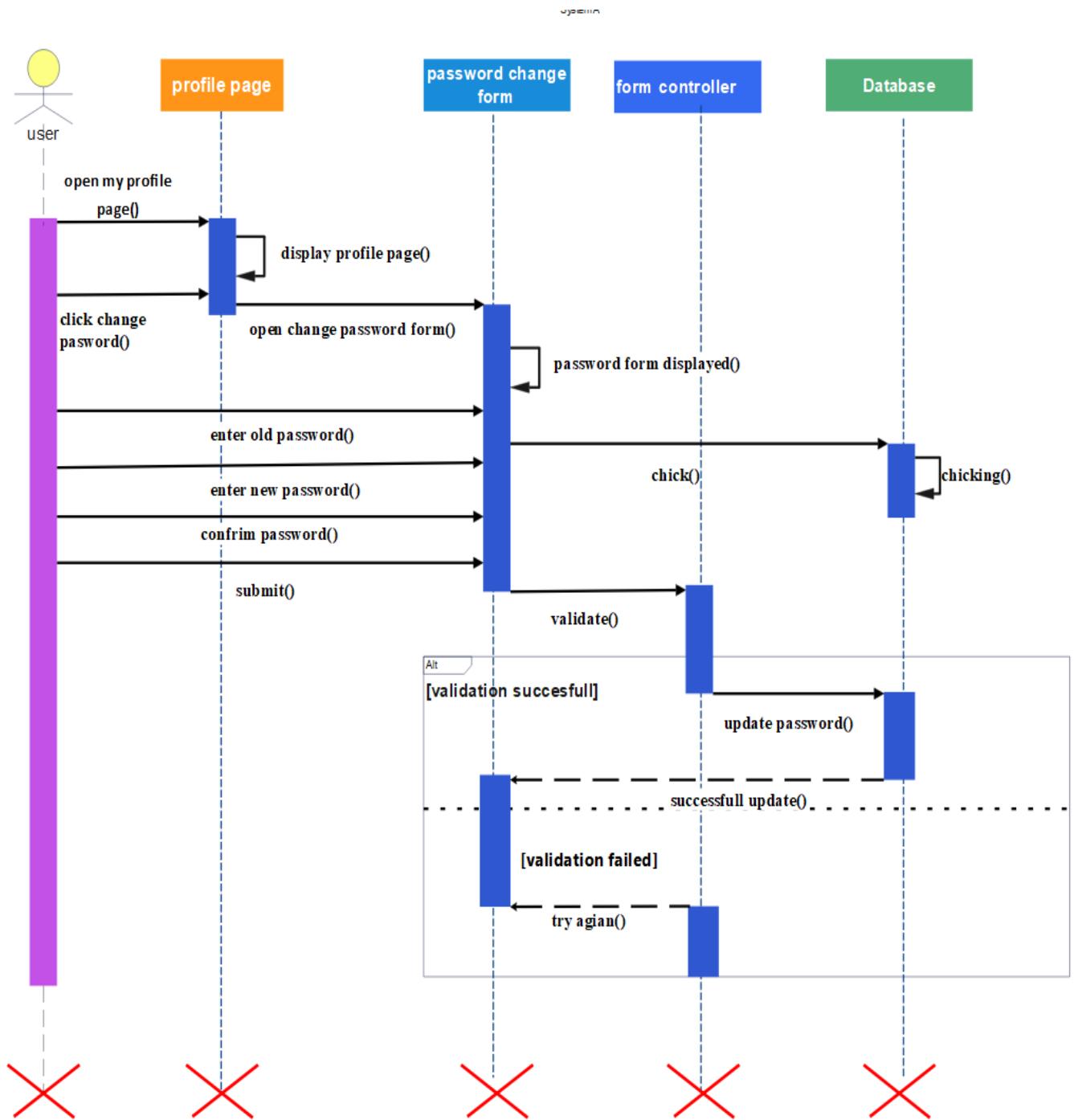


Figure 15: sequence diagram for Change password

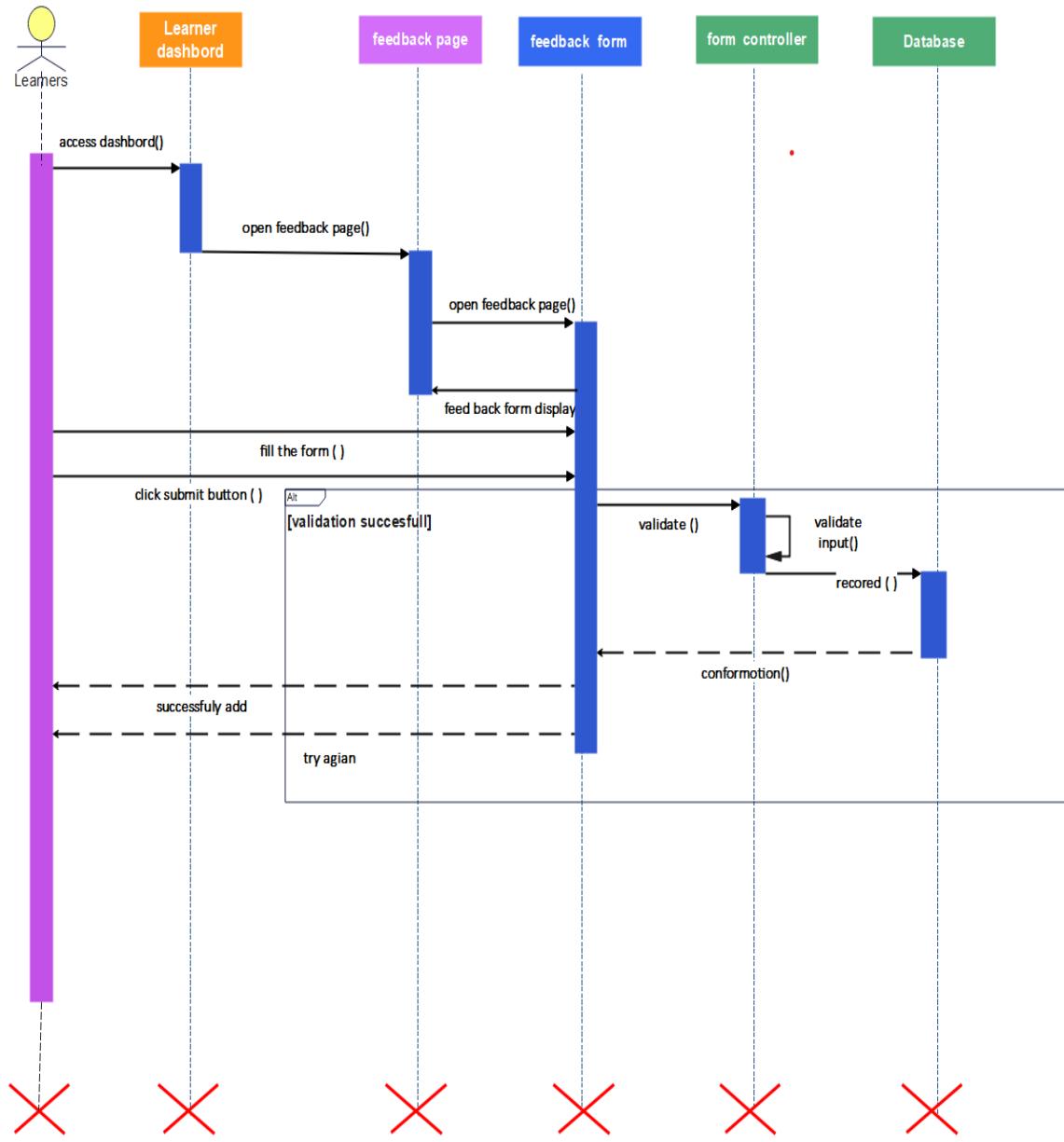


Figure 16: sequence diagram for give feedback

3.4.3 Activity diagram

The activity diagrams are a type of behavioral diagram in UML, which represents modelling the dynamic aspects of a system or process. They demonstrate the chain of activities, actions and decisions adopted within a workflow. Activity diagrams are helpful in the visualization of business processes, software algorithms and system dynamics [10].

An activity diagram consists of several components, such as:

Activities: These are the specific actions or tasks within the system or process that are being modeled. Activities are represented by rounded rectangles in the diagram.

Transitions: These are arrows that connect activities, indicating the order in which they are executed. Transitions show the flow of control from one activity to another activity.

Decisions: Diamond-shaped symbols represent decision points where the flow of control can take multiple paths based on conditions or choices. Each path from a decision point is labeled with a condition.

Initial and Final Nodes: An initial node is represented by a small filled circle and indicates the starting point of the diagram. A final node is represented by a larger circle with a border and marks the end of the activity.

The activity diagrams significance for our project includes validation and verification of the logic and functionality before implementation detection, as well as correction addressing errors.

They allow the designing and construction of a system or process through decomposition into manageable modules, as well as displaying dependencies between them.

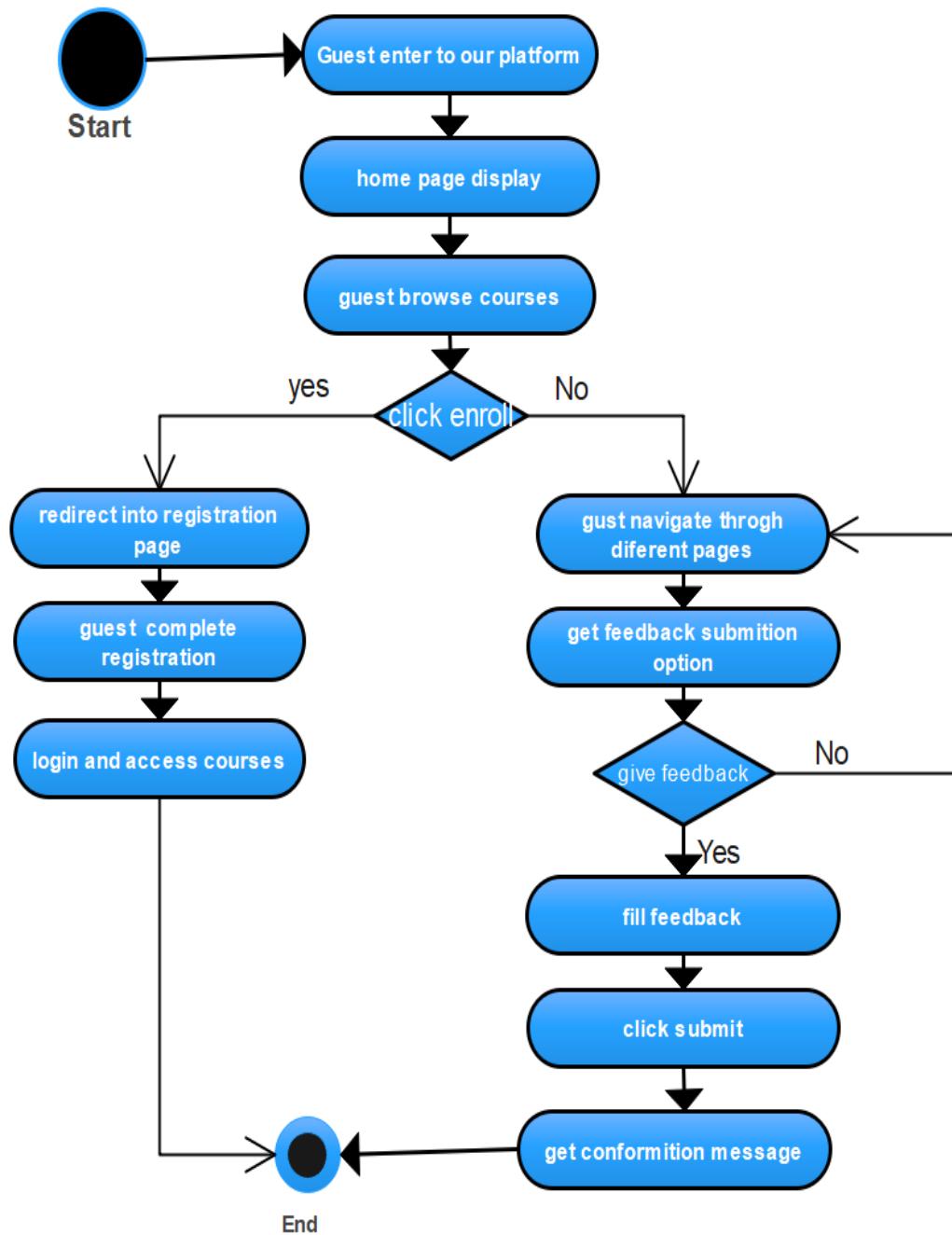


Figure 17: activity diagram for visit

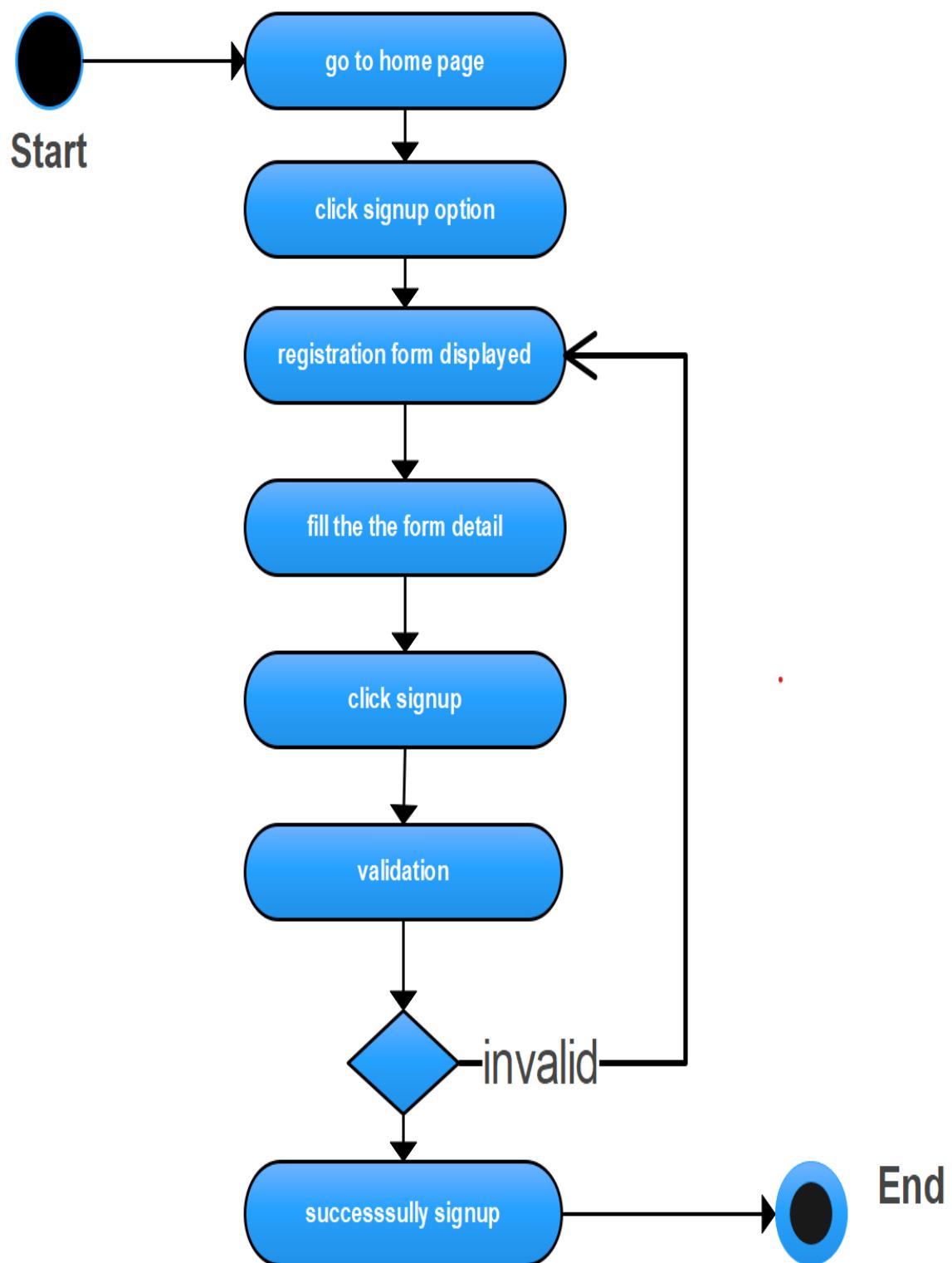


Figure 18: activity diagram for Registration

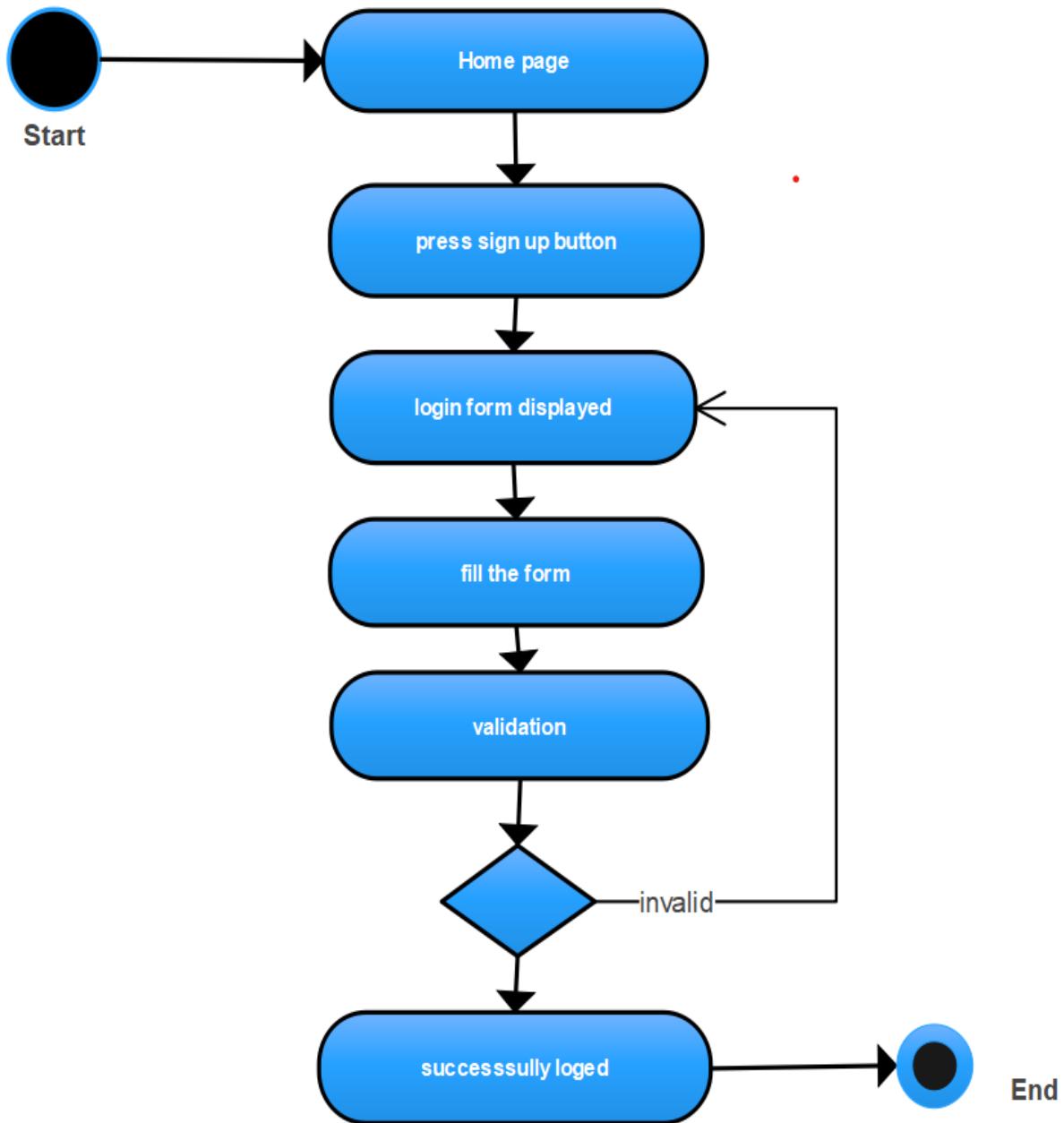


Figure 20: activity diagram for login

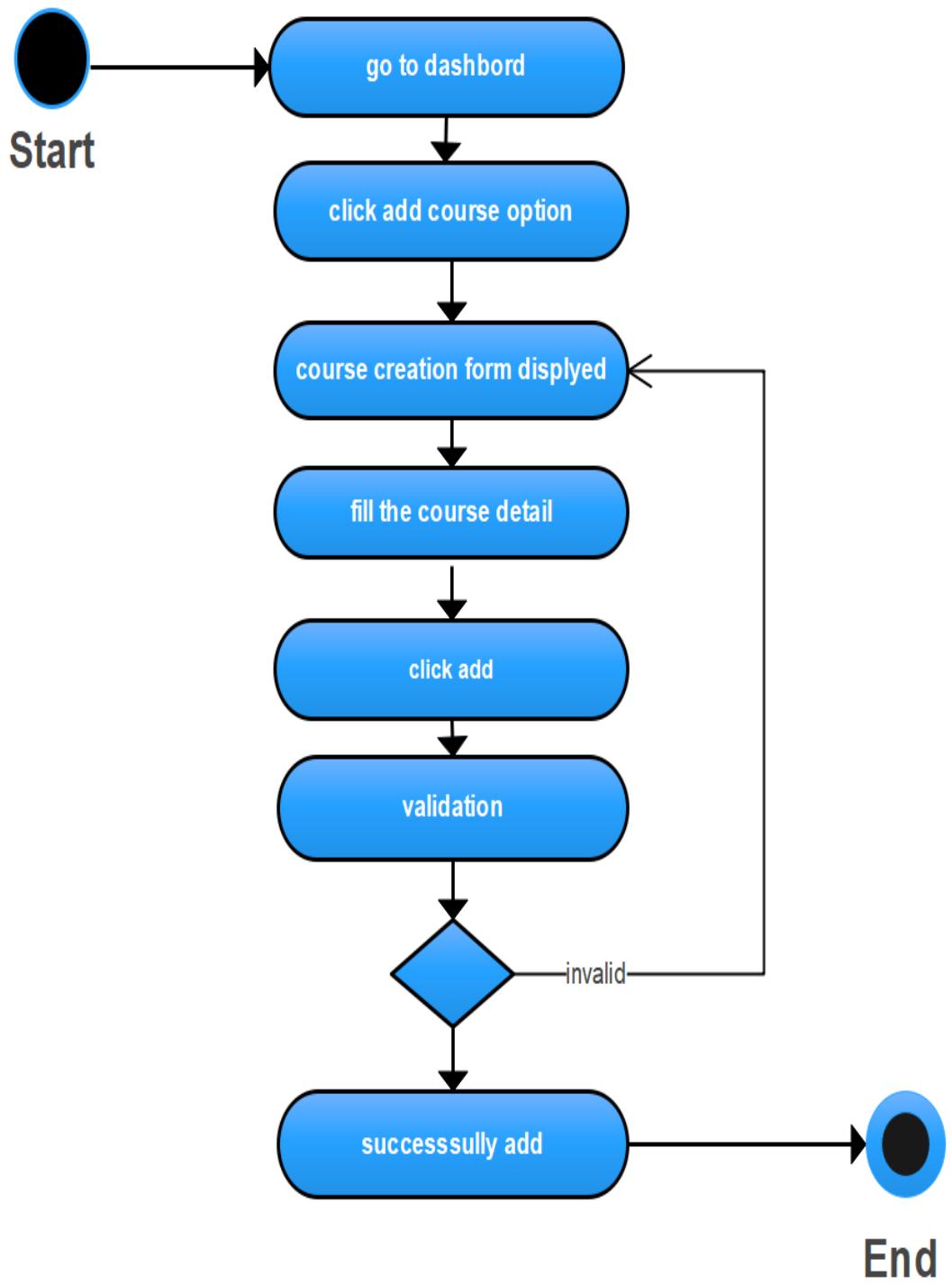


Figure 21: activity diagram for add course

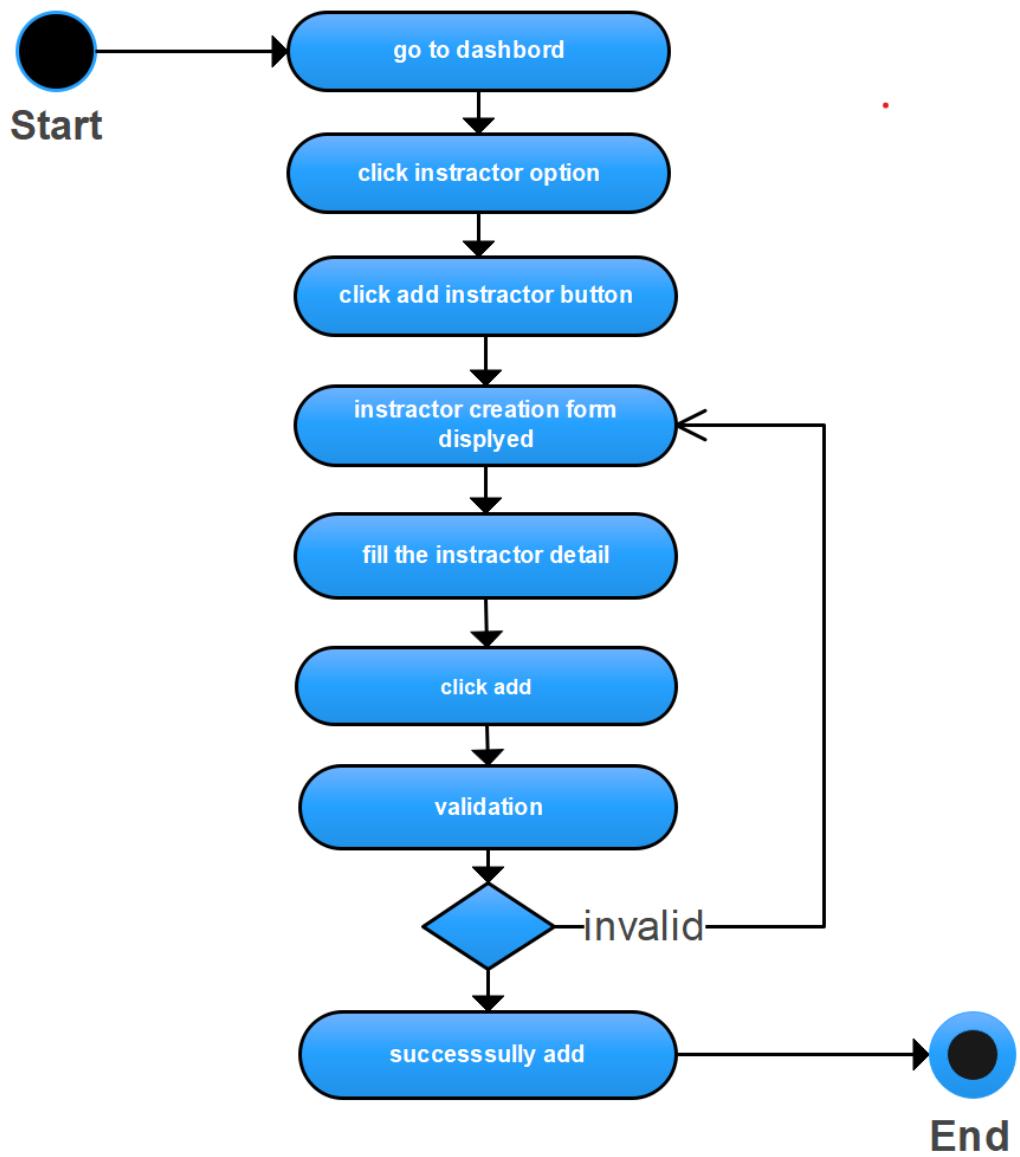


Figure 22: activity diagram for add instructor

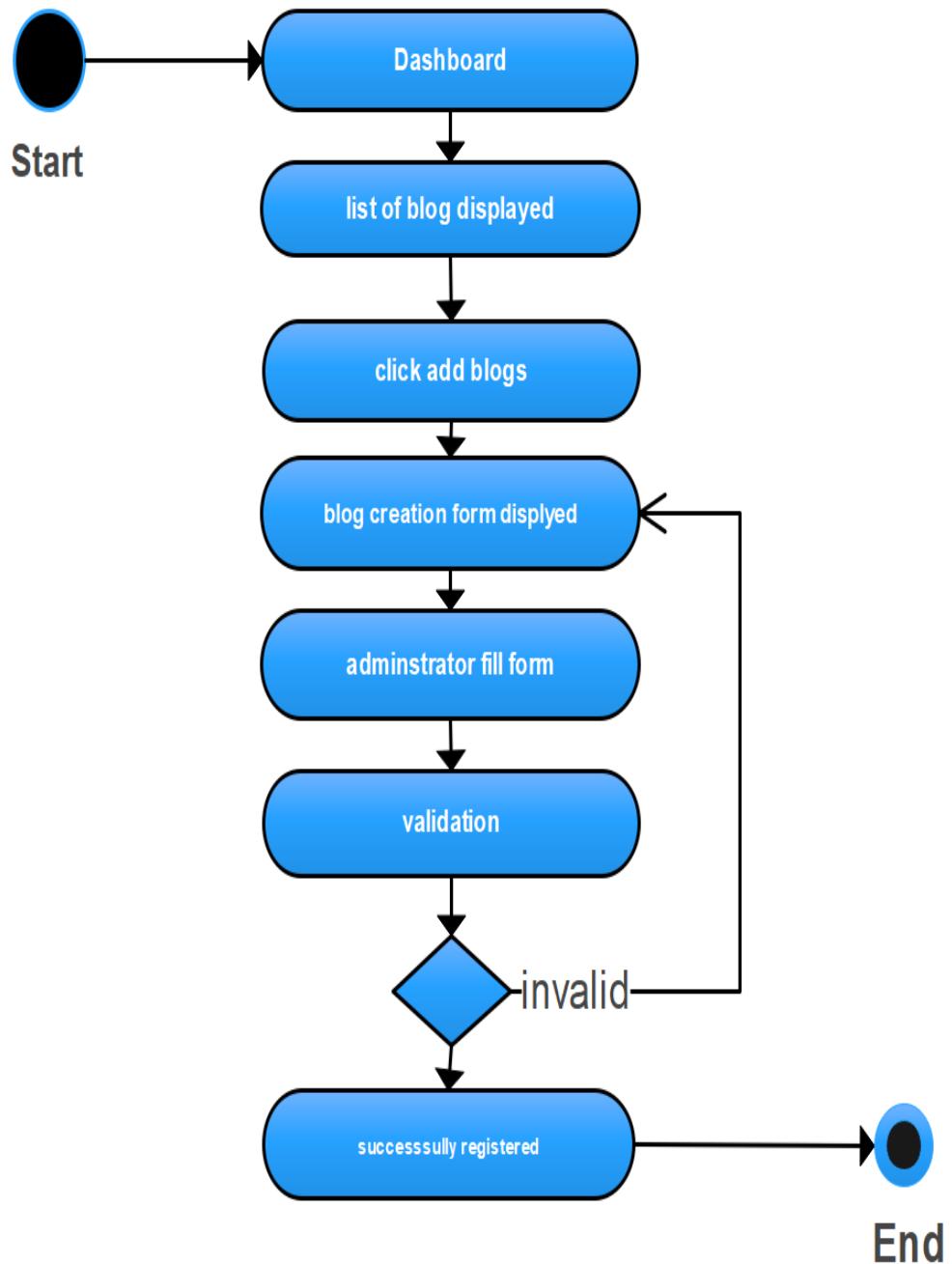


Figure 23: activity diagram for add blogs

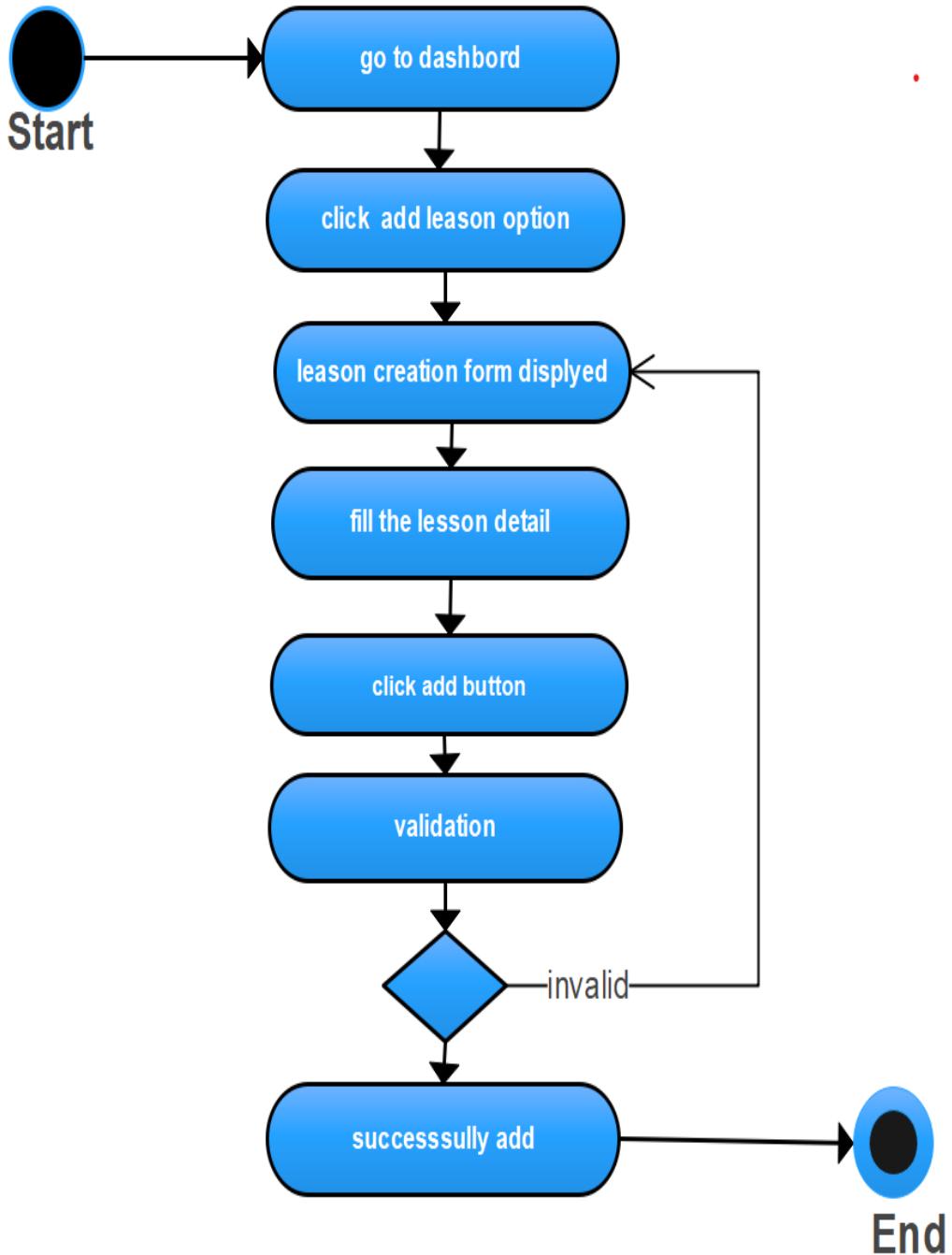


Figure 24: activity diagram for add lesson

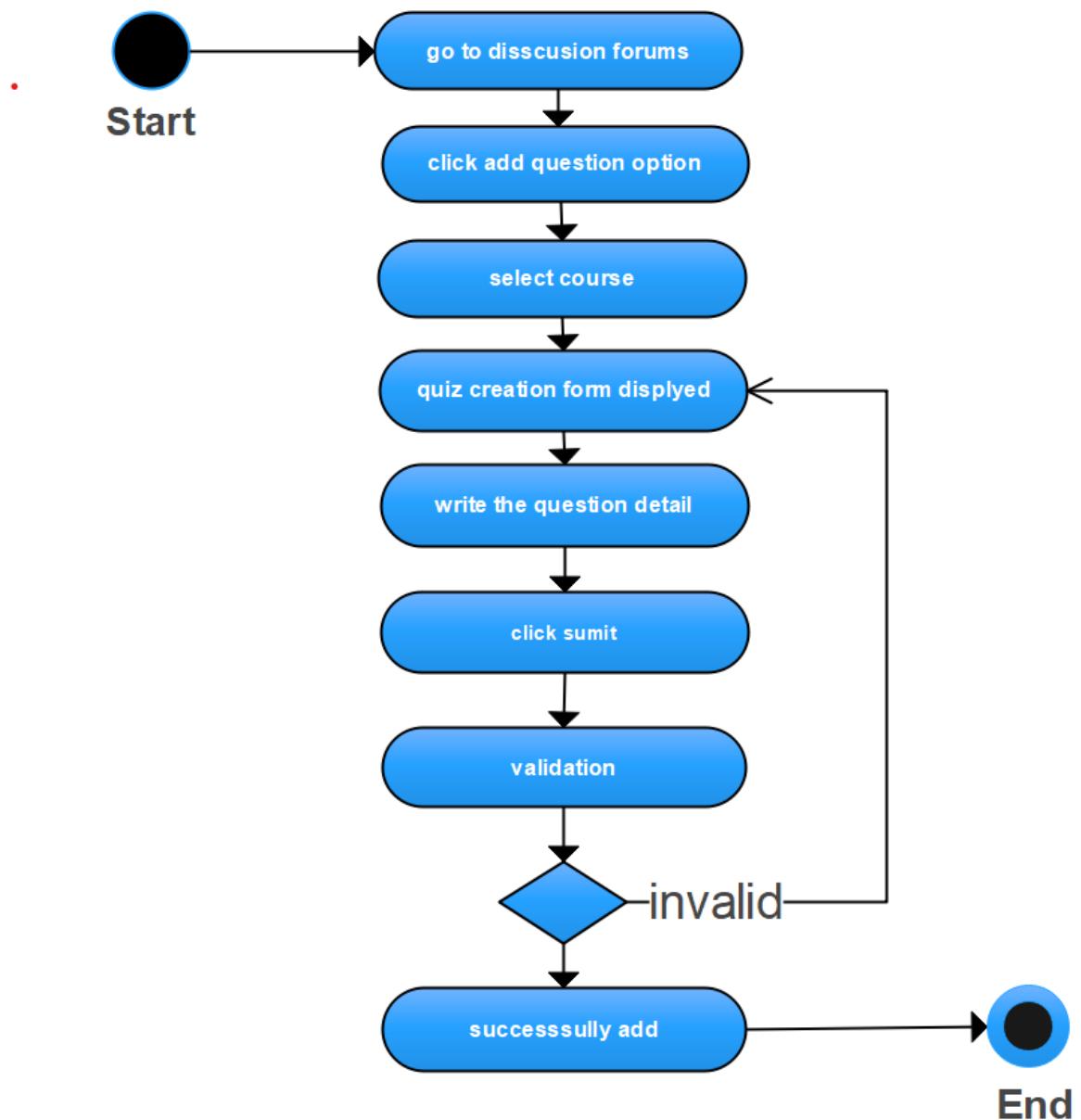


Figure 25: activity diagram for add a quiz

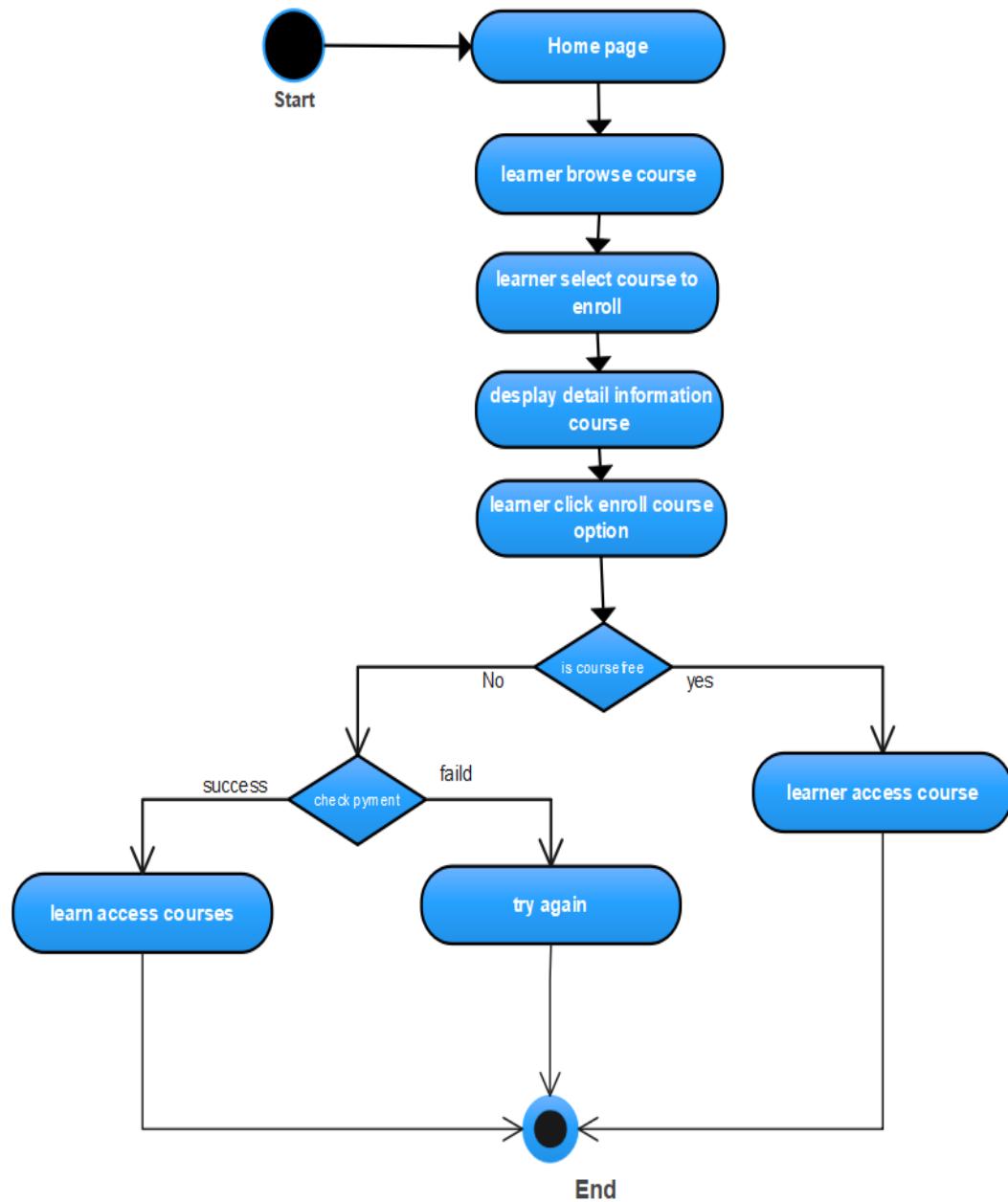


Figure 26: activity diagram for enroll course

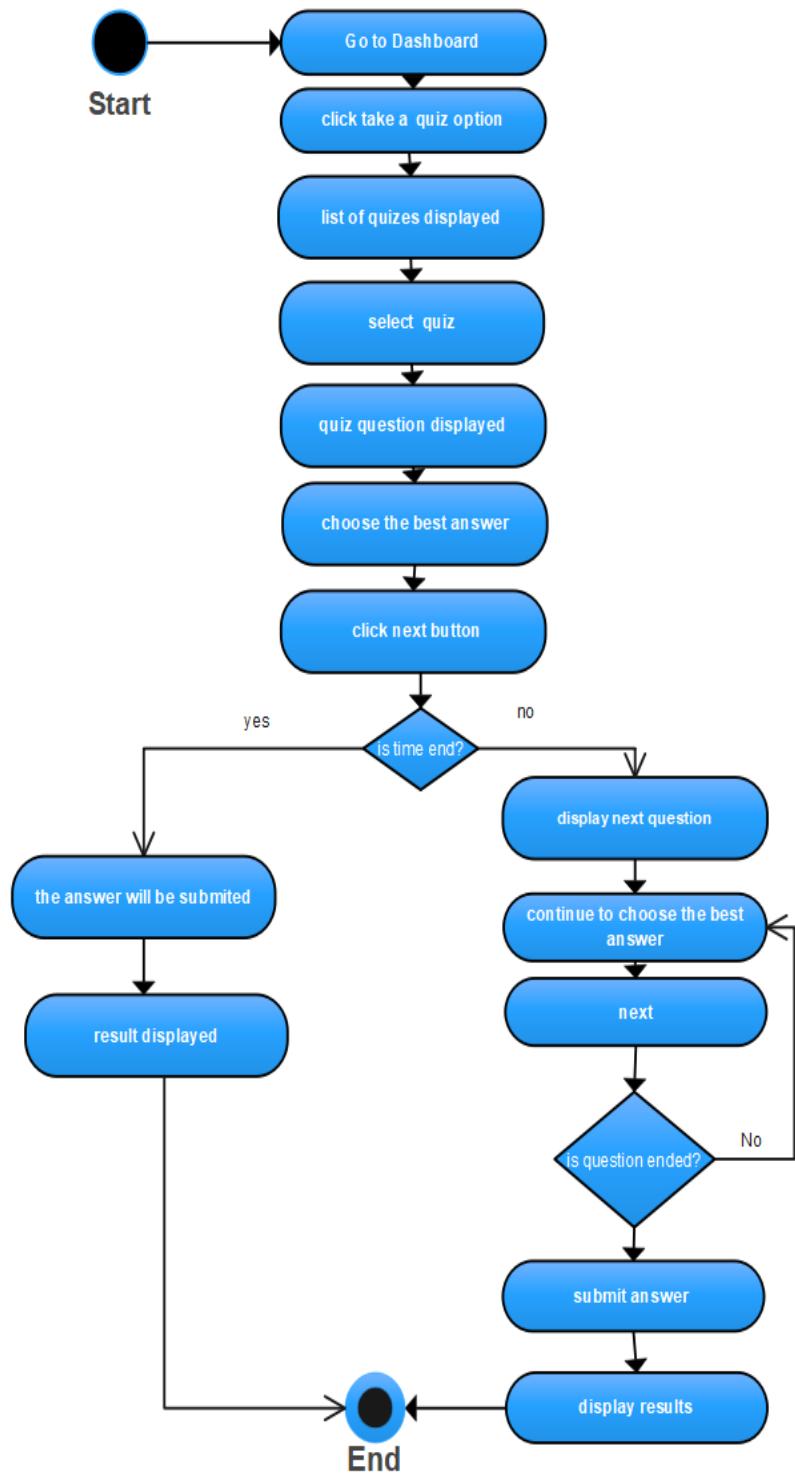


Figure 27: activity diagram for Take a quiz

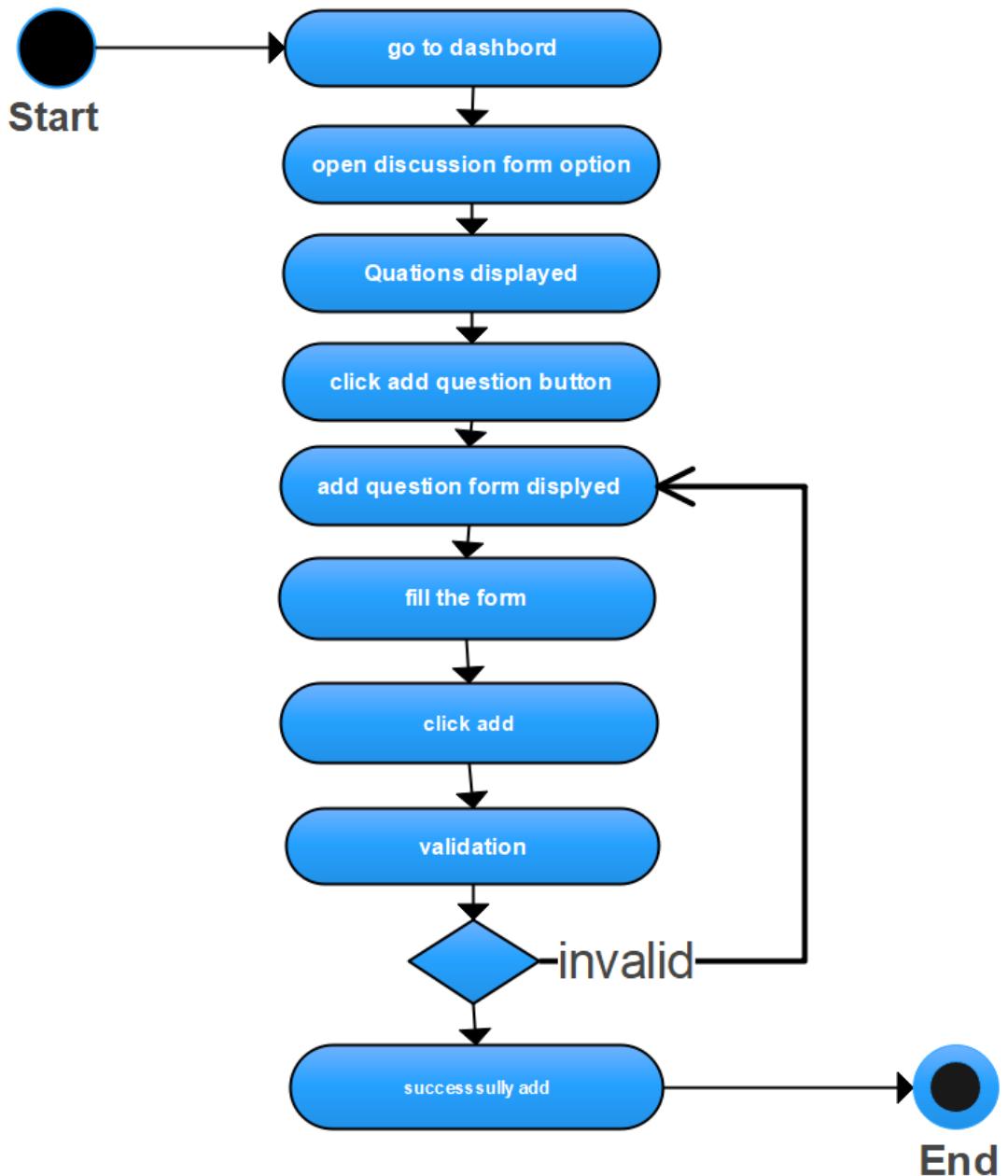


Figure 28: activity diagram for add question in discussion forum.

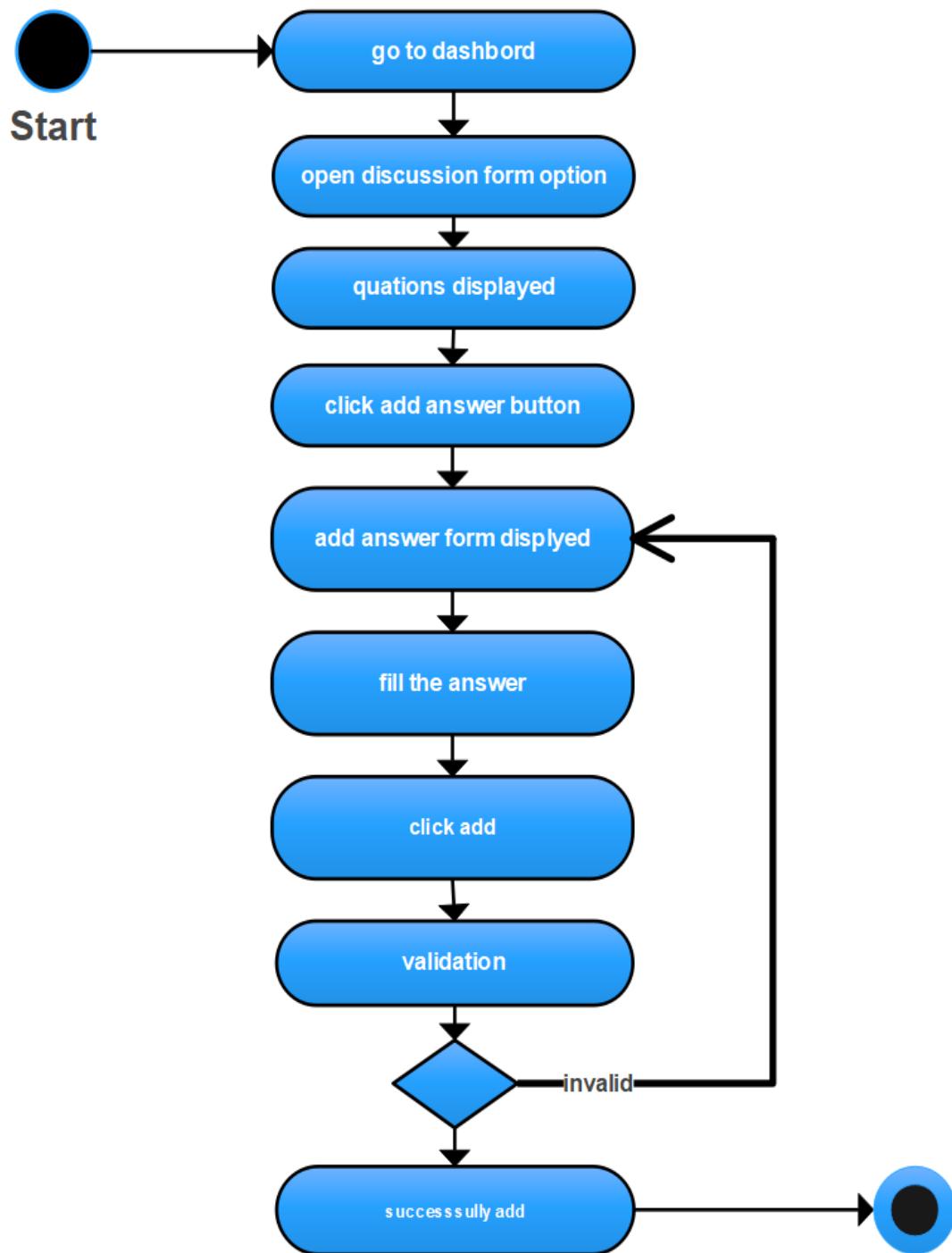


Figure 29: activity diagram for give answer in discussion forum

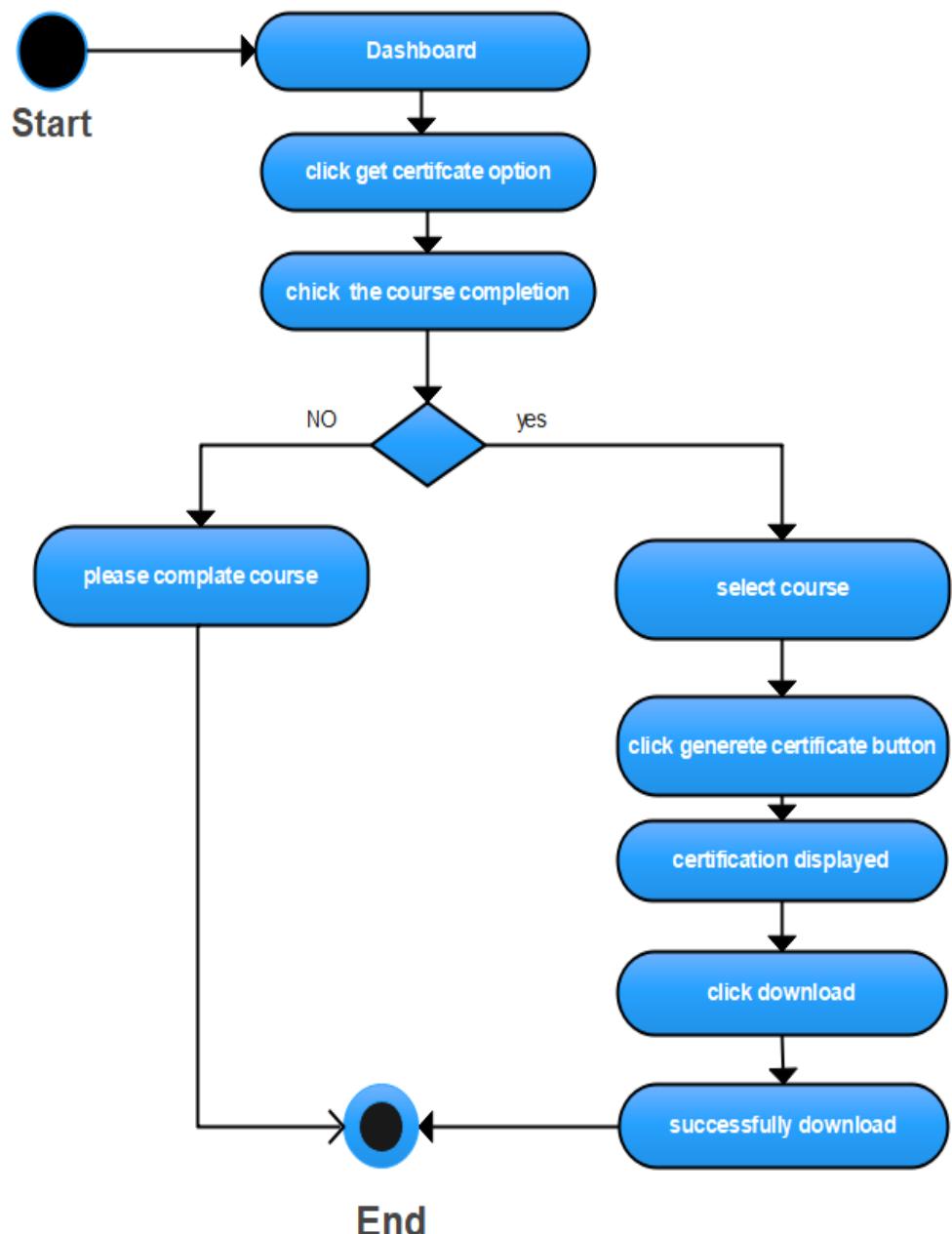


Figure 30: activity diagram for Get certificate

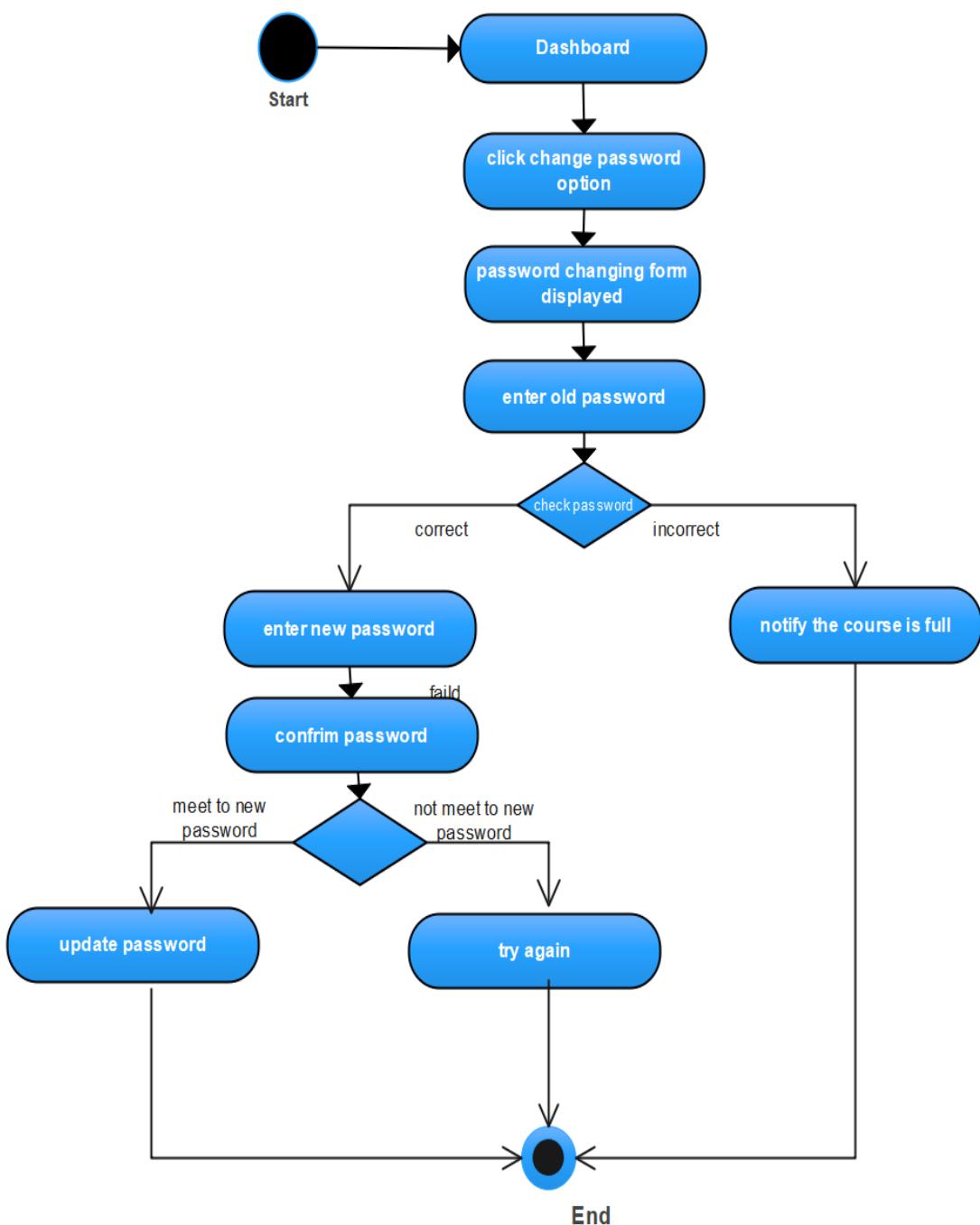


Figure 31: activity diagram for Change password

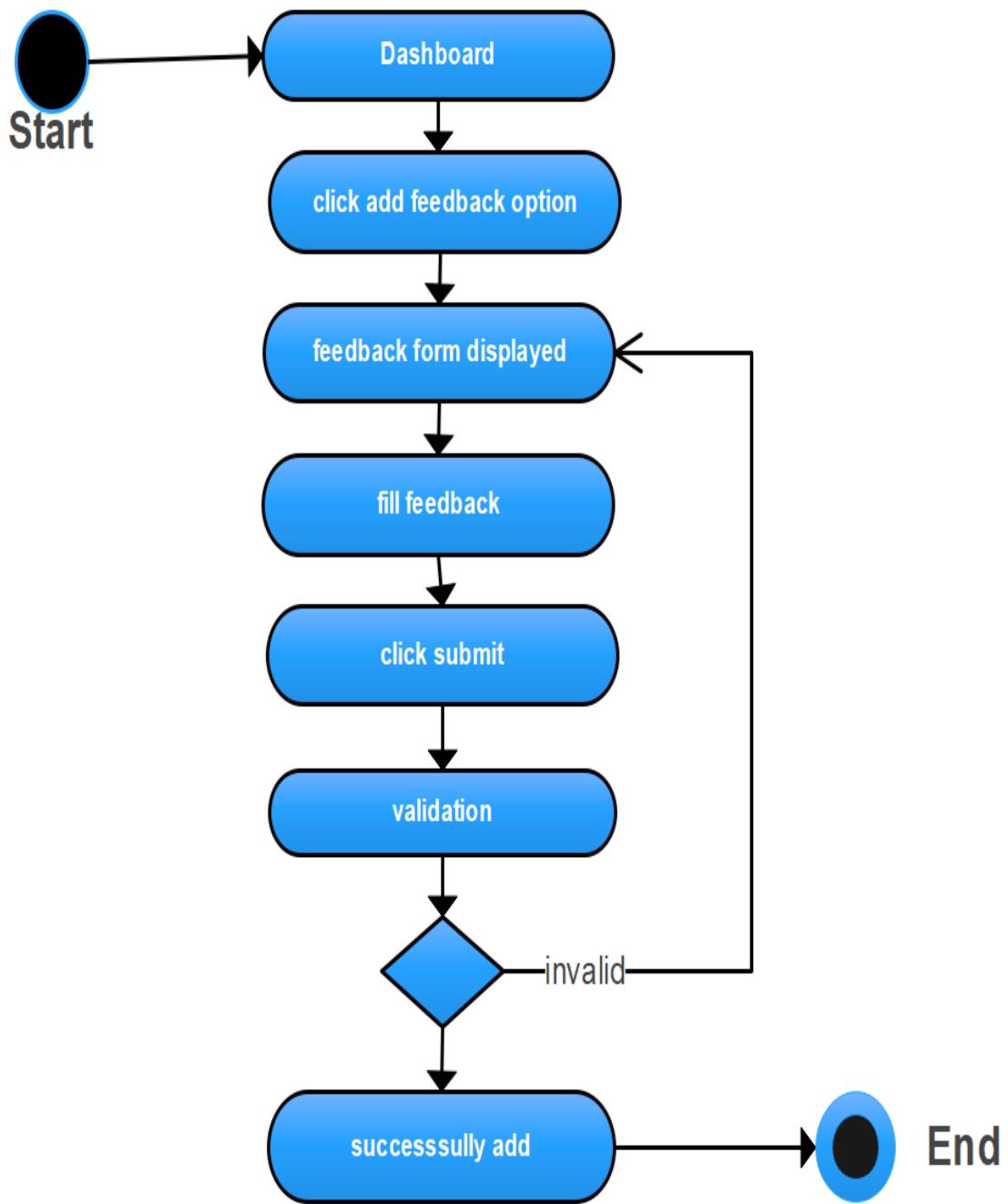


Figure 32: activity diagram for give feedback

3.4.4 Analysis level Class diagram

Class diagrams are a type of UML (Unified Modeling Language) diagram used in software engineering to visually represent the structure and relationships of classes within a system. It used to construct and visualize object-oriented systems. It depicts the classes, their attributes, methods, and the associations among them. Class diagrams are useful for modeling the static aspects of a system, such as the concepts, properties, and operations that exist in the problem domain [\[11\]](#).

A class diagram consists of several components, such as:

Class: in object-oriented programming (OOP), a class is a blueprint or template for creating objects. Objects are instances of classes, and each class defines a set of attributes (data members) and methods (functions or procedures) that the objects created from that class will possess. The attributes represent the characteristics or properties of the object, while the methods define the behaviors or actions that the object can perform.

Association: An association represents a bi-directional relationship between two classes. It indicates that instances of one class are connected to instances of another class. Associations are typically depicted as a solid line connecting the classes, with optional arrows indicating the direction of the relationship.

Aggregation: Aggregation is a specialized form of association that represents a “whole-part” relationship. It denotes a stronger relationship where one class (the whole) contains or is composed of another class (the part). Aggregation is represented by a diamond shape on the side of the whole class. In this kind of relationship, the child class can exist independently of its parent class.

Composition: Composition is a stronger form of aggregation, indicating a more significant ownership or dependency relationship. In composition, the part class cannot exist independently of the whole class. Composition is represented by a filled diamond shape on the side of the whole class.

Inheritance (Generalization): Inheritance represents an “is-a” relationship between classes, where one class (the subclass or child) inherits the properties and behaviors of another class

(the superclass or parent). Inheritance is depicted by a solid line with a closed, hollow arrowhead pointing from the subclass to the superclass.

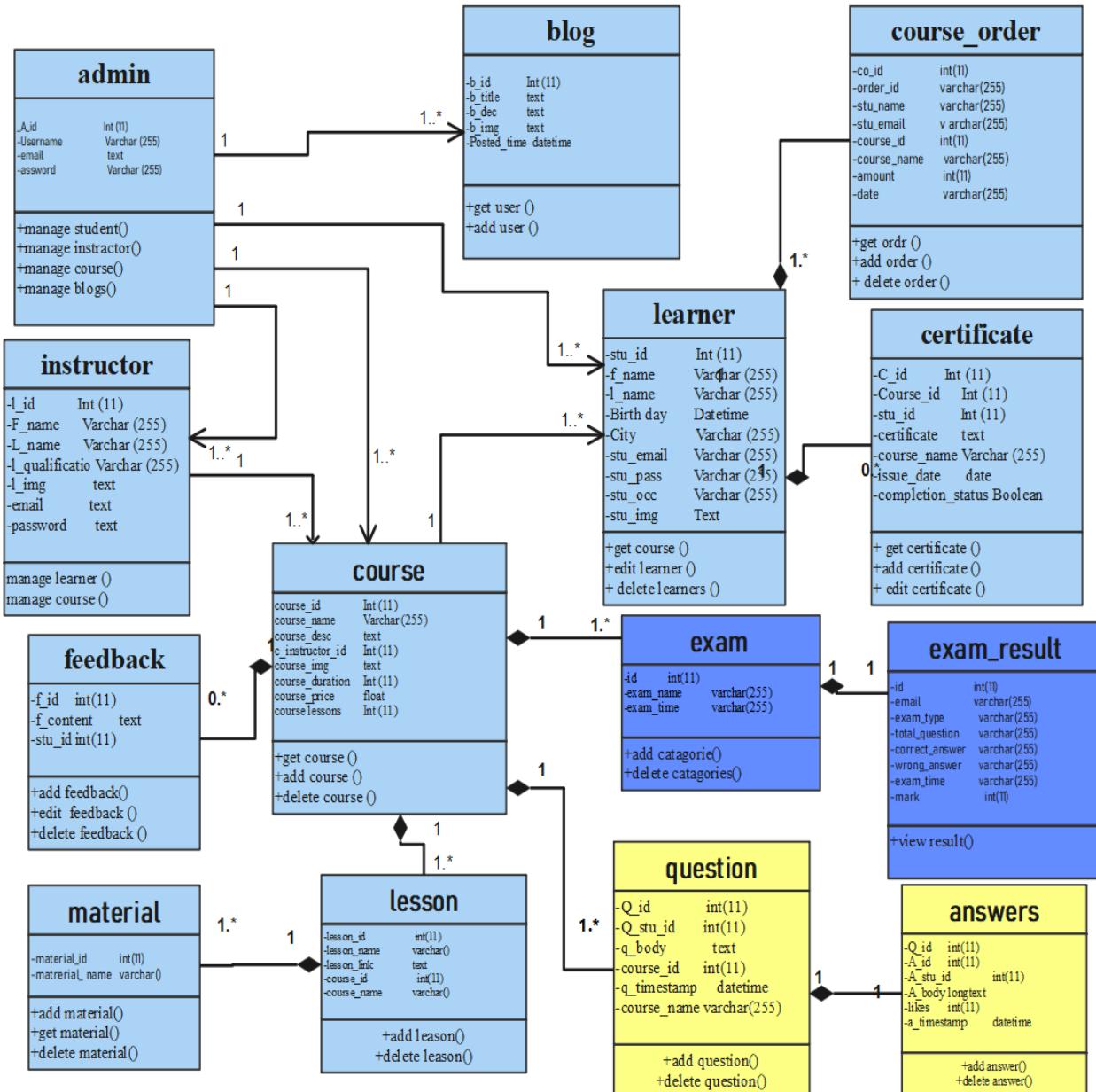


Figure 33: class diagram

3.4.5 User Interface Design

User interface design is a fundamental aspect of crafting a positive and user-friendly experience within our project. This design discipline revolves around creating the visual components and interactive features that users engage with on the platform. Its importance lies in its ability to make the learning environment intuitive and easily navigable. It emphasizes the creation of an aesthetically pleasing and coherent layout, incorporating factors such as buttons, menus as wells appearances to increase user experience. User interface design is extremely important because it forms how the learners will access educational materials, creating a better and more efficient learning environment. project members design some user interface of our platform using figma it is available on online.

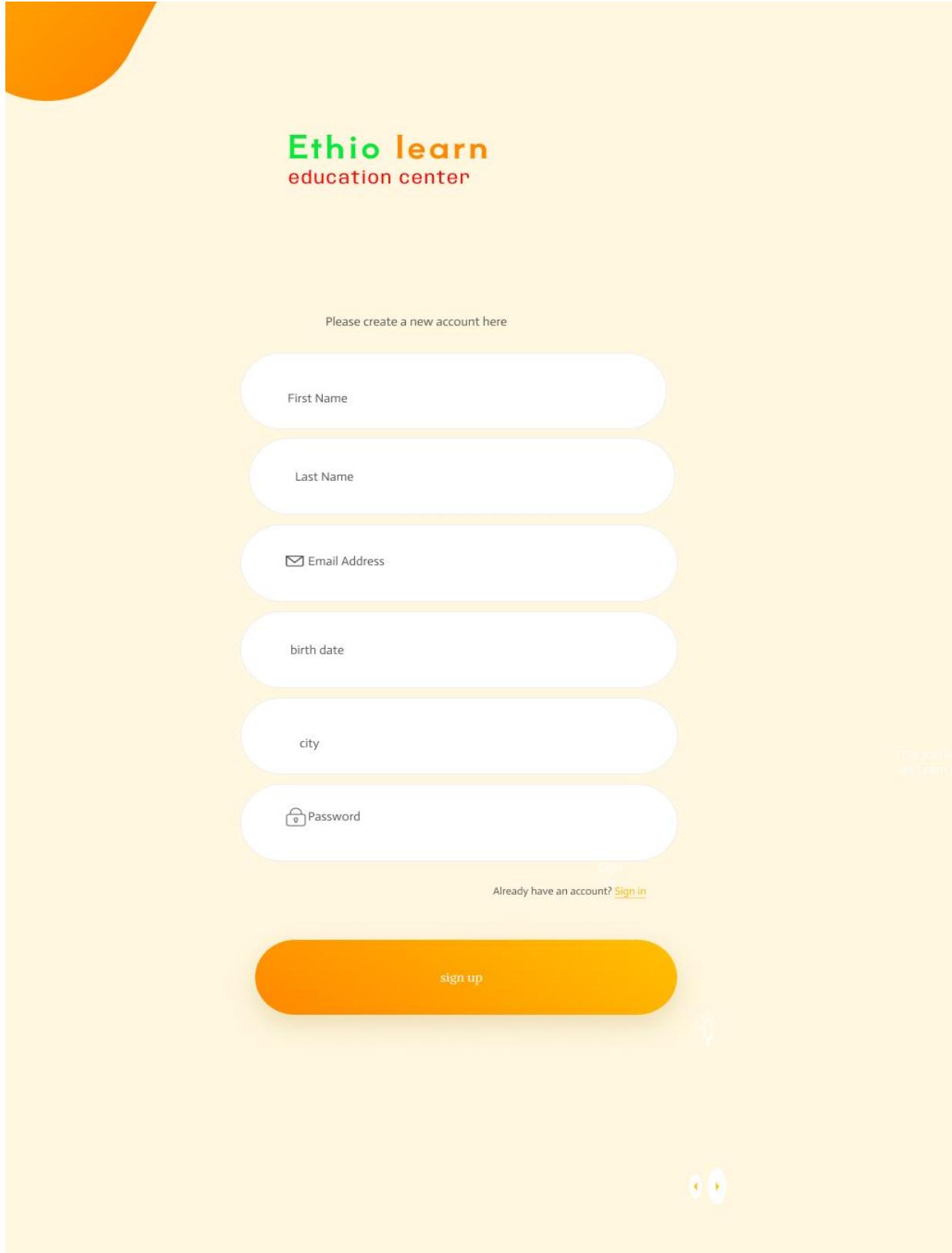


Figure 34: UI design for sign-up

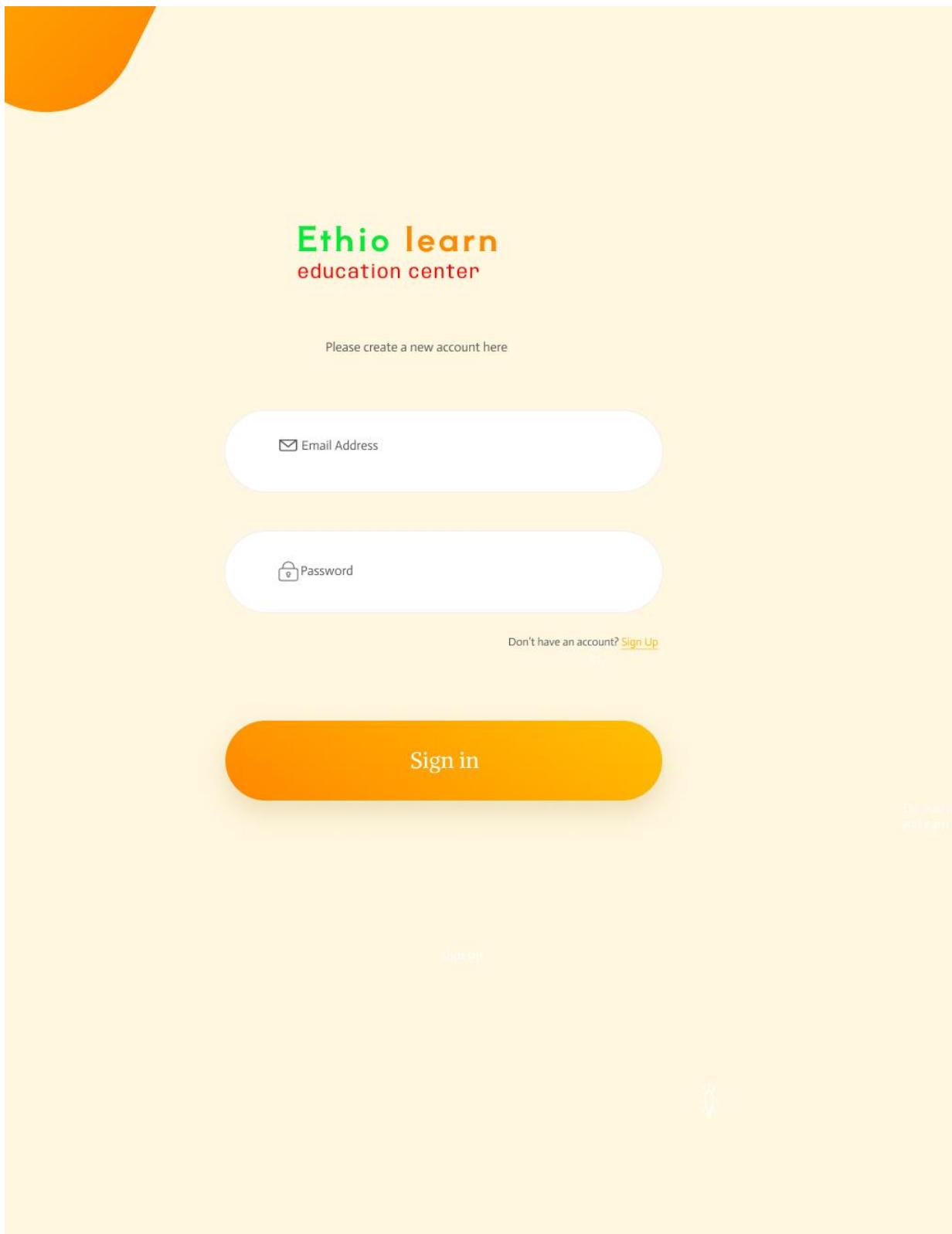


Figure 35: UI design for log in

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Data mining by Yabessa bedate	Java script by Mohamed	Human computer interaction by ethio learn

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daniel albert Categories: jd Modeling

Arthur Brooklyn Categories: jd Modeling

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Login

Figure 36: UI design for home page

The image displays the UI design for a course page. At the top, there is a yellow header with the text "Browse Our courses get access Video Tutorials, resources,take quizzes znd get your certificate." Below this, a message encourages users to log in to access all tutorials and resources. The main content area features a grid of course cards, each with a title, author, price, and a "Learn more" button. To the right of the grid, a sidebar lists "Courses category" including Web Development, app development, IT and software, Software Engineer (100+), UI/ UX RoadMap (75+), Digital Marketing (50+), and Accounting. At the bottom, there is a footer with social media icons, a logo for "Ethio learn education center", and links to Home, Courses, About Us, Contact Us, and Log in. There are also links for Quicklinks, Contact Us, and Terms and Conditions.

Figure 37: UI design for course page

Ethio learn
education center

choose enrollment for this course to gain access and also to the materials been attached to it online only or you can add to cart for checkout to view offline

this course includes :

- 30 lectures
- 48 hours demand videos
- full time access
- attend quizzes
- certificate completion

Enroll

Instructor

destiny des

Drew Bridewell is a senior design specialist at InVision. He also teaches user experience design on a weekly basis to the community and also has piloted UX design programs for middle schools.

Released Date: 1/03/2019
Duration: 1 h 05 mins 00 secs
Tags: Modelling, Rendering, Animation

Description

Ever wondered how other UX designers troubleshoot problems and juggle conflicting priorities? In this weekly series, Drew Bridewell—a user experience designer and leader of the digital transformation team at InVision—shares his hard-earned knowledge and shows how to apply basic UX design principles to real-world projects. Ever wondered how other UX designers troubleshoot problems and juggle conflicting priorities? In this weekly series, Drew Bridewell—a user experience designer and leader of the digital transformation team at InVision—shares his hard-earned knowledge and shows how to apply basic UX design principles to real-world projects. Ever wondered how other UX designers troubleshoot problems and juggle conflicting priorities? In this weekly series, Drew Bridewell—a user experience designer and leader of the digital transformation team at InVision—shares his hard-earned knowledge and shows how to apply basic UX design principles to real-world projects. Ever wondered how other UX designers troubleshoot problems and juggle conflicting priorities? In this weekly series, Drew Bridewell—a user experience designer and leader of the digital transformation team at InVision—shares his hard-earned knowledge and shows how to apply basic UX design principles to real-world projects.

Modules

Lesson 1	
Lesson 2	
Lesson 3	
Lesson 4	
Module 2	
Module 3	
Module 4	
Module 5	
Module 6	

Quicklinks

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Figure 38: UI design for course detail view page

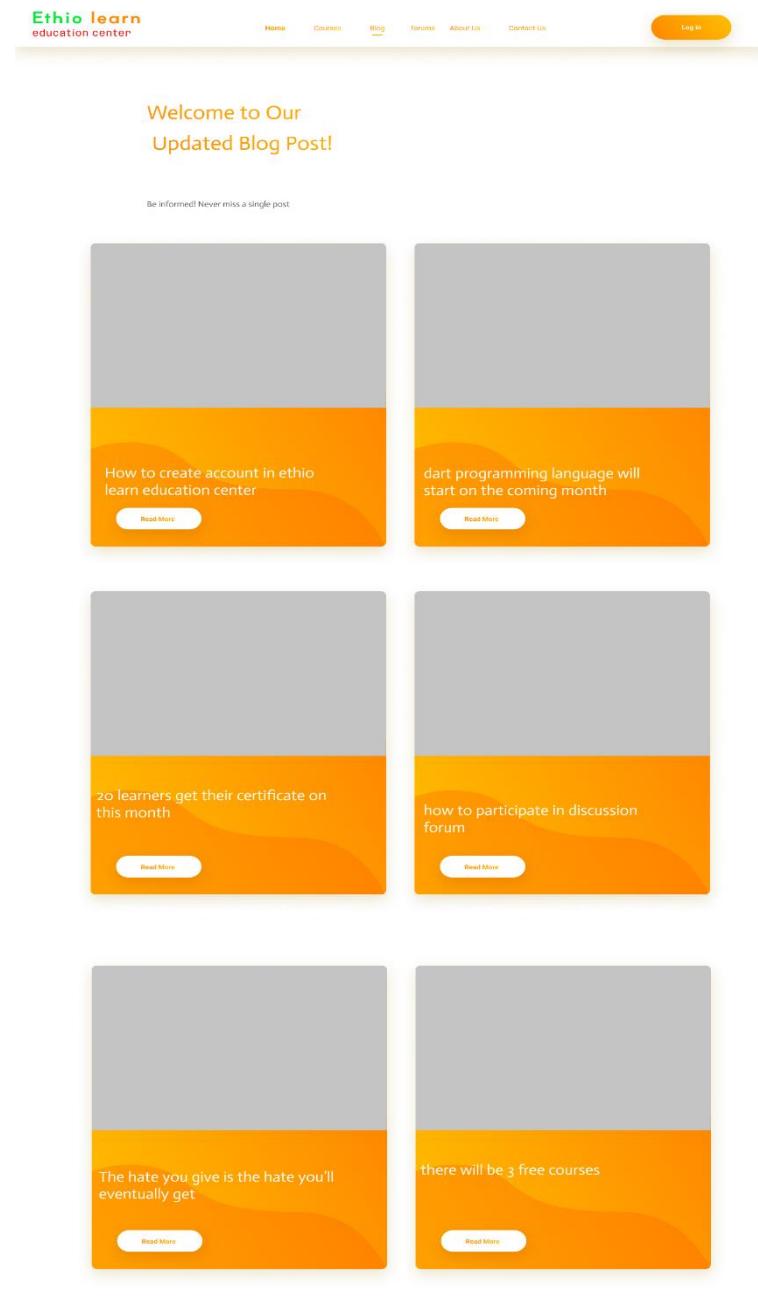


Figure 39: UI design for blogs page

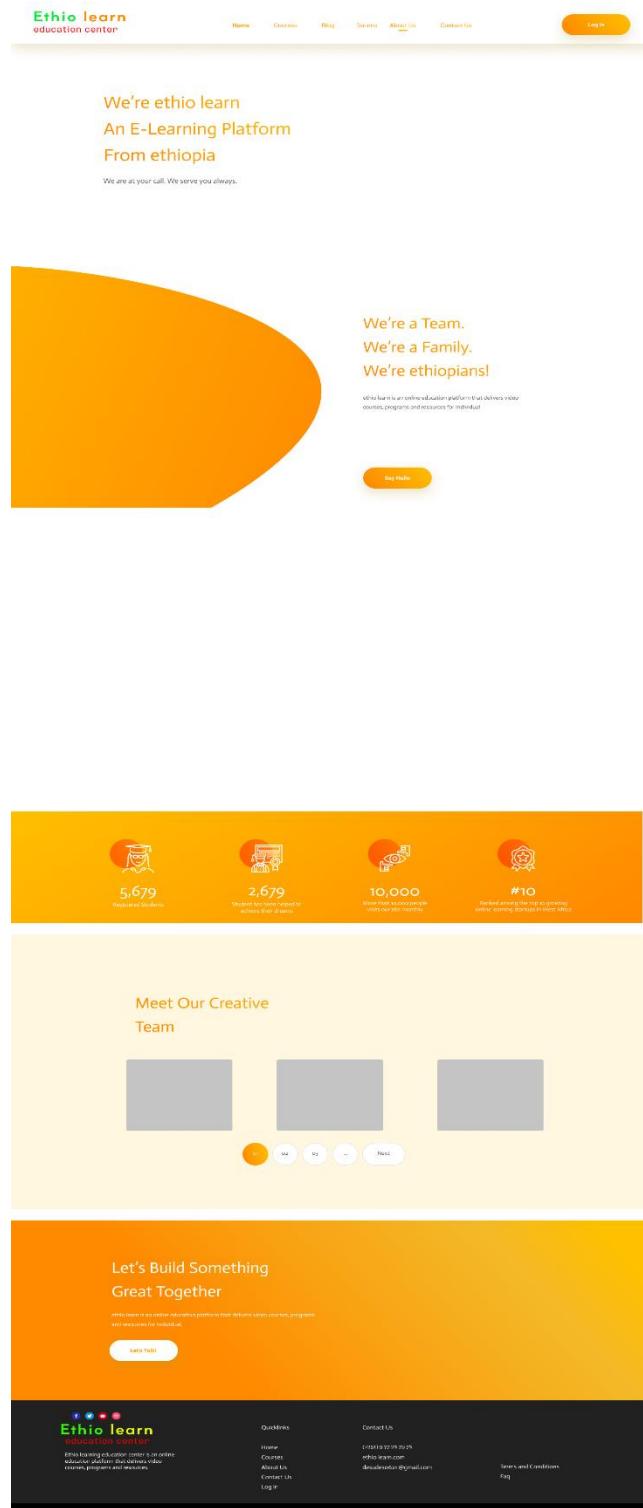


Figure 40: UI design for course page

24Hrs Customer Support

We are at your call. We serve you always.

Let's Talk!

We do normally get back within 48hrs. Please leave a message.

first name

last name

email Address

City

Your Message

Send Message

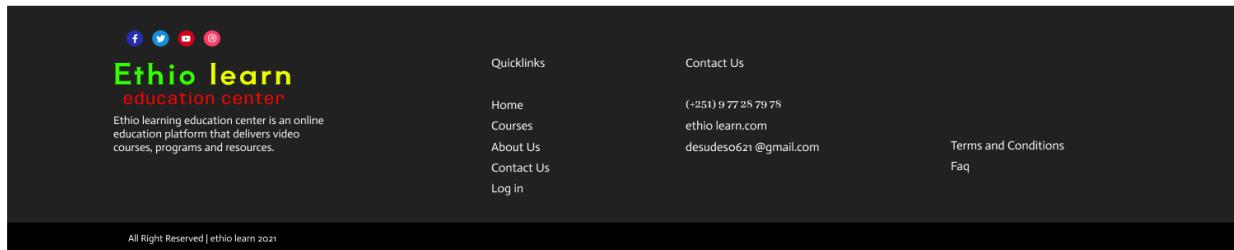


Figure 41: UI design for contact us page

3.4.6 Sitemap

A site map is a listing of the pages on your website that search engines use to crawl it. They can be structured differently depending on who is using them or how they're being used. This visual sitemap provides a clear overview of the website's structure. Boxes represent webpages, with labels describing their content. Lines show connections and navigation flow. It helps visualize information architecture and user journeys.

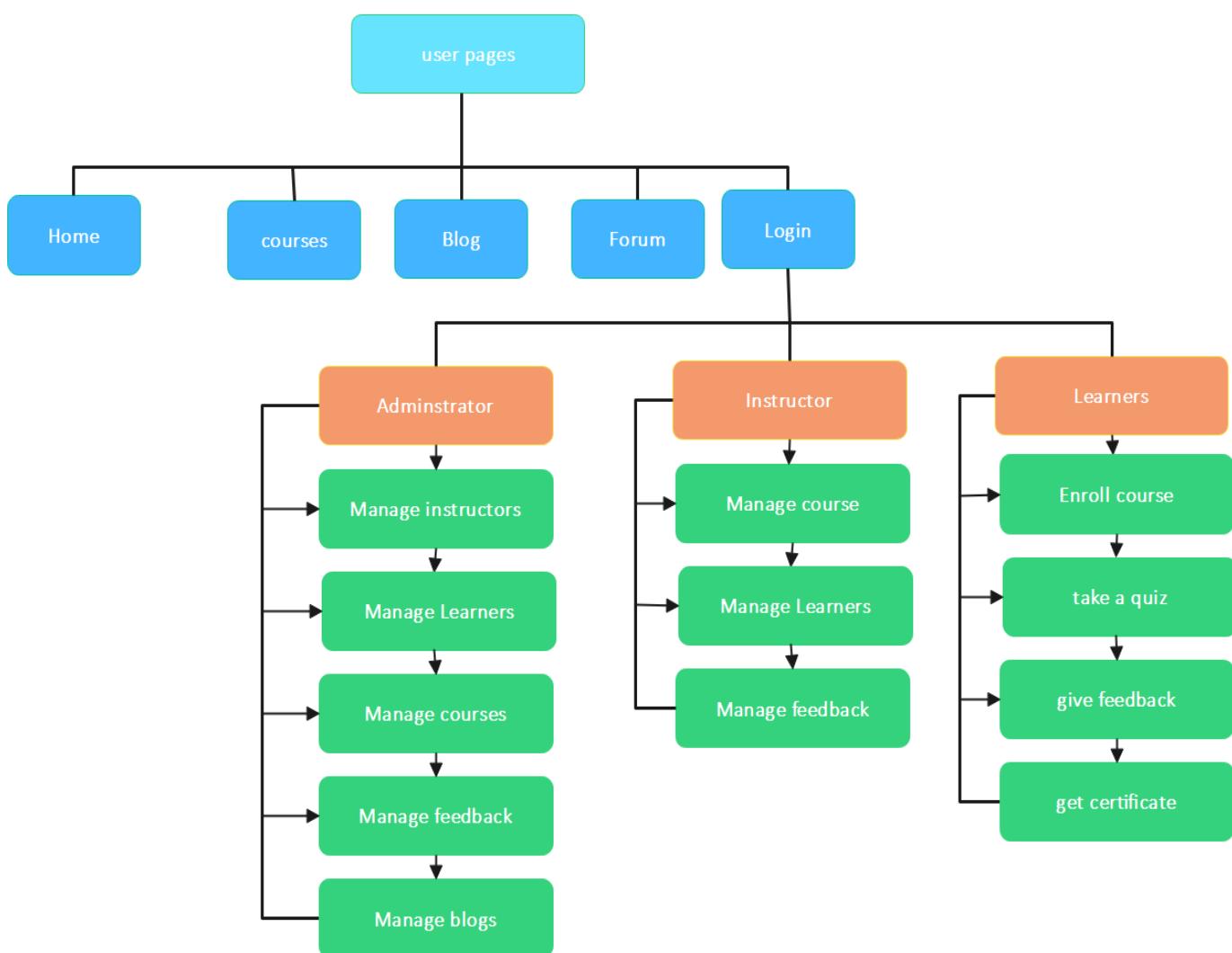


Figure 42: site map

CHAPTER FOUR

SYSTEM DESIGN

4.1. Introduction

We were trying to show you detail about the system feature of proposed system in the chapter three. In this chapter of the we will develop the system design. It includes and explains logic view, process view, deployment diagram, ER diagram and Database design. The transition of the analytical model into a system design model is known as system design. System design is the process of defining the architecture, interfaces, and data for a system to satisfy specific requirements [\[12\]](#). It involves creating an architecture for different components, interfaces, and modules of a system, and providing data helpful in implementing the platform. It is an iterative process, and the design may change as new information is gathered and requirements evolve. It's also important to communicate the design effectively to all stakeholders, including an administrator, the instructor, the learners to ensure that the system meets their needs and expectations.

4.2. Purpose of the System Design Document (SDD)

The purpose of this System Design Document (SDD) is to specify the detailed architecture and system design of the Online Learning Platform (OLP). The OLP aims to provide a comprehensive, interactive, and user-friendly platform for learners of all ages and educators across various disciplines.

The SDD is intended for use by the project team to ensure a clear understanding of the system's components and their interactions. It will guide the development process, facilitate accurate estimation of costs, and serve as a reference for future system enhancements. The ultimate goal of the online learning platform, as guided by this SDD, is to create an accessible, engaging, and effective online learning environment that empowers learners and educators, promotes active learning, and fosters educational achievement.

4.3. Design Goal

A design goal is a purpose or intention which directs the design process. It is a formulation of the expected design characteristics. Design goals are usually solution oriented and user-driven, concentrating on the solving of a problem rather than the problem itself. Basically, a design goal is the target that a design process tries to attain. It can be used as a reference for all design considerations and checks whether the design is aligned with the needs of its potential users [13]. The best aspects of our system that should be maximized are specified by the design goals. As well, develop a great quality, unique features, solid as well as efficient online learning platform. Some of the objectives are given below:

- I.** User-Friendly Interface: The platform should have an intuitive and easy-to-navigate interface to ensure a seamless user experience.
- II.** Accessibility: A platform should work on several devices and browsers, and support disabled learners.
- III.** Engaging Content Delivery: The platform should have different types of content such as videos, slides, quizzes etc. to accommodate different learning styles and retain users.
- IV.** Interactive Learning: The platform ought to provide means for learners and instructors to interact, as well as among learners, and this can be realized through features such as discussion forums.
- V.** Personalized Learning Experience: The platform should provide individualized learning paths considering the learner's progress, interests and achievements.
- VI.** Performance Tracking: The platform needs accurate tracking and reporting functions to trace the trajectory of learners' progress and results
- VII.** Security and Privacy: The platform should provide the security and privacy of the users' data.
- VIII.** Scalability: The platform must be scalable-able to fit the needs of an increasing number of users and courses.
- IX.** Support and Help: There should be reliable and prompt support on the platform to deal with any challenges that the users may encounter.

- X. Continuous Improvement: **The platform should have mechanisms for collecting user feedback and making continuous improvements based on the feedback.**

4.4. Architectural Design

4.4.1. Logical View of the Architecture

A logical view is a way of representing a system's functionality from a high-level perspective [14]. It is concerned with the functional requirements of the system and how it provides value to the end-users, it is a way of describing the functionality and structure of a system from the perspective of different stakeholders, such as end-users, developers, or system engineers. It can be represented by various diagrams, such as class diagrams, state diagrams, or package diagrams, depending on the level of abstraction and the purpose of the view we will use package diagram to since it provides a clear and concise representation of our online learning platform. In our proposed system, we've structured the architecture into six distinct packages.

The User Package: encapsulates the system's roles, including administrators, educators, and learners. It delineates the permissions and actions associated with each user type, forming the backbone of user interactions.

The User Interface Package complements this by providing tailored interfaces for each user category, along with the essential sign-in and sign-up interfaces, facilitating seamless user interactions.

The Content Management Package: At the heart of our project lies on this package This package oversees the creation, organization, and management of learning materials. With subcomponents like course management, forum management, and resource management, it ensures an engaging and organized learning environment, overseen by administrators and educators.

The Communication Package: fosters collaboration and interaction among users through forums, feedback mechanisms, and blogs. This enhances the learning experience and promotes a sense of community within the platform.

The Assessment Package: contributes to the learning process covering functionalities like exams, quizzes, grading, and certificates. It gives the tools to create, administer and assess which secures the accuracy of measurement of learner performance and progress.

The Database Management Package: is the backbone of the system, dealing with the data storage and authentication procedure. It ensures a secure access to the platform, holds user data, content assets and system configurations.

Every package is significant in molding the user experience, supporting content provision, and keeping the online learning platform functionally seamless. These packages allow for smooth integration and combine forces to importantly, achieve the platform's effectiveness, usability, and scalability.

Here is a logical view look like

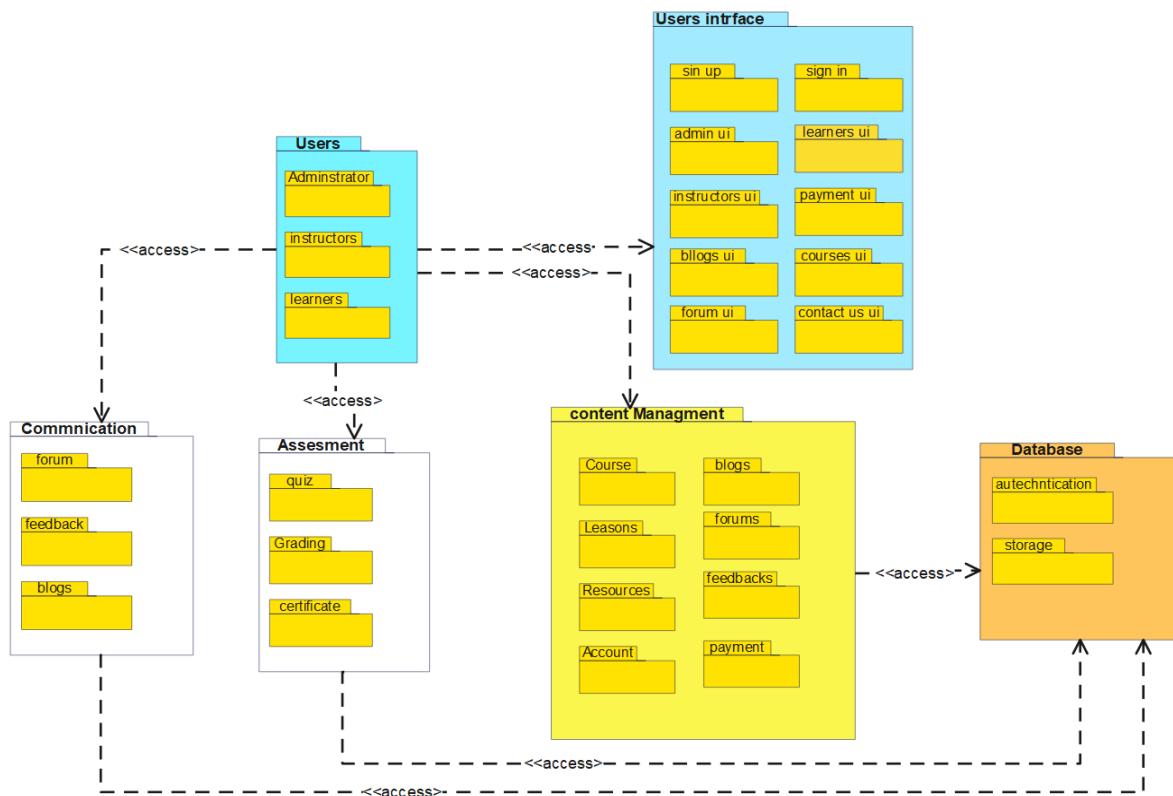


Figure 43: logical view

4.4.2. Process View

Process View is a way of looking at work as a series of steps or actions that transform inputs into outputs. It helps to understand how different processes interact and communicate with each other, and how they affect the performance and quality of the system. Process View can be used to design, analyze, improve, and manage work processes of our platforms. This figure design view below shows the core features and interaction within the learner interface, so that the learners can navigate, get the course materials and perform various learning activities. It includes the key parts such as courses, forums and profiles or user accounts as well as account creation, registration, and log in processes. Through such elements, stakeholders would get a picture of how their learners navigate the learning management system.

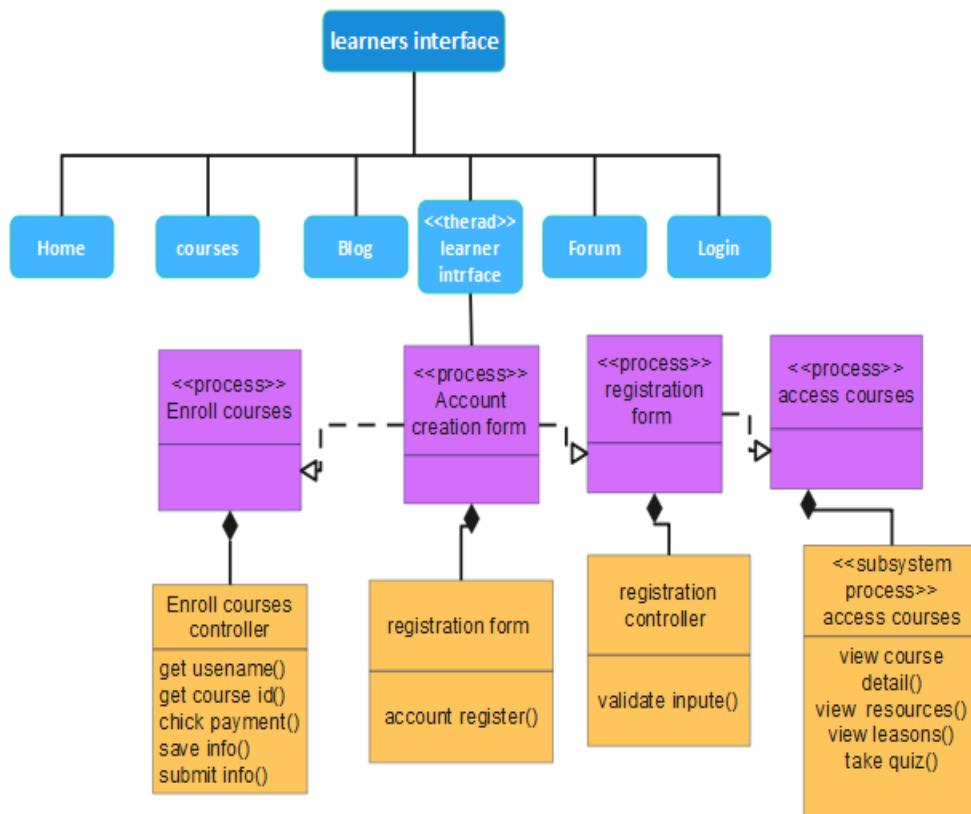


Figure 44: process view

4.4.3. Deployment View

A deployment view is a type of structure diagram that models the physical aspects of an object-oriented system. It is often used to represent the topology of the hardware and the configuration of run time processing nodes and the components that live on them [15].

A deployment view is a way of showing how a system is distributed and executed on different hardware and software components. It can also show the communication and dependencies between these components. A deployment view can help to plan, design, and manage the system's infrastructure and performance. It is useful for visualizing, specifying, and documenting embedded, client, and distributed systems and also for managing executable systems. It describes how the operator can perform throughout the platform.

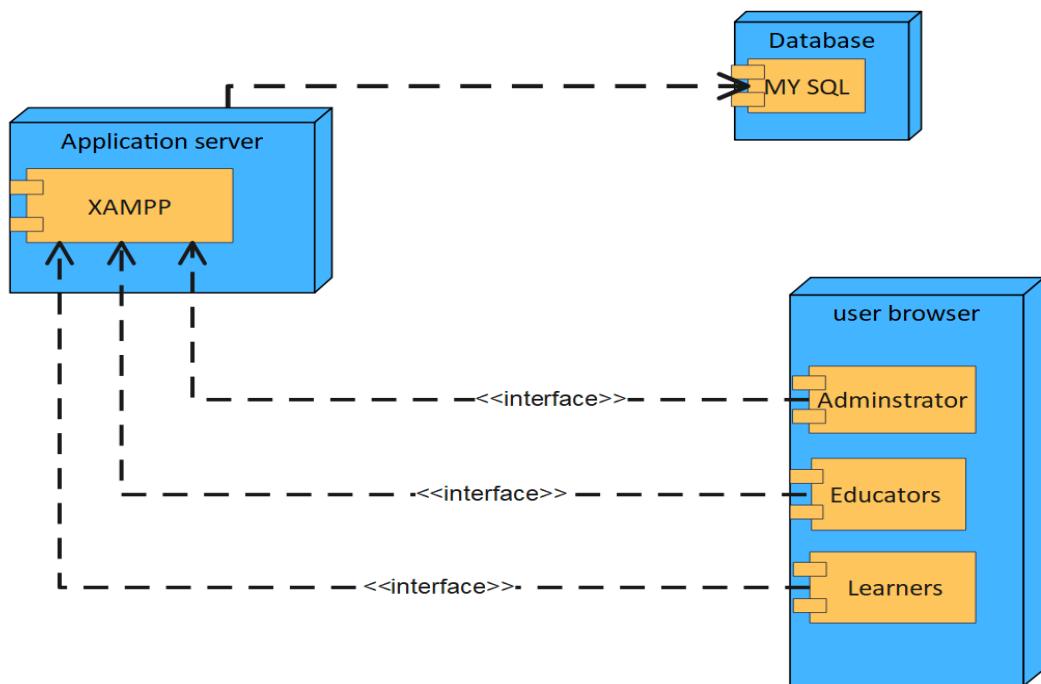


Figure 45: deployment view

4.5. Database Design

Database design is the process of organizing data according to a database model. The designer or database administrator can determine what data must be stored and how the data elements interrelate. With this information, they can begin to fit the data to the database model. A database management system manages the data accordingly.[\[16\]](#).

The process of database design involves classifying data and identifying interrelationships. By determining the relationships and dependencies among the different pieces of data it is possible to organize the data into a logical structure which can then be mapped into the storage objects supported by the database management system. The data represent types as courses, course categories, students, course enrollments teachers, classes, attendance, exams, and scores. The main objectives of database design in DBMS are to construct logical and physical designs models of the database system under consideration. A well-designed database should be capable of handling a large amount of data and at the same time provide faster access to the data. It should also provide data integrity and security. To elaborate Logical design involves mapping the conceptual design to a specific data model, such as relational, hierarchical, or network, and defining the constraints, keys, and indexes for each entity. Physical design involves choosing the storage structures, file organizations, and access methods that optimize the performance, security, and availability of the database. the logical model is largely focused on data needs, and considerations must be made in terms of monolithic concerns, and so the stored physical data must be stored independently of physical conditions. The physical database design model, on the other hand, involves a translation of the logical design model of the database by maintaining control of physical media utilizing hardware resources and software systems such as Database Management System (DBMS).

The following points describe the significant considerations that may be considered while stressing the importance of database design.

- Ensures **simplicity**: A well-designed database makes it easy to write queries and access data in a user-friendly way.
- Eliminates **redundancies**: A good database design avoids unnecessary data duplication, which saves disk space.

- Enables **analysis**: A structured database design allows for effective data retrieval, reporting, and analytics, which can help online learning platforms measure and improve their performance.
- Maintains **accuracy**: A reliable database design ensures that the data stored is valid, complete, and up-to-date.

	Instructors	Data Type
PK	l_id	Int (11)
	F_name	Varchar (255)
	L_name	Varchar (255)
	l_qualification	Varchar (255)
	l_img	text
	email	text
	password	text

	Admin	Data Type
PK	A_id	Int (11)
	Username	Varchar (255)
	email	text
	password	Varchar (255)

	Learners	Type
PK	stu_id	Int (11)
	f_name	Varchar (255)
	l_name	Varchar (255)
	Birth day	Datetime
	City	Varchar (255)
	stu_email	Varchar (255)
	stu_pass	Varchar (255)
	stu_occ	Varchar (255)
	stu_img	Text

	courses	Data Type
PK	course_id	Int (11)
	course_name	Varchar (255)
	course_desc	text
FK	c_instructor_id	Int (11)
	course_img	text
	course_duration	Int (11)
	course_price	float
	course lessons	Int (11)

	Course order	Type
PK	order_id	Varchar (255)
FK	C_stu_id	Int (11)
FK	course_id	Int (11)
	amount	int (11)
	date	datetime
	L_stu_name	Varchar (255)
	course_name	varchar (255)

	Lesson	Data Type
PK	lesson_id	Int (11)
FK	L_course_id	Int (11)
	lesson_name	Varchar (255)
	lesson_link	Varchar (255)

	Form_question	Data Type
PK	Q_id	Int (11)
FK	Q_stu_id	Int (11)
	q_body	text
FK	q_course_id	int (11)
	q_timestamp	datetime
	resolved	varchar (255)

	Materials	Data Type
PK	material_id	Int (11)
FK	M_course_id	Int (11)
FK	M_lesson_id	Int (11)
	material_type	Varchar (50)
	material_url	text
	upload_date	datetime

	Exam Result	Data Type
PK	id	Int (11)
FK	E_stu_id	Int (11)
	exam type	Varchar (255)
	total_question	Int (11)
	correct_answer	Int (11)
	wrong_answer	Int (11)
	exam_time	Datetime
	mark	Int (11)

	Exam question	Data Type
PK	id	int (11)
FK	e_category	Varchar (255)
	ques_no	Int (11)
	question	Varchar (255)
	opt1	Varchar (255)
	opt2	Varchar (255)
	opt3	Varchar (255)
	opt4	Varchar (255)
	answer	Varchar (255)

	Exam Category	Data Type
PK	id	Int (11)
	exam_name	Varchar (255)
	exam_time	Varchar (255)

	Answer	Data type
PK	A_id	Int (11)
FK	Q_id	Int (11)
FK	A_stu_id	Int (11)
	A_body	long text
	likes	Int (11)
	a timestamp	Datetime

	Certificate	Data Type
PK	C_id	Int (11)
FK	Course_id	Int (11)
FK	stu_id	Int (11)
	certificate	text
	course_name	Varchar (255)
	issue_date	date
	completion_status	Boolean

	Learner's progress	Data Type
PK	progress_id	Int (11)
FK	P_stu_id	Int (11)
FK	P_course_id	Int (11)
FK	P_lesson_id	Int (11)
	completed	Booleans
	progress_date	date

	Contact	Data Type
PK	id	int (11)
	f_name	Varchar (255)
	l_name	Varchar (255)
	email	text
	msg	text

	Feedback	Data Type
PK	f_id	Int (11)
	f_content	text
FK	f_stu_id	Int (11)

	Notification	Data Type
PK	notification_id	Int (11)
FK	N_stu_id	Int (11)
FK	material_id	Int (11)
	is_read	Boolean
	notification_date	datetime

	Blogs	Data Type
PK	b_id	Int (11)
	b_title	text
	b_dec	text
	b_img	text
	Posted_time	datetime

4.5.1 ER Diagram

An entity relationship model is a way of representing the data and its relationships in a database. It uses symbols to show the entities, attributes, and relationships that are relevant to a specific domain of knowledge. An entity relationship model can help to design and understand a database by showing the logical and physical structure of the data and how it can be manipulated [17]. An E-R diagram, or entity-relationship diagram, is a way of representing the data and its relationships in a database.

It uses symbols to show the entities, attributes, and relationships that are relevant to a specific domain of knowledge. An E-R diagram can help to design and understand a database by showing its logical and physical structure. An E-R diagram consists of symbols that represent entities, attributes, and relationships. An entity is a thing of interest that can be identified and distinguished from others. An attribute is a property or characteristic of an entity. A relationship is an association or connection between two or more entities.

The following diagram on the next page is the entity relationship diagram of our project

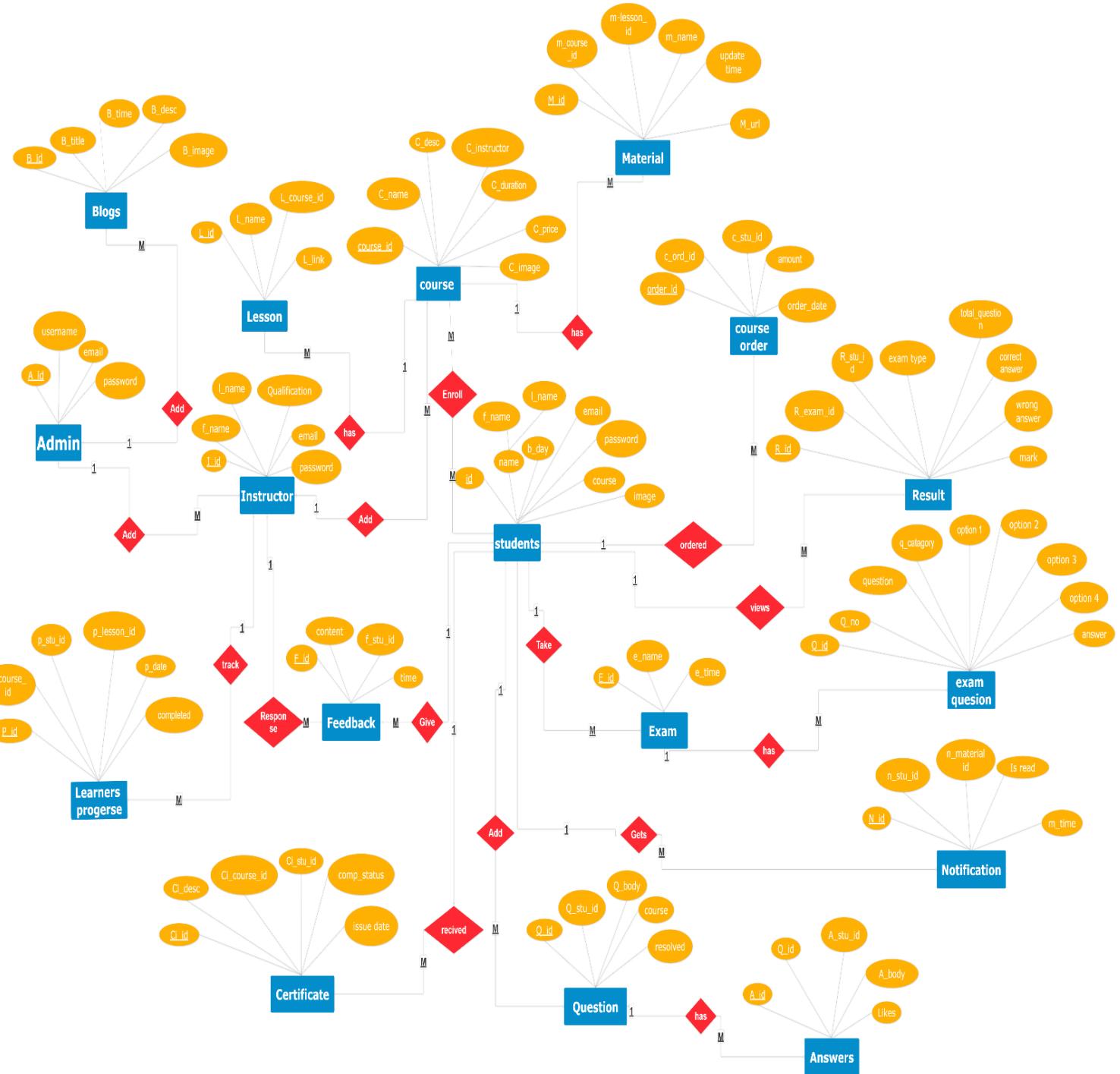


Figure 46: ER-diagram

4.5.2 Relational Mapping & Database Normalization

1st normalization form

In the first normal form, each table must have a unique identifier, and each attribute must contain atomic values. The provided tables below demonstrate the 1st normal form of the proposed system tables, as each table has a primary key, and attributes contain atomic values.

Exam question												
id	ques_no	question	opt1	opt2	opt3	opt4	answer	category	correct_answer	wrong_answer	exam_time	mark

admin			
id	email	password	username

questions						
Q_id	q_body	q_timestamp	resolved	answer	Answer_body	Answer time

blog			
b_id	b_title	b_dec	b_img

certificates			
id	certificate	issue_date	completion_status

contact					
id	f_name	l_name	email	msg	

course								
course_id	course_name	course_desc	Course_order	amount	date	course_img	course_duration	course_price

instructors					
l_id	l_name	l_qualification	l_img	email	password

lesson		
lesson_id	lesson_name	lesson_link

materials						
material_id	material_type	material_url	upload_date	notification	notification_date	notification_date

students								
stu_id	f_name	l_name	stu_email	stu_pass	stu_phone	stu_img	feedback	F_content

student_progress					
progress_id	stu_id	course_id	lesson_id	completed	progress_date

2nd normalization form

In the second normal form, a table is in 2NF if it is in 1NF, and every non-prime attribute is fully functionally dependent on the entire primary key.

To modify the following tables from 1NF to 2NF:

1. Splitting learners Table into Feedback and Learner: The Learner table contains attributes related to both the learner and their feedback. Therefore, we create a new table called Feedback with attributes dependent on feedback.
2. Splitting Exam Question Table into Exam Question, Exam Result, and Exam Category: The Exam Question table contains attributes related to both the question and the exam result. We create a new table called Exam Result with attributes dependent on the exam result and Exam Category to store information about exam categories.
3. Splitting Question Table into Questions and Answers: Since the Question table contains both questions and answers, we create a new table called Answers with attributes related to answers.

4. Splitting Courses Table into Course and Course Order: The Courses table contains both course information and order information. We create a new table called Course Order with attributes related to course orders.

5. Splitting Material Table into Material and Notifications: The Material table contains both material information and notification information. We create a new table called Notifications with attributes related to notifications and remove the notification-related attributes from the Material table.

By following these steps, each table contains only attributes that are fully functionally dependent on the primary key, thus achieving the second normal form. The 2nd normal form tables are provided below.

students							
stu_id	f_name	l_name	stu_email	stu_pass	stu_phone	stu_img	stu_course (FK)

feedback		
f_id	f_content	f_stu_id (FK)

Exam question								
id	ques_no	question	Option 1	Option 2	Option 3	Option 4	category_id (FK)	C_answer

exam category		
id	exam_name	exam time

exam result						
r_id	r_stu_id (FK)	Question_id (FK)	total question	correct_answer	wrong_answer	mark

answers					
A_id	Q_id (FK)	A_stu_id (FK)	A_body	likes	a_timestamp

course						
course_id	course_name	course_desc	c_instructor (FK)	course_img	course_duration	course_price (FK)

courseorder				
order_id	stu_id (FK)	course_id (FK)	amount	date

notifications				
notification_id	stu_id (FK)	material_id (FK)	is_read	notification_date

materials					
material_id	course_id (FK)	lesson_id (FK)	material_type	material_url	upload_date

questions			
Q_id	Q_stu_id (FK)	q_body	course_id (FK)

contact				
id	f_name	l_name	email	msg

admin			
id	email	password	username

blog			
b_id	b_title	b_dec	b_img

instructors					
l_id	l_name	l_qualification	l_img	email	password

student_progress					
progress_id	stu_id (FK)	course_id (FK)	lesson_id (FK)	completed	progress_date

lesson				
lesson_id	lesson_name	lesson_link	course_id (FK)	

certificates					
id	certificate	issue_date	completion_status	stu_id (FK)	course_id (FK)

3rd normalization form

To further normalize the tables to the 3rd normal form, we need to ensure that there are no transitive dependencies. In other words, all non-key attributes must depend only on the primary key and not on other non-key attributes. In our case There are no transitive dependencies in any table except For the questions table, the modification for 3rd normal form would be to remove the attribute Q_stu_id, as it represents the student who submitted the question.

students							
stu_id	f_name	l_name	stu_email	stu_pass	stu_phone	stu_img	stu_course (FK)

feedback		
f_id	f_content	f_stu_id (FK)

Exam question								
id	ques_no	question	Option 1	Option 2	Option 3	Option 4	category_id (FK)	C_answer

exam category		
id	exam_name	exam time

exam result						
r_id	r_stu_id (FK)	Question_id (FK)	total question	correct_ answer	wrong_ answer	mark

answers					
A_id	Q_id (FK)	A_stu_id (FK)	A_body	likes	a_timestamp

course						
course_id	course_name	course_desc	c_instructor (FK)	course_img	course_duration	course_price (FK)

courseorder				
order_id	stu_id (FK)	course_id (FK)	amount	date

notifications				
notification_id	stu_id (FK)	material_id (FK)	is_read	notification_date

materials					
material_id	course_id (FK)	lesson_id (FK)	material_type	material_url	upload_date

contact				
id	f_name	l_name	email	msg

admin			
id	email	password	username

blog			
b_id	b_title	b_dec	b_img

instructors					
l_id	l_name	l_qualification	l_img	email	password

lesson			
lesson_id	lesson_name	lesson_link	course_id (FK)

certificates					
id	certificate	issue_date	completion_status	stu_id (FK)	course_id (FK)

student_progress					
progress_id	stu_id (FK)	course_id (FK)	lesson_id (FK)	completed	progress_date

questions		
Q_id	q_body	course_id (FK)

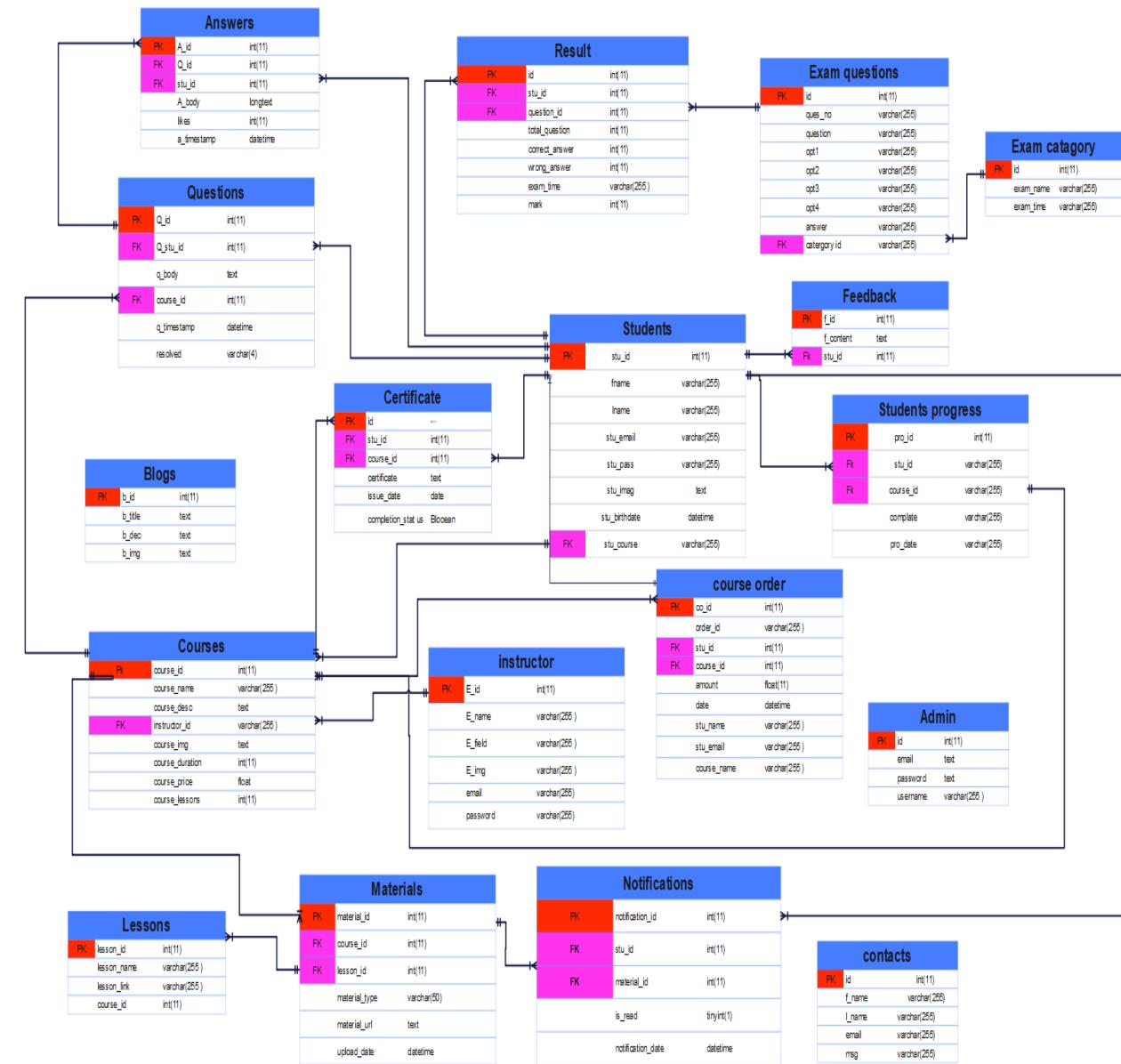


Figure 47: Relational Mapping

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1 conclusion

Our project was born from the identified scarcity of online learning platforms catering to the vast and diverse population of Ethiopia. Existing platforms, while present, revealed several shortcomings, including limited course accessibility, high costs, and lack of interactive features and certificates. These limitations hinder the potential of online learning to empower Ethiopians and bridge the knowledge gap.

In order to deal with these challenges, an exhaustive, accessible, and inclusive platform has been devised. Considering broad learning objectives and financial limitations, we offered a hybrid model of both free and paid courses. Free courses provide essential knowledge and skills to a larger audience, which increases the level of education access. Paid courses deal with people's particular interests and thus benefit the platform for its long-term strategic plan.

this platform which is user-centered facilitates a learning environment that is supportive and collaborative through aspects such as discussion forums, blogs, feedback tools and certificates. Our aim is to help Ethiopians improve their welfare by gaining new knowledge and skills, and to do this irrespective of their background or income.

Finally, with scalability in mind, the platform will be able to accommodate a growing user base and also expand the course offerings which, consequently, will contribute to a more robust and accessible online learning ecosystem in Ethiopia.

5.2 Recommendation

Our project has yielded valuable insights and laid a strong foundation for future development. While time constraints and team size may have limited the scope of functionalities in this iteration, we encourage future efforts to address these limitations by expanding the development team and allocating sufficient time for comprehensive feature implementation.

To further enhance the platform's capabilities, we recommend several key areas for improvement:

Educator Engagement: Fostering a collaborative and sustainable ecosystem requires creating opportunities for educators to easily register, collaborate with each other, and potentially generate income through their contributions. Revenue-sharing models or other incentive structures could be explored to achieve this.

Question Diversity: Expanding beyond multiple-choice questions to include diverse formats like essay, matching, or true/false can enhance learners' critical thinking and assessment skills.

Interactive Learning: Integrating video conferencing capabilities would enable real-time interaction between educators and learners, fostering a more engaging and dynamic learning experience.

Assessment Variety: we will Utilizing quizzes, exams for assessment in addition to this we recommend including assignments, enhancing students' engagement and retention.

By implementing these recommendations, future iterations of the platform can address identified limitations, enhance functionality, and contribute to a more robust, engaging, and accessible online learning ecosystem for Ethiopians.

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Appendix

The following observation check list and interview questions are designed to gather valuable insights from Ethiopian learners and stakeholders in the educational sector. These questions aim to understand the current challenges, preferences, and needs regarding online learning platforms in Ethiopia. By collecting this data, we can tailor our platform to effectively address these requirements and contribute to improving the educational landscape in Ethiopia.

interview questions

1. Could you please describe your experience with online learning platforms in Ethiopia or else? If not, what factors discourage your engagement with them? Also, are you aware of any available online learning platforms specifically in Ethiopia?"
2. If you have experienced any challenges using these platforms, please mention.
3. What features and functionalities do you think will be important in a successful online learning platform in Ethiopia?
4. How crucial is affordability when coming to online learning spaces?
5. Do you find online platforms currently available easy to access in terms of internet connection and software compatibility from any device?
6. What changes would you like to have in upcoming e-learning platforms in Ethiopia.
7. What is the way that online learning platforms can help in addressing the educational challenges in Ethiopia, for instance, the lack of access and the high admission fees?

This checklist below will guide the project team members in systematically observing and recording relevant information about existing learning platforms to inform the development of our platform.

Observation Area	Description	Observation	Interview	Notes
Learning Strategies	Observe the current learning strategies employed by users on existing platforms.	<input checked="" type="checkbox"/>		List of strategies observed
Functionalities	Record some functionalities available on existing learning platforms, including navigation, search options, etc.	<input checked="" type="checkbox"/>		Strengths and weaknesses noted
User Interface	Evaluate the user interface design, including layout, readability, accessibility, and responsiveness.	<input checked="" type="checkbox"/>		Ease of use assessed
Interactions and Engagement	Note the level of user interaction and engagement with the platform, including participation in discussions, quizzes, and other interactive features.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Importance highlighted
Platform Accessibility	Evaluate the accessibility of the platform in terms of internet connectivity, device compatibility, and availability.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Compatibility assessed
Areas for Improvement	Identify specific areas where existing platforms fall short and suggest improvements for the design and development of the new platform.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Identified shortcomings