

Creating Online Tools for Theoretical Resource Management

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Abstract: Concurrent lifelong education of individuals requires more robust online tools due to avoid vast unorganized data. In this work, a web site and a mobile application of the web site have been developed to provide an online tool for theoretical resource management and to facilitate a hub for downloading theoretical resources. A Website and mobile application is developed and named as "Resources and Community for College Students - REPO". The website helps students to find and download all type of resources about their trainings. It is useful in the way that it makes an easier way to search and download books online. REPO is the first online platform which deals with Iraqi students and their materials. The website includes two sections, in which an administration exists at the first section and provided contents are presented at the second section. The administration section (admin) initiates with a login screen. The admin has the highest authority to modify all content in the web site, which is abbreviated as CRUD (create, read, update, delete) operation for all those parts (Users, Blog, Resources, Forum, Application). The mobile app replicates the web sites in mobile devices.

Keywords: e-learning, mobile application, online theoretical web source, e-commerce, e-management

1. Introduction

Concurrent world obliges online resources and sources as active components of vocational training. Abundant theoretical materials accelerate innovation and development. In order to keep up with the developments, one should use the online resources. However, in the vast amount of data and sources, some software tools are necessary to categorize the sources and aid the user. Without such online tools, it is almost impossible to find the necessary sources. It is reported that more than half of the world population can access internet [1] in 2020. It should be considered that accesses to internet also populates the content. In recent years, internet accessing device numbers and varieties also grow immensely [1].

The development of website and mobile applications are required because students do not have a lesson in one easily accessible place. This due to the student's lack of knowledge of reliable sources, and lack of knowledge of the student in the search for a solution to a particular problem. Moreover, the design of this environment will enable students to have a single place to ask questions and benefit from previous questions and stay up to date with the modern technologies and materials of the coursework. Therefore, it is expected that various technologies and tool in the world wide web will continue to develop in a beneficial manner while scaling would not be a major issue [1]. The major issue will be continuing to be the classification and organization of the web content. The main focus of professionals

in the internet community is building such structures for users. Nevertheless, increasing numbers of web platforms also increases the cyber security concerns [1]. Not to mention, technology has become part of our daily life in various uses and to meet our requirements. This prompted many people and companies to go and enter this field to meet the general needs at the individual or societal level. [2]. One major issue about the concurrent work of web professionals is designing web tools that can be accessible by different types of devices with different operating systems. This is also known as communication of platforms. While development in world wide web universe indicates developing web sites, which can be accessed by different types of devices, one should consider physical limitations of the devices such as screen sizes and browsing material such as mouse of human finger.

There are numerous literature works. In order to exemplify the ongoing studies, some very recent literature papers are summarized in the following. Arista et al. [3] published a comprehensive literature review on systems for manufacturing with reconfiguration options aiming the aerospace industry. The authors used Google Scholar and Scopus online tools for their resource searches. Those two websites show the necessity of online tools for systematic searches. A similar situation for smaller groups such as college students is therefore expected. Gopal et al. [4] focused on legitimate and illegitimate websites and try to propose a method for third parties such as REPO to build a request to detect the illegitimate fraudulent websites. They assert the need of third-party websites that uses other services for their functionality to identify the erroneous targets. The authors also utilizes machine learning for their proposed method. The authors' main approach is to shape the request structure to effectively avoid the undesired targets. Bartikowski et al. [5] investigate the importance of categorization approaches

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of a website design. The authors claim that website content that is presented to user has a categorization by the navigation tools. However, this categorization cannot be done considering various cultures. Therefore, the authors assess the culture effect of the user end. In case of REPO, this study inspires to think on effects of categorization. Lin et al. [6] stresses the transparency and safety issues related to user information of websites. The authors spent almost half a year to measure the privacy of famous websites of China by targeting 663 websites. They utilized 199,060 network behaviors of the targets. It is emphasized that very few websites are transparent about third party sharing and retention of cookies. The authors propose three main points for better privacy policies and applications. In case of REPO, college student information and privacy will be an issue to be handled. Rudich-Strassler et al. [7] studied biases of website users by their attentions and interests using the eye tracking technology and additional metrics. The authors assess that highly depressed users find dysphoric content much more interesting comparing to positive contents. Sanchez-Chaparro et al. [8] used 354 keywords and their 933 combinations in order to assess sustainability of corporations by their websites. The authors focus on environmental, social, and economical sustainability conditions of the sample corporations by reviewing their websites with semantic tools. This shows that website content analyses are growing rapidly and REPO will be subjected to such analyses. Chang et al [9] favor ontology-based design of websites. The authors test their approach on a case study that focuses on tests during pregnancy periods. The authors emphasize the importance of website design. They use illustrations to provide better understanding of percentage success of medical tests. van Klaveren et al. [10] surveyed 24 websites in respect of their didactical characteristics. The investigated 2 websites provide about 250 pages. This particular work from the literature has similarities with REPO since there are content topics and teaching modes. About 84% of the surveyed websites have professional origin. The authors identified 16 different teaching modes. However, interaction among users and contribution by groups are identified as absent features of the websites. Website design necessitates some measures from user part and there is a literature work of Alnawas and Al-Khateeb [11], in which the authors present qualitative and quantitative tools to assess the e-commerce websites. Last

but not least is the work of Moneva et al. [12], stating the defacement problem about the websites. The authors suggest that conventional crime theories and tools are also useful for cyber crime cases such as website defacement and repeat victimization.

In this study, we developed a website and a mobile application for Community College Students at the city of Kirkuk in Iraq. This application will enable students, to have a programming community for study discussions and brainstorming, to publish all lessons for all stages and sections (computers, software, networks), to provide additional sources for each material, videos, and books. The present content provides the design of the platforms, the tools that were used for the design and shows some indicative figures of the designed web site.

2. Method

In this section, the codes, their utilization, and the design work are introduced. In the present study, PHP was preferred due to its flexibility comparing to codes such as C or Perl which would lead to numerous command lines to construct a HTML page. In PHP pages, there are HTML with codes that is for doing functions as an embedded manner. The browsing software identifies PHP section by the special lines indicating initiation and ending parts. In order to indicate the start, `<?php` group is used and to finalize the section `?>` signs are used. The PHP page runs on the server unlike JavaScript that is executed on the client. The server generates HTML and send it to the client in case of PHP. By this way, client is not aware of the code that generates the HTML and results of the script. This way of working by PHP solves the operation at the server and provides the content to the client without depending on client resources. In other words, the client-side possible problems cannot affect the result [13].

The term “front-end” means the screen that appears on the client-side [14]. The apparent screen can be interacted, browsed, or just viewed. Therefore, the served-side is designated as “back-end”. The webpage is prepared at the back end and published towards front-end. The back-end does not reveal the mechanisms that prepare the apparent content as shown to a typical user.

There are different technologies, techniques, and approaches for the back-end sides. In Table 1, some features and technologies for the front-end and back-end parts are exemplified [15].

Table 1. Features and technologies of front-end and back-end parts

Features	
Front-end	Back-end
Client-side	Server-side
Website design	Databases
UI/UX	Servers
Technologies	
HTML	PHP
CSS	Java
JavaScript	Python
AJAX	Ruby
-	.NET

Since there are a lot of historical applications, programmers are relying on past experiences that build frameworks. The frameworks constitute a basis for special purpose web pages or online tools. In order to specialize a framework, coders first pick

an appropriate framework that suits the task and then modify and develop the framework. The framework outlines the main routine and it needs finer details to function as is designated. In Table 2, some well-known frameworks and their coding

languages are provided [16]. It should not be forgotten that those frameworks are for the back-end and they represent the latest technology.

Table 2. Back-end frameworks and their languages

Frameworks	Languages
Vue.js	JavaScript
Express	Node.js (JavaScript)
React.js	JavaScript
AngularJS	JavaScript
Django	Python
Flask	Python
Laravel	PHP

The administrative section, which publishes materials and curriculum as well as articles, and a specific section for fourth-stage students is illustrated in Figure 1 as a block diagram. The

design and execution of the website system is discussed here. In Figure 2, the block diagram of the user side is shown.

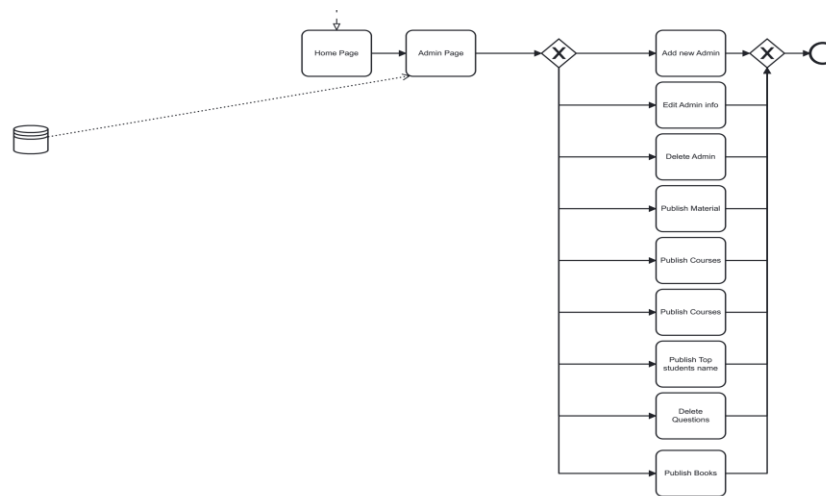


Fig. 1. Block diagram of the administration section

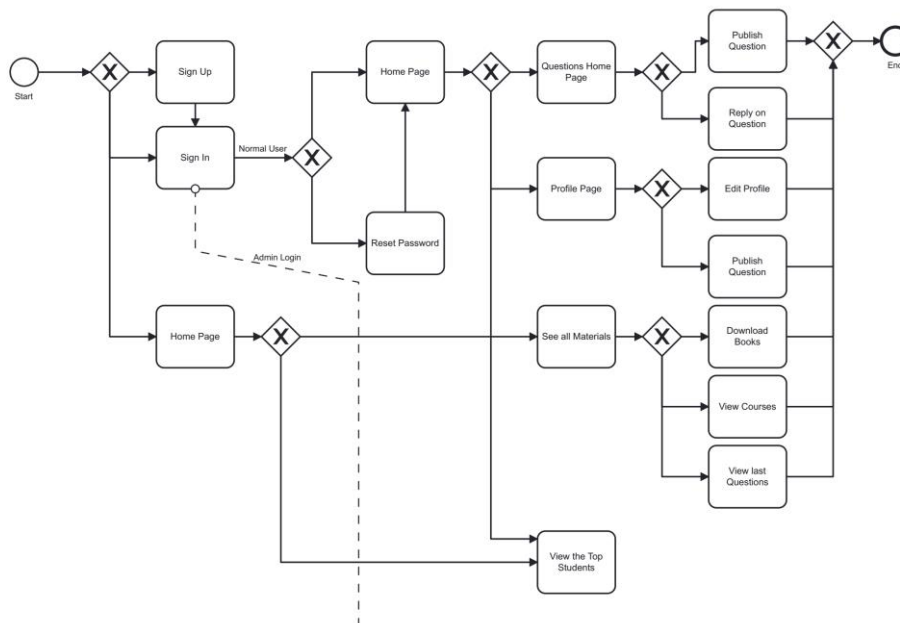


Fig. 2. Block diagram of the user section

In Figure 3, the tables and fields used in databases and how they are related to each other are presented. After login is done to admin account, the dashboard page that contain static analytic such as number of users, books, applications, discussions) are seen as in Figure 4. In left side a

navigation bar (navbar) that contain all sections, i.e., users, blog system, references, applications, forum system, exists. Figure 5 shows that create, read, update, delete (CRUD) operations can be realized.

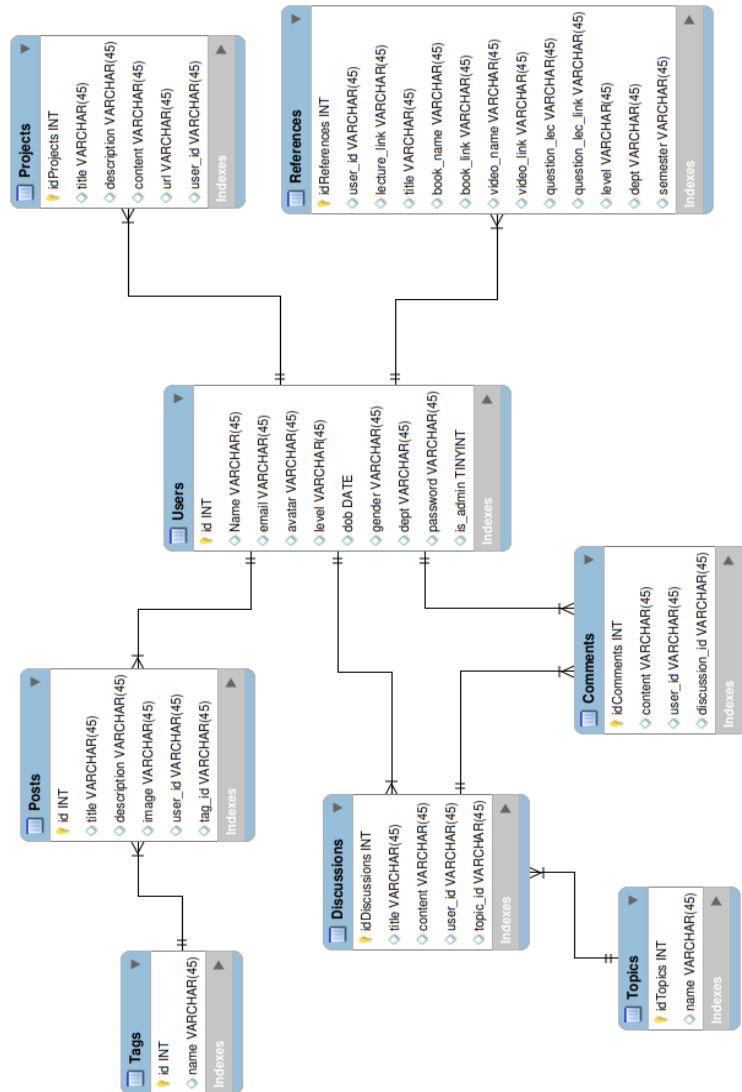


Fig. 3. Database scheme for the designed online tool.

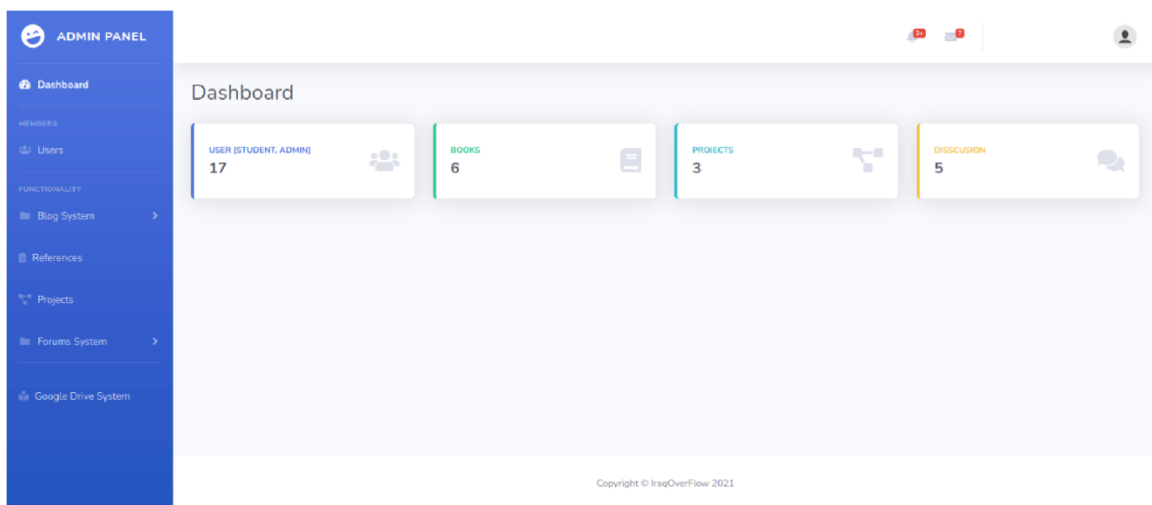


Fig. 4. Admin dashboard

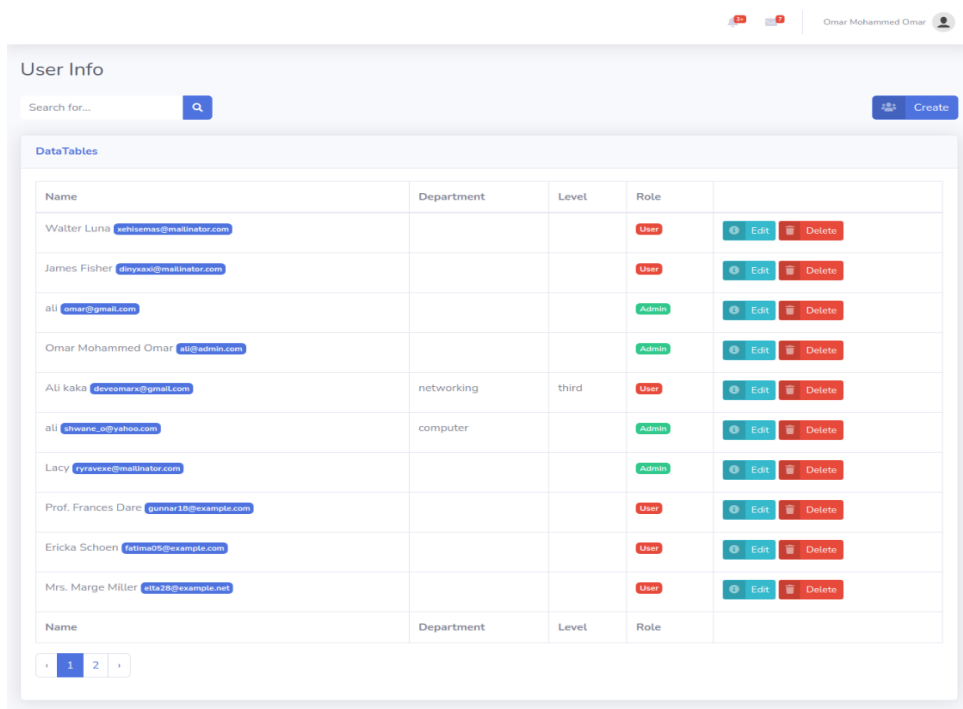


Fig. 5. Admin part user information board

In the login page, as shown in Figure 6, user or admin can create a new user.

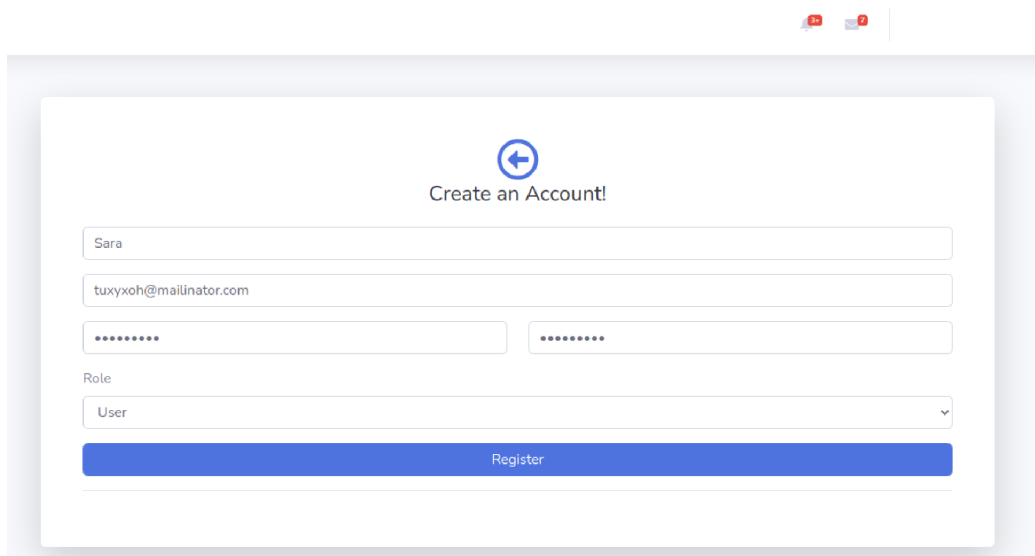


Fig. 6. Creating a new user from the login screen

In blog system we have two section, i.e., “post” and “tags” because every post is belonging to a specific tag, for example the post is about Pointers in C++, then this post is belonging to C++ tags. Then there is an important part that is called as “Reference” section. In this section, every material have 4 items. For example, C++ for a first stage student and first semester the reference contains “C++ Lectures, C++ Books, C++ Videos, C++ Questions” as shown in Figure 7. If one needs to edit or read all references, then “Reference” called link in left side should be selected or clicked. Last but not least, the “Forum” for discussions exists. This section is just for students to post their problem and reply them by another student. On the other hand, admins can read all discussion and/or delete or update them.

After all pages and operation for the admin part, the student section is introduced in the following. The first page in the student section is the home page. Home page has a navbar similar to the admin section, which contains all other pages, i.e., “Lecture’s, Forum, Blog, Applications, About”. If an admin logs to the student section, an admin link is also apparent. If one selects “Lectures” link in the navbar, a new page appears with 4 stages, i.e., “first, second, third, fourth”, in which every stage contains 2 semesters (first and second). This page can be seen in Figure 7.

Figure 8 shows that if one chooses an option in Figure 7, a new screen appears containing the “Department” (for instance, computer, networking, software).

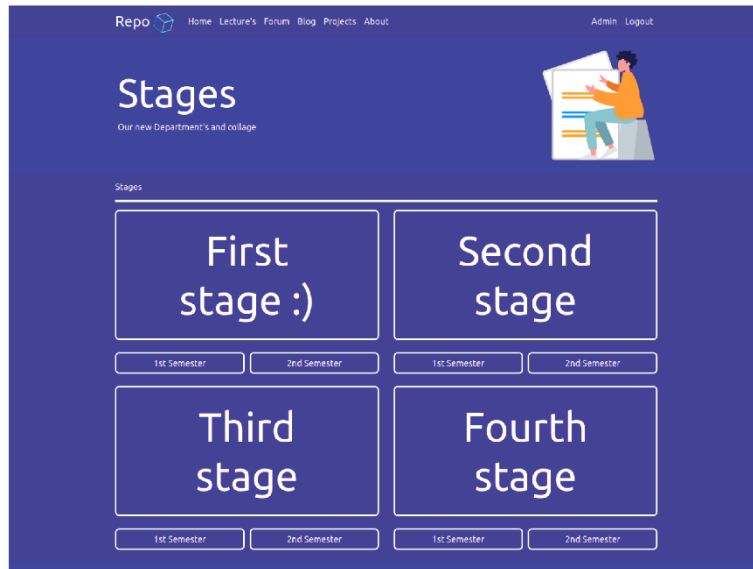


Fig. 7. The student part with stages and semesters

If a department is selected and then a topic is requested, user is directed to a cloud storage such as Google Drive that contains all lecture's, Books, Videos, and Questions.

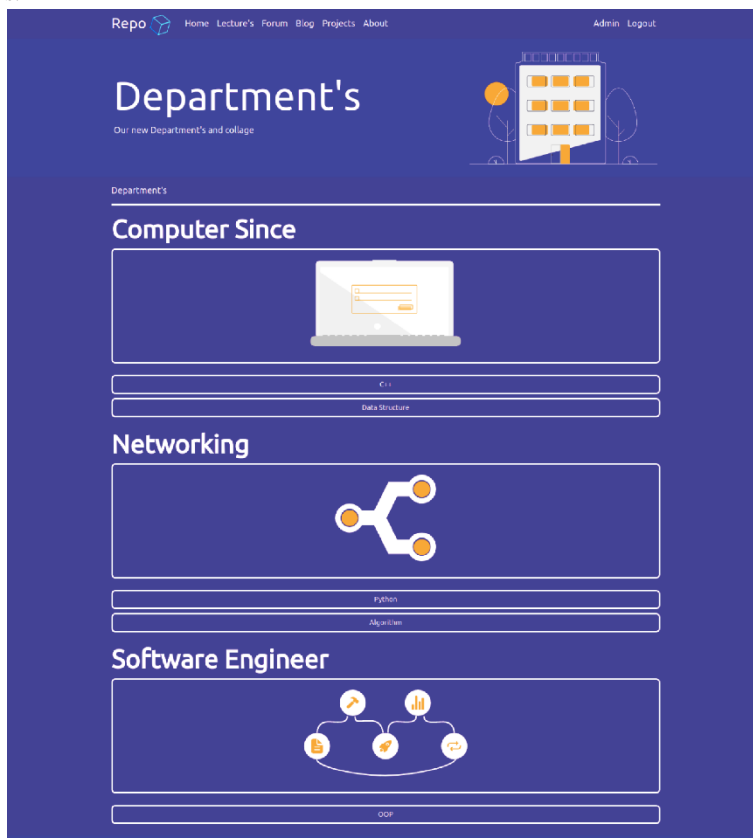


Fig. 8. Student part - departments

In the mobile version, in other words, in the mobile application, content is suitable only for Android operation systems. Coding was done in Java. Content is same with the web site. Figure 9

shows the splashed page of the mobile application. This page contains information about the application.

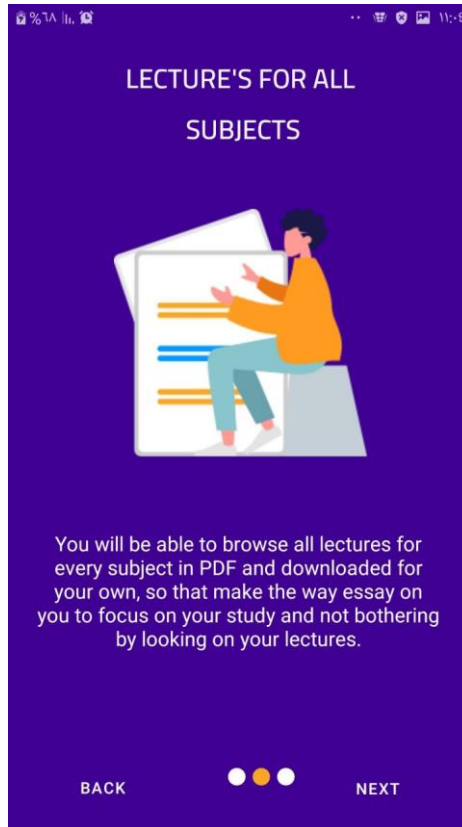


Fig. 9. Splash screen of the mobile application.

The navigation bar of the mobile application directs user to same options of the website. If one selects the “Resources” section, the whole department semesters are provided as shown in Figure 10.

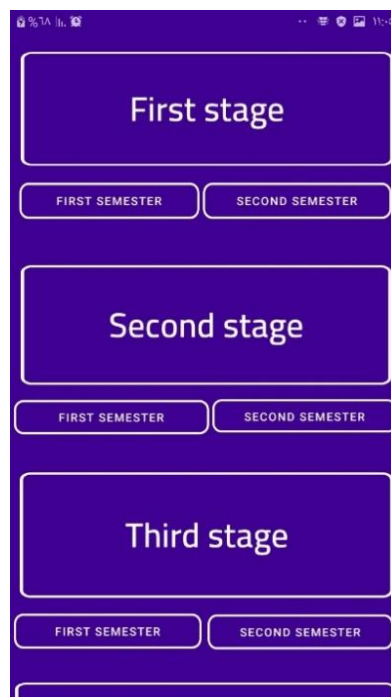


Fig. 10. Sources with stages in the mobile application.

When a semester and stage is picked, the materials according to topics are listed as shown in Figure 11.

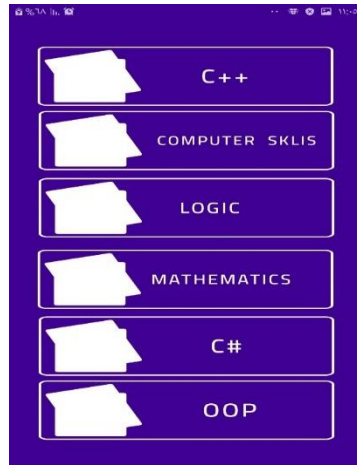


Fig. 11. Lecture list in the mobile application.

3. Conclusion

This study was realized to consist of a website and an Android based mobile application called Repo that replicates and functions as the website. The main objective is to build an environment that is helpful for students, in particular, in obtaining study materials, their resources, their books and the educational courses that explain them. Also, one of the sections the main thing in this application is to build an interactive platform that enables students to ask and fill their curiosity about a specific topic or a specific inquiry about one of the study topics or others so that they can discuss it and get different opinions and answers. In addition, there is a section that is named as “the Department of Applications” in which students’ applications are raised to be a point of inspiration for students, as well as an advertising and promotional base for them. In the mobile version, the application was shortened to consist only of the study materials and articles section in order not to be distracting and a waste of time, as the application contains an interactive-social section.

This application was developed on the basic idea of providing all the student needs study materials, resources, books, model solutions and educational courses. The possibility of developing the application to be comprehensive for most colleges and departments and be an informative and interactive platform for them is considered for future additions. Also, there is a possibility of linking the website with the mobile application to share the same files by uploading the application to a paid server so that developers can create a special API to be the link between the mobile application and the website.

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