

Location Independent Presentations Platform
For Programming Lectures

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February 2019

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A software tool that providing interactive and more productivity on programming sessions

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Dissertation submitted to the Faculty of Information Technology, University of Moratuwa, Sri Lanka for the partial fulfilment of the requirements of the Degree of MSc in Information Technology.

Faculty of Information Technology

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February 2019

Declaration

I declare that this report is my own work and has not been submitted in any form for another Masters, Degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Date:

Dedication

This dissertation is dedicated to my beloved parents, siblings, my teachers who gave me endless courage and support to achieve my task and goal in completing the research project.

Acknowledgement

My heartiest thanks go to my supervisor Mr Chaman Wijesiriwardana for the guidance, assistance, encouragement, valuable advice on improving the research and providing this opportunity to carry out this research project.

Also, sincerely thanks to all my teachers who taught in MSc IT degree program. Things learned from these subjects made it easier to make this research project a successful one.

Finally, a sincere thank goes to everyone who supported teams especially from Redot Pvt for contributing their valuable time on this research.

Abstract

The rise of modern-day technologies also affects the classroom. When it comes to teaching and learning, they use advanced technology methods, as it's easier to communicate with the students and teacher in or out of the classrooms.

Lecture presenting becomes a significant part here, and earlier days addresses must use conventional ways to do the presentation of their speech. Starting from the projector to attractive touch screens they convert. But these methods are not enough to get interact with the students. They used to get boring and when conducting programming lectures, both students and lecture face to a primary problem, which is when they do the coding part. When the lecture shows in the presentation and gives exercises to students, it gets hard to interact with the lecture and doing the debugging. Because students have to wait till lecturer comes or lecturer should go through every student. If users need to get help with each other, they need to visit each of everyone. This part requires an external effort like the help of lab assistants.

Primary Goal of the research is to find a proper mechanism to conduct the presentation with code synchronized with lecture, student and all together. Also, there are some other methods nowadays people achieving it, like remote desktops, using an online IDE. But those have limitations.

Also, we have found a big problem that lots of people face when using FTP, as this should be port forwarded. When it comes to setup port forwarding it has many limitations like ISP blocked, router not supported and require some technical knowledge to setup. So, we have also research to find a proper solution for connecting and do FTP process without the port forwarding or any complex methods.

With this research, we can resolve all those problems and remove external efforts like lab assistants. This will affect the productivity of lecture sessions with connectivity among lecture and students. With the proposed tool, we use an online presentation platform with code syncing and debugging with every student who connected to the current session. Plus the students can raise their questions from the lecturer, without visiting and users together can help each other to solve their problems without visiting them.

Also, we can achieve the goal of connecting the File Manager process without any FTP or port forwarding methods. By installing a simple software, everyone can share their specified file location with another end. So, we connect both Presentation Platform with coding syncing to the method to achieve the File Transfer process easy.

This tool reduces the waste time of lecture and student by automating the synchronized part of coding exercise and presentations. Make more interactive and productivity classroom for both ends.

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Chapter 1

1 Introduction

1.1 Prolegomena

Nowadays presentations have become one of the essential factors in a higher education environment. There are many flexible tools to conduct a presentation. (ex. Internet, pdf, ppt, etc.).

Most of the lecturers use presentation tools to present their presentation to the audience. That will make the audience keep attention to the display.

But most of the time people fall in sleep or get bored , because they are not interactive with the presentation. They have to watch and listen. They don't have a way to interact with the lecture and continue the presentation with collaboratively.

Never the less when the lecture goes on and if the user needs to get help from colleagues, they need to visit each of them, and that makes the disturbance to the lecture.

Also, when it comes to File sharing using FTP methods, it was a big problem for many people. They need to do port forwarding's, router configs and lot of other works. So, most people and developers have been stuck in this process for a long time.

This research suggests overcoming these problems by adding new slide based and code syncing presentations platform which gives more interactive experience and increase the productivity of the classroom with attention and collaboration of the audience to keep them connected with presentation together. This platform is providing a synchronized slide to slide transitions and coding with the lecture. When master slide change that will affect to all the participants in presentation, as well as the altogether, can sync all participants with coding exercises and debug with lecture device. No need to visit each an every student to check the code and help with debugging. Everyone who is connected can sync with submitting code to the

platform. This is an essential platform where classic projector can't use and make a lecture continuous without interrupting the session. [1]

Also, by providing software that can be installed and set up to use FTP file transferring methods without any configuration. People can log in and set the desired path to share, and the other ends have all the access that path. So, this reduces the setup FTP configuration time. And we can connect these two platforms to achieve the Presentation Platform with coding syncing with file transferring for both ends.

1.2 Background and Motivation

In present presentation platforms, we can find lots of tools that can be use to do a presentation more interactively. And in code debugging, we can see lots of means the same as presentations. For presentation most famous is PowerPoint and Google Slides, some others are Libre PowerPoint, PowerPoint Cloud, Slide Share, etc. when comes to code sharing, we like AWS Cloud9, where we can share the code with others and code as a team. Some other tools are that can teach coding for users more interactively are Code.org, Scratch, CodeHS, Google CS and bot assistance tools like Cozmo.

And if look for File Sharing FTP methods we can find FileZilla, Cyberduck and many more FTP Clients.

We can use these three types to achieve our goal. But all the above three has limitations and cannot use the same together. Presentation tools like PowerPoint and Google Slides can be used to make and show presentation but cannot interact real time with the user and do the presentations. Then in cloud IDE can use to do a Cloud debugging but cannot sync with the user and do the debugging. Another solution is that we can use remote desktop to connect with users. But when it comes to many users with sync, it becomes a nightmare.

When it comes to File Sharing these methods have many limitations like people, have to set up the FTP Servers, do the port forwarding and many other technical things. But the chance of failure of these methods is high. Even Without specialized knowledge, it's hard to fix them.

All these solutions made a significant advantage to presenter and students do an interactive session. But still, have many limitations when it comes to sync code with the presentation. Users must show there coding separately, or in coding session when they got a question or problem, they must wait till lecture. When a user needs to get help from other users, they need to visit each other. It makes a disturbance to the classroom. So, these ways make students more bored and fall back. Especially when they have an issue in coding exercises. Also, in the lecture side, it takes a lot of time to visit each student to debugging. These issues fall back class productivity significantly.

1.3 Problem in Brief

To conduct proper presentation participants should be at the same place. And need some extra effort to solve their coding problems or solve user's questions. It is hard to do a presentation remotely. If presenter must do a presentation remotely, the user has to do lots of stuff. Another thing is presentations aren't interactive. When they are listening to a long time to the presentation [2], and if the user gets a problem or stuck in some errors it's hard to reach presenter, and the audience gets bored of what they are doing.

When it comes to File Sharing using FTP, most people become stuck and tired because they are such a hard setup in regular computing. Need to do many installations to achieve it.

In lab sessions on programming in university, we identify that there is a lot of things to do for lab assistant as well as a lecturer. If the student caught up on issue lab assistant must go every student to fix their issue. This issue also added for students who tried to help each other because for them need to visit for help to debug.

Ex: -

- If presenter going to use the presentation using skype, the presenter must add all of them to his friend list before starting the presentation.
- Lecturers are using presentations to do their lecture. But lecturer cannot get an idea about students gave full attention to his lecture or getting any errors.
- Some students are shy to ask questions from the lecturer.
- Setting up an FTP Server need Technical Knowledge.
- Hard to interact with another user's code

This application will provide a solution to these kinds of problems.

Proposed Solution

This research is to suggest a web-based presentation platform with code debugging which give more interactive and collaborative experience to get the attention of the audience and keep them on a presentation by keep them busy with activities.

The presenter can use application editor to design the presentation with embedded functional parts coding and share it on URL via email, text message to, etc. Each participant can do the practical coding parts and submit the code to the presenter for debugging or submitting. Every user can share their code among them to get help from other users, the presenter can review them and push back to users — synchronized code review with user and presenter or all together. When presenter changes the slide, all the participant's slides are automatically evolving according to the presenter's slide state. But participants can improve their transparency to whenever they want and can work on their IDE without limitations. If a participant has something to ask, they can use the “ask question” option. A participant can draw on their presentation to mark specific places using a pencil (Heatmap). The presenter can view all the drawing instantly. The presenter can add questionnaires to the presentation then participants can answer it. As soon as they reply to the questioner, presenter gets the answers.

Also, when it comes to File Sharing without FTP program. The user needs to install the application we provide and set the desired path to give access to use File Managing. Then the third party can do any file processing mechanism from that folder.

This platform also helps to conduct especially programming lectures because the platform will provide a way to sync lecturer's code segment. Most importantly this will reduce the task of a lab assistant because master presenter can fix student codes remotely. So, lab assistant no need to go to each student. He or she can fix all of the student's code by one sit.

We combined these two methods to achieve our Online Presentation Platform with Code Syncing and Debugging for both ends from any location in the world.

1.4 Aim and Objectives

1.4.1 Aim

This research aims to provide the presentation platform to do programming lectures inaccuracy.

1.4.2 Objectives

With the view develop of this platform for presentation, we have identified the following objectives.

1. Research for software-based solution to increase the effectiveness of presentations done related programming, and identify the drawback in existing systems
2. Successfully identify the technologies to implement a presentation platform
3. Design and Implement a presentation platform which addresses the drawbacks from existing systems and equipped with newly found methods.
4. Implantation and evaluate the presentation platform with users to see how it impact to the programming presentations.

1.5 System Requirements

This platform is a web-based solution and runs on the latest web browsers like chrome, firefox, opera, Microsoft edge, etc.

This is running on any operating system since this is a web-based solution. Compatible operating systems are windows, mac os, Linux based os, etc.

Only Presentation Platform is support for mobile operating systems like IOS, Android, bada, etc.

Also, users and presenter need to install an IDE (Visual Code, Storm,etc..) and File Server(File Zilla) on their Devices.

To run this application, the user needs below mention specification on their device.

Device	Processor	Ram	HDD	Resolution	GPU
Pc/ laptop	P4 or higher	Above 2Gb	2gb free space	Minimum resolution 640x380	512mb
Mobile (smart phones)	Snapdragon latest or A4 to A11	1 or higher	-	Minimum resolution 380*320	-

Table 1 - System Requirements

1.6 Structure

In chapter one, we have given the full introduction to this research. After that, I have discussed the literature review. In that chapter, we have explicitly specified previous work, problems in existing researches, research gap. After that we have explained the technologies, we are going to use to provide this solution. In approach chapter, we have provided the overall picture of this research. It includes hypothesis, input, output, process users and features of this system. Next chapter we have discussed the design of this solution. It provides development methodology, selection of software process and current development workflow. Also, it describes the main modules of this system. Next chapter discusses the overall implementation, development process, development of UI and backend. After that, we have explained the evaluation of this system. It includes test cases and real-world testing results as well. It also provides aim, objectives, drawbacks, and limitations. Next chapter we have to discuss the overall conclusion of the thesis, and after that, we have specified the references as well as appendices.

1.7 Summary

In this chapter explains about the location independent presentation platform and how it works and how it will help to the do an excellent presentation with users collaboratively and carry lecturer presentations effectively and more productively. In this chapter explains about the location independent presentation platform and how it works and how it will help to the do an excellent presentation with users collaboratively and carry lecturer presentations effectively and more productively.

2 Current Development and Challenges

2.1 Introduction

The Previous chapter, we talked about the overall picture of the thesis. This chapter discusses a critical review of the literature in using current presentation and code sharing tools and defines the research problem for this project. We also analysis various technologies used to develop presentations and code sharing platforms to address our research problem. Mainly Use of existing presentation platforms, use of existing code syncing platforms and finally the research problem is defined.

2.2 Current Developments

2.2.1 A simple Presentation Tool Based on Web pages

Ying Peng and Chanle Wu in 2008 developed a simple presentation platform because at that time e-learning was very popular. PowerPoint was the most popular tool at that time used to do a presentation. But the popularity of the e-learning ppt files needed to share on web pages. But the file formats of those presentation tools like ppt do not support web page format which is suitable for web publishing. Those presentation tools file formats are usually needed further format converting process, like converting ppt files to web page files or SWF files. To solve the problem, Ying Peng and Chanle Wu designs and implements a simple presentation tool, and the file format is based on web pages. [1]

Advantages

A software tool which was built in that research is capable of design and implement presentations in the format of web pages. So, the slides are equal to the web pages.no need of further file formatting is needed. [1]

2.2.2 Canvas Based and Slide Based Presentation Platform

Arvind Krishnaa Jagannathan proposed two methods, canvas based and slide-based presentation platforms. In the canvas-based model, the entire content of the presentation is laid out on a two-dimensional boundary-less view area, called a canvas. A viewport is moved across the canvas to bring in to view any rectangular area of the canvas, called a frame. In the slide-based presentation paradigm, information is organized into a sequence of slides. In each slide, a "slideful" of information is further organized into a bulleted list. [3]

Michal Kokorceny and Agata Bodnarova proposed desktop-projector project is to create a software tool (application) for more effective teaching in computer classrooms, especially in cases, where classic projector can't be used.

Advantages

This software tool which was the outcome of the research was based on a two-dimensional boundary-less area of the canvas. And the main advantage is the teacher's desktop can be broadcasted to other computers in the local area network. [4]

2.2.3 Paranoid

Paranoid is a global file access control system that allowed users to selectively, securely and efficiently share information with others. This application is using peer to peer application transparent file sharing. With this user can grant privileges access to others from outside of his administrative domain without creating the account or grant access for outsiders. The primary goal of the paranoid is to facilitate global peer-to-peer file sharing. Paranoid includes a hybrid encryption system file storage.

Paranoid uses global usernames and file names. The system uses email addresses as global user identities, and for global file names, the system uses a URL like naming conversion. This uses HTTP similar protocol offer communications. [5]

Advantages

The main advantage of using paranoid is it uses peer-to-peer file sharing technology which and uses to broadcast files over the internet and accessible to set up user privileges without creating an administrative domain for an outsider.

2.2.4 Cloud-based IDE

To achieve more productivity throughout the coding session's people are committed to using the cloud-based tools. That also improved the team dynamics. Most of the code syncing platforms target to make the project coding get sync among the team members. So, they can share the code base online and do the coding. [6]

In 2010 Online, based IDE found name called Cloud9. And it used to do as an online based IDE to do the project's cloud-based and without installing any third-party applications. Later this used as a workspace to work with other project members at the same cloud-based project with share code and reviewing.

Eclipse Che is also an open-source Java-based cloud IDE that supports a workspace server built for Teams and Organizations to sync and work together with their coding.

These cloud-based IDEs provide some advantages. They can take advantage of the rich opportunities afforded by the client-server model of web applications. These advantages include, for example, automatic saving and backup of code, real-time pair programming across a distance, such as a build and a search, that previously were done on the desktop.

Advantages

With the implantation of the cloud base, IDE's primary target is to make available the project to everyone. Can connect to the same workspace and share and work together on projects.

2.2.5 Other works

Apart from the major researches that we have discussed above, we will look a bit more into modern day tools which are being used in the market.

2.2.6 Google Slides

Google Slide is an online based presentation tool that can create slides and share with other users. Also, they can edit with the team and present to all users' same time. Can use pdf and all type of powerpoint formats with slides. Based on google drive and store information's in the cloud. [7]

2.2.7 Prezi

Prezi is a cloud-based presentation and story telling application that uses a single canvas instead of traditional slides. Prezi helps you to reveal the relationship between your ideas. Your message has a better chance resonate, motivate and be remembered with Prezi. [8]

2.2.8 Ludus

Ludus is a web app that lets you integrate all the power of the internet into slides. It helps to add code to slides in an easy way. It gets synced in all your presentations and updates in one place. [9]

2.2.9 FileZilla

Filezilla is free open sourced software which supports FTP and FTPS and SFTP server support. Transfer files using FTP and encrypted FTP such as FTPS (server and client) and SFTP (client only) and it also supports IPv6. [10]

2.2.10 Cyberduck

Cyber-Duck is an Open Source client for FTP and SFTP and most of the cloud storage. It supports FTP/TLS and directory synchronized. Cyberduck is written in Java and C# using the Cocoa user interface framework on macOS and Windows Forms on Windows. Also, provide GUI to support drag and support. [11]

2.3 The Research Gap

To identify the research gap. Above mentioned research methods were evaluated under the following criteria. These criteria were selected based on the research articles and from field expert's requirements based on surveys.

1. Web Based	9. Setup Port Forwarding need
2. Can access from anywhere	10. Real-time Heatmaps
3. Share the Code	11. Multiple language support
4. Code Synchronized for both end	12. Cloud-based service support
5. Code Debugging for both end	13. Two-dimensional Canvas
6. Real-time online Presentation	Based Presentation
7. Real-time code sharing and editing	14. Unicast
8. Import and Export to other formats	15. Working on Port 80

Table 2 - List of Evaluation Criteria for existing prototyping tools

Research	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A Simple Presentation Tool Based on Web Pages	✓	✓	x	x	x	x	x	✓	-	x	x	x	x	x	x
Canvas based and slide-based presentation platform	✓	✓	x	x	x	x	x	✓	-	x	x	x	✓	x	x
Cloud9	✓	✓	✓	x	x	x	✓	x	-	x	✓	✓	x	x	x
Eclipse Che	✓	✓	✓	x	x	x	✓	x	-	x	✓	✓	x	x	x
Google Slides	✓	✓	x	x	x	✓	x	✓	-	x	✓	✓	✓	x	x
Prezi	✓	✓	x	x	x	✓	x	✓	x	x	✓	✓	✓	x	x
FileZilla	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓	x
Cyberduck	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓	x
Paranoid	-	-	-	-	-	-	-	-	x	-	-	-	-	x	x

Table 3 - Evaluation done for existing prototyping tools

2.4 Problems Identified

Students can improve only if they know their flaws and weak points. But one of the most famous problems between students these days is being shy to contact the lecturer. Also, some students try to reach their colleagues before goes to lecture. Even if lecturers do give feedback to students, they will still not find enough time to work with students the way they expect. This problem can be solved if lectures and users could find an easy way to interact with each other.

Some students find it hard to motivate themselves because of the same schedule. The way lecturers conduct the class is a primary factor. Learning this subject can be boring and confusing of the students are not interested in the subject. But the lecturer will continue teaching the same way without knowing that students do not understand the topic.

The uncomfortable speed of lectures can be a problem for students to understand. Programming is a system where students need basics before learning the advanced level. But with the busy day to day lives of lecturers, they will continue teaching advanced programming to finish the syllabus on time without knowing students cannot understand. [12]

Students who fail in the final examination required to repeat the programme and the students who passed the exam will go through to the next level. We find students sometimes who have passed the reviews but still lack of confidence when it comes to programming. They are facing big problems when they face the next course. [12]

There are two types of students. Students who learn without the help of others and students who need personal attention. With the busy day to day lives of lecturers, they won't be able to check on every single student. It is a significant problem when it comes to making good programmers. [13]

It is hard to students to understand all the issues related to the execution of a programme. "it takes quite a long time to learn the relation between a programme on the page and the mechanism it describes" [13]

One of the major problems in these days is students surfing on the internet through their computers while lecturer is teaching. Lectures have no way or time to check

whether every student is listening to what they say. Time goes, and students have missed the most important parts of the lecture. Students think they will be able to catch up with the lessons they missed but this a huge problem. It is also producing a negative impact on neighbouring students. If the lecturers can encourage them to use their computers properly, students will have a better future. [14]

Lack of effort students are giving for the exams are another problem. To encourage students to have good performance, lecturers must keep a good relationship with students. Having a 'relational classroom environment' will also have positive effects on the lecturers themselves.

For File-Transferring methods, most people are getting stuck in the process of setting up an FTP Server in their local machine. Because it needs technical knowledge done. Because of that people are trying to buy external FTP servers, using third-party File sharing's.

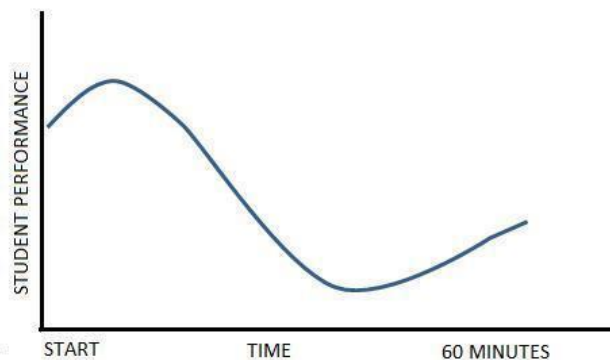


Figure 1 - lecture without activities

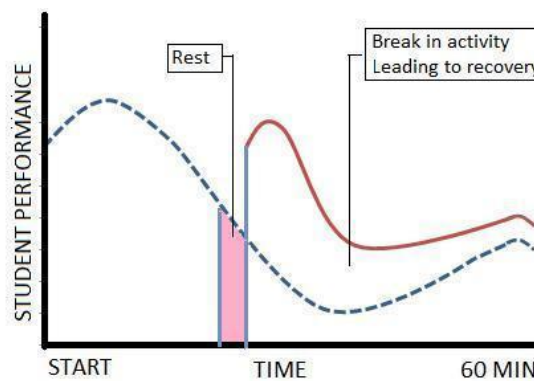


Figure 2 - lecture with activity

2.5 Summary

In this chapter, the previous work of the researchers has been critically evaluated by reading their research papers and articles.

To conduct a successful programming presentation, the presenter should provide interesting information to the audience with an attractive manner and submitting activities to the user. By using a good presentation, the platform can conduct an excellent and useful presentation.

Based on the research gap an in-depth analysis has been carried out as to what criteria have been supported by the previously identified standards based on the literature review by previous researches.

There are a lot of presentation tools and platforms, but there is no interactive and collaborative presentation platform to conduct programming lectures with sync coding features.

In the next chapter, we will be discussing the technology which has been adopted in the proposed solution mainly focusing on the deliverables.

3 Technology foundation of the solution

3.1 Introduction

In the previous chapter, we go through the in-depth review and discussion about how the researcher's work conducted. In this chapter, we go through the technologies which will be used in the proposed solution.

3.2 Technologies used for the solution

We use various type of technologies to keep up the performance and development. Main Technologies that used are NodeJS, MongoDB, NPM Package Manager, AngularJS, electron, tunnelling.

3.2.1 NodeJS for server-side JavaScript

We need a framework that supports real-time communication for both client and server end. To achieve that we must NodeJS framework. This platform is built on Chrome's JavaScript runtime for quickly creating and scalable network applications. Most of the technologies use the stateless request-response paradigm, but in this problem, we must initiate a two-way connection that connects client and server real time. So NodeJS over the web sockets helps us to solve the problem by making the two-way connection, and mostly it's open web stack with running over standard HTTP port (port 80). [15]

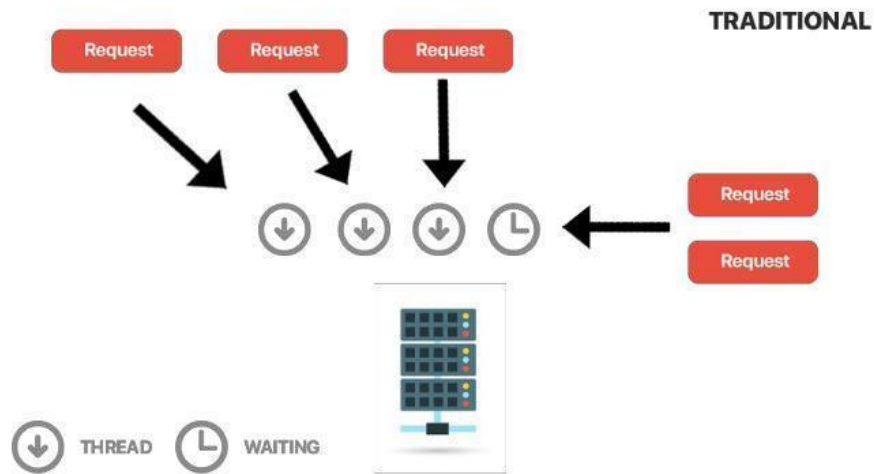


Figure 3 - Server Creates New thread from Limited Pool or Waits for Available Thread.

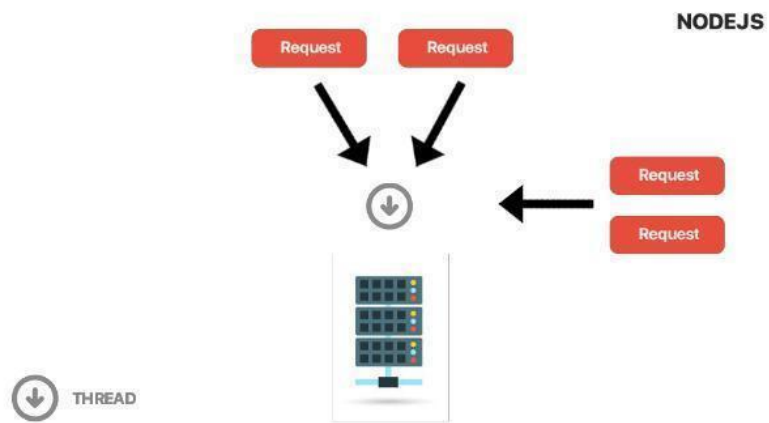


Figure 4 - Handles Event-Based Call-back on Single Thread

3.2.2 NPM Package Manager

When we move up with a larger content application, we need up to date styles that make it more convenient to the end user. To achieve that we use CSS3 which is re-module with CSS2 with newer style modules and faster. This also has a cross-browser compatible, and this helps to run the application and show styles on any platform. [16]

3.2.3 MongoDB

We won't get used of faster data access, Clear, no complex, deep query-ability and ease in scaling database to solve this problem. Because of that, we move to MongoDB. This is a schema-less DB and its matches the all above features. It also Document Oriented Storage that helps to store JSON style documents and can index any attribute. With the growth and NodeJS framework, it helps us solve our problem. [17]

3.2.4 JSON

JavaScript Object Notation (JSON) is lightweight data-interchange format. It is used primarily to transmit data between a server and web application, as an alternative to XML. [18]

3.2.5 AngularJS for Client-Side JavaScript

As we use of powerful NodeJS backend, we need the same for front-end to solve the problem. So we moved up with AngularJS because it's powerful JavaScript based framework. AngularJS helps us to extend HTML's syntax to express the application's components clearly and succinctly. It also gives us to write a client-side application in a clean model view controller way. [19]

3.2.6 File System Technology

As we are using async coding system, we need to use a proper file management system to handle the IDE files transfer to the presenter device. To achieve that we use File systems that make all file system operations synchronous and asynchronous forms. [20]

3.2.7 Tunnelling

Although we have to you tunnelling platform to get access to the user's file structure. [21]

3.2.8 HTML 5

For the use of the above technologies, we need a big basement. To do that we moved up with latest HTML5 lay down the front end with AngularJS. This also helps with newer tags, cross-browser tricks and supports native JavaScript API. [22]

3.2.9 jQuery

We also get moved with jQuery because it helps us to write down java scripts easier. It has more pre-written functionalities. [23]

3.2.10 ExpressJS

ExpressJS is a minimalist web framework that works for NodeJS. That set more features for web and mobile applications. [24]

3.2.11 Electron

Electron is an open sourced framework that allows developing desktop GUI applications using front end and backend components that developed for web applications. It also enables to develop applications for cross platforms. Electron used for many high-end applications like Atom IDE, Visual Studio Code. [25]

3.2.12 Development Tools

When we start implanting the proposed solution, we can use below tools to speed the implantation of the solution.

3.2.13 Bitbucket

Bitbucket is a version control service based on web hosting services. Used for development projects that use either Mercurial or Git revision systems that are owned by Atlassian. [26]

3.2.14 Visual Code

Visual code is open-sourced code editor developed by Microsoft, it supports Git Control, debugging, Internal Terminal, Syntax Highlighting, intelligent code completion, snippets and code refactoring. [27]

3.2.15 Ampps

AMPPS is a solution stack of Apache, MySQL, MongoDB, Perl and Python for Windows NT, Linux and macOS. AMPPS is created by Softaculous Ltd. a company founded in 2009 which makes the Softaculous Auto-installer. [28]

3.3 Hosting and Deployment technologies

To hosting deployment, we used below technologies, because of proposed solution architecture is very sophisticated.

3.3.1 AWS EC2

Amazon Elastic Compute Cloud (Amazon EC2) is a web service provides that gives secure, and resizable compute capacity in the cloud. Designed to make it easier for developers when it comes to cloud web-scale computing. [29]

3.3.2 MobaXtream

MobaXtream is the platform where we can connect to the server using SSH protocol to do the deployments.it has been there for years are easy to use. [30]

3.4 Summary

Finally, in this chapter, we briefed the technologies to solve our problem. Not only that those technologies make the application real time, faster and scalable. And those latest technologies make the application future proof too. And in the next chapter, we talked about the approach for the proposed solution.

4 Approach

4.1 Introduction

Earlier we have discussed technology to adapt to solve the problem of Location Independent and Interactive presentation platform with coding sync feature. And this chapter presents the approach to developing our solution.

4.2 Requirement Gathering

Before coming to the proposed solution had to go through the previous research papers and articles done by other researchers about the problems in presenting lectures for programming classes. Those articles give great value when it comes to getting references. Then went through the personal experience that can get from many students and lectures about their difficulties when developing the solution explained in this thesis. Also, with the technical knowledge of how hard it is to set up FTP servers and do the port forwarding to achieve the File Managing sessions.

4.3 Issues faced by the lectures and students and in industry

When we come to the programming lecture, we can find many problems faced by students and lectures. As the main problem that lectures faced is presenting the coding exercise, they have to put them in a slide and show students to type it in their IDE. For this process, it takes more time to students, and maybe there will cause many syntax errors. So, lecture must go through every student and make them correct. This creates considerable fall-back classroom productivity. If we use presentation platform with code syncing lecture can easily submit the code, and every student can get it without type again and again. When they finished the lecture can go through codes and get an overall picture of the lesson or mark every student who has

a problem because the error is shown in the platform editor. So, no need to get extra time for it.

When it comes to the student's side, they didn't get the slide, and if they have a question, they don't have a way to point it out rather than raised hand and asked. Some students are shy to do that. With the presentation platform, they can easily sync with slide and point out the section of the slide that they have a problem. So, the lecture can see the heatmap of slides real-time and helps to identify that slide area have a problem and can go through again or ask from students. This helps to reduce the time and makes a more interactive classroom.

As we go through above problems and how they come with presentation platform solution we can see that it helps to make the classroom more interactive and make collaboration between the students are teachers by working them through the same platform with synchronized each other.

4.4 Gap identified which hasn't been addressed by other researchers

As we conducted and discussed in the literature review chapter, the gap is identified by the other researcher is in the same domain which is most of the researches try to go with an online presentation platform and not for code syncing. And most of the others are trying to go with Cloud base IDE's which can work as teams. But not to presenting and submitting, so the gap is these two models not combine. Also, the limitation of FTP clients and servers made this impossible. Because a lot of methods need to go with some hard mechanism like setting up port forwarding. So, this creates a huge gap to make those platforms together.

4.5 Limitations with current development tools

We also have discussed the current development tools in the literature review chapter. As we saw the limitations are mainly in presentation platforms, we cannot share the coding segments or debug and when it comes to online IDE or code sharing most of them are working on cloud base IDE and cannot be integrated with the presentation. Also, by using the cloud base IDE's students miss out the opportunity to learn about the setting up a project and using loss their comfortability by using another IDE than their favourite IDE. And we aim to reduce that gap and give solutions to all the problems identified by us in this research.

Also, our aim to provide seems fewer FTP operations without doing any other hard mechanism like doing port forwarding.

4.6 Hypothesis

The hypothesis was based on the requirement gathering of the main research problem "Can programming lectures do on an interactive manner with a dedicated platform?"

Hypothesis 1: Problems that Presenters and users face when doing a presentation that needs to make more interactive with currently available tools.

Hypothesis 2: Difficulties of File sharing using FTP including setup file management software and networking setup.

Hypothesis 3: Find Presentation platforms that support code synchronized with the user, presenter and users together using provide a File Managing software that can be connected and access files of the user with a secure manner.

4.7 Requirement definition

Most of the research proposed to go with a new type of presenting tools or cloud base IDE's. For coding sessions, they go with code sharing workspace with cloud base IDE that users can do their project on cloud and share with team members or get feedback from them. When it comes to presenting tools, they use team sharing presentations. The main drawback of these tools is we cannot use them as they cannot sync code with presentation and the same time with students and when it comes to FTP, they need to do a lot of works, like port forwarding and ISP setups since our primary goal in this research is to make the bridge between Presentations and code sharing tools with easy FTP access. Our hypothesis is making it in a presentation platform with code syncing and debugging for both lecture and student. So, this will make it easier to do the programming lecture with code exercises and make the classroom more productivity.

4.8 Input and Output

Mainly in this system inputs and outputs are worked together because of the sync code sharing system. Both presenter and user are providing inputs and outputs concurrently until the sync flow is finished. The presenter can submit the coding assignments and send them to all the users who connected. Then presenter can see code segment of any student as feedback. Meanwhile, if any error found or need assistance with the presenter or another user, the student can submit to the presenter or anyone in the presentation and get the assistance. As a result of this flow is synchronized.

4.9 Process

To develop this presentation platform, we have used the Nodejs as the backend development because it is event-driven and powerful than most of the other web-based languages. Like the database, we used MongoDB (collection-based database). For the front end, we used the html5, css3, angular 1(es6), and jQuery. And for the Files management, we had to create a new tunnelling service to get authorization to access users file structure.

First of all, we research what the technologies are suitable to build this kind of platform. After we decided to go with the web-based solution we choose what the technologies can use to make this efficiently. at that time there were lots of technical difficulties since we weren't familiar with the technologies to choose.

After we research about how we can sync the slide according to the master slide, so we found using sockets we can achieve my goal.

After that, we build the database schemas. After finishing all the schemas, we want, started to make the code.

And with File system technology we managed to synchronize files with different operating systems, IDE and browsers with sync between them.

4.10 Users

This system can be used by any user who knows about using a PC or handheld device. System divided users into two main sections: presenter and the user.

The presenter is the one who makes the presentation with coding segments and users are the people who view it and engage in coding assignments.

So, features of the system are divided into the main two user levels. Presenter got access to all the tools that need to make the presentation and coding assignments by pushing them to users. Users can only access to submitting or debugging the assignment to the presenter or other users while viewing the presentation.

4.11 Features

- Web-based system - anyone can access the platform from anywhere with any devices; only the requirement is an active internet connection.
- Synchronized Code Learning - users can learn code with do code assignments, code reviewing and debugging with the presenter or other users.
- Real-time - Creator and the viewer can interact with the slides at a real-time.
- Modern Tools - with provided modern tools users can create interactive presentations and code assignments
- Fast - minimum time to set up a presentation and get live to an audience, compare with other presentation software.

4.12 Summary

In this chapter explained the solution to fill up the gap of research. This enables us to come up with a hypothesis that has requirement definitions schemes, and we can create a presentation with code exercise for syncing and debugging with other users. And we also discuss the relevant solutions approaches and components that required for the solution. In next chapter will discuss the system design.

5 Design

5.1 Introduction

In this chapter, we provide an overall picture of the proposed solution. In here we add design for the answer with its modules, roles and its interconnections. Although we have mainly four interfaces, Backend, Frontend (User Interface), Database, we will discuss the System design, Platform design, and infrastructure design of the system throughout this design chapter.

5.2 Research planning

Planning and the scheduling of the project are shown in the table below. Most of the time was spent on the literature survey and the implementation stages

Task	Q2		Q3				Q4			Q1			Q2
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Literature Review													
Identify the Problem													
System Design													
Implementation													
Testing													
Deployment													

Figure 5 - Execution plan for the proposed system

5.3 Development methodology

Evolutionary prototyping methodology was used for implementing the system, because of the research component involved in the project. Some excellent tuning rounds were required to get the best possible prototype generated.

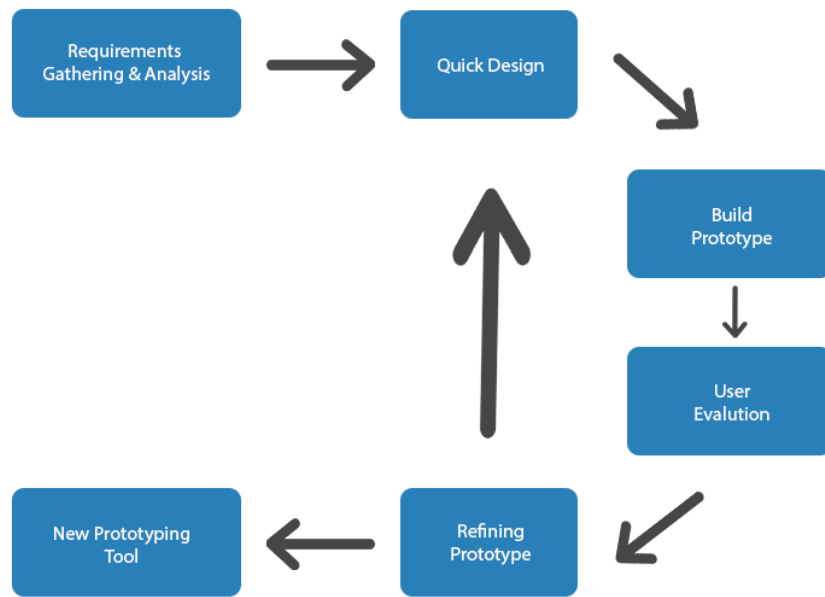


Figure 6 - Development methodology for proposed system

5.4 Selection of the software process model

We realized that the suggestions which were given by previous work were not the same most of the time, by spending considerable time on literature review before selecting the process model for this research. Because of that, we had to test most of the suggestions and work on the best possible method.

5.5 Analysis of the current development workflow

As we explained in approach chapter, we spent a considerable amount of time examining the previous research papers and articles done by other researchers about the problems in presenting lectures for programming classes. Those articles are the best possible way to gather references. Then went through the personal experience that can get from many students and lectures about their difficulties when developing the solution explained in this thesis.

5.6 Requirement analysis

Application usage can be described in a few simple steps.

- The presenter can make the slides for presentation and also can add the coding exercises to it.
- The presenter should be able to see connected users instantly.
- All the connected students can sync it to do the coding sessions and do the tasks and can share code and debug together also.
- After users are done, then lecture can check the codes through the platform, and it shows if any error is there.
- Also, the users have heatmap option that can be selected slides areas that have questions and can lecture notify

5.6.1 Functional requirements of the solution

The primary goal of the proposed solution is to make the availability of presentation platform with code syncing and code debugging for lecture and student. Also, real-time slides syncing between students. And give real-time heatmap tool to users for point out the slides area that which need to point highlighted.

5.6.2 Non - Functional requirements of the solution

We must keep up the speed and best performance of the platform, because it works on real time so making delay will make an effect on the classroom also. And we need to keep User-Friendly in excellent point since application work on very busy lectures to many kinds of students. So, both need to excellent User Experience than making it complicated.

5.7 Top Level Design

As the figure, the show below, top-level architecture can be divided into six main objects, which are File Manager, Lexer, File Processor, User Interface, Backend Core and Database Schema which store all the data.

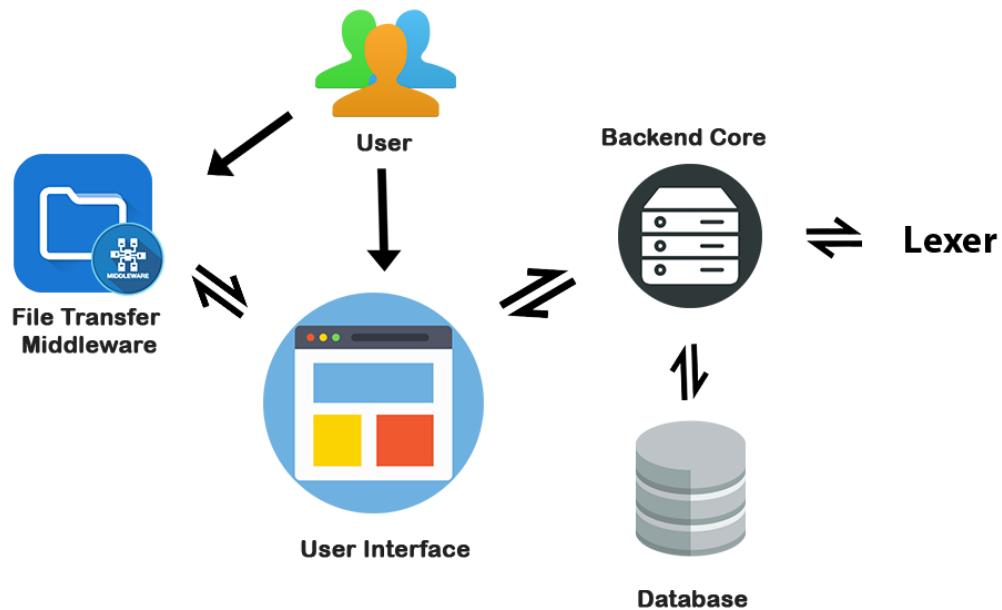


Figure 7 - Top level design architecture of the proposed system

5.8 Module architecture

As we discuss the above-proposed presentation platform is containing six modules. We will go through each of them below.

5.8.1 File Manager

File manager uses systems to watch for any changes in the file system and notify the backend core or any request that made through the backend core must take effect by the file manager. This enables us to the synchronized file system for both lecture and user end. The primary functionality of the file manager is to manipulate files, namely creating new files, removing files and making new directories. Maintain the distribution flow and many other things to file processing.

5.8.2 Lexer

We use PHP and Java Lexer to check PHP and Java code segments syntax. So, it will go through submitted code files and check whether they have errors or not and informed to the code editor.

5.8.3 File Processor

File Processor is used to creating the project main file created on the server. And also, we used file processor to read user submitted file and process it to check whether they have compiled errors and then sent it to lexer for testing syntax errors.

5.8.4 User Interface Module

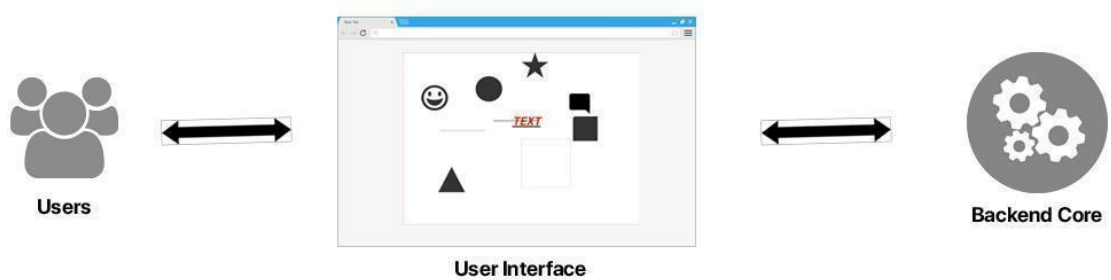


Figure 8 - User Interface Module

This module is the main module that makes a connection between the user and the backend of the system. It gets both lecture and student input and sends to the backend to start processing and return the result to users.

After getting the authorization presenter can access the user's file structure.

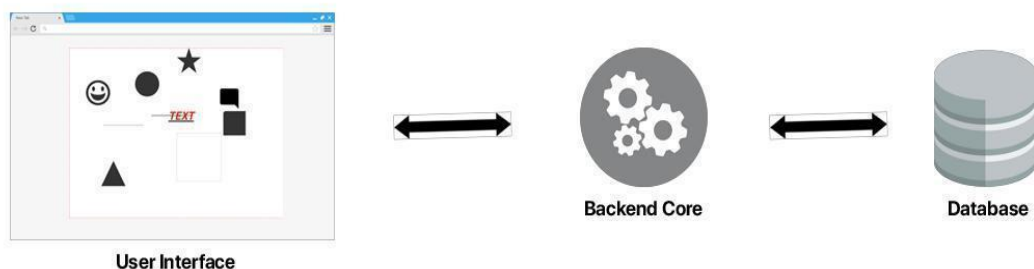


Figure 9 - Backend Core

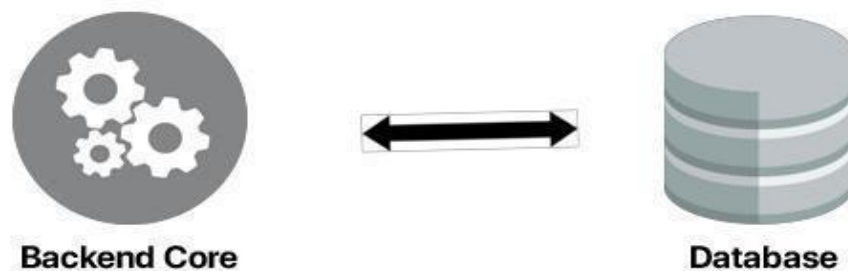
5.8.5 Backend Core

This is the main module that works between both the User interface and the Database module. This is the most critical part of the system. It provided the bridge between those two modules and simulated the functions that need to work on both sides.

In this module, it gets all the inputs from user and lecture to process with its logical knowledge with File Manager, File processor, and Lexar. And meantime it queries the database module and gets the data. Finally, it outputs the process data to the frontend.

Also, this is a real-time two-way connection module, and it needs to work effectively and handle all the connections simultaneously.

5.8.6 Database Module



This

Figure 10 - Database Module

is the module which interacts with backend core and helps to achieve its goals. This module affects to both core and frontend and the design of this database is an essential activity in the solution. As a real-time, system DB must be in a ready state to function with the core to facilitate int needs smoothly.

In this Design, Database is directly connected with its core and work efficiently to support its functions. The core can directly query the database so that it won't give any load to the frontend module.

5.9 Version controlling

In this solution, we have provided a version controlling system that can be supported with popular services like bitbucket and Github. Recommendation to use versioning controlling system before starting up the project.

5.10 Dependency management

For this product, we have used npm as our dependency manager. Because this solution is built using Node JS. The client-side application uses bower as its dependency manager. This is the most popular dependency manager for client-side web applications with Angular JS version 1.

5.11 Compiling and building

JavaScript is outdated now even we use it with NodeJS. The new version of JavaScript is ES6. To get support with ES6, we must use babel and superscript of JavaScript which will get compiled to JavaScript later. For frontend applications, we use typescripts which also a superscript. With typescript, we can use a Summery maintainable code.

5.12 Testing and continuous integration

For making the testing process and integration process faster we right test cases that can run through the grunt task and will check app the API whether working or not.

5.13 Summary

In this chapter, we discuss how the system is design and the flow of working and how each module optimized to work independently balance load and achieve fast and smooth. In the next chapter, we will be discussing the implementation of the proposed system according to the designs which we have discussed.

6 Implementation

6.1 Introduction

In the previous chapter, we described the overall picture of the proposed solution, and we discussed the architecture of the proposed solution. In this chapter, we discuss the steps of implementation of the proposed solution. It will consist of all the significant modules as well as how these modules are implemented.

6.2 Overall solution

This solution has been implemented as an open source application. This can run on any platform like windows, macOS, and Linux and this a web-based solution so accessibility can be done anywhere if there is a web browser. We have used the component base development to this solution to speed up the development process. To provide the solution we used NodeJS as the back end and angular js as the front-end development. We used no SQL database called MongoDB to give the solution. Next, we will discuss the implementation of the main modules of the proposed solution.

6.3 Implementation of the Solution

To provide the proposed solution we have to use different technologies for different modules. Also, it contains sub-modules which have to be developed with the reusability. So final solution will be the presentation platform which can conduct programming lectures with slide synchronizability, and the lecturer can create practical programming sessions while doing the presentation and after that students can set up the practice with one click. The lecturer can sync a student's source code whenever he wants and can edit the source code of the student and push back to the student's computer. Not only that lecturer can sync the syntax errors made by students with the single click.

6.4 Preparation and Programming

Before starting the implementation, we have to set up the initial structure of the development. Such as the set up the bitbucket or git repository to help the version controlling process. Also, need to set up the development environment such as the need to install NodeJS, MongoDB, angular full stack, rubygem, electron and required to set up the environment variables of the NodeJS and MongoDB.

For programming, we used the visual code studio and sublime text 2 IDEs which will provide the best support for web-based open source applications. We have set up the nodemon plugin to give automatic refresh of as soon as changing the file. This will speed up the development process as well as reduce the effort of the developer. Since we use the MongoDB, we had to use the terminal to test the added the to the database because MongoDB does not have easy access UI.

6.5 Implementing of User Interface

This user interface has been developed using the latest web technologies by achieving responsive capabilities to the UI. So, no need to build separate UI for mobiles, iPads, etc. Since this is responsive, it will automatically adjust to the device display size. Also, we have to use the latest HTML5, CSS3 for this development. For the front end, we have used the angular js and JQuery as script framework.so all the relevant data fetching using API calls. All the data from the API retrieve as json because for easy manipulation from the front end.

Nevertheless, all API calls should include the authorization token; otherwise, request data won't provide from the backend. The authorization token is JSON web token when user login to the system backend will provide the JWT token. The token must store somewhere like cookies to make API calls.

When a lecturer is conducting a presentation, he should be able to see the online users of the current presentation. So, when student login to the system we'll create a web socket to see the availability of the students.

The user must log in to the desktop and should select the authorized folder that can access by the system.

While doing the presentation lecturer must be able to create programming assessments and should be able to give a separate file name to the assessment. Then it should appear on the students who logged in the system.

By using the setup button, students should be able to set up the project to their pc.

Students can use any IDE to continue the programming assignment. The lecturer can see the status of the programming progress by retrieving student's errors as well as source codes.

Also, the lecturer can share presentation link to the students. So they can access the presentation slides easily, although lecturer can provide questionnaires to the same slide, and users can answer them through the platform. The lecturer can quickly view the people who answer to the questioner.

Students can mark the slides which they not clear by using drawing tool in students view. so lecture can go through those unclear sections again.

6.6 Implementation of Back End

Before starting the implementation, we have to set up the initial structure of the development. Such as the set up the bitbucket or git repository to help the version controlling process. Also, need to set up the development environment such as the need to install NodeJS, MongoDB, angular full-stack, rubygem, electron and required to set up the environment variables of the NodeJS and MongoDB.

For programming, we used the visual code studio or sublime text 2 IDEs which will provide the best support for web-based open source applications. We have set up the nodemon plugin to give automatic refresh of as soon as changing the file. This will speed up the development process as well as reduce the effort of the developer. Since we use the MongoDB, we had to use the terminal to test the added the to the database because MongoDB does not have easy access UI.

To create file transfer from presentation to user and user to the presentation we have to create access tunnel. So as soon as a user creates a tunnel presentation can communicate with the user's file structure.[21]

6.7 Summary

This chapter was all about the implementation of the proposed solution.it has elaborate on the implementation of all main modules. Next chapter will discuss how the evaluation is done of the implemented system and details weather target objectives has been achieved.it also describe the limitation of the implementation as well.

7 Evaluation

7.1 Introduction

In this chapter, we'll discuss how the implemented solution was evaluated by letting this system used to do programming lectures. To estimate the proposed settlement, we have used a couple of evaluation methods, and we have used two case studies. Also, this chapter will gather the feedbacks and analyse with the existing presentation platforms whether we can achieve the goal. We have created two case studies to evaluate the proposed solution.

1. Conducting interactive programming training and case study
2. Participating in an interactive webinar.

7.2 Case study 1 – conducting interactive programming training

7.2.1 Problem Definition and Requirement Analysis

The first test case study is doing an interactive programming training session for a software firm. The presenter should be able to create training sessions using the presentation platform and IDE also should be able to create surveys and should be able to see the status of the connected users to the presentation. Also, they should be able to provide programming practice sessions and presenter should be able to see the situation of the training and should be able to evaluate the users.

7.2.2 Problem Definition and Requirement Analysis

The first test case study is presenter needs to do interactive programming session. The presenter should be able to create slides using a presentation platform and also should be able to create surveys and should be able to see the status of the connected users to the presentation. Also, should be able to provide programming assignments and presenter should be able to see the status of the assignment and should be able to evaluate the assignment.

7.2.3 Design and Implementation

Design the presentation using a presentation platform and see the feedback from the presenter and users.

7.2.4 Evaluation

We have used a couple of methods to evaluate the proposed solution. We have observed the presentation, provided online surveys, interviewed the presenter and users to get the feedback.

Results:

Evaluation	PowerPoint	Haiku Deck	Our Solution
Create slides	✓	✓	✓
Slides sync with users	-	✓	✓
Create surveys	-	✓	✓
Export slides to pdf	✓	✓	✓
Share presentation	✓	✓	✓
View presentation online users	-	✓	✓
Import PDF	-	-	✓
Get survey results	-		✓
Get Errors of the Users assignment	-	-	✓
Sync with other users code and fix them	-	-	✓
Fix errors of the program and push back to Users	-	-	✓
Chat with online users and presenter	-	✓	-

Table 4 - Evaluation Conduct in the case study 1

According to results, we have identified that there are not many tools to do a good programming presentation. Also, we recognize that there are need some UI optimizations as well.

7.3 Case study 2 – Participating in an interactive webinar

7.3.1 Problem Definition and Requirement Analysis

Second test case we do remote webinar from Australia to Sri Lanka software firm. Developers should be able to join an interactive webinar. Developers should be able to set up an assignment with a single click and project will initialize to their pc. Developers should be able to carry out the assignment using any IDE. If the user made some errors, the remote presenter should be able to fix those errors.

7.3.2 Evaluation

We used the same evaluation methods which we used in case 1 and got the result from the developers.

Results:

Evaluation	PowerPoint	Haiku Deck	Our Solution
slides sync with master presentation	-	✓	✓
answer surveys	-	✓	✓
View presentation online users	-	✓	✓
Sync with other users code and fix them	-	-	✓
Set up the project instantly	-	-	✓
Fix errors of the program and push back to users	-	-	✓
Chat with online users and presenter	-	✓	-

Table 5 - Evaluation Conduct in the case study 2

According to the results, we found there is less number of interactive presentation platforms for programming.

7.4 Other Evaluations

Here we'll discuss the other evaluation we have done on this platform. We provide this platform to some known programming developers to use in their webinar and getting the feedback from them. Then we can identify our provided solution is a success or not.

7.4.1 Participants

7.4.1.1 Redot Pvt Ltd

Redot Pvt Ltd is a software firm which founded in 2012, and it is mostly in web and mobile development. Most of the clients are from Singapore. They are experienced web and mobile developers to provide good and quality products to the market.

With an Expand of their business they have decided to do a training session for some developers.so they have added developers to the programming training session. So we have provided our presentation platform to conduct their programming sessions. We have got their feedbacks as below and added to the solution as well.

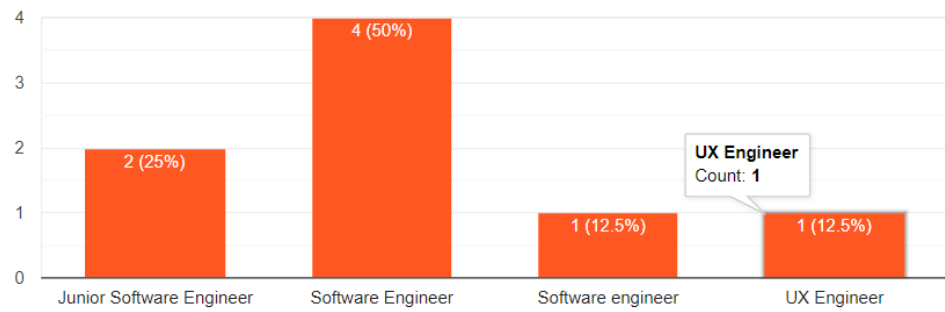
Name

8 responses

Thushara
Ranidu Nadeesha
Dakshina Udayanga
Lakshan Kasun
Kavinda Silva
Nuwan Wimalasena
Oshada Ranasighe
Shashika Perera

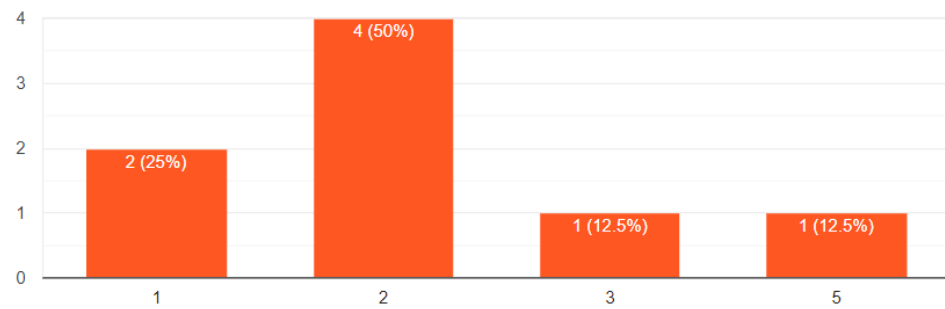
Designation

8 responses



Experience (Years)

8 responses

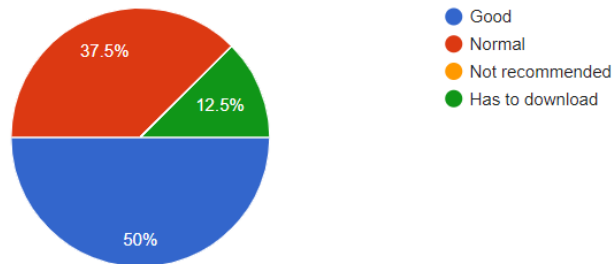


Questions

how is the configuration of system?

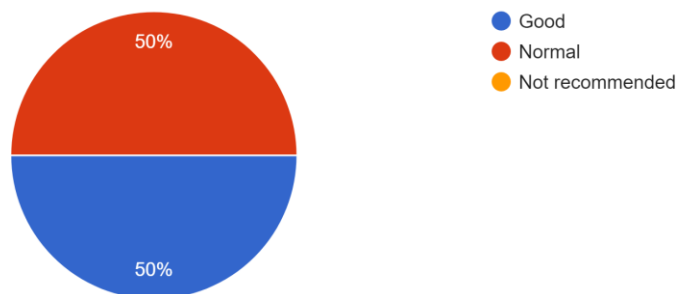


8 responses



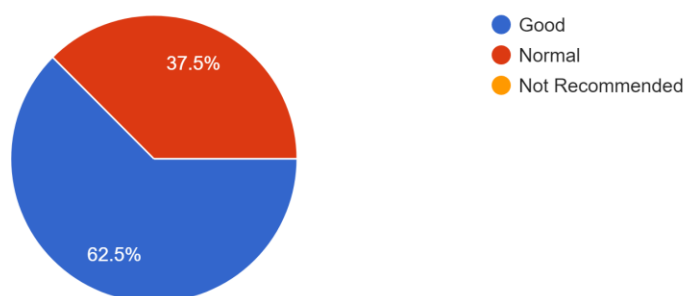
how is the error syntax showing

8 responses



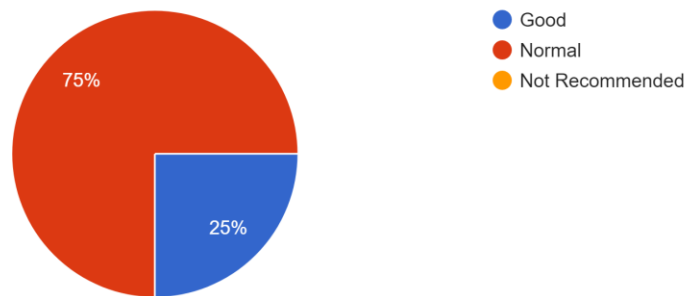
how is the code sharing reliability and accuracy?

8 responses



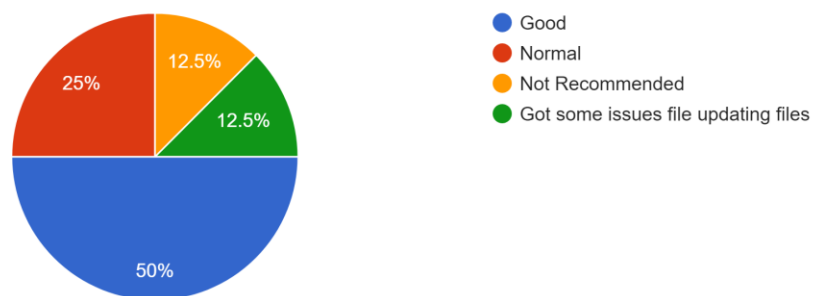
how is the code sharing with users and presenter?

8 responses



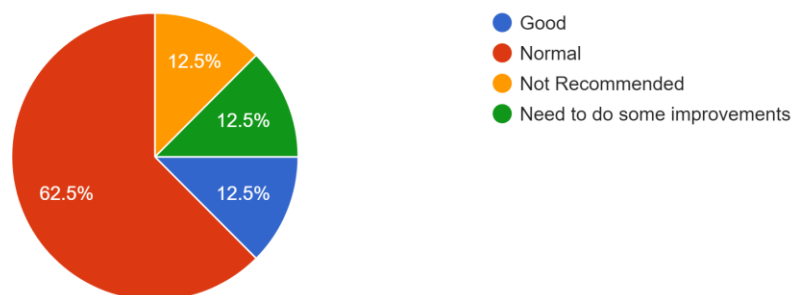
how is the file updating and FTP?

8 responses



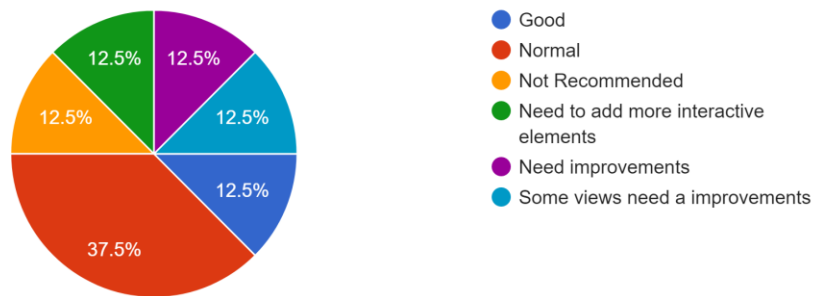
how is the User Experience?

8 responses



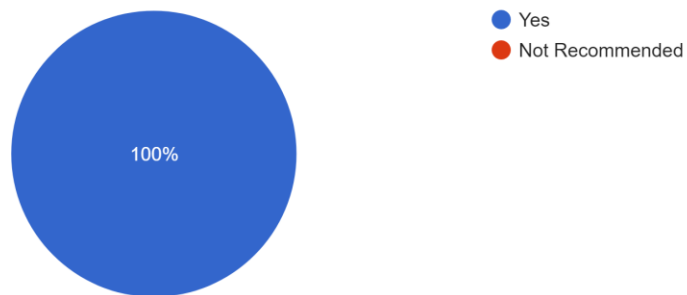
how is the User Interface?

8 responses



Is it secure to conduct a programming training?

8 responses



how this tool help to conduct a programming training?

8 responses

This is very helpful,once participants got errors,presentator can fix the errors remotely,so participants can get working source code end of the day and can learn easily

it been easier to connect with presenter and user to do conduct a learning session

it reduces the gap between user and presenter

good to use it and easy to fix errors and continue the lecture

can have bored free training with this tool

good to do a programming session with code sync and error showing

code error showing is good and helpful to sync with presenter

people will be more interactive when use these kind of tools for training sessions

7.4.1.2 Ranomark International

Ranomark international (Pvt) Ltd is a medium scale software firm which provides the all kind of its solutions all around the world. Most of their clients are from Australia. They have strategically, developers and designers to give excellent quality products to the market.

To evaluate this project, we have got almost developers and ran the webinar session from Australia to Sri Lanka office using this platform. We have got their feedbacks as below and added to the solution as well.

Name

5 responses

Yohan Uthpala
Treasure Priyamal
Hesara Muthiarahchchi
Asanaka Nawarathna
Sanka Madushan

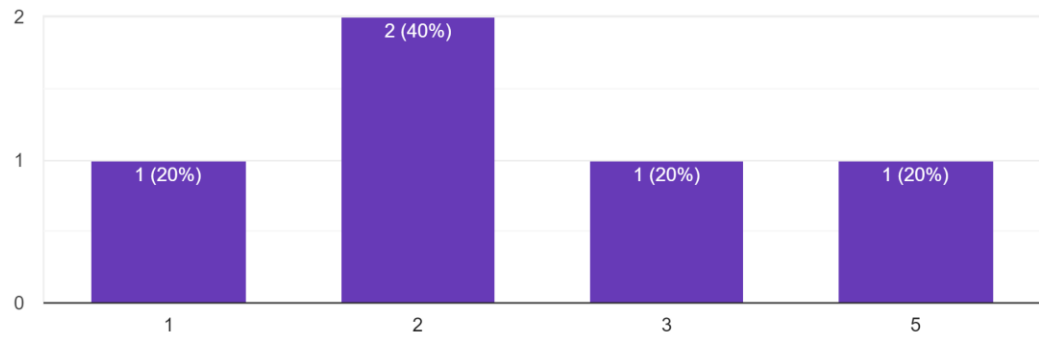
Designation

5 responses

Software Engineer
Senior Software Engineer
UI Enginner
Senior Software Engineer
Junior Software Engineer

Experience (Years)

5 responses

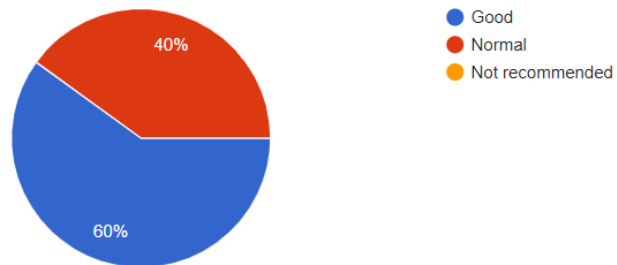


Questions

how is the configuration of system?

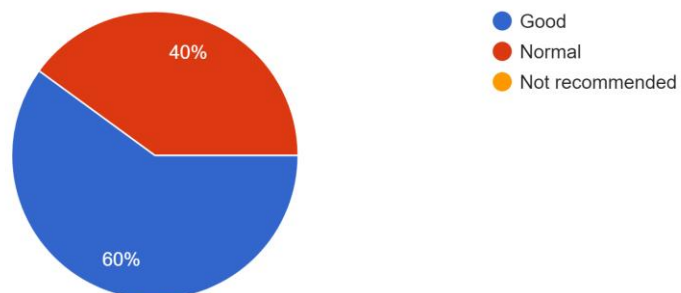


5 responses



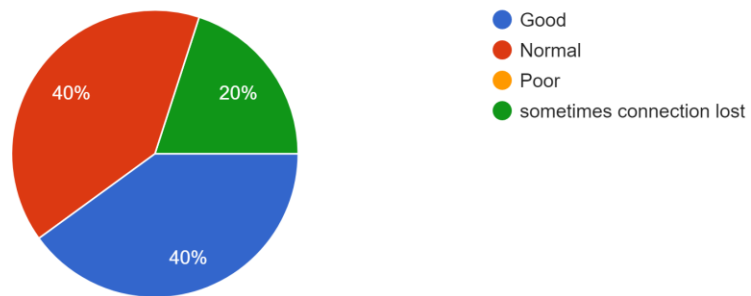
how is the error syntax showing?

5 responses



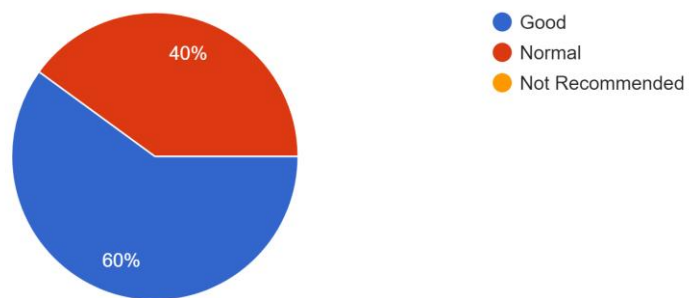
How is the connection between host and remote user?

5 responses



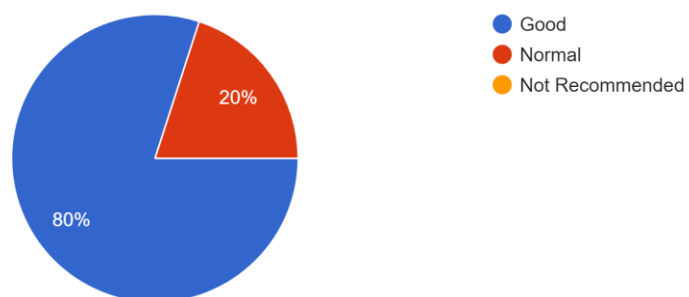
how is the code sharing reliability and accuracy?

5 responses



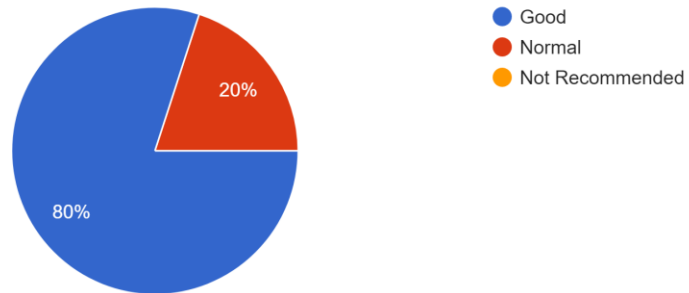
how is the code sharing with users and presenter?

5 responses



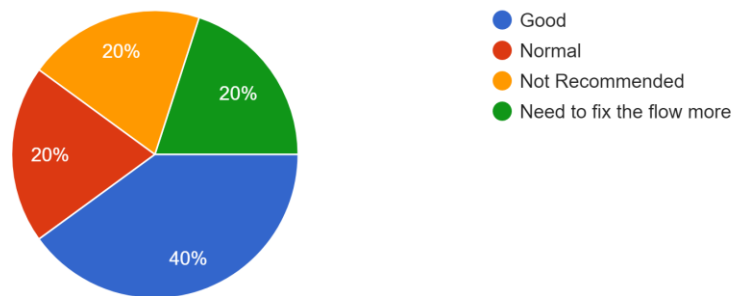
how is the file updating and FTP?

5 responses



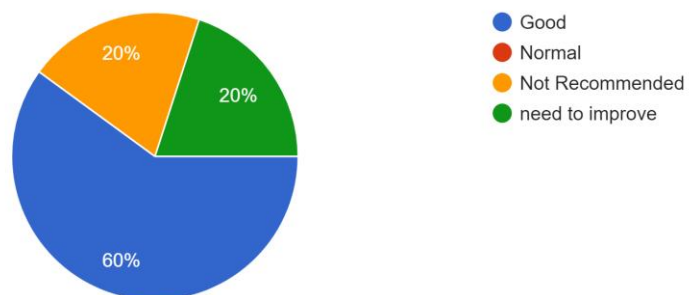
how is the User Experience?

5 responses



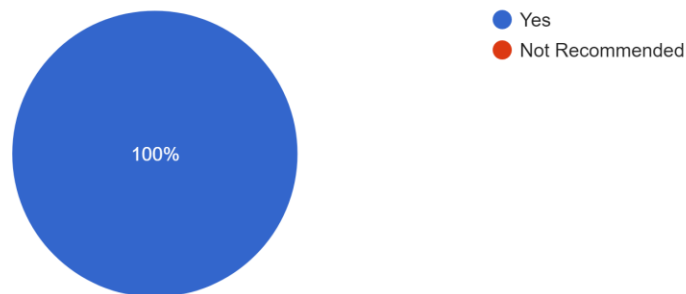
how is the User Interface?

5 responses



Is it secure to conduct a programming webinar?

5 responses



how this tool help to conduct a programming webniar?

5 responses

helpful to a interactive session
users can get real time update with presenter, this help to improve the coding practices
easy to fix errors and understand the session
easy to use and users will interactive to have an programming session with this tool
easy to interact with each users and presenter to fix errors

7.5 Test Environment

Primary testing has been done on Redot Pvt Ltd and Ranomark Pvt Ltd with remote assistance. We ensure that address problem is being solved by running the defined test cases. All tests have been submitted to relevant companies as well.

7.6 Personal Feedback

Personal feedbacks from Ranomark, Redot Pvt Ltd and some other couple of presenters, we refine and optimize the solution because those are the people who use it on actual environment. Personal feeds from them help us to make our solution better and efficient.

7.7 Aim

The main aim of the project to provide a better presentation platform for programming.so lecturers can use this platform to teach programming better and efficient.

7.8 Objectives

- Create synchronized presentation slides.
- Share the slide among the students.
- Create programming projects.
- Get student source code errors to the lecturer.
- Get student source file to the lecturer.
- Fix errors of other users source code and push back to the there pc.
- Get share code with each user.

7.9 Drawbacks and limitations

Right now, this is support for one project file only, and still, errors can be a check on PHP and Java language only. Even user must inform the lecturer to get the file and fix the error. Project file size cannot be more than 40mb.

7.10 Summary

This chapter thoroughly discusses this evaluation and testing has full fill the address problem, aim and objectives. Results of the assessment have been submitted to Redot Pvt Ltd and Ranomark Pvt Ltd. next chapter will discuss the conclusion and future work of this project.

8 Conclusion and Future Development

8.1 Introduction

In this research we have an address to provide a platform where lecturers can have done programming lectures efficiently and effectively. so we have developed a web-based presentation platform to perform programming lectures. Following are the tasks we have targeted by this system.

The lecture can be created interactive slides using the platform and can sync them with all the users that connected. Because of that main presentation in sync with all the users' slides and change with Realtime. Also, the users can export all the sides to PDF from the platform or can share them with a dedicate slide link to outside users to access.

To create the presentation lecture can be use PDF that already created and imported it to the platform. Using the PDF platform will create slides.

The presenter also can create a survey for users that can be answered by the users and submit throughout the platform. Also, the presenter can see the answer and review the users from the platform.

The lecture can create programming assignment and then users can follow the task to do the coding with use of any IDE for complete the assignment. After finish, the assignment users can submit the coding files to the platform and debug through the platform to find out which syntax errors have occurred. Also, the presenter can view each of users code assignment and check for syntax errors through the platform syntax error checker after that can fix coding errors and push back to users. Also, each of the students can share the code for debugging purpose throughout the platform.

8.2 Conclusion

Building location independent presentation platform for programming has been achieved successfully. By analyzing how the lectures use this platform to do a presentation, we can conclude that we have provided an efficient and effective solution.

To provide this solution I have to go through various technologies to find out the best technology should use to succeed in this project. Because of this research, it improved my researching skills coding skills as well as writing skills.

This platform will be very much use full in future because the outcome of the lecture will have increased. At the end of the lecture students has completed working code, so it is easy to study after they go to their homes.

As a conclusion location, independent presentation platform for programming research is achieved its goals and success.

8.3 Future work

Even though this platform provides this much of functionalities, it needs to be developed further. Because it has only PHP and Java support when transferring the files to students, so there are some limitations. A project can have only one PHP and Java file. In the future, we can develop it to have multiple files to one project. using this tool can add a prediction function to predict how much time it will take to improve students coding skills by using data mining techniques. However, it is also important to consider several software engineering aspects such as software security [31] and code duplications [32]. As mentioned in [33], our solution can be used to assess the quality of undergraduate and postgraduate projects in the future.

8.4 Summary

This chapter concludes the overall solution achieved by location independent presentation platform for programming platform done at the faculty of IT at the University of Moratuwa.

References

- [1] Y. Peng, C. Wu, S. Peng, and J. Yue, "A Simple Presentation Tool Based on Web Pages," in *Knowledge Acquisition and Modeling Workshop, 2008. KAM Workshop 2008. IEEE International Symposium on*, 2008, pp. 715–718.
- [2] "4 ½ Reasons Your Presentations are Boring! - PCS." [Online]. Available: <https://www.cmaa.org/PcsTemplate.aspx?id=36839>. [Accessed: 17-Jun-2017].
- [3] A. K. Jagannathan, S. Suresh, V. G. Venkataaraman, and S. M. R., "A Canvas-Based Presentation Tool Using Scalable Vector Graphics," 2012, pp. 149–152.
- [4] M. Kokorceny and A. Bodnarova, "Desktop presentation tool for e-learning support and the high-speed UDP datagram loss," in *e-Learning and e-Technologies in Education (ICEEE), 2012 International Conference on*, 2012, pp. 21–25.
- [5] F. Zaffar, G. Kedem, and A. Gehani, "Paranoid: A Global Secure File Access Control System," 2005, pp. 322–332.
- [6] Y. Wang, "Characterizing Developer Behavior in Cloud Based IDEs," 2017, pp. 48–57.
- [7] "Google Docs, Sheets, and Slides," *Wikipedia*. 23-May-2018.
- [8] "Presentation Software | Online Presentation Tools | Prezi." [Online]. Available: <https://prezi.com/>. [Accessed: 26-May-2018].
- [9] "Ludus · Limitless creativity for your slides." [Online]. Available: <https://ludus.one/>. [Accessed: 26-May-2018].
- [10] "FileZilla - The free FTP solution." [Online]. Available: <https://filezilla-project.org/>. [Accessed: 26-May-2018].
- [11] "Cyberduck | Libre server and cloud storage browser for Mac and Windows with support for FTP, SFTP, WebDAV, Amazon S3, OpenStack Swift, Backblaze B2, Microsoft Azure & OneDrive, Google Drive and Dropbox." [Online]. Available: <https://cyberduck.io/>. [Accessed: 26-May-2018].
- [12] M. Rahmat, S. Shahrani, R. Latih, N. F. M. Yatim, N. F. A. Zainal, and R. A. Rahman, "Major Problems in Basic Programming that Influence Student Performance," *Procedia - Soc. Behav. Sci.*, vol. 59, pp. 287–296, Oct. 2012.
- [13] K. Ala-Mutka, "PROBLEMS IN LEARNING AND TEACHING PROGRAMMING," p. 13.
- [14] S. Espana-Boquera, D. Guerrero-Lopez, A. Hermida-Perez, J. Silva, and J. V. Benlloch-Dualde, "Analyzing the learning process (in Programming) by using data collected from an online IDE," 2017, pp. 1–4.
- [15] N. js Foundation, "Node.js," *Node.js*. [Online]. Available: <https://nodejs.org/en/>. [Accessed: 26-May-2018].
- [16] "npm." [Online]. Available: <https://www.npmjs.com/>. [Accessed: 10-Nov-2017].
- [17] "MongoDB for GIANT Ideas," *MongoDB*. [Online]. Available: <https://www.mongodb.com/index>. [Accessed: 10-Nov-2017].
- [18] "JSON," *Wikipedia*. 20-May-2018.
- [19] "AngularJS," *Wikipedia*. 18-May-2018.
- [20] "file-system," *npm*. [Online]. Available: <https://www.npmjs.com/package/file-system>. [Accessed: 26-May-2018].
- [21] "Localtunnel ~ Expose yourself to the world." [Online]. Available: <https://localtunnel.github.io/www/>. [Accessed: 26-May-2018].
- [22] "HTML5," *Wikipedia*. 24-May-2018.
- [23] "jQuery," *Wikipedia*. 14-May-2018.

- [24] “Express.js,” *Wikipedia*. 18-May-2018.
- [25] “Electron (software framework),” *Wikipedia*. 03-Apr-2019.
- [26] “Overview — Bitbucket.” [Online]. Available: <https://bitbucket.org/dashboard/overview>. [Accessed: 26-May-2018].
- [27] “Visual Studio Code - Code Editing. Redefined.” [Online]. Available: <https://code.visualstudio.com/>. [Accessed: 26-May-2018].
- [28] “WAMP, MAMP and LAMP Stack : Softaculous AMPPS.” [Online]. Available: <https://www.ampps.com/>. [Accessed: 26-May-2018].
- [29] “Amazon EC2.” [Online]. Available: <https://aws.amazon.com/ec2/>. [Accessed: 26-May-2018].
- [30] Mobatek, “MobaXterm free Xserver and tabbed SSH client for Windows.” [Online]. Available: <https://mobaxterm.mobatek.net/>. [Accessed: 04-Apr-2019].
- [31] Wijesiriwardana, C., & Wimalaratne, P. (2017, May). On the detection and analysis of software security vulnerabilities. In 2017 International Conference on IoT and Application (ICIOT)(pp. 1-4). IEEE.
- [32] Wijesiriwardana, C., & Wimalaratne, P. (2017, November). Component-based experimental testbed to facilitate code clone detection research. In 2017 8th IEEE International Conference on Software Engineering and Service Science (ICSESS) (pp. 165-168). IEEE.
- [33] Fernando, O. N. N., Wanniarachchi, V. U., Fernandopulle, Y., Wijesiriwardana, C., & Wimalaratne, P. (2017). Software Quality Assessment Tool: Source code evaluation tool for undergraduate and post graduate projects. In International Conference on Computer Science Education Innovation & Technology (CSEIT). Proceedings (pp. 29-33). Global Science and Technology Forum.

1 Appendix A

1.1 File Project Initialization and Update to User Engine

```
141 }
142
143 export function initialize(req, res) {
144   let slideId = req.body.slideId;
145   let userId = req.body.userId;
146   let fileId = req.body.fileId;
147
148   console.log("*****", slideId, userId, fileId)
149
150   Users.findOne({ _id: userId })
151     .then(response => {
152
153       let directoryname = response.name.replace(/s/g, '') + "_" + slideId + "_" + shortid.generate();
154
155       return new Promise((resolve, reject) => {
156
157         UserFtp.find({ _ftp: fileId, _user: userId, _slide: slideId })
158           .then(userFtp => {
159             Ftp.findOne({ _id: fileId })
160               .then(responseFtp => {
161                 console.log("***creator***", {
162                   path: response.directory,
163                   directory: directoryname
164                 })
165                 if(!_isEmpty(userFtp)){
166                   axios.post(response.access_url+"/file/create-directory", {
167                     path: response.directory,
168                     directory: directoryname
169                   })
170                   .then(folderCreateSuccess => {
171                     console.log("*** folder create success ***", folderCreateSuccess);
172                     return axios.post(response.access_url+"/file/create", {
173                       file: response.directory+"\\'+directoryname+'\\'+responseFtp.filename+'."+responseFtp.ext,
174                       content: responseFtp.code
175                     })
176                   })
177                   .then(fileCreate => {
178                     console.log("****created file****", fileCreate)
179                     return resolve(fileCreate);
180                   })
181                   .catch(err => {
182                     reject(err);
183                   })
184                 }else{
185                   reject('project already initialized');
186                 }
187               })
188             })
189         })
190       })
191     .then(() => {
192       createUserFtp({
193         _user: userId,
194         _slide: slideId,
195         _ftp: fileId,
196         folderName: directoryname
197       }, res)
198     })
199   })
200 }
```

Figure 11 - Project Initialization Engine

```

export function updateUsersFile(req, res){
  let slideId = req.body.slideId;
  let userId = req.body.userId;
  let fileId = req.body.fileId;
  let updatedCode = req.body.updatedCode;

  Users.findOne({ _id: userId })
    .then(response => {
      return new Promise((resolve, reject) => {
        Ftp.findOne({ _id: fileId })
          .then(files => {
            UserFtp.findOne({ _ftp: fileId, _user: userId, _slide: slideId })
              .then(userfiles => {
                if(!_isEmpty(userfiles)){
                  let codeWithoutHtml = AllHtmlEntities.decode(updatedCode);
                  codeWithoutHtml = codeWithoutHtml.replace(/<br\s*\/?>/gi, '\n');

                  return axios.post(response.access_url+"/file/create", {
                    file: response.directory+'\\'+userfiles.folderName+"\\'+files.filename+'."+files.ext,
                    content: codeWithoutHtml
                  })
                }else{
                  reject("cannot find the user file.");
                }
              })
            })
          .then(responseFromProcess => {
            console.log("**** user file update success ****",responseFromProcess);
            resolve("file update successful.");
          })
          .catch(err => {
            console.log("**** user file update failed ****",err);
            reject(err);
          })
        })
      })
    .catch(err => {
      reject(err);
    })
  })
  .then(respondWithResult(res))
  .catch(handleError(res));
}

```

Figure 12 - Project file update engine

2 Appendix B

2.1 Create Tunnel Access

```
static onListening() {
  let addr = Main.server.address();
  let bind = (typeof addr === 'string') ? `pipe ${addr}` : `port ${addr.port}`;
  console.log(`Listening on ${bind}`);
  var tunnel = localtunnel(addr.port, function (err, tunnel) {
    if (err) {
      console.log('could\'t create local tunnel to slide it!');
      return false;
    }
    Main.tunnel = tunnel.url;
    console.log("Tunnel ----- ", tunnel.url);
  });
  tunnel.on('close', function () {
    console.log("Tunnel Closed!");
  });
}
```

Figure 13 - Initialize tunnel access

2.2 Get local files and transfer to presentation

```
export function getFile(req, res) {
  readFilePromise(req.body.file).then(function (data) {
    let file = {};
    file.mime = mime.lookup(req.body.file);
    file.contents = data;
    file.name = path.basename(req.body.file);
    file.directory = path.dirname(req.body.file);

    res.status(200).json({ message: 'success', file: file });
  })
  .catch(e => {
    res.status(400).json({ message: 'error reading file!', body: req.body, error: e });
  })
}
```

Figure 14 - get file and transfer to presentation

3 Appendix C

3.1 Select working directory

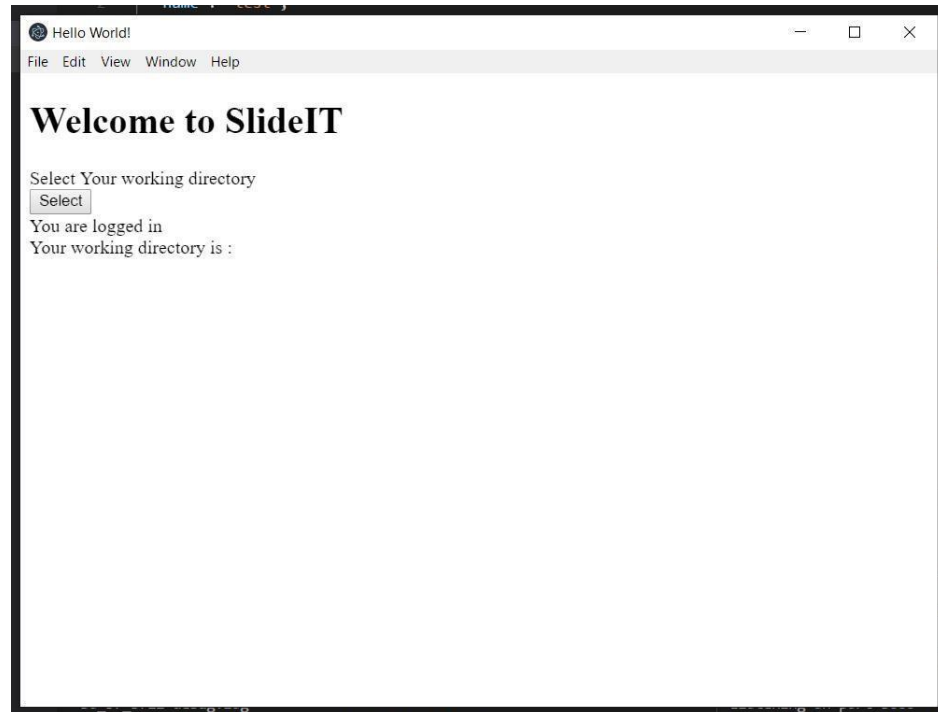


Figure 15 - File Authorizer Before Select

3.2 Enter the user logins of the system

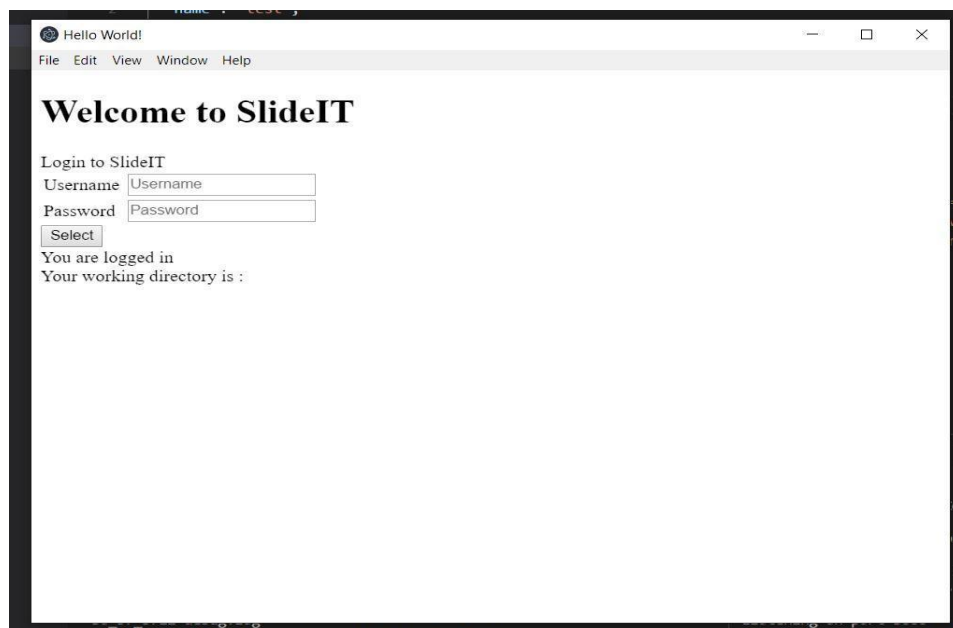


Figure 16 - File Authorizer after select directory

3.3 View list of online users and projects

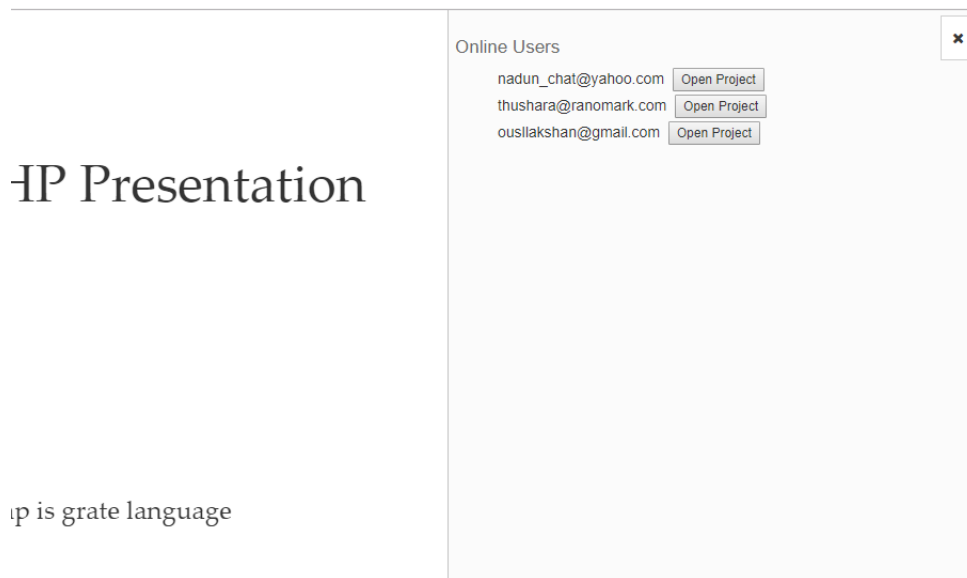


Figure 17 - View of online users

3.4 Presenter creating programming assessments for users

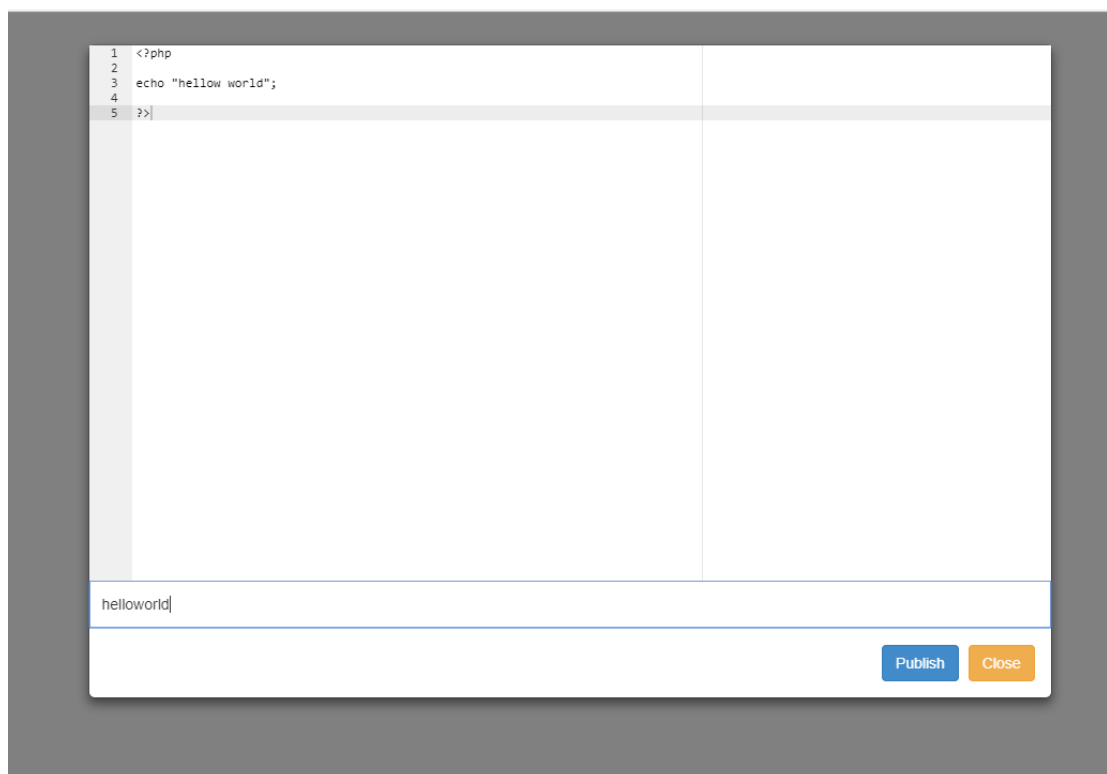


Figure 18 - creating assessment

3.5 Assessments appear on the students who logged in the system

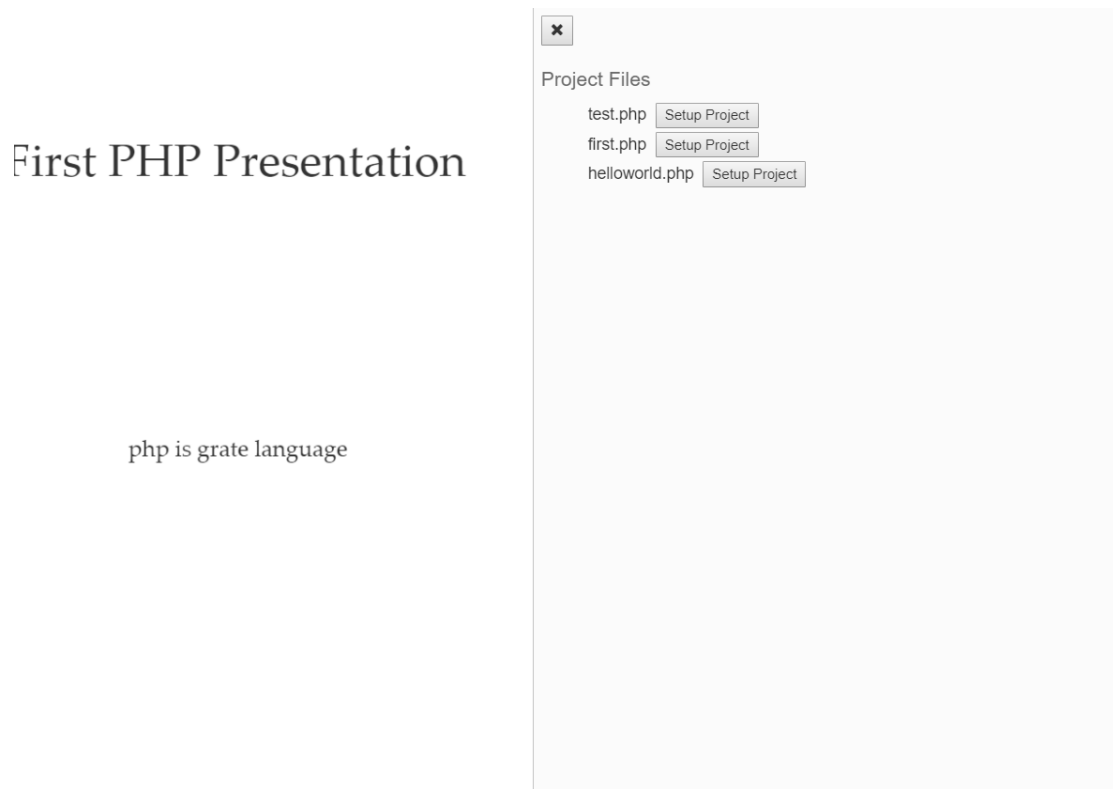


Figure 19 - available assessment files

3.6 Set up the project to their pc


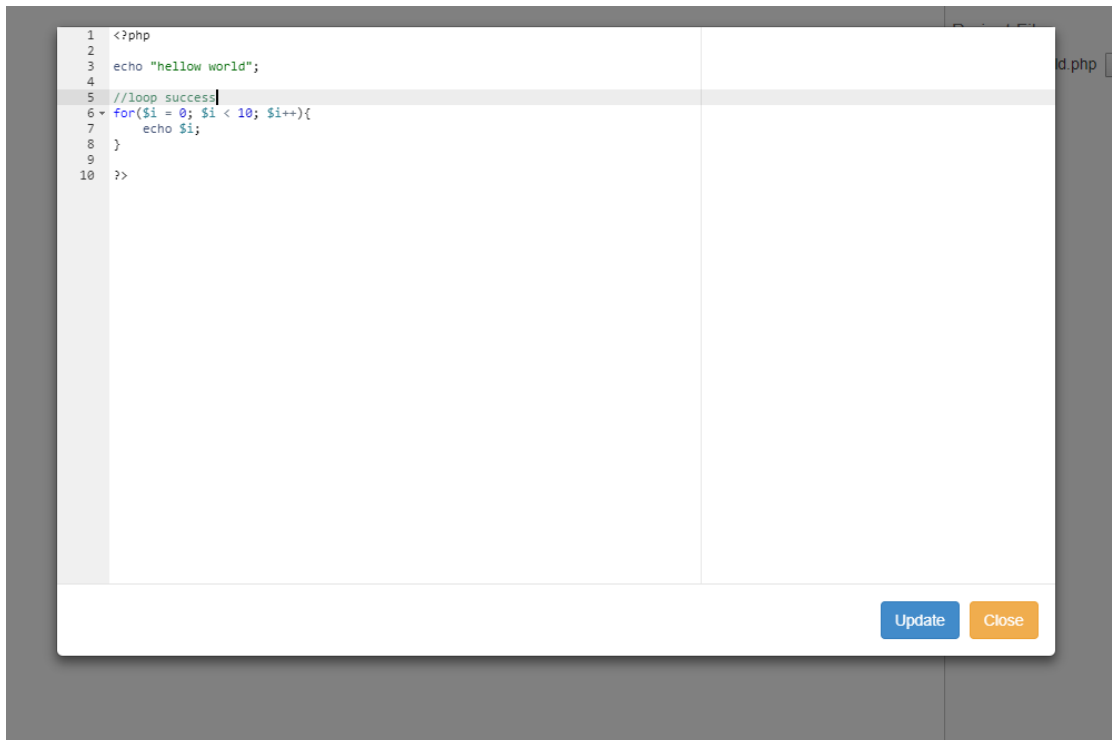
Organise	New	Open	Select
C > Local Disk (C:) > xampp > htdocs > nadun_5b05d7582d6a7ca81273f4b1_H1KZ8F7kQ			
Name	Date modified	Type	Size
 helloworld.php	5/24/2018 5:53 AM	PHP File	1 KB

Figure 20 - setup project file

3.7 Users source code for programming assessment



A screenshot of a code editor window. The editor has a light gray background and a white code area. The code is written in PHP and is as follows:

```
1 <?php
2
3 echo "hellow world";
4
5 //loop success
6 for($i = 0; $i < 10; $i++){
7     echo $i;
8 }
9
10 ?>
```

The code is displayed with line numbers on the left. The editor has a blue 'Update' button and an orange 'Close' button at the bottom right.

Figure 21 - student's code without syntax errors

3.8 Can see the status of the programming code with errors



A screenshot of a code editor window showing a syntax error. The code is the same as in Figure 21, but there is a red 'x' icon next to line 10. An 'Error List' dialog box is open on the left, showing the error message: 'Parse Error : syntax error, expecting ')' on line 10'. The code in the editor is as follows:

```
1 <?php
2
3 echo "hellow world";
4
5 //loop success
6 for($i = 0; $i < 10; $i++){
7     echo $i;
8 }
9
10 ?>
```

The error list dialog box has a 'Close' button at the bottom right.

Figure 22 - code with error and error listing