

Virtual Lab

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Abstract: *E-Learning plays the main role to support the traditional learning with online learning. This is achieved through the management of the Learning Management System (LMSs) and their functionalities. Many LMSs contain functionality that virtualizes the course's theoretical part in the classroom but not addressing the technical part. In this direction and to support the Computer Science Education (CSE) the virtual lab has emerged as an adopted environment which could be integrated into the LMS environment. This paper proposes Web –Based Approach those can be used to prepare and integrate the virtual lab for CSE into LMSs (Moodle). The tool can be implemented using any programming language and then integrated to Moodle using LTI. It reduces the load on the LMS environment since the processing will be outside. This paper is aimed to extend the main idea behind the development of e-Learning platform tools to be useful in the academic life. This paper showed that many learning Management Systems have a limitation in the availability of software tools for practical sessions for education in general and for Computer Science Education as a special case. Therefore, this paper proposed the Web –Based Integration to integrate the needed software tools into the LMS environment in order to help learners gain knowledge through the practical session. The work depends on Moodle environment as an open source LMS to help in the integration process by accessing its code.*

Keywords: Moodle, Learning management system, e-Learning

1. Introduction

At the time of learning languages like C, C++, Java ... etc. The beginners had number of problem like to install compilers at desktop-pc. Some time student had to face the problem of configuring the compiler. So that they can't get execute the program successfully. And other problem is that if the users want to compile program on any other system they require again all processing to install and configuration problem. To solve these entire problems we thought of designing an android application to execute the program on different type of source code by one editor and also a well configured compiler providing services by servers. That is simply to create a common server for different programming language and to create a common interface for all programming language. Also tried to make a windows application so that teachers can conduct their lab exams by providing different topics to each students. Students can write the code online and teachers can evaluate it and can put mark for it[1]. An online compiler has the same basic functionality as a conventional compiler, however with one significant difference: all of a project or application's source code is stored and executed online. Storing and executing source code online significantly reduces both the hardware and the software required by programmers when working on any given project. Modern online compilers are still somewhat limited in their capabilities when compared to conventional compilers, however today's online compilers are capable of compiling Java, C Sharp (programming language), VB.net, C, HTML and C++. It gives benefits in mobility i.e., the primary purpose behind the development of online compilers is the mobility that they provide to programmers. This is only because of it require only a web browser and internet connection to access and edit code. This is in contrast to conventional compilers which require programmers to set up and store their code on a single computer. It can be access from anywhere using any device which has an internet connection. It can also give the benefits to share our logic or code and do not have installation procedure i.e., you can spend your time on what really matters – the programming itself.

1.1 Background

The users need to create the source files locally and compile them through separate editors / compilers. The compiling procedure is different for different language. The user needs to know the procedure in advance. At the time of installation, we need to be aware of the hardware and software requirements. When the existing hardware didn't meet the specification, we will not be able to install the product. When the latest version is released by the company, user needs to upgrade the existing product to get the new features. User need to install multiple language compilers for compiling different language[3]. Now a day, these compilers are much costly. In the case of company, they may need to buy a number of same language compilers. Currently, many companies using the pirated products. Now Windows make strict rules against the use of pirated versions.

2. Objective

The system can automatically find out the compiler server. After creating the source application, the user needs to press execute button in order to compile the file and execute.

The remote host compiles the file at its own location, and the result is send back to the client. Programs can be downloading from an application. And also save for future purpose to every user. The main functional modules of the desired application are user management and CODE editor. User management module is handled by the admin. Online compiling is the one of the important feature of this application.

Another objective is to conduct virtual lab. Mainly it contains one module called lab module. In Lab module admin can create question and it can be distributed among the students. There will be a time limit for the exam. After time exceed the program will be automatically saved and the

teachers can evaluate it from the server side and can provide mark for it.

2.1 Purpose and Scope

“VIRTUAL LAB” is planned in order for the client to compile the source code of multiple language in Mobile so that it need only a common client interface for creating program in any language and a cost factor also reduced since it using only a single compiler for the entire network. The project entitled “VIRTUAL LAB” is a new approach that implements a common server for different programming languages like JAVA, C and CPP. This software deals with the globalization of multiple compilers. This project is actually a distributed application software project. Features include:

- 1) Need only a common client interface for creating programs in any language.
- 2) Mobility: -Can access it from anywhere via internet connection.
- 3) The cost factor is reduced, when using a single compiler for the entire network.
- 4) Android Application.
- 5) Windows application

The main objective of VIRTUAL LAB server is- to overcome the disadvantages of existing compilers. The application used to create a very user friendly and an easier way to use compilers as compared with existing compilers. Actually this application is an enhancement for existing compilers installed for each language. Main benefit is that it can access form anywhere with an Android device which has an internet connection. With this application you can log in with your Android phone, write code and test logic or syntax, edit the code, and have it sent off to all viewer sin a matter of minutes.

2.2 Problem Definition

E-learning is known as the electronic learning that allows instructors to improve the quality of learning by using the technology. Some researchers showed that the students' outcome increase with e-Learning technology. Therefore, a virtual lab is one tool that uses technology to improve the accessibility of the learning resources by providing the needed software tools for online practice of exercises and labs.

In this paper, the main idea of extending the virtual lab in Moodle environment will be discussed. This paper studies the ability to extend the virtual lab software tools for the CSE. Computer Science Education is one area that needs a special effort to prepare the needed virtual lab for it .[4]

The courses in CSE involve two main parts:

- 1) The theoretical part, which is concerned with the theory and knowledge that are needed for the courses. This part can use office suite, multimedia, wikis and others.
- 2) The practical part which is concerned with the practice that the learner gains through practical sessions. This part needs the support of the virtual lab and can use computer applications (e.g. Programming Langue Compiler, UML drawing, UNIX environment, etc.)[6]

The limited availability of these software tools in e-Learning application produces a big gap in e-Learning against traditional learning for education in general and CSE as a special case Therefore, the purpose of this paper is to prepare the virtual lab with the software tools and integrate it into the LMS environment using different integration approaches. These approaches will provide the accessibility facility of the tools from the LMS to the students from anywhere and at any time.

3. Design and Implementation

The most creative and challenging phase of the system life cycle is system design. The term design describes a final system and the process by which it is developed. System design transforms a logical representation of what a given system is required to do into the physical specifications. The specifications are converted into a physical reality during development. The design forms a blue print of the system and the components relate to each other. The design phase proceeds according to an orderly sequence of steps beginning with review and assignment of tasks and ending with package design. Database is a collection of interrelated data stored with minimum redundancy to serve many users quickly and efficiently. In database design data independence, accuracy, privacy and security are given higher priority. Database design is an integrated approach to file design. This activity deals with the design of the physical database. All entities and attributes have been identified while creating database.

3.1 Main Technological Resources and Interfaces

Technological resources provide opportunities to enhance the participation and, as a result, make them suited to the kind of implementation by virtual lab. In the following section, there will be an examination of the technological resources and main interfaces that offer support to a set of structured and measurable activities based on the principles and key elements of learning through virtual lab.

User Management Module: In this module, administrator can list the existing users. An admin can deactivate the user form further uses. After deactivating, user can't login into the Client Application because their profile will deactivate. When user firstly login in to application then they are in an activate state. Admin can delete, view all programs of each user and check it. Users can save programs to their profile. But it is visible only after activating by admin. Admin can also set programs as visible to everyone for future reference.

User mainly interacts with the 3 modules. User may be a student or a learner or a beginner of the programming language or high level programmer.

Registration Module: When a new user comes, he/she need to register in the application. Registered user can login in to the application and goes to the language selection process. After selecting a language, just typing corresponding programs and click an execute button. After clicking an execute button, they can get the result, download the program and save that program.

Login Process Module: A registered user can login in to this application. User is interacting with user interface. When the user login or logout, status is updated.

Code Editor Module: When user login in to the software, he is directed to the user interface source editor window. This window is like a text editor. Here there are so many options. They can initiate different actions such as, Select the language, the user can select the different language options. Currently the application includes java, C#, VB, C and C++. When the user selects the language, its corresponding skeleton is displayed. The different language has different skeletons.

Lab Management Module: In this module we are trying to conduct a lab exam in the context of Moodle. When user login in to the software, he is directed to the user lab exam window. Here there are so many options. They can initiate different actions such as: Create Question, Distribute Question, View Result, Enter Mark.

Server Module: The main function of this is to receive data from android application. Socket communication is used to communicate between server and client module. SQL database is used to store data sent from client. Server side application is created using java technology. Because it is platform independent, so it is worked in any operating system. For the application development I am using Net Beans IDE. It has very effective and very user friendly interface to develop this application. So normal user can develop any application with this IDE.

4. Conclusion and Future Scope

Android is the technology of this era and developed a mobile application 'VIRTUAL LAB' and also a windows application using Java. It is found that it could be used for any person who has an internet connection in anywhere. A consistent and efficient system design has been successfully developed. The system has been developed using java. The system is very flexible and user friendly. So further changes can be incorporated into these systems easily. The project design was successfully completed within the time span allotted. The system has fulfilled the entire objective identified. The system design had been developed in an attractive dialog fashion. So the user with minimum knowledge can understand system design easily.

The system has been designed in such a way that it can be modified with very little effort when such a need arise in the future. The system has been found to work efficiently and effectively. Due to its higher user friendliness, others may use these documents as a prototype for developing similar application. The system is found to be error free and ready for implementation. To survive from the competition each has to produce some modifications to it in the future. New features will provide the system is a new fresh look, by which it can attract a lot of users .changes inevitable when computer based system are built. We are live in a rapidly changing world. The demands on any organization and the information technology that supports them are a pace that's puts enormous competitive pressure on every organization. To keep track with the changing environment, the system

that we developed should be easily enhanced. The software is applied to periodic revisions to create revised software will meet the current goals. The intent of this is to create versions of existing programs that create higher quality. The "VIRTUAL LAB" is flexible and allows for modifications and future enhancements. We can add further enhancements to system by adding functions and procedures to increase the processing of system. Since the system is more flexible, further enhancements can easily do if time and cost schedules are suitable for it the modifications can be made by the support of the maintenance personnel without much difficulty.

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